A Validation Study of the Cepheid Xpert® CT/NG for Detecting Chlamydia trachomatis and Neisseria gonorrhoeae in rectal samples

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Background

- Nucleic acid amplification testing (NAAT) is the optimal method for detection of the two most common sexually transmitted diseases (STIs), Chlamydia trachomatis (CT) and Neisseria gonorrhoeae (GC).
- Current FDA-approved NAAT for detection of CT/GC in genital swab specimen include:
  - Cepheid Xpert® CT/NG (Xpert) test is a qualitative in vitro real-time PCR test.
  - Gen-Probe Aptima Combo 2 ® (AC2) test utilizes target capture Transcription-Mediated Amplification (TMA) and Dual Kinetic Assay (DKA) technology.
- No commercial NAAT is currently cleared by the US Food and Drug Administration (FDA) for CT/GC detection from extragenital specimens.
- Validation of these tests is required to provide data to support the use of NAAT for anorectal swab samples.

Objective

- To validate and compare rectal swab specimens for the detection of CT and GC using the Cepheid Xpert CT/NG (Xpert) test and the Gen-Probe Aptima Combo 2 (AC2) test.

Methods

- 399 participants (224 men and 175 women) aged 18 – 62 years reporting a history of receptive anal intercourse (RAI).
- Swabs were collected by clinicians; order of collection was randomized.
- CT/GC Testing: Xpert and AC2 tests per insert.
- True positive controls:
  - Both Xpert and AC2 positive or
  - Either Xpert or AC2 positive AND the Aptima CT or GC alternate primers were positive.

Results

- CT/GC Prevalence: CT was detected in 59 (14.8%) and GC in 30 (7.5%) participants, prevalence of rectal GC was significantly higher in men vs women (Table 1).
- NAAT Discrepancy rates - Xpert vs AC2: CT - 9/59 GC - 2/30
- NAAT performance: Xpert had numerically higher sensitivity than AC2 for GC and CT (Tables 2 and 3); Xpert and Aptima performance was similar for both pathogens.

Table 1. Prevalence of Rectal STI’s Stratified by Sex

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Men (n=224)</th>
<th>Women (n=175)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. trachomatis</td>
<td>39 (17.4%)</td>
<td>20 (11.4%)</td>
<td>0.12</td>
</tr>
<tr>
<td>N. gonorrhoeae</td>
<td>26 (11.6%)</td>
<td>4 (2.3%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 2. Performance of Xpert and Aptima in the Detection of CT from Rectal Specimens

<table>
<thead>
<tr>
<th>Test Method</th>
<th>True +</th>
<th>False -</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xpert</td>
<td>56</td>
<td>3</td>
<td>94.9% (85.9%, 98.9%)</td>
<td>99.7% (98.4%, 99.9%)</td>
</tr>
<tr>
<td>AC2</td>
<td>54</td>
<td>5</td>
<td>91.5% (81.3%, 97.2%)</td>
<td>100% (98.9%, 100%)</td>
</tr>
</tbody>
</table>

Table 3. Performance of Xpert and Aptima in the Detection of GC from Rectal Specimens

<table>
<thead>
<tr>
<th>Test Method</th>
<th>True +</th>
<th>False -</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xpert</td>
<td>30</td>
<td>0</td>
<td>100% (88.4%, 100%)</td>
<td>100% (99.0%, 100%)</td>
</tr>
<tr>
<td>AC2</td>
<td>28</td>
<td>2</td>
<td>93.3% (77.9%, 99.2%)</td>
<td>100% (99.0%, 100%)</td>
</tr>
</tbody>
</table>

Conclusions

- Rectal GC and CT infections were common among people reporting a history of RAI, and rectal testing for STIs should be expanded.
- Rectal infection with CT was equally common among men and women but rectal GC infection occurred more often among men.
- Both Xpert and AC2 NAATs demonstrated a high degree of sensitivity and specificity for detection of CT and GC from rectal swab samples.

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