Low Antiretroviral Therapy Adherence in A National Pediatric Cohort with HIV in the United States

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Disclosures

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• Conflicts
  • No conflicts of interest
Background

• In the United States, children and adolescents with HIV:
  - 1.2% of total population with HIV
  - require life-long HIV drug therapy

• Adherence to antiretroviral therapy (ART) is challenging in children
Limitations of Previous Studies

• Most studies - small sample sizes
  - Available largest study (n=2,088 aged 3-18 yrs)
    - based on the Pediatric AIDS Clinical Trials Group data
    - self-reported ART use
    - adherence assessment window: 3 days before each clinic visit

• Mostly short assessment window (3-7 days)

Study Questions

• What are the demographic and clinical characteristics of pediatric population with HIV in the U.S.?

• Which factors are associated with ART adherence in this cohort?
Methods: Medicaid Program

• Joint federal-state income-based public health insurance program

• Enrollment criteria vary by state
  • Income qualifications

• Claims for some enrolled populations not observable
  • Medicare-Medicaid duals
Methods: Design and Data Sources

- Retrospective cohort study of Medicaid enrollees

- The Medicaid Analytic eXtract (MAX) files 2011 and 2012:
  - 14 states with 75% of HIV prevalence in the U.S.
  - Children and youth (<20 yrs) with HIV: n=8,730 in 2011; n=10,899 in 2012; (CDC report: n=9,907 in 2012)
  - Inpatient/outpatient claims
  - Demographics/Medicaid enrollment

Methods: Study Population

• Children aged 2-19 years identified as having HIV

1+ ICD code for HIV plus 2+ CD4 cell count diagnostic tests

1+ hospitalization claim for HIV

2+ outpatient ICD codes for HIV or 2+ ART ingredients

1 ICD code for HIV plus 1+ ICD code for HIV wasting

Children <2 years were excluded from the ART analyses as the veracity of their diagnosis codes may be suspect.
Methods: Observation Period and Patient Characteristics

- Observation period: continuous Medicaid enrollment after the observed first date on an ART regimen

- Censoring dates: enrollment discontinuation, reaching age 20 yrs, or December 31, 2012

- Patient characteristics:
  - Demographics (age, sex, race)
  - Rurality of residence
  - State residence
  - Comorbidities
Methods: ART Adherence

• An ART regimen was defined as receipt of 2+ ART prescriptions

• Proportion of days covered = $\frac{\text{Sum of days on ART regimens}}{\text{Follow-up days}}$

• Good adherence: PDC≥90%
  Sensitivity analysis: good adherence (PDC≥80%)
Methods: Analysis

- Multivariable logistic regression – examine the association between patient characteristics and ART good adherence (PDC≥90%)
Results: Characteristics of Study Cohort

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Children and youth with HIV and 1+ year’s Medicaid enrollment, n=10,978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Age groups, %</td>
<td></td>
</tr>
<tr>
<td>2 - 5</td>
<td>5</td>
</tr>
<tr>
<td>6 - 9</td>
<td>6</td>
</tr>
<tr>
<td>10 - 14</td>
<td>22</td>
</tr>
<tr>
<td>15 - 19</td>
<td>67</td>
</tr>
<tr>
<td>Females, %</td>
<td>62</td>
</tr>
<tr>
<td>Race, %</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>50</td>
</tr>
<tr>
<td>White</td>
<td>17</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>20</td>
</tr>
<tr>
<td>Rurality of residence, %</td>
<td></td>
</tr>
<tr>
<td>Urbanized area (population size ≥50k)</td>
<td>29</td>
</tr>
<tr>
<td>Urban cluster (2.5~&lt;50k)</td>
<td>68</td>
</tr>
<tr>
<td>Rural (&lt;2.5k)</td>
<td>1</td>
</tr>
<tr>
<td>ART exposure, %</td>
<td></td>
</tr>
<tr>
<td>ART exposed</td>
<td>42</td>
</tr>
<tr>
<td>ART unexposed</td>
<td>58</td>
</tr>
</tbody>
</table>
Results: Comorbidity Profile

- Any psychiatric condition: 33
- Pulmonary condition: 26
- Anemia: 17
- HIV-related condition: 14
- Drug/alcohol abuse: 14
- Hyperlipidemia: 9
- Hypertension: 7
- Diabetes: 4
- Cardiovascular disease: 4
- Renal insufficiency/failure: 3

