

Provider uptake of extragenital screening for gonorrhea and chlamydia in a cohort of Air Force members with incident HIV diagnosis

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Abstract

The prevalence of *Neisseria gonorrhoea* (GC) and *Chlamydia trachomatis* (CT) is higher at extragenital anatomic sites among men who have sex with men (MSM) with HIV infection. Although national guidelines recommend that all MSM with HIV infection undergo screening for extragenital sexually transmitted infections (EG-STIs), uptake is low in many primary care settings. We evaluated EG-STI screening by primary care providers (PCPs) for US Air Force (USAF) members with incident HIV infection. All USAF members with incident HIV infection who received initial HIV specialty care with Infectious Disease (ID) providers at Brooke Army Medical Center from 2016 to 2018 (n = 98) were included. A retrospective chart review was conducted to evaluate STI screening performed by PCPs within 1 week of HIV diagnosis compared to screening at entry into ID care. Demographic, clinical, laboratory and behavioral risk data were collected. STI screening included GC/CT EG-STIs, urethral GC/CT, syphilis, and hepatitis B and C. Patients were predominantly male (98%) with a median age of 26 (IQR 23, 32) years at HIV diagnosis. A previous history of STIs was reported in 53 (54%) patients and the majority of males self-identified as MSM (66%) or bisexual (23%). The median time from HIV diagnosis to ID evaluation was 26 days (IQR 9, 33). PCPs performed any STI screening in 61 (62%) patients. EG-STI screening was conducted in 3 (3%) patients overall and in (3%) MSM/bisexuals. A total of 31 (32%) patients had missed STIs; the majority due to EG-STIs of the rectum (59%) and pharynx (19%). All EG-STIs would have been missed by urethral GC/CT screening alone. EG-STI screening uptake was low among PCPs evaluating USAF members with incident HIV infection. Underutilization of EG-STI screening can result in missed infections and forward transmission of GC/CT. Barriers to low uptake need to be explored.

Abbreviations: CT = *Chlamydia trachomatis*, EG-STI = extragenital sexually transmitted infection, GC = *Neisseria Gonorrhoea*, HIV = human immunodeficiency virus, ID = Infectious Disease, IQR = interquartile range, MEU = Medical Evaluation Unit, MSM = men who have sex with men, MSW = men who have sex with women, PCP = primary care provider, STI = sexually transmitted infection, US = United States, USAF = United States Air Force.

Keywords: chlamydia, gonorrhea, human immunodeficiency virus, military, public health, sexually transmitted infections

1. Introduction

Neisseria gonorrhoea (GC) and *Chlamydia trachomatis* (CT) are nationally notifiable sexually transmitted infections (STIs) that

pose a significant public health threat and have an increasing incidence in the United States (US). In the US, GC cases increased by 10 percent from 2019 to 2020, while reported cases of chlamydia declined 13 percent. However, chlamydial infections are

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The data that support the findings of this study are available from a third party, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are available from the authors upon reasonable request and with permission of the third party.

Due to the sensitive nature and higher likelihood of identification of patients, which could realistically include adverse impact to HIV infected United States Air Force personnel still in service and possible insurability and employability impacts, data cannot be made publicly available. For questions about data, contact the Brooke Army Medical Center Public Affairs Office at usarmy.jbsa.medcom-bamc.mbx.bamc-irb@mail.mil.

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usually asymptomatic and identified through screening which was interrupted during the SARS-CoV-2 pandemic.^[1] GC/CT extra-genital sexually transmitted infections (EG-STI) of the pharynx and rectum are largely asymptomatic, thereby avoiding detection and facilitating forward transmission of disease.^[2] Reported rates of EG-STI can range from 5% to 20% varying by site, pathogen, and patient population.^[2,3] Men who have sex with men (MSM) and people living with human immunodeficiency virus (HIV) infection are high-risk populations for acquisition of EG-STI. Therefore, national guidelines recommend that all MSM with HIV infection undergo EG-STI screening at entry into care and at least annually.^[4] Despite these recommendations EG-STI uptake remains suboptimal.^[5,6] Nonadherence to guideline recommendations and continued circulation of asymptomatic infections in high-risk populations may facilitate the spread of STIs and intensify the impact of this significant public health concern.

