

# Risk of coinfection with *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in Nova Scotia

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KR Forward. Risk of coinfection with *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in Nova Scotia. *Can J Infect Dis Med Microbiol* 2010;21(2):e84-e86.

**BACKGROUND:** The frequency of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* coinfection can vary depending on their individual incidence and prevalence rates.

**OBJECTIVE:** To determine the frequency of *C trachomatis* and *N gonorrhoeae* coinfections by evaluating the results of testing in 2007 and 2008 to better inform testing and treatment decisions.

**METHODS:** Specimens from the same patient submitted on the same day served as the basis for the present study. The age, sex and the source of the specimen were also linked to the accession number. Infection and coinfection rates were analyzed in both males and females.

**RESULTS:** Concurrent testing was performed on 41,567 female specimens and 1827 male specimens, of which, 1495 female samples (3.6%) tested positive for *C trachomatis* infection and 88 (0.2%) tested positive for *N gonorrhoeae* infections. Only 31 females were coinfecting; however, for those between 11 and 25 years of age, 25 of 61 females (40.1%) with *N gonorrhoeae* infection also tested positive for *C trachomatis* infection; conversely, 25 of 1248 females (2.0%) with *C trachomatis* infection also tested positive for *N gonorrhoeae* infection. For males, 213 (11.7%) tested positive for *C trachomatis* infection, and 59 (3.2%) tested positive for *N gonorrhoeae* infection. In 30 males with *N gonorrhoeae* between 11 and 25 years of age, and 149 males with *C trachomatis*, eight coinfections were observed (26.7% and 5.3%, respectively). Of those older than 25 years of age, only five of 905 men and six of 19,465 women were coinfecting. None of the 10,935 women who were 30 years of age or older had coinfections.

**CONCLUSION:** The *N gonorrhoeae* coinfection rate in males with *C trachomatis* may justify empirical antimicrobials; however, in females, the proportion of coinfecting may not justify empirical treatment for *N gonorrhoeae* infection when the *C trachomatis* test is positive and *N gonorrhoeae* testing has not been performed.

**Key Words:** *Chlamydia trachomatis*; Coinfection; *Neisseria gonorrhoeae*

Both *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are commonly occurring sexually transmitted bacteria that produce broadly overlapping clinical syndromes. In men, infection is most often manifested as urethritis; women most often develop cervicitis. The large majority of infections in women are asymptomatic. Asymptomatic infections are less commonly seen in men, but still represent an important reservoir for transmission. Our laboratory tests approximately 25,000 Nova Scotia clients yearly for *C trachomatis*, and about 4% of these tests are positive; of the 15,000 cultures for *N gonorrhoeae*, about 0.2% are positive. The prevalence of both *C trachomatis* and *N gonorrhoeae* infections in males and females of different age groups varies considerably. Many physicians tend to only test for *C trachomatis*; guidelines suggest empirical treatment of *N gonorrhoeae* in those patients testing positive for the former.

Le risque de co-infection par le *Chlamydia trachomatis* et la *Neisseria gonorrhoeae* en Nouvelle-Écosse

**HISTORIQUE :** La fréquence de co-infections par le *Chlamydia trachomatis* et la *Neisseria gonorrhoeae* peut varier selon l'incidence et le taux de prévalence de chaque infection.

**OBJECTIF :** Déterminer la fréquence de co-infections en évaluant les résultats des tests effectués en 2007 et 2008 afin de mieux éclairer les décisions à l'égard des tests et des traitements.

**MÉTHODOLOGIE :** L'auteur s'est servi des échantillons d'un même patient soumis la même journée pour mener la présente étude. Il a également lié l'âge, le sexe et la source de l'échantillon au numéro d'entrée. Il a analysé les taux d'infections et de co-infections chez les hommes et les femmes.

**RÉSULTATS :** Des tests concomitants ont été exécutés sur 41 567 échantillons de femmes et 1 827 échantillons d'hommes. De ce nombre, 1 495 échantillons de femmes (3,6 %) étaient positifs à l'infection par le *C trachomatis* et 88 (0,2 %), à l'infection par la *N gonorrhoeae*. Seulement 31 femmes étaient co-infectées. Toutefois, 25 des 61 femmes de 11 à 25 ans (40,1 %) infectées par la *N gonorrhoeae* étaient également positives à l'infection par le *C trachomatis*, mais seulement 25 des 1 248 femmes (2,0 %) infectées par le *C trachomatis* étaient également positives à l'infection par la *N gonorrhoeae*. Chez les hommes, 213 (11,7 %) étaient positifs à l'infection par le *C trachomatis*, et 59 (3,2%), à l'infection par la *N gonorrhoeae*. Chez les 30 hommes de 11 à 25 ans infectés par la *N gonorrhoeae* et les 149 hommes infectés par le *C trachomatis*, on a observé huit co-infections (26,7 % et 5,3 %, respectivement). Cependant, seulement cinq des 905 hommes et six des 19 465 femmes de 25 ans et plus étaient co-infectés. Aucune des 10 935 femmes de 30 ans ou plus n'était co-infectée.

