Recent Tobacco Smoking Associated with Indicators of HIV Progression

Stephen Hile, MSW
Matthew Feldman, PhD, MSW
Emily Alexy, MPH
Mary Irvine, DrPH, MPH

Care and Treatment Program,
Bureau of HIV/AIDS Prevention and Control

New York City Department of Health and Mental Hygiene
Ryan White Part A

- Care and support services for people living with HIV/AIDS (PLWHA) who have no other payer for services

- Eligibility
  - \( \leq 435\% \) of the federal poverty level
  - Residence in the New York Eligible Metropolitan Area (EMA) – New York City, Westchester, Rockland, or Putnam Counties
  - HIV Diagnosed

- Client population
  - Most earn less than 150\% of the federal poverty level
  - High prevalence of substance use
  - High prevalence of comorbid conditions (e.g., Hep C, Depression)
Tobacco smoking among PLWHA

- PLWHA are two to three times more likely to smoke than the general population
  (Gonzalez, Barinas & O’Cleirigh, 2011; Gritz et al, 2004; Kwong & Bouchard-Miller, 2010; Mdodo, 2015; Reynolds, 2009; USDHHS, 2014;)

- Approximately 50 to 60% of PLWHA in NYC smoke
  (Messeri & Vardy, 2013; Tesoriero et al, 2008)

- Smoking associated with increased mortality and a higher-risk of negative health outcomes
  (Helleberg et al., 2012; 2014; 2015; Marshall, 2009; Nakagawa et al., 2012; Petrosillo & Cicalini, 2013)
Tobacco smoking and HIV health outcomes

- **Viral Suppression**
  - Smoking associated with unsuppressed viral load
    (Feldman et al., 2006; Miguez-Burbano et al., 2003; Wojna et al., 2007)
  - Smoking **not** associated with unsuppressed viral load
    (Kabali et al., 2011)

- **CD4 Cell Count**
  - Smoking associated with both increases and decreases in CD4 cell counts
    (Feldman et al., 2006; Royce & Winkelstein, 1990; Wojna et al., 2007)
  - Smoking **not** associated with changes in CD4 cell counts
    (Burns et al., 1991; Conley et al., 1996; Craib et al., 1992; Gritz et al., 2004; Park et al., 1992; Webber et al., 1999).
Limitations of prior research

- Did not control for important covariates
  - ART status
    - Burns et al., 1991; Conley et al., 1996; Craib et al., 1992; Park et al., 1992
  - Substance use
    - Burns et al., 1991; Conley et al., 1996; Miguez-Burbano et al., 2003; Park et al., 1992; Wojna et al., 2007
- Small sample sizes
  - Burns et al., 1991; Miguez-Burbano et al., 2003; Webb et al., 2007; Wojna et al., 2007
Aims

 To examine differences in sociodemographic and clinical characteristics between HIV-positive individuals with and without recent tobacco smoking

 To examine the association between recent tobacco smoking and HIV health outcomes (unsuppressed viral load and low CD4 cell counts)
Data sources

- Electronic System for HIV/AIDS Reporting & Evaluation (eSHARE)
  - Demographic and clinical information (e.g., ART prescription status, age, gender, race-ethnicity, recent drug use)
  - Contractually required of organizations who provide HIV/AIDS services through a Ryan White Part A contract

- New York City HIV Surveillance Registry
  - Viral load and CD4 test dates and results
  - Legally mandated reporting by medical providers in NYC
Study population

- **Enrolled**
  - N=24,114
  - HIV+ Ryan White clients enrolled in eSHARE between 11-1-2010 and 9-20-2013

- **Assessed**
  - N=19,042
  - Clients age 18 or over who completed a valid substance use assessment

- **Matched**
  - N=17,554
  - Clients who matched to the New York City Surveillance Registry and had at least one documented viral load and/or CD cell count

- **Final Sample**
  - N=14,713
  - Clients who had a viral load and/or CD4 cell count test result within the three months prior to their most recent valid substance use assessment
Measures

- Recent tobacco smoking
  - Self-reported tobacco smoking in the 3 months prior to the substance use assessment

- Covariates
  - Age, ART prescription status, country of birth, education, gender, housing status, income, primary language, race/ethnicity, recent drug use, years since HIV diagnosis

- HIV health outcomes
  - Unsuppressed viral load (VL): VL > 200 copies/mL
  - Low CD4 cell count: CD4 < 200 cells/mm³
    - (both outcomes ≤ 3 months prior to substance use assessment)
Data analysis

- **Chi-square tests**
  - Used to examine differences between HIV-infected individuals with and without recent smoking

- **Multivariate logistic regression**
  - Two models used to identify covariates that remained independently associated with each HIV medical outcome
### Comparisons between recent and non-recent tobacco smokers (n=14,713)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Recent tobacco smoking</th>
<th>No recent tobacco smoking</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=5942 (40%)</td>
<td>N=8771 (60%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3918 (40.8%)</td>
<td>5691 (59.2%)</td>
<td>.004</td>
</tr>
<tr>
<td>Female</td>
<td>1903 (39.2%)</td>
<td>2955 (60.8%)</td>
<td></td>
</tr>
<tr>
<td>Transgender</td>
<td>117 (50.8%)</td>
<td>121 (49.2%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>504 (40.6%)</td>
<td>739 (59.5%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Black/African American</td>
<td>3322 (42.6%)</td>
<td>4473 (57.4%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1930 (37.9%)</td>
<td>3169 (62.2%)</td>
<td></td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>163 (31.4%)</td>
<td>357 (68.7%)</td>
<td></td>
</tr>
<tr>
<td>&lt;30 years old</td>
<td>612 (35.5%)</td>
<td>1114 (64.5%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>30-49 years old</td>
<td>2764 (41.6%)</td>
<td>3876 (58.4%)</td>
<td></td>
</tr>
<tr>
<td>50+ years old</td>
<td>2566 (40.4%)</td>
<td>3781 (59.6%)</td>
<td></td>
</tr>
<tr>
<td>&lt; High school diploma</td>
<td>2646 (44.8%)</td>
<td>3260 (55.2%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>≥ High school diploma</td>
<td>3191 (38.6%)</td>
<td>5074 (61.4%)</td>
<td></td>
</tr>
</tbody>
</table>

