Baseline HIV Drug Resistance Testing Upon Linkage to Care: A Common Practice in San Francisco Even Prior to National Guidelines Revisions

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HIV-1 Drug Resistance Testing

- HIV-1 drug resistance testing can inform regimen selection upon subsequent decision to initiate ART
- Baseline testing during early stage of HIV infection can detect transmitted drug resistance mutations that might revert to wild-type over time
HIV-1 Drug Resistance Testing

- National guidelines for HIV-1 drug resistance testing have evolved over the past decade

  - Reasonable to consider baseline resistance testing
  - Recommend baseline resistance testing upon linkage to care

2001 2003 2006 2010
Study Objectives

- Assess patterns in genotypic HIV-1 drug resistance testing over time in San Francisco
- Describe the demographic and clinical characteristics of HIV-1 drug resistance testers
Study Sample

- San Francisco residents with HIV/AIDS
  - Diagnosed between 2001 and 2010
  - Linked to care at publicly-funded facilities in San Francisco

- Data Sources
  - San Francisco Department of Public Health HIV/AIDS Case Registry
  - UCSF Laboratory of Clinical Virology HIV-1 Drug Resistance Testing Database
Characterization of HIV Cases

- Clinical characteristics
  - HIV diagnosis date
  - Date of first HIV-1 drug resistance test
  - Antiretroviral treatment initiation date
  - CD4 at treatment initiation

- Demographic characteristics
  - Gender
  - Age
  - Race/ethnicity
  - HIV transmission risk
Analysis

- Associations assessed by Chi-square and Fisher's Exact Tests
- Temporal trends assessed using the Cochran-Armitage Trend Test
- Data stratified based on era of drug resistance testing guidelines
Newly-Diagnosed HIV Infections
San Francisco, 2001-2010, N=4,223

<table>
<thead>
<tr>
<th>Year</th>
<th>AIDS @ Diagnosis</th>
<th>HIV/non-AIDS @ Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>150</td>
<td>550</td>
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<tr>
<td>2002</td>
<td>200</td>
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<td>2006</td>
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<td>430</td>
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<td>2007</td>
<td>195</td>
<td>425</td>
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<td>2008</td>
<td>190</td>
<td>420</td>
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<tr>
<td>2009</td>
<td>185</td>
<td>415</td>
</tr>
<tr>
<td>2010</td>
<td>180</td>
<td>410</td>
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N = 911
N = 3,312
Characteristics of New Cases AIDS at Diagnosis San Francisco, 2001-2010, N=911

Gender
- Male: 87.3%
- Female: 9.1%
- TG: 3.6%

Age
- <20: 1.0%
- 20-29: 14.3%
- 30-39: 34.8%
- 40-49: 32.3%
- ≥50: 17.7%
Characteristics of New Cases
AIDS at Diagnosis
San Francisco, 2001-2010, N=911

Race/Ethnicity
- White: 41.8%
- Hispanic: 25.9%
- Black: 20.2%
- API: 9.0%
- Other: 3.1%

HIV Risk
- MSM: 75.1%
- IDU: 13.0%
- Het: 8.2%
- ?: 3.5%
HIV-1 Drug Resistance Testing

AIDS at Diagnosis
2001-2010
N = 911

No Drug Resistance Test
n = 545

Yes Drug Resistance Test
n = 366

40.2%
HIV-1 Drug Resistance Testing
AIDS at Diagnosis, N=911

Percent

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

12.3 19.0 25.2 34.8 47.3 48.0 53.7 60.5 58.9 70.1

P < 0.001

HIV-1 Drug Resistant Testing
Characteristics of New Cases HIV/non-AIDS at Diagnosis
San Francisco, 2001-2010, N=3,312

**Gender**
- Male: 86.8%
- Female: 9.2%
- TG: 4.0%

**Age**
- <20: 1.4%
- 20-29: 25.0%
- 30-39: 38.4%
- 40-49: 25.2%
- 50+: 10.0%
Characteristics of New Cases HIV/non-AIDS at Diagnosis San Francisco, 2001-2010, N=3,312

Race/Ethnicity
- White: 50.5%
- Hispanic: 21.3%
- Black: 17.5%
- API: 6.5%
- Other: 4.2%

HIV Risk
- MSM: 82.3%
- IDU: 9.7%
- Het: 3.0%
- ?: 4.8%
HIV-1 Drug Resistance Testing

