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Characteristics associated with urethral and rectal gonorrhea and chlamydia diagnoses in a U.S. national sample of gay and bisexual men: Results from the *One Thousand Strong* panel

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Abstract

Background—Gay and bisexual men (GBM) are at elevated risk for gonorrhea and chlamydia trachomatis (GC/CT). Rectal GC/CT symptoms may be less obvious than urethral, increasing opportunities for undiagnosed rectal GC/CT.

Method—A U.S. national sample of 1,071 GBM completed urethral and rectal GC/CT testing and an online survey.

Results—In total, 6.2% were GC/CT positive (5.3% rectal, 1.7% urethral). We calculated adjusted (for education, race, age, relationship status, having health insurance, and income) odds ratios for factors associated with rectal and urethral GC/CT diagnoses. Age was inversely associated with urethral and rectal GC/CT. Compared to White men, Latinos had significantly greater odds of rectal GC/CT. Among men who reported anal sex, those reporting only insertive sex had lower odds of rectal GC/CT than men who reported both insertive and receptive. There was a positive association between rectal GC/CT and number of male partners (<12 months), the number of anal receptive acts, receptive condomless anal sex (CAS) acts, and insertive CAS acts.

Compared to those who had engaged in both insertive and receptive anal sex, those who engaged in only receptive anal sex had lower odds of urethral GC/CT. The number of male partners (<12 months) was associated with increased odds of urethral GC/CT.

Conclusion—Rectal GC/CT was more common than urethral and associated with some demographic and behavioral characteristics. Our finding that insertive CAS acts was associated with rectal GC/CT highlights that providers should screen patients for GC/CT via a full range of transmission routes, lest GC/CT go undiagnosed.

Keywords

men who have sex with men; gonorrhea; chlamydia; gay and bisexual men

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Introduction

Gay, bisexual, and other men who have sex with men (GBMSM) represent 4–15% of the U.S. population(1, 2) and are disproportionally affected by sexually transmitted infections, including *Neisseria gonorrhoeae* (GC) and *Chlamydia trachomatis* (CT)(3, 4). In 2013, in the U.S. STD surveillance network—comprised of 42 STD clinics within 12 collaborating jurisdictions—GC prevalence was 16.9% (range by site: 10.4%–28.1%) and CT prevalence was 15.2% (range by site: 7.4%–30.7%) among GBMSM(4). Across collaborating jurisdictions, 27.4% of GC cases were estimated to be among GBMSM, 30.5% among men who have sex with women, and 42.1% among women—comparable data on CT were not reported.

Testing for GC and CT has historically been conducted with culture, however, Nucleic Acid Amplification Tests (NAAT) (e.g., the Abbott Real-Time, Aptima COMBO 2 assay, cobas® 4800) are now cleared by the U.S. Food and Drug Administration as the standard diagnostic tests for their increased sensitivity, specificity, and ease of specimen transport(5). The most common methods by which GC and CT are tested are through the collection of urine. Urine-based screening allows for self-collection(6) with minimal sample collection barriers compared to urethral specimens that need to be collected in a clinic setting(7). Patients provide a first-catch urine specimen that is transferred to a test specific transport tube. Fewer studies have examined the prevalence of rectal GC and CT, which is typically identified via a swab of the rectum and culture. NAATs are not FDA cleared for rectal specimens, limiting their accessibility to patients and providers(8). Patients self-swab the inside of the rectum and break off the swab into a test specific transport tube. Self-sampling has been compared to clinic-based testing finding high viability and acceptability with a variety of populations including MSM(6, 9). Although GBMSM do not engage in anal sex every time they have sex(10), there remains a need to test for urethral as well as rectal GC/CT given that many GBMSM do engage in insertive as well as receptive anal sex(11, 12). Studies of GBMSM who engage in anal sex have found that rates of engaging in receptive as well as insertive anal sex (i.e., versatility) ranged from moderate (e.g., 38%(13)) to high (e.g., 73%(14), 83%(15)). Certainly, routine STI screening is contingent upon engaging in sex without a condom, or sex with multiple partners; however, data on rates of receptive and versatile sex among GBMSM suggest that a significant portion should be routinely screened for urethral as well as rectal STIs.

