Title

Prevalence of and Factors Associated With Genital and Extragenital Chlamydia and Gonorrhea Among Transgender Women in HIV Care in the United States, 2005 to 2016.

Journal

Sexually transmitted diseases, 48(6)

ISSN

0148-5717

Authors

Van Gerwen, Olivia T
Tamhane, Ashutosh
Westfall, Andrew O
et al.

Publication Date

2021-06-01

DOI

10.1097/olq.0000000000001335

Peer reviewed

Published in final edited form as:

Sex Transm Dis. 2021 June 01; 48(6): 410–416. doi:10.1097/OLQ.0000000000001335.

Prevalence of and Factors Associated With Genital and Extragenital Chlamydia and Gonorrhea Among Transgender Women in HIV Care in the United States, 2005 to 2016

Olivia T. Van Gerwen, MD, MPH[*], **Ashutosh Tamhane, MD, PhD, MSPH**[*], **Andrew O. Westfall, PhD**[*], **Michael J. Mugavero, MD, MHSc**[*], **Heidi M. Crane, MD, MPH**[†], **Richard D. Moore, MD**[‡], **Maile Karris, MD**[§], **Katerina Christopoulos, MD, MPH**[¶], **Julia C. Dombrowski, MD, MPH**[†], **Kenneth H. Mayer, MD**[‖], **Jeanne Marrazzo, MD, MPH**[*], **Jodie Dionne-Odom, MD**[*]

[*]Department of Medicine, Division of Infectious Diseases, University of Alabama at Birmingham, Birmingham, AL

[†]Department of Medicine, Division of Allergy and Infectious Diseases, University of Washington, Seattle, WA

[‡]Department of Medicine, Division of Infectious Diseases, Johns Hopkins University, Baltimore, MD

[§]Department of Medicine, Division of Infectious Diseases, University of California at San Diego, San Diego

[¶]Department of Medicine, Division of Infectious Diseases, University of California at San Francisco, San Francisco, CA

[‖]Fenway Health and Department of Medicine, Division of Infectious Diseases, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, MA

Abstract

Background: Data on testing rates and prevalence of and factors associated with genital and extragenital chlamydia and gonorrhea among transgender women with HIV in the United States are limited.

Methods: This retrospective cohort analysis included transgender women living with HIV enrolled in the US Centers for AIDS Research Network of Integrated Clinical Systems cohort between January 2005 and December 2016 with chlamydia or gonorrhea testing performed in HIV clinic. The primary outcome was a positive test result for chlamydia or gonorrhea at urogenital or extragenital (rectal/pharyngeal) sites. Factors associated with infection were examined using logistic regression and generalized estimating equations to account for multiple tests per woman.

Results: Among 312 transgender women in HIV care, 252 (81%) were tested for chlamydia or gonorrhea at least once. Annual testing rates were low: 23% to 53% at genital sites and 24% to 47% at extragenital sites. A total of 88 infections were detected, and 22% of women (55/252) had

Correspondence: Olivia T. Van Gerwen, MD, MPH, Division of Infectious Diseases, University of Alabama at Birmingham, 703 19th St South, ZRB 204, Birmingham, AL 35233. oliviavangerwen@uabmc.edu.

at least one positive test result. Most infections occurred at extragenital sites (80% of chlamydia and 82% of gonorrhea positive test results). Factors associated with infection in an adjusted model were as follows: age 18 to 29 years compared with ≥50 years (adjusted odds ratio [aOR], 7.6; 95% confidence interval [CI], 1.8–31.2), CD4 count >350 compared with CD4 <200 (aOR, 5.5; 95% CI, 1.2–25.1), and higher engagement in HIV care (aOR, 2.2; 95% CI, 1.0–4.5).

Conclusions: Among transgender women living with HIV testing rates for chlamydia and gonorrhea are inadequate, particularly at extragenital sites where most infections occur.

An estimated 1.4 million individuals in the United States identify as transgender, meaning that their gender identity or expression differs from the sex they were assigned at birth.[1] HIV prevalence in transgender women (TGW) is high compared with cisgender men and women.[2] According to a recent meta-analysis, approximately 14% of TGW in the United States are living with HIV; 44% of whom are Black and 26% were Hispanic/Latinx.[3] The high burden of HIV infection in TGW has been associated with commercial sex work, condomless anal intercourse, and multiple sexual partners.[4] Because HIV disproportionately affects TGW of color, racial discrimination and socioeconomic factors also contribute to disparities in HIV prevalence.[5]

The prevalence of chlamydia (CT) and gonorrhea (GC) among TGW is as high as 13%, regardless of HIV status.[6,7] US data regarding CT/GC prevalence by anatomic site are limited. However, one multisite US study documented a high prevalence of CT (14% overall) and GC (13% overall) among TGW, with 86% and 81%, respectively, presenting with an extragenital CT or GC infection in the setting of negative urogenital testing in the same visit.[8] For adults living with HIV, the US Centers for Disease Control and Prevention recommends CT/GC screening at entry to care and at least annually among those who are sexually active.[9] In terms of frequency and site, the Centers for Disease Control and Prevention recommends sexually transmitted infection (STI) screening in TGW “on the basis of behavioral history and sexual practices.”[9] Limited evidence suggests that CT/GC screening rates in TGW are low, particularly at extragenital sites; Pitasi et al.[8] described only 58.9% of TGW being testing for CT and 62.1% being tested for GC during a 3.5-year observation period.

CT and GC have been on the rise in the general population in the US in recent years.[10] Because incident STIs are a risk factor for HIV transmission, STI screening and testing among people living with HIV is essential to limiting the spread of STIs and preventing transmission of HIV.[11] This study aimed to define the testing rates and prevalence of and factors associated with CT/GC positivity at genital and extragenital sites among TGW who access HIV care in the United States. We hypothesized that testing rates would be low and that extragenital infections would be more common than urogenital infections.

