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## Extragenital Sexually Transmitted Infection Testing Among Louisiana Parish Health Units, 2016–2019

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### Abstract

**Background:** The Centers for Disease Control and Prevention recommends that men who have sex with men (MSM) get tested annually for urethral and rectal chlamydia (CT) and gonorrhea (NG), and pharyngeal NG. There are no national recommendations to screen women and heterosexual men at extragenital sites. We assessed extragenital CT/NG screening among men and women at Louisiana's Parish Health Units (PHU).

**Methods:** The Louisiana STD/HIV/Hepatitis Program piloted extragenital screening at four PHUs in February 2016 and expanded to eleven PHUs in 2017. Sexual histories were used to identify gender of sex partners and exposed sites. Due to billing restrictions, up to two anatomical sites were tested for CT/NG.

**Results:** From February 2016-June 2019, 70,895 urogenital and extragenital specimens (56,086 urogenital, 13,797 pharyngeal and 1,012 rectal) were collected from 56,086 patients. Pharyngeal CT positivity was 160/7,868 (2.0%) among women, 54/4,838 (1.1%) among MSW (men who have sex with women) and 33/1,091 (3.0%) among MSM. Rectal CT positivity was 51/439 (11.6%) among women and 95/573 (16.6%) among MSM. Pharyngeal NG positivity was 299/7,868 (3.8%) among women, 222/4,838 (4.6%) among MSW and 97/1,091 (8.9%) among MSM. Rectal NG positivity was 20/439 (4.6%) among women and 134/573 (23.4%) among MSM.

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Urogenital-only screening would have missed: among women, 173/3,923 (4.4%) CT and 227/1,480 (15.3%) NG infections; among MSW, 26/2,667 (1%) CT and 149/1,709 (8.7%) NG infections; and among MSM, 116/336 (34.5%) CT and 127/413 (42.1%) NG infections.

**Conclusions:** Many CT/NG infections would have been missed with urogenital-only screening. MSM had much higher extragenital infection rates than women and MSW.

## Summary

Many chlamydia and gonorrhea infections would have been missed with urogenital-only screening. Men who have sex with men (MSM) had higher extragenital infection rates than women and heterosexual men.

## Keywords

Chlamydia; Gonorrhea; Extragenital; Screening; Sexually Transmitted Infection

## Introduction:

Over the past several years, Louisiana consistently has had some of the highest rates of chlamydia (CT) and gonorrhea (NG) in the United States.<sup>1,2</sup> To help prevent disease, screening is recommended for different persons based on their age, sex, and the sex of their sex partners. For sexually active men who have sex with men (MSM), annual urethral and rectal screening for CT/NG and pharyngeal screening for NG are recommended by the Centers for Disease Control and Prevention (CDC), based on exposure.<sup>3</sup> In addition to MSM, routine anorectal screening for CT/NG for transgender persons is also recommended by the World Health Organization (WHO).<sup>4</sup> For sexually active females ages 24 years and other women at increased risk for infection, annual urogenital CT/NG screening is recommended by the U.S. Preventive Services Task Force (USPSTF).<sup>5</sup> There is no recommendation for CT/NG screening for men by USPSTF due to insufficient evidence to assess the balance of benefits and harms.<sup>5</sup> Screening recommendations for women differ in other countries. For example, rectal and pharyngeal screening (based on exposure) is recommended by both the International Union Against Sexually Transmitted Infections (IUSTI) and the British Association for Sexual Health and HIV (BASHH).<sup>6,7,8</sup>

It has been well-established that urogenital-only screening of MSM misses most chlamydia and gonorrhea infections.<sup>9,10,11,12,13</sup> Most CT and NG infections of the pharynx and rectum are asymptomatic, so diagnosis and treatment depend on routine screening.<sup>9,14,15,16,17,18</sup> Although there are currently no recommendations in the US to routinely screen women and heterosexual men at extragenital sites, a substantial number of rectal and pharyngeal infections may be present in these populations.