As a result of the continuing HIV and STI epidemics, much of researchers' attention to GBMSM has been grounded in HIV prevention. And, much of what we know about GBMSM has been based on samples in urban epicenters. As a result, less is known about U.S. GBMSM who live outside of urban centers. Although CDC surveillance data is helpful with identifying incident HIV and STIs, much of these data are limited to urban centers and/or collected at STD clinics (i.e., self-selected samples of individuals who perceive themselves to need, or are referred for, STI testing). Furthermore, surveillance data is restricted in that it provides little context as to social and behavioral factors that are associated with STI diagnoses.

With the expanded use of the Internet both by researchers as well as GBMSM, engaging geographically diverse samples of GBMSM in research has become and increasingly acceptable method of data collection(16–20). Recently, researchers have begun combining online data collection with self-administered biological data collection, particularly for HIV among GBMSM(21, 22). Less is known about the use of at-home self-administered testing for STIs among GBMSM; however studies suggest it is feasible and acceptable(9, 23). To that end, the present study reports on rates of urethral and rectal GC/CT diagnosis in a U.S. national sample of HIV-negative GBM, as well as factors associated with urethral and rectal diagnosis.

Method

Participants and Procedures

The *One Thousand Strong* panel is a longitudinal study following a U.S. national sample of gay and bisexual men (GBM) for a period of three years(24). Analyses for the present manuscript were based on baseline data. Participants were identified via Community Marketing and Initiatives (CMI) panel of over 45,000 LGBT individuals, over 22,000 of whom are GBM throughout the United States. CMI draws panelists from over 200 sources ranging from LGBT events to social media and non-gay identified venues/mediums (e.g., social media). Participants in the *One Thousand Strong* panel were targeted to represent the diversity and distribution of GBM in the U.S. population. In so doing, recruitment targets were established using data from the U.S. Census with regard to same sex households and racial and ethnic composition.

CMI emailed potential participants with a brief description of the study along with a link to a brief 2-minute survey that would determine preliminary eligibility criteria (e.g., reside in the U.S., be at least 18 years of age, be biologically male and currently identify as male, identify as gay or bisexual, report having sex with a man in the past year, self-identify as HIV-negative, willing to complete at-home self-administered rapid HIV antibody testing, willing to complete self-administered testing for urine and rectal GC/CT, able to complete assessments in English, have access to the Internet such to complete at-home online assessments, have access to a device that was capable of taking a digital photo (e.g., camera phone, digital camera), have an address to receive mail that was not a P.O. Box, and were residentially stable (i.e., have not moved more than twice in the past 6 months)). Those meeting these preliminary criteria were invited to join the study and presented with informed consent. Those consenting had their contact information shared with the research team to follow up for enrollment in the study. The research team emailed participants a link to a secure online survey that took approximately one-hour to complete. Participants were mailed a kit for self-collection of urine and rectal GC/CT specimens as well as at-home OraQuick© HIV testing. Because the rapid HIV-antibody test must be read between 20 and 40 minutes following collection, participants used their digital device to take a picture of the test paddle and sent that to the research team as confirmation of HIV-negative serostatus. There were 11 men who tested HIV-positive at baseline and these men were not enrolled in the study. The research team contacted these 11 men to facilitate confirmatory testing and treatment. Urine and rectal samples were returned mail to the lab at Emory University for

analysis. Participants were compensated $25 for completing the first hour-long at-home survey and an additional $25 for HIV/STI testing procedures.

Participants were enrolled between April 2014-October 2014. The City University of New York (CUNY) Institutional Review Board approved study procedures.