MATERIALS AND METHODS

Study Design and Population

In this retrospective cohort study, we examined data related to adult TGW living with HIV and enrolled in the US Centers for AIDS Research Network of Integrated Clinical Systems (CNICS). The CNICS is a prospective clinical cohort of approximately 32,000

adults engaged in HIV care at 8 academic sites. Cohort data are collected from multiple data sources including the electronic medical record and a clinical assessment of patient-reported outcomes (PROs) at routine HIV clinical care visits.[12–14] The CNICS clinical assessment was integrated at each site, but the start year varied (median 2009) so was not available for all participants throughout the entire study period. A comprehensive set of clinical data undergoes data-quality assessment via a central data repository that is updated quarterly. Transgender women were identified based on their self-reported gender identity that was documented either in the medical record or through PRO responses. CT/GC testing and treatment was provided as part of routine clinical care. This study was limited to TGW living with HIV who had at least 1 HIV clinic visit between January 1, 2005, and December 31, 2016. For annual testing and positivity rates, patients "in care" with at least 1 clinic visit in a given calendar year or a CT or GC test available were included, regardless of whether or not they reported sexual activity at the time of their visit.

Study Outcomes

The primary study outcome was a positive CT/GC test result at any site. This was defined as a positive nucleic acid amplification test (NAAT) result for CT/GC or culture for GC performed on urine or samples collected from rectal, oropharyngeal, or "unspecified" sites. Because of specimen coding at the time of order entry, some specimens collected from extragenital sites were designated as site "unspecified." In discussion with providers at the CNICS sites, many of these samples were collected from the rectal site, but the limited information available did not allow for specification as rectal or pharyngeal samples. For the main analysis, specimens collected from unspecified sites were grouped as extragenital. We calculated the prevalence of CT and/or GC among those tested by anatomic site and overall annually and during the most recent calendar year in care for each woman. For women with more than 1 positive CT/GC test result in a year, we used the first positive test result in the analysis of annual rates. Models were created for the primary outcome of CT/GC positivity at any site during the study period.

Covariates of Interest

We examined the following baseline demographic and clinical characteristics: age (continuous and categorical), race (black, white, other/unknown), ethnicity (Hispanic/non-Hispanic), CNICS study site (Case Western University, Fenway at Harvard University, Johns Hopkins University, University of Alabama at Birmingham, University of California San Diego, University of California San Francisco, University of North Carolina at Chapel Hill, University of Washington), hepatitis B (HBsAg), and hepatitis C (hepatitis C virus antibody) testing. The most proximal CD4 count (in cells per millimeters cubed) and HIV viral load (in copies per milliliter) ±365 days from the date of positive CT/GC test result were included. Median number of years in care, median number of HIV visits per year, and year of initial CNICS HIV visit were also evaluated. Engagement in HIV care was defined as at least 2 HIV visits separated by 90 days within a 12-month calendar period. CT/GC during the past 12 months according to clinic laboratory data was included as relevant STI history.

We assessed sexual risk behavior and substance (alcohol, illicit drugs) use through information obtained from the clinical assessment of PROs using the closest assessment to

the diagnosis of CT/GC (±365 days). Components of sexual risk behavior assessed included partner HIV status, number of sexual partners, sex in the setting of drugs or alcohol, and condom use all in the last 6 months. The sexual risk behavior and substance use variables are collected every 6 months as a part of the PRO assessment. Drug use was assessed using the Alcohol, Smoking, and Substance Involvement Screening Test instrument, and responses were categorized as current (i.e., in the last 3 months), prior, or never use for illicit opioids, methamphetamines, cocaine/crack, and marijuana.[15,16] The validated Alcohol Use Disorders Identification Test instrument was used to assess alcohol intake in the past 12 months.[17] We use the term problem alcohol use to refer to the category of high-risk use defined as an Alcohol Use Disorders Identification Test score of ≥4.

STI Testing

Although the vast majority of CT/GC testing in this study was via NAAT, GC testing performed by culture was included. Nucleic acid amplification testing was performed for CT and GC simultaneously on most specimens. Screening practices at each CNICS site varied throughout the study period, and some women had multiple tests performed in the same 12-month period.

Statistical Analysis

The main study outcome was a positive CT/GC test result at any site. Women could have more than 1 positive test result during follow-up, but a woman was counted only once during the year for the calculation of annual positivity rates. Sociodemographics and clinical characteristics were described for the most recent year in care. Patients were grouped into those tested for either CT or GC versus those not tested; those tested were subgrouped into positive versus negative NAAT results. Continuous variables were described as medians with quartiles (Q1, first quartile; Q3, third quartile). Categorical variables were described as frequencies and percentages. Data are described at the patient level (those with positive CT/GC test result at any time or year-wise), test level (repeated tests in the same patient), and site level (e.g., urogential and extragenital). Therefore, the denominators differ. Test of trend in testing and positivity rates was performed using the Cochran-Armitage test. To minimize selection bias caused by loss to follow-up, each year in care was analyzed separately for outcomes of interest. This allowed for variability in associations over time. Associations were examined using univariate and multivariable logistic regression with generalized estimating equations and autoregressive correlation structure to account for women who contributed data in more than 1 calendar year. Associations for the multivariable model were chosen a priori based on other studies,[18,19] data completeness, and collinearity considerations. They included the following: age, race, CNICS site, engagement in HIV care, number of sex partners, HIV viral load, and CD4 count. Patient-reported outcomes had the most missing data and imputation was not performed, so these variables were excluded from the models. Associations were reported using crude and adjusted odds ratios (aOR) and 95% confidence intervals (CIs), respectively. Statistical significance was set at 0.05 (2-tailed). Analysis was conducted using SAS statistical software, version 9.4 (Cary, NC).

Ethics

All patients enrolled in the CNICS study completed written informed consent. Institutional review boards at each study site approved the cohort protocol. This study was approved by the University of Alabama at Birmingham.

RESULTS

Participant Characteristics

Overall, 5122 women were identified from the CNICS cohort between 2005 and 2016. From this sample, 315 patients were identified in the data set as TGW, of which 312 were "in care" and were included in the analysis; they contributed a total of 1694 person-years and represented 6.1% of the overall sample. The characteristics of these 312 women during their most recent year in care are shown in Table 1, stratified by CT/GC testing and positivity at the time of their most recent test. The median age was 42 years (Q1, 34 years; Q3, 49 years), median CD4 count was 461 cells/mm^3 (Q1, 277 cells/mm^3; Q3, 669 cells/mm^3), and 46% of TGW were Black. A majority (83%) of TGW had 1 to 5 sex partners in the past 6 months, 13.8% reported current cocaine use, and 18.9% reported problem alcohol intake. A total of 149 (48%) of 312 women were tested for CT or GC during their most recent year in care, and 23 (15%) of 149 tested positive.