In the United States Air Force (USAF), the incidence of notifiable diseases is routinely tracked, and the USAF has also witnessed an increased incidence similar to the US population at large.^[7] However, aside from annual GC/CT testing in females and biannual HIV testing in all active-duty service members, little is known about STI screening practices by primary care providers (PCPs), particularly EG-STIs. In order to address this gap, we evaluated EG-STI screening by PCPs for USAF members with incident HIV infection.

2. Methods

USAF members diagnosed with HIV infection typically receive initial evaluation and counseling by a military PCP. All active duty USAF patients, stationed around the world, are then referred to the USAF HIV Medical Evaluation Unit (MEU) in San Antonio, Texas for comprehensive evaluation and counseling by an Infectious Disease (ID) specialist. The investigators conducted a retrospective case series of all active duty USAF members with incident HIV diagnosis evaluated at the MEU between January 1, 2016 and December 31, 2018. Exclusion criteria included: lack of evaluation at the MEU, missing clinical data within the electronic medical record, and USAF members in the Reserve component since their care is received in the civilian sector. Clinical, demographic, and laboratory data were extracted from the entirety of the patient's electronic medical record. Clinical data included a previous diagnosis of STI, CD4 count, and HIV viral load at the time of diagnosis. Demographic data included the patient's age at diagnosis, gender, rank, race, and ethnicity. Data regarding sexual practices were extracted from case report forms created at time of initial MEU evaluation per clinic protocol. This study was approved by the Army Public Health Center's Institutional Review Board (#14-311.M4).

The primary outcome of interest was the comparison of EG-STI screening performed by PCP within 1 week of HIV diagnosis to EG-STI screening at entry into ID care. Secondary outcomes were comparison of all STI testing between PCP and ID during the same time period. Sexually transmitted infections considered in the review were GC/CT EG-STI of the pharynx and rectum, GC/CT of the urethra, syphilis, and hepatitis B and C. The proportion of patients who received screening for STIs by PCP was assessed. STIs were classified as "missed" if they were tested for and detected at ID evaluation but were not screened for by a PCP at the time of HIV diagnosis. In patients with a history of syphilis infection, patients were interpreted as missed if the treating ID provider ordered syphilis directed antibiotic therapy at the time of initial intake. Descriptive analyses were performed in Microsoft Excel version 16.60.

While a case series design is prone to bias, we have tried to minimize this by including all cases identified in the 3-year time period and not a sample. Furthermore, we restricted sample size to those who receive comprehensive care in the military health

system and excluded members who do not, i.e., members in reserve service. The longitudinal availability of electronic health records for each individual in the military health care system and the universal care provided in this system facilitated comprehensive reviews of each case and comparability across cases. Lastly, standardized case report forms ensured uniformity in data collection of sexual risk practice and demographic information and comparability across cases.

3. Results

A total of 139 patients were diagnosed with HIV infection during the time period of interest. Ten patients were Air Force Reservists, 2 patients separated from active service without undergoing evaluation at the HIV MEU, and 29 patients were missing clinical or demographic information in the electronic medical record and were excluded. Ninety-eight patients with incident HIV infection were evaluated at the HIV MEU during the study period. Patients were predominantly male (98%) with a median age of 26 years (IQR 23, 32) at the time of HIV diagnosis (Table 1). There were no significant differences in self-reported race and Hispanic ethnicity was reported by 17% of patients. The majority of patients were MSM (66%), followed by bisexual (23%), and a minority were men who have sex with women (MSW, 9%). The 2 female patients reported sexual contact exclusively with men. Beginning from their entry into military service, a previous history of STIs before HIV diagnosis was observed in over half (54%) of patients.

PCPs screened 61 (62%) individuals for any STI prior to ID specialty evaluation and diagnosed 12 infections. Overall, 52 (53%) individuals were screened for urethral GC/CT, while only 3 (3%) patients were screened for EG-STIs (Table 2). Hepatitis B and C screening was performed in 51 (52%) individuals and 54 (55%) patients were tested for syphilis. Every patient received complete STI screening at entry into ID specialty care. A total of

Table 1
Characteristics of 98 active duty Air Force members with incident HIV infection, 2016 to 2018.

