Blood-borne viruses in marginalised populations

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SYDNEY MEDICAL SCHOOL

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THE UNIVERSITY OF SYDNEY

Overview

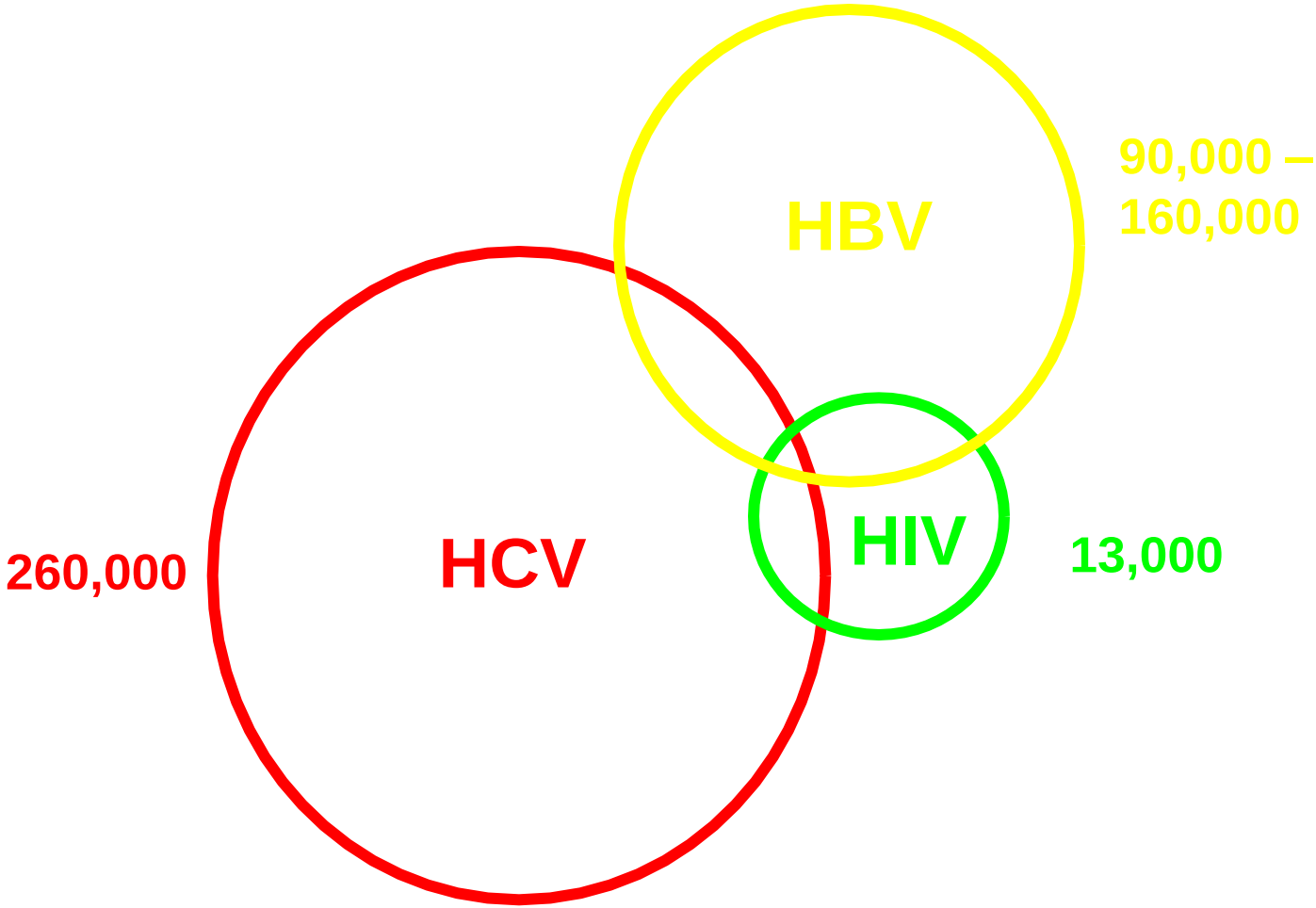
- Blood-borne viruses:
  - HIV
  - Hepatitis B virus (HBV)
  - Hepatitis C virus (HCV)
- Epidemiology: transmission, prevalence, treatment & prevention
- Harm reduction: needle and syringe programs
- Hepatitis C Incidence and Transmission Study – community (HITS-c)