CT/GC Testing Rates

Among 312 TGW, 252 (81%) were tested for CT/GC at least once during the study period; 250 were tested for GC and CT and 2 TGW were only tested for GC. Regarding site, 218 (87%) were tested at the urogenital site, 155 (62%) at the rectal site, 139 (55%) at the pharyngeal site, and 125 (47%) at the "unspecified" extragenital site (Fig. 1). Of these 252 TGW, 50 (20%) were only tested at a single anatomical site throughout the duration of the study, with 41 of those only receiving urogenital testing.

Figure 2 shows the annual testing rates of CT/GC by anatomical site and overall from 2005 to 2016. Of note, only 17 tests were performed, with 40 to 69 tests performed per year during the 2006–2016 period. Between 2006 and 2016, annual CT/GC testing rates overall ranged from 38% to 64%: 23% to 53% at the urogenital site and 24% to 47% at extragenital sites. These testing rates were similar to CT/GC testing rates in cisgender women followed up in CNICS.

Among the 252 women tested for CT/GC during the study period, 22% (55/252) had at least 1 positive test result and there were 146 positive test results (62 GC and 84 CT); overall, 1949 tests for CT and 1950 tests for GC were conducted. The vast majority of GC testing was NAAT (97%), with only 67 GC culture tests performed. Annual CT/GC positivity rates among women tested are shown in Figure 3. The positivity rate ranged from 4.5% in 2007 to 23.1% in 2005. With the exception of the data from 2005, a significant increase over time ($P = 0.02$) was noted.

Sites of CT/GC Infection

Most CT/GC infections were found in women who were tested more frequently (3 or more times) during the study period. Most CT/GC infections occurred at extragenital sites (Fig. 4). Of the 84 positive CT test results (in 67 patients) detected during the study, 80% (67/84) were from extragenital sites. For GC, of the 62 positive test results (in 49 patients), 82% (51/62) were from extragenital sites.

Factors Associated With CT/GC Infection

Table 2 shows results for the univariate and multivariable models assessing for relationships between clinical characteristics and annual CT/GC positivity throughout the study. In multivariable modeling, age was found to be a strongly and significantly associated with infection. The youngest age group (18–29 years) had the highest odds of positivity (aOR, 7.6; 95% CI, 1.8–31.2) followed incrementally by the age groups 30–39 and 40–50 years (aORs, 4.4 [95% CI, 1.2–16.1] and 3.5 [95% CI, 1.2–10.1], respectively) compared with age >50 years. Black race was not associated with CT/GC positivity (aOR, 0.8; 95% CI, 0.4–1.6). Engagement in care was associated with CT/GC positivity (aOR, 2.2; 95% CI, 1.0–4.5) and higher CD4 count (aOR, 5.5 [95% CI, 1.2–25.1], for CD4 >350 vs. <200 cells/mm^3).

DISCUSSION

In a large US cohort of TGW in HIV care, fewer than 50% were tested for CT or GC during their most recent year in care and only 81% were tested during long-term follow-up. On average, testing rates were higher at urogenital sites compared with extragenital sites, but the vast majority of infections occurred at extragenital sites. There was evidence of a trend for more CT/GC testing over time ($P < 0.01$). The rate of CT/GC positivity among those screened was high. Younger age, higher engagement in care, and higher CD4 count were independently associated with CT/GC infection in TGW with HIV.

The low testing rates at extragenital sites are concerning because study findings support existing literature citing high extragenital CT/GC burden among TGW.[8] The finding of high positivity at the rectal site coupled with undertesting is of particular concern because rectal infections are often asymptomatic and require routine testing to detect.[9] This may also have implications for HIV transmission given that condomless receptive anal intercourse and transactional sex are common among TGW.[4,20] HIV transmission to sexual partners may increase up to 4-fold in the setting of STI coinfection.[21] In our study, 62% of TGW were tested for CT/GC at the rectal site, although this testing is likely an underestimate because 47% of TGW had testing at “unspecified” sites, many of which were likely rectal swabs. These data underscore missed opportunities in HIV clinics for detecting rectal CT/GC infection in TGW and preventing transmission of CT/GC and HIV to their sex partners.

Low STI testing rates among TGW in this cohort may be multifactorial. Many providers caring for TGW may not be taking adequate social histories in a gender-affirming, nonthreatening way that would lead them to pursue appropriate multisite CT/GC testing. Patients may also be reticent to discuss their sexual practices with providers because of the

mistrust many transgender individuals experience in the health care setting.[22] In addition, more invasive STI testing (i.e., rectal swabs) in HIV clinic may be challenging because of discomfort, with providers collecting anogenital samples or swab collection logistics (i.e., tucking genitalia). TGW were also included in this analysis regardless of reported sexual activity. Therefore, TGW who were not sexually active may not have been offered screening or may have declined it. As noted previously, the testing rates for TGW were similar to those of cisgender women followed up in CNICS, indicating that factors unrelated to gender identity may also be contributing to low testing rates.

Regarding annual positivity rates, our study found the average CT/GC positivity rate to be 11 per 100 person-years among TGW receiving HIV care during 832 person-years of testing. This finding is consistent with existing literature regarding CT/GC positivity among TGW. One Australian cohort study found that of 326 TGW tested for CT and GC at genital and extragenital sites, 10% were diagnosed with CT and 9% were diagnosed with GC.[23] These data suggest that CT/GC is prevalent in TGW despite low STI testing rates.

Regarding factors associated with infection, age is consistently associated with CT/GC in this study and most others. The association seen between CT/GC positivity and engagement in care and high CD4 counts is likely due to testing bias. TGW who attend HIV clinic and are adherent to their antiretroviral medications have higher CD4 and more opportunities for STI testing compared with TGW who do not access care regularly. It should not be assumed that the burden of CT and GC is higher among TGW engaged in care. For TGW who are not actively engaged in HIV care, testing for CT/GC at every opportunity remains important.