Proportion
Results: Distribution of PDC (n=4,627)

Follow-up time, mean (SD): 15 (8)
Results: Distribution of PDC

Mean = 67.87
Std. Dev. = 32.288
N = 4,627
Results: Distribution of PDC

- 47% of the study population
- 53% of the study population

Mean = 67.87
Std. Dev. = 32.288
N = 4,627
Results: Multivariable Logistic Regression (n=4,627)

Subject characteristics

Age groups, ref: 2-5 years
- 6-9: 1.15 (0.77 - 1.72)
- 10-14: 0.99 (0.70 - 1.43)
- 15-19: 0.49 (0.34 - 0.69)

Females vs. Males: 0.98 (0.86 - 1.10)
Black vs. White: 0.74 (0.60 - 0.91)
Hispanic/Latino vs. White: 0.85 (0.67 - 1.09)

Rurality of residential area, ref: urbanized area (population size ≥50k)
- Urban Cluster (2.5~<50k): 0.86 (0.74 - 0.99)
- Rural area (<2.5k): 1.37 (0.75 - 2.52)
### Subject characteristics

<table>
<thead>
<tr>
<th>Number of physical comorbidities, ref: 0</th>
<th>Adjusted ORs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>1.09 (0.96 - 1.24)</td>
</tr>
<tr>
<td>3+</td>
<td>1.32 (1.04 - 1.68)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Presence vs. absence of other comorbidities</th>
<th>Adjusted ORs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatric conditions</td>
<td>0.74 (0.64 - 0.86)</td>
</tr>
<tr>
<td>Substance/drug abuse</td>
<td>0.54 (0.43 - 0.68)</td>
</tr>
</tbody>
</table>

Less likely to have good ART adherence

More likely to have good ART adherence
Results: Multivariable Logistic Regression (cont.)

<table>
<thead>
<tr>
<th>States, ref: NY/NJ</th>
<th>Adjusted ORs</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL</td>
<td>1.43 (1.10 - 1.87)</td>
</tr>
<tr>
<td>NC</td>
<td>1.42 (1.04 - 1.95)</td>
</tr>
<tr>
<td>MD</td>
<td>1.31 (1.00 - 1.72)</td>
</tr>
<tr>
<td>FL</td>
<td>1.31 (1.08 - 1.60)</td>
</tr>
<tr>
<td>CA</td>
<td>1.20 (0.96 - 1.51)</td>
</tr>
<tr>
<td>GA</td>
<td>1.20 (0.89 - 1.62)</td>
</tr>
<tr>
<td>TX</td>
<td>0.98 (0.75 - 1.27)</td>
</tr>
<tr>
<td>PA</td>
<td>0.74 (0.41 - 1.35)</td>
</tr>
<tr>
<td>OH</td>
<td>0.64 (0.45 - 0.93)</td>
</tr>
<tr>
<td>LA</td>
<td>0.61 (0.42 - 0.88)</td>
</tr>
<tr>
<td>VA</td>
<td>0.56 (0.36 - 0.87)</td>
</tr>
<tr>
<td>MA</td>
<td>0.50 (0.34 - 0.74)</td>
</tr>
</tbody>
</table>

Less likely to have good ART adherence  More likely to have good ART adherence
Limitations

- No laboratory data e.g., CD4+ cell counts and viral loads
- Unable to differentiate perinatally infected and non-perinatally infected children
- Unable to differentiate non-persistence and poor implementation through PDC

Prescription claims
- Filled prescription ≠ medication taken
- Alternative sources of medications (samples, free supplies)

Unmeasured confounders
- e.g., family/caregiver characteristics

Generalizability
- commercially insured, and uninsured HIV patients

Short study period; more recent data needed
Conclusions

• 58% of children and adolescents with at least 1 year of follow up had no ART exposure in 2011 and 2012.

• Approximately half of children and adolescents who were enrolled in Medicaid (low income/disabled) and received an ART regimen for HIV in 2011 and 2012 did not present good ART adherence.

• Late adolescents, those with mental health and substance/drug abuse problems were associated with lower odds of ART adherence.
Implications

• Further investigations of more recent population based cohorts of children and youth with HIV are needed to examine rates of ART treatment and ART adherence after the 2013 recommendations for universal treatment.

• Late adolescents, those with mental health or substance/drug abuse problems may be targets for clinical interventions to improve HIV medication use.
Thank you! Questions?

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