Sentinel Surveillance for Pharyngeal Chlamydia and Gonorrhea Among Men Who Have Sex With Men—San Francisco, 2010

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Background: Although a potentially important route for transmission, limited data exist on the burden of pharyngeal chlamydia (CT) and gonorrhea (GC) among men who have sex with men (MSM). We examined pharyngeal CT and GC among MSM screened in San Francisco in 2010.
Methods: MSM seeking services in a variety of clinical settings provided clinician-collected pharyngeal specimens that were tested using the APTIMA Combo 2 platform. The prevalence of pharyngeal CT and GC was estimated at 5 sentinel sites: the municipal STD clinic, a gay men's health clinic, an HIV care clinic, an HIV testing site, and primary care clinics supported by the San Francisco Department of Public Health. Positivity for each infection was calculated as the number of positive tests divided by the number of testers with corresponding confidence intervals (CI).
Results: In 2010, a total of 12,454 pharyngeal CT specimens and 12,457 pharyngeal GC specimens were tested for an overall CT positivity of 1.69% (95% CI: 1.47–1.93) and GC positivity of 5.76% (95% CI: 5.36–6.19). At the 5 sentinel sites, pharyngeal CT positivity ranged from 1.10% (HIV testing site) to 2.28% (STD clinic); pharyngeal GC positivity ranged from 3.4% (HIV testing site) to 7.01% (STD clinic).
Conclusion: Sentinel surveillance data indicate that there is a substantial burden of pharyngeal CT and GC infections among MSM in San Francisco. Identification and treatment of pharyngeal infections could prevent ongoing transmission of these bacteria. Increasing access to nucleic acid amplification tests-based pharyngeal screening should be a public health priority.

Infections with *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are the two most commonly reported conditions to the Centers for Disease Control and Prevention (CDC).[1] An overwhelming majority of chlamydia (CT) and gonorrhea (GC) cases reported to the CDC are diagnosed at urogenital sites[1] and, although a potentially important route for transmission, sparse data exist on the burden of pharyngeal GC and CT infections among men who have sex with men (MSM). Limited availability of high-quality diagnostics for pharyngeal CT and GC impedes regular screening at that anatomical site among MSM. Culture-based diagnostics for pharyngeal CT and GC have poor sensitivity, and although NAAT (nucleic acid amplification tests) have been shown to have improved sensitivity over culture, they are currently not cleared by the FDA for pharyngeal testing.[2–4] As a result, validation at local laboratories of NAAT tests for pharyngeal specimens is required for their use in clinical care.

Although the long-term sequelae of untreated pharyngeal infections are poorly understood, new insights suggest that the public health implications of pharyngeal CT and GC infections are greater than previously thought. Recent reports have indicated that the pharynx may play an important role in the development of antibiotic-resistant gonorrhea.[5] Additionally, analyses from San Francisco have demonstrated that pharyngeal CT and GC can be transmitted from the female and male throat to the male urethra.[3,4] Consequently, reducing the burden of pharyngeal infections may have a broader impact by reducing local burdens of disease at all anatomical sites and slowing the development and transmission of antibiotic-resistant GC.

The San Francisco Department of Public Health has recommended NAAT-based pharyngeal (and rectal) screening for CT and GC among MSM since 2005, when locally validated NAAT-based diagnostics for pharyngeal CT and GC screening became widely available through the San Francisco Public Health Laboratory (PHL). Through the San Francisco Sexually Transmitted Disease (STD) screening program, selected clinical sites are supported to screen MSM for both pharyngeal and rectal CT and GC.

Here, we describe the epidemiology of pharyngeal CT and GC among MSM participating in the STD screening program in 2010 by estimating the prevalence of pharyngeal infections in that population. These data can help inform the planning and prioritization of STD screening services for MSM in San Francisco.

MATERIALS AND METHODS

Pharyngeal Screening

San Francisco's STD Prevention and Control Services (SFSTD) recommends that all sexually active MSM be screened for CT and GC rectally and pharyngeally every 3 to 6 months.[2,6] In this analysis, we examined pharyngeal CT and GC positivity among MSM seeking services at clinical sites that serve large MSM populations and are supported by the STD screening program. Clinical sites in San Francisco that serve large MSM client populations are invited to participate in the SFSTD screening program. Memorandums of understanding are created between SFSTD and each of the screening program sites, outlining expectations that screening will follow local SFSTD recommendations. SFSTD staff provide technical assistance and training on proper specimen collection, clinical

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case management, and treatment. We examined tests conducted at 5 types of sentinel sites from January 1, 2010 through December 31, 2010. The 5 types of clinical settings included the following: (1) San Francisco City Clinic, the only municipal STD clinic in San Francisco; (2) a gay men's health clinic; (3) an HIV care clinic; (4) an HIV testing site; and (5) primary care clinics supported by the San Francisco Department of Public Health.