Many studies have found pharyngeal and rectal infections in women.<sup>12,13,19, 20,21,22,23,24</sup> Urogenital infections among women are clearly linked to the development of pelvic inflammatory disease (PID). However, the benefits of identifying and treating extragenital infections are not well understood. Similarly, for heterosexual men, as stated by the USPSTF, there is no convincing evidence that even urethral screening has a benefit because it has not been shown to reduce disease or prevalence of infection.<sup>5</sup>

NG infection interrupts mucosal barriers at the site of infection and could increase the risk of HIV acquisition if left untreated. Specifically, men who had rectal CT/NG had a 2–5 times higher risk of HIV acquisition.<sup>25</sup> Although no studies have shown that CT/NG screening reduces prevalent infection, because MSM are at high risk for HIV, the argument for rectal CT/NG screening is compelling.<sup>25</sup>

Concern about the possibility of missing infections in exposed persons led the Louisiana Office of Public Health - STD/HIV/Hepatitis Program (SHHP) to institute routine extragenital screening of patients attending parish (county) health units, based on reported sites of sexual exposure. We assessed this extragenital CT and NG screening program to determine how many cases were identified that would have been missed and untreated without extragenital screening. Results were stratified by gender and gender of sex partners.

## Methods:

The Louisiana Office of Public Health – STD / HIV / Hepatitis Program collaborated with the Bureau of Family Health - Reproductive Health Program, Louisiana Office of Public Health Laboratory, and Denver Prevention Training Center to pilot extragenital testing in 4 Parish Health Units in February 2016. Due to patient acceptability and uptake and program interest, extragenital testing was expanded to 3 additional parish health units in June 2017, and 4 more parish health units in July 2017. By December 2017, eleven parish health units were offering extragenital testing in Louisiana.

Beginning in September 2015, four major preparatory steps were taken. First, the Louisiana Office of Public Health Laboratory validated CT/NG nucleic acid amplification testing (NAAT) of extragenital specimens using an internally developed and approved protocol following Clinical Laboratory Improvement Amendments (CLIA) guidelines. Second, the Reproductive Health Program developed a standardized protocol for extragenital testing, including questions about whether patients performed oral sex on their partners or had receptive anal sex. Third, based on this protocol, multi-language instruction sheets for nurses and patients were created. Fourth, parish health unit staff were trained on the new protocol by the Louisiana Office of Public Health – STD/HIV/Hepatitis Program STD Medical Director and Reproductive Health Program Statewide Nurse Consultant with Denver Prevention Training Center assistance. All four steps were completed by February 2016.

During patient visits at the parish health units, routine sexual histories were used to determine the gender of sex partners within the last 12 months. Women were classified into three groups: women who have sex with only men (WSM), women who have sex with only women (WSW), and women who have sex with both men and women (WSMW). Men were also classified into three groups: men who have sex with only women (MSW), men who have sex with only men (MSM), and men who have sex with both women and men (MSWM). For the purposes of this study, MSWM were classified as MSM.

Sexual histories were also used to determine exposed anatomical sites within the last 12 months for pharyngeal, genital, and/or rectal exposures. Kissing was not assessed as a

potential exposure while obtaining sexual histories. Due to billing restrictions, up to two exposed anatomical sites were tested for CT/NG in a single visit. If there were only two exposed sites, both were screened. If there were three exposed sites, then patients were screened at the urogenital site and one extragenital site. Which extragenital site screened depended on frequency and type of exposure, with priority given to unprotected receptive anal intercourse. For example, if a patient gave a history of genital, anal, and oral sex then specimens were collected from the genital and rectal sites.

For extragenital specimen collection, the patients were given the option of self-collection versus provider collection which was not captured in the medical charts. However, clinician collected specimen was usually done and by clinical report, self-collection was not an issue at these 11 parish health units. Specimens from all participating parish health units were sent to the Louisiana Office of Public Health Laboratory and tested using the validated Aptima Combo 2 Assay on a Panther System platform.