Our study had limitations. First, correctly identifying women who identified as transgender from clinical care data is difficult. This was true in CNICS particularly in the early years of the study period before all sites had instituted a gender identity instrument in the CNICS clinical assessment of PROs. Therefore, it is likely that we missed some TGW who were misclassified as male. Second, we were unable to categorize samples from unspecified sites as rectal or pharyngeal samples. This limited our ability to draw conclusions about the relative rates of testing and positivity at these sites. Third, some associations of interest (sexual behaviors, drug use) were not included in multivariable models because of missing data.

In conclusion, TGW living with HIV are disproportionately impacted by CT/GC infection, particularly at extragenital sites. One essential component to improving sexual health outcomes in TGW living with HIV may be to improve provider training about respectful medical care to keep patients engaged in care so they can be tested routinely for CT/GC at all exposure sites.

Conflict of Interest and Sources of Funding:

This work is supported by the Agency of Healthcare Research and Quality (T32HS013852 to O.T.V.G.), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (K23HD090993 to J.C.D.), the National Institute of Alcohol Abuse and Alcoholism (U01AA020792 to H.M.C.), the National Institute of Drug Abuse (R01DA047045 to H.M.C.), and the National Institute of Allergy and Infectious Diseases of the National Institutes of Health (CFAR P30 A1027767 [University of Alabama at Birmingham], P30 AI094189 [Johns Hopkins University], P30 AI027757 [University of Washington], U01 DA036935 [R.D.M.], CNICS R24 A1067039).

K.C. has received investigator-initiated grant support from Gilead Sciences and has served as a medical advisory board member for Gilead. J.C.D. has conducted research funded by Hologic. All other authors have no relevant disclosures.

K.C. has received investigator-initiated grant support from Gilead Sciences and has served as a medical advisory board member for Gilead. J.C.D. has conducted research funded by Hologic. All other authors have no relevant disclosures.

REFERENCES

1. Flores A, Herman JL, Gates GJ, et al.. How Many Adults Identify as Transgender in the United States? Los Angeles, CA: The Williams Institute, 2016. Available at: https://williamsinstitute.law.ucla.edu/wp-content/uploads/How-Many-Adults-Identify-as-Transgender-in-the-United-States.pdf. Accessed August 20, 2020.
2. Van Gerwen OT, Jani A, Long DM, et al. . Prevalence of sexually transmitted infections and human immunodeficiency virus in transgender persons: A systematic review. Transgend Health 2020; 5:90–103. [PubMed: 32656353]
3. Becasen JS, Denard CL, Mullins MM, et al. . Estimating the prevalence of HIV and sexual behaviors among the US transgender population: A systematic review and meta-analysis, 2006–2017. Am J Public Health 2019; 109:e1–e8.
4. Herbst JH, Jacobs ED, Finlayson TJ, et al. Estimating HIV prevalence and risk behaviors of transgender persons in the United States: A systematic review. AIDS Behav 2008; 12:1–17. [PubMed: 17694429]
5. Clark H, Babu AS, Wiewel EW, et al. . Diagnosed HIV infection in transgender adults and adolescents: Results from the national HIV surveillance system, 2009–2014. AIDS Behav 2017; 21:2774–2783. [PubMed: 28035497]
6. Shover CL, DeVost MA, Beymer MR, et al. . Using sexual orientation and gender identity to monitor disparities in HIV, sexually transmitted infections, and viral hepatitis. Am J Public Health 2018; 108(S4):S277–S283. [PubMed: 30383431]
7. Pitasi MA, Oraka E, Clark H, et al. . HIV testing among transgender women and men—27 states and Guam, 2014–2015. MMWR Morb Mortal Wkly Rep 2017; 66:883–887. [PubMed: 28837547]
8. Pitasi MA, Kerani RP, Kohn R, et al. . Chlamydia, gonorrhea, and human immunodefiency virus infection among transgender women and transgender men attending clinics that provide sexually transmitted disease services in six US cities: Results from the Sexually Transmitted Disease Surveillance Network. Sex Transm Dis 2019; 46:112–117. [PubMed: 30278030]
9. Workowski KA. Centers for Disease Control and Prevention sexually transmitted diseases treatment guidelines. Clin Infect Dis 2015; 61(Suppl 8):S759–S762. [PubMed: 26602614]
10. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2018. Atlanta, GA: U.S. Department of Health and Human Services, 2019.
11. Secco AA, Akselrod H, Czeresnia J, et al. . Sexually transmitted infections in persons living with HIV infection and estimated HIV transmission risk: Trends over time from the DC cohort. Sex Transm Infect 2020; 96:89–95. [PubMed: 31907326]
12. Hutton HE, Lesko CR, Li X, et al. . Alcohol use patterns and subsequent sexual behaviors among women, men who have sex with men and men who have sex with women engaged in routine HIV care in the United States. AIDS Behav 2019; 23:1634–1646. [PubMed: 30443807]
13. Mimiaga MJ, Reisner SL, Grasso C, et al. . Substance use among HIV-infected patients engaged in primary care in the United States: Findings from the Centers for AIDS Research Network of Integrated Clinical Systems cohort. Am J Public Health 2013; 103:1457–1467. [PubMed: 23763417]
14. Kitahata MM, Rodriguez B, Haubrich R, et al. . Cohort profile: The Centers for AIDS Research Network of Integrated Clinical Systems. Int J Epidemiol 2008; 37:948–955. [PubMed: 18263650]
15. Humeniuk R, Ali R, Babor TF, et al. . Validation of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). Addiction 2008; 103:1039–1047. [PubMed: 18373724]
16. Wolff N, Shi J. Screening for substance use disorder among incarcerated men with the Alcohol, Smoking, Substance Involvement Screening Test (ASSIST): A comparative analysis of computer-

administered and interviewer-administered modalities. J Subst Abuse Treat 2015; 53:22–32. [PubMed: 25659203]

