Low *Neisseria gonorrhoeae* culture yield in vaginal and pharyngeal sites; the impact of sampling site and timing.

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INTRODUCTION

The emergence of multidrug-resistant *Neisseria gonorrhoeae* (NG) is a great cause of concern worldwide (1), and both Australian and International guidelines recommend NG culture prior to treatment for surveillance and treatment guidance purposes.

OBJ ECTIVE

To determine the NG culture yield following a positive NG nucleic acid amplification test (NAAT) within 30 days, stratified by culture specimen collection site and the time interval between NAAT and culture collection.

METHODOLOGY

We conducted a retrospective data analysis of positive NG NAAT specimens of individuals who attended the Melbourne Sexual Health Centre (MSHC) between 1st April 2015 and 31st March 2023 for NG treatment following positive NG NAAT result.

Our in-house clinical protocols recommend NG culture of all sites when clinicians provide antibiotic treatment. Clinicians can request NG NAAT and culture tests on the day of the patient's attendance for highly suspicious NG cases, such as those with purulent urethral discharges, symptoms or signs of pelvic inflammatory disease or proctitis, or upon identifying Gram-negative diplococci on smear microscopy examination. All asymptomatic NG cases are cultured when they are recalled for treatment following NG NAAT test.

Hologic Aptima Combo 2 assay was used for the NG screening NAAT test followed by confirmatory testing with the Aptima GC assay. NG culture specimens were collected using a fibre-wrapped swab either by clinicians or patients. Cultures were performed on modified Thayer-Martin agar by direct inoculation by clinicians, who then transferred the plates immediately to an on-site laboratory for inoculation. Plates were read at 48 hours after inoculation at 37℃ in CO_2.

We excluded NG cultures following indeterminate NAAT results and cases that were cultured after receiving beta-lactam, macrolide, tetracycline and fluoroquinolone-based antibiotics.

Chi-squared test was utilized to perform pairwise comparison of culture yield between adjacent culture-time interval for each specimen collected site. Trends in the proportion of NG culture yield over time were examined using a Chi-squared trend test.

CONCLUSION

Our study shows that the anatomical sites and time to culture collection influence the culture yield rate. The lower culture yield from the pharynx and vagina limit antimicrobial resistance surveillance data.

NG culture should be performed as close as possible to NAAT testing to optimize culture yield. Combing molecular resistance testing with culture would enhance antimicrobial resistance detection, particularly pharyngeal and vaginal specimens.

RESULTS

During our study periods, 72% (15,893 / 22,013) of positive NG NAAT specimens had culture performed within 30 days. Of these 15,893 cases, 1,970 cases were excluded because the culture was performed after receiving antibiotics.

Our analysis showed that NG culture yield decreased with increasing time between positive NAAT and culture collection across all anatomical sites ($p_{trend} < 0.001$). For culture specimens that were collected on the same day as the positive NG NAAT, the urethral site had the highest NG culture yield (98%, 95% CI: 97.4% to 98.4%, 3,178/3,244) followed by cervical (72%, 95% CI: 62.5% to 80.7%, 73/101), rectal (71%, 95% CI: 68.9% to 73.1%, 1,349/1,899), vaginal (62%, 95% CI: 55.0% to 70.6%, 99/157) and pharyngeal (41%, 95% CI: 38.4% to 43.8%, 554/1,349).

The cervical site had the greatest reduction in NG culture yield over time, dropping from 72% on the same day to 17% (95% CI: 0.4% to 61.1%, 1/6) at the 8-14 day interval. The rectal site had the least reduction, dropping from 71% on the same day to 60% (95% CI: 49.1% to 68.8%, 61/101) at the 15-30 day interval.

The vaginal NG culture yield declined from 62% on the same day to 37% (95% CI: 26.8% to 47.5%m 33/90) at the1-3 day interval followed by gradual reduction to 21% (95% CI: 8.0% to 39.7%, 6/29) at the 8-14 day interval. The pharyngeal NG culture yield remained stable to 41% (95% CI: 38.8% to 44.6%, 486/4,166) at the 1-3 day interval before gradually declined to 31% (95% CI: 27.0% to 35.5%, 146/469) at the 8-14 day interval.