**CONCLUSION :** Le taux de co-infections par la *N gonorrhoeae* chez les hommes infectés par le *C trachomatis* peut justifier la prescription empirique d'antimicrobiens, mais chez les femmes, la proportion de co-infections ne justifie peut-être pas un traitement empirique contre l'infection par la *N gonorrhoeae* lorsque le test du *C trachomatis* est positif, mais que le test de la *N gonorrhoeae* n'a pas été effectué.

Recommendations to treat patients for concurrent infections would be better informed if there was recent Canadian research relating to the frequency of coinfections in males versus females, and in younger versus older adults.

We evaluated the results of testing in our laboratory over a two-year period to precisely determine the frequency of coinfection in males and females, and at different ages, to better inform testing and treating decisions.

## METHODS

Specimens for *C trachomatis* and *N gonorrhoeae* testing submitted together and registered in the laboratory information system served as the basis for the present study. The specimens were primarily obtained from the Capital District Health Authority (Halifax, Nova Scotia), and the vast majority of tests were

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performed by physicians in their private offices. There is one sexually transmitted infection clinic, which runs for approximately 6 h/week and is physician based. Testing in Nova Scotia is seldom performed by nurse practitioners; no testing was performed for jurisdictions outside of Nova Scotia. These specimens were assigned the same laboratory accession number. The results of both *C trachomatis* and *N gonorrhoeae* testing were extracted from the database, stripped of unique identifiers, and joined using the common accession number, as well as the age and sex of the patients. Results were abstracted from the laboratory information system database.

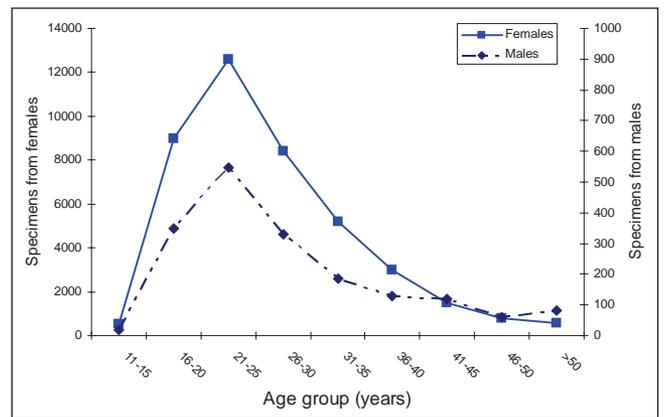
Specimens for *N gonorrhoeae* testing were submitted using the Copan M40 Transystem specimen transport system (Copan Diagnostics Inc, USA) and were processed on the day of receipt. Cultures were performed using modified Thayer-Martin media incubated in 10% CO<sub>2</sub> at 37°C for 48 h and identified using conventional means (1). Genital swabs and urine samples (the most common sample in men) were tested using the Cobas Amplicor *C trachomatis* analyzer (Roche Diagnostics, Canada) as described in the manufacturer's package insert. Female urine sample testing was very rarely performed. Internal controls were used for female urethral but not cervical specimens. The Cobas Amplicor analyzer automatically performed all of the amplification, hybridization and detection steps. All results were interpreted according to the manufacturer's guidelines, based on signal cut-off readings.

A copy of the protocol was reviewed and approved by the Capital Health Research Review Board. The present study did not receive any funding.

**RESULTS**

In total, 41,567 specimen pairs were obtained from females and 1827 specimen pairs from males (Figure 1). Of which, 1495 female samples tested positive for *C trachomatis*, and 88 (0.2%) tested positive for *N gonorrhoeae*. Females between 16 and 20 years of age had *C trachomatis* detected in 7.1% of samples and *N gonorrhoeae* in only 0.3%. Two hundred forty-seven (1.3%) specimens received from women older than 25 years of age were positive for *C trachomatis*, and 0.14% of cases tested positive for *N gonorrhoeae* (Table 1). Only six women older than 25 years of age were coinfecting with both *N gonorrhoeae* and *C trachomatis*.

Almost one-half of the testing was performed on men 26 years of age or older (Table 1). *C trachomatis* infection was more common in males younger than 26 years of age; however, the proportion testing positive for *N gonorrhoeae* infection was not significantly different. Patients with *N gonorrhoeae* infection



**Figure 1)** The number of specimens received for both *Chlamydia trachomatis* and *Neisseria gonorrhoeae* testing by age group

commonly tested positive for *C trachomatis* infection. Twenty-five of the 61 (41%) women younger than 26 years of age who had *N gonorrhoeae* infection also had *C trachomatis* infection (Figure 2). Twenty-five of the 1248 (2.0%) females 25 years of age or younger with *C trachomatis* also had *N gonorrhoeae* infection. In women older than 25 years of age, six of 27 (22.2%) with *N gonorrhoeae* infection also had *C trachomatis* infection; six of the 247 women with *C trachomatis* infection also had *N gonorrhoeae* infection. There were no coinfections in women older than 30 years of age, and only one coinfection in a man older than 30 years of age.

