Stable incidence of hepatitis C virus infection among PWID in an Australian prison setting, 2005-2014: the HITS-p study

Evan B. Cunningham¹, Brigid Betz-Stablein², Neil A. Bretana², Gregory J. Dore¹, Behzad Harjarizadeh¹, Fabio Luciani¹, Suzy Teutsch², Andrew R. Lloyd*¹ and Jason Grebely*¹ on behalf of the HITS-p investigators

¹The Kirby Institute, UNSW Australia, Sydney, Australia
²Inflammation and Infection Research Centre, School of Medical Sciences, UNSW Australia, Sydney, Australia
HCV in prison

- Injecting drug use is known to continue in prison and therefore onward transmission of HCV occurs in prison
  - Global prevalence (HCV Ab+): 26%
  - Global incidence (among ever PWID): 16.4 per 100py

- HCV prevention strategies such as needle syringe programs (NSP), and opioid substitution treatment (OST) are either not available or have low coverage in many global prison settings
  - In Australia OST is available and inmates are given access to bleach for cleansing injecting equipment
HCV in prison

• Given the high prevalence of HCV and the high risk for HCV acquisition in the prison setting, this represents a key setting in which to implement new treatment and prevention measures
  • Including NSP and treatment as prevention

• Understanding the incidence of HCV infection and the trends in incidence in recent years is needed to inform prevention strategies

• Previous studies have been limited by retrospective design, short follow-up periods, small sample sizes, and limited to single institutions
• **HITS-p**: A prospective, multi-prison study of PWID between 2005 and 2014 the aims of this study were to:

1. **Determine the temporal trends in HCV incidence**

2. **Determine factors associated with time to HCV seroconversion**
Study population and design

The Hepatitis C Incidence and Transmission study – prisons

- Adult male and female prison inmates were recruited in 23 correctional centres and followed across 30 of 35 centres

Inclusion criteria:

- Incarcerated in one of the NSW prisons where recruitment occurred
- Lifetime history of IDU
- 18 years or older
- HCV antibody and RNA negative at enrolment
- At least one follow-up visit after enrolment
  - Either continuously incarcerated or re-incarcerated after a period of release to community
- Provided informed written consent
Study assessments

• At enrolment, participants were interviewed using a questionnaire to determine demographic characteristics and risk behaviour

• Every 6-12 months, participants completed a follow-up interview

• All interviews were done by study nurses outside of the custodial authority

• At each interview a blood sample was taken to test for HCV

• HCV results were given by the study nurse and participants were referred to clinical services and treatment if appropriate
Statistical analyses

• **Study endpoint:** HCV seroconversion
  • An HCV antibody or HCV RNA positive test following a HCV negative status at previous visit

• Factors associated with time to HCV seroconversion:
  • Time updated Cox proportional hazards analyses
  • Follow-up time truncated at 5 years post enrolment
## Baseline characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=320)</td>
</tr>
<tr>
<td>Age, median (25%, 75%)</td>
<td>26 (22-32)</td>
</tr>
<tr>
<td>Female sex</td>
<td>91 (28)</td>
</tr>
<tr>
<td>&gt;10 years of schooling</td>
<td>76 (24)</td>
</tr>
<tr>
<td>Injecting drug use ever</td>
<td>320 (100)</td>
</tr>
<tr>
<td>Heroin</td>
<td>206 (64)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>143 (45)</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>248 (78)</td>
</tr>
<tr>
<td>Any sharing of injection equipment ever</td>
<td>208 (65)</td>
</tr>
<tr>
<td>Injecting drug use since entering prison</td>
<td>104 (33)</td>
</tr>
<tr>
<td>Sharing of needle and syringe since entering prison</td>
<td>81 (78)*</td>
</tr>
<tr>
<td>Current opioid substitution treatment</td>
<td>49 (15)</td>
</tr>
</tbody>
</table>

* Of those who injected since entering prison
Trends in incidence

Overall population
• 11.4 /100 py (9.3-14.0)
## Factors associated with HCV seroconversion

