Effectiveness of Data-to-Care Activities for Improving HIV Care Outcomes: A Systematic Review

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Continuum 2024 • June 9-11, 2024 • Puerto Rico
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

This work was supported by the Division of HIV Prevention at the U.S. Centers for Disease Control and Prevention and was not funded by any other organization.
OVERVIEW

- Background
- Methods
- Results
- Conclusions, Limitations, and Implementation Considerations
- Acknowledgements
BACKGROUND
2019 PLAN: ENDING THE HIV EPIDEMIC (EHE) IN THE U.S.

HHS aims to reduce new infections by 90% by 2030

DATA-TO-CARE (D2C)

- **Public Health Strategy**
- **Uses**
  - HIV Surveillance Data
  - Other Data Sources: Clinic data, HIV Program Data (e.g., AIDS Drug Assistance Program (ADAP), Ryan White Care service data, pharmacy data)
- **In Order To**
  - Identify people with HIV (PWH) that are out of care (OOC)
  - Re-engage them in care
Relinkage staff

- Use data sources to locate PWH who are OOC
- Contact and encourage PWH to link or re-engage in HIV care
- Structural interventions are used to assess and address barriers (e.g., transportation)

Relinkage staff position titles vary per D2C program

- Social workers
- Disease intervention specialists
- Linkage care specialists
- Patient navigators
D2C SYSTEMATIC REVIEW
RESEARCH QUESTIONS

- What is the demographic composition of participants reached by D2C interventions?

- What are commonly reported HIV care status categories?
  - Examples: Current to care, deceased

- How effective are D2C interventions at:
  - Linking or re-engaging OOC PWH to care?
  - Improving viral suppression?
  - Reducing the length of time to care
METHODS
D2C INCLUSION AND EXCLUSION CRITERIA

INCLUSION

- Describes a D2C intervention:
  - Uses a data source to identify PWH who are potentially OOC, AND
  - Implements an activity to link or re-engage people to care (e.g., patient navigation)
- Intervention implemented in the U.S.
- Uses U.S.-based surveillance or local data (e.g., clinical medical records)
- Published between January 2009-January 2021
- All study designs

EXCLUSION

- Systematic reviews
Initial PWH OOC List

Current to Care
Not Located
Incarcerated
Deceased
Out of Jurisdiction

Truly OOC
Link or Re-engage in Care

This example is for visual purposes only and is not based on real numbers.
- **Engagement in care:**
  - A HIV health care visit or documented laboratory test result (e.g., VL)

- **Retention in care:**
  - Multiple (i.e., ≥2) HIV health care visits or documented laboratory test results within a timeframe

- **Viral suppression (VS):**
  - A VL test result <200 copies/mL
RESULTS
Records identified via online database search and other sources (N=6,362)

Duplicates excluded (N=2,494)

Titles and abstracts screened (N=3,868)

Records excluded (N=2,895)

Full-text articles reviewed (N=973)

Records excluded (N=939)
- Not among PLWH (N=378)
- Did not meet D2C data criteria (N=467)
- Not based in the U.S. (N=70)
- Full report not available (N=11)
- No unique outcomes (N=9)
- No relevant outcomes (N=4)

No. of Studies (N=34)
No. of Interventions (N=30)
PARTICIPANTS’ DEMOGRAPHIC CHARACTERISTICS
(OF 30 INTERVENTIONS)

Age Categories, n=12

- 76% ≤29 years
- 21% ≥30 years
- 1% Missing

Sex/Gender Categories, n=24

- 76% Men
- 21% Women
- 1% Transgender or Non-Binary Persons*
- 6% Missing

- n=9 reported “Other” data type
- n=8 age was not reported (NR)

- n=1 “Other” data type
- n=5 sex/gender was NR

*As reported by authors
**DEMOGRAPHIC CHARACTERISTICS**

(OF 30 INTERVENTIONS)

**Race and Ethnicity, n=23**

- 76% Black Non-Hispanic
- 21% White Non-Hispanic
- 1% Other
- 17% Hispanic/Latino*

**Transmission Risk, n=20**

- 41% MSM
- 28% Heterosexual
- 12% Other
- 10% PWID
- 7% MSM+PWID

- n=1 reported “Other” data type
- n=6 race/ethnicity was NR

*As reported by authors

MSM: men who have sex with men; PWID: people who inject drugs
HIV CARE STATUS: WHO IS TRULY OOC?

Interventions (n=28)

Pooled Median % (IQL): 40 (19 to 59)

Intervention numbers (i.e., x-axis) are for visual purposes only, and hold no quantitative value.
HOW EFFECTIVE IS D2C IN IMPROVING ENGAGEMENT TO CARE?

<table>
<thead>
<tr>
<th>Study</th>
<th>RR</th>
<th>95%-CI</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson 2020A</td>
<td>1.30</td>
<td>[1.09; 1.55]</td>
<td>19.0%</td>
</tr>
<tr>
<td>Anderson 2020B</td>
<td>1.10</td>
<td>[1.03; 1.17]</td>
<td>23.0%</td>
</tr>
<tr>
<td>Avoundjian 2020</td>
<td>1.06</td>
<td>[0.90; 1.25]</td>
<td>19.5%</td>
</tr>
<tr>
<td>Bove 2015</td>
<td>1.60</td>
<td>[1.22; 2.10]</td>
<td>14.9%</td>
</tr>
<tr>
<td>Sharp 2019</td>
<td>1.63</td>
<td>[0.99; 2.68]</td>
<td>8.0%</td>
</tr>
<tr>
<td>Udeagu 2019</td>
<td>0.85</td>
<td>[0.66; 1.10]</td>
<td>15.5%</td>
</tr>
</tbody>
</table>