Patient registration information, demographics, and sexual histories - along with test order data - were collected from the Louisiana Electronic Health Record. The test results data were collected from the Louisiana Office of Public Health Laboratory Lab Reporting System (STARLIMS). Data were collated and stored in a password-protected MS Access database on the Louisiana Office of Public Health – STD/HIV/Hepatitis Program server. Data were analyzed using SPSS version 24.0. This evaluation of a public health program was reviewed by the Louisiana Department of Health Institutional Review Board and received a non-research determination because it was an evaluation of routine programmatic activities and was considered exempt.

## Results:

During the project period (February 2016 – June 2019), CT/NG testing was done among 56,086 patients (Table 1) in 11 participating parish health units. Sixty-nine percent (n=38,507) of patients were female, 73% (n=40,963) of patients were Black and 20% (n=11,180) were White. The majority of the patients (76%) were 15 to 29 years of age. Among women, 92% (n=35,422) were WSM while 89% (n=15,626) of men were MSW and 11% (n=1,953) were MSM. A total of 70,895 urogenital and extragenital specimens were collected from 56,086 patients and tested for CT and NG. Of those, 46,814 (66.0%) were from women and 24,081 (34%) were from men. (Table 2)

## Women:

Of the 46,814 specimens from women, 38,507 (82.3%) were urogenital, 7,868 (16.8%) were pharyngeal, and 439 (0.9%) were rectal. Among the urogenital specimens, 3,712 (9.6%) were positive for CT and 1,161 (3.0%) were positive for NG; among pharyngeal samples, 160 (2.0%) were positive for CT and 299 (3.8%) were positive for NG; and among rectal samples, 51 (11.6%) were positive for CT and 20 (4.6%) were positive for NG. Among women who were tested, the site most likely to be positive was the rectum (CT 11.6% and NG 4.6%), however only 439 rectal tests were done because anal sex was rarely reported. Pharyngeal specimens were less likely to test positive than rectal specimens, but there were almost 18 times as many pharyngeal specimens tested, so most extragenital

infections (86.6%) identified were in the pharynx. Of the 530 extragenital CT and NG infections identified, 400 (173 CT and 227 NG) were from women who had negative urogenital tests; these infections would have been missed if urogenital-only screening was done. These 400 infections account for 7.4% of the 5,403 infections identified in women.

Considering the gender of women's sex partners, among the 46,814 specimens from women, 42,447 (90.7%) were from WSM, 884 (1.9%) WSW and 3,483 (7.4%) WSMW. The number of WSMW tested was 4 times the number of WSW tested. Test positivity was highest among WSMW for all sample types (urogenital 11.1%, pharyngeal 2.9% and rectal 21.7%) compared to WSM (urogenital 9.6%, pharyngeal 1.9% and rectal 9.8%) and WSW (urogenital 7.9%, pharyngeal 1.4%, and rectal 0%).

### Men:

Of the 24,081 specimens from men, 17,579 (73.0%) were urogenital, 5,929 (24.6%) were pharyngeal, and 573 (2.4%) were rectal. Considering the gender of men's sex partners, among the 24,081 specimens from men, 20,464 (85.0%) were from MSW and 3,617 (15.0%) were from MSM

Of the 20,464 specimens among MSW, 15,626 (76.4%) were urogenital and 4,838 (23.6%) were pharyngeal. No rectal samples were collected among MSW. Among the urogenital specimens, 2,613 (16.7%) were positive for CT and 1,487 (9.5%) were positive for NG; and among pharyngeal samples, 54 (1.1%) were positive for CT and 222 (4.6%) were positive for NG. Among MSW who were tested, urogenital specimens were more likely to test positive than specimens from the throat. Pharyngeal specimens were submitted by 31.0% of MSW. There were 276 pharyngeal infections identified including 175 infections (26 CT and 149 NG) from MSW who had negative urogenital tests and would have been missed with urogenital-only screening. These 175 infections account for 3.9% of the 4,376 infections identified in MSW.