Measures

STI testing—GC/CT were tested using the Abbott m2000 Real-Time assay. Specimens are collected using the Abbott multi-Collect Specimen Collection Kit and can be stored for up to 14 days. This NAAT assay uses a polymerase chain reaction (PCR) testing approach where DNA is extracted. The method of detection has a sensitivity of 95.2% for CT/98.7% for GC and a specificity of 99.3% for CT/99.2% for GC, thus the chances of a false positive and false negative are low(5). If CT and GC are present, their sequences are amplified and detected with fluorescent-labeled oligonucleotide probes(25). To validate the rectal swabs, double rectal swabs were obtained from Emory Medical Labs and each was analyzed both straight and inoculated with CT and GC DNA. The rectal samples inoculated with CT and GC did not show any inhibition. Internal controls are run alongside each test sample to ensure no inhibition. During the enrollment process, there were 26 participants not enrolled in the panel because they failed to complete the STI testing procedures and an additional 7 men whose samples resulted in inconclusive results. Attempts to resample these men were unsuccessful. Meanwhile, among the 1071 enrolled in the panel, only 2.8% (n = 30) experienced an STI sampling error (e.g., fecal contamination of the rectal swab, urine vial improperly sealed and came open in the biohazard bag during transit to the lab, rectal swab inserted into the vial containing urine) and < 1% (n = 8) had to be resent a kit because it was reported as lost in the mail—either not received by participant or not received by lab after reportedly being mailed. Our attempts to resample these 30 participants were successful. In the event of a positive STI result, participants were telephoned to discuss the results and to facilitate getting treatment.

Demographic and behavioral characteristics—Participants reported demographic characteristics including race/ethnicity, education, income, age, sexual identity, whether they had used illegal drugs (cocaine, methamphetamine, ecstasy/MDMA, GHB/GBL, heroin/opiates, ketamine, crack) in the prior 3 months, and whether they had health insurance and a primary doctor. Participants also reported their sexual behavior including the number of times they engaged in receptive and/or insertive condomless anal sex (CAS) with an HIV-positive or unknown status main partner or any casual male partners in the prior 3 months.

Analytic Plan

We first describe the prevalence of rectal and urine GC/CT as well as demographic and behavioral characteristics of the sample. As appropriate, we next report unadjusted and adjusted odds ratios for the association between demographic and behavioral characteristics with testing positive for rectal or urethral CG/CT. Adjusted odds ratios accounted for the effects of education, race, age, relationship status, having health insurance, and income. Finally, using Mann-Whitney U tests, which account for the non-normal distribution of

count variables, we reported bivariate associations between various sexual behaviors (e.g., number of anal insertive acts, number of receptive anal sex acts) and diagnosis with rectal or urethral GC/CT.

Results

Figure 1 indicates the distribution of participants across the US. Participants represented 49 of 50 states. Table 1 presents descriptive characteristics of the *One Thousand Strong* panel. In total, 95% were self-identified as gay, 29% were men of color, and the average age was average age of 40.2. Nearly half (48.7%) were in a relationship, 91.8% reported having health insurance, 76.0% reported having a primary care provider, and 10.8% reported drug use in the prior 3 months. With regard to sexual behavior, 39.2% reported having engaged in CAS with a casual male partner or with an HIV-positive or HIV-unknown main partner in the prior 3 months. Nearly half (49.8%) said they had not engaged in any anal sex in the past 3 months, 12.3% reported only acts of anal receptive sex, 20% reported both insertive and receptive anal sex (versatile), and 17.6% reported only anal insertive sex.

In total, 6.2% tested positive for rectal or urethral GC/CT. Rectal STIs were more common than urethral (5.3% vs. 1.7%), and CT was more common than GC (5.3% vs. 1.8%). Nine men (0.8%) were diagnosed with both rectal and urethral STIs, 9 men (0.8%) with just a urethral STI, and 48 men (4.6%) with just a rectal STI.

