Individual- and Area-Level Predictors of Direct Acting Antiviral Uptake for Hepatitis C Virus in a New England Medicaid Population

Karen M. Clements, ScD1, Parag Kunte, MPH1, Bonnie C. Greenwood, PharmD BCP51, Carter Pratt, MPH1, Laura Setton, MPP1, Melissa Clark, PhD2, Amy Leary, BA1, Sharina Person, PhD3 and Deborah Gurewich, PhD1

1University of Massachusetts Medical School/Commonwealth Medicine, Shrewsbury, MA 2University of Massachusetts Medical School, Worcester, MA 3VA Boston Healthcare System, Boston, MA

Background

- The direct acting antiviral (DAA) sofosbuvir was introduced in Dec, 2013; others followed in 2014-17
- Shorter treatment duration than previous options, all-oral regimens
- Higher efficacy, fewer adverse events, initially expensive
- Uptake initially low in the United States
- Although uptake increased since 2013, many with HCV remain untreated
- Some individual- and area-level disparities in uptake have been documented, including age, disease stage, substance use disorder, and rural residence
- Research focusing in the Medicaid population is sparse

Study Objectives

Examine individual- and area-level predictors of DAA uptake in a multi-state Medicaid population

Methods

- Study Design: Claims-based retrospective cohort study
- Data Sources:
  - Enrollment, medical, and pharmacy from three New England states, Dec, 2012 – Dec, 2017
  - American Community Survey (ACS) 2015 linked to Medicaid data using member zip code
  - Area Health Resource File (AHRF) 2015 linked to Medicaid data using member county of residence
- Study Population: Members 18-64 years with a HCV diagnosis Dec, 2012-Dec, 2017
- Study Measures:
  - HCV: ≥ 2 claims with ICD code for HCV diagnosis in one year or 1+ claim for chronic HCV
  - DAA uptake: ≥ 1 pharmacy claim for a DAA
  - Individual-level characteristics: Medicaid enrollment and ICD-9-CM/ICD10-CM codes
  - DxCG: comorbidity score calculated from ICD codes
  - Metro/population status: by county, 2013 Urban-Rural Continuum Codes [Source: USDA]
  - Gastroenterologists (GI) and primary care providers (PCP) /100,000 population in county
  - Advanced hepatic disease diagnosis
  - Serious mental illness diagnosis
  - Opioid use disorder diagnosis

Results

Table 1. DAA uptake among Medicaid members with HCV, by selected individual-level characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) w/HCV</th>
<th>N (%) treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>22,338 (39.9%)</td>
<td>3,792 (17.0%)</td>
</tr>
<tr>
<td>Male</td>
<td>33,660 (61.1%)</td>
<td>6,355 (18.9%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>19,727 (35.2%)</td>
<td>3,407 (18.9%)</td>
</tr>
<tr>
<td>35-49</td>
<td>18,047 (32.2%)</td>
<td>4,057 (22.3%)</td>
</tr>
<tr>
<td>50-64</td>
<td>18,224 (32.6%)</td>
<td>9,434 (17.8%)</td>
</tr>
<tr>
<td>HIV diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>53,096 (94.8%)</td>
<td>9,375 (18.2%)</td>
</tr>
<tr>
<td>Yes</td>
<td>2,902 (5.2%)</td>
<td>713 (24.6%)</td>
</tr>
<tr>
<td>Advanced hepatic disease diagnosis</td>
<td>No</td>
<td>47,894 (86.0%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>7,815 (14.0%)</td>
</tr>
<tr>
<td>Serious mental illness diagnosis</td>
<td>No</td>
<td>39,407 (70.4%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>16,591 (29.6%)</td>
</tr>
<tr>
<td>Opioid use disorder diagnosis</td>
<td>No</td>
<td>31,521 (56.3%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>24,477 (43.7%)</td>
</tr>
</tbody>
</table>

Table 2. DAA uptake among Medicaid members with HCV, by selected area-level characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) w/HCV</th>
<th>N (%) treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid members living in zip code with ≤ 5% HS graduates</td>
<td>13,012 (23.6%)</td>
<td>2,939 (12.0%)</td>
</tr>
<tr>
<td>Medicaid members living in zip code with ≥ 102 PCPs/100,000 populations in county</td>
<td>3,792 (18.9%)</td>
<td>1,859 (18.6%)</td>
</tr>
</tbody>
</table>

Individual- and area-level predictors of direct acting antiviral uptake, Medicaid members, Dec 2013 - Dec 2017, Adjusted Risk Ratios and 95% Confidence Intervals

Analysis

- Adjusted estimates from hierarchical model
  - Generalized estimating equations with binomial distribution and log link
  - Adjusted for zip-code level correlations
  - Adjusted risk ratios (aRR) and 95% CIs are presented

Principal Findings

- Sample: 55,207 members with HCV
  - Majority male; mean age 41.2 years
  - Significant %: with a MI or OUD, living in a metro region, living in a zip code with low educational attainment
- Over all, 18.2% HCV received treatment
- HIV diagnosis was strongest individual-level predictor (aRR = 1.44, 95% CI 1.35-1.55)
- Advanced liver disease, older age, male gender predicted increased uptake; OUD, SUD, psychiatric diagnoses, tobacco use, and documented homelessness predicted lower uptake
- The strongest area-level predictor was living in a county with 0-1 GIS (aRR=1.44, 95% CI 1.21-1.70)
- Uptake was highest among members living in zip code with highest percentage of non-HS graduates, and varied by metropolitan category and PCP density in county

Conclusion/Implications

- A high percentage of New England Medicaid members with HCV remained untreated through 2017
- Women, younger adults, those at early disease stage, homeless, and with SUD and MI are at higher risk of not being treated
- Medicaid members living in areas with indicators of higher socioeconomic status such as high percentage of high school graduates, and highest density of specialists, are also at higher risk of not being treated

Policy implications

- Findings identify groups in the Medicaid population that may benefit from targeted interventions designed to increase HCV treatment
- The unexpected finding of lower uptake among individuals living in geographical areas with higher socioeconomic indicators and highest density of healthcare providers merits further exploration into healthcare access of Medicaid members living in these areas