

Standard Symptom- and Sexual History–Based Testing Misses Anorectal *Chlamydia trachomatis* and *Neisseria gonorrhoeae* Infections in Swingers and Men Who Have Sex With Men

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Background: Currently, individuals at risk for sexually transmitted diseases (STDs) are tested extragenitally only if indicated, most often when there is a history of self-reported symptoms or self-reported anal sex. The sensitivity of such selective symptom- and sexual history–based testing for detection of anorectal STD has not been determined.

Methods: All men having sex with men (MSM) and swingers (heterosexual couples who have sex with other heterosexual couples and their self-identified heterosexual sex partners) attending our STD clinic (consults: n = 1690) from January 2010 until February 2011 were universally tested for urogenital, anorectal, and oropharyngeal *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections (STD). We compared STD prevalence at anorectal site based on universal versus selective testing.

Results: Sensitivity of selective symptom- and sexual history–based testing for anorectal STD was 52% for homosexual MSM, 40% for bisexual MSM, 43% for bisexual male swingers, 40% for heterosexual male swingers, and 47% for female swingers.

Conclusions: Universal testing of STD clinic clients who were MSM and swingers yielded more than half of all anorectal STD infections and is more sensitive for identifying anorectal STD infections compared with selective testing. Universal testing may be a more effective strategy for interrupting the ongoing transmission in high-risk sexual networks.

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Sexually transmitted diseases (STDs) at extragenital sites are common. Studies found anorectal STD in up to 21% of men having sex with men (MSM)^{1–8} and women.^{8–13} Early detection and treatment are critical strategies in STD control to prevent medical complications and reduce transmission.⁷ Therefore, availability of an appropriate diagnostic test is essential. The highly sensitive and specific nucleic acid amplification tests (NAATs) are superior to culture for extragenital *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) detection.¹⁴ US Centers for Disease Control guidelines advocate annual testing for CT and NG in sexually active women and/or women younger than 26 years¹⁵ but make no recommendations on anatomical site-specific testing in this group. For sexually active MSM, US Centers for Disease Control guidelines advocate anatomical site-specific testing for CT and NG based on sexual history, that is, urogenital testing after insertive anal intercourse, anorectal testing after receptive anal intercourse, and oropharyngeal testing after oral intercourse. World Health Organization guidelines for MSM and transgender individuals advocate periodic testing for asymptomatic urogenital and anorectal CT and NG.¹⁶ Dutch guidelines recommend anorectal testing in those with a history of anal sex and/or symptoms, as well as oropharyngeal testing after self-reported oral sex.¹⁷ However, heterosexual men and women were not often tested anorectally and/or oropharyngeally.^{8,18} Prior clinical studies document high rates of missed extragenital CT/NG by urogenital testing only in MSM^{1,3–8} and women.^{8–10,12,13} However, these studies relied on selective testing based on history of anal sex and/or symptoms. Anorectal CT/NG infections are very likely to be asymptomatic,¹ and history of sexual behavior seems to be an unreliable triaging tool for anatomical site-specific testing.² Reliability may be compromised by underreporting of specific sexual practices or improper history taking. Two other studies universally screened MSM for oropharyngeal CT/NG,^{19,20} and 1 study universally screened HIV positives for anorectal and oropharyngeal CT/NG.²¹ To date, there have been no studies comparing symptom- and/or sexual history–based testing with universal testing at anorectal site in MSM and swingers. Swingers are heterosexual couples who have sex with other heterosexual couples and their self-identified heterosexual sex partners. Swingers differ from nonswinging heterosexual adults by their sexual network, characterized by concurrent sexual partners and high rates of unprotected sex. This makes swingers more prone to CT/NG.²² With current testing practices, many anorectal CT/NG cases are likely to be missed, resulting in underestimated prevalence and ongoing transmission in high-risk populations. In this study, we determined the sensitivity of symptom- and sexual history–based testing,

compared with universal testing at anorectal site in MSM and female/male swingers.

MATERIALS AND METHODS

The South Limburg Public Health Service’s STD unit provides more than 6000 consults annually, offering free examination and treatment at 3 regional outpatient STD clinics.

