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Infection positivity among sexual contacts to chlamydia and gonorrhea, STI Surveillance Network, 2021-2023

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Abstract

Background: Patients reporting sexual contact with a person(s) with chlamydia (CT) and/or gonorrhea (NG) are at increased risk of acquiring these sexually transmitted infections (STIs). Presumptive antimicrobial therapy is recommended for sexual contacts, but concerns have been raised about unnecessary antibiotic use.

Methods: We reviewed visits of patients who reported sexual contact to a partner with CT or NG (“contacts”) from 1/2021-10/2023 in 10 STI clinics. We calculated CT and NG positivity, stratified by 3 patient groups (women, men who have sex with men [MSM], and men who have sex with women only [MSW]) and symptomatic status.

Results: Overall, 11,072 (6.8%) CT and/or NG contacts were identified (7,660 [4.7%] CT contacts and 4,988 [3.1%] NG contacts). CT positivity among CT contacts was 35%; NG positivity among NG contacts was 31%. CT positivity did not differ by symptomatic status across patient groups. NG positivity was higher for symptomatic vs. asymptomatic MSM (34%, 95% confidence interval [CI] 31-37% vs 28% [CI 26-30%]) and MSW (37%, CI 33-41% vs 23%, CI 20-27%), but not in women (38%, CI 33-43% vs 37%, CI 32-42%).

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Conflicts of Interest

None declared for any authors.

Conclusions: Substantial CT/NG positivity among sexual contacts to CT or NG was observed. Among CT contacts, CT infection was most often detected in MSW; among NG contacts, NG infection was most often detected in women. However, ~60% did not have either CT or NG. The use of point-of-care tests in this population may optimize antimicrobial use while prioritizing individual clinical care.

Summary

Among 11,072 visits by patients presenting to a network of STI clinics reporting sexual contact to a chlamydia or a gonorrhea-infected partner, 35% and 31% were positive for chlamydia and gonorrhea, respectively.

Keywords

Neisseria gonorrhoeae; *Chlamydia trachomatis*; STI clinic; sexual contact

Introduction

Chlamydia trachomatis (CT) and *Neisseria gonorrhoeae* (NG) are the most common reportable bacterial sexually transmitted infections (STIs) in the United States (US).¹ Rates of both infections have been increasing over the last decade despite the COVID-19 pandemic and public health efforts aimed at prevention, testing, and treatment.² Management of patients who present as sexual contacts to a partner suspected or diagnosed with an STI has been a cornerstone of STI control for decades. Current Centers for Disease Control and Prevention (CDC) guidelines recommend that all sex partners of patients with either CT or NG infection who were exposed in the preceding 60 days undergo evaluation and treatment without laboratory confirmation of infection.³ This public health control policy, known as epidemiologic treatment, not only can reduce the need for patients to return for treatment after laboratory confirmation of infection, but may also hasten resolution of symptoms, reduce disease progression and sequelae, and prevent further transmission.³

The recommendation for epidemiologic treatment is based on evidence that sex partners (sometimes called “contacts”) of persons with CT or NG are at higher risk for acquiring these infections. Numerous studies have documented high CT or NG positivity (21-57%) among sexual contacts across various populations and settings.⁴⁻¹⁵ Despite this high proportion of infection positivity, there are increasing concerns about antimicrobial stewardship and possible contribution of antibiotic overuse to antimicrobial resistant *N. gonorrhoeae* (AMR-NG), prompting some to call for a re-examination of this practice and the adoption of a treatment strategy based on test results.¹³⁻¹⁷ Given escalating concerns around antimicrobial stewardship, we aimed to describe, based on a large network of STI clinic patients, CT and NG positivity rates in symptomatic and asymptomatic sexual contacts to CT and/or NG. We also compared CT and NG positivity between women, men who have sex with women only (MSW), and men who have sex with men (MSM).

