

Prevalence of Rectal, Urethral, and Pharyngeal Chlamydia and Gonorrhea Detected in 2 Clinical Settings among Men Who Have Sex with Men: San Francisco, California, 2003

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Background. The Centers for Disease Control and Prevention developed screening and diagnostic testing guidelines for chlamydia and gonorrhea at urethral, rectal, and pharyngeal sites for men who have sex with men (MSM). However, in most clinical settings, rectal chlamydial testing is not performed for MSM, and primarily sexually transmitted disease (STD) clinics alone perform routine rectal and pharyngeal gonorrhea screening for asymptomatic men.

Methods. We evaluated the prevalence of rectal, urethral, and pharyngeal chlamydial and gonococcal infections among MSM seen at the municipal STD clinic and the gay men's community health center. We also determined the proportion of asymptomatic rectal infections, described the patterns of single and multiple anatomic sites of infection, and evaluated the proportion of chlamydial infections that would be missed and not treated if MSM were not routinely tested for chlamydia. We tested specimens using previously validated nucleic acid amplification tests (NAATs).

Results. The prevalence of infection varied by anatomic site (chlamydia: rectal, 7.9%; urethral, 5.2%; and pharyngeal, 1.4%; for gonorrhea, rectal, 6.9%; urethral, 6.0%; and pharyngeal, 9.2%). Approximately 85% of rectal infections were asymptomatic supporting the need for routine screening. Because 53% of chlamydial infections and 64% of gonococcal infections were at nonurethral sites, these infections would be missed and not treated if only urethral screening was performed. In addition, >70% of chlamydial infections would be missed and not treated if MSM were tested only for gonorrhea.

Conclusions. Because these infections enhance both HIV transmission and susceptibility, clinical settings serving MSM should evaluate the prevalence of chlamydial and gonococcal infections by anatomic site using validated NAATs.

To reduce the acquisition and transmission of HIV [1] and to improve the sexual health of men who have sex with men (MSM), the Centers for Disease Control and Prevention (CDC) developed screening and diagnostic testing guidelines for HIV and other sexually transmitted diseases (STDs) [2]. Included in the guidelines were specific recommendations for chlamydia and gon-

orrhea screening: annual urethral/urine screening for both infections among sexually active MSM, pharyngeal gonorrhea cultures for MSM with oral-genital exposure, and rectal chlamydia and gonorrhea cultures for MSM who have had receptive anal sex. The CDC recommended screening every 3–6 months for MSM at highest risk (e.g., those with multiple partners or those who used illicit drugs). Screening tests were recommended regardless of reported condom use for insertive or receptive anal sex.

Adherence to the CDC guidelines can be an important strategy to control increases in the rates of chlamydia, gonorrhea, syphilis, and HIV infection among MSM in many large cities in the United States, including San Francisco, California [3–8]. However, widespread anecdotal reports and 1 published report suggest

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Table 1. Prevalence of chlamydial and gonococcal infections at any anatomic site, by demographic characteristic, among men who have sex with men who were seen at 2 clinical settings, San Francisco, California, 2003.

Characteristic	STD clinic (n = 5539)		Gay men's health center (n = 895)					
	Chlamydial infection	P	Gonococcal infection	P	Chlamydial infection	P	Gonococcal infection	P
Age, years		<.001		.02		.12		.94
≤24	67/422 (15.8)		78/422 (18.5)		7/57 (12)		5/57 (8.8)	
25–34	222/1995 (11.1)		314/1995 (15.7)		13/262 (5.0)		20/262 (7.6)	
≥35	305/3122 (9.8)		432/3122 (13.8)		41/576 (7.1)		43/576 (7.5)	
Race/ethnicity		.004		.05		.80		.56
African American	36/396 (9.1)		74/396 (18.7)		1/11 (9.1)		1/11 (9.1)	
Asian/Pacific Islander	88/597 (14.7)		74/597 (12.4)		3/32 (9.4)		4/32 (12.5)	
Hispanic	116/976 (11.9)		131/976 (13.4)		5/60 (8.3)		6/60 (10.0)	
White	352/3530 (10.0)		539/3530 (15.3)		28/360 (7.8)		31/360 (8.6)	
Other/unknown	2/34 (5.9)		5/34 (14.7)		24/431 (5.6)		26/431 (6.0)	
HIV status		<.001		<.001		.02		.05
Positive	195/1259 (15.5)		263/1259 (20.9)		9/60 (15.0)		6/60 (10.0)	
Negative	388/4123 (9.4)		543/4123 (13.2)		18/242 (7.4)		26/242 (10.7)	
Unknown	11/157 (7.0)		18/157 (11.5)		34/593 (5.7)		36/593 (6.1)	
Total	594/5539 (10.7)		824/5539 (14.9)		61/895 (6.8)		68/895 (7.6)	