Study Population

Between January 2010 and February 2011, MSM and male and female swingers were universally tested for CT and NG at 3 anatomical sites—urogenital, anorectal, and oropharyngeal—yielding a total of 1690 consults for analysis. Individuals younger than 18 years were excluded from analysis on medical ethical grounds. Risk group allocation was performed routinely in all attendees at each consult, based on self-reported sexual behavior, in accordance with national testing guidelines. Men having sex with men were defined as men who had sex with 1 or more men in the past 6 months. An individual was registered as a swinger when he or she reported to be part of a male-female couple, who, as a couple, had sex with other male-female couples, or when he or she reported to be a swinger’s heterosexual sex partner. Although swingers, by definition, have a heterosexual orientation, their sexual behavior may include same-sex activities. Swingers form their sexual networks, especially at physical venues such as swingers clubs or erotic parties and virtual venues, for example, specific dating Web sites.

Study Procedures

Specimens to be tested were self-collected vaginal swabs, anorectal swabs, oropharyngeal swabs, and urine and, in a minority of cases, clinician-collected urethral and cervical swabs. Specimens were processed at 2 regional laboratories using 2 different nucleic acid amplification assays (strand displacement amplification [Becton Dickinson ProbeTec ET system, Sparks, MD] and polymerase chain reaction [PCR; Roche Cobas Amplicor, San Francisco, CA], respectively). The rationale for using NAAT assays for testing extragenital specimens is that they have demonstrated higher sensitivity compared with culture.²³ Each of the 2 laboratories performed approximately half of all tests included in our study. Laboratory selection was based on the geographical location of the STD clinic and independent of risk group, anatomical site tested, or day and month of testing. All

NG-positive samples were confirmed with an in-house PCR.²⁴ Serum was tested for *Treponema pallidum* hemagglutination (TPHA) and HIV (anti-HIV[1/2], AxSYM; Abbott Laboratories, Chicago, IL). Reactive samples were confirmed using Western blot (HIVblot 2.2; Genelabs Diagnostics, Science Park, Singapore), according to the manufacturer’s protocol. Besides testing, each consult included the taking of a standardized medical and sexual history by trained study nurses, including demographic data, self-reported symptoms, and sexual behavior in the preceding 6 months. All data were registered in an electronic patient registry.

Variables

Risk group category was hierarchically constructed based on self-reported sexual behavior that is associated with sexual preference and sex of the sex partner(s). Each participant/attendee was allocated to 1 of the after nonoverlapping groups: MSM who only had sex with men (homosexual MSM), MSM who had sex with both men and women (bisexual MSM), male swingers who had sex with both men and women (bisexual male swingers), male swingers who only had sex with women (heterosexual male swingers), and female swingers. Rectal symptoms were defined as any of the following: rectal discharge, bleeding, pain, redness, burning sensation, or itch. Anal sex included insertive anal sex, receptive anal sex, or both. Age (<32, 32–45, >45 years) and number of sex partners in the past 6 months (<3, 3–8, >8) were categorized into 3 groups, both based on tertile distributions. HIV status was defined as (tested) positive or tested negative. Syphilis status was defined as positive or negative, based on the presence or absence of TPHA.

Statistical Analysis

Prevalences of CT, NG, and CT and/or NG (CT/NG) were calculated by dividing the number of positive tests by the total number of tests multiplied by 100. Prevalences of urogenital, anorectal, and oropharyngeal CT/NG were stratified and compared between risk group categories using the χ^2 test. Prevalence of anorectal CT/NG was further stratified for self-reported anal sex (yes/no), rectal symptoms (yes/no), and the combination of self-reported anal sex and/or rectal symptoms (yes/no), using the χ^2 test. The proportion detected (sensitivity) by symptom- and sexual history-based (selective) testing was assessed by dividing the number of

TABLE 1. Characteristics of the Study Population

Characteristic	Risk Group					P
	Homosexual MSM (n = 674)	Bisexual MSM (n = 95)	Bisexual Male Swingers (n = 157)	Heterosexual Male Swingers (n = 303)	Female Swingers (n = 461)	
Age, y	35 (24–47)	40 (25–49)	45 (40–49)	46 (41–51)	44 (38–49)	*
Dutch nationality	85.2% (572)	90.4 (85)	69.0 (107)	68.0 (206)	71.4 (329)	*
No. sex partners past 6 mo	3 (2–6)	4 (2–6)	8 (5–15)	5 (3–10)	6 (4–10)	*
HIV						*
HIV positive	17.2 (116)	7.4 (7)	2.5 (4)	0	0	
Syphilis						*
Positive (TPHA)	13.8 (93)	11.6 (11)	0	0	0.2 (1)	
Self-reported anorectal symptoms	5.9 (40)	1.1 (1)	2.5 (4)	1.0 (3)	2.4 (11)	*
Self-reported anal sex						*
Only with men	51.1 (344)				29.5 (136)	
Only with women				26.1 (79)		
With men and women		52.6 (50)	50.3 (79)			

Data are provided as percentages (n) for dichotomous variables and as median (IQR) for continuous variables.

