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 asses 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 sore 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

	Beta coefficient
Fever	1.6
Lymphadenopathy	1.5
Oral thrush	1.7
Weight loss	0.9
>5 sexual partners	0.9
Gonorrhoea	1.6
Receptive CLAI	1.1

*All self-reported and in the previous 6 months

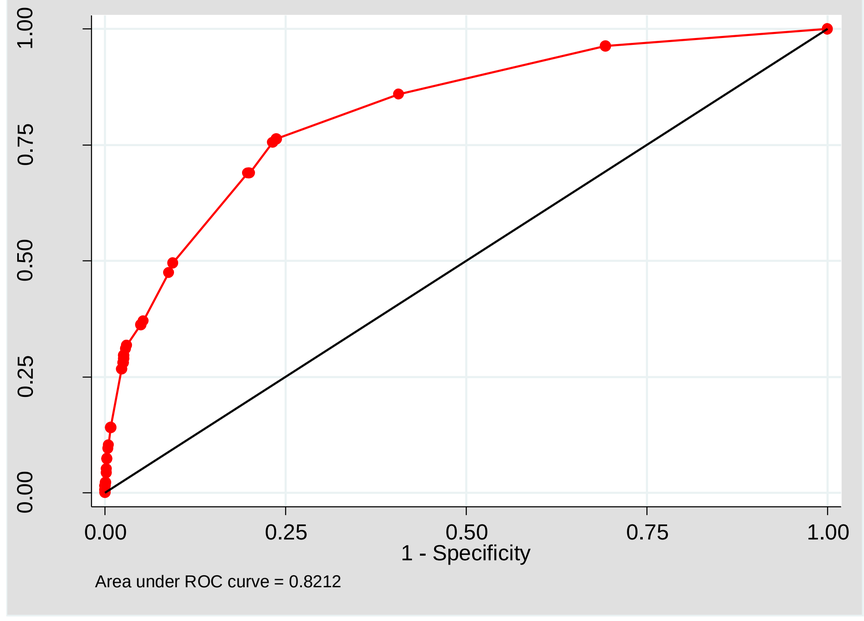

Figure. Receiver operating characteristic curve (ROC) of AHI risk score among ACS participants

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

Cohort	Cutoff	Seroconversions among visits with a positive risk score	Seroconversions among visits with a negative risk score	Sensitivity % (95% CI)	Specificity % (95% CI)	Overall AUC (95% CI)	% to be tested
ACS	1.5*	103/3675	32/11517	76.3 (68.2-83.2)	76.3 (75.6-77.0)	0.82 (0.79-0.86)	24.2
MACS	1.5	77/3779	60/29274	56.2 (48.5-63.4)	88.8 (88.2-88.9)	0.78 (0.74-0.82)	11.7

*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.

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