HIV, HBV & HCV transmission

Type of exposure to infected source

	Efficiency of transmission		
	HIV	**HBV**	**HCV**
Transfusion	++++	++++	++++
Injecting drug use	++++	++++	++++
Unsafe injections	+	+++	+++
Needlestick	<+	+++	+
Sexual	+++	+++	+
Perinatal	+++	++++	++
Non-intact skin	+/-	++	+/-
Intact skin	-	-	-

Estimates of BBV prevalence in Australia



Risk groups

- Blood product and organ recipients
- Children of infected individuals
- Partners of infected individuals
- Health/laboratory workers

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- Men who have sex with men
- Sex workers
- Prisoners
- People who inject drugs

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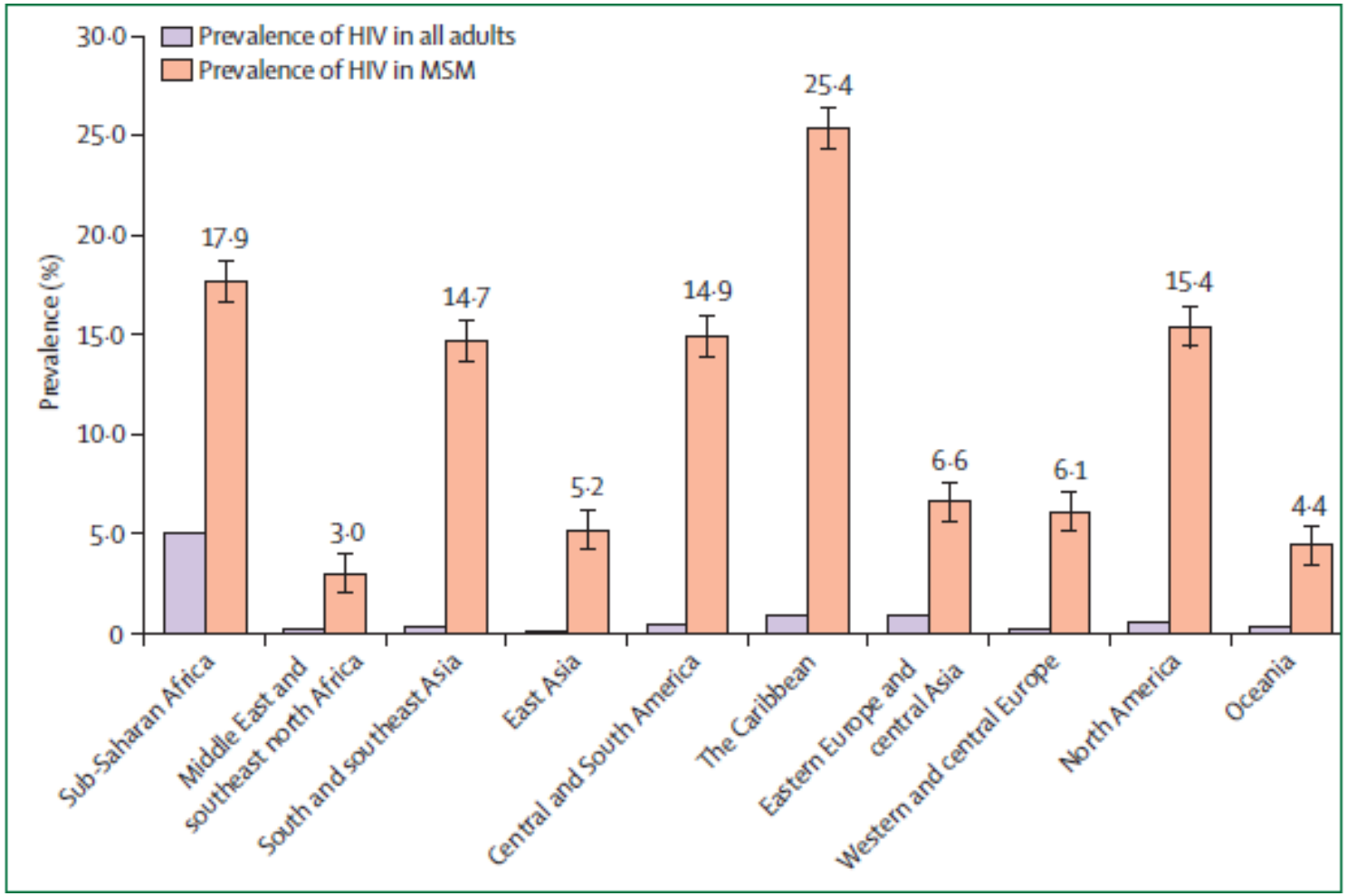
Prevalence

