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HIV Med. Author manuscript; available in PMC 2019 September 20.

Published in final edited form as:

HIV Med. 2015 April ; 16(4): 249–254. doi:10.1111/hiv.12192.

HIV status and viral loads among men testing positive for rectal gonorrhoea and chlamydia, Maricopa County, Arizona, USA, 2011–2013

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Abstract

Objectives—Men diagnosed with rectal gonorrhoea (GC) and chlamydia (CT) have engaged in unprotected receptive anal intercourse. We reviewed the HIV positivity and HIV viral loads (VLs) of men who had rectal GC and CT testing to evaluate potential HIV acquisition and transmission risk.

Methods—Rectal GC and CT testing data for men attending the Maricopa County STD clinic during the period from 1 October 2011 to 30 September 2013 were cross-matched with HIV surveillance data to identify men with HIV coinfection. We examined HIV status, HIV diagnosis date, and the values of VL collected nearest to the date of reported rectal infection.

Results—During the 2-year time period, 1591 men were tested for rectal GC and CT. Of the men tested, 506 (31.8%) were positive for GC (13.2%), CT (12.2%) or both (6.4%); 119 (23.5%) of those with rectal GC or CT were coinfected with HIV. Among the 275 men with HIV at the time of rectal testing, 54 (19.6%) had no reported VL; 63 (22.9%) had an undetectable VL (< 20 HIV-1 RNA copies/mL) and 158 (57.4%) had a detectable VL collected within 1 year of rectal diagnosis. Mean VL was higher among HIV and rectal GC/CT coinfected cases compared with men with HIV alone (174 316 *vs.* 57 717 copies/mL, respectively; $P = 0.04$).

Conclusions—Approximately one-third of men undergoing rectal testing were positive for GC or CT and one-quarter of men with rectal GC or CT also had HIV infection. Of the HIV-infected men tested for rectal GC or CT, more than half had a detectable VL collected near the time of rectal testing, demonstrating a risk for transmitting HIV.

Keywords

chlamydia; gonorrhea; HIV aquisition; HIV transmission; HIV; rectal infection; STD; viral load

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Introduction

Rectal gonorrhoea (GC) and chlamydia (CT) infections are markers for unprotected receptive anal intercourse and risk for HIV seroconversion among men who have sex with men (MSM) [1–4]. High positivity among asymptomatic MSM screened for rectal GC and CT has been reported in multiple US jurisdictions [5,6], demonstrating a risk for HIV acquisition. Increasing rates of sexually transmitted diseases (STDs) diagnosed among HIV-infected persons have been reported from multiple US jurisdictions [7–9] and suggest ongoing risk behaviour for HIV transmission [10].

Rectal screening for GC and CT is recommended by the Centers for Disease Control and Prevention (CDC) for sexually active MSM [11] and models suggest that it may be cost effective for preventing HIV infection [12]. However, few programmes are carrying out rectal testing, possibly because of the need to perform local validation of the procedure. Comprehensive STD screening, including rectal testing for HIV-infected and noninfected MSM, is a local and national priority, along with intensive behavioural counselling to reduce the likelihood of acquiring or transmitting these infections [11,13–15]. Comprehensive care should also include referral to and retention in clinical services that provide antiretroviral (ARV) treatment among those coinfected with HIV [16–18].

Maricopa County (Phoenix Area) is the fourth most populous county in the USA [19] and is a high-morbidity area for GC, CT and syphilis [20]. Maricopa County reports the highest annual number of new HIV diagnoses in Arizona and these occur disproportionately among MSM and African Americans [21]. Maricopa County has one publicly funded STD clinic providing services to a population of approximately 4 million [22,23]. Rectal testing for GC and CT was implemented at this clinic using nucleic acid amplification testing in October 2011. This test was offered to all men who reported recent receptive anal intercourse (RAI) during intake questioning. We evaluated men undergoing rectal testing at Maricopa County STD clinic for GC and CT, HIV infection and detectable HIV viral loads (VLs) to evaluate HIV acquisition and transmission risk.

Methods

Maricopa County began rectal GC and CT testing via clinician-collected rectal swabs on 1 October 2011. This analysis includes all men undergoing rectal testing from the inception of this procedure to 30 September 2013.