Table 2 reports unadjusted and adjusted odds ratios for factors associated with rectal GC/CT diagnosis. Several bivariate associations were no longer significant after adjusting for the effects of other variables. These included income, relationship status, and drug use in the prior 3 months. Compared to White men, Latino men had significantly greater odds of having a rectal STI. Among men who reported anal sex, those reporting only insertive anal sex had significantly lower odds of being diagnosed with a rectal STI than men who reported both insertive and receptive sex. Recent CAS was associated with rectal STIs. There was a negative association between age and rectal GC/CT. There was a positive association between rectal GC/CT and the number of male partners in the past 12 months, the number of anal receptive acts, receptive CAS acts, and insertive CAS acts.

Table 3 reports unadjusted and adjusted odds ratios for factors associated with urethral GC/CT diagnosis. Age was inversely associated with urethral GC/CT diagnosis. No other demographic characteristics were associated with urethral GC/CT diagnosis. However some behavioral characteristics were. Adjusting for the effects of education, race, age, relationship status, having health insurance, and income, compared to those who said they had engaged in both insertive and receptive anal sex, those who said they engaged in only receptive anal sex had significantly lower odds of testing positive for urethral GC/CT. In addition, the number of male partners in the past 12 months was associated with increased odds of urethral GC/CT diagnosis. Interestingly, the number of insertive and receptive anal sex acts with and without a condom were all positively associated with testing positive for urethral GC/CT (at the bivariate level); however, these effects did not hold up after accounting for the effects of education, race, age, relationship status, having health insurance, or income.

Discussion

Participants completed at-home self-administered STI sample collection and mailed those to a lab for analyses with minimal errors, suggesting high feasibility and acceptability for incorporating at-home self-administered STI sample collection into studies that would otherwise be entirely online. In this study 6.2% tested positive for rectal or urethral GC/CT with rectal STIs being more common than urethral (5.3% vs. 1.7%), and CT was more common than GC (5.3% vs. 1.8%). Our rates of new diagnoses were lower than CDC surveillance; however, it is worth noting the intrinsic differences between surveillance data and our sample. Surveillance data are collected via STD clinics, and those attending clinics are likely doing so because they are experiencing symptoms of an infection. Our sample also excluded HIV-positive men, who are included in surveillance data.

Positive STI results are behaviorally driven and infection location is indicative of sexual acts performed. We believe the discrepancy between urethral and rectal GC/CT might be a combined result of multiple variables operating at different levels of the sexual health care continuum(26–28). These include an individual's own failure to recognize the symptoms of rectal STI infection (which can include discharge or be asymptomatic)(29) relative to the more pronounced symptoms of urethral infection, and thus a patients' failure to seek out testing/treatment. Second, there may be lower acceptability—by providers and by patients—of the method by which samples for rectal STI are collected (e.g., a medical provider inserting a swab into the rectum vs. self-collection through routine urination). Third, both patients and providers may have discomfort around discussing sexual behavior and sexual health, particularly anal sexual health, or disclosing that they engaged in condomless anal sex. Fourth, a failure on behalf of medical providers to suggest/provide rectal STI testing to their GBM patients as a part of his routine medical care as well as a failure on behalf of patients to request it. Fifth, there may be insurance coverage gaps whereby routine testing for urethral STIs is covered but rectal STIs is not. Sixth, some individuals may believe that routine urine collection or blood work by their physician also tested then for rectal STIs. Our study did not assess frequency of STI testing nor methods of STI testing (e.g., urethral and rectal) thus cannot comment as to the extent that higher rates of rectal STIs are a factor of one of the aforementioned hypotheses. In addition, we did not collect data on perceived STI symptoms (e.g., pain, discharge), which would have been useful for the present study.

In our study, STI diagnoses appeared to be more so a factor of behavioral as opposed to demographic characteristics. That is, and perhaps unsurprising, men who reported a history of CAS were more likely to also be diagnosed with GC/CT, and there was a positive association between number of male partners in the prior 12 months and GC/CT diagnoses. Although it may seem counterintuitive that, for example, receptive CAS acts were associated with urethral CT/GC, we highlight that receptive CAS was positively correlated with insertive CAS.