Methods

This is a retrospective observational study of routinely collected data from January 1, 2021, through October 31, 2023 in 10 STI clinics participating in the STI Surveillance Network (SSuN), including Baltimore, Maryland (2 clinics), Orange County, California (1 clinic), Florida (Miami-Dade [1 clinic], Escambia County [1 clinic], and Hillsborough County [1 clinic]), Indianapolis, Indiana (1 clinic), New York City (1 clinic), Philadelphia, Pennsylvania (1 clinic), and Seattle, Washington (1 clinic). Full SSuN methods have been described elsewhere^{18A}, but briefly, SSuN is a sentinel STI surveillance network comprised of health departments that was established in 2005. One of SSuN's primary aim is to better understand STI epidemiology and delivery of sexual health services nationally and locally through the collection of de-identified patient level data from clinics' electronic databases. Clinic visits at which patients reported sexual contact to a partner with CT and/or NG were included in the analysis. Men who reported having sex with ≥ 1 male partner (past 3 months) at any of their clinic visits were defined as men who have sex with men (MSM); males who never reported having sex with a male partner and who reported only female sex partners were defined as men who have sex with women (MSW). Women who reported sexual contact to a partner with NG and/or CT were included regardless of self-reported sexual orientation or behaviors. Patients testing positive for CT and/or NG at ≥ 1 anatomic sites from a specimen collected on the same day as their clinic visit were classified as CT/NG positive. We classified patients as symptomatic if they reported any of the following symptoms: pain with urination, anal/vaginal/penile discharge, genital pain, genital itching, genital malodor, or abdominal pain. Patients who denied the presence of any of the above symptoms or whose symptom status was missing were categorized as asymptomatic. The unit of analysis was visit-based, and persons could be included more than once if they had >1 visit for contact to a sexual partner with CT/NG >7 days apart during the study period. While the 7-day window was arbitrarily selected, it was done so that visits with the same diagnosis (ex: contact to CT) were not overcounted within the short timeframe.

Characteristics of contacts in each group were described. We calculated positivity among contacts who were tested for CT and/or NG, stratified by pathogen of contact, sex/sex-of-sex-partner, and symptomatic status. We conducted Chi-square tests to compare positivity between groups and presented 95% confidence intervals (CI) to examine differences between proportions. All analyses were conducted in SAS 9.4 (SAS Institute, Cary, NC).

Results

Between January 2021 and October 2023, there were 11,072 or 6.8% clinic visits among patients reporting sexual contact with a partner with CT and/or NG. This included 7,660 CT contacts (6,084 CT only contacts and 1,576 contacts to both NG and CT) and 4,988 NG contacts (3,412 NG only contacts and 1,576 contacts to both NG and CT). Demographic and clinical information reported by CT and NG contacts are summarized in Table 1. The proportion of both CT contacts and NG contacts was highest in Philadelphia; while the proportion of CT contacts was lowest in Baltimore and Orange County (CA) and the proportion of NG contacts was lowest in Baltimore (MD). Nearly half of the CT contacts were MSW, while MSM represented over half of the NG contacts. The median age of CT

contacts (28 years, interquartile range [IQR 23-33]) was slightly younger than that of NG contacts (30 years, IQR [25-36]). Most of the CT contacts and NG contacts were between the ages of 25-34 years and of Black race. The proportion of contacts who were living with HIV was higher among NG contacts compared with CT contacts (17% vs 10%). Most of the CT contacts and NG contacts were asymptomatic.

CT contacts

Of the 7,660 CT contacts (inclusive of 6,084 CT only and 1,576 NG and CT contacts), 95% were tested for CT (n=7,293) and 35% (n=2,520) tested positive for CT (Figure 1). Of the 6,084 CT only contacts, 95% (n=5,793) were tested for CT and NG, with an additional 13 contact visits tested for NG only (n=5,806). CT positivity among those tested for CT was 37% (2,169/5,793) and NG positivity among those tested for NG was 6% (340/5,806). Of the 5,793 CT only contacts tested for both NG and CT, 41% or 2,363 (194 NG+, 2169 CT+) were positive for either or both pathogens.

MSW contacts to CT were more likely to have CT diagnosed (42%) compared to women (35%) and MSM (24%). CT positivity was similar for contacts with and without symptoms for all patient groups (women: 33%, CI 29-36% versus 37%, CI 34-40%; MSM: 23%, CI 20-26% versus 25%, CI 23-37%); MSW: 40%, CI 37-43% versus 43%, CI 40-45%) (Figure 2).