Specimen collection and testing

Since October 2011, men disclosing RAI during intake questioning at the Maricopa County STD clinic were offered rectal GC and CT testing. Refusal rates were not collected. Clinicians in the STD clinic performed rectal swab testing using the Aptima Nucleic Acid Amplification Test (NAAT) swab test kit (Hologic-GenProbe Inc., San Diego, CA, USA). Specimens were processed by the Maricopa County Public Health Laboratory (MCPHL) located in the same facility. MCPHL validated the off-label use of this testing methodology in 2010. Testing results were maintained in the electronic patient records system Leonardo*

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(LeonardoMD, Inc, San Diego, CA, USA). Rectal test results and demographic data including age and race were abstracted from this system.

HIV status and viral load results

Line-listed data for persons undergoing rectal GC/CT testing were cross-matched with the Arizona Department of Health Services HIV Surveillance database (eHARS) in order to identify HIV-infected persons. For persons identified as HIV-infected, we searched for VLs that were obtained within 1 year of rectal testing and selected results for the VL nearest to the date of rectal testing. VLs < 20 HIV-1 RNA copies/mL were considered undetectable. The number of days elapsed between the date of HIV diagnosis and rectal testing was calculated in order to determine the timing of HIV diagnosis relative to rectal testing and diagnosis of rectal infection. Cases with < 30 days elapsed between rectal and HIV diagnoses were considered coincident diagnoses and were categorized as 'HIV diagnosis at rectal test'.

Analysis

Data were imported into SAS (v 9.2; SAS Institute, Cary, NC). Correlates of rectal GC and CT infections and rectal GC/CT and HIV coinfection were calculated using χ^2 tests. Multivariate analysis of univariate correlates was performed using logistic regression. The *t*-test was used to compare mean VLs between HIV-infected men who had and did not have rectal infections using the Satterthwaite method for evaluating unequal variances.

Analysis of these data was performed for public health surveillance purposes and did not involve research or human subjects.

Results

Population

During the 2-year time period, there were a total of 26 538 men seen at the Maricopa County STD clinic. Of these, 1591 men (6.0%) were tested for rectal GC and CT (Table 1). Of those tested, 35.8% were aged 14-24 years; 35.1% were aged 25-34 years; 47.5% were white; 9.0% were African American; and 12.5% were Hispanic (Table 1).

Rectal testing and positivity

Of the men tested, 506 (31.8%) were positive for GC and/or CT: 13.2% for GC only, 12.2% for CT only, and 6.4% for both. The median age of men with rectal infection was 25 (range 16-62) years. Of the 570 men aged 14-24 years tested for rectal GC and CT, 227 (39.8%) were positive. Among race/ethnicity groups, African American men tested positive most frequently (43.4%), followed by American Indians (42.9%) (Table 1). In multivariate analysis controlling for age group, race/ethnicity, and HIV status, men in the age group 14-24 years were more likely to be positive for rectal GC or CT in comparison to those in the age group 35-44 years [odds ratio (OR) 1.7; 95% confidence interval (CI) 1.2-2.3] (Table 1).

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HIV infection

Of the 1591 men tested for rectal GC and CT, 1299 (81.7%) were HIV-negative at the time of rectal testing, 223 (14.0%) were HIV-positive prior to rectal testing, 52 (3.3%) were diagnosed with HIV infection at the same time as rectal testing, and 17 (1.1%) were diagnosed with HIV infection after rectal testing. HIV-negative men were less likely to have rectal GC or CT compared with those men who were or became HIV-infected (OR 0.6; 95% CI 0.2-1.6) (Table 1).

Of the 506 men with rectal GC or CT infection, 380 (75.1%) had no reported history of HIV infection, 90 (17.8%) were diagnosed with HIV infection prior to rectal infection, 29 (5.7%) were diagnosed with HIV infection at the time of rectal diagnosis, and seven (1.4%) were diagnosed with HIV infection after rectal diagnosis.

In multivariate analysis controlling for age group and race/ethnicity, men in the age group 14-24 years were significantly less likely to be coinfected with rectal GC or CT and HIV (OR 0.3; 95% CI 0.2-0.7) in comparison to the age group 35-44 years, while Hispanic men had a significantly greater risk of coinfection (OR 3.5; 95% CI 2.0-6.2) in comparison to white men (Table 2).

HIV viral loads

Of the 275 men with HIV infection at the time of rectal testing, 54 (19.6%) had no reported VL, 63 (22.9%) had an undetectable VL (< 20 copies/mL), and 158 (57.4%) had a detectable VL collected within 1 year of rectal GC/CT diagnosis. Mean VL among the 158 men with detectable virus was 110 113 copies/mL (range 21-2 968 091 copies/ mL), and the mean time from rectal GC/CT diagnosis to VL collection was 24.6 days (range −363 to +336 days).