Of the 3,617 specimens among MSM, 1,953 (54.0%) were urogenital, 1,091 (30.2%) pharyngeal and 573 (15.8%) were rectal. Among the urogenital specimens, 208 (10.7%) were positive for CT and 182 (9.3%) were positive for NG; among pharyngeal samples, 33 (3.0%) were positive for CT and 97 (8.9%) were positive for NG; and among rectal samples, 95 (16.6%) were positive for CT and 134 (23.4%) were positive for NG. Among MSM who were tested, the site most likely to be positive was the rectum (CT 16.6% and NG 23.4%). Rectal and pharyngeal specimens were more commonly submitted by MSM (29.1% rectal and 55.9% pharyngeal) than by women (1.1% rectal and 20.4% pharyngeal) or MSW (none tested for rectal and 31.0% pharyngeal). Among 359 CT and NG cases identified in MSM through extragenital testing, 290 cases (116 CT and 174 NG) were from men who had negative urogenital tests and would have been missed with urogenital-only screening. These 290 infections account for 38.7% of the 749 infections identified in MSM.

### Discussion:

Our study found that when the Louisiana Office of Public Health – STD/HIV/Hepatitis Program introduced extragenital screening, more infections, and more people with

infections, were identified. This is consistent with previous studies including a study among women attending STI clinics in the Netherlands which found an additional 10% of CT infections and 30% of NG infections diagnosed after implementing extragenital testing based on exposure history.<sup>26</sup>

The likelihood of infection in our study could be calculated in two ways: among those tested or among those asked about exposure. For example, in our study 38,507 women were asked about their exposure, among whom 439 reported anal sex and were tested. Among them, 71 had a positive test result at the rectal site. Thus 0.2% (71/38,507) of women asked about their exposure had rectal infections, and 16.1% (71/439) of women tested had rectal infections. Although infections were relatively common among those who reported exposure and tested, only 1.1% (439/38,507) reported anal sex. Data from other studies found that 10% - 30% of women engaged in receptive anal intercourse<sup>27,28,29</sup> which suggests that women in our parish health units may have under-reported receptive anal sex. Twenty percent (7,868/38,507) of women submitted pharyngeal specimens, so, again, infections were relatively common among those submitting specimens, (5.8%), but we found only 459 pharyngeal infections among 38,507 women asked about exposure (1.2%).

Among women who were tested, positivity was 3.8% for pharyngeal NG, 2.0% for pharyngeal CT, 4.6% for rectal NG, and 11.6% for rectal CT. These findings are consistent with previous studies including a study in Baltimore City STI clinics where positivity was 2.6% for pharyngeal NG, 3.0% for pharyngeal CT, 3.0% for rectal NG, and 13.8% for rectal CT.<sup>24</sup> Several other studies in women found pharyngeal NG positivity between 1–2%, pharyngeal CT positivity between 1–3%, rectal NG positivity between 0–3% and rectal CT positivity between 7–17%. Interestingly, rectal CT and NG positivity among women varied significantly by study with positivity ranging from 0%–29%.<sup>30, 31s, 24,32s, 33s,34s,35s</sup>

In our study, among women who were tested, some had infections that would have been missed without extragenital testing: 2.7% pharyngeal NG, 1.8% pharyngeal CT, 3.2% rectal NG, and 7.3% rectal CT. Overall, in our study, 4.4% of all CT infections identified and 15.3% of all NG infections identified among women would have been missed with urogenital-only screening. In Baltimore City, 13.8% of CT infections and 30.3% of NG infections among women would have been missed with urogenital-only testing.<sup>24</sup> Although these percentages are much higher than our study, they only included STI clinic clients. A study among women in college health settings found 4.4% of CT and 28.6% of NG infections would have been missed with urogenital-only screening.<sup>23</sup> Another study among women in 24 STD clinics in the US who reported receptive anal intercourse found that 20.5% of CT and 18.0% of NG infections would have been missed with urogenital-only screening.<sup>22</sup> Among a large cohort of women attending STI centers in the Netherlands, 12.9% of CT and 30.0% of NG infections would have been missed without extragenital screening.<sup>21</sup>