17. Fujii H, Nishimoto N, Yamaguchi S, et al. . The Alcohol Use Disorders Identification Test for Consumption (AUDIT-C) is more useful than pre-existing laboratory tests for predicting hazardous drinking: A cross-sectional study. BMC Public Health 2016; 16:379. [PubMed: 27165437]
18. Harder E, Thomsen LT, Frederiksen K, et al. . Risk factors for incident and redetected chlamydia trachomatis infection in women: Results of a population-based cohort study. Sex Transm Dis 2016; 43:113–119. [PubMed: 26760181]
19. Do AN, Hanson DL, Dworkin MS, et al. . Risk factors for and trends in gonorrhea incidence among persons infected with HIV in the United States. AIDS 2001; 15:1149–1155. [PubMed: 11416717]
20. Shannon CL, Keizur EM, Fehrenbacher A, et al. . Sexually transmitted infection positivity among adolescents with or at high-risk for human immunodeficiency virus infection in Los Angeles and New Orleans. Sex Transm Dis 2019; 46:737–742. [PubMed: 31453926]
21. Galvin SR, Cohen MS. The role of sexually transmitted diseases in HIV transmission. Nat Rev Microbiol 2004; 2:33–42. [PubMed: 15035007]
22. Kosenko K, Rintamaki L, Raney S, et al. . Transgender patient perceptions of stigma in health care contexts. Med Care 2013; 51:819–822. [PubMed: 23929399]
23. Callander D, Cook T, Read P, et al. . Sexually transmissible infections among transgender men and women attending Australian sexual health clinics. Med J Aust 2019; 211:406–411. [PubMed: 31468530]

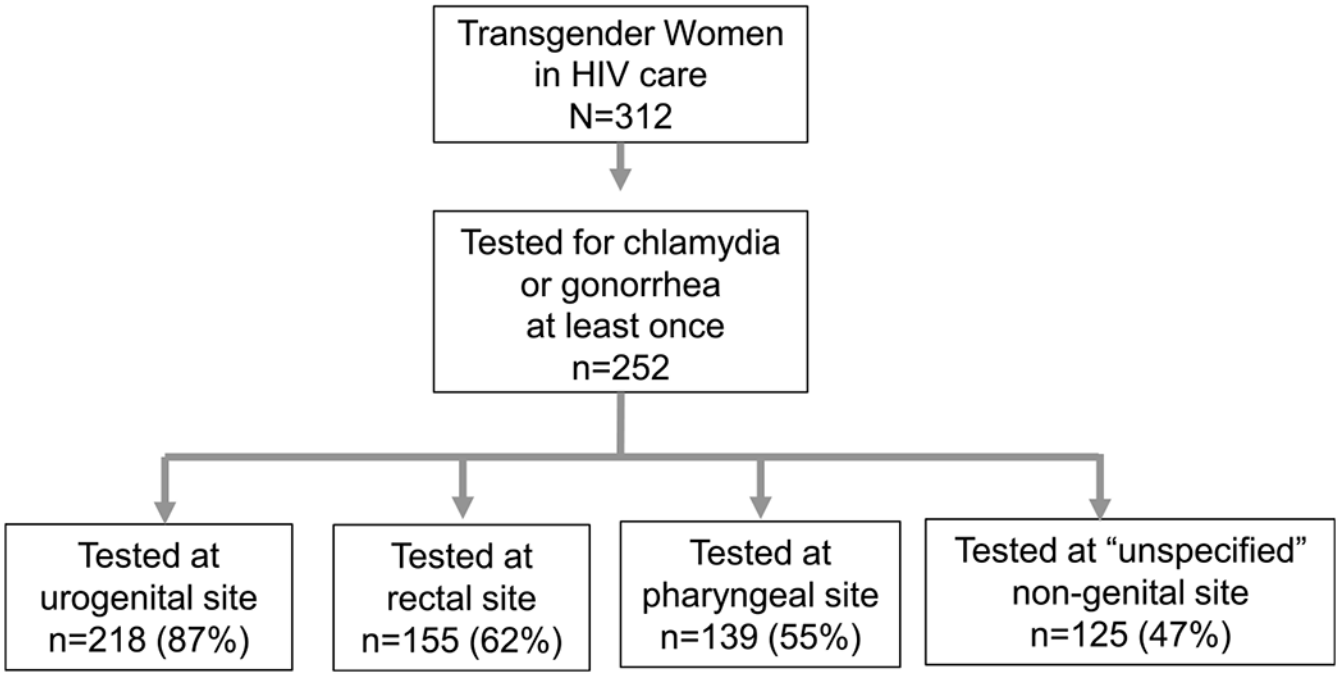

Figure 1.

Flow diagram of chlamydia and gonorrhea testing among transgender women with HIV in a US CFAR CNICS cohort, 2005 to 2016. CFAR indicates Centers for AIDS Research; CNICS, Centers for AIDS Research Network of Integrated Clinical Systems.