Characteristics	N (%) or median (IQR)
Number, N	98 (100.0)
Median age (yr)	26 (23, 32)
Gender	
Male	96 (97.9)
Female	2 (2.1)
Rank	
Enlisted	90 (91.8)
Officer	8 (8.2)
Race	
Black	36 (36.7)
White	36 (36.7)
Asian/Native Hawaiian/Pacific Islander	4 (4.1)
Other/unknown	22 (22.4)
Ethnicity	
Hispanic	17 (17.3)
Non-Hispanic	66 (67.3)
Other/unknown	15 (15.3)
Sexual practices ^a	
MSM	65 (66.3)
Bisexual	22 (22.5)
MSW	9 (9.2)
Laboratory markers at HIV diagnosis	
Median CD4 count (cells/ μ L)	535 (392.5, 680)
Median viral load (\log_{10} copies/mL)	4.52 (4.1, 5.0)
Previous history of any STI	53 (54.1)

HIV = human immunodeficiency virus, IQR = interquartile range, MSM = men who have sex with men, MSW = men who have sex with women, STI = sexually transmitted infection.

aMale data only, both females reported having sex with men exclusively.

Table 2
Frequency and results of sexually transmitted infection screening among 98 newly diagnosed HIV-infected active duty United States Air Force service members, 2016 to 2018.

STI	Screening by PCP at HIV diagnosis		Screening at ID specialty evaluation*	STIs missed at HIV diagnosis
	Tested, N (%)	Positive result, N (%)	Positive result, N (%)	N (%)
Urethral GC/CT	52 (53.1)	3 (5.8)	2 (2.0)	2
Pharyngeal GC/CT	3 (3.1)	1 (33.0)	7 (7.1)	7
Rectal GC/CT	3 (3.1)	0 (0.0)	22 (22.4)	22
Syphilis	54 (55.1)	8 (14.8)	14 (14.3)	6
HBV	51 (52.0)	0 (0.0)	0 (0.0)	0
HCV	51 (52.0)	0 (0.0)	0 (0.0)	0
Any STI screening	61 (62.2)	12 (36.1%)	45 (45.9)	37†

GC/CT = *Neisseria gonorrhoea/Chlamydia trachomatis*, HBV = hepatitis B virus, HCV = hepatitis C virus, HIV = human immunodeficiency virus, ID = Infectious Disease, PCP = primary care provider, STI = sexually transmitted infection.

*All 98 patients were tested for all listed STIs.

†Occurred in 31 patients.

37 STIs were missed; the majority due to EG-STIs of the rectum 22 (59%) and pharynx 7 (19%). All EG-STIs would have been missed by urethral GC/CT screening alone. The median time from notification of HIV diagnosis to EG-STI testing was 26 days (IQR 9, 33). No infections of hepatitis B or C were found in the study population.

4. Discussion

This study showed that PCP directed STI testing was performed in approximately two-thirds of patients in a high-risk population with multiple risk factors, including young age, predominantly MSM, a new diagnosis of HIV, and approximately half reporting a history of STIs. For the primary outcome of interest only 3 patients underwent EG-STI testing and when complete STI testing was performed an additional 37 STIs were diagnosed, nearly 80% of which were EG-STI thereby highlighting the importance of adherence to guideline recommendations.

The low rates of EG-STI testing within the military health system is concerning as the bulk of patient care for HIV positive service members comes from PCPs. However, these low rates have also been reported in civilian populations. For example, the HIV Outpatient Study reviewed STI testing practices within their multisite cohort of people living with human immunodeficiency virus MSM and found only 3.8% and 7.8% of patients received pharyngeal and rectal testing, respectively.^[8] Patients were more likely to be tested if seen in private clinics which suggests that an increase in testing may be associated with an increase in cost and therefore refused. However, Weiser et al^[6] reviewed differences in STI services between clinics that received Ryan White HIV/AIDS Program funds and those clinics who did not receive Ryan White HIV/AIDS Program funds and found that EG-STI testing was performed in approximately 20% of cases regardless of the site of care. Our study further argues against purely cost driven motivations given that all active-duty members have universal healthcare coverage with no out-of-pocket laboratory costs. PCP's lack of familiarity with sexual health recommendations may be a more likely explanation. Quality improvement initiatives have been shown to increase rates of EG-STI testing when utilizing targeted physician training and pre-clinic patient surveys on STI risk assessment for physician review.^[9]