NG contacts

Of the 4,988 NG contacts (inclusive of 3,412 NG only contacts and 1,576 contacts to NG and CT) 31% tested positive for NG (Figure 1). Of the 3,412 NG only contacts, 96% (n=3,261) were tested for NG and 95% (n=3,224) were tested for CT. NG positivity among NG only contacts who were tested for NG was 32% (1,058/3,261) and CT positivity among those tested for CT was 12% (377/3,224). Of the 3,244 NG contacts who were tested for both NG and CT, 38% (n=1,230) were positive for either or both pathogens.

Women were more likely to have NG infection (38%) compared to MSM (31%) and MSW (29%). Symptomatic men were more likely than asymptomatic men to have NG infection (MSM [34%, CI 31-37% versus 28%, CI 26-30%], and MSW [37%, CI 33-41% versus 23%, CI 20-27%]). However, there was no difference in NG positivity between symptomatic and asymptomatic cisgender female NG contacts (38%, CI 33-43% versus 37%, CI 32-42%) (Figure 2).

CT and NG contacts

Of the 1,576 contacts to both persons with CT and NG, 95% (n=1,500) were tested for CT and 96% (n= 1,519) were tested for NG. CT positivity among those tested for CT was 23% (351/1,500) and NG positivity among those tested for NG was 29% (445/1,519). Of the 1,500 CT/NG contacts tested for both CT and NG, 41% or 616 (351 CT+, 265 NG+) were positive for either or both infections.

Discussion

In this study, we found substantial NG and CT positivity among patients presenting as sexual contacts to persons with CT and/or NG, with more than one-third positive for these infections. This finding supports current recommendations for prioritizing this population for testing. Women contacts to NG were most likely to have NG infection, while MSW contacts to CT were most likely to have CT infection. While symptoms were associated with NG infection for males regardless of sex of sex partner(s), it was not associated with CT infection in any subgroups examined. Despite the prevalence of infection, a substantial proportion of contacts to CT and NG were not infected with either pathogen at the time of testing. This finding is consistent with numerous previously published analyses across diverse geographic settings and populations^{7-15,18}, where most gonorrhea and chlamydia contacts tested negative, pointing to some degree of overuse of antimicrobial therapy as part of epidemiologic treatment.

Our data demonstrates that patients presenting as sexual CT or NG contacts are among STI-related high-priority populations and aggressive screening remains imperative. This is especially true in the case of women contacts, as we know that women are disproportionately affected by STIs, in part owing to the higher efficiency of male-to-female STI transmission and the biology of the female reproductive tract.¹⁹ Interestingly, compared with MSM contacts, CT positivity (35%) and NG positivity (38%) was higher in women CT and NG contacts, respectively, underscoring the importance of referral and testing of all women exposed to these infections. For context, the proportion of all female STI clinic patients who tested positive for CT and NG in the SSuN network in 2022 (inclusive of additional clinic sites not included in our analysis) was 5.3% and 10.3%, respectively.¹ However, the provision of epidemiologic treatment equates to over half of the women being treated unnecessarily (in that they did not have either CT or NG infection). Given concerns of antimicrobial stewardship, new approaches are needed to reduce unnecessary antimicrobial use while interrupting the chain of transmission sufficiently to reduce disease progression and prevent serious sequelae.

A more nuanced approach may need to be considered for males who present as contacts to NG. We found differences in NG positivity between symptomatic and asymptomatic MSM and MSW NG contacts, suggesting that the presence of symptoms may be associated with a greater likelihood of NG infection. Given that asymptomatic MSM and MSW contacts had a lower proportion of NG infection compared to their symptomatic counterparts, further studies may be warranted to help inform if epidemiologic treatment for all asymptomatic MSM and MSW NG contacts is necessary or whether a shared decision-making approach based on counseling on the risks and benefits of delayed treatment is preferable. This may be especially important given that MSM have been repeatedly linked to transmission of resistant *N. gonorrhoeae*.²⁰ For CT contacts, the impact of symptoms was not statistically significant for CT infection among MSM or MSW. Without established predictors to prioritize contacts who are likely to test positive or confirmation of who is positive, the public health strategy of empiric treatment has justified this tradeoff. Additionally, in the case of asymptomatic MSW, treatment may provide an added benefit given that their female partners are at higher risk for both infection and sequelae.