Limitations

Although we used parameters taken from the Census to establish recruitment targets (e.g., geographic distribution of same-sex male couples, age, race and ethnicity), this was based on data on same-sex households (i.e., couples). The Census does not collect data on sexual

identity or sexual behavior, thus the true prevalence/distribution of GBM across the U.S. remains unknown. It is possible to weight our data to correct for deviation in our sample (with regard to characteristics such as race and ethnicity, geographic diversity, and age), but this requires for the population characteristics to be known. Certainly other datasets could also be used for post hoc sample weights (e.g., CDC surveillance data); however, we also highlight that adding sample weights to match our dataset to CDC surveillance data simply corrects for our sample to match another sample, not to a population.

We tested only for GC/CT, but not other STIs such as genital warts, genital herpes, or syphilis. These STIs are detected via blood draw, which would not have been feasible for the present study. Further, we did not assess for pharyngeal infections.

By partnering with CMI to enroll members from their LGBT panel, we were able to engage a population that is already attuned to participating in web-based studies. This ensures participants are familiar with, for example, how to complete a survey online as well as how to use a computer. Individuals who do not know how to use a computer or do not have Internet access would not be eligible to be a CMI panelist and thus would not be represented in this present study. This bias toward a more technologically savvy population should be noted.

Conclusions

The *One Thousand Strong* panel is prospectively following 1,071 HIV-negative GBM from across the United States. In addition to online components, we were able to engage the panel in self-administered at-home STI testing and only a small proportion of potential participants failed to complete these procedures. This suggests that there is high feasibility and acceptability in incorporating self-administered STI testing into research studies that would be otherwise fully online. Rectal GC/CT was more common than urethral and associated with some demographic and behavioral characteristics. Our finding that insertive CAS acts was associated with rectal GC/CT highlights the importance for providers to screen patients for GC/CT via a full range of transmission routes, lest GC/CT go undiagnosed. Because as much as 14.6% of HIV infections among GBMSM may be attributable to GC/CT co-infection(30), testing and treating GC/CT may dually serve to reduce HIV incidence within this population.

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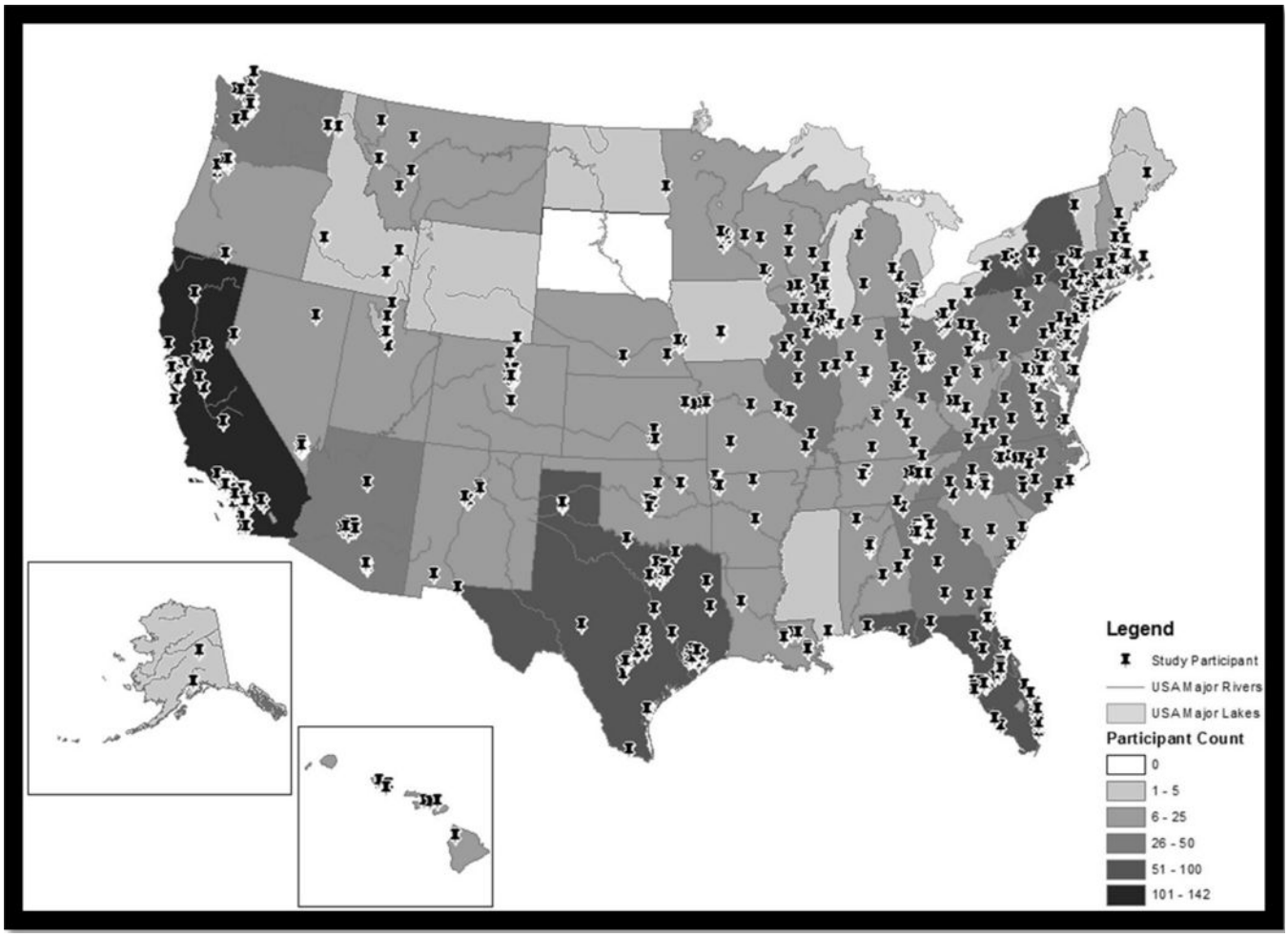