Prevalence of rectal EG-STI in the study population was consistent with rates in the literature though rates of pharyngeal EG-STIs were slightly lower. In a United States Army ID clinic, inclusion of EG-STI testing revealed a 31.1% prevalence of rectal and 15.6% prevalence of pharyngeal EG-STI.^[10] Similarly, previously studies on USAF HIV-infected members reported a 11.1% and 21.9% rate of rectal and pharyngeal EG-STIs,

respectively.^[11] While rates of prevalence vary based on the population and clinic setting investigated, the lower rate of pharyngeal EG-STIs found may be secondary to differences in our patient population's sexual practices. Aside from gender of sexual partners, no additional sexual practice information was collected.

The potential for EG-STIs to be overlooked by solely utilizing urethral testing is a common phenomenon that was notable with our data. We did not find any concomitant urethral and EG-STI cases. A Dutch study evaluating EG-STI testing found that 54% of GC infections were oropharyngeal only and, in a Pittsburgh-based study following men with reported receptive anal intercourse, 79.6% of CT and 76.5% of GC were detected only in the pharynx or rectum.^[12,13] Our higher rates may be secondary to a small sample size and patient sexual practices but serves to highlight the pitfalls on reliance of single site testing. The implications of single site STI testing are greater than a failure to detect occult infection. Rectal and ulcerative STIs have been shown to potentiate the forward transmission of HIV through a complicated interplay of multiple factors: increased HIV viral shedding, breakdown of mucosal barriers, and circulation among a high risk sexual network.^[14] Consequently, EG-STIs have been linked to an increased risk of future HIV infection with rates ranging from two to seventeen fold, varying by STI, geographic location, and population studied.^[15] In this context the presence of EG-STIs can serve as not only indicators of high HIV risk but also be utilized as a tool to prompt clinicians to offer HIV preventative services such as counseling, condoms, and HIV pre-exposure prophylaxis.

There are several limitations to this study. This was a retrospective medical record review and as such it was not possible to investigate PCP motivations not to screen for additional STIs. It is possible that testing was performed outside of the military health system and would therefore been missed on review. However, finding nearly one third of the population to have an occult STI argues against testing via civilian laboratory services. While commonly used in clinical practice for many years, e.g.-GC/CT nucleic acid amplification testing did not become approved by the US Food and Drug Administration until May 2019.^[16] Reluctance to utilize an unapproved platform may have contributed to low rates of EG-STI testing. Additionally, it is possible that PCPs make use of EG-STI testing in non-HIV positive patients. However, the relatively low rate of GC/CT urethral NAAT, syphilis, and viral hepatitis testing, all of which were US Food and Drug Administration approved, argues towards a deeper issue. Air Force policy dictating that all HIV patients undergo ID evaluation may have influenced PCPs to leave additional testing to specialists. This study only evaluates STI testing practices for the HIV positive population, a minority group. However, evaluating practice patterns in patients with incident HIV infection guarantees that all PCPs

were aware that their patients were part of a high-risk sexual network. Finally, spontaneous clearance of STIs has been shown to occur in 6-33% of cases with evidence that clearance is more likely to occur as time progresses.^[17] The duration of time from HIV diagnosis to eventual STI testing may have led to an underestimation of the true burden of infections.

5. Conclusion

EG-STI screening uptake was low among PCPs evaluating USAF members with incident HIV infection. Underutilization of EG-STI screening can result in missed infections and forward transmission of both GC/CT as well HIV. Future studies aimed at barriers to low uptake should be undertaken. Similarly, studies on STI screening in less high-risk populations may also provide novel insight into sexual health services within the military health system. Continued education and training of PCPs may be necessary to improve uptake of EG-STI screening.

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