The basis of current recommendations, providing treatment to sexual CT/NG contacts while awaiting test results, presents a challenging tradeoff, leading some to call for a reexamination of the practice of epidemiologic treatment. Some of the factors cited in support of epidemiologic treatment include preventing ongoing transmission and sequelae, concerns of loss to follow-up, and need for patient to return for treatment/increases in clinic work flow to allow for follow-up appointments.²¹ In a recent anonymous survey conducted in Australian sexual health clinics, patients supported a switch to non-empirical treatment if their results were reported quickly and if the ability to return for treatment was considered.²² While some local settings have opted to discontinue the routine use of treatment in asymptomatic contacts, this may not be entirely feasible or practical in all settings because of contextual factors, including access to healthcare services, local positivity rates and the likelihood of patients returning for treatment. But the implementation of rapid or near rapid point-of-care (POC) tests for CT and NG may be a solution that can both decrease unnecessary antibiotic use and its associated costs and drastically reduce the potential of delayed treatment and loss to follow-up. Currently, use in most clinical settings is cost prohibitive²³ and more implementation studies are needed to optimize its full adoption. However, mathematical modelling suggests that CT/NG POC assays may be useful in settings where there is a strong potential for ongoing STI transmission in the time between testing and treatment and where the likelihood of patients returning for STI test results and treatment are low.²⁴ We believe our findings lend support for the consideration of using POC tests in these populations. First, the CT positivity among those reporting only contacts to NG, and similarly the NG positivity among those only reporting CT contact is more consistent with baseline CT or NG positivity of STI clinic patients¹, illustrating how much higher the CT positivity was among CT contacts and the NG positivity was among NG contacts. Though a cost analysis is beyond the scope of this paper, exploring the targeted use of CT/NG POCT from a cost perspective may seem reasonable given the relatively small patient numbers coupled with the 40% positivity for either condition in this patient group.

Secondly, at least in the case of NG, results of the POCT would differentiate chlamydia from gonorrhea infection and avoid overprescription of doxycycline for those contacts positive for gonorrhea only. Until POC tests are more widely available, adjustments to the practice of universal epidemiologic treatment may be warranted to limit this intervention to those most likely to be infected, unable, or unlikely to return for treatment, and/or at highest risk of serious sequelae.

There are important limitations that may have affected our analysis. First, this was a retrospective study reliant on the integrity of data within the medical record, including behavioral data which might be subject to recall and social desirability biases. Second, this study was conducted in urban sexual health clinics and has limited generalizability to rural and non-STI clinic populations or to other populations with a different background prevalence of NG or CT infection. Third, our study population self-reported contact to chlamydia or gonorrhea without laboratory confirmation of their partner(s) infection and the time since exposure and anatomic site of exposure were not assessed. Despite these limitations, our sample size of over 11,000 contacts in geographically diverse STI clinics exceeded the number of patients included in most previously published studies.

In conclusion, a substantial proportion of patients reporting sexual contact with CT or NG positive partners were found to be infected with CT and NG respectively. The justification of the current epidemiologic treatment guidance for contacts is that it addresses one of the main problems of STI control, that CT and NG are frequently asymptomatic. Justification for presumptive treatment of sex partners has been centered on interrupting the chain of transmission sufficiently to reduce disease progression and prevent serious sequelae. But this strategy is not without its costs. Given the availability of new testing technologies, reconsideration of the balance and tradeoff between appropriate treatment of the 40% positive contacts on the day of the clinic visit and inappropriate treatment of the 60% of negative contacts is needed.

