ART Coverage and Predictors of Detectable Viral Load in the Los Angeles County Ryan White System of Care

Jennifer N. Sayles, MD, MPH
Mike Janson, MPH
Min Kim, MPH
Los Angeles County Department of Public Health
Division of HIV and STD Programs
Background: Benefits of ART

- An estimated 21%\(^1\) of those with HIV/AIDS are unaware of their status, and incident HIV infection rates are not declining\(^2\).
- HIV treatment as prevention is critical component of the HIV prevention toolbox.
- Strong evidence that access and adherence to antiretroviral therapy (ART) can lead to:
  1. Improved morbidity and mortality
  2. Reduced forward HIV transmission


Changes in ART Guidelines

• Treat patients w/ CD4 counts b/w 350-500 cells/mm$^3$ (A/B-II)
• Consider treatment for patients w/ CD4 counts >500 (B/C-III)
Changes in ART Guidelines

- Treat patients with CD4 counts between 350-500 cells/mm³ (A/B-II)
- Consider treatment for patients with CD4 counts >500 (B/C-III)

CD4 351-500: Deferred ART group had 69% increase risk of death
CD4 > 500: Deferred ART group had 94% increase risk of death

Conclusion – Early ART initiation before CD4 count decrease led to significant improvements in survival.
HPTN 052: RCT of 1763 serodiscordant couples
• HIV+ had CD4 350-550, randomized to early/ immediate ART or delayed ART (CD4<250 or AIDS related illness)
• Overall 39 transmission, 28 linked to HIV+ partner: 27 delayed arm, 1 early tx arm: HR 0.04, 95% CI, .01-0.27
  – 96% relative reduction HIV transmission with early ART
• Overall early ART associated with fewer clinical events, HR 0.59, 95% CI, .40-.88
  – 41% relative reduction HIV related clinical events with early ART
How can we optimize ART coverage and viral suppression in LA County to reduce HIV transmission?

Step 1: Understand ART use and viral load levels in a population of HIV+ persons in LA County

Goal: Identify individual-level and geographic factors associated with ART use and detectable viral load in the LA County Ryan White system of care

Objectives:
- Assess geographic, demographic differences in ART coverage
- Model behavioral, clinical, demographic predictors of VL
Ryan White Population in LAC

- Approx 18,000 HIV+ individuals receive HIV care and support services in the Los Angeles County (LAC) Ryan White (RW) system
  - RW population represents ~37% of all known HIV/AIDS cases in LAC.

* Via Ryan White Part A, B and MAI funding.
** Utilized medical outpatient care services.
Sample for Analysis

FINAL SAMPLE: N = 11,397

Patients with one or more medical visit in Ryan White system in 2009
N = 14,799

N = 12,752
86%

Valid Viral Load Measure in CY 2009

N = 11,397
89%

Patients w/ non-missing covariates

N = 1,355
11%

Patients w/ missing covariates

N = 2,047
14%

No Viral Load Measure in CY 2009
Methods: Variable Definitions

- **On ART:**
  - patient reported to be on an antiretroviral regimen or on ADAP (AIDS Drug Assistance Programs)

- **HIV Viral Load:**
  - patient’s most recent HIV RNA viral load (VL) reported in CY 2009

- **Undetectable VL:**
  - a viral load reported at less than 200 copies/uL

- **Mean VL:**
  - sum of most recent HIV VL for each patient / total # patients with VL
Methodology – Analysis

- **Timeframe:** Jan. 1 – Dec. 31, 2009
- **Data Source:** Casewatch Millenium
  - administrative and clinical data: demographics, insurance, income, health history, utilization, lab data.
- **Analysis plan:**
  - Frequencies and Chi Squares to determine ART coverage and variations in detectable VL on ART
  - Frequencies and bivariates of key demographic, behavioral and clinical variables by detectable VL
  - Multivariate logistic regression to determine key factors associated with detectable VL
Demographics of RW Sample

Source: Casewatch CY 2009

Gender
- Male: 84%
- Female: 15%
- Transgender: 2%

N = 11,397

Race
- Black: 51%
- Latino: 23%
- Other/Unknown: 3%
- Asian/PI: 22%
- Other: 0%

Age
- 0-24: 32%
- 25-39: 41%
- 40-49: 25%
- 50+: 3%
Demographics of RW Sample

Health Insurance

- Private: 61%
- Public: 34%
- None: 5%
- Other: 12%

Living Situation
- Permanent: 12%
- Non-Permanent: 88%

Income Level
- >400% FPL: 1%
- 301-400% FPL: 2%
- 201-300% FPL: 6%
- 101-200% FPL: 25%
- ≤ 100% FPL: 65%