NOTE. Data are no. of subjects with infection/no. with characteristic (%), unless otherwise indicated.

that few STD clinics and gay men's health centers (GMHCs) in the United States offer rectal chlamydial screening or diagnostic testing, and few GMHCs perform routine rectal or pharyngeal gonorrhea screening for asymptomatic men [9]. The appropriateness of the CDC's chlamydia and gonorrhea screening guidelines for MSM have been questioned by some researchers on the basis of their own findings [10]. To evaluate and encourage appropriate screening strategies, there is a need for more data on the prevalence of chlamydia and gonorrhea among MSM by anatomic site from different populations. Below, we present results from chlamydia and gonorrhea screening and diagnostic tests in 2 clinical settings in San Francisco.

Our objectives were 4-fold: (1) to evaluate the prevalence of rectal, urethral, and pharyngeal chlamydial infections, compared with gonococcal infections, among MSM in San Francisco seen at the municipal STD clinic and the new GMHC; (2) to determine the proportion of asymptomatic rectal and urethral chlamydial and gonococcal infections; (3) to describe the patterns of single and multiple anatomic sites of infection with chlamydia and gonorrhea; and (4) to evaluate the proportion of chlamydial infections missed and not treated in MSM, if they were not tested routinely for chlamydia.

METHODS

Population and clinical procedures. We examined demographic and clinical data from self-identified gay or bisexual men who attended San Francisco's municipal STD clinic during 2003 and from men who attended San Francisco's GMHC dur-

ing the period of July through December 2003. The GMHC opened in July 2003. In both clinical settings, clinicians discussed with all patients the gender of patients' sex partners and recent sexual behavior. On the basis of sexual history, clinicians tested MSM in accordance with San Francisco Department of Public Health protocols [11].

MSM were tested for rectal infections if they reported having receptive anal sex during the previous 6 months, regardless of whether condoms were used or whether they had symptoms or signs of rectal infection. Rectal specimens were collected by inserting a BD Laboratories ProbeTec swab for the female cervix in the distal 3 cm of the anal canal. Specimens were placed in ProbeTec transport media and were stored in accordance with the manufacturer's guidelines.

MSM were tested for urethral infections if they reported having insertive sex (anal, vaginal, or oral), regardless of whether condoms were used or whether they had symptoms or signs of urethral infection. Men with signs or symptoms of urethritis had a urethral specimen collected for gonorrhea culture and Gram staining. All men had urine specimens collected for chlamydia testing and screening. Additionally, urine specimens from asymptomatic men were screened for gonorrhea. Urine specimens were tested using ProbeTec.

MSM were screened for pharyngeal infection if they reported having receptive oral sex during the previous 2 weeks with >1 partner. Pharyngeal specimens were obtained from the tonsillar area and posterior pharyngeal wall using a ProbeTec female cervical swab. Specimens were placed in ProbeTec transport

media and were stored in accordance with the manufacturer's guidelines.

The San Francisco Department of Public Health routinely collects demographic characteristics, test results, and site of test on specimens collected for disease control. We analyzed these data for program evaluation. This activity was therefore designated as public health practice and not research. In accordance with the Code of Federal Regulations, Title 45, Part 46, The Public Service Act, human subjects review is not required for public health, nonresearch activities.

Laboratory methods. Specimens from both clinical settings were tested at the San Francisco Public Health Laboratory, which had previously validated the performance of ProbeTec for detecting chlamydia and gonorrhea in rectal and pharyngeal specimens [12]. The validation study compared the performance of ProbeTec with 2 other nucleic acid amplification tests (NAATs) and gonorrhea and chlamydia culture using the methodology of Black et al. [13].