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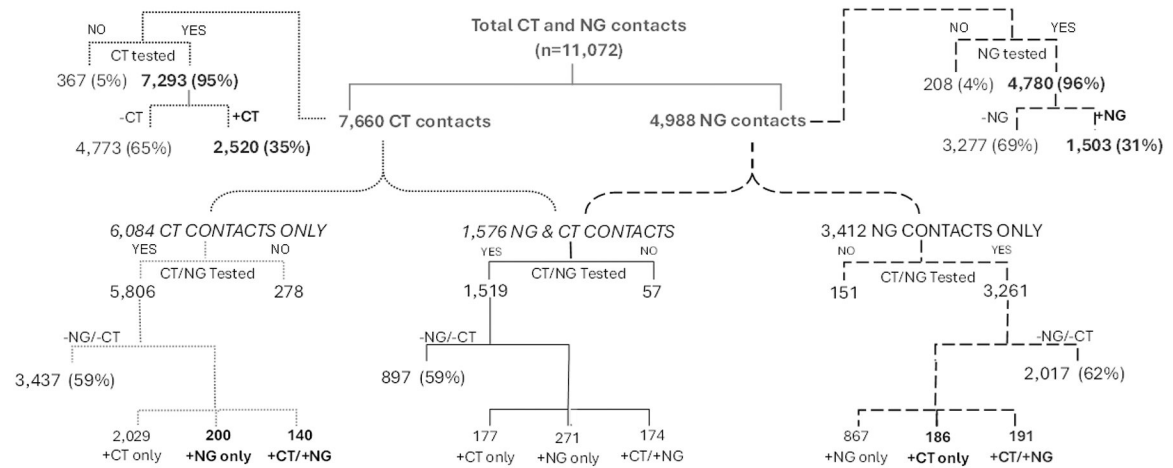
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“The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official and conclusions in this report are those of the author(s) and do not necessarily represent the official position of [the Centers for Disease Control and Prevention/the Agency for Toxic Substances and Disease Registry].”

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**Figure 1.**

Number and percentage of tested and infected NG contacts and CT contacts, STI Surveillance Network 2021-2023

CT = *Chlamydia trachomatis*; NG = *Neisseria gonorrhoeae*

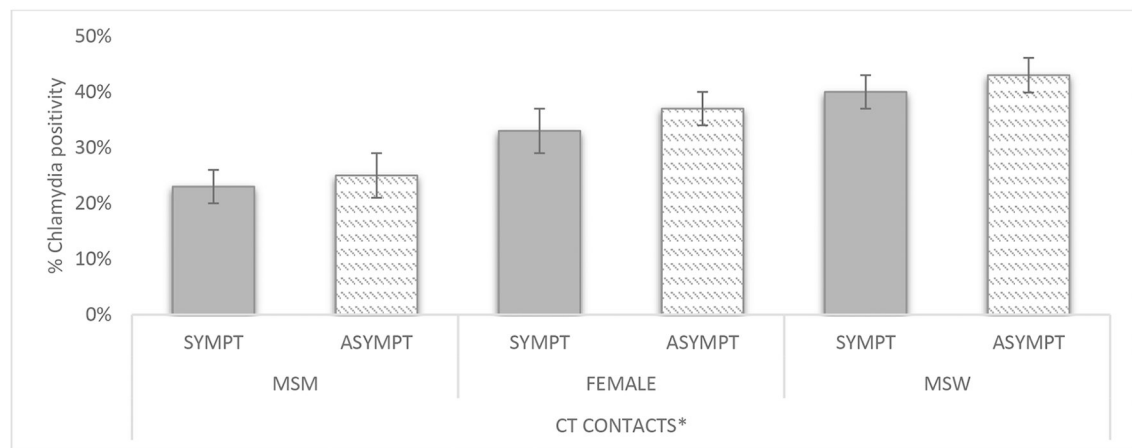
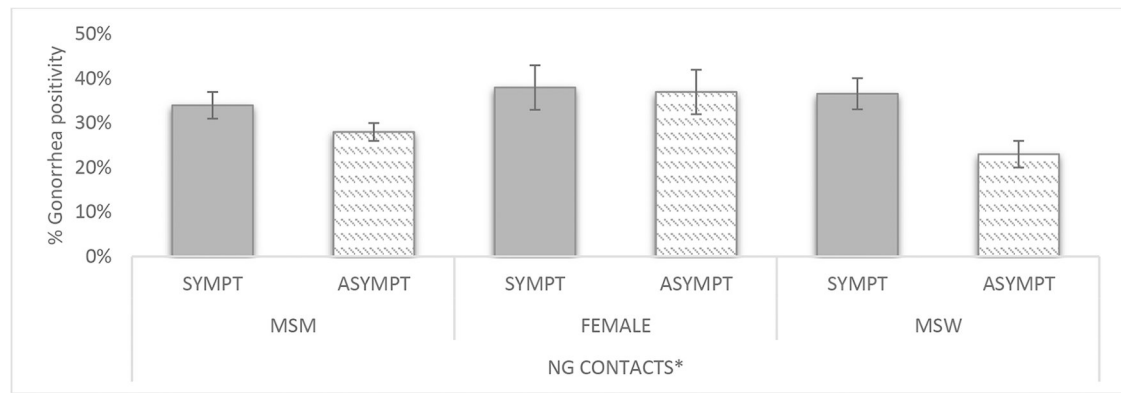