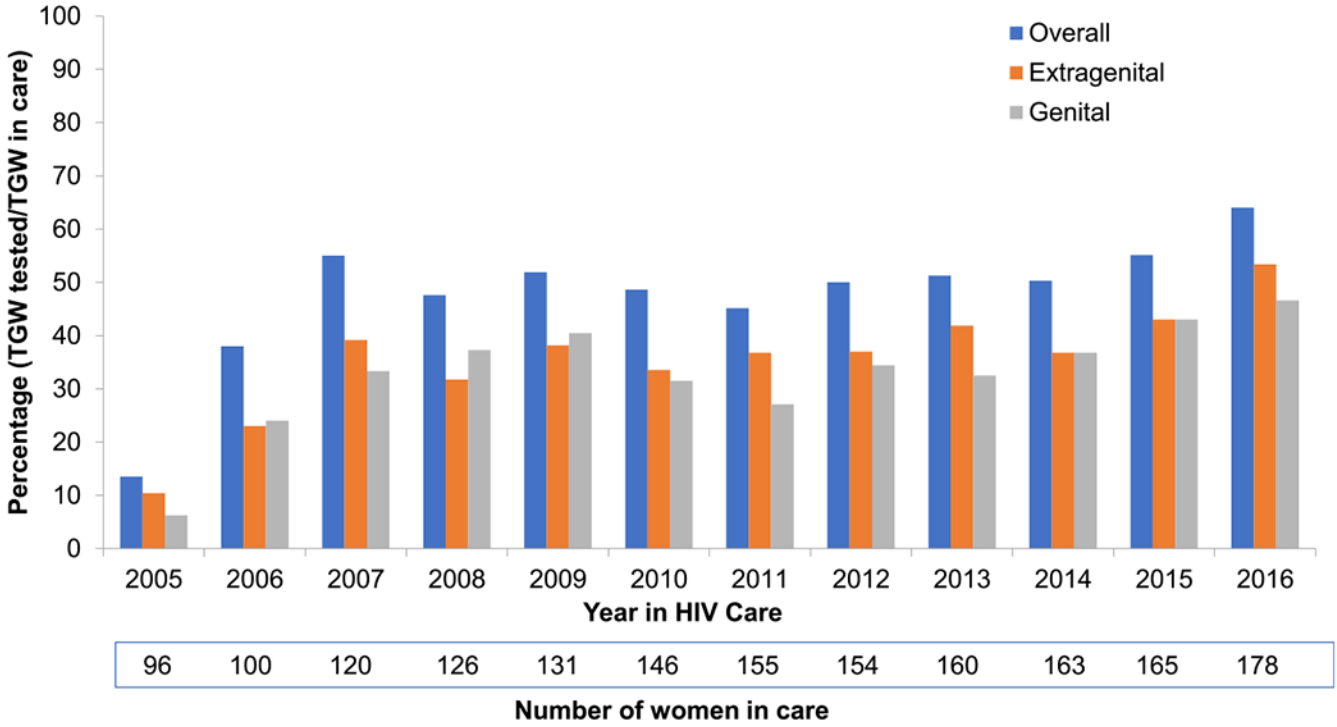

Figure 2.

Annual testing rates of chlamydia/gonorrhea by anatomical site among transgender women with HIV in a US CFAR CNICS cohort, 2006 to 2016. CFAR indicates Centers for AIDS Research; CNICS, Centers for AIDS Research Network of Integrated Clinical Systems.

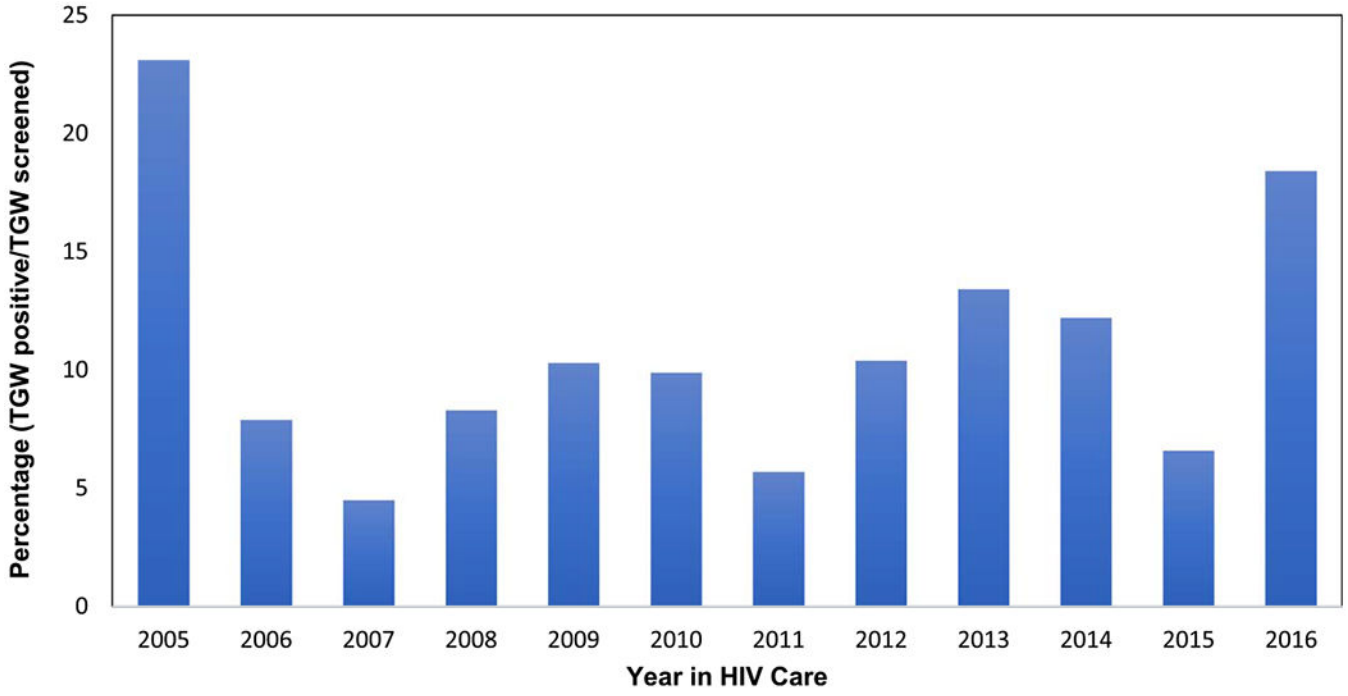

Figure 3.

Annual positivity rates of chlamydia/gonorrhea among transgender women with HIV in a US CFAR CNICS cohort, 2006 to 2016. CFAR indicates Centers for AIDS Research; CNICS, Centers for AIDS Research Network of Integrated Clinical Systems; TGW, transgender women.

