Bloody prisons: hepatitis B and C in the prison environment

The Hepatitis C Incidence & Transmission Study (HITS)

Professor Andrew Lloyd
Overview

• Background - hepatitis B & C and prisons
• HITS cohort
• Hepatitis C incidence and risk factors
• Hepatitis B incidence and immunisation uptake
Hepatitis B - key facts

- ~360 million chronically infected individuals
- ~5 million new cases of HBV annually
- Transmission amongst adults parenteral & sexual
- Injecting drug use (IDU) accounts for 45% Australian HBV infections
- Adult infection commonly results in clearance (95%); fulminant hepatitis in ~0.1-0.5%
- Australian HBsAg prevalence ~ 0.6-1.1%
- Highly effective vaccine, but uptake amongst IDUs poor
- Modelling (UK) suggests 70% immunisation coverage of prisoners could achieve 80% reduction in HBV incidence over 12 years in IDU
Hepatitis C - key facts

- 3% of the world’s population infected
- Blood-to-blood transmission
- Injecting drug use and unsafe medical injecting devices
- No well established behavioural prevention strategy
- Clearance in ~30%; chronicity in 70%
- Chronic liver inflammation, progressive fibrosis
- Cirrhosis ~ 5-10% per decade; then liver failure / HCC 2-5% annually
- Antiviral Rx increasingly effective (~50% cured) - arduous, costly
- Direct-acting antivirals offer potential for ‘treatment-as-prevention’
NSW prisoners

- NSW inmate population: ~10,000; ~7% females
- 74% Australian born, 17% non-English background
- Aboriginal: 19%
- Education: 50% < Year 10
- Mental illness: 33% males, 59% females
- Short sentences (incl. remand): 63% males, 76% females <6 mo.
- Recidivism: 70%
NSW prisons

- Predominantly public sector prisons

Facilities:

- 30 correctional centres
- 11 periodic detention centres
- 2 transition centres
- 8 police cell & 7 court cell complexes
- 9 juvenile detention centres

- ~20,000 imprisonments annually
- ~146,000 movements annually
Prevalence of hepatitis B and C in Australian prisons

Table 12  Hepatitis B virus immune status by jurisdiction (2010)†

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>No. tested</th>
<th>No. (%) with no evidence of HBV immunity</th>
<th>No. (%) immune through past exposure</th>
<th>No. (%) HBV carrier</th>
<th>No. (%) vaccine conferred immunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>1</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>NSW</td>
<td>202</td>
<td>101 (50)</td>
<td>32 (16)</td>
<td>6 (3)</td>
<td>63 (31)</td>
</tr>
<tr>
<td>NT</td>
<td>54</td>
<td>18 (33)</td>
<td>18 (33)</td>
<td>3 (6)</td>
<td>15 (28)</td>
</tr>
<tr>
<td>Qld</td>
<td>107</td>
<td>16 (15)</td>
<td>14 (13)</td>
<td>2 (2)</td>
<td>75 (70)</td>
</tr>
<tr>
<td>SA</td>
<td>33</td>
<td>8 (24)</td>
<td>2 (6)</td>
<td>1 (3)</td>
<td>22 (67)</td>
</tr>
<tr>
<td>Tas</td>
<td>28</td>
<td>16 (57)</td>
<td>5 (18)</td>
<td>0 (0)</td>
<td>7 (25)</td>
</tr>
<tr>
<td>Vic</td>
<td>33</td>
<td>15 (45)</td>
<td>3 (9)</td>
<td>1 (3)</td>
<td>14 (42)</td>
</tr>
<tr>
<td>WA</td>
<td>97</td>
<td>50 (52)</td>
<td>16 (16)</td>
<td>0 (0)</td>
<td>31 (32)</td>
</tr>
<tr>
<td>Total</td>
<td>555</td>
<td>225 (41)</td>
<td>90 (16)</td>
<td>13 (2)</td>
<td>227 (41)</td>
</tr>
</tbody>
</table>

† Excludes equivocal test results and missing values.