ProbeTec swabs were processed by the laboratory in accordance with the manufacturer's protocol for the testing of swabs. Urine specimens also were stored and processed in accordance with ProbeTec protocols for urine specimens.

Neisseria gonorrhoeae was isolated by culture from urethral specimens using selective medium (modified Thayer-Martin medium; Microbiological Media), and its identification was confirmed by fluorescent antibody or carbohydrate utilization reactions [14].

Statistical analyses. Our analyses included only MSM who had been tested for chlamydia and/or gonorrhea at ≥ 1 anatomic site. For analytic purposes, rectal symptoms were defined as rectal discharge or a clinical diagnosis of proctitis. Urethral symptoms were defined as urethral discharge, dysuria, or a clinical diagnosis of urethritis. Pharyngeal infections were assumed to be asymptomatic on the basis of an earlier study [15].

SAS software, version 8e (SAS Institute), was used to perform univariate and bivariate analyses with the χ^2 test. Prevalence rate ratios also were calculated.

RESULTS

Table 1 presents the prevalence and demographic characteristics of men tested at the STD clinic ($n = 5539$) and GMHC ($n = 895$). Among gay or bisexual men seen at the STD clinic, the prevalence of chlamydial and gonococcal infections was substantial and varied significantly by race/ethnicity, with Asian/Pacific Islanders having the highest prevalence of chlamydia and African American subjects having the highest prevalence of gonorrhea (table 1). Younger men and men known to be HIV infected also were significantly more likely to have either infection. However, the majority of chlamydial and gonococcal infections were detected among white men (>59%),

men aged ≥ 35 years (>50%), and men who reported that they were HIV uninfected (>65%).

Data from GMHC also revealed that HIV-infected men were at greater risk for chlamydial infection than were HIV-uninfected men (table 1). There were no significant differences between patients with chlamydial infection and those with gonococcal infection with regard to age or race/ethnicity, although race/ethnicity data were missing for nearly one-half of the patients (table 1).

Comparison of data on chlamydial and gonococcal infections, by anatomic site. Among gay or bisexual men with chlamydia or gonorrhea testing at any 1 of 3 anatomic sites,

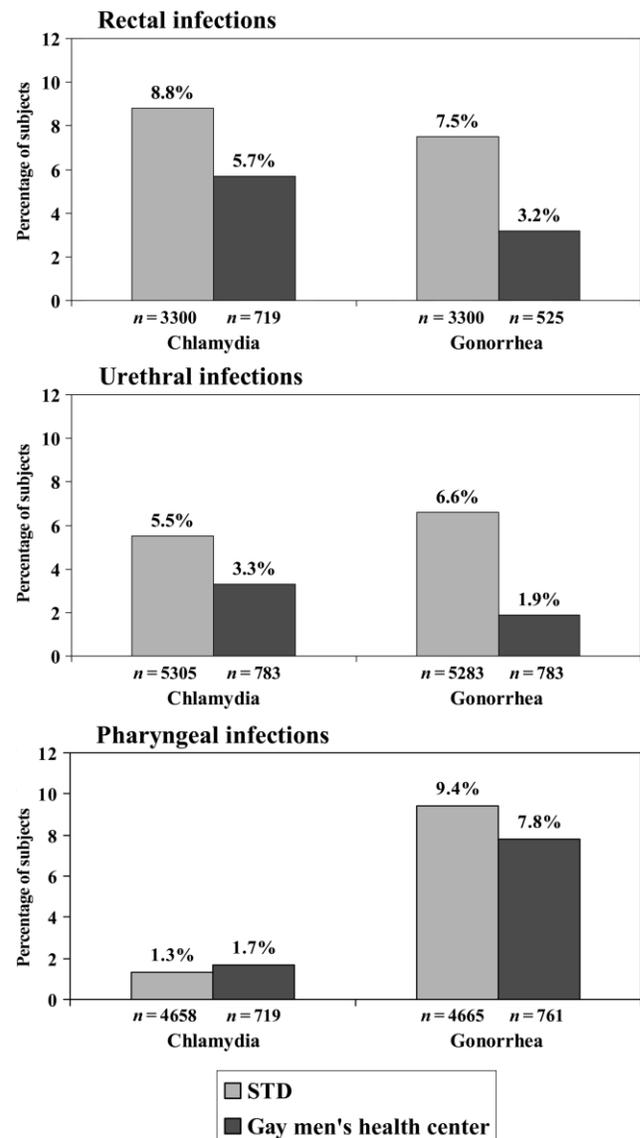


Figure 1. Prevalence of chlamydial and gonococcal infections, by anatomic site of infection, among gay and bisexual men seen in 2 clinical settings (a sexually transmitted diseases clinic [STD] and a gay men's health center), San Francisco, California, 2003.

