Gouda
Amsterdam
Development and validation of a risk score to assist screening for acute HIV-1 infection among MSM

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Background
Identifying patients with acute HIV-1 infection (AHI) is important from both an individual and public health perspective. Timely recognition of AHI is challenging due to a range of nonspecific symptoms and guidelines on whom to test for AHI with HIV-1 RNA tests are lacking.

Objectives
- To assess whether a risk score could be useful for AHI screening and to evaluate performance of this risk score among men who have sex with men (MSM)
- To validate the optimal risk score using data from a different population of MSM

Conclusions
- Applying the AHI risk score to ACS participants, 24% of MSM would be indicated for AHI testing, correctly identifying 76% of cases
- Validation in the MACS showed comparable performance, but lower sensitivity
- Screening for AHI with 4 symptoms and 3 risk factors would reduce the number of individuals needing HIV-1 RNA testing if MSM could be targeted for AHI evaluation at the point-of-care
- This would potentially enhance early diagnosis and immediate treatment

Results
1,562 MSM who were HIV-1 negative at enrolment in the ACS were included in the analyses. They accounted for 175 seroconversion visits and 17,271 seronegative visits. The optimal AHI risk score included 4 symptoms and 3 risk factors (Table 1) and yielded an overall AUC of 0.82 (ACS) and 0.78 (MACS) (Table 2 and Figure).

Table 1. Variables* significantly associated with HIV-1 seroconversion in multivariable analysis in the ACS and included in AHI risk score

<table>
<thead>
<tr>
<th>Beta coefficient</th>
<th>Fever</th>
<th>Lymphadenopathy</th>
<th>Oral thrush</th>
<th>Weight loss</th>
<th>&gt;5 sexual partners</th>
<th>Gonorrhea</th>
<th>Receptive CLAI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.6</td>
<td>1.5</td>
<td>1.7</td>
<td>0.9</td>
<td>0.9</td>
<td>1.6</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*All self-reported and in the previous 6 months

Table 2. Performance of AHI risk score among participants of ACS (development study) and MACS (validation study), 1984-2010

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Cutoff</th>
<th>Seroconversions among visits with a positive risk score</th>
<th>Seroconversions among visits with a negative risk score</th>
<th>Sensitivity % (95% CI)</th>
<th>Specificity % (95% CI)</th>
<th>Overall AUC (95% CI)</th>
<th>% to be tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>1.5*</td>
<td>103/3675</td>
<td>32/1151</td>
<td>76.3 (68.2-83.2)</td>
<td>76.3 (75.6-77.0)</td>
<td>0.82 (0.79-0.86)</td>
<td>24.2</td>
</tr>
<tr>
<td>MACS</td>
<td>1.5</td>
<td>77/3779</td>
<td>60/29274</td>
<td>56.2 (48.5-63.4)</td>
<td>88.8 (88.2-88.9)</td>
<td>0.78 (0.74-0.82)</td>
<td>11.7</td>
</tr>
</tbody>
</table>

*Based on Youden-Index

Methods
Two multivariable logistic regression models were constructed using data from the Amsterdam Cohort Studies (ACS) among MSM: one including only AHI symptoms and one combining symptoms with known risk factors for HIV-1 seroconversion, using generalised estimated equations. To each of the symptoms and risk factors points were assigned equal to the beta coefficients, and these points were summed to reach a risk score. Several AHI risk scores were generated based on the two models and the optimal risk score was validated using data from the Multicenter AIDS Cohort Study (MACS), USA.