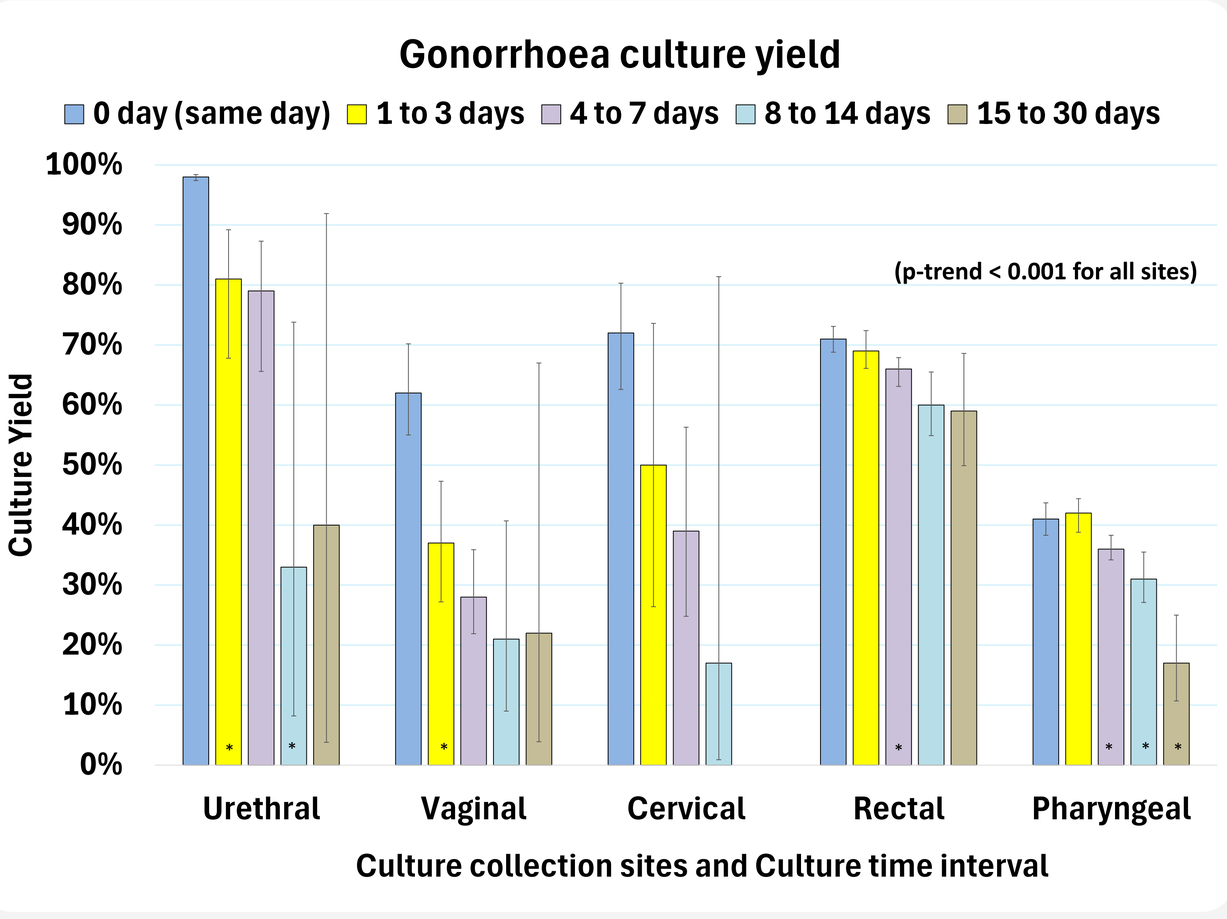

Figure 1. Gonococcal culture yield rate by culture site and time interval following positive NAAT. (* - statistically significant difference (p<0.05) between adjacent time intervals)

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REFERENCE:

1. WHO Bacterial Priority Pathogens List, 2024: bacterial pathogens of public health importance to guide research, development and strategies to prevent and control antimicrobial resistance. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

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