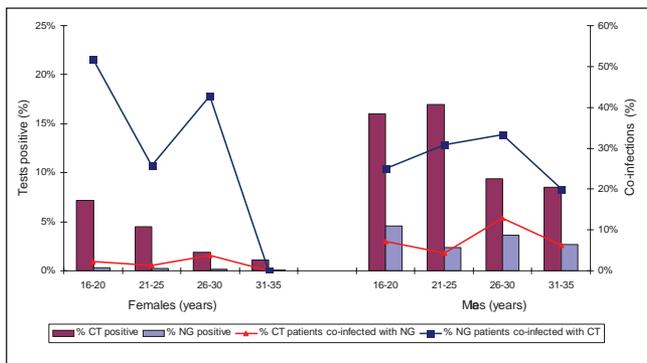
**DISCUSSION**

The testing practices of Nova Scotia physicians vary widely. The tests that we received represented a composite of patients with symptoms suggestive of a sexually transmitted infection who may have been in contact with an infected partner, who may have been tested because they fell within established guidelines or who may have been tested as part of a regular sexual health checkup (for instance, with an annual contraceptive renewal visit). As is the case in many other centres, women were tested much more frequently than men, and the lower positivity rate in women was more a reflection of prevalence; whereas, in men, more testing was performed for symptoms and for contacts. Irrespective of how patients were identified, this should not fundamentally affect our observations regarding the proportion that was coinfecting.

Other studies (2-6) have observed that the frequency of coinfection can vary dramatically, depending on the setting and the background prevalence of each of these sexually

**TABLE 1**  
The number and proportion of females and males tested and positive for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) infections

Age	Females		Males	
	≤25 years	>25 years	≤25 years	>25 years
Both negative, n	20,818	19,197	747	821
CT positive/NG negative, n (%)	1,223 (5.53)	241 (1.24)	141 (15.36)	59 (6.49)
CT negative/NG positive, n (%)	36 (0.16)	21 (0.11)	22 (2.4)	24 (2.64)
Coinfected, n (%)	25 (0.11)	6 (0.03)	8 (0.87)	5 (0.55)
Total tests performed, n	22,102	19,465	918	909



**Figure 2)** The proportion of specimens from males and females of different ages that were positive for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG), and the proportion in each age group that was coinfecting

transmitted infections. Creighton et al (2) found that 24% of heterosexual men and 38% of women with gonorrhoea also had chlamydia. The opposite was less often true, ie, heterosexual men with chlamydia had gonorrhoea in 18% of cases; whereas, 13% of women also had gonorrhoea. Most of the coinfecting were between 15 and 19 years of age. The high prevalence in this setting suggested a policy of epidemiological treatment for chlamydia in patients known to have or be in contact with gonorrhoea. In a very high-prevalence setting, a sexually transmitted disease clinic in Edinburgh, Scotland, identified chlamydia in 24% of men who had sex with men and who had rectal gonorrhoea (3). Nsuami et al (4) studied approximately 6000 high school students in Louisiana (USA). In this relatively high-prevalence setting, gonorrhoea was detected in 11%

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of students with chlamydia; conversely, 42% of students with gonorrhoea also had chlamydia.

Furthermore, two studies within a low-prevalence setting were reported. The first from Sydney, Australia, by Tapsall and Kinchington (5), identified only four of 124 men with chlamydia infections with concurrent *N gonorrhoeae* (5). van Bergen et al (6) recently described their experience in the Netherlands (6), and found a very low rate of coinfection in a community where gonorrhoea had a very low prevalence. Based on their evidence, they suggested that population screening for asymptomatic gonorrhoea may no longer be indicated in Holland. Rather than suggest empirical treatment, they suggested that patients be tested for *N gonorrhoeae* infection if *C trachomatis* tests were positive. Canadian treatment guidelines suggest 'empirical cotreatment when a diagnosis of *N gonorrhoeae* is made without waiting for test results of *C trachomatis* due to the significant probability of coinfection (20% to 42%)' (7). The coinfection rates that are cited in the Canadian guidelines are not, however, based on Canadian data (2,8).

Testing for *N gonorrhoeae* infection is infrequently performed alone, and it is unlikely that clinicians will encounter a patient with *N gonorrhoeae* infection without results of *C trachomatis* testing. On the rare occasions when this situation arises, the very high coinfection rate in both males and females should easily justify cotreatment. The opposite situation is often encountered; ie, *C trachomatis* testing is positive, but *N gonorrhoeae* testing is not performed. The 5.4% coinfection rate in males younger than 26 years of age might justify empirical treatment, especially when follow-up is not reasonably assured. Only 2.0% of females younger than 26 years of age diagnosed with *C trachomatis* infection were coinfecting with *N gonorrhoeae*. Whether these patients should empirically receive an antibiotic or be tested for gonorrhoea should be the subject of further analysis.



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