

Incident hepatitis B infection and immunisation in Australian prison inmates



(The-Kirby-Institute, 2011; O'Sullivan et al., 2004; WHO, 2008; Newman et al., 2010)

Introduction: Background

- Globally, there are 5 million new cases of HBV annually and up to 360 million chronically infected individuals.
- Transmission in the developed world is predominantly parenteral and sexual.
- Approximately 200 cases of newly acquired HBV infection are notified to public health authorities each year in Australia (incidence~ 1.2/100,000).

Serological markers in HBV infection

HBsAg	negative	Susceptible
HBcAb (anti-HBc)	negative	
HBsAb (anti-HBs)	negative	
HBsAg	negative	Resolved HBV infection
HBcAb (anti-HBc)	positive	
HBsAb (anti-HBs)	positive	
HBsAg	negative	Successful vaccination
HBcAb (anti-HBc)	negative	
HBsAb (anti-HBs)	positive	
HBsAg	positive	Current HBV infection

(Zekry, A., 2012)

Introduction: Background

- Injecting drug use (IDU) accounts for 45% of new HBV infections in Australia.
- 70% of NSW prisoners incarcerated have a history of IDU.
- 2009 NSW Inmate Health Survey showed 42% of prisoners are HBV marker negative (HBsAg -ve / HBsAb -ve / HBcAb -ve).
- Social, personal and environmental factors make prisons high risk environments for the acquisition of HBV.

(C. A. Day et al. 2010; Indig et al., 2010; Nelson et al., 2011; Awofeso, 2002; Maher, 2008)

Introduction: Background

- Vaccination coverage amongst IDU prisoners is 29% in NSW prisons (0, 1, 6 mo. schedule)
- Mathematical modelling in IDU population in England and Wales suggests an 80% decrease in HBV prevalence could be achieved through prison vaccination with 50% coverage.

(Indig et al., 2010; T. Butler et al., 2007; Sutton, Gay, & Edmunds, 2006)

Aims

In NSW prison inmates:

- To determine the incidence of HBV infection.
- To determine successful HBV immunisation rates.
- To identify predictors of incident HBV infection and successful HBV immunisation.



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Methods

- HITS cohort:
 - Hepatitis C Incidence and Transmission Study in prisons (HITS-p)
 - N=500 – lifetime report of IDU.
 - Imprisoned within last 12 months.
- Eligibility criteria for HBV analysis:
 - Pre-enrolment screening test results available.
 - HBV marker negative on pre-enrolment screening test.
 - Stored plasma samples at baseline and follow-up.



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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]).



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Methods

Statistical analyses:

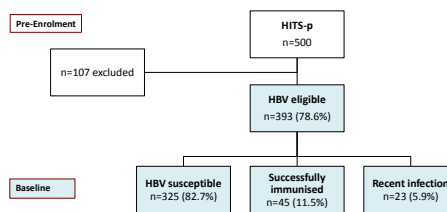
- Incident HBV – seroconversion to HBcAb and/or HBsAg pos.
- Successful HBV immunisation – seroconversion to HBsAb
- Incident HBV infection or immunisation - person-time method.
- Univariate analyses - associations with demographic and behavioural risk variables.
- Multivariate analysis for predictors of incident HBV infection or successful immunisation.



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Results



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Results – Demographic characteristics of HITS -HBV cohort

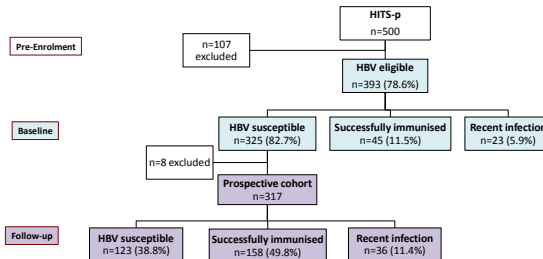
Variable	All individuals N=500	Baseline HBV eligible N=393	HBV marker negative at Baseline N= 325
Mean age (years)	27.5	27.6	27.4
Male gender	65%	66%	67%
Education ≤10 years schooling	77%	78%	79%
Aboriginal or Torres Strait Islander	24%	25%	25%
Sexuality:			
Straight	90%	91%	90%
Gay/Lesbian	2%	2%	3%
Bisexual	8%	7%	7%
Number of imprisonments	2.6	2.5	2.4
Ever had a tattoo	72%	73%	72%
Mean duration of injecting (years)	10.2	8.7	8.7
Ever injected heroin	65%	67%	67%
Ever shared injecting equipment	62%	61%	62%
Receiving MMT	20%	21%	21%



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Results



Results – Prospective incidence analysis

- Annual incidence rate of HBV infection in IDU inmates who were HBV marker negative at Baseline - 10.5% p.a.
- Annual incidence rate of successful HBV immunisation amongst those who were marker negative at Baseline - 35.8% p.a.

Results – Multivariate analysis of predictors of HBV incidence

Subgroup	N	%	Incident cases	%	OR	95% CI	Adjusted p-value
All	317	77.4	36	22.6			
Aboriginal or Torres Strait Islander	24	19.5	13	36.1	2.15	1.08 – 4.28	0.029
Frequency of injecting:							
Daily or more	89	72.4	32	88.9	2.88	1.01– 8.18	0.047

Results – Multivariate analysis predictors of HBV immunisation

Subgroup	N	%	Immunised %	OR	95% CI	Adjusted p-value	
All	317	43.8	158	56.2			
Length of sentence							
>6 months	61	49.6	93	58.9	2.15	1.07 – 4.33	0.032
No. imprisonments	2.0		2.7		1.32	1.13 – 1.53	0.0004
Age first injected	19.7		18.5		0.90	0.84 – 0.97	0.0041
Years of injecting	10.2		8.3		0.91	0.86 – 0.97	0.0027

Conclusions

- A high incidence of new HBV infections in IDU prison inmates was observed (10.5% p.a.) suggesting that prevention strategies are currently inadequate.
- The rate of successful HBV immunisation was reasonable (35.8% p.a.) but further improvements are required, potentially via an accelerated immunisation schedule (0, 7, 21 days).

Future directions

- Expand prospective study
 - Interview schedules modified to include sexual risk behaviours.
 - Improved recording of HBV immunisation data across centres.
- Further investigate barriers to HBV immunisation uptake
 - Detailed Qualitative interviews.

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