At the clinical visit, patient risk behavior and gender of sexual partners are assessed. Screening is conducted based on that sexual history using the standardized SFSTD protocol.

Laboratory Methods

The STD screening program provided training for clinical site staff on pharyngeal specimen collection. All pharyngeal specimens were collected by clinical staff at each of the screening sites, using the collection swab from the APTIMA uni-sex kit. For collection, the patient is asked to open his mouth widely and the clinician swabs the throat, ensuring contact with the tonsils, uvula, and posterior walls. The swab is then placed in transport media for testing. Clinician-collected pharyngeal specimens from all test sites were tested at the PHL using the APTIMA Combo 2 platform (GenProbe, San Diego, CA) according to the manufacturer's protocols. Patients found to be infected with CT or GC were treated according to the current CDC treatment recommendations.[7]

Pharyngeal Infections and HIV Status

Positivity for pharyngeal CT and GC was calculated separately and for each of the 5 types of clinical sites using data from laboratory reporting to the San Francisco PHL. Positivity was defined as the proportion of specimens testing positive divided by the total number of specimens collected. Corresponding 95% confidence intervals (CI) were calculated. Because data on HIV status of persons testing were only available from the patients screened at the municipal STD clinic, we report on the pharyngeal CT and GC positivity stratified by HIV serostatus for tests conducted at that site. All analyses were conducted at the visit level, and not using the patient as the unit of analysis. Analyses were conducted using SAS version 9.1 (SAS Institute Inc., Cary, NC).

Human Subjects

As these were deidentified medical records undergoing retrospective analyses, this study was considered exempt from human subjects considerations in accordance with the Code of Federal Regulations, Title 45.

RESULTS

Among 12,454 MSM tested through the San Francisco STD screening program, 210 pharyngeal CT infections were detected, for an overall CT positivity of 1.69% (95% CI: 1.47–1.93). Among 12,457 MSM tested, 718 pharyngeal GC infections were detected, for an overall GC positivity of 5.76% (95% CI: 5.36–6.19). Table 1 presents the positivity of pharyngeal CT and GC in each test setting. Pharyngeal CT positivity ranged from 1.10% (HIV testing site) to 2.28% (STD clinic), and pharyngeal GC positivity ranged from 3.40% (HIV testing site) to 7.01% (STD clinic). A total of 210 and 718 pharyngeal CT and GC cases, respectively, were identified in the 5 types of clinical sites during 2010.

In 2010, a total of 3,949 pharyngeal specimens were collected from MSM at the municipal STD clinic, of which 25% were from MSM known to be HIV-infected, 61% from MSM not infected with HIV, and 14% from MSM with unknown HIV status. Figure 1 shows the positivity for pharyngeal CT and GC by HIV status. Among specimens collected from HIV-uninfected men, pharyngeal CT positivity was 1.57% (95% CI: 1.11–2.15) and pharyngeal GC positivity was 7.02% (95% CI: 6.03–8.11). For specimens collected from HIV-infected individuals, the pharyngeal CT positivity and pharyngeal GC positivity were 4.06% (95% CI: 2.92–5.49) and 6.99% (95% CI: 5.48–8.76), respectively. Although pharyngeal CT positivity was significantly higher for HIV-infected MSM compared with HIV-uninfected MSM at the STD clinic ($P < 0.05$), no difference was seen in the prevalence of pharyngeal GC by HIV serostatus.

TABLE 1. Pharyngeal Chlamydia and Gonorrhea Positivity Among Men Who Have Sex with Men, San Francisco, 2010

Clinical Site	N	CT Positivity (%)	95% CI (%)	GC Positivity (%)	95% CI (%)
HIV testing site	816	1.1	0.5–2.1	3.4	2.3–4.9
STD clinic	3949	2.3	1.8–2.8	7.0	6.2–7.9
Community clinics	505	1.4	0.6–2.8	4.0	2.4–6.1
Gay men's health center	6556	1.4	1.2–1.7	5.5	4.9–6.0
HIV care clinic	633	1.7	0.9–3.1	5.6	3.9–7.6

DISCUSSION

We examined pharyngeal CT and GC positivity among MSM screened in various clinical settings in San Francisco in 2010. Overall positivity for pharyngeal CT and GC was 1.69% and 5.76%, respectively. For both pharyngeal CT and GC, the HIV testing site had the lowest positivity and the municipal STD clinic had the highest positivity. However, a relatively large burden of disease was found at clinical sites supported by the San Francisco STD screening program. Among MSM screened at the STD clinic, no difference in pharyngeal GC positivity was seen by HIV serostatus; for pharyngeal CT, HIV-infected MSM were over twice as likely to be infected compared with HIV-uninfected MSM.