*P < 0.01.

TABLE 2. Prevalence of CT, NG, and CT/NG at Any Site (Urogenital, Anorectal, Oropharyngeal) by Universal Testing in 5 Different Risk Group Categories

	Homosexual MSM (n = 674)	Bisexual MSM (n = 95)	Bisexual Male Swingers (n = 157)	Heterosexual Male Swingers (n = 303)	Female Swingers (n = 461)	P
CT	10.5%	10.5%	7.0%	5.3%	8.5%	
NG	6.1%	5.3%	2.5%	1.3%	3.0%	*
CT/NG	15.6%	14.7%	9.6%	7.6%	10.8%	*

*P < 0.01.

anorectal CT/NG found by symptom- and sexual history-based testing by the number of anorectal CT/NG found by universal testing and multiplied by 100. The proportion CT/NG missed by symptom- and sexual history-based testing was calculated by dividing the number of anorectal CT/NG without anal sex or rectal symptoms by the total number of anorectal CT/NG found by universal testing multiplied by 100. A P value <0.05 was considered statistically significant. Analyses were performed using SPSS version 17.0.0 (IBM Inc., Somers, NY).

RESULTS

Baseline Characteristics

We included 1690 STD consults by 1052 individuals; these included 482 homosexual MSM, 78 bisexual MSM, 79 bisexual male swingers, 165 heterosexual male swingers, and 248 female swingers. The overall median age was 43 years (interquartile range [IQR], 32–49), MSM were somewhat younger compared with heterosexual male swingers and female swingers

(35 years [IQR, 24–47] vs. 45 years [IQR, 39–50]). Most had Dutch nationality (77.1%); this varied between 68.0% and 90.4%. Rectal symptoms were reported in 1.0% to 5.9% consults; most consults were by homosexual MSM and female swingers. Anal sex was reported in 26.1% to 52.6% consults. Men having sex with men reported anal sex more often compared with swingers (Table 1).

Chlamydia and Gonorrhoea Prevalence and Associated Determinants After Universal Testing

Prevalences of overall CT, NG, and CT/NG varied by risk group category (Table 2). Multiple-site infections (i.e., both anorectal and oropharyngeal) were scarcely observed (in 15 consultations). Prevalence of oropharyngeal CT/NG ranged by risk group category from 2.0% to 5.1% (P = 0.46), prevalence of urogenital CT/NG ranged from 4.5% to 7.2% (P = 0.42), and prevalence of anorectal CT/NG differed by risk group category (Table 3). Prevalence of anorectal CT/NG was higher in consults with reported rectal symptoms (27.6%) compared with

TABLE 3. Absolute Numbers and Prevalences of Anorectal CT, NG, and CT/NG by Universal Testing and Selective Testing With Sensitivity Estimates in 5 Different Risk Group Categories

	Homosexual MSM (n = 674)	Bisexual MSM (n = 95)	Bisexual Male Swingers (n = 157)	Heterosexual Male Swingers (n=303)	Female Swingers (n = 461)	P
CT						
Universal						
n	60	7	6	4	31	
%	8.9	7.4	3.8	1.3	6.7	*
Selective						
n	27	4	3	1	16	
%†	4.0	4.2	1.9	0.3	3.5	†
Sensitivity selective, % (CI)‡	45.0	57.1	50.0	25.0	51.6	
NG						
Universal						
n	28	3	1	1	5	
%	4.2	3.2	0.6	0.3	1.1	*
Selective						
n	20	0	0	1	1	
%	3.0	0	0	0.3	0.2	§
Sensitivity selective, % (CI)‡	71.4	0	0	100	20.0	
CT/NG						
Universal						
n	83	10	7	5	34	
%	12.3	10.5	4.5	1.7	7.4	*
Selective						
n	43	4	3	2	16	
%	6.4	4.2	1.9	0.7	3.5	†
Sensitivity selective, % (CI)‡	51.8	40.0	42.9	40.0	47.1	

*P < 0.0001.

†P < 0.05.

‡Calculated as the proportion of anorectal infections diagnosed by symptom- and sexual history-based testing versus universal testing.

§P < 0.01.

consults without (7.5%; $P < 0.001$). Prevalence of anorectal *CT/NG* did not differ between consults with self-reported anal sex (9.6%) and no self-reported anal sex (7.3%; $P = 0.09$). Prevalence also did not differ by the presence or absence of the combination of anal sex and/or rectal symptoms (9.6% vs. 7.3%; $P = 0.09$). In only 11 (0.7%; confidence interval [CI], 0.4%–1.2%) consults, a *CT/NG* coinfection was diagnosed.

