Exploring Length of Therapy and Factors Associated with HIV Pre-Exposure Prophylaxis (PrEP) Medication Adherence using Pharmacy Claims Data

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Member of Walgreens Boots Alliance
Presentation Overview

1. Background – What is PrEP?
2. Research Objective
3. Methods
4. Results
5. Discussion/Conclusions
6. Questions
What is PrEP?

- PrEP is pre-exposure prophylaxis for HIV prevention
- The only FDA approved drug combination to prevent HIV\(^1\)
- Truvada® for PrEP is once daily fixed dose tenofovir disoproxil fumarate 300 mg (TDF) and emtricitabine (FTC) 200 mg
- Recommended for certain at-risk groups
  - 600K heterosexual
  - 500K MSM
  - 100K IDU

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PrEP has been shown to reduce HIV infection risk by more than 90%\(^1\)

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Drug</th>
<th>Number</th>
<th>Participants</th>
<th>Adherence-adjusted Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPrEx(^1)</td>
<td>P3 clinical trial</td>
<td>TVD</td>
<td>2,499</td>
<td>MSM</td>
<td>92%</td>
</tr>
<tr>
<td>TDF2(^2)</td>
<td>P2 clinical trial</td>
<td>TVD</td>
<td>1,200</td>
<td>Heterosexual men/women</td>
<td>85%</td>
</tr>
<tr>
<td>Partners PrEP(^3)</td>
<td>P3 clinical trial</td>
<td>TDF/TVD</td>
<td>4,747</td>
<td>Heterosexual sero-discordant couples</td>
<td>86% / 90%</td>
</tr>
<tr>
<td>Bangkok IDE(^4)</td>
<td>P3 clinical trial</td>
<td>TDF</td>
<td>2,400</td>
<td>IDU</td>
<td>74%</td>
</tr>
<tr>
<td>Kaiser(^5)</td>
<td>Real-world observational</td>
<td>TVD</td>
<td>388 PY</td>
<td>99% MSM</td>
<td>100%</td>
</tr>
<tr>
<td>SF Strut Clinic(^6)</td>
<td>Real-world observational</td>
<td>TVD</td>
<td>1,252</td>
<td>99% MEN</td>
<td>100%</td>
</tr>
</tbody>
</table>


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Daily Oral CDC\(^1\) PrEP Guidelines

PrEP treatment guidelines include:

- Initially screen for HIV, STI’s, and tests of kidney/liver functioning
- Follow-up doc visits every three months
- Limit refill periods to ≤ 90 day supply
- HIV test every three months and STI screen every three-six months

Potential Considerations for PrEP

- Antiretroviral resistance\(^1\) rare
- Generally safe, kidney/liver\(^2,3\) function tests & potential decrease in bone density
- Side effects, i.e. “start up syndrome”
- Average wholesale price is ~ $1,759\(^4\); addition cost for doc/labs
- Risk compensation

PrEP and Adherence: An emerging concept

ARV treatment adherence differs from PrEP adherence:

• May be used for periods of high risk times
• May provide protection if taken less than daily
• Uses have other means to prevent HIV

Little is know about PrEP use outside of clinical trials

Alternative dosing schedules

PrEP reaches peak concentration in 9 days for rectal tissue in and 20 days for blood and vaginal tissue

Research Objective

To characterize PrEP medication utilization patterns and factors associated with medication adherence
# Research Methods

<table>
<thead>
<tr>
<th>Study design</th>
<th>Retrospective cohort study using 2013-2016 pharmacy claims data from Walgreens.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study population</td>
<td>A national random sample of 15,000 PrEP patients who filled an RX of Truvada ≥90 in the index year. Patients excluded if they had evidence of combined ARV therapy at any point during study period.</td>
</tr>
<tr>
<td>Primary outcome</td>
<td>Medication adherence (PDC) and length of therapy.</td>
</tr>
<tr>
<td>Statistical methods</td>
<td>Descriptive statistics and regression modeling in SAS 9.3</td>
</tr>
</tbody>
</table>
Demographics of PrEP Users (n=15,000)
PrEP User Increased Rapidly since 2013

