Longitudinal trajectories of sexual behavior and incident HCV re-infection among men who have sex with men in the Netherlands

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Introduction

- WHO set ambitious targets to eliminate HCV as a public health threat (i.e. 80% reduction in new chronic infections and 65% reduction in mortality)

- MSM with HIV are a key population\(^1,\)\(^2\)

- Re-infection rate among MSM with HIV remains high due to continuing risk behavior\(^3\)

- While there have been studies that linked specific behaviors to HCV re-infection, none examined how these behaviors evolved over time

Study objective

To identify classes of MSM with HIV with different patterns of HCV-related sexual behavior over time and assess the risk of re-infection within these classes
Methods

Study design and participants
- MSM Observational Study of Acute Infection with hepatitis C (MOSAIC) study (2009-2018)
- Longitudinal study with semi-annually visits
- Sociodemographic, clinical and virologic data
- Detailed self-administered questionnaire about HCV-related risk behavior

Inclusion criteria
- Participants at risk for re-infection (i.e., after spontaneous clearance or successful treatment)
- Completed ≥1 questionnaire
Methods

Study outcomes

- HCV-MOSAIC risk score\(^1\) [range 0-7]
  - Receptive CAS (\(\beta=1.1\)), sharing of toys (\(\beta=1.2\)), unprotected fisting (\(\beta=0.9\)), IDU (\(\beta=1.4\)), sharing of straws (\(\beta=1.0\)), ulcerative STI (\(\beta=1.4\))
  - Score ≥2 indicating high reinfection risk

- HCV re-infection: defined as having a positive HCV-RNA test following HCV clearance

Statistical analyses

- Latent class analysis modelling HCV-MOSAIC score adjusting for age, group sex and casual partnerships
- HCV re-infection risk was jointly modelled with a class-specific survival model

# Results – Study population

Characteristics at first visit at risk for HCV re-infection

<table>
<thead>
<tr>
<th></th>
<th>Overall (n=123)</th>
<th>Not re-infected (n=90)</th>
<th>Re-infected (n=33)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td>45 (41-50)</td>
<td>46 (41-50)</td>
<td>43 (39-50)</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Dutch origin</strong></td>
<td>105 (85.4)</td>
<td>76 (84.4)</td>
<td>29 (87.8)</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>College degree or higher</strong></td>
<td>78 (63.4)</td>
<td>56 (62.2)</td>
<td>22 (66.7)</td>
<td>0.81</td>
</tr>
<tr>
<td><strong>CD4 cell count (cells/mm³)</strong></td>
<td>475 (328-642)</td>
<td>520 (360-700)</td>
<td>370 (270-561)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Nadir CD4 cell count (cells/mm³)</strong></td>
<td>436 (290-610)</td>
<td>460 (340-695)</td>
<td>339 (250-480)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Follow-up time, years</strong></td>
<td>2.7 (1.2-4.7)</td>
<td>2.8 (1.2-4.7)</td>
<td>2.5 (1.1-3.6)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*Presented are n (%) or median (IQR)*
Results – Trajectories HCV-MOSAIC score over time

Consistent lower risk class
Fluctuating higher risk class

Number of MSM at risk

<table>
<thead>
<tr>
<th>Class 1</th>
<th>67</th>
<th>38</th>
<th>28</th>
<th>20</th>
<th>15</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 2</td>
<td>56</td>
<td>32</td>
<td>21</td>
<td>13</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
Results – Trajectories of individual risk behaviors

- Higher proportions of sharing toys (A), unprotected fisting (B) and sharing straws (C) in the fluctuating higher risk class (blue) vs. the consistent lower risk class (orange)
Results – HCV re-infection probabilities

- IR consistent lower risk: 6.5 (95%CI=3.6-11.8) per 100 PYs
- IR fluctuating higher risk: 11.9 (95%CI=7.0-20.0) per 100 PY
- IRR: 2.0 (95%CI=0.9-4.5) fluctuating higher risk vs. consistent lower risk

<table>
<thead>
<tr>
<th></th>
<th>Consistent lower risk class</th>
<th>Fluctuating higher risk class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3</td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td>Year 5</td>
<td>22%</td>
<td>37%</td>
</tr>
</tbody>
</table>
Discussion

Strengths
- Prospective study design with frequent monitoring of detailed sexual behavior

Limitations
- Small number of MSM at risk for re-infection at ≥3 years
- Unable to identify reasons for behavioral variations
- Generalizable mostly to MSM with HIV from high-income countries with at least a college degree
We identified two classes of MSM with different patterns of behavioral risk.

Re-infection became more frequent in the fluctuating higher risk class after 3 years of follow-up.
- Periods of higher risk among the consistent lower risk class
- Level of waning immune protection?

Wide variation in risk behaviors suggests that behavioral assessment is continually needed to ensure timely testing.
Acknowledgements

MOSAIC study participants

and

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Thank you for your attention!

Questions?
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