Prevalence of hepatitis B and C in Australian prisons

Table 7  Hepatitis C antibody prevalence by jurisdiction and sex (2010)†

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No° tested</td>
<td>No° (%) with HCV</td>
<td>No° tested</td>
</tr>
<tr>
<td>ACT</td>
<td>4</td>
<td>2 (50)</td>
<td>1</td>
</tr>
<tr>
<td>NSW</td>
<td>195</td>
<td>46 (24)</td>
<td>7</td>
</tr>
<tr>
<td>NT</td>
<td>64</td>
<td>3 (5)</td>
<td>3</td>
</tr>
<tr>
<td>Qld</td>
<td>160</td>
<td>29 (18)</td>
<td>28</td>
</tr>
<tr>
<td>SA</td>
<td>26</td>
<td>5 (19)</td>
<td>7</td>
</tr>
<tr>
<td>Tas</td>
<td>29</td>
<td>8 (28)</td>
<td>1</td>
</tr>
<tr>
<td>Vic</td>
<td>25</td>
<td>7 (28)</td>
<td>5</td>
</tr>
<tr>
<td>WA</td>
<td>92</td>
<td>22 (24)</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>595</td>
<td>122 (21)</td>
<td>56</td>
</tr>
</tbody>
</table>

† Excludes equivocal test results and missing values.
Hepatitis C Incidence & Transmission Study (HITS) cohort

- Prospective cohort study enrolling high-risk, HCV uninfected IDU prisoners.
- Subjects followed up at 6 monthly intervals.
- Structured interviews and HCV testing at enrolment (baseline) and each follow-up.
- Sample storage (serum, plasma, PBMCs, DNA)
- Detailed immunological and virological studies in incident cases.
Aims

• To describe risk behaviours for blood borne virus transmission in the prison setting.

• To determine HCV incidence rates in the prison setting.

• To define demographic, behavioural factors, and host immune factors associated with incident infection, and clearance after incident infection.

• To provide a platform for immunological and virological studies of the pathogenesis of primary HCV infection.

• To define HBV incidence and immunisation uptake rates.
Subjects

Inclusion criteria

• ≥ 18 years
• “ever” injected drugs
• anti-HCV Ab negative in last 12 months
• recently imprisoned (<12 mo.)

Exclusion criteria

• insufficient English
• HIV positive
• pregnant
• forensic
Methods

Structured interview:

- Demographics
- IDU risk behaviours (IDU, sharing, drug choice(s))
- Other blood to blood risk behaviours (tattooing, piercing, physical assaults or injuries)
- Taking a break from injecting (break, duration)
- Current treatments for drug dependency, (e.g. methadone maintenance treatment (MMT))

Blood for HCV Ab (ELISA), HCV RNA (Taqman), and storage
Methods - Interview

II. THIS SECTION IS ABOUT RISK FACTORS FOR THE SPREAD OF HEP C SINCE THE LAST INTERVIEW

[Interviewer: Explain that the purpose of the follow-up interview is to record any high risk activities for HCV transmission which have occurred since the last interview – both inside prison and outside (if applicable)].

2. Have you had a tattoo applied?
   Yes (Go to 3)  1
   No (Go to 5)  2
   Don’t recall (Go to 5)  9

3. How many different times have you been tattooed?
   [Interviewer: consider each session of tattooing as a separate tattoo]
   [Interviewer: Include tattoos that have been removed]

4. Were the tattoos done inside or outside of prison?
   Inside  1
   Outside  2
   Both inside and outside  3
   Don’t know  9
## Methods - Interview

### III. This section is about injecting drug use since the last interview

[Interviewer: Explain that this section is to record the general pattern of IDU since the last interview both inside prison and outside (if applicable)].