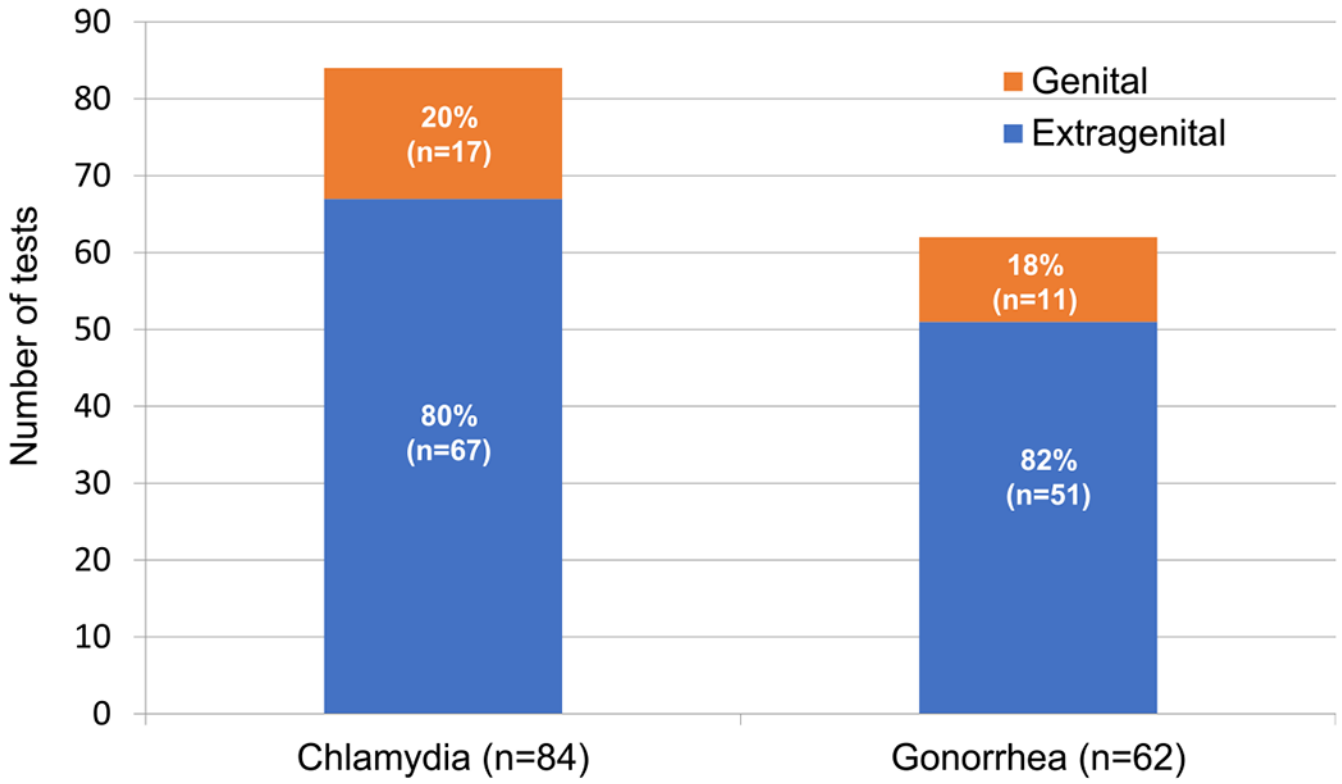

Figure 4.

Number of positive chlamydia and gonorrhea tests by anatomical site among transgender women with HIV in a US CFAR CNICS cohort, 2005 to 2016. CFAR indicates Centers for AIDS Research; CNICS, Centers for AIDS Research Network of Integrated Clinical Systems.

TABLE 1.

Characteristics of Transgender Women With HIV in a US CFAR CNICS Cohort (2005–2016) According to CT/GC Detection, Based on Last Year in Care[*] (n = 312)

	TGW Tested (n = 149)		
Demographic Characteristics	**TGW With Positive CT/GC Testing[†] (n = 23)**	**TGW With Negative CT/GC Testing (n = 126)**	**TGW Not Tested (n = 163)**
Median age (IQR), y	37 (29–45)	40 (31–50)	43 (36–51)
Age, y			
18–29	6 (26.1)	23 (18.3)	12 (7.4)
30–39	8 (34.8)	39 (31.0)	46 (28.2)
40–49	9 (39.1)	31 (24.6)	57 (35.0)
≥50	0 (0)	33 (26.2)	48 (29.5)
Race			
Black	7 (30.4)	53 (42.1)	84 (51.5)
White	8 (34.8)	43 (34.1)	54 (33.1)
Other/unknown	8 (34.8)	30 (23.8)	25 (15.3)
Hispanic ethnicity	10 (43.5)	36 (28.6)	38 (23.3)
CNICS site			
A	4 (17.4)	24 (19.1)	12 (7.4)
B	3 (13.0)	15 (11.9)	21 (12.9)
C	6 (26.1)	31 (24.6)	24 (14.7)
D	5 (21.7)	32 (25.4)	69 (42.3)
E	2 (8.7)	7 (5.6)	11 (6.8)
F	3 (13.0)	15 (11.9)	10 (6.1)
G	0 (0)	0 (0)	3 (1.84)
H	0 (0)	2 (1.6)	13 (8.0)
HIV and comorbidities			
Year of initial CNICS HIV visit			
1995–2004	5 (21.7)	27 (21.4)	60 (36.8)
2005–2010	5 (21.7)	46 (36.5)	60 (36.8)
2011–2016	13 (56.5)	53 (42.1)	43 (26.4)
Median no. years with HIV visits (IQR)	5 (2–9)	5 (3–8)	4 (2–8)

