Decreased Confirmation of Chronic Hepatitis C in Correctional Institutions Compared to the Community in Ontario

7th Canadian Symposium on HCV
February 2018

Nagma Grewal, Jennifer A. Flemming, Anna Majury, Kinsey Beck, Tony Mazzulli, and Wendy Wobeser

Conflicts of Interest

Dr. Flemming has received research funding and speakers fees from Gilead and speakers fees from Abbvie.

Dr. Wobeser has received speakers fees from Gilead, acted on the advisory boards of ViiV, Gilead, Merck, GSK and Abbott.

This work was supported by an unrestricted grant from Merck Canada.
Chronic HCV in Correctional Institutions – Canada

- Prevalence in the general population = 0.64 - 0.71%
- Prevalence in federal institutions = 18.1 - 37.1%
- Prevalence in provincial institutions = 18.1 - 28.1%


HCV Screening in Correctional Institutions

- Federal institutions have systematic, opt-in screening
- Provincial institutions have variable screening practices

Importance of Screening

[Diagram showing the cascade of care for Hepatitis C, from estimated prevalence to cured patients.]


Gap in the Literature

- No studies have investigated data specific to HCV-RNA testing following HCV-Ab testing to determine presence of active infection or clearance of virus in incarcerated individuals
- Infectious Disease Surveillance reports released by Correctional Services Canada only include data on HCV-Ab positivity NOT HCV-RNA positivity
Why Incarcerated Individuals?

- Sub-population at higher risk
- Identified as a priority population for prevention & treatment

Study Objectives

1) To describe individuals with a history of incarceration who have a positive HCV-Ab test
2) To compare the proportion of individuals incarcerated at least once who complete HCV-RNA testing between the correctional facilities in Ontario and the community


**Study Design**

Longitudinal retrospective cohort study

**Database**

Public Health Ontario (PHO) laboratory data collected from 1999-2014 containing information on all HCV-Ab and HCV-RNA test results sent to PHO during that period of time

**Study Population**

Individuals *EVER* incarcerated between 1999 - 2014

Definition: Having at least one HCV test submitted from a correctional facility during the study
Federal
Millhaven Institution
Joyceville Institution
Grand Valley Institution for Women
Fenbrook Institution
Kingston Penitentiary
Collins Bay Institution
Warkworth Institution
Bath Institution
Pittsburgh Institution
Regional Treatment Centre
Frontenac Institution
Beaver Creek Institution

Provincial
Central North Correctional Centre
Ottawa-Carlton Detention Centre
Central East Correctional Centre
Elgin-Middlesex Detention Centre
Hamilton-Wentworth Detention Centre
Vanier Centre For Women
Toronto West Detention Centre
Maplehurst Correctional Complex
Algoma Treatment and Remand Centre
North Bay Jail
Toronto East Detention Centre
Niagara Detention Centre
Kenora Jail
Sudbury Jail
Thunder Bay Correctional Centre

Variables

Primary exposure variable
Location of first HCV-Ab+
- Community
- Federal
- Provincial

Primary outcome variable
Completion of HCV-RNA
Variables

Covariates
- Age
- Sex
- Period of testing (1999-2006 vs 2007-2014)

Statistical Analyses

Descriptive Analyses
- Chi-square test
- Kruskal-Wallis test

Univariate & Multivariate Logistic Regression
Results

- Ever Incarcerated (n = 25,313)
  - HCV-Ab+ (n = 7,768)
    - HCV-Ab+ Location
      - Community (n= 2,527)
      - Federal (n = 2,646)
      - Provincial (n= 2,595)
Table 1: Demographics by location of first positive HCV-Ab test for all persons who have had at least one HCV-Ab test sent from a correctional facility.