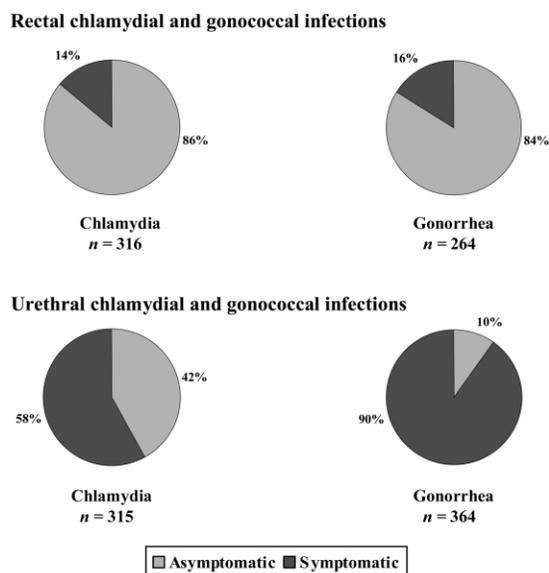


Figure 2. Proportion of asymptomatic and symptomatic rectal and urethral chlamydial and gonococcal infections among men who have sex with men, San Francisco, California, 2003.

3300 (59.6%) of 5539 were tested for rectal infections at the STD clinic, and 525 (58.7%) of 895 were tested at GMHC ($P = .60$). The proportion of men tested for pharyngeal infections also was similar at the 2 clinical settings (4665 [84.2%] of 5539 men at the STD clinic vs. 761 [85.0%] of 895 at GMHC; $P = .53$). However, the proportion of men tested for urethral infections varied significantly by clinical setting (5305 [95.8%] of 5539 at the STD clinic vs. 783 [87.5%] of 895 at GMHC; $P < .001$).

Figure 1 shows that, in both clinical settings, the anatomic site with the highest prevalence of chlamydia was the rectum, followed by the urethra and the pharynx. Gonococcal infections followed a different pattern, with the highest prevalence of infection occurring in the pharynx, followed by the rectum and, finally, the urethra. Among men tested at GMHC, chlamydia was detected more often than gonorrhea at urethral and rectal sites. Among men tested at the STD clinic, chlamydia was more common than gonorrhea only at rectal sites. In both clinical settings, pharyngeal gonococcal infections were substantially more common than were chlamydial pharyngeal infections.

We examined infection status by anatomic site and by HIV status among men seen at the STD clinic. (There were insufficient data on HIV status from the GMHC.) Among 290 men with rectal chlamydia, 164 (56.6%) were HIV negative or had unknown HIV status, as was also the case for 139 (56.5%) of 246 men with rectal gonorrhea. By comparison, among 291 men with urethral chlamydia, 232 (79.7%) were HIV negative or had unknown HIV status, as was also the case for 227

(65.6%) of 346 men with urethral gonorrhea. Of 62 men with pharyngeal chlamydia, 40 (64.5%) were HIV negative or had unknown HIV status, as was also the case for 332 (75.8%) of 438 men with pharyngeal gonorrhea.

Chlamydia and gonorrhea rates, by symptom status, for rectal and urethral infections. Approximately 85% of rectal chlamydial and gonococcal infections seen in both clinical settings were asymptomatic (figure 2). Among men seen at either the STD clinic or the GMHC, those with rectal symptoms or proctitis were significantly more likely to have either chlamydial or gonococcal infections than were persons with no rectal symptoms (44 [20.7%] of 213 symptomatic men and 272 [7.6%] of 3579 asymptomatic men had rectal chlamydia [$P < .001$]; 42 [19.8%] of 212 symptomatic men and 222 [6.1%] of 3613 asymptomatic men had rectal gonorrhea [$P < .001$]).