Mode of Exposure
- MSM: 62%
- MSM/IDU: 7%
- IDU: 25%
- Hetero: 4%
- Other**: 3%
Behavioral Characteristics of RW Sample

N = 11,397

Substance Abuse History*
- Recently Used: 72%
- Ever Used: 15%
- Never Used: 13%

Incarceration History**
- Recently Incarcerated: 8%
- Ever Incarcerated: 10%
- Never Incarcerated: 82%

* Includes any substances used. Recent use refers to last 12 months, and ever use refers to greater than 1 yr. ago.
** Recent incarceration is within last 2 yrs., and ever incarceration refers to greater than 2 yrs. ago.
Clinical Characteristics of RW Sample

Time w/ HIV*

- ≤ 1 yr. (94%)
- > 1 yr. (6%)

N = 11,397

CD4 Count

- < 200 (11%)
- 201-350 (19%)
- 351-500 (25%)
- > 500 (46%)

Retention in Care**

- Retained (≥ 2 MOP visits) (16%)
- Not Retained (84%)

* Based on self-report time since diagnosis.

** Retention in care is defined as 2 or more medical outpatient visits 3 months apart in one year.
ART Coverage in RW System
ART Utilization in RW Sample

N = 14,799

CD4 Levels*

- 0-199: 13%
- 200-350: 20%
- 351-500: 24%
- > 500: 43%
- n = 14,097

On ART: 90%
Not on ART: 10%
Geographic Distribution of ART Coverage

* p-value < 0.05 (Chi-square test). Comparison group is SPA 4: Metro.

Medical Outpatient Sites

Antiretroviral Coverage

- < 83.4%
- 83.4 - 89.3%
- 89.4 - 92.9%
**ART Use in RW Sample**

Source: Casewatch CY2009: Data limited to RW Client w/ 1 or more MOP visit.

* Detectable is a subset of those on antiretroviral therapy with ≥ 200 copies/mL.

† Chi-square p-value < 0.05 for whole category
ART Use in RW Sample

Source: Casewatch CY2009: Data limited to RW Client w/ 1 or more MOP visit.

* Detectable is a subset of those on antiretroviral therapy with ≥ 200 copies/mL.
† Chi-square p-value < 0.05 for whole category
ART Use in RW Sample

Source: Casewatch CY2009: Data limited to RW Client w/ 1 or more MOP visit.
* Detectable is a subset of those on antiretroviral therapy with ≥ 200 copies/mL.
† Chi-square p-value < 0.05 for whole category
HIV Viral Load in RW System
Geographic Distribution of Mean VL

Ryan White Mean VL: 16,807 copies/ul (72% undetectable VL)

Mean VL of RW Clients † (% with undetectable VL*)

* p-value < 0.05 (Chi-square test).
Comparison group is SPA 4: Metro.
† p-value < 0.05 (Wilcoxon-rank sum test).
Comparison group is SPA 4: Metro.
Multivariate Model for Detectable* HIV Viral Load

- Multivariate Logistic Regression with dependent variable: Detectable VL
- Independent covariates include:
  - Gender
  - Race
  - Age
  - Poverty
  - Time w/ HIV
  - Housing
  - Insurance
  - Substance Use
  - Incarceration
  - Mode of Exposure
  - On ART
  - CD4 Levels
  - Retention in Care

* Detectable VL is $\geq 200$ copies/mL
## Demographic Factors Associated with Detectable VL (N = 11,397)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender (Male = reference)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.26</td>
<td>1.07 – 1.48</td>
</tr>
<tr>
<td>Transgender</td>
<td>1.08</td>
<td>0.78 – 1.50</td>
</tr>
<tr>
<td><strong>Race (White = reference)</strong></td>
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<td></td>
</tr>
<tr>
<td>African-American</td>
<td>1.42</td>
<td>1.25 – 1.63</td>
</tr>
<tr>
<td>Asian/Pacific-Islander</td>
<td>0.59</td>
<td>0.43 – 0.79</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>0.87</td>
<td>0.77 – 0.98</td>
</tr>
<tr>
<td>Native American</td>
<td>1.44</td>
<td>0.79 – 2.62</td>
</tr>
<tr>
<td><strong>Age (50+ = reference)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth (13-24 yrs.)</td>
<td>3.36</td>
<td>2.60 – 4.34</td>
</tr>
<tr>
<td>Age 25-39 yrs.</td>
<td>1.87</td>
<td>1.65 – 2.13</td>
</tr>
<tr>
<td>Age 40-49 yrs.</td>
<td>1.24</td>
<td>1.10 – 1.40</td>
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</tbody>
</table>
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<tr>
<th>Characteristic</th>
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<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty (&gt;100% FPL = reference)</td>
<td>1.28</td>
<td>1.15 – 1.41</td>
</tr>
<tr>
<td>≤ 100% Federal Poverty Level (FPL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing status (Permanent Housing = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeless</td>
<td>1.05</td>
<td>0.91 – 1.20</td>
</tr>
<tr>
<td>Health Insurance (no insurance = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (HMO, PPO)</td>
<td>0.75</td>
<td>0.61 – 0.93</td>
</tr>
<tr>
<td>Public (MediCal, Medicare, Medicaid)</td>
<td>0.69</td>
<td>0.62 – 0.77</td>
</tr>
</tbody>
</table>
## Behavioral Factors Associated With Detectable VL (N = 11,397)