HIV prevalence among key risk groups

Risk group	Prevalence
Men who have sex with men	Globally 3-25% Australia: 11.2%
People who inject drugs	China (12%), USA (16%), Russia (37%) Australia: 1.3%
Sex workers	Low-middle income countries: 11·8% Australia: 0.037%
Prisoners	Australia: 0.4%

HIV prevalence among MSM vs. adults



Beyrer et al 2012. Lancet, 380, 367-377.

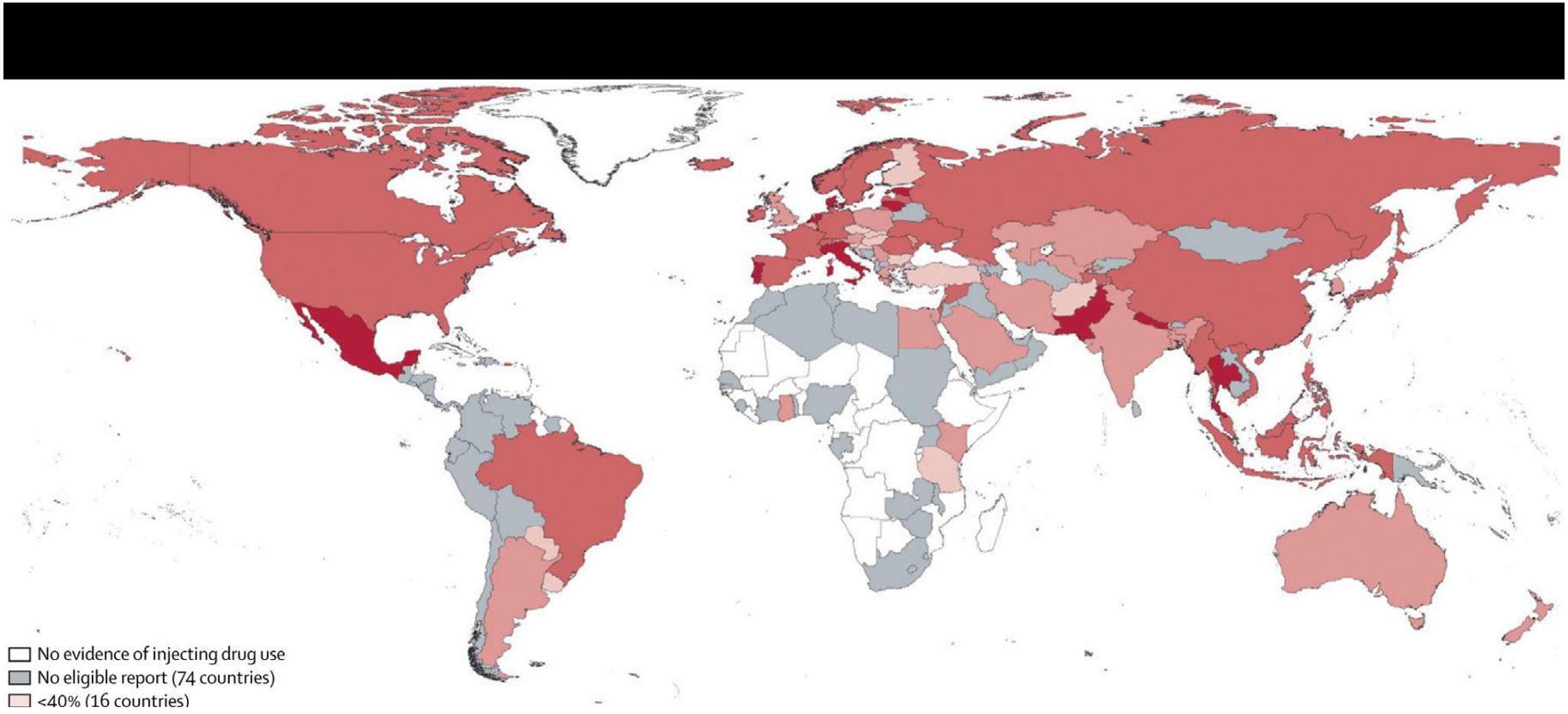
HBsAg prevalence among key risk groups

Risk group	Prevalence
Men who have sex with men	~20%
Sex workers	~10%
People who inject drugs	5–10%
Prisoners	2.3%