= Percent Increase

- Returning Patient
- New Patient

<table>
<thead>
<tr>
<th>Year</th>
<th>Returning Patient</th>
<th>New Patient</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>807</td>
<td>641</td>
<td>1,448</td>
</tr>
<tr>
<td>2014</td>
<td>2,448</td>
<td>2,612</td>
<td>5,060</td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td>66%</td>
<td>6,536</td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td>6,411</td>
</tr>
</tbody>
</table>

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Distribution of Total Gap Days in Index Year

- Mean gap days = 31
- Median gap days = 9

Total Gap Days

- 0: 57.1%
- 14: 12.5%
- 28: 7.3%
- 42: 4.7%
- 56: 3.6%
- 70: 2.8%
- 84: 2.0%
- 98: 1.9%
- 112: 1.4%
- 126: 1.2%
- 140+: 5.3%
Percent of Users with Gaps in PrEP Coverage (n=15,000)

- 1 or More Gaps > 14 days
- No Gaps > 14 days

- 63% of PrEP users had NO interruptions in therapy using 14 days gap criteria
Average Days with PrEP Therapy in Index Year

16% stopped at 3 months, “Discontinued Use”

61% had 3 - 11 months, “Intermittent Use”

23% had full year coverage, “Everyday Use”

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Proportion of Days Covered Standard (PDCs) Calculation

\[
PDCs = \frac{Days \ with \ medication \ in \ year}{360}
\]

- At least 90 days with medication in index year
- Two fills at least 5 months apart
- Followed for entire year, regardless of drop off
- Mean PDCs = .64

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Proportion of Days Covered Modified (PDC\textsuperscript{m})

Calculation

\[ PDC^m = \frac{\text{Days with medication in period}}{(\text{Last fill date} + \text{days supply}) - \text{first fill date}} \]

- At least 90 days with medication in index year
- Followed for up to 360 days
- Mean \( PDC^m = .88 \)
## Odds Ratio of Adequate PrEP Adherence

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Odds Ratio Modified PDC $^m \geq .90$ (95% CI)</th>
<th>Odds Ratio Standard PDC $^s \geq .90$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (vs. male)</td>
<td>0.67 (0.54 - 0.80)</td>
<td>0.53 (0.39 - 0.73)</td>
</tr>
<tr>
<td>Age Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-29 (vs. 18-24)</td>
<td>1.36 (1.20 - 1.53)</td>
<td>1.31 (1.06 – 1.62)</td>
</tr>
<tr>
<td>30-39 (vs. 18-24)</td>
<td>1.82 (1.62 - 2.04)</td>
<td>1.89 (1.54 – 2.31)</td>
</tr>
<tr>
<td>40-49 (vs. 18-24)</td>
<td>2.36 (2.07 - 2.69)</td>
<td>2.59 (2.08 – 3.23)</td>
</tr>
<tr>
<td>50+ (vs. 18-24)</td>
<td>2.67 (2.31 – 3.09)</td>
<td>2.63 (2.07 – 3.35)</td>
</tr>
<tr>
<td>HIV Specialized Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV-SP (vs. Non HIV-SP)</td>
<td>1.43 (1.29 - 1.58)</td>
<td>1.48 (1.26 - 1.74)</td>
</tr>
<tr>
<td>Urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (vs. no)</td>
<td>0.90 (.80 - 1.01)</td>
<td>0.97 (.80 – 1.18)</td>
</tr>
<tr>
<td>Days with Medicine (cont.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.99 (.99 -.99)</td>
<td><strong>1.10 (1.09 – 1.12)</strong></td>
</tr>
<tr>
<td>Plan Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public (vs. Private)</td>
<td>0.61 (.55 - .67)</td>
<td>0.59 (.45 – .77)</td>
</tr>
<tr>
<td>Cash/Other (vs. Private)</td>
<td>0.73 (.63 - .83)</td>
<td>0.58 (.49 - .68)</td>
</tr>
</tbody>
</table>
### Adjusted PrEP Length of Therapy and $PDC^m$