In contrast to rectal infections, only 42% of urethral chlamydial infections and 10% of urethral gonococcal infections were asymptomatic (figure 2). Urethral chlamydial and gonococcal infections were also more common among persons with urethral symptoms or urethritis (181 [15.1%] of 1198 symptomatic men and 133 [2.7%] of 4891 asymptomatic men had urethral chlamydia [$P < .001$]; 325 [26.9%] of 1209 symptomatic men and 37 [0.8%] of 4857 asymptomatic men had urethral gonorrhea [$P < .001$]).

Patterns of single and multiple anatomic sites of infection with chlamydia and gonorrhea: the proportion of infections missed if only urethral screening was performed. A substantial proportion of men were screened at all 3 anatomic sites (rectal, urethral, and pharyngeal) on the basis of sexual behavior characteristics (recent receptive anal sex, receptive oral sex, insertive anal or oral sex, or vaginal sex) (2995 [54.1%] of 5539 men at the STD clinic and 416 [46.5%] of 895 men at the GMHC; $P < .001$). Table 2 details the distribution of chlamydia and gonorrhea, by anatomic site, among men screened at all

Table 2. Distribution of chlamydia and gonorrhea, by anatomic site of infection, among men who have sex with men who were tested at rectal, urethral, and pharyngeal sites, San Francisco, California, 2003.

Type(s) of infection	No. (%) of subjects	
	Chlamydia (n = 452)	Gonorrhea (n = 574)
Rectal only	242 (53.5)	121 (21.0)
Urethral only	132 (29.2)	86 (14.9)
Pharyngeal only	30 (6.6)	209 (36.4)
Rectal and urethral	28 (6.2)	32 (5.6)
Rectal and pharyngeal	16 (3.5)	70 (12.2)
Urethral and pharyngeal	2 (0.4)	30 (5.2)
All 3 sites	2 (0.4)	26 (4.5)

NOTE. A total of 3411 men were tested for chlamydia, and 3435 were tested for gonorrhea.

Table 3. Distribution of chlamydia and gonorrhea, by site of infection, among men who have sex with men who were tested at urethral and pharyngeal sites, San Francisco, California, 2003.

Type(s) of infection	No. (%) of subjects	
	Chlamydia (n = 122)	Gonorrhea (n = 211)
Urethral only	106 (86.9)	79 (37.4)
Pharyngeal only	14 (11.5)	103 (48.8)
Urethral and pharyngeal	2 (1.6)	29 (13.7)

NOTE. A total of 1715 men were tested for chlamydia, and 1735 were tested for gonorrhea.

3 anatomic sites, with data combined from both clinical settings. For chlamydial infections, 54% of men were infected in the rectum alone, and 10% were infected at >1 anatomic site. If only urethral screening for chlamydia was conducted in this population of men who had receptive anal sex during the previous 6 months, 258 (89.6%) of 288 rectal chlamydial infections would be missed. For gonococcal infections, 36% of men were infected in the pharynx alone, and 28% were infected at >1 anatomic site. If only urethral screening for gonorrhea was performed, 191 (76.7%) of 249 rectal gonococcal infections would be missed.

Some men were screened at only pharyngeal and urethral sites on the basis of their sexual behavior (1487 [26.8%] of 5539 men at the STD clinic and 228 [25.4%] of 896 men at GMHC; $P = .39$). Among these men, the urethra was the most common site of infection for chlamydia, and the pharynx was the most common site for gonorrhea (table 3).

Men screened at all 3 anatomic sites had an overall prevalence of chlamydia of 13.3% and an overall prevalence of gonorrhea of 16.7%. In comparison, men screened only at urethral and pharyngeal sites had a significantly lower overall prevalence of chlamydia (7.1%) and gonorrhea (12.2%). The prevalence rate ratios (RR) for overall risk of infection when men screened at 3 anatomic sites were compared with men screened at 2 sites were as follows: chlamydia, 1.9 (95% CI, 1.5–2.3); gonorrhea, 1.4 (95% CI, 1.2–1.6). On the basis of our data, the majority of chlamydial (53%) and gonococcal (64%) infections would be missed if only urine/urethral screening was performed for MSM (figure 3).