Among MSW, positivity was 4.6% for pharyngeal NG and 1.1% for pharyngeal CT. Rectal testing was not done among MSW as there was no reported anal sex. In our study, among MSW who were tested, some had infections that would have been missed without extragenital testing: 3.1% pharyngeal NG, 0.5% pharyngeal CT, 0% rectal NG, and 0%



rectal CT. Overall, in our study, 8.7% of all NG infections identified and 1% of all CT infections identified among MSW would have been missed with urogenital-only screening.

The prevalence of extragenital infections among MSW in several studies ranged from 0.4–15.5% for pharyngeal NG and from 0–22.0% for pharyngeal CT.<sup>24,32s,36s,37s</sup> Data regarding extragenital CT and NG infections among MSW are limited – but available studies show that between 0.3% and 1.0% of CT infections and between 1.0% and 13.0% of NG infections would have been missed without extragenital testing.<sup>24,38s</sup>

Among MSM, positivity was 8.9% for pharyngeal NG, 3.0% for pharyngeal CT, 23.4% for rectal NG, and 16.6% for rectal CT. These findings are consistent with multiple previous studies. A systematic review of the literature found pharyngeal NG prevalence ranging from 0.5–16.5%, pharyngeal CT prevalence ranging 0–3.6%, rectal NG prevalence ranging from 0.2–24.0%, and rectal CT prevalence ranging from 2.1%–23.0%.<sup>36s,39s</sup> In our study, among MSM who were tested, some had pharyngeal infections and several had rectal infections that would have been missed without extragenital testing: 4.9% pharyngeal NG, 2.6% pharyngeal CT, 20.9% rectal NG, and 15.4% rectal CT. Overall, in our study, 42.1% of all NG infections identified and 34.5% of all CT infections identified among MSM would have been missed without extragenital screening. A study in San Francisco STI clinics and gay men's health centers reported that 64% of NG infections and 53% of CT infections among MSM would have been missed with urogenital only testing.<sup>9</sup> Similarly, a study in 42 STI clinics in the US found that 70% of NG infections and 85% of CT infections would have been missed in MSM without extragenital testing.<sup>40s</sup>

The importance of finding and treating rectal NG and CT infections among MSM is based on a study where men who had rectal NG and CT had 2–5 times higher risk of HIV acquisition compared to those without rectal NG and CT.<sup>25</sup> Early diagnosis and treatment of rectal NG and CT is often used for HIV prevention among both HIV-negative and HIV-positive MSM.<sup>41s,42s</sup> In addition, identifying rectal infections among MSM might increase uptake of HIV PrEP.

The importance of finding and treating rectal NG and CT infections among women is not well described. For women, 1 of 11 with untreated urogenital chlamydia will develop PID<sup>43s</sup> and an estimated 10% of those will develop infertility.<sup>44s</sup> The presence of a genital STI is associated with increased HIV transmission in heterosexuals<sup>32s</sup> – and women with syphilis and gonorrhea are at increased risk for HIV infection.<sup>45s</sup> But in 2008, the risk of newly diagnosed HIV for MSM was 58 times the risk for women,<sup>46s</sup> so even if rectal infections increase a woman's risk of HIV acquisition, her absolute risk remains low.<sup>47s</sup>

The importance of finding and treating pharyngeal NG infections has also not been well established. NG and CT infections can be transmitted from female throats to the urethra of their male partners,<sup>48s</sup> and pharyngeal STIs can be transmitted to the urethra in the absence of other forms of sexual intercourse in MSM.<sup>49s</sup> Some researchers have suggested that deep kissing might transmit pharyngeal NG.<sup>50s,51s</sup> So, in theory, undetected and untreated pharyngeal STIs could facilitate spread. Untreated pharyngeal NG may play a role in acquiring antibiotic resistance through horizontal gene transfer.<sup>52s,53s,54s</sup> However,

pharyngeal CT and NG can spontaneously clear in 4 to 6 months without treatment.<sup>55s,56s</sup> So, the actual impact of untreated pharyngeal NG on antibiotic resistance is currently theoretical.