Of the 119 men with HIV and rectal GC/CT coinfection (23.5%, 119/506 of those positive for rectal GC/CT were HIV-coinfected), 28 (23.5%) had no reported VL, 20 (16.8%) had an undetectable VL (< 20 copies/mL) and 71 (59.7%) had a detectable VL collected within 1 year of rectal GC/CT diagnosis (mean 174 316 copies/mL; range 21-2 968 091 copies/mL; mean time from rectal GC/CT diagnosis to VL collection 20.2 days; range −363 to +336 days).

Among men who had a VL reported, men coinfected with rectal GC/CT and HIV had a higher mean VL than men who had HIV infection alone (174 316 *vs.* 57 717 copies/mL, respectively; $P = 0.04$) (Table 2).

Discussion

In this analysis, nearly one-third of men had rectal GC or CT infection. Most of them (81.7%) were HIV-negative and therefore at very high risk of acquiring HIV infection. In this sample, one-quarter of the men were previously infected with HIV at the time of diagnosis of their rectal GC/CT infection, demonstrating ongoing unprotected receptive anal intercourse (URAI) in this population. Men with rectal GC/CT and HIV coinfection were more often older than 24 years of age and of Hispanic ethnicity. Our data showed that over

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half of the coinfected men had a detectable VL reported within 1 year of rectal GC and CT testing and their VLs were higher than the VLs of HIV-infected MSM who did not have a rectal GC/CT infection.

These data reflect the findings of other jurisdictions providing rectal GC and CT testing to MSM [5,6]. Our data demonstrate high rectal GC and CT positivity (31.8%), suggesting a greater reservoir of undiagnosed rectal infection among predominantly HIV-negative MSM in Maricopa County. These predominantly HIV-negative MSM with rectal GC and CT are at high risk of acquiring HIV infection [1]. As recommended by CDC [13], risk-reduction counselling to prevent STD and HIV acquisition is incorporated into partner services interviews delivered by disease intervention specialists (DISs) to patients with rectal GC/CT infections in Maricopa County. In addition, community partnerships with local medical care providers have been fostered in preparation for referral of HIV-negative MSM for consideration for HIV pre-exposure prophylaxis (PREP) [24].

We identified HIV transmission risk among the population of HIV-infected MSM who were tested for rectal GC and CT. Most coinfected men in our sample acquired HIV infection prior to their rectal GC/CT diagnosis, demonstrating ongoing unprotected sex. Additionally, our crossmatch of the HIV surveillance and HIV VL data allowed us to describe VL as an additional element of HIV infectivity among this group of MSM undergoing rectal GC and CT testing. A concerning proportion of MSM coinfected with HIV and rectal GC and CT had detectable a VL collected within 1 year of rectal testing and the VLs of coinfected men were higher than those of MSM with HIV alone. These individuals represent community reservoirs of transmissible HIV identified by their history of URAI, rectal GC and CT infections, and high detectable VL. Of the 15 288 prevalent cases of HIV infection in Arizona in 2012, 47% of individuals were retained in care and 36% had a reported undetectable VL [21]. Our data, collected from the same HIV surveillance records, reflect that a considerably lower proportion of HIV-infected patients undergoing rectal testing had undetectable VLs (22.9%) compared with the statewide HIV-infected population, demonstrating opportunities to confirm, establish or re-establish connections to HIV clinical care.

Interpretation of these data should consider the following limitations. First, data on rectal symptoms at the time of testing were not collected, and thus our positivity cannot be compared to values in other jurisdictions where asymptomatic rectal screening was evaluated. Secondly, incomplete laboratory reporting data for VL have been reported in other jurisdictions and probably occurred in this population [25]. We assumed that all MSM undergoing rectal testing had engaged in URAI, including those not diagnosed with rectal infection. Finally, information on sexual practices, including condom use and serosorting was not collected.

To our knowledge, this is the first report of HIV VL among MSM with rectal GC or CT infection. This analysis identified populations at high risk for HIV acquisition and transmission as well as opportunities for expansion of risk-reduction interventions among MSM seeking rectal testing for GC/CT. Opportunities to engage this group of MSM are prioritized as part of HIV prevention efforts in Maricopa County. Contemporary venues and

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communication sources such as social media and text reminders are under development for use in delivering testing and prevention messages. Additional work is needed to evaluate comprehensive care for HIV-negative MSM that includes risk-reduction counselling, routine STD and HIV screening, and evaluation for PREP.