Dual chlamydial and gonococcal infections, by anatomic sites. More than 70% of chlamydial infections at any anatomic site would be missed and not treated if MSM were tested only for gonorrhea (figure 4), assuming that those with gonorrhea were also treated for chlamydia. Rates of coinfection varied by anatomic site among persons with gonorrhea: 61 (23.1%) of 264 men with rectal gonorrhea had rectal chlamydia, 39 (11.1%) of 351 men with urethral gonorrhea had urethral chlamydia, and 22 (4.4%) of 496 men with pharyngeal gonorrhea had pharyngeal chlamydia.

DISCUSSION

In our populations, chlamydia most commonly infected the rectum, was more likely to be asymptomatic, and occurred most often among MSM without concurrent gonococcal infection. Therefore, >70% of chlamydial infections would be missed without comprehensive, routine chlamydia testing and screening. Gonorrhea also most commonly infected nonurethral sites, and 64% of gonococcal infections would be missed without routine rectal and pharyngeal screening.

There are several limitations to our findings. The populations we tested at the STD clinic and the GMHC may not be representative of all MSM, and, thus, our findings may not be generalizable. Other STD clinics and GMHCs should pilot routine chlamydia and gonorrhea screening at all anatomic sites at which MSM are at risk for infection, to better understand the local epidemiology and then to develop appropriate guidelines. In addition, some may be concerned about the specificity of NAATs used at nongenital sites, particularly for gonorrhea, and some may question the validity of our findings, given that we used NAATs. However, recent published research consistently found NAATs to be specific at nongenital sites, even for gonorrhea [12, 15–23].

There are several reasons that current testing practices generally do not follow CDC guidelines. Because of low infection rates in the past [24], and because of the perception that there were few consequences of chlamydial infection in men, chlamydia has not been perceived as a health concern for MSM. This has resulted in minimal chlamydia-control efforts in this population. Recent data suggest that rates of chlamydia have increased among MSM: studies published since 2000 from the western United States [4, 25–28], the United Kingdom [29, 30], Australia [31], and Peru [16] have found moderate-to-high prevalences of chlamydia among MSM. We found that chlamydia was more common than gonorrhea among men with rectal infections and asymptomatic urethral infections. In fact, 6 of 10 previously published reports that examined rectal in-

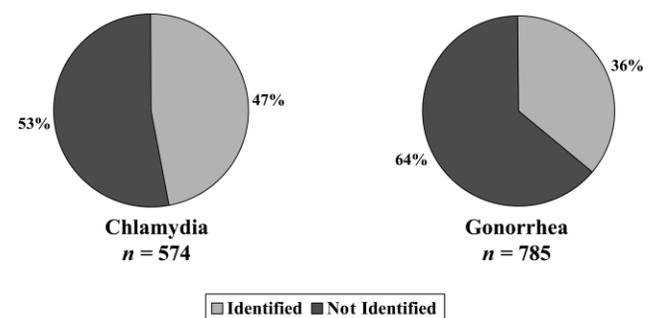


Figure 3. Proportion of chlamydial and gonococcal infections not identified if only urine/urethral screening was performed among men who have sex with men, San Francisco, California, 2003.

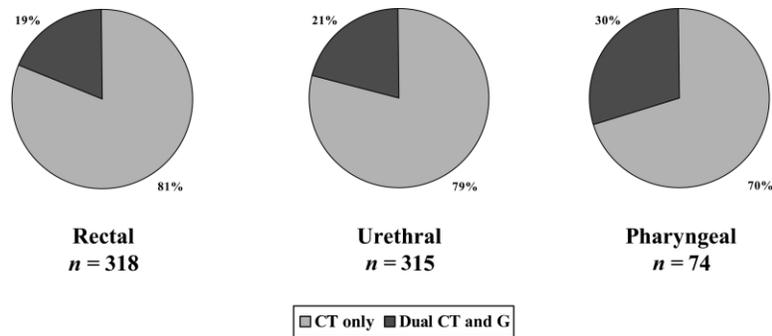


Figure 4. Proportion of subjects with chlamydial infections (CT) who have concurrent gonococcal infection (GC), by site of infection, among men who have sex with men, San Francisco, California, 2003.

fections in MSM also found a higher prevalence of chlamydia than gonorrhea at this site [4, 10, 26, 28, 30–35]. In addition—also consistent with our findings—4 studies that examined asymptomatic urethral chlamydial and gonococcal infections in MSM also found a higher prevalence of chlamydia than gonorrhea [10, 31, 32, 35]. There also are assumptions among some clinicians that most MSM with chlamydia are coinfecting with gonorrhea. Under this assumption, chlamydial infections would be treated once gonorrhea was identified and treated, because current treatment guidelines recommend providing treatment for chlamydia if the patient is being treated for gonorrhea [2]. However, in our population, ~80% of men with rectal and urethral chlamydial infections did not have concurrent gonorrhea and, thus, would remain untreated if no screening was performed.