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<tbody>
<tr>
<td>HIV Exposure Mode (heterosexual = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSM</td>
<td>1.15</td>
<td>0.99 – 1.31</td>
</tr>
<tr>
<td>MSM/IDU</td>
<td>1.28</td>
<td>0.98 – 1.67</td>
</tr>
<tr>
<td>IDU</td>
<td>0.98</td>
<td>0.75 – 1.28</td>
</tr>
<tr>
<td>Other</td>
<td>1.23</td>
<td>1.01 – 1.49</td>
</tr>
<tr>
<td>Substance Abuse Hx* (never used = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recently used (≤ 1 yr.)</td>
<td>1.35</td>
<td>1.17 – 1.54</td>
</tr>
<tr>
<td>Incarceration Hx (never incarcerated = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recently incarcerated (≤ 2 yrs.)</td>
<td>1.33</td>
<td>1.12 – 1.58</td>
</tr>
<tr>
<td>Ever incarcerated (&gt; 2 yrs.)</td>
<td>1.26</td>
<td>1.08 – 1.47</td>
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</tbody>
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* Substances include any substances

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### Clinical Factors Associated with Detectable VL (N = 11,397)

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<thead>
<tr>
<th>Characteristic</th>
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<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td><strong>Antiretroviral Medication</strong></td>
<td></td>
<td></td>
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<tr>
<td>(not on ART = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently on ART</td>
<td>0.52</td>
<td>0.44 – 0.60</td>
</tr>
<tr>
<td><strong>CD4 Levels (&gt; 500 = reference)</strong></td>
<td></td>
<td></td>
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<tr>
<td>&lt; 200</td>
<td>7.55</td>
<td>6.54 – 8.72</td>
</tr>
<tr>
<td>201 – 350</td>
<td>2.75</td>
<td>2.43 – 3.11</td>
</tr>
<tr>
<td>351 - 500</td>
<td>1.75</td>
<td>1.56 – 1.96</td>
</tr>
<tr>
<td><strong>Time w/ HIV (&gt; 1 yr. = reference)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1 yr.</td>
<td>2.50</td>
<td>2.10 – 2.99</td>
</tr>
<tr>
<td><strong>Retention in Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(fallen out = reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retained in Care (≥ 2 MOP Visits)</td>
<td>0.52</td>
<td>0.46 – 0.58</td>
</tr>
</tbody>
</table>
Summary of Findings

• Overall ART coverage rates for those in care in RW system were high (90%), however 27% of those on ART still had detectable VL
  – There were significant differences in ART coverage and detectable VL by geography and demographics

• 72% of sample had undetectable VL, factors associated with having a detectable VL included:
  – Gender, race, age, poverty, health insurance, substance abuse history, incarceration history, ART, CD4 count, time with HIV, retention in care
Limitations

• Sample limited to RW population
  – Analysis includes only patients who receive RW medical care, not generalizable to entire population of persons living with HIV/AIDS in LA County

• Analysis does not include out of care population, who are likely to have highest viral loads and not be on ART

• Not able to account for time to achieve VL suppression for those starting new ART regimens
Conclusions

• Analysis provides important information that may inform strategies to utilize ART as a prevention tool in Los Angeles County
• Interventions to address access and adherence to ART among youth, African Americans, substance users, and recently incarcerated populations are urgently needed
• Geographic distribution of VL will be used to further target HIV prevention and testing programs for LA County
Division of HIV and STD Programs
Contact Information

Jennifer N. Sayles, MD, MPH
Medical Director
Division of HIV and STD Programs
Los Angeles County Department of Public Health

Phone: (213) 351-8264
Email: jsayles@ph.lacounty.gov