**Background**

- Human Immunodeficiency Virus (HIV) is a sexually transmitted or bloodborne virus that causes immune suppression, potentially leading to Acquired Immune Deficiency Syndrome (AIDS).
- Hepatitis C virus (HCV) is the most common bloodborne viral infection in the United States and can lead to cirrhosis, hepatocellular carcinoma, and the need for liver transplant.
- HIV/HCV coinfection is estimated to occur in approximately 25% of persons with HIV and among 50% of injection drug users infected with HIV in the United States.
- Persons living with HIV are at risk for a faster progression to life-threatening liver disease than persons with HCV alone.
- The Enhanced HIV/AIDS Reporting System (eHARS) is used nationally to capture information on persons infected with HIV.
- In January 2013, ADH began using the National Electronic Disease Surveillance System (NEDSS) for acute and chronic HCV surveillance.
- Link Plus software is a probabilistic matching tool created by the CDC’s National Program for Cancer Registries to match individuals in registries by assigning scores to indicate the probability of a true match.

**Methods**

- Resource limitations for HIV follow-up necessitate a targeted surveillance strategy to the persons below, who were recorded in NEDSS beginning in 2013: 1. Age <30 years.
- 2. Incarcerated in a state or federal correctional facility.
- 4. Recorded on a document along with the persons listed above.
- All individuals with HIV infection in Arkansas were recorded in eHARS.
- Individuals in NEDSS were matched to individuals in eHARS by first name, last name, and date of birth using Link Plus software, which generates a score from 0 to 1 indicating the strength of the match (higher score indicates a better match). The following strategies were used:
  1. Pairs scoring >0.1 were accepted.
  2. Pairs scoring <0.1 were reviewed manually and accepted if at least one of the following criteria matched: address, race, sex, or middle name, and the match could not be disproven via information obtained by internet search of the person’s name.
  3. Pairs scoring <10 and 22 were reviewed as above if one of the following criteria was met: same first letter of first name, same first two letters of last name, same month, day, year of birth, or same month or day of birth if month and day were switched in one registry.
- Demographic and risk factor information were examined using SAS 9.3 (SAS Institute, Cary, NC).

**Results**

- There were 6,025 persons living in Arkansas with HIV recorded in eHARS.
- If HCV prevalence among HIV-infected persons is approximately 25%, an estimated 1,506 individuals are living with HIV/HCV coinfection in Arkansas.
- Matching detected 63% (95) of the expected 1,506 individuals with HIV/HCV coinfection via case follow-up procedures for HCV.
- 2 did not match to an eHARS record but were documented with HIV infection in NEDSS.
- In total, 322 linkages were identified (Figure 1) - 1. Of 26 linkages with a score <14, 91 (35%) were accepted.
- 2. Among 34 linkages with a score of 10-14, 12 (35.3%) were accepted.
- 3. Among 205 linkages with a score <0.01, 60 (29%) were accepted.
- 4. Two persons did not link to an eHARS record but were documented with HIV infection in NEDSS.
- In total, 26 (27.4%) persons were identified with HCV/HIV coinfection via case follow-up procedures for HCV; 2 did not match to an eHARS record.
- The identification of 69 (72.6%) HIV/HCV coinfected individuals was attributable to the linkage of the HIV and HCV registries.
- The majority of HIV/HCV coinfected persons were male, diagnosed with HIV-infection in the years 2000–2009 and 30–49 years, and currently aged ≥50 years (Table 1).
- Coinfected cases were primarily white race; one-third were black, in contrast to the population of Arkansas, of which blacks comprise approximately 11%.
- Approximately half of cases had been diagnosed with AIDS during or before 2013.
- The most common risk factor was injection drug use (IDU), while 40 cases (42.1%) had a history of IDU in eHARS, only 6 (6.3%) had the same risk factor documented in NEDSS.