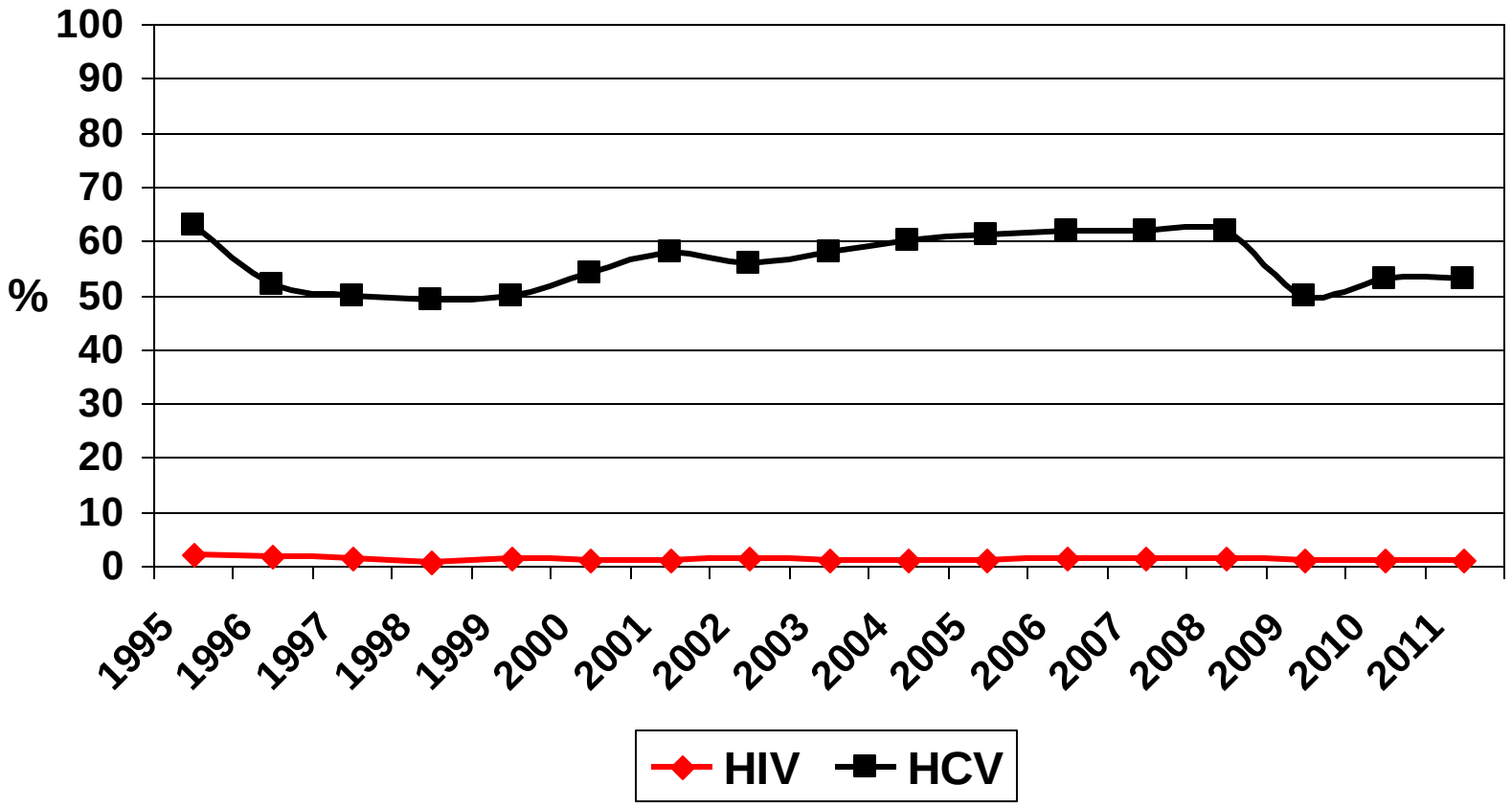
Prevalence of HCV among key risk groups

Risk group	Prevalence
People who inject drugs (PWID)	60–80% globally
Prisoners	29%
Female sex workers (FSW)	?
HIV+ MSM	2-5%
HIV- MSM	1%

Anti-HCV prevalence among PWID



HIV & HCV prevalence among Australian NSP attendees 1995-2011



National NSP Survey, Kirby Institute

Prevention

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	✗
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	✗	✓	✗
Treatment	✓	✗	✓?
Needle and syringe programs	✓	✓	✓

✓available and effective
✗ Unavailable or ineffective
? Inconclusive

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	x
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	x	✓	x
Treatment	✓	x	✓?
Needle and syringe programs	✓	✓	✓

Effective in preventing sexual transmission of HIV and HBV, but not HCV as it is not sexually transmitted *per se*

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	×
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	×	✓	×
Treatment	✓	×	✓?
Needle and syringe programs	✓	✓	✓

- Level 1 (multiple RCT) evidence of OST effectiveness in preventing HIV
- Increasing evidence of its effectiveness for HCV
- No real data on its role in HBV prevention

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	×
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	×	✓	×
Treatment	✓	×	✓?
Needle and syringe programs	✓	✓	✓

- Evidence that testing and counselling is beneficial for prevention of HIV and to a less degree HCV
- No evidence for HBV prevention

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	×
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	×	✓	×
Treatment	✓	×	✓?
Needle and syringe programs	✓	✓	✓

As with all health related behaviours, education plays a role, but no compelling evidence for its effectiveness in reducing transmission of BBV

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	×
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	×	✓	×
Treatment	✓	×	✓?
Needle and syringe programs	✓	✓	✓

- A safe, effective and inexpensive vaccine available for HBV
  - Uptake and completion rates of vaccination schedule poor among PWID, largely due to systemic barriers

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	×
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	×	✓	×
Treatment	✓	×	✓?
Needle and syringe programs	✓	✓	✓

- Recent advances in prophylactic treatment for HIV, including PWID
- No evidence that treatment has any impact on HBV prevention
- Much anticipation that new HCV treatments will drive down prevalence among PWID and thereby reduce overall incidence

Prevention

	HIV	HBV	HCV
Condoms	✓	✓	x
Opioid substitution therapy	✓	?	✓
Testing and counselling	✓	?	✓
Education	✓?	✓?	✓?
Vaccination	x	✓	x
Treatment	✓	x	✓?
Needle and syringe programs	✓	✓	✓