21. Since the last interview did you inject drugs?
   - Yes (go to Q14) 1
   - No (go to Q37) 2
   - Don’t recall (go to Q37) 9

22. Since the last interview how often did you inject drugs?
   [Interviewer: resolve an average for the period]
   [Interviewer: check that “daily” and “more than once a day” are distinguished]
   - Less than monthly 1
   - Monthly or more often 2
   - Weekly or more often 3
   - Daily 4
   - More than once a day 5
   - Don’t recall 9

23. Since the last interview, compared to the rest of your life, has your injecting pattern been...
   [Interviewer: assess the lifetime pattern of injecting and code yes if frequency, sharing behaviours or drug of choice have changed]
   - Stable 1
   - Increasing 2
   - Decreasing 3
   - Don’t recall 9

24. Since the last interview, which drugs did you inject? [Interviewer: read the options and emphasise “injecting”]
   - Heroin 1
   - Buprenorphine / Methadone 2
   - Crystal meth/shabu/ice/goey/Amphetamine/Speed/methamphetamine 3
   - GHB/GBH/ liquid e/fantasy 4
   - Cocaine/ Coke 5
   - Benzodiazepines/ Benzos 6
   - Anabolic/Steroids 7
   - Other opiates/morphine/pethidine/omnopon 8
   - Hallucinogens/LSD/ Acid/Magic/Mushies/Dmtura 9
   - Ecstasy/ E/MDA/MDMA 10
   - Ketamine 11
Epidemiological studies

Pre-enrolment negative HCV test

Baseline HCV test

Follow-up HCV tests

Time (mths)

-12 0 6 12 18

Incidence analysis 1 Incidence analysis 2
### Results

**Demographic and behavioural characteristics at enrolment (n=488)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age yrs (SD)</td>
<td>28 (±6.9)</td>
</tr>
<tr>
<td>Gender (%) male</td>
<td>65%</td>
</tr>
<tr>
<td>Education (%) ≤10 years schooling</td>
<td>76%</td>
</tr>
<tr>
<td>Aboriginal &amp; Torres Strait Islander (%)</td>
<td>25%</td>
</tr>
<tr>
<td>Non-English speaking background (%)</td>
<td>2%</td>
</tr>
<tr>
<td>Previous imprisonment (%)</td>
<td>72%</td>
</tr>
<tr>
<td>Ever had a tattoo (%)</td>
<td>73%</td>
</tr>
<tr>
<td>Mean duration of injecting (years)</td>
<td>8.5 (±6.2)</td>
</tr>
<tr>
<td>Ever shared injecting equipment (%)</td>
<td>63%</td>
</tr>
<tr>
<td>IDU in prison (%)</td>
<td>27%</td>
</tr>
</tbody>
</table>
Incidence analysis 1 - Baseline

- HCV Ab and PCR testing of first 488 inmates enrolled:
  - 94 HCV incident cases
  - Incidence: 31.6 % per annum (p.a.)
    - (Teutsch et al., BMC Public Health 2010)

- HCV Ab and PCR testing of 120 were continuously in prison:
  - 16 incident cases
  - Incidence: 34.2 % p.a.
    - (Dolan et al., Eur J Epidemiology, 2010)
Incidence analysis 2 – Prospective cohort

• Inclusion:
  – HCV Ab and PCR negative at baseline
  – At least one follow-up visit.

• Results:
  – 225 subjects
  – 325 person years of follow-up
  – 40 incident cases:
    o 1 symptomatic
    o 14 genotype 1, 6 genotype 3, 3 other genotypes, 17 unknown
Prospective cohort

Demographic and behavioural characteristics (n=225)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age yrs (SD)</td>
<td>27.2 (±6.5)</td>
</tr>
<tr>
<td>Gender (%) male</td>
<td>73%</td>
</tr>
<tr>
<td>Education (%) ≤10 years schooling</td>
<td>76%</td>
</tr>
<tr>
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<td>2%</td>
</tr>
<tr>
<td>Previous imprisonment (%)</td>
<td>72%</td>
</tr>
<tr>
<td>Ever had a tattoo (%)</td>
<td>70%</td>
</tr>
<tr>
<td>Mean duration of injecting yrs (SD)</td>
<td>7.8 (±5.9)</td>
</tr>
<tr>
<td>Ever shared injecting equipment (%)</td>
<td>66%</td>
</tr>
</tbody>
</table>
Conclusions

• High incidence of risk behaviours
  – IDU-related
  – Other blood-to-blood
• Significant HCV incidence (12.3%)
  – Key risks - IDU, heroin
  – No protection from MMT, bleach
• Significant HBV incidence (4.2%)
  – Successful immunisation ~50%
  – Opportunities lost
Acknowledgments

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