

# *Neisseria meningitidis* An Emerging Sexually Transmitted Infection

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## Abstract

**Background:** The Oakland County Health Division (OCHD) laboratory in Pontiac, Michigan participates in the Gonococcal Isolate Surveillance Project (GISP) and identified a recent increase in *Neisseria meningitidis* (NM) urethritis that would have otherwise been broadly classified as non-gonococcal urethritis.

**Methods:** Evaluation of male clients with urethritis includes urethral gram stain and urine nucleic acid amplification test (NAAT) for *Neisseria gonorrhoeae* (NG), *Chlamydia trachomatis* and *Trichomonas vaginalis*. Specimens with gram-negative diplococci on gram stain but negative NAAT for NG were defined as discordant. Percentages of discordant specimens were compared by year, with data available since 2011. In 2015, GISP cultures from the discordant specimens were obtained. Detailed interviews of male clients with NM isolated from urethral specimens in 2015 were performed.

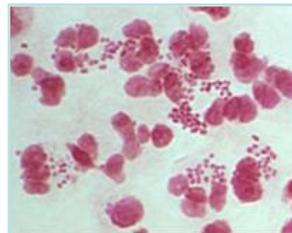
**Results:** An increase in discordant specimens was noted: 2.78% in 2011 to 8.93% in 2015. In 2015, male clients with urethritis and discordant specimens were confirmed by culture to have infection with NM. Discordant specimens prior to 2015 most likely represent NM. The majority of clients reported only female partners and reported receipt of oral sex. The clients did not develop invasive disease. Only one reported a partner with similar symptoms.

**Discussion:** The prevalence of clients with discordant specimens, presumed to be NM based on 2015 culture results, increased dramatically. This change in epidemiology would have been unrecognized if only NAAT was used for evaluation. The demographics identified in this study differ from recently reported outbreaks of invasive meningococcus, in which HIV positivity and being a man who has sex with men were risk factors. Other studies have reported an increase in NM from urogenital sites and attributed this to a change in sexual behavior, including an increase in oral sex.

**Conclusion:** Evaluation of urethritis with only NAAT will miss important causes of non-gonococcal urethritis, including NM. While NM has been occasionally identified as causing urethritis, its prevalence is increasing and could go unnoticed if gram stain or culture is not performed for urethritis work up.

## Introduction

- Gram negative diplococci (GNDC) (Figure 1) on gram stain from a urethral swab most commonly represents gonococcal urethritis.
- However, negative *Neisseria gonorrhoeae* (NG), nucleic acid amplification testing (NAAT) should raise suspicion for other *Neisseria* species.
- Neisseria meningitidis* (NM) is recognized, rarely, as a cause of anogenital infections<sup>1</sup>.
- OCHD evaluated cases of male urethritis with GNDC on gram stain but negative NG NAAT.



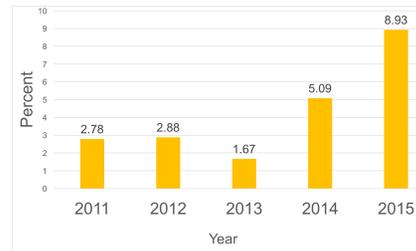
**Figure 1. Gram Negative Diplococci on Gram Stain**

## Methods

- OCHD is a participant in the CDC's Gonococcal Isolate Surveillance Project.
- Per routine evaluation, urethral swab for gram stain and urine for NAAT were collected from male clients with urethritis.
- Specimens with GNDC on gram stain but negative NG NAAT were defined as discordant.
- Percentages of discordant specimens were compared by year, with data available since 2011.
- Specimens found to be discordant in 2015 were identified further by culture.
- Male clients with NM identified by culture were interviewed.
- 12 NM isolates underwent molecular characterization by the CDC.

## Results

- Discordant specimens increased from 2.78% in 2011 to 8.93% in 2015 (Figure 2).



**Figure 2. Percent of Discordant Specimens**

- NM was isolated from cultures of all 20 discordant specimens in 2015.
- Characteristics of male clients with NM urethritis are displayed in Table 2.

	N=20 (%)
<b>Age, mean (range)</b>	31.8 (18-53)
<b>Race</b>	
Caucasian	3 (15)
African American	17 (85)
<b>HIV Positive</b>	0
<b>Sexual Orientation</b>	
Female Only	19 (95)
Male Only	0
Male and Female	1 (5)
<b># Partners Prior 2 Months, mean (range)</b>	1.95 (1-6)
<b>Receipt of Oral Sex</b>	19 (95)
<b>Vaginal Sex</b>	19 (95)
<b>Anal Sex</b>	2 (10)
<b>Consistent Condom Use</b>	4 (20)
<b>Anonymous Partner Prior Year</b>	3 (15)
<b>Exchanged Money for Sex</b>	1 (5)
<b>Partner with Similar Symptoms</b>	1 (5)
<b>Chlamydia NAAT Positive</b>	0

**Table 2. Characteristics of Clients with NM Urethritis**

- One client reported a partner with similar symptoms. No clients had invasive disease.
- Eleven isolates were nongroupable and part of the CC-11/ET-37 clonal complex; 1 was group B.
- The most common treatment regimen was azithromycin 1 gm PO and ceftriaxone 250 mg IM.

## Conclusions

- A marked increase in NM-associated male urethritis was observed by OCHD. An increase in NM urethritis was also noted in a Columbus, Ohio clinic during a similar time period<sup>2</sup>.
- No clients developed invasive disease and the majority were heterosexual. This differs from a previously described outbreak of invasive NM serogroup C in men who have sex with men<sup>3</sup>.
- A change in sexual behavior, including an increase in oral sex, may contribute to the increase in NM urethritis cases<sup>4</sup>.
- NM urethritis may be unrecognized and instead categorized only broadly as non-gonococcal urethritis if diagnosis relies solely on NAAT.
- Point-of-care testing with gram stain or similar technique remains an important diagnostic tool in the evaluation of sexually transmitted infections<sup>5</sup>.
- This study was limited to only urethral swabs from male clients; further evaluation of specimens from female clients and from additional anatomical sites (oropharyngeal, cervical, vaginal, anal) is warranted.
- NM should be recognized as an emerging cause of sexually transmitted infections.

## References

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## Acknowledgements

Molecular characterization of the NM isolates was performed by the CDC.