HIV+ Individuals on ART are at Risk of Polypharmacy, Yet More Medications Increases Mortality


Funded by the National Institute on Alcohol Abuse and Alcoholism

YALE UNIVERSITY SCHOOL OF MEDICINE
VA CONNECTICUT HEALTHCARE SYSTEM
Polypharmacy

- Commonly defined as $\geq 5$ medications

- Growing healthcare problem
  - costs, negative health outcomes

- More common among HIV-infected patients despite potential for risk of harms

- Limited data on polypharmacy in HIV
Study Aims

• Patterns of polypharmacy by HIV status

• Factors associated with polypharmacy

• The association between polypharmacy and mortality overall and by HIV status
Design

- Cross sectional analysis, 10/2009 – 9/2010

- Veterans Aging Cohort Study
  - HIV+ and 2:1 matched uninfected controls
  - Electronic medical record and pharmacy data
  - Death data
Variables

• Main Predictor – Medication Count:
  – All formulations of long-term outpatient medications
  – Median number of dispensed medications, excluding antiretroviral therapy

• Outcome - Death

• Covariates:
  – Demographics and clinical characteristics (HIV status, comorbidities, VACS Index score)
Analysis

• Descriptive statistics by HIV status

• Multivariable models to determine independent associations of:
  – Comorbidities and polypharmacy (linear regression)
  – Polypharmacy and mortality (Cox model)
Analytic Sample

VACS FY2010
N=89,636

At least one inpt/outpt visit
n=82,404

No visit in past 12 months
n=7,232

Cancer-free
n=80,110

Cancer Dx at baseline
n=2,294

At least one dispensed med
n=68,867

No dispensed meds
n=11,243

ANALYTIC SAMPLE
Uninfected, n = 47,613
HIV+ on cART, n=16,989

Ambiguous HIV status
n=84 and
HIV+ no cART n=4,181
# Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Uninfected n=47,613</th>
<th>HIV on cART n=16,989</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>56 (9)</td>
<td>54 (10)</td>
</tr>
<tr>
<td>Gender, %</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>Race/Ethnicity, %:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>Black</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>VACS Index Score, median (IQR)</td>
<td>12 (0, 18)</td>
<td>26 (15, 43)</td>
</tr>
<tr>
<td>Medications, median (IQR)</td>
<td>4.23 (2.29, 7.23)</td>
<td>3.49 (2.00, 6.08)</td>
</tr>
<tr>
<td>cART-regimen, %:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protease-inhibitor</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>NNRTI</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>CD4 count, median (IQR)</td>
<td></td>
<td>322 (162, 504)</td>
</tr>
<tr>
<td>HIV-1 RNA viral load, median (IQR)</td>
<td></td>
<td>4321 (400, 54674)</td>
</tr>
</tbody>
</table>
Comorbid Conditions by HIV Status

- Hypertension
- Diabetes Mellitus
- Severe Mental Illness
- Substance Use Disorder
- Cardiovascular Disease
- Chronic Kidney Disease
- Cirrhosis

Proportion (%)

Uninfected, $n=47,613$
HIV w/ cART, $n=16,989$
Medication Count by HIV Status

![Bar chart showing medication count by HIV status. The chart displays the proportion (%) of uninfected and HIV-infected individuals on cART across different medication count categories: 0-3, 4-6, 7-9, 10-12, and >12.](image-url)
Top 10 Medication Classes by HIV Status

- Anti-Lipemic Agents
- Ace-Inhibitors
- Gastric Medications
- Anti-Depressants
- Beta Blockers
- Nonopioid Analgesics
- Calcium Channel Blockers
- Diuretics
- Hypoglycemic Agents
- Genitourinary Medications

Proportion (%)

Uninfected

HIV-Infected on cART
## Factors associated with Med Count

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean Change in Med Count</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>-0.45</td>
<td>-0.53, -0.37</td>
</tr>
<tr>
<td>Male</td>
<td>-0.28</td>
<td>-0.45, -0.11</td>
</tr>
<tr>
<td>Race/Ethnicity (ref: white)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>-0.63</td>
<td>-0.69, -0.57</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.29</td>
<td>-0.39, -0.18</td>
</tr>
<tr>
<td>Other</td>
<td>-1.23</td>
<td>-1.38, -1.08</td>
</tr>
<tr>
<td>VACS Index Score (5 pt increments)</td>
<td>0.06</td>
<td>0.05, 0.07</td>
</tr>
<tr>
<td>Medical Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>2.48</td>
<td>2.42, 2.54</td>
</tr>
<tr>
<td>COPD</td>
<td>2.23</td>
<td>2.11, 2.34</td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>1.61</td>
<td>1.51, 1.72</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.48</td>
<td>1.42, 1.54</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>0.15</td>
<td>-0.20, 0.50</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>0.06</td>
<td>-0.21, 0.33</td>
</tr>
</tbody>
</table>
Medication Count and Mortality

Uninfected

HIV-infected on cART

*Note: reference is 0-3 medications; models adjust for gender, race/ethnicity, VACS index score
Summary

- Treated HIV-infected patients are commonly exposed to polypharmacy

- HIV-infected patients are less likely to be prescribed non-ART medications

- Polypharmacy is independently associated with mortality among uninfected and HIV-infected patients
Conclusions

• Future studies examining longitudinal associations with polypharmacy and mortality and other health outcomes are warranted

• The development and evaluation of interventions to reduce polypharmacy among HIV-infected patients are needed
Thank you

Questions/Comments:

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