Anorectal Chlamydia/Gonorrhoea Infections Missed in Standard Symptom- and sexual history–Based Testing

The overall proportion of anorectal *CT/NG* missed in symptom- and sexual history–based testing compared with non-selective, universal testing was 51.1% (71/139; CI, 43%–59%) (Table 3). Sensitivity of symptom- and sexual history–based testing for anorectal *CT/NG* differed across groups: 51.8% in homosexual MSM, 40.0% in bisexual MSM, 42.9% in bisexual male swingers, 40.0% in heterosexual male swingers, and 47.1% in female swingers (Table 3). Including self-reported rectal symptoms as an indication for anorectal testing yielded just 2 additional anorectal *CT/NG* diagnoses, somewhat lowering the proportion of missed anorectal *CT/NG*. The proportion of missed anorectal *CT* diagnoses was 55.0% (33/60) in homosexual MSM, 42.9% (3/7) in bisexual MSM, 50.0% (3/6) in bisexual male swingers, 75.0% (3/4) in heterosexual male swingers, and 48.4% (15/31) in female swingers ($P = 0.84$). For *NG*, this was 28.6% (8/28) in homosexual MSM, 100% (3/3) in bisexual MSM, 100% (1/1) in bisexual male swingers, 0% (0/1) in heterosexual male swingers, and 80.0% (4/5) in female swingers ($P = 0.02$). For *CT/NG*, this was 48.2% (40/83) in homosexual MSM, 60.0% (6/10) in bisexual MSM, 57.1% (4/7) in bisexual male swingers, 60.0% (3/5) in heterosexual male swingers, and 52.9% (18/34) in female swingers ($P = 0.92$).

DISCUSSION

In MSM and female and male swingers, sensitivity of symptom- and sexual history–based testing for detection of anorectal *CT/NG* was low. Prevalence of anorectal *CT/NG* was highest in MSM (11%–12%) and female swingers (7%), and the highest numbers of missed *CT/NG* were in these risk groups (49%–60% in MSM, 53% in female swingers).

These findings add to the growing body of evidence supporting universal testing in MSM⁷ and strongly suggest that universal testing may also be warranted for female swingers. Although literature on universal anorectal testing in women is scarce, our findings are supported by Barry et al.,⁹ who found that 80% of the women who tested positive for anorectal *CT* did not report anal sex. Presence of anorectal *CT/NG* in those men and women without a history of self-reported anal sex may be explained by underreporting or alternative transmission routes not captured by routine history taking, for example, anal-digital activity and use of sex toys. In women, autoinoculation by infected vaginal secretions²⁵ may also be a possibility, although scientific evidence for this is scarce.

Because using self-report of sexual behavior as indication for selective testing may be problematic, so is the use of self-reported symptoms. Several studies suggest that anorectal *CT* infections most often are asymptomatic^{1,11}; in our study, the prevalence of self-reported symptoms was very low (5%).

Our study has several limitations. First, we had no sexual history data distinguishing between receptive and insertive anal sex, preventing us from performing analyses accounting for this difference. Limiting testing to those reporting receptive anal sex may yield a high prevalence of anorectal *CT/NG* in this selected group. However, as our study shows, this approach

would likely be overselective, leading to even larger proportions of missed anorectal *CT/NG*.

Second, data on self-reported condom use were unreliable because of a high proportion of missing values in our records. Thus, we were unable to assess the association between condom use and anorectal *CT/NG*. A study by Tian et al.²⁶ in the United States showed that condom use among heterosexuals practicing anal sex was low; 63% never used a condom during anal sex. Data from a surveillance study in the Netherlands revealed that 69% of women did not use a condom during their last anal sexual contact with a casual partner; for men, this was 45%.²⁷

Third, although our instructions on specimen collection were clear,²³ we cannot entirely rule out the possibility of specimen contamination, for example, via the urogenital-anorectal route.

Fourth, the sensitivity of different NAATs in testing of oropharyngeal and anorectal samples is under discussion.^{23,28} Sensitivity of strand displacement amplification and PCR was, in some studies,^{14,28} lower compared with other tests; this could have led to an underestimation of *CT/NG* infections.

In conclusion, our data show low sensitivity of symptom- and sexual history–based testing for detection of anorectal *CT/NG* in high-risk groups. Therefore, *CT/NG* control should include universal anorectal testing in MSM and female swingers for early detection and treatment of *CT* and *NG* to prevent medical complications and reduce further transmission.

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