Strengths of this study include stratification by gender of sex partners and the large sample size in general. Limitations include the self-reporting of sexual behaviors - which may be affected by recall bias or may be underreported due to stigma. Among heterosexuals in 20 US cities, 30% of women reported receptive anal sex in the preceding year<sup>27</sup> and among women in community and clinical settings in South Africa, 10% reported anal intercourse.<sup>28</sup> Another study found 19% of women reporting receptive anal sex in the year after an STD clinic visit.<sup>29</sup>

The major limitation of this study was that a patient could only be screened at two anatomical sites in a single visit regardless of exposure history. In women who engaged in receptive vaginal intercourse, receptive anal intercourse, and fellatio, only two specimens could be submitted – a urogenital and one extragenital. The health department attempted to minimize this limitation by taking one urogenital specimen and the extragenital specimen of the site with more frequent or higher risk exposure. Therefore, we may have underestimated pharyngeal infections in relation to rectal infections, because rectal exposure was given priority for testing. Additional limitations include small numbers in some categories and the inclusion of patients presenting for asymptomatic screening and diagnosis (symptomatic testing).

We found extragenital CT and NG infections in women and MSW, but we had to screen a lot of people to find a few infections, and untreated infections in these anatomical locations have not been associated with disease and sequelae. Current evidence remains insufficient to assess the balance of benefits and harms of extragenital screening among women and MSW. With limited resources, increasing extragenital screening of MSW and WSM, with unknown long-term benefits, may reduce screening at urogenital sites or among populations (e.g. MSM) with established long-term benefits, such as HIV prevention.

More research is needed to establish the contribution of untreated extragenital NG and CT infections to antimicrobial resistance, HIV acquisition, and the persistence of these infections in the community.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgement:

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**Table 1:**

Characteristics of Patients Tested at Louisiana Parish Health Units, Feb 2016 – Jun 2019

Characteristics	Total Patients N (%)	Urogenital only n (%)	Extragenital only n (%)	Urogenital and Extragenital n (%)
	56,086	41,277 (74)	295 (<1)	14,514 (26)
<b>Gender</b>				
Female	38,507 (69)	30,200 (78)	7 (<1)	8,300 (22)
Male	17,579 (31)	11,077 (63)	288 (2)	6,214 (35)
<b>Race/Ethnicity</b>				
Black, Non-Hispanic	40,963 (73)	29,777 (73)	189 (<1)	10,997 (27)
White, Non-Hispanic	11,180 (20)	8,153 (73)	79 (1)	2,948 (26)
Hispanic	2,879 (5)	2,502 (87)	23 (1)	354 (12)
Other/MultiRace *	830 (1)	653 (79)	1 (<1)	176 (21)
Unknown	234 (<1)	192 (82)	3 (1)	39 (17)
<b>Age Group</b>				
14	450 (1)	407 (90)	0 (0)	43 (10)
15–19	7,902 (14)	6,246 (79)	6 (<1)	1,650 (21)
20–24	14,209 (25)	10,096 (71)	97 (1)	4,016 (28)
25–29	12,450 (22)	8,708 (70)	83 (1)	3,659 (29)
30–34	8,405 (15)	6,097 (73)	61 (1)	2,247 (27)
35–39	5,427 (10)	4,027 (74)	27 (<1)	1,373 (25)
40–44	2,917 (5)	2,215 (76)	9 (<1)	693 (24)
45+	4,326 (8)	3,481 (80)	12 (<1)	833 (19)
<b>Sexual Orientation **</b>				
Female				
WSM	35,422 (92)	28,397 (80)	0 (0)	7,025 (20)
WSW	606 (2)	328 (54)	1 (<1)	277 (46)
WSMW	2,479 (6)	1,475 (59)	6 (<1)	998 (40)
Male				
MSW	15,626 (89)	10,788 (69)	0 (0)	4,838 (31)
MSM ***	1,953 (11)	289 (15)	288 (15)	1,376 (70)

