Understanding the Disparity: Predictors of Virologic Failure in Women using HAART vary by Race/Ethnicity

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Racial/ethnic and gender disparities in HIV/AIDS-related morbidity and mortality have been well documented.

The National HIV/AIDS Strategy:

To reduce HIV-related disparities and health inequities by addressing “the factors that influence disparate health outcomes” and being “mindful of the diversity and needs of the most affected communities.”

Study Population

• Women’s Interagency HIV Study (WIHS), a multi-site, prospective, observational cohort, which includes six sites in Washington, DC, Brooklyn, NY, Bronx, NY, San Francisco, CA, Los Angeles, CA, and Chicago, IL
  • Semi-annual study visits include structured interviews, physical examinations, and laboratory specimen collection

• A nested cohort study conducted from April 1, 2006 to March 31, 2011
  • Inclusionary criteria: HIV-infected women that reported HAART use with a suppressed viral load occurring during our study period
Outcome and Predictors

• **Outcome:** HIV virologic failure
  - Defined as HIV RNA ≥200 copies/mL after confirmed suppression (<80 copies/mL) on HAART
  - HAART defined according to Department of Health and Human Services guidelines

• **Adherence**

• **Predictors**
  - Behavioral: alcohol and illicit drug use, cigarette smoking
  - Psychosocial: depressive symptoms (CESD)
  - Socioeconomic: annual household income
  - Healthcare-related: type of health insurance, ADAP participation
Statistical Methods

• Annual proportion of women experiencing virologic failure
  - Estimated using a series of annual, cross-sectional studies was used

• Estimated univariate (HR) and adjusted (aHR) hazard ratios and 95% confidence intervals
  - Discrete-time complementary log-log (clog-log) survival models
  - Time from baseline study visit (Oct 2005-Mar 2006) or viral suppression, whichever came later, to virologic failure

• Population attributable fractions (PAFs):
  - Estimated using the Rockhill’s formula⁴ using the aHRs and the prevalence of the predictor among women with virologic failure
  - Interpretation: the proportion of failures that could be avoided if the predictor/exposure were eliminated or at the lowest exposure level⁵
  - Tool to highlight characteristics of women in which virologic failure is concentrated
Results
Table 1 Characteristics of Women's Interagency HIV Study (WIHS) participants, by virologic failure. April 2006 - March 2011 (N=919)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Suppressed N=288</th>
<th>Virologic Failure N=634</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic African-American</td>
<td>348</td>
<td>241</td>
<td>0.032</td>
</tr>
<tr>
<td>Hispanic</td>
<td>138</td>
<td>114</td>
<td>0.27</td>
</tr>
<tr>
<td>Non-Hispanic White and other</td>
<td>153</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Country of birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States and territories</td>
<td>353</td>
<td>261</td>
<td>0.002</td>
</tr>
<tr>
<td>Other</td>
<td>141</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>Age (years) (median/IQR)</td>
<td>45 (39-51)</td>
<td>49 (37-49)</td>
<td>0.001</td>
</tr>
<tr>
<td>Currently employed</td>
<td>Yes</td>
<td>283</td>
<td>198</td>
</tr>
<tr>
<td>Drug use since last study visit</td>
<td>Yes</td>
<td>63</td>
<td>80</td>
</tr>
<tr>
<td>Alcohol use since last study visit</td>
<td>Yes</td>
<td>420</td>
<td>298</td>
</tr>
<tr>
<td>Current antiretroviral treatment</td>
<td>Yes</td>
<td>141</td>
<td>184</td>
</tr>
<tr>
<td>Type of health insurance</td>
<td>Public</td>
<td>238</td>
<td>291</td>
</tr>
<tr>
<td>Private or military</td>
<td>127</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>No insurance</td>
<td>64</td>
<td>68</td>
<td>0.02</td>
</tr>
<tr>
<td>CD4 count (cells/mm³) (median/IQR)</td>
<td>543 (481-732)</td>
<td>481 (311-672)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Chi-square test for categorical variables and Wilcoxon rank sum test for continuous variables

Percentages may not add to 100% due to missing data.
Figure 1 Annual proportion and 95% confidence intervals of women with virologic failure, by race/ethnicity, the Women’s Interagency HIV Study (WIHS), 2007-2010

P-value for trends: All women, p=0.313; African American, p=0.713; Hispanic, p=0.889; white/other p=0.293.

Number at risk (N)
All women 621 731 796 814
African American 379 405 412 423
Hispanic 214 231 236 240
White/other 138 153 148 151

P-value for trends: All women, p=0.313; African American, p=0.713; Hispanic, p=0.889; white/other p=0.293.
Figure 2 Adjusted Hazard Ratios* (aHR) and 95% confidence intervals of virologic failure by race/ethnicity, Women’s Interagency HIV Study, April 2006-March 2011 (N=792)

- Income ≤ $24,000/year
- Current smoking
- Alcohol use
- Recent drug use

*Adjusted for all predictors in the figure as well as history of hepatitis C, country of birth, study center, age, CD4 count, clinical AIDS diagnosis, time since HAART initiation, and previous virologic failure.

Compared to annual income > $36,001, compared to non-smoker, > 3 drinks/week compared to < 3 drinks/week, compared to non-use.
Figure 2 Adjusted Hazard Ratios* (aHR) and 95% confidence intervals of virologic failure by race/ethnicity, Women’s Interagency HIV Study, April 2006-March 2011 (N=792), continued

Depressive symptoms

No health insurance

ADAP non-participation

*Adjusted for all predictors in the figure as well as history of hepatitis C, country of birth, study center, age, CD4 count, clinical AIDS diagnosis, time since HAART initiation, and previous virologic failure. a Compared to no depressive symptoms, b Compared to no health insurance, c Compared to ADAP participation.
Figure 3 Population attributable fractions (PAF) and prevalence of predictors stratified by race/ethnicity, Women's Interagency HIV Study (WIHS), April 2006 - March 2011 (N=792)

- **Population attributable fraction (PAF)**
- **Prevalence among women with virologic failure**

**ADAP nonparticipation**
- Negative PAF because of the protective effect of the predictor on virologic failure

**No health insurance**

**3 or more alcoholic drinks per week**

**Depressive Symptoms**

Limitations

- Investigation of first virologic failure in study period
- Small sample sizes for Hispanic and white/other women, resulting in a reduction in power and challenging to discern predictors specific to these groups
- PAF interpretation depends on a causal relationship between the predictor and the outcome
  - We have not established causal relationships for our predictors
Conclusions

• Similar to national trends, racial/ethnic disparities in virologic failure exist among WIHS women

• Low income was a barrier to successful viral suppression in all racial/ethnic groups but may be more of a burden for African American and Hispanic women

• Nonparticipation in ADAP carried a moderate increase in risk of virologic failure in all groups

• Lack of health insurance associated with a large risk and PAF only in Hispanic and white/other women

• Depressive symptoms only associated with an increased risk in African American women

• Drug use and alcohol use do not seem to be large contributors to virologic failure
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References


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