Cook et al. [10] have questioned the value of CDC screening recommendations for MSM on the basis of their own experience with screening for urethral chlamydial and gonococcal infections and finding very low prevalences of infections. Cook et al. [10] may have assumed that infections at other anatomic sites would be low too. However, our findings are consistent with other reports that found that nonurethral infections were more common than urethral infections. Studies that have reported results of rectal and urethral tests for chlamydia and gonorrhea have generally found that rectal infections were more common than asymptomatic urethral infections among MSM [10, 27, 30–32, 35]. For these reasons, screening guidelines for MSM developed by Public Health–Seattle and King County (Washington) did not recommend routine screening for asymptomatic urethral infections among MSM [36]. In programs with limited resources, given the much higher prevalence of asymptomatic rectal infections, screening for rectal chlamydial and gonococcal infections rather than urethral infections would be a better use of resources and would likely be a more effective HIV prevention strategy.

Another important reason why rectal and pharyngeal screening does not occur in many settings is the current limitations

of laboratory testing. Culture is the only chlamydia and gonorrhea assay for rectal and pharyngeal specimens that has been approved by the US Food and Drug Administration (FDA). Culture is also the only method recommended by the CDC for screening pharyngeal and rectal specimens [2]. However, culture requires cumbersome handling of specimens; also, chlamydia culture is quite expensive, and few laboratories have the capacity to perform it [9]. There is an urgent need for manufacturers of NAATs to seek FDA clearance of NAATs for rectal and pharyngeal sites. However, manufacturers will not devote resources to this process unless there is a clear demand. Public health leaders and other leaders in gay men’s sexual health must advocate for manufacturers to seek FDA clearance for these important screening and diagnostic tools. For now, STD-control programs, GMHCs, and clinicians who serve a large number of MSM should work with local laboratories to validate rectal and pharyngeal NAATs for chlamydia and gonorrhea, to provide improved clinical care and screening for MSM.

A key component of STD control is reducing the risk of HIV transmission associated with STDs. For HIV-infected men, diagnosis and treatment of rectal and urethral infections reduces the likelihood that they will transmit HIV [37], whereas, for HIV-uninfected persons, diagnosis and treatment of rectal infections decrease susceptibility to HIV [37–39]. Given that 55% of men with rectal chlamydial and gonococcal infection reported that they were HIV negative in our study, it is critical that rectal infections be identified and treated to reduce the risk for acquisition of HIV infection. In addition, HIV-uninfected men with urethral infections are at greater risk for HIV infection [37, 38]. Because MSM with urethral symptoms do not always seek treatment and may still engage in sexual activity [31], MSM should be educated about urethral symptoms and their implications. Finally, MSM and clinicians should be educated that the greater the number of anatomic sites with sexual exposures, the greater the risk of contracting an STD.

Providing appropriate STD screening for MSM requires that clinicians perform an STD/HIV risk assessment that includes

asking all male patients the sex of their recent sex partners, the number of sex partners that they have had, and the types of sex that they have had (e.g., oral insertive, oral receptive, anal receptive, anal insertive, and vaginal sex) [36, 40, 41]. If clinicians lack skills in performing straightforward, nonjudgmental risk assessments, guidelines are available at <http://www.stdhivtraining.org/pdf/ask-screen-intervene>. Clinical settings serving MSM should evaluate the prevalence of chlamydial and gonococcal infections by anatomic site using validated NAATs, because these infections greatly enhance HIV transmission and susceptibility. Given recent increases in the rates of STDs and HIV infection among MSM [4–8, 37, 38], performing risk assessments and appropriate screening is critical to the sexual health of MSM and to HIV prevention.

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