**Table 1. Characteristics of HIV and HCV Coinfected Arkansans**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>%</th>
<th>Characteristic</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td>Year of HIV Diagnosis</td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>27</td>
<td>28.4</td>
<td>1980–1989</td>
<td>9</td>
<td>9.5</td>
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<tr>
<td>Male</td>
<td>68</td>
<td>71.6</td>
<td>1990–1999</td>
<td>26</td>
<td>27.4</td>
</tr>
<tr>
<td>Current Age (as of January 1, 2014)*</td>
<td></td>
<td></td>
<td>2000–2009</td>
<td>39</td>
<td>41.1</td>
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<tr>
<td>20 – 24</td>
<td>2</td>
<td>2.1</td>
<td>2010–2014</td>
<td>19</td>
<td>20.0</td>
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<tr>
<td>25 – 29</td>
<td>10</td>
<td>10.6</td>
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<td>2</td>
<td>2.1</td>
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<tr>
<td>30 – 34</td>
<td>6</td>
<td>6.4</td>
<td>&lt;50</td>
<td>32</td>
<td>33.7</td>
</tr>
<tr>
<td>35 – 44</td>
<td>9</td>
<td>5.3</td>
<td>30 – 49</td>
<td>52</td>
<td>54.7</td>
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<tr>
<td>45 – 49</td>
<td>16</td>
<td>17.0</td>
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<td>9</td>
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<tr>
<td>50 – 54</td>
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<td>21.3</td>
<td>Unknown</td>
<td>2</td>
<td>2.1</td>
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<tr>
<td>≥55</td>
<td>20</td>
<td>21.3</td>
<td>HIV Risk Factor (Documented in eHARS)</td>
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<tr>
<td>Race</td>
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<td>Male who has Sex with Men (MSM)</td>
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<tr>
<td>White</td>
<td>52</td>
<td>54.7</td>
<td>Injection Drug Use (IDU)</td>
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<td></td>
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<tr>
<td>Black</td>
<td>32</td>
<td>33.7</td>
<td>MSM/IDU</td>
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<td>11.6</td>
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<tr>
<td>Other or Unknown</td>
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<td>11.6</td>
<td>Heterosexual</td>
<td>15</td>
<td>15.8</td>
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<tr>
<td>HIV or AIDS Status</td>
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<td></td>
<td>Unknown</td>
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<td>12.6</td>
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<tr>
<td>AIDS</td>
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<td>History of Injection Drug Use (Documented in NEDSS)</td>
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<td>HIV (Non-AIDS)</td>
<td>42</td>
<td>44.2</td>
<td>Yes</td>
<td>6</td>
<td>6.3</td>
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<tr>
<td>Unknown</td>
<td>2</td>
<td>2.1</td>
<td>No or Unknown</td>
<td>89</td>
<td>93.7</td>
</tr>
</tbody>
</table>

*Current age not applicable to 1 person who died during 2013.

**Conclusions**

- Use of alternate data sources to enhance information available on persons with HCV is important given resource limitations that challenge thorough investigation of each HIV case.
- A total of 95 HIV/HCV coinforted cases were identified and registry linkage was mutually beneficial to enhancing data quality and completeness of both registries, in particular with risk factor information.
- Registry linkage using an HCV registry established approximately 1 year earlier captured 95 of an estimated 1,506 individuals living in Arkansas with both HIV and HCV.
- Results were used to enhance completeness of information on HCV-infected Arkansans by updating risk factor and demographic information in NEDSS and to identify HCV-infected Arkansans who were potentially undocumented in eHARS.
- HIV and HCV registry matching will be completed annually to continue the exchange of demographic and risk factor information.

**Limitations**

- All HCV-infected persons in Arkansas are not documented in NEDSS, therefore, registry matching does not adequately characterize the prevalence of HIV–HCV coinfection in Arkansas.
- Although eHARS serves as the primary registry and source of data to estimate the number of Arkansans with HIV–HCV infection, it likely underestimates the true burden of HIV due to undetected infections in laboratories, other sources.

**References**


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