

Development and validation of the HCV-MOSAIC risk score to assist testing for acute HCV infection in HIV-infected MSM

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Background

Current guidelines recommend annual hepatitis C virus (HCV) testing of HIV-infected men who have sex with men (MSM) who have unprotected sex or who were exposed to risk factors, without further specification. To improve early detection of acute HCV, development of clear-cut recommendations is relevant. For chronic HCV infections, several risk scores or screening strategies to target those at highest risk for HCV were developed. However, to the best of our knowledge risk scores identifying HIV-infected MSM at increased risk for acute HCV infection do not exist.

Objectives

- To develop a risk score identifying HIV-infected MSM at-risk for acute HCV infection and evaluate its sensitivity and specificity.
- To validate the performance of this risk score in three different populations of HIV-infected MSM.

Methods

Development of the HCV-MOSAIC risk score:

The risk score was developed using data from self-administered questionnaires from a Dutch case-control study of HIV-infected MSM with and without an acute HCV infection (MOSAIC study). Risk factors for HCV were determined using multivariable logistic regression. For each patient an individual risk score was calculated by summing the β -coefficients of all significant risk factors reported by that patient. Using ROC curves, an optimal cut-off for the risk score to predict acute HCV infection was determined, defined as the highest sensitivity in combination with the highest specificity. Post-test probability of acute HCV infection and diagnostic gain were calculated.

Validation of the HCV-MOSAIC risk score:

The risk score was validated among HIV-infected MSM from case-control studies in Belgium and the UK and from cross-sectional surveys at a Dutch STI-clinic.

Results

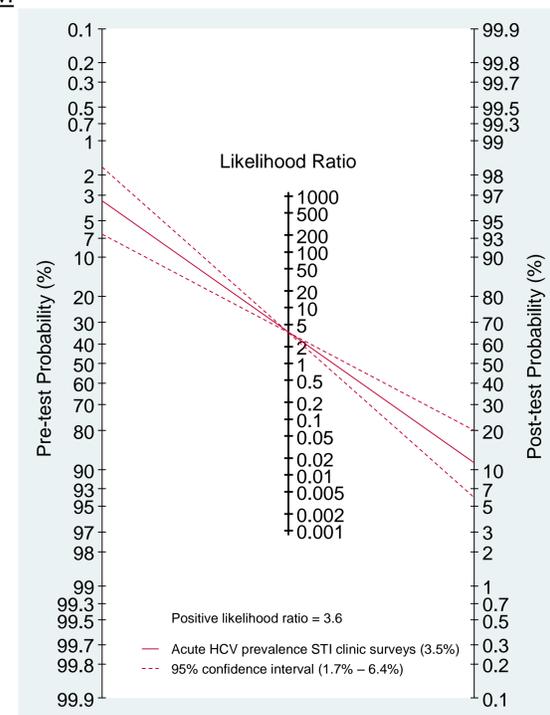
Six risk factors were included in the HCV-MOSAIC risk score:

- Condomless receptive anal intercourse (β 1.1) ^{6M}
- Sharing of sex toys (β 1.2) ^{6M}
- Fisting without gloves (β 0.9) ^{6M}
- Injecting drug use (β 1.4) ^{12M}
- Sharing straws when snorting drugs (β 1.0) ^{12M}
- Self-reported ulcerative STI (syphilis, genital herpes or lymphogranuloma venereum infection, β 1.4) ^{12M}

6M = in the past 6 months
12M = in the past 12 months

The optimal cut-off of the HCV-MOSAIC risk score was ≥ 2.0 , at which 43% of the development study group would be advised to be tested for HCV, with a sensitivity of 78.0% and a specificity of 78.6%. In the three validation studies sensitivity ranged from 73.1% to 100% and specificity from 56.2% to 65.6% (table).

Figure: Fagan's nomogram showing the post-test probability of acute HCV infection given a risk score of ≥ 2.0 , for a range of pre-test probabilities of acute HCV infection in HIV-infected MSM



The post-test probability of acute HCV infection ranged from 5.9% to 20.0% given acute HCV prevalence of 1.7% to 6.4% (confidence interval of the acute HCV prevalence in the STI clinic surveys), yielding a diagnostic gain of 4.2% to 13.6%.

Table: Characteristics of the study populations including the performance of the HCV-MOSAIC risk score among HIV-infected MSM

Characteristics	Validation studies			
	Development study	Belgium (N = 142)	UK (N = 190)	Dutch STI-clinic (N = 284)
	MOSAIC (N = 213)			
Study design	Case-control	Case-control	Case-control	Cross-sectional
- HCV positive (n)	82	52	60	10
- HCV negative (n)	131	90	130	274
Study period	2009 – 2013	2010 – 2013	2003 – 2005	2007 – 2009
Median age (IQR)	45.7 (41.0 – 52.2)	45.0 (37.0 – 51.0)	38.0 (33.5 – 41.9)	42.0 (35.0 – 47.0)
Sensitivity (95% CI)	78.0% (67.9 – 85.6)	73.1% (59.7 – 83.2)	93.3% (84.1 – 97.4)	100% (72.2 – 100)
Specificity (95% CI)	78.6% (70.8 – 84.8)	65.6% (55.3 – 74.6)	56.2% (47.6 – 64.4)	60.6% (54.7 – 66.2)
Proportion with a risk score of ≥ 2.0 (% to be tested)	43%	49%	59%	42%
Area under the ROC curve (95% CI)	0.82 (0.76 – 0.88)	0.74 (0.66 – 0.83)	0.82 (0.76 – 0.88)	0.92 (0.85 – 0.98)

Conclusions

- We developed and validated the HCV-MOSAIC risk score, which is the first risk score identifying HIV-infected MSM at risk for acute HCV infection.
- Using this risk score 42-59% of HIV-infected MSM would be advised to undergo HCV testing, correctly identifying 73-100% of HCV patients.
- We encourage the use of this risk score, especially at testing locations where MSM are not regularly tested for HCV or where ALT is not routinely measured (e.g. STI-clinics).
- It could be a valuable addition to the current guidelines for HCV testing and potentially reduce the amount of tests performed in MSM at low risk for HCV.