### Overall population

<table>
<thead>
<tr>
<th>Variable</th>
<th>HR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (10 year increments)</td>
<td>0.62</td>
<td>0.43-0.88</td>
<td>0.008</td>
</tr>
<tr>
<td>Female sex</td>
<td>1.51</td>
<td>0.98-2.34</td>
<td>0.063</td>
</tr>
<tr>
<td>≤10 years of schooling</td>
<td>1.39</td>
<td>0.80-2.41</td>
<td>0.247</td>
</tr>
<tr>
<td>Methamphetamine injecting</td>
<td>1.84</td>
<td>1.22-2.77</td>
<td>0.004</td>
</tr>
<tr>
<td>Cocaine injecting</td>
<td>1.99</td>
<td>1.19-3.34</td>
<td>0.009</td>
</tr>
<tr>
<td>Heroin injecting</td>
<td>3.50</td>
<td>2.33-5.27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Buprenorphine/methadone injecting</td>
<td>2.05</td>
<td>1.18-3.58</td>
<td>0.011</td>
</tr>
<tr>
<td>Other opioid injecting</td>
<td>1.79</td>
<td>0.98-3.24</td>
<td>0.056</td>
</tr>
<tr>
<td>Frequency of injecting (vs. no injecting)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; Weekly</td>
<td>1.59</td>
<td>0.76-3.29</td>
<td>0.216</td>
</tr>
<tr>
<td>≥ Weekly</td>
<td>4.95</td>
<td>2.93-8.37</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Syringe sharing</td>
<td>2.27</td>
<td>1.48-3.46</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Factors associated with HCV seroconversion

<table>
<thead>
<tr>
<th>Variable</th>
<th>HR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (10 year increments)</td>
<td>0.73</td>
<td>0.43-1.26</td>
<td>0.256</td>
</tr>
<tr>
<td>Female sex</td>
<td>0.91</td>
<td>0.40-2.11</td>
<td>0.834</td>
</tr>
<tr>
<td>≤10 years of schooling</td>
<td>1.12</td>
<td>0.48-2.60</td>
<td>0.789</td>
</tr>
<tr>
<td>Methamphetamine injecting</td>
<td>1.59</td>
<td>0.78-3.24</td>
<td>0.199</td>
</tr>
<tr>
<td>Cocaine injecting</td>
<td>1.15</td>
<td>0.35-3.77</td>
<td>0.822</td>
</tr>
<tr>
<td>Heroin injecting</td>
<td>2.67</td>
<td>1.30-5.48</td>
<td>0.007</td>
</tr>
<tr>
<td>Buprenorphine/methadone injecting</td>
<td>1.24</td>
<td>0.37-4.16</td>
<td>0.726</td>
</tr>
<tr>
<td>Other opioid injecting</td>
<td>1.20</td>
<td>0.36-4.00</td>
<td>0.767</td>
</tr>
<tr>
<td>Frequency of injecting (vs. no injecting)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; Weekly</td>
<td>2.40</td>
<td>0.95-6.09</td>
<td>0.065</td>
</tr>
<tr>
<td>≥ Weekly</td>
<td>3.34</td>
<td>1.48-7.57</td>
<td>0.004</td>
</tr>
<tr>
<td>Syringe sharing</td>
<td>3.60</td>
<td>1.79-7.26</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Implications

- Syringe sharing was associated with HCV infection among continually imprisoned participants, irrespective of frequency of injecting or the type of drug injected.

- Each individual injecting event carries with it a higher chance of HCV infection due to the scarcity of clean injecting equipment.

- Even people with a lower frequency of injecting drug use in the prison environment have a high risk of infection.
Conclusions

• Current prevention strategies have failed to reduce the incidence of HCV infection in the NSW prison setting between 2005 and 2014

• Prison remains a high risk environment for acquisition of HCV infection

• Due to the scarcity of clean injecting equipment in prison, each injection event carries with it a high risk of HCV infection

• Further studies are needed to fully understand the risk behaviours of PWID in the prison setting
Acknowledgements

HITS-p study participants

HITS-p investigators

UNSW Australia
A/Prof. Jason Grebely
Prof. Andrew Lloyd (PI)
Prof. Gregory Dore
Dr. Behzad Hajarizadeh
Dr. Tanya Applegate
Dr. Fabio Luciani
Neil Bretana
Dr. Brigid Betz-Stablein
Dr. Suzy Teutsch