HIV incidence among people who attend sexual health clinics in England in 2012: estimates using a biomarker for recent infection

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Background

• HIV incidence remains challenging to determine, due to the prolonged asymptomatic infection period

• Currently there are two estimates for HIV incidence among MSM in the UK using modelling techniques

• Incidence estimates are imprecise for recent years as current data are used to determine transmission rates in prior years (back calculation)

• Biomarkers for recent infection are an alternate method which permit timely results at low cost.


Aim and methods

Aim
To estimate HIV incidence using biomarkers for recent HIV infection

Methods
WHO cross-sectional HIV incidence estimation method\(^1\):

\[
lr = \frac{R - \epsilon P}{(1 - \epsilon)wN}
\]

\(lr\) = Annual rate  
\(R\) = the number of recent infection cases  
\(\epsilon\) = the False Recent Rate (FRR)  
\(P\) = is the number of HIV positive people  
\(W\) = the mean duration of recency  
\(N\) = the number of people that tested negative

\(^1\) UNAIDS/WHO Working Group on Global HIV/AIDS and STI Surveillance. When and how to use assays for recent infection to estimate HIV incidence at a population level. 2011
Testing for recent HIV infection

- Samples from persons newly diagnosed tested at PHE since 2009
- In 2012, 50% of new HIV diagnoses tested for recent infection
- AxSym avidity assay (result <0.8 is considered a recent infection)
## Recent HIV infections among persons diagnosed with HIV, 2012

<table>
<thead>
<tr>
<th>Group of attendees</th>
<th>N new Dx tested in the RITA programme</th>
<th>N tested recent</th>
<th>% HIV diagnoses tested recent</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2968</td>
<td>562</td>
<td>18.9%</td>
</tr>
<tr>
<td>MSM</td>
<td>1715</td>
<td>444</td>
<td>25.9%</td>
</tr>
<tr>
<td>MSM attending in London</td>
<td>1042</td>
<td>279</td>
<td>26.8%</td>
</tr>
<tr>
<td>Heterosexuals</td>
<td>1108</td>
<td>99</td>
<td>8.9%</td>
</tr>
<tr>
<td>Black African heterosexuals</td>
<td>608</td>
<td>36</td>
<td>5.9%</td>
</tr>
</tbody>
</table>
Recent HIV infections in 2012, by transmission risk group

- All: 18.9%
- MSM: 25.9%
- MSM attending in London: 26.8%
- Heterosexuals: 8.9%
- Black African heterosexuals: 5.9%
### Estimating the total number of negative HIV tests corresponding to RITA tests conducted

<table>
<thead>
<tr>
<th>Group of attendees</th>
<th>Tests per HIV Dx in GUMCAD(^1)</th>
<th>N DX tested in RITA programme</th>
<th>Estimated N HIV tests</th>
<th>Estimated N negative HIV tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>222.5</td>
<td>2968</td>
<td>660253</td>
<td>657286</td>
</tr>
<tr>
<td>MSM</td>
<td>35.5</td>
<td>1715</td>
<td>60957</td>
<td>59242</td>
</tr>
<tr>
<td>MSM in London</td>
<td>30.9</td>
<td>1042</td>
<td>32191</td>
<td>31149</td>
</tr>
<tr>
<td>Heterosexuals</td>
<td>396.5</td>
<td>1108</td>
<td>439300</td>
<td>438192</td>
</tr>
<tr>
<td>Black African heterosexuals</td>
<td>45.1</td>
<td>608</td>
<td>27421</td>
<td>26813</td>
</tr>
</tbody>
</table>

\(^1\)Genitourinary Medicine Clinical Activity Dataset

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HIV incidence among people who attend sexual health clinics in England in 2012: estimates using a biomarker for recent infection
HIV incidence among sexual health clinic attendees in 2012

<table>
<thead>
<tr>
<th>Group of attendees</th>
<th>Estimated incidence</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0.15%</td>
<td>0.13%-0.17%</td>
</tr>
<tr>
<td>MSM</td>
<td>1.34%</td>
<td>1.15%-1.53%</td>
</tr>
<tr>
<td>MSM attending in London</td>
<td>1.6%</td>
<td>1.34%-1.86%</td>
</tr>
<tr>
<td>Heterosexuals</td>
<td>0.03%</td>
<td>0.02% -0.04%</td>
</tr>
<tr>
<td>Black African heterosexuals</td>
<td>0.17%</td>
<td>0.08%-0.27%</td>
</tr>
</tbody>
</table>
Comparisons with other studies

• Data only available on MSM in the general population

• Estimates from a CD4 back calculation model, 2300-2500 infections each year (0.4%) among MSM in 2010\(^1\)

• Estimates from simulation of risk behaviours between 2006 & 2010, estimated 0.53% among MSM\(^2\)

• As expected, both estimates are lower than our findings (1.3%) as our study population consists of higher risk HIV test seeking sexual health clinic attendees


Limitations

- Number of new diagnoses in GUMCAD may be an overestimate as can only identify individuals within and not between clinics.
- Coverage of RITA testing incomplete, those tested may differ to those not.
- Potential testing bias: ‘seroconversion effect’. MSM more likely to test earlier during the course of their infection if recent risk exposure or symptomatic, would inflate incidence estimates as testing is not random.
- Analyses by geographic area may not reflect area of transmission.
- Not generalisable to the whole population.
Conclusions

- Testing for recent HIV infection allows timely estimation of HIV incidence among the sexual health clinic attending population.

- HIV incidence among sexual health clinics attendees is high, highest among MSM attending clinics in London (1.34%).

- Combining findings from the CD4 back calculation study\(^1\) which estimates 2500 new infections annually, and extrapolating 1.34% incidence to all MSM clinic attendees (n=87,000), half (47%) of incident infections are diagnosed within a year.

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We gratefully acknowledge the continuing collaboration of clinicians, microbiologists, immunologists, public health practitioners, occupational health doctors and nurses and other colleagues who contribute to the surveillance of HIV and STIs in the UK.
Adjusting for the false recent rate (FRR)

We estimated a false recent rate of 1.9% (n=11) among 580 specimens from persons known to have been infected for more than a year.

<table>
<thead>
<tr>
<th>Group of attendees</th>
<th>N new DX tested</th>
<th>N recent</th>
<th>% recent</th>
<th>N recent after FRR applied</th>
<th>% recent after FRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2968</td>
<td>562</td>
<td>18.9</td>
<td>520.8</td>
<td>17.5</td>
</tr>
<tr>
<td>MSM</td>
<td>1715</td>
<td>444</td>
<td>25.9</td>
<td>422.5</td>
<td>24.6</td>
</tr>
<tr>
<td>MSM attending in London</td>
<td>1042</td>
<td>279</td>
<td>26.8</td>
<td>266.2</td>
<td>25.5</td>
</tr>
<tr>
<td>Heterosexuals</td>
<td>1108</td>
<td>99</td>
<td>8.9</td>
<td>81.4</td>
<td>7.3</td>
</tr>
<tr>
<td>Black African heterosexuals</td>
<td>608</td>
<td>36</td>
<td>5.9</td>
<td>26.0</td>
<td>4.3</td>
</tr>
</tbody>
</table>

We used a mean duration of recent infection 202 days (0.55 years).