Figure 1.
Distribution of *One Thousand Strong* participants across the United States

Table 1

Demographic characteristics, *N* = 1071

	n	%
Rectal or urethral GC and/or CT (i.e., any STI diagnosis)	66	6.2
Rectal CG and/or CT	57	5.3
Rectal GC	19	1.8
Rectal CT	47	4.4
Urethral GC and/or CT	18	1.7
Urethral GC	5	0.5
Urethral CT	15	1.4
Income		
< $50,000	575	53.7
$50,000 +	496	46.3
Sexual identity		
Gay	1017	95.0
Bisexual	54	5.0
Has a 4-year college degree		
No	474	44.3
Yes	597	55.7
Relationship status		
Single	549	51.3
In a relationship	522	48.7
Race and Ethnicity		
Black	83	7.7
Latino	135	12.6
White	763	71.2
Multiracial or “other”	90	8.4
Has health insurance		
Yes	983	91.8
No	88	8.2
Has a primary care provider	814	76.0
Any drug use,[1] < 3 months	107	10.8
Anal sexual behavior with casual male partners, < 3 months		
No anal sex	533	49.8
Exclusive bottom	132	12.3
Versatile	217	20.3
Exclusive top	189	17.6
CAS[2] with a casual male partner or HIV-positive or HIV-unknown main partner, < 3 months	420	39.2

CT *Chlamydia trachomatis*, GC *Neisseria gonorrhoeae*

[1] Cocaine, methamphetamine, ecstasy/MDMA, GHB/GBL, heroin/opiates, ketamine, crack

[2] Condomless anal sex

Table 2

Demographic and behavioral characteristics associated with rectal GC/CT diagnosis

