Predictors of PrEP adherence among men who have sex with men in Amsterdam, the Netherlands
Background

- PrEP prevents HIV
- Adherence $\rightarrow$ effectiveness
- RCT mobile application: AMPPrEP app
- Aim: improve adherence by giving feedback on self-reported PrEP use & sexual behaviour
Methods

- RCT nested within AMPrEP cohort (2015 - ongoing)

- Eligibility:
  - Daily PrEP use
  - Able to use app
  - Willing to provide Dried Blood Spots (DBS)
Methods

- Randomisation 1:1
  - Basic app
  - Extended app

- Inclusion at:
  - 3 / 6 / 9 month study visit
Methods

- **Intervention**
  - Extended app
  - Visual feedback on PrEP use & sexual behaviour
    - Trends in pill use and sex partners
    - Covered sex acts
  - Advanced alarm clock
Methods

- Dried Blood Spots (DBS) collected at
  - 12 months
  - 24 months
  - (48 months) after PrEP initiation

- Tenofovir diphosphate concentrations [TFV-DP]\(^1,2\)

<table>
<thead>
<tr>
<th>Adherence level</th>
<th>[TFV-DP]</th>
<th>Equivalent to # tablets taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Good”</td>
<td>700 - 1249 fmol/punch</td>
<td>4 - 6 / week</td>
</tr>
<tr>
<td>“Excellent”</td>
<td>≥ 1250 fmol/punch</td>
<td>(≥) 7 / week</td>
</tr>
</tbody>
</table>

Methods

- Primary outcome
  - Good adherence at 12 and 24 months

- Secondary outcomes
  - Excellent adherence at 12 and 24 months
  - Overall [TFV-DP]

- Factors associated with adherence
Results

- Assessed for eligibility (n=351)
  - Excluded (n=122)
    - Not meeting inclusion criteria (n=100)
      - edPrEP at inclusion (n=89)
      - no/old phone (n=8)
      - does not use app (n=2)
      - language barrier (n=1)
    - Declined to participate (n=22)
  - Randomised (n=229)
    - Any follow-up (n=367)
      - Early loss to follow-up (n=9)
      - Stopped participation (n=2)
      - Lost to follow-up (n=3)
      - Not invited to participate (n=11)
    - Initiated AMPReP (n=376)
# App use & acceptability (n=166)

<table>
<thead>
<tr>
<th></th>
<th>12 months</th>
<th>24 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>6.6%</td>
<td>13.3%</td>
</tr>
<tr>
<td>≥ once weekly</td>
<td>73.5%</td>
<td>64.5%</td>
</tr>
<tr>
<td>≥ 5 days/week</td>
<td>47.7%</td>
<td>41.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>App acceptability*</th>
<th>24 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful</td>
<td>5 [4-6]</td>
</tr>
<tr>
<td>Pleasant to use</td>
<td>5 [4-6]</td>
</tr>
<tr>
<td>Ease of use</td>
<td>6 [4-7]</td>
</tr>
</tbody>
</table>

*Median and [IQR], 7-point Likert scale
Adherence at 12 & 24mo by study arm

<table>
<thead>
<tr>
<th>Study Arm</th>
<th>Excellent Adherence</th>
<th>Good Adherence</th>
<th>Poor Adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic app (n=83)</td>
<td>31.3</td>
<td>57.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Extended app (n=83)</td>
<td>48.2</td>
<td>36.1</td>
<td>15.7</td>
</tr>
</tbody>
</table>

- Excellent adherence
- Good adherence
- Poor adherence
Good adherence at 12 & 24mo

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<thead>
<tr>
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<th>Basic app (n=83)</th>
<th>Extended app (n=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent adherence</td>
<td>31.3%</td>
<td>48.2%</td>
</tr>
<tr>
<td>Good adherence</td>
<td>57.9%</td>
<td>36.1%</td>
</tr>
<tr>
<td>Poor adherence</td>
<td>10.8%</td>
<td>15.7%</td>
</tr>
</tbody>
</table>

χ² p=0.36
Excellent adherence at 12 & 24mo

χ² p=0.026

Basic app (n=83)  Extended app (n=83)

Excellent adherence

Good adherence

Poor adherence

31.3% 48.2%

57.9% 36.1%

10.8% 15.7%
[TFV-DP] in fmol/punch per arm per visit

p=0.026  p=0.135  ranksum test

Dashed line: excellent adherence cut-off
(1250 fmol/punch)

Solid line: good adherence cut-off
(700 fmol/punch)
### Multivariable linear regression

#### Factors associated with higher [TFV-DP]

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>95% CI</th>
<th>p-value</th>
<th>Effect size (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study arm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended vs. basic app</td>
<td>0.131</td>
<td>0.011 - 0.251</td>
<td>0.032</td>
<td>11</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per decade older</td>
<td>0.057</td>
<td>0.006 - 0.109</td>
<td>0.029</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Sexual preference</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not exclusively homosexual vs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exclusively homosexual</td>
<td>0.137</td>
<td>0.017 - 0.258</td>
<td>0.026</td>
<td>17</td>
</tr>
<tr>
<td><strong>HIV concern</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High/medium concern vs. low</td>
<td>0.242</td>
<td>0.457 - 0.027</td>
<td>0.027</td>
<td>31</td>
</tr>
<tr>
<td>concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Multivariable logistic regression

Factors associated with poor adherence

<table>
<thead>
<tr>
<th>Factor</th>
<th>aOR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of depression / anxiety</td>
<td>4.4</td>
<td>1.4 - 14</td>
<td>0.012</td>
</tr>
<tr>
<td>Low concern for acquiring HIV</td>
<td>5.8</td>
<td>2.0 - 17</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Factors associated with *less than* excellent adherence

<table>
<thead>
<tr>
<th></th>
<th>aOR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engaging in chemsex</td>
<td>2.2</td>
<td>1.2 - 4.3</td>
<td>0.019</td>
</tr>
</tbody>
</table>
Conclusions

- AMPrEP participants are highly adherent in general
- Visual feedback did not increase the proportion of participants with good adherence...
- ... but it did increase the proportion with excellent adherence
- ... and yielded higher [TFV-DP]
Conclusions

- Characteristics associated with higher adherence:
  - Older age
  - Not exclusively homosexual preference
  - Higher concern for acquiring HIV
Conclusions

Possible barriers for adherence:

– Signs of depression / anxiety
– Low concern for acquiring HIV
– Engaging in chemsex
Opportunities for preventing ongoing HIV transmission

- Extra attention to potential poor adhering PrEP users
  - Targeted adherence counselling during PrEP consultations
  - Referral to specialist
    - Depression / anxiety disorder
    - Problematic engagement in chemsex

- Future research: populations with lower baseline adherence levels
Acknowledgements

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