The results presented here highlight several aspects of the epidemiology of pharyngeal GC and CT. Both pharyngeal GC and pharyngeal CT infections were identified at all of the clinical settings examined. Positivity was much higher for pharyngeal GC compared with CT, both overall and within

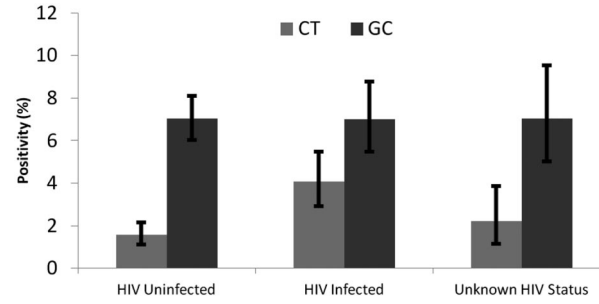

Figure 1. Pharyngeal chlamydia and gonorrhea positivity among men who have sex with men: San Francisco City Clinic 2010.

sites. Furthermore, more than 700 pharyngeal GC and more than 200 pharyngeal CT infections were diagnosed in a 1-year period. Most examinations of pharyngeal GC and CT infections have been limited to disease identified in the context of cohort studies.[8,9] To our knowledge, this is the first report on disease identified as a result of screening programs designed to identify pharyngeal infections in clinical practice. These data highlight the substantial burden of pharyngeal infections among MSM, as well as the potential value of increased access to NAAT-based STD diagnostics for pharyngeal specimens.

In our analysis, we found higher pharyngeal GC positivity compared with pharyngeal CT. Assuming a specificity of the APTIMA test for pharyngeal CT is 98%, we would expect that 2% of the specimens that the test identifies as positive were in fact false positives. Given the low positivity of pharyngeal CT found in our analysis, a sizable amount of the "infections" identified may well be false positives that would be expected as a result of the test characteristics. Many NAAT platforms bundle GC and CT testing for a single specimen. Therefore, while the utility of screening for pharyngeal CT may be minimal, there are minimal cost savings in testing pharyngeal specimens for GC alone.

Although data suggest that both infections can be transmitted from the male and female pharynx to the male urethra,[3,4] it is possible that the throat is a more hospitable environment for GC than CT. This is particularly concerning in light of recent data suggesting that the throat may play an important role in the development of antibiotic-resistant GC. Studies have shown that *Neisseria gonorrhoeae* may acquire genetic material from commensal Neisseria species, many of which routinely inhabit the throat.[5,10] Additionally, pharyngeal GC infections may be more difficult to treat with currently recommended regimens as a result of the decreased penetration of antimicrobial agents into the pharyngeal mucosa.[5,10] Given recent reports of increases in potentially resistant GC infections,[11–13] it may be prudent from a public health perspective to focus more attention on the potential role that pharyngeal infections play in antimicrobial resistance development and ongoing transmission.

Conducting pharyngeal screening is an important part of clinical care that is missing for MSM. In our analysis, 62.7% of pharyngeal GC and 57.8% of pharyngeal CT infections were in MSM who did not have a concurrent urogenital or rectal GC or CT infection (data not shown). Many MSM who are not infected urogenitally have rectal and/or pharyngeal CT or GC infections, which are often asymptomatic and would go undetected and untreated without regular screening at those sites.[6,14] Pharyngeal NAAT testing is relatively uncommon for several reasons, including the lack of NAAT tests validated for pharyngeal specimens and the belief that pharyngeal infections have minimal clinical or public health impact.[15] Despite the potential for missed infections, recent analyses of administrative data show that the overwhelming majority of NAAT testing is urogenital.[16]

A number of limitations of our analysis are worth noting. First, surveillance data were used in our analysis; therefore, the number of cases of pharyngeal infections identified is dependent on how often MSM were screened. Second, the data did not distinguish between asymptomatic and symptomatic cases, as these data are not routinely collected from participating clinical sites. The test, and not the individual, was the unit of analysis examined here; as a result, some MSM may have been tested multiple times and may be overrepresented in the data set. Because the data included men tested at specific settings in San Francisco, this sample may not be representative of all MSM in San Francisco or in the United States. Furthermore, these data represent positivity for pharyngeal GC and CT among men presenting for care at a range of clinical sites in San Francisco. Therefore, our results may not represent population level prevalence among MSM in San Francisco. It is possible that the prevalences presented here are an overestimate (MSM presenting for care may be at higher risk for pharyngeal infections) or an underestimate (MSM presenting for care are less likely to have a pharyngeal infection) of the true prevalences among MSM. Finally, HIV status was only available for MSM tested at City Clinic.

Physicians and clinics are not routinely testing MSM for pharyngeal infections, [15–16] representing an important missed opportunity to prevent ongoing transmission of GC and CT. Sentinel surveillance data indicate that there is a substantial burden of pharyngeal CT and GC infections among MSM in San Francisco. Identification and treatment of pharyngeal infections could prevent ongoing transmission of these bacteria. Increasing access to NAAT-based pharyngeal screening should be a public health priority.

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