	Rectal GC and/or CT							
	No		Yes					
	n	%	*n*	%	Odds Ratio	95% CI	Adj. Odds Ratio [a]	95% CI
Income								
< $50,000	536	52.9	39	68.4	**0.52**	**0.29 – 0.92**	0.79	0.41 – 1.50
$50,000 +	478	47.1	18	31.6				
Has a 4-year college degree								
No	444	43.8	30	52.6	0.70	0.41 – 1.20	0.87	0.49 – 1.53
Yes	570	56.2	27	47.4				
Relationship status								
Single	512	50.5	37	64.9	**0.55**	**0.32 – 0.96**	0.62	0.35 – 1.09
In a relationship	502	49.5	20	35.1				
Race and ethnicity								
White (Ref.)	729	71.9	34	59.6	Ref.	-- - --	Ref.	-- - --
Black	79	7.8	4	7.0	1.09	0.38 – 3.14	0.96	0.56 – 1.64
Latino	121	11.9	14	24.6	**2.48**	**1.29 – 4.76**	**2.01**	**1.02 – 3.97**
Multiracial or “other”	85	8.4	5	8.8	1.26	0.48 – 3.31	1.00	0.37 – 2.70
Has health insurance								
No	85	8.4	8	14.0	0.56	0.26 – 1.22	0.73	0.33 – 1.64
Yes	929	91.6	49	86.0				
Has a primary care providers								
Yes	774	76.3	40	70.2	1.37	0.76 – 2.46	0.90	0.47 – 1.72
No	240	23.7	17	29.8				
Any drug use,[1] < 3 months								
No	841	89.8	42	79.2	**2.29**	**1.14 – 4.61**	1.89	0.93 – 3.85
Yes	96	10.2	11	20.8				
Anal sexual behavior with casual male partners, < 3 months, excluding men who did not report anal sex with a casual male partner, valid *n* = 538								
Exclusive bottom	122	24.7	10	22.7	0.49	0.23 – 1.04	0.48	0.22 – 1.03

	Rectal GC and/or CT							
	No		Yes					
	n	**%**	***n***	**%**	**Odds Ratio**	**95% CI**	**Adj. Odds Ratio [a]**	**95% CI**
Versatile (Ref.)	186	37.7	31	70.5	Ref.	-- - --	Ref.	-- - --
Exclusive top	186	37.7	3	6.8	**0.10**	**0.03 – 0.32**	**0.11**	**0.03 – 0.36**
CAS[2] with a casual male partner or HIV-positive or HIV-unknown main partner, < 3 months								
No	633	62.4	18	31.6	**3.60**	**2.03 – 6.38**	**3.26**	**1.82 – 5.83**
Yes	381	37.6	39	68.4				
	M	*SD*	*M*	*SD*	*t*	*p*	Adj. Odds Ratio [a]	
Age in years	40.6	13.8	34.4	13.8	3.29	**< .001**	**0.97**	**0.95 – 0.99**
	Mdn	IQR	Mdn	IQR	*U*	*p*		
Male partners in the last 12 months	4	1–10	8.0	5–15	39448.0	**< .001**	**1.02**	**1.01 – 1.03**
Sexual behavior with casual male partners in the last 3 months, valid *n* = 1071								
Number of anal insertive acts	0	0–2	2	0–7.5	36719.0	**< .001**	1.01	0.993 – 1.04
Number of anal receptive acts	0	0–1	2	0–7	42140.0	**< .001**	**1.03**	**1.01 – 1.06**
Number of condomless anal insertive acts	0	0–0	1	0–3	36891.0	**< .001**	**1.06**	**1.02 – 1.10**
Number of condomless anal receptive acts	0	0–0	1	0–3	40033.0	**< .001**	**1.04**	**1.01 – 1.08**

M Mean, *SD* Standard Deviation, *Mdn* Median, IQR Interquartile Range, *U* Mann-Whitney U CT *Chlamydia trachomatis*, GC *Neisseria gonorrhoeae*

[a] Adjusted for education, race, age, relationship status, having health insurance, and income **Bold** items are significant at $p < .05$

[1] Cocaine, methamphetamine, ecstasy/MDMA, GHB/GBL, heroin/opiates, ketamine, crack

[2] Condomless anal sex

Table 3

Demographic and behavioral characteristics associated with urethral GC/CT diagnosis