<table>
<thead>
<tr>
<th></th>
<th>Whole Cohort (n = 7,768)</th>
<th>Community (n = 2,527)</th>
<th>Federal Institutions (n = 2,646)</th>
<th>Provincial Institutions (n = 2,595)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male), % (n)</td>
<td>79.4 (6,168)</td>
<td>71.3 (1,802)</td>
<td>90.3 (2,390)</td>
<td>76.2 (1,976)</td>
</tr>
<tr>
<td>Median Age at first positive HCV-Ab test (IQR)</td>
<td>35 (29-45)</td>
<td>35 (28-41)</td>
<td>38 (32-45)</td>
<td>33 (27-41)</td>
</tr>
</tbody>
</table>

**Period of positive test**

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Whole Cohort (n)</th>
<th>Community (n)</th>
<th>Federal Institutions (n)</th>
<th>Provincial Institutions (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2006, % (n)</td>
<td>49.9 (3,877)</td>
<td>50.7 (1,282)</td>
<td>66.2 (1,752)</td>
<td>32.5 (843)</td>
</tr>
<tr>
<td>2007-2014, % (n)</td>
<td>50.1 (3,861)</td>
<td>49.3 (1,245)</td>
<td>33.8 (894)</td>
<td>67.5 (1,752)</td>
</tr>
</tbody>
</table>

*P value is comparison between federal versus provincial institutions versus community

Overall HCV-RNA testing = 70%  
\[ n = 5,423 \]

- Community = 85%  
  \[ n = 2,145 \]
- Federal = 75%  
  \[ n = 1,996 \]
- Provincial = 50%  
  \[ n = 1,282 \]
Table 2: Factors associated with receipt of HCV RNA test.

<table>
<thead>
<tr>
<th>Location of HCV-Ab test</th>
<th>Univariate</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>95% CI</td>
</tr>
<tr>
<td>Community</td>
<td>Ref</td>
<td>-</td>
</tr>
<tr>
<td>Federal</td>
<td>0.55</td>
<td>0.48-0.63</td>
</tr>
<tr>
<td>Provincial</td>
<td>0.17</td>
<td>0.15-0.20</td>
</tr>
<tr>
<td>Age at test*</td>
<td>1.0</td>
<td>0.99-1.0</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (vs. Male)</td>
<td>0.63</td>
<td>0.56-0.72</td>
</tr>
<tr>
<td>Period of Testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 – 2014**</td>
<td>0.85</td>
<td>0.77-0.94</td>
</tr>
</tbody>
</table>

*Odds ratio given for every 1 year increase in age
**Compared to 1999-2006

Key Findings

1) HCV-Ab* submitted from correctional facilities associated with decreased linkage to care
   - **Federal**: 45% reduction of odds
   - **Provincial**: 83% reduction of odds

2) Females less likely to be linked to care
Future Directions

1) Identify potential barriers
2) Not a “one size fits all”
   - Federal: sentences of 2+ years
   - Provincial: sentences of less than 2 years
3) Reduce burden of HCV in correctional environments

Acknowledgments

PHOL Information Management Technology Group including Mihaela Smochina, Iona Belchita, Tom Dallas & Alex Marchand-Austin for the exhaustive data preparation

Kevin Guthrie, Pam Stratton & Drs. Ilan Schwartzand & Richard Medford for early data mining at PHO Kingston

Drs. Peter Ford, Don Low & Perin Sankar-Mistry for their mentorship

Dr. Seth Chitayat from Industry partnerships at Queen’s

Dr. Lori Kiefer from the Ministry of Community Safety and Correctional Services

Jonathan Smith from Correctional Services Canada

Funding for this research was provided by Merck Canada, a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA
Great variability in institutional size

- ~ 26 facilities
- Smallest facility = 22 beds
- Largest (Central North Correctional Central) = ~1200
- Extensive variation with rest → ~ 100 - 600

Often short length of stay

- 60% of people are remanded (now it’s 66%)
- Median Length of stay on remand - 7 days (now is 9)
- Median Length of stay sentenced - 35 days (now it’s 20)

Provincial Institutions in 2013-2014

Thank You!

Questions?

Dr. Lori Keifer. Ministry of Community Safety and Correctional Services. Personal correspondence with Dr. Wobeser