Figure 2A.

Proportion of gonorrhea positivity among gonorrhea contacts by symptomatic status, STI Surveillance Network, 2021-2023

Figure 2B. Proportion of chlamydia positivity among chlamydia contacts by symptomatic status, STI Surveillance Network, 2021-2023.

SYMPT = symptomatic

ASYMPT = asymptomatic

MSM = men who have sex with men or men and women

MSW = men who have sex with women only

CT = *Chlamydia trachomatis*; NG = *Neisseria gonorrhoeae*

Note: Symptomatic visits included patients who reported ≥ 1 of the following symptoms: pain with urination, anal/vaginal/penile discharge, genital pain, genital itching/ malodor, or abdominal pain. Patients who denied the presence of any of the above symptoms or whose symptom status was missing were categorized as asymptomatic.

*The proportion of chlamydia positivity in contacts was based on the number of chlamydia contact visits that were evaluated and same-day tested for chlamydia. The proportion of

gonorrhea positivity in contacts was based on the number of gonorrhea contact visits that were evaluated and same-day tested for gonorrhea.

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Table 1:

Demographics, sexual behavior, and clinical information among patient CT and NG contact visits, STI Surveillance Network, 2021-2023

	CT CONTACT (N=7,660)	NG CONTACT (N=4,988)
	# (%)	# (%)
Jurisdiction		
Baltimore, MD	558 (7)	295 (6)
Orange County, CA	567 (7)	544 (11)
Florida	757 (10)	380 (8)
Indianapolis, IN	1,417 (18)	623 (12)
New York City, NY	1,333 (17)	904 (18)
Philadelphia, PH	1,797 (23)	1,168 (23)
Seattle, WA	1,231 (16)	1,074 (22)
Sex and Sex of Sex Partner(s)		
Cisgender women	1,675 (22)	854 (17)
MSM	2,491 (32)	2,929 (59)
MSW	3,494 (46)	1,205 (24)
Age Group		
Median age, years (IQR)	28 (23-33)	30, (25-36)
<24	2,486 (33)	1,061 (21)
25-34	3,509 (46)	2,389 (48)
35-44	1,140 (15)	988 (20)
45+	525 (7)	550 (11)
Race/Ethnicity		
White, Non-Hispanic	1,721 (22)	1,380 (28)
Black, Non-Hispanic	3,500 (46)	1,837 (37)
Hispanic	1,471 (19)	1,083 (22)
Asian	338 (4)	250 (5)
NH-Other *	630 (8)	438 (9)
Living with HIV		
Yes	766 (10)	887 (18)
Symptoms		
Yes	2,759 (36)	2,148 (43)
No	4,830 (63)	2,768 (56)
Missing	71 (1)	72 (1)

MSM = men who have sex with men or men and women

MSW = men who have sex with women only

CT = *Chlamydia trachomatis*; NG = *Neisseria gonorrhoeae*

* includes American Indian/Alaskan Native, multi-race, missing race, and Other

IQR = interquartile range