EVALUATION OF THE PATH GC-CHECK RAPID TEST FOR THE DETECTION OF GONOCOCCAL INFECTION AMONG FEMALE SEX WORKERS IN BENIN

Alary Michel1, Aïna G2, Ndour M3, Gbenafa-Agossa C4, Fortin D5, Steele M6, Peeling RW6
1 Centre hospitalier affilié universitaire de Québec, Québec, Canada; 2 Dispensaire IST, Cotonou, Bénin; 3 Projet Sida-3, Cotonou, Bénin; 4 Hôpital Maisonneuve-Rosemont, Montréal, Canada; 5 Program for Appropriate Technology in Health (PATH), Seattle, WA, USA; 6 Diagnostics R&D, TDR, World Health Organization (WHO), Geneva, Switzerland.

INTRODUCTION
• Syndromic approach is recommended for management of STIs in developing countries.
• In women, it may result in significant over-treatment, especially when prevalence is relatively low.
• Over-treatment of women may lead to social stigma related to a STI diagnosis and to domestic violence, especially in case of partner notification.
• It has been shown that a modified syndromic approach (clinical screening) targeting high risk women or the use of point-of-care test could have a better sensitivity than gold standard tests when taking into account the lack of attendance to return visits, both in developed [1] and developing [2] countries.
• There is clearly a need to develop and evaluate rapid point-of-care tests for cervical infections such as Neisseria gonorrhoeae (GC) and Chlamydia trachomatis (CT).
• The involvement of our team in projects supporting female sex worker (FSW) clinics in Benin since 1993 and the fact that GC prevalence has repeatedly been > 15% in this population in the past provided an opportunity to evaluate a new GC rapid point-of-care test.

OBJECTIVE
To assess the validity of the PATH (Seattle, WA) GC-Check rapid test, a point-of-care immunochromatographic strip test, in the detection of gonococcal infection (GC) among female sex workers (FSWs) in Benin.

METHODS
Women consulting consecutively at 2 FSW-dedicated clinics in Cotonou, the largest city and economic capital of Benin [Dispensaire IST (DIST), a clinic with long-standing experience in clinical research], and Porto Novo, the political capital of Benin [Clinique Solidarité-Sidaction (CSS), a clinic participating for the first time in a clinical study], were recruited over 3 one-month periods between October 2003 and July 2004.

After written informed consent, participants were administered a short interview and underwent a speculum examination where two cervical swabs were collected (in a subset of women, a vaginal swab was also collected).

One cervical swab and the vaginal swab were immediately tested with the rapid test and the results interpreted by two independent readers.

Figure 1 shows the PATH GC-Check rapid test kit.

Figure 2 shows the interpretation of results of the test.

The other cervical swab was frozen at -20°C for at most 4 weeks and then transported to Quebec (Canada), where it was tested using the Roche Amplicor CT/NG PCR assay.

GC-positive samples were confirmed with a 16SrRNA PCR assay, using a real-time PCR technology (Light Cycler, Roche Diagnostics) at a laboratory designated by Roche Diagnostics in Montreal, Canada.

The gold standard for GC positivity was defined as a positive GC Amplicor AND a positive 16SrRNA PCR assay.

RESULTS
1084 FSWs were recruited in the study (876 at DIST and 208 at CSS).

Median age was 29 years.

50 (4.6%) women were GC-infected according to the gold standard (4.2% at DIST and 6.3% at CSS).

51 (4.7%) women were infected by CT (5.3% at DIST and 2.4% at CSS).

Table 1 shows the comparison of the single Amplicor GC result with the gold standard.

Table 2 shows the comparison of the High OD criterion GC result with the gold standard.

Inter-reader agreement for the PATH GC-Check rapid test on cervical samples was 99.8%

Table 3 shows the comparison of the PATH GC-Check rapid test result on cervical swabs with the gold standard (n=1084).

Inter-reader agreement for the PATH GC-Check rapid test on vaginal samples was 99.9%.

Table 4 shows the comparison of the PATH GC-Check rapid test result on vaginal swabs with the gold standard (n=759).

METHODS (CONTINUED)
• The sensitivity (Se), specificity (Sp), positive and negative predictive values (PPV and NPV) were estimated for the PATH GC-Check rapid test used on both cervical and vaginal specimens.
• The Sp and PPV were also estimated for the Roche Amplicor CT/NG PCR assay used once (single Amplicor) or declared positive for GC when 2 tests out of 3 yield optical densities >2.0 (High OD criterion) [3].
• Comparisons of Se and Sp were carried out between types of samples, study sites and periods of recruitment using chi-square or Fisher’s exact test (when appropriate).