*a Missing responses within covariates were not included in the analysis*
Comparisons between recent and non-recent tobacco smokers (n=14,713)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Recent tobacco smoking</th>
<th>No recent tobacco smoking</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=5942 (40%)</td>
<td>N=8771 (60%)</td>
<td></td>
</tr>
<tr>
<td>Other language</td>
<td>763 (24.8%)</td>
<td>2310 (75.2%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>English speaking</td>
<td>5177 (44.5%)</td>
<td>6456 (55.5%)</td>
<td></td>
</tr>
<tr>
<td>Born in USA/US territory</td>
<td>5426 (47.1%)</td>
<td>6100 (52.9%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Born outside of USA/US territory</td>
<td>487 (16%)</td>
<td>2567 (84.1%)</td>
<td></td>
</tr>
<tr>
<td>Income &lt;100% FPL</td>
<td>4641 (44%)</td>
<td>5900 (56%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Income &gt;=100% FPL</td>
<td>786 (31.2%)</td>
<td>1730 (68.8%)</td>
<td></td>
</tr>
<tr>
<td>Stable housing</td>
<td>3510 (34.9%)</td>
<td>6541 (65.1%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Temporary housing</td>
<td>927 (48.7%)</td>
<td>978 (51.3%)</td>
<td></td>
</tr>
<tr>
<td>Unstable housing</td>
<td>1407 (57.9%)</td>
<td>1025 (42.2%)</td>
<td></td>
</tr>
<tr>
<td>Prescribed ART</td>
<td>4890 (40.2%)</td>
<td>7284 (59.8%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Not prescribed ART</td>
<td>1040 (45.1%)</td>
<td>1264 (54.9%)</td>
<td></td>
</tr>
</tbody>
</table>

*Missing responses within covariates were not included in the analysis*
Comparisons between recent and non-recent tobacco smokers (n=14,713)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Recent tobacco smoking N=5942 (40%)</th>
<th>No recent tobacco smoking N=8771 (60%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No recent drug use^b</td>
<td>4097 (33.5%)</td>
<td>8140 (66.5%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Recent drug use^b</td>
<td>1632 (77.3%)</td>
<td>480 (22.7%)</td>
<td></td>
</tr>
<tr>
<td>No recent alcohol use^b</td>
<td>3046 (30.8%)</td>
<td>6847 (69.2%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Recent alcohol use^b</td>
<td>2788 (60.1%)</td>
<td>1852 (39.9%)</td>
<td></td>
</tr>
<tr>
<td>CD4 cell counts ≥ 200</td>
<td>4321 (38.8%)</td>
<td>6807 (61.2%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CD4 cell counts &lt; 200</td>
<td>1321 (46.7%)</td>
<td>1506 (53.3%)</td>
<td></td>
</tr>
<tr>
<td>Viral load ≤200 (suppressed)</td>
<td>3070 (34.8%)</td>
<td>5762 (65.2%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Viral load &gt; 200 (unsuppressed)</td>
<td>2658 (49.7%)</td>
<td>2688 (50.3%)</td>
<td></td>
</tr>
<tr>
<td>Years since HIV diagnosis (M +/- SD)</td>
<td>12.6 (7.2)</td>
<td>11.4 (7.2)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

^a Missing responses within covariates were not included in the analysis

^b Recent alcohol and drug use is defined as having used one or more times in the three months prior to the substance use assessment
In multivariate models, there was a significant, independent relationship between recent tobacco smoking and:
- unsuppressed viral load (AOR=1.38, CI=1.26-1.5)
- low CD4 cell counts (AOR=1.12, CI=1.01-1.24)

Sensitivity analysis results – no recent alcohol:
- Independent relationship with unsuppressed viral load (AOR= 1.35, CI= 1.21-1.50)
- Non-significant relationship with low CD4 cell counts (AOR= 1.11, CI= 0.98-1.25)
Limitations

- Social desirability bias
- Causal relationship could not be established
- High prevalence of low CD4 cell counts and unsuppressed viral load could lead to slightly inflated odds ratios
- Variables not included in analysis
  - Alcohol use, ART adherence, smoking frequency, past smoking status
Strengths

- The NYC HIV/AIDS Surveillance Registry
- Large sample size (n=14,713)
- Controlled for ART prescription status and substance use
Implications for practice and research

- Underscores the importance of addressing smoking in patients with HIV
- Smoking may not be an optimal harm reduction strategy for clients receiving substance use and/or mental health services
- More research required to determine potential mechanisms to explain the relationship between recent tobacco smoking and HIV health outcomes
Implications for Ryan White Part A in NYC

- Designating “tobacco smoking reduction counseling” as a reimbursable service type
- Improving data collection to better track prevalence, frequency, and type of tobacco use
- Requiring at least two annual smoking and tobacco use counseling sessions for mental health and harm reduction clients who report tobacco smoking
- Offering smoking and tobacco use trainings to service providers
Acknowledgements

- Ryan White providers for reporting client assessment and services data
- This work was supported through a grant from the Health Resources and Services Administration (H89HA0015) to the New York City Department of Health and Mental Hygiene.
References


References


References