Acknowledgements

Conflict of interest: The findings and conclusions in this paper are those of the authors and do not necessarily represent views of the Centers for Disease Control and Prevention, the Arizona Department of Health Services, or the Maricopa County Department of Public Health.

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Table 1

Male patients who were tested and who tested positive for rectal gonorrhoea (GC) and chlamydia (CT) by HIV status, Maricopa County sexually transmitted disease (STD) clinic, 2011–2013

	Correlates of rectal GC or CT positivity				Correlates of HIV positivity among men testing positive for rectal GC or CT		
Variable	**Total tested (*n*)**	**GC or CT positive [*n* (%)]**	**Adjusted OR[*] (95% CI)**	***P*-value[*]**	**HIV positive [*n* (%)][‡]**	**Adjusted OR[§] (95% CI)**	***P*-value[§]**
Population	1591	506 (31.8)			119 (23.5)		
Age							
14–24 years	570	227 (39.8)	1.7 (1.2–2.3)	0.0001	41 (18.1)	0.3 (0.2–0.7)	0.02
25–34 years	558	154 (27.6)	0.9 (0.7–1.3)	0.8	29 (18.8)	0.4 (0.2–0.8)	0.1
35–44 years	243	73 (30.0)	1.0	–	27 (37.0)	1.0	
45–54 years	170	42 (24.7)	0.8 (0.5–1.3)	0.3	20 (47.6)	1.4 (0.7–3.3)	0.009
≥ 55 years	50	10 (20.0)	0.6 (0.3–1.3)	0.2	2 (20.0)	0.4 (0.1–2.4)	0.6
Race							
White	756	214 (28.3)	1.0		56 (26.2)	1.0	
Hispanic	199	80 (40.2)	1.2 (0.9–1.7)	0.7	19 (23.8)	**3.5 (2.0–6.2)**	**0.0001**
African American	143	62 (43.4)	1.6 (1.1–2.4)	0.2	40 (64.5)	1.6 (0.9–3.2)	0.2
American Indian	35	15 (42.9)	1.9 (0.9–3.8)	0.2	3 (20)	0.8 (0.2–3.2)	0.7
Asian, Pacific Islander or other	47	15 (31.9)	1.2 (0.6–2.3)	0.8	1 (6.7)	0.3 (0.03–2.1)	0.1
Unknown	411	120 (29.2)	1.1 (0.8–1.4)	0.2	0 (0.0)	[†]	
HIV status							
HIV negative	1299	380 (29.3)	0.6 (0.2–1.7)	0.001			
HIV positive prior to rectal test	223	90 (40.4)	1.1 (0.4–3.1)	0.7			
HIV diagnosis at rectal test	52	29 (55.8)	1.7 (0.5–5.3)	0.05			
HIV positive after rectal test	17	7 (41.1)	1.0				

CI, confidence interval; OR, odds ratio.

[*] Adjusted odds ratio (OR) and *P*-value for correlates of GC/CT positivity.

[†] Includes only patients coinfected with HIV at the time of rectal GC/CT diagnosis ($n = 119$).

[‡] There were no HIV-infected persons with unknown race; thus, the 'Unknown' race category was removed from the adjusted model.

[§] Adjusted OR and P-value for correlates of HIV infection among men testing positive for rectal GC or CT.

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Table 2

Viral loads of HIV-infected men who tested negative or positive for rectal gonorrhoea (GC) and chlamydia (CT), Maricopa county sexually transmitted disease (STD) clinic, 2011–2013

Variable	Total HIV-infected at time of rectal test	Negative for rectal GC/CT*	Positive for rectal GC/CT*	OR (95% CI)	*P*-value
Population (*n*)	275	156	119		
Viral load collection within 1 year of rectal diagnosis [*n* (%)]					0.07
Undetectable (≤ 20 copies/mL)	63	43 (68.3)	20(31.7)	0.6 (0.3–1.1)	
Detectable	158	87 (55.0)	71 (44.9)	Ref	
None available	54	26 (48.1)	28(51.9)	1.3 (0.7–2.5)	
Viral load† (copies/mL) [mean (range)]	110 113 (21–2 968 091)	57 717 (26–528 081)	174 316 (21–2 968 091)		0.04

CI, confidence interval; OR, odds ratio.

*Percentages reflect row totals.

†Among 158 men with reported viral loads.