Figure 1. Photograph of the PATH GC-Check rapid test
Figure 2. Interpretation of results of the PATH GC-Check rapid test

1. Two Visible Lines—Positive for *N. gonorrhoeae* antigen. Both the procedural control and the test line of any intensity are observed. Interpretation: the test detected *N. gonorrhoeae* antigen in the specimen. Action: record the test as positive.

2. Visible Control Line Only—Negative for *N. gonorrhoeae* antigen. Only the procedural control line is observed. Interpretation: the test did not detect *N. gonorrhoeae* antigen in the specimen. Action: record the test as negative. Do not interpret results before the 20-minute end point.

3. No Visible Control Line—Invalid test. Control line is not observed. Interpretation: the test was improperly performed, or the test strip and/or reagents have deteriorated. Action: Repeat the test with a new test cassette. If the test is repeated, the remaining extracted solution in the reaction tube can be used, provided it has been extracted less than 1 hour previously.

Table 1. Comparison of the single Amplicor GC result with the GC gold standard.

<table>
<thead>
<tr>
<th>Single Amplicor GC results</th>
<th>Gold standard results</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive</td>
<td>50</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

Se: 100% (95%CI: 92.9-100)
Sp: 97.0% (95%CI: 95.8-98.0)
PPV: 61.7%
NPV: 100%

Table 2. Comparison of the High OD criterion GC result with the GC gold standard.

<table>
<thead>
<tr>
<th>High OD criterion GC results</th>
<th>Gold standard results</th>
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</thead>
<tbody>
<tr>
<td>Positive</td>
<td>50</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

Se: 100% (95%CI: 92.9-100)
Sp: 97.9% (95%CI: 96.8-98.7)
PPV: 69.4%
NPV: 100%

Table 3. Comparison of the PATH GC-Check rapid test result on cervical swabs with the GC gold standard.

<table>
<thead>
<tr>
<th>PATH GC-Check rapid test results</th>
<th>Gold standard results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>35</td>
</tr>
<tr>
<td>Negative</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

Se: 70.0% (95%CI: 55.4-82.1)
Sp: 97.2% (95%CI: 96.0-98.1)
PPV: 54.7%
NPV: 98.5%

Table 4. Comparison of the PATH GC-Check rapid test result on vaginal swabs with the GC gold standard.

<table>
<thead>
<tr>
<th>PATH GC-Check rapid test results</th>
<th>Gold standard results</th>
</tr>
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<tbody>
<tr>
<td>Positive</td>
<td>20</td>
</tr>
<tr>
<td>Negative</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
</tr>
</tbody>
</table>

Se: 54.1% (95%CI: 36.9-70.5)
Sp: 98.2% (95%CI: 96.9-99.0)
PPV: 60.6%
NPV: 97.7%

DISCUSSION

- The prevalence of GC was lower than previously estimated using the same gold standard, suggesting a significant impact of the FSW intervention in both cities.
- However, this lower prevalence reduced the scope of this evaluation, with only 50 GC-positive cases according to the gold standard, whereas 100 cases were initially expected.
- Not surprisingly, Se of the PATH GC-Check rapid test was lower on vaginal swabs than on cervical swabs.
- Se was also lower at CSS, a clinic with less research experience than DIST. However, with experience, Se of the test improved at CSS, suggesting that Se of the PATH GC-Check rapid test could in fact be higher than 70% when used by experienced users.
- Some previous data suggest that the confirmatory assay used in this study (16SrRNA PCR assay) could lack Se when the detection method is based on EIA [4], which would result in an overestimation of the Se of the PATH GC-Check rapid test.
- However, some recent data suggest that this confirmatory assay is in fact highly sensitive, especially when using a real time PCR methodology [5].

CONCLUSIONS

- The PATH GC-Check test using cervical samples may be at least as efficient as a gold standard test for treating GC when taking into account the proportion of women who do not return for their test results [6].
- In clinics serving populations with moderate GC prevalence and where speculum examination is possible, it could significantly reduce over-treatment compared to the syndromic approach.
- Cost-effectiveness studies are needed to compare the use of such tests with that of the syndromic approach in both high-risk and low-risk women.

REFERENCES


ACKNOWLEDGEMENTS

This study was funded by the STI Diagnostic Initiative (SDI), TDR, World Health Organization (WHO). The PATH GC-Check test was provided free of charge by Program for Appropriate Technology in Health (PATH), Seattle, WA, USA.

We thank all the personnel involved in the study at both clinics (DIST and CSS) as well as all participating women.