Random effects model 1.18
Heterogeneity: $I^2 = 70\%$, $p < 0.01$
## ADDITIONAL EVIDENCE FOR IMPROVING ENGAGEMENT TO CARE

### Interventions

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Study Design</th>
<th>Intervention vs. Comparison</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RCT</td>
<td>Intervention vs. Control</td>
<td>OR (95% CI): 2 (1 to 3)</td>
</tr>
<tr>
<td>2</td>
<td>nRCT</td>
<td>Intervention vs. Control</td>
<td>19% vs. 23%*</td>
</tr>
<tr>
<td>3</td>
<td>nRCT</td>
<td>Intervention vs. City</td>
<td>84% vs. 34%</td>
</tr>
<tr>
<td>4</td>
<td>Cohort</td>
<td>Intervention vs. State</td>
<td>78% vs. 74%</td>
</tr>
<tr>
<td>5</td>
<td>Cohort</td>
<td>Intervention vs. In-Care Control</td>
<td>OR (95% CI): 2 (1 to 3)**</td>
</tr>
<tr>
<td>6 &amp; 7</td>
<td>Cohort</td>
<td>Intervention 1 vs. Intervention 2</td>
<td>63% vs. 78%***</td>
</tr>
<tr>
<td>8-26</td>
<td>Post-Only</td>
<td>N/A</td>
<td>Pooled Median % (IQR): 63 (45 to 81)</td>
</tr>
</tbody>
</table>

*outcomes measure: missed visits; **Due to comparison condition, closer to 1 is ideal; ***Compared two D2C models
HOW EFFECTIVE IS D2C IN IMPROVING VIRAL SUPPRESSION?
## ADDITIONAL EVIDENCE FOR IMPROVING VIRAL SUPPRESSION

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Study Design</th>
<th>Measurement</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14</td>
<td>Post-Only</td>
<td>&lt;200 copies/mL</td>
<td>Pooled Median % (IQR): 39% (25 to 57%)</td>
</tr>
</tbody>
</table>
# RETENTION IN CARE, N=7

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Measurement</th>
<th>Timeframe</th>
<th>Median % (IQI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥2 CD4/VL test</td>
<td>≥60 days apart</td>
<td>12%</td>
</tr>
<tr>
<td>2</td>
<td>≥2 CD4/VL test</td>
<td>≥90 days apart</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>≥2 CD4/VL test</td>
<td>≥90 days apart</td>
<td>48%</td>
</tr>
<tr>
<td>4</td>
<td>≥2 CD4/VL test</td>
<td>&lt;365 days</td>
<td>48%</td>
</tr>
<tr>
<td>5</td>
<td>≥2 labs (VL or CD4 cell count)</td>
<td>≥90 days apart</td>
<td>54%</td>
</tr>
<tr>
<td>6</td>
<td>2 visits/year; lab as marker</td>
<td>&gt;90 days apart</td>
<td>55%</td>
</tr>
<tr>
<td>7</td>
<td>≥2 labs (VL or CD4 cell count)</td>
<td>&gt;90 days apart</td>
<td>82%</td>
</tr>
</tbody>
</table>

48% (38-55%)

IQI: Interquartile Interval; Intervention column are for visual purposes only, and holds no quantitative value.
# TIME TO HIV CARE, N=4

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Measurement</th>
<th>Median Days (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time from initial contact with re-linkage staff to: 1&lt;sup&gt;st&lt;/sup&gt; labs (CD4 or VL test)</td>
<td>97 (NR)</td>
</tr>
<tr>
<td>2</td>
<td>Time from initial contact to: 1&lt;sup&gt;st&lt;/sup&gt; medical visit</td>
<td>78 (74)</td>
</tr>
<tr>
<td>3</td>
<td>Time to re-engaged I care</td>
<td>53 (73)</td>
</tr>
<tr>
<td>4</td>
<td>Time from case assignment to: 1&lt;sup&gt;st&lt;/sup&gt; clinic appoint</td>
<td>25 (46)</td>
</tr>
</tbody>
</table>

IQR: Interquartile Range; Intervention column is for visual purposes only, and holds no quantitative value.
D2C activities may help PWH who are OOC to engage in HIV care. 
- Although evidence is limited (4 interventions), after contact with relinkage staff, D2C may be helpful with linking PWH to care within 100 days.

D2C activities may help retain PWH who are OOC in HIV care (7 interventions).

D2C activities may help people to become virally suppressed.
Varying definitions of engagement in care
- Relinked to care
- Attending an appointment
  - Attending an appointment and/or collection of labs

Varying focus of D2C studies
- Primary focus of paper could have been surveillance with little information about engagement activities or vice versa

Limited reporting of data
- Demographics
- Retention in care and time to care outcomes
- Lack of D2C details (e.g., data source strategies or engagement activities and intensities)
IMPLEMENTATION CONSIDERATIONS

- Difficulty identifying truly OOC populations
  - Multiple rounds of data cleaning
  - Relinkage staff may need to clean data as well

- D2C is resource intensive
  - Accurate OOC list
  - Correct contact information
  - Availability of engagement staff
ACKNOWLEDGEMENTS

- **D2C Systematic Review Team**
  - Kristin Tansil Roberts
  - Theresa Sipe
  - Darrel Higa
  - Mary Mullins
  - Megan Mallett
  - Megan Wichser
  - Christa Denard
  - Jayleen Gunn, Division of Global HIV and TB
  - Briana Nguyen
  - Former interns

- **CDC Division of HIV Prevention (DHP)**
  - Linda Koenig
  - Adrian Szakallas
  - DHP D2C Work Group
Thank You!

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