HIV/non-AIDS at Diagnosis
2001-2010
N = 3,312

- No Drug Resistance Test
  n = 2,144
- Yes Drug Resistance Test
  n = 1,168

35.3%
HIV-1 Drug Resistance Testing
HIV/non-AIDS at Diagnosis, N=3,312

P < 0.001
HIV-1 Drug Resistance Testing by Era
HIV/non-AIDS at Diagnosis, N=3,312

Era 1
2001-2003
n = 1,114
- DRT: n = 257
- No DRT: n = 857

23%

Era 2
2004-2006
n = 1,030
- DRT: n = 381
- No DRT: n = 649

37%
P < 0.0001

Era 3
2007-2010
n = 1,168
- DRT: n = 530
- No DRT: n = 638

45%
Time from HIV Diagnosis to Drug Resistance Testing
HIV/non-AIDS at Diagnosis, N=1,168

- 2001-2003:
  - DRT 0-12 months: 33%
  - DRT >12 months: 67%
  - P < 0.001

- 2004-2006:
  - DRT 0-12 months: 52%
  - DRT >12 months: 48%

- 2007-2010:
  - DRT 0-12 months: 80%
  - DRT >12 months: 20%
Time from HIV Diagnosis to Drug Resistance Testing and ART Initiation
HIV/non-AIDS at Diagnosis, N=1,168

P = 0.751
## Testing Rate by Demographic Characteristics

### HIV/non-AIDS at Diagnosis

**Time from Diagnosis to DRT = 0-12 months**

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<tr>
<td><strong>Gender</strong></td>
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<td><strong>Age</strong></td>
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<td>0-19</td>
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<td>52.3</td>
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<td>30-39</td>
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<td>55.5</td>
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<td>78.4</td>
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<td>40-49</td>
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<td>46.2</td>
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<td>80.2</td>
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<tr>
<td>≥50</td>
<td>25.0</td>
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<td></td>
<td>50.0</td>
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<td>79.0</td>
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## Testing Rate by Demographic Characteristics

### HIV/non-AIDS at Diagnosis

#### Time from Diagnosis to DRT = 0-12 months

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<tbody>
<tr>
<td></td>
<td>%</td>
<td>P</td>
<td>%</td>
<td>P</td>
<td>%</td>
<td>P</td>
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<tr>
<td><strong>Race/Ethnicity</strong></td>
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<tr>
<td>White</td>
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<td>48.5</td>
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<td>Hispanic</td>
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<td>Other</td>
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Testing Rate by Demographic Characteristics
HIV/non-AIDS at Diagnosis
Time from Diagnosis to DRT = 0-12 months

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</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>P</td>
<td>%</td>
</tr>
<tr>
<td>CD4 at Diagnosis</td>
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<tr>
<td>0-199</td>
<td>28.6</td>
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<td>40.0</td>
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<tr>
<td>200-350</td>
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<td>66.7</td>
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<tr>
<td>351-500</td>
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<tr>
<td>&gt;500</td>
<td>23.9</td>
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P-values: 0.004, 0.137
Limitations

- Data from publicly-funded facilities
  - Publicly-funded facilities represent about 75% of newly-diagnosed HIV cases annually
- Individuals who had HIV-1 drug resistance testing conducted at other laboratories would not be reflected in this analysis
  - UCSF Laboratory of Clinical Virology conducts the large majority of HIV-1 drug resistance testing for public-funded facilities in San Francisco
Summary

- HIV-1 drug resistance testing among new cases who were HIV/non-AIDS at diagnosis increased steadily starting in 2002 and continued through 2010
- Increase in HIV drug resistance testing likely in response to revised clinical guidelines
Summary

- Baseline HIV-1 drug resistance testing upon linkage to care was adopted in San Francisco as early as 2002
  - Preceded 2003 and 2006 guideline revisions
- Hispanics, Asians and MSM more likely to be tested for HIV-1 drug resistance within 12 months of diagnosis during 2001 to 2003 era
- Demographic, risk and clinical characteristics of early drug resistance testers did not differ significantly by the 2007-2010 era
Conclusions

- Starting in 2004-2006 era, majority of newly-diagnosed HIV/non-AIDS cases had first drug resistance test conducted within 12 months after diagnosis.
- Disparities in baseline drug resistance testing within 12 months after diagnosis decreased in recent years.
- Further analyses needed to evaluate whether early baseline drug resistance testing ultimately improves treatment outcomes.
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