	Urethral GC and/or CT							
	No		Yes					
	n	%	*n*	%	Odds Ratio	95% CI	Adj. Odds Ratio [a]	95% CI
Income								
< $50,000	562	53.4	13	72.2	0.44	0.16 – 1.24	0.98	0.30 – 3.20
$50,000 +	491	46.6	5	27.8				
Has a 4-year college degree								
No	462	43.9	12	66.7	0.39	0.15 – 1.05	0.47	0.17 – 1.34
Yes	591	56.1	6	33.3				
Relationship status								
Single	540	51.3	9	50	1.05	0.42 – 2.67	1.26	0.49 – 3.27
In a relationship	513	48.7	9	50				
Race and ethnicity								
White (Ref.)	750	71.2	13	72.2	Ref.	-- - --	Ref.	-- - --
Black	81	7.7	2	11.1	1.42	0.32 – 6.41	1.09	0.51 – 2.35
Latino	133	12.6	2	11.1	0.87	0.19 – 3.89	0.49	0.11 – 2.25
Multiracial or “other”	89	8.5	1	5.6	0.65	0.08 – 5.01	0.48	0.06 – 3.77
Has health insurance								
No	90	8.5	3	16.7	0.47	0.13 – 1.65	0.62	0.17 – 2.27
Yes	936	91.5	15	83.3				
Has a primary care providers								
Yes	803	76.3	11	61.1	2.04	0.78 – 5.33	1.24	0.43 – 3.57
No	250	23.7	7	38.9				
Any drug use,[1] < 3 months								
No	869	89.3	14	82.4	1.79	0.51 – 6.33	1.37	0.37 – 4.95
Yes	104	10.7	3	17.6				
Anal sexual behavior with casual male partners, < 3 months, excluding men who did not report anal sex with a casual male partner, valid *n* = 538								
Exclusive bottom	131	25	1	7.1	0.16	0.02 – 1.25	**0.12**	**0.01 – 0.95**

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	Urethral GC and/or CT							
	No		Yes					
	n	**%**	***n***	**%**	**Odds Ratio**	**95% CI**	**Adj. Odds Ratio [a]**	**95% CI**
Versatile (Ref.)	207	39.5	10	71.4	Ref.	-- - --	Ref.	-- - --
Exclusive top	186	35.5	3	21.4	0.33	0.09 – 1.23	0.36	0.09 – 1.38
CAS[2] with a casual male partner or HIV-positive or HIV-unknown main partner, < 3 months								
No	647	61.4	4	22.2	**5.58**	**1.82 – 17.06**	**5.55**	**1.78 – 17.29**
Yes	406	38.6	14	77.8				
	M	*SD*	*M*	*SD*	*t*	*p*	Adj. Odds Ratio [a]	
Age in years	40.4	13.8	31.0	10.7	2.87	**0.004**	**0.94**	**0.90 – 0.99**
	Mdn	IQR	Mdn	IQR	*U*	*p*		
Male partners in the last 12 months	4.0	1–10	10.5	4–20	13121.0	**0.01**	**1.03**	**1.01 – 1.05**
Sexual behavior with casual male partners in the last 3 months, valid *n* = 1071								
Number of anal insertive acts	0	0–2	4.0	0–7.5	13220.0	**0.001**	1.02	0.99 – 1.06
Number of anal receptive acts	0	0–1	1.0	0–7.75	12637.0	**0.004**	1.03	1.00 – 1.06
Number of condomless anal insertive acts	0	0–0	1.0	0–4.25	13894.0	**< .001**	1.07	1.00 – 1.14
Number of condomless anal receptive acts	0	0–0	0.0	0–4.5	11625.0	**0.02**	1.03	0.99 – 1.06

M Mean, *SD* Standard Deviation, *Mdn* Median, IQR Interquartile Range, *U* Mann-Whitney U CT *Chlamydia trachomatis*, GC *Neisseria gonorrhoeae*

[a] Adjusted for education, race, age, relationship status, having health insurance, and income **Bold** items are significant at $p < .05$

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[2] Condomless anal sex