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Days on Therapy (95% CI)</th>
<th>$PDC^m$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>194 (185 - 203)</td>
<td>.86 (.85 - .87)</td>
</tr>
<tr>
<td>Male</td>
<td><strong>213 (210 - 217)</strong></td>
<td>.88 (.88 - .89)</td>
</tr>
<tr>
<td><strong>Age Category</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>177 (170 - 184)</td>
<td>.84 (.83 - .85)</td>
</tr>
<tr>
<td>25-291</td>
<td>193 (187 - 199)</td>
<td>.86 (.85 - .87)</td>
</tr>
<tr>
<td>30-39</td>
<td>208 (202 - 213)</td>
<td>.87 (.86 - .88)</td>
</tr>
<tr>
<td>40-49</td>
<td><strong>221 (215 - 227)</strong></td>
<td>.89 (.88 - .90)</td>
</tr>
<tr>
<td>50+</td>
<td><strong>220 (213 - 226)</strong></td>
<td>.90 (.89 - .91)</td>
</tr>
<tr>
<td><strong>Urban</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td><strong>209 (205 – 214)</strong></td>
<td>.87 (.86 - .87)</td>
</tr>
<tr>
<td>No</td>
<td>198 (192 – 205)</td>
<td>.87 (.86 - .88)</td>
</tr>
<tr>
<td><strong>HIV Specialization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV-SP</td>
<td><strong>210 (204 - 216)</strong></td>
<td>.88 (.87 - .89)</td>
</tr>
<tr>
<td>Non HIV-SP</td>
<td>197 (192 - 202)</td>
<td>.86 (.85 - .87)</td>
</tr>
<tr>
<td><strong>Plan Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td><strong>225 (219 – 230)</strong></td>
<td>.88 (.88 – 89)</td>
</tr>
<tr>
<td>Public</td>
<td>203 (197 – 209)</td>
<td>.85 (.84 - .86)</td>
</tr>
<tr>
<td>Other</td>
<td>183 (176 – 190)</td>
<td>.88 (.86 - .89)</td>
</tr>
</tbody>
</table>
Conclusions

- Different patterns of PrEP use immerge (i.e., ‘discontinued’, ‘intermittent’ and ‘consistent’ coverage).

- PDCs was .64 for a year, and PDCm was .88 during PrEP usage periods.

- PrEP adherence was significantly associated with age, gender, HIV-specialized (HIV-sp) services and insurance type.

- These results highlight the importance of adherence counseling among specific populations and illustrate differences in adherence patterns for PrEP by demographics and service setting.

- Future research should investigate improved methods for PrEP adherence and length of therapy calculations.
Limitations

• Observational design, 2013-2016 data

• Based on a sample of PrEP users from a single pharmacy chain’s administrative data.

• Based on pharmacy claims only (no clinical data); cannot confirm HIV status.

• We were unable to determine if a patient fills scripts at another pharmacy.

• Other adjustments, missing data, etc.
Disclaimers:

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For more information on this presentation, please contact: John.hou@walgreens.com or heather.kirkham@walgreens.com

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Thank you & Questions?
PrEP Resources

AIDS View (other articles on aidsmap.com)
  •  https://aidsvu.org/

PrEP Locator
  •  https://preplocator.org/

NIH Guidelines
  •  https://aidsinfo.nih.gov/guidelines

Walgreens (Houston Area):
  •  https://www.walgreens.com/topic/pharmacy/scheduler/hiv-prep.jsp

Gilead:
  •  http://www.truvada.com/truvada-patient-assistance

CDC Adherence Guidelines

PrEPline: 885-448-7737
PEPline: 888-448-4911