JUSTICE HEALTH
STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

Bloody prisons: hepatitis B and C in the prison environment

The Hepatitis C Incidence & Transmission Study (HITS)

Professor Andrew Lloyd

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

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

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

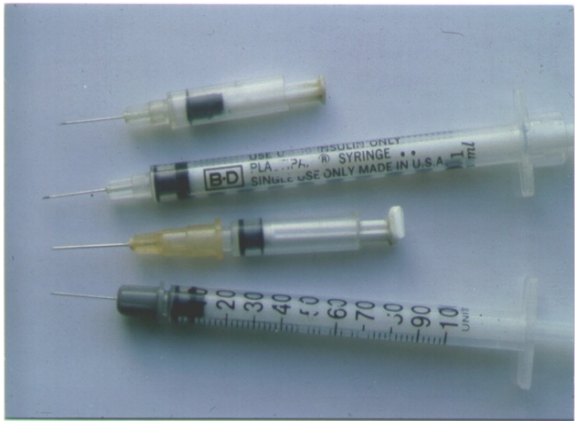
THE UNIVERSITY OF NEW SOUTH WALES

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

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

Prevalence of hepatitis B and C in Australian prisons

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

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

† Excludes equivocal test results and missing values.

National Prison Entrants Blood Borne Virus and Risk Behaviour Survey Report 2004, 2007 and 2010

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

Prevalence of hepatitis B and C in Australian prisons

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

	Male		Female		Total	
	Nº tested	Nº (%) with HCV	Nº tested	Nº (%) with HCV	Nº tested	Nº (%) with HCV
ACT	4	2 (50)	1	0 (0)	5	2 (40)
NSW	195	46 (24)	7	2 (29)	202	48 (24)
NT	64	3 (5)	3	0 (0)	67	3 (4)
Qld	160	29 (18)	28	12 (43)	188	41 (22)
SA	26	5 (19)	7	2 (29)	33	7 (21)
Tas	29	8 (28)	1	0 (0)	30	8 (27)
Vic	25	7 (28)	5	3 (60)	30	10 (33)
WA	92	22 (24)	4	0 (0)	96	22 (23)
Total	595	122 (21)	56	19 (34)	651	141 (22)

† Excludes equivocal test results and missing values.

National Prison Entrants Blood Borne Virus and Risk Behaviour Survey Report 2004, 2007 and 2010