\* Other/MultiRace includes – Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, More than One race and Other race

\*\* Sexual Orientation: WSM = Women who have sex with only men; WSW = women who have sex with only women; WSMW = women who have sex with both men and women; MSW = men who have sex with only women; MSM = men who have sex with only men; Additionally, MSWM = men who have sex with both women and men, were included in MSM category

\*\*\* MSM category includes men who have sex with men (MSM) and men who have sex with both women and men (MSWM)

**Table 2:**

Extragenital and Urogenital Test Results by Gender and Gender of Sex Partner at Louisiana Parish Health Units, Feb 2016-Jun 2019

Group	Specimen Source	Number Tested	Chlamydia Positive N (%) <sup>‡</sup>	Chlamydia Would Have Been Missed <sup>*</sup> n (%) <sup>‡</sup>	Gonorrhea Positive N (%) <sup>‡</sup>	Gonorrhea Would Have Been Missed <sup>*</sup> n (%) <sup>‡</sup>
<b>WSM</b>	Rectal	368	36 (9.8)	22 (6.0)	12 (3.3)	8 (2.2)
	Pharyngeal	6,657	129 (1.9)	117 (1.8)	254 (3.8)	182 (2.7)
	Urogenital	35,422	3,389 (9.6)		1,023 (2.9)	
<b>WSW</b>	Rectal	2	0 (0)	0 (0)	0 (0)	0 (0)
	Pharyngeal	276	4 (1.4)	2 (0.7)	4 (1.4)	3 (1.1)
	Urogenital	606	48 (7.9)		22 (3.6)	
<b>WSMW</b>	Rectal	69	15 (21.7)	10 (14.5)	8 (11.6)	6 (8.7)
	Pharyngeal	935	27 (2.9)	22 (2.4)	41 (4.4)	28 (3.0)
	Urogenital	2,479	275 (11.1)		116 (4.7)	
<b>All Female</b>	Rectal	439	51 (11.6)	32 (7.3)	20 (4.6)	14 (3.2)
	Pharyngeal	7,868	160 (2.0)	141 (1.8)	299 (3.8)	213 (2.7)
	Urogenital	38,507	3,712 (9.6)		1,161 (3.0)	
<b>MSW</b>	Rectal	0	0 (0)	0 (0.0)	0 (0)	0 (0)
	Pharyngeal	4,838	54 (1.1)	26 (0.5)	222 (4.6)	149 (3.1)
	Urogenital	15,626	2,613 (16.7)		1,487 (9.5)	
<b>MSM**</b>	Rectal	573	95 (16.6)	88 (15.4)	134 (23.4)	120 (20.9)
	Pharyngeal	1,091	33 (3.0)	28 (2.6)	97 (8.9)	54 (4.9)
	Urogenital	1,953	208 (10.7)		182 (9.3)	
<b>All Male</b>	Rectal	573	95 (16.6)	88 (15.4)	134 (23.4)	120 (20.9)
	Pharyngeal	5,929	87 (1.3)	54 (0.9)	319 (5.4)	203 (3.4)
	Urogenital	17,579	2,821 (16.0)		1,669 (9.5)	

\* For these patients there was no concomitant urogenital infection detected, so the extragenital infection would have gone undetected and untreated without extragenital testing

\*\* MSM category includes men who have sex with men (MSM) and men who have sex with both women and men (MSWM)

<sup>‡</sup> Denominator is number tested at the site