Demographic Characteristics	TGW Tested (n = 149)		TGW Not Tested (n = 163)
	TGW With Positive CT/GC Testing† (n = 23)	TGW With Negative CT/GC Testing (n = 126)	
Engaged in HIV Care (HRSA HAB)	14 (60.9)	76 (60.3)	88 (54.0)
Median no. HIV visits in year (IQR)	3 (2–4)	3 (1–5)	3 (1–4)
Median CD4 count (IQR), cells/mm^3	578 (446–803)	536 (330–803)	411 (203–657)
CD4 count, cells/mm^3			
<200	1 (5.6)	13 (13.3)	35 (24.3)
200–350	1 (5.6)	16 (16.3)	26 (18.1)
>350	16 (88.9)	69 (70.4)	83 (57.6)
HIV viral load			
<500 copies/mL	13 (81.3)	78 (75)	103 (68.7)
≥500 copies/mL	3 (18.8)	26 (25)	47 (31.3)
Hepatitis B coinfection (HBsAg+)	1 (4.4)	11 (8.7)	12 (7.4)
Hepatitis C coinfection (HCV Ab+)	2 (8.7)	34 (27.0)	47 (28.8)
History of CT/GC in previous 12 mo	8 (34.8)	74 (58.7)	43 (26.4)
Sexual behaviors‡			
No. sex partners (n = 107)			
0	2 (16.7)	14 (25.5)	16 (40.0)
1	3 (25.0)	23 (418)	12 (30.0)
2–5	4 (33.3)	16 (29.1)	6 (15)
6–10	2 (16.7)	0 (0)	3 (7.5)
11–20	1 (8.3)	0 (0)	0 (0)
≥21	0 (0)	2 (3.6)	3 (7.5)
Largest no. max sex partners over last 3–6 mo ever (n = 155)			
<6	10 (58.8)	65 (85.5)	53 (85.5)
≥6	7 (41.2)	11 (14.5)	9 (14.5)
Sex partner characteristics (n = 76)			
HIV-positive	3 (37.5)	15 (41.7)	6 (18.8)
Consistent condom use (n = 85)	4 (44.4)	15 (37.5)	7 (19.4)
Sex after drugs/alcohol (n = 91)	2 (22.2)	10 (21.3)	6 (17.1)
Drug/alcohol use‡			

Sex Transm Dis. Author manuscript; available in PMC 2022 June 01.

Demographic Characteristics	TGW Tested (n = 149)		TGW Not Tested (n = 163)
	TGW With Positive CT/GC Testing† (n = 23)	TGW With Negative CT/GC Testing (n = 126)	
Cocaine/crack use (n = 109)			
Current	0 (0)	8 (14.6)	7 (16.7)
Prior	1 (8.3)	15 (27.3)	15 (35.7)
Never	11 (91.7)	32 (58.2)	20 (47.6)
Illicit opioid use (nonprescribed) (n = 105)			
Current	0 (0)	1 (2.0)	2 (4.8)
Prior	1 (8.3)	8 (16.0)	13 (31.0)
Never	11 (91.7)	42 (82.4)	27 (64.3)
Methamphetamine use (n = 108)			
Current	2 (18.2)	6 (10.9)	3 (7.1)
Prior	0 (0)	15 (27.3)	19 (45.2)
Never	9 (81.8)	34 (61.8)	20 (47.6)
Marijuana use (n = 109)			
Current	3 (25)	23 (41.1)	14 (34.2)
Prior	1 (8.3)	10 (17.9)	11 (26.8)
Never	8 (66.7)	23 (41.1)	16 (39.0)
Problem alcohol use (n = 111)	2 (16.7)	11 (19.3)	8 (19.1)

Data are presented as n (%) unless otherwise noted and refer to most recent year in care for time-dependent variables (age, most recent year in care, engagement in care, CD4, viral load, history of CT/GC in previous 12 months, PRO).

*Last year in which the patient had at least 1 clinic visit in a given year.

†At the time of most recent test.

‡Behavior data were collected as PROs and refer to the past 12 months for alcohol, past 6 months for sex, and past 3 months for drug use.

Ab+ indicates antibody positive; CFAR, Center for AIDS Research; CNICS, Centers for AIDS Research Network of Integrated Clinical Systems; CT, *Chlamydia trachomatis*; GC, *Neisseria gonorrhoeae*; HCV, hepatitis C virus; HIV, human immunodeficiency virus; HRSA HAB, Health Resources and Services Administration HIV/AIDS Bureau; IQR, interquartile range; PRO, patient-reported measure and outcome; TGW, transgender women.

TABLE 2.

Factors Associated With CT/GC Infection in Transgender Women With HIV in a US CFAR CNICS Cohort (2005–2016; n = 88)

Variable	Crude* OR (95% CI)	*P*	Adjusted* OR (95% CI)	*P*
Age, y				
18–29	5.54 (1.71–17.98)	<0.01	7.55 (1.83–31.21)	<0.01
30–39	4.00 (1.39–11.54)	0.01	4.38 (1.19–16.14)	0.03
40–50	3.92 (1.89–8.16)	<0.01	3.51 (1.22–10.08)	0.02
>50	Reference		Reference	
Race				
White	Ref		Ref	
Black	0.82 (0.39–1.69)	0.58	0.79 (0.39–1.62)	0.53
Other/unknown	2.07 (0.97–4.40)	0.06	1.22 (0.53–2.77)	0.64
CNICS site				
A	Reference		—	—
B	0.97 (0.32–2.95)	0.96	Not included	N/A
C	1.10 (0.39–3.09)	0.86	—	—
D	0.80 (0.29–2.26)	0.68	—	—
E	1.11 (0.32–3.88)	0.87	—	—
F	1.12 (0.34–3.72)	0.85	—	—
IVDU	0.64 (0.21–1.95)	0.43		
Engaged in HIV Care (HRSA HAB)	1.60 (0.93–2.75)	0.09	2.17 (1.04–4.52)	0.04
No. sex partners				
0	Reference		Not included	N/A
1	3.43 (0.87–13.49)	0.08	—	—
≥2	7.74 (1.94–30.90)	<0.01	—	—
HIV viral load >500 copies/mL	0.99 (0.57–1.70)	0.96	1.27 (0.73–2.22)	0.40
CD4 count, cells/mm^3				
<200	Reference		Reference	
200–350	3.45 (0.85–14.02)	0.08	3.88 (0.84–17.93)	0.08
>350	5.29 (1.31–21.35)	0.02	5.48 (1.20–25.07)	0.03

Among the 252 patients tested, overall 88 were positive for CT/GC when repeated infections within the same year were not recounted.

[*] Univariate and multivariable logistic regression with generalized estimating equations to account for women who contributed more than 1 infection per year.

CI indicates confidence interval; CFAR, Center for AIDS Research; CNICS, Center for AIDS Research Network of Integrated Clinical Systems; CT, *Chlamydia trachomatis*; GC, *Neisseria gonorrhoeae*; HIV, human immunodeficiency virus; HRSA HAB, Health Resources and Services Administration HIV/AIDS Bureau; IVDU, intravenous drug use; OR, odds ratio.

Sex Transm Dis. Author manuscript; available in PMC 2022 June 01.