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

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

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

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

JUSTICE HEALTH STATEWIDE SERVICE | NSW HEALTH

THE UNIVERSITY OF NEW SOUTH WALES

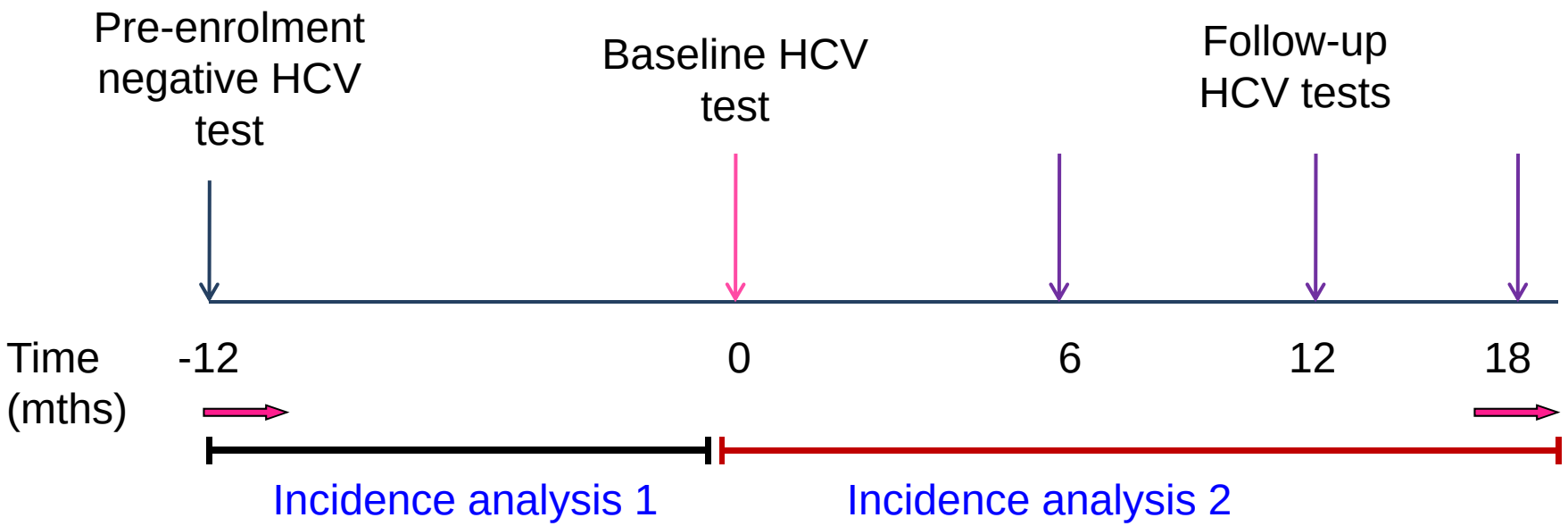
Methods - Interview

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"]* *[Interviewer: Exclude medications prescribed and administered by health workers, e.g. morphine in hospital]*	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/Daitura	☐	9
		Ecstacy/ E/MDA/MDMA	☐	10
		Ketamine	☐	11

Epidemiological studies



Results

Demographic and behavioural characteristics at enrolment (n=488)

Variable	
Mean age yrs (SD)	28 (±6.9)
Gender (%) male	65%
Education (%) ≤10 years schooling	76%
Aboriginal & Torres Strait Islander (%)	25%
Non-English speaking background (%)	2%
Previous imprisonment (%)	72%
Ever had a tattoo (%)	73%
Mean duration of injecting (years)	8.5 (±6.2)
Ever shared injecting equipment (%)	63%
IDU in prison (%)	27%

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:
    - 1 symptomatic
    - 14 genotype 1, 6 genotype 3, 3 other genotypes, 17 unknown

Prospective cohort

Demographic and behavioural characteristics (n=225)

Variable	
Mean age yrs (SD)	27.2 (±6.5)
Gender (%) male	73%
Education (%) ≤10 years schooling	76%
Aboriginal & Torres Strait Islander (%)	28%
Non-English speaking background (%)	2%
Previous imprisonment (%)	72%
Ever had a tattoo (%)	70%
Mean duration of injecting yrs (SD)	7.8 (±5.9)
Ever shared injecting equipment (%)	66%

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

HITS Investigators

Professor Andrew Boyd (UNSW)

Professor Paul Haber (RPAH)

A/Professor Kate Dolan (NDARC)

Professor Michael Levy (ANU)

Professor Bill Rawlinson (POWH)

A/Professor Peter White (UNSW)

A/Professor Carla Treloar (UNSW)

Professor Greg Dore (Kirby)

Professor Lisa Maher (Kirby)

Professor John Kaldor (Kirby)

A/Professor Rose Richmond (Burnet)

Staff/Students

Luke McCredie (CHRCJ)

Marian Bloomfield (CHRCJ)

Lena Boonwaat (CHRCJ)

Dr Toby Topp (CHECR)

Nick Scheuer (NDARC)

Brendan Jackas (SEALS)

Alice Steller (SEALS)

Yorui Pan (SEALS)

Chrissy Willenberg (SEALS)

Dr Peter Robertson (SEALS)

Dr Sue Teutsch (IIRC, UNSW)

Dr Fabio Luciani (IIRC, UNSW)

Dr Barbara Cameron (IIRC, UNSW)

Dr Rowena Bull (IIRC, UNSW)

Hui Li (IIRC, UNSW)

Dr Jen Post (POWH)

Parastou Hosseiny (IIRC, UNSW)

Emma Jagger (IIRC, UNSW)

Mirna Hunter (IIRC, UNSW)

Lisa Elliott (IIRC, UNSW)

Peter Hugden (IIRC, UNSW)

Nam Nguyen (IIRC, UNSW)

Dominic Douglas (IIRC, UNSW)

Funding

NHMRC, UNSW Hepatitis C Vaccine Initiative

NSW Health

Careers : Become a Prison Doctor.