Harm Reduction: Needle and Syringe Programs

Harm reduction

- Embraced in mid-1980's in response to looming HIV epidemic
- A key component of both national and State drug policy
- *"To build safe and healthy communities by minimising alcohol, tobacco and other drug-related health, social and economic harms among individuals, families and communities*" (National Drug Strategy 2010-2015)

NSP in Australia

- Commenced 1987 to ***reduce HIV infections***
- Widespread and publicly funded
- Bipartisan support
- General public support
- Fixed site, outreach, vending machines and pharmacy
  - Public, private and NGO operated

- **<u>Distribution rather than exchange</u>**
  - This is why in Australia they are referred to as needle and syringe programs and NOT needle and syringe exchange programs

Unintended consequences

- International evidence suggests there is no evidence that NSP produce any unintended negative outcome
  - Increased injection frequency
  - Increased drug use
  - Reduction in willingness to cease drug use
  - Increased syringe lending
  - Increase in new injectors
  - Increased transition to injecting
  - Increase in discarded needles/syringes

NSPs and HCV prevention

- Insufficient evidence to conclude that NSPs are effective in preventing HCV transmission (*Palmateer et al Addiction 2010)*
- ***No evidence does not mean ineffective***
- However, estimated 96,667 HCV infections averted because of NSPs between 2000-2009 *(Kirby, 2009)*
- With a net financial cost-saving of **$1.03 billion** *(Kirby, 2009)*

NSPs and HCV prevention

- Some recent advances...
- Protective effects of comprehensive harm reduction (NSP+MMT) on HCV incidence *(van den Berg et al. 2007; Hagan et al. 2011)* – combination prevention
- HCV infections 80% lower among those on OST & ≥100% NSP coverage (AOR = 0.21, 95% CI 0.08 to 0.52) *(Turner et al Addiction 2011)*

Hepatitis C Incidence and Transmission Study- community (HITS-c)

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Hepatitis C Incidence and Transmission Study-community (HITS-c): 2008-2011

- Determine HCV incidence, spontaneous clearance and associated factors in a prospective cohort of PWID
- Evaluate retention and factors associated with adherence to the study protocol
- Investigate immunisation acceptability, clinical trial literacy, and willingness to participate (WTP) in future candidate HCV vaccine trials in this group.

Hepatitis C Incidence and Transmission Study-community (HITS-c): 2008-2011

Multiple strategies

- Direct approaches
- Targeted outreach sampling
- Respondent driven sampling

Hepatitis C Incidence and Transmission Study-community (HITS-c): 2008-2011

- Tailored pre/post-test counselling
- Approx 9ml blood
  - HCV Ab
  - HIV 1 & 2 Ag/Ab
  - HBsAb, HBsAg, HBcAb
- HBV immunization referral where indicated

Hepatitis C Incidence and Transmission Study-community (HITS-c): 2008-2011

Hepatitis C Incidence and Transmission Study-community (HITS-c): 2008-2011

Enrolment and follow-up (Nov 2008-Oct 2011)

- 268 PWID screened; anti-HCV prevalence 37%
- 156 anti-HCV and HCV RNA negative PWID enrolled
- Re-tested for HCV 6 monthly
- Total observation time = 212 person-years
- Retention at 12 months: 88%.

Characteristics of people screened for HITS-c

	Oct 2011
Screened	268
Anti-HCV (%)	37%
Enrolled	156
Incident cases	17
Incidence	7.9/100py
Median age at enrolment (years)	27
Female (%)	24
Born in Australia (%)	79
CALD background (%)	30
F/T work or study (%)	15
Lived 3+ places last 6 months (%)	37
Median age first injected (years)	20
Main drug injected - heroin (%)*	52
Daily or more frequent injection (%)*	23
Receptive syringe sharing*	14
Current drug treatment (%)	31
Prison last year (%)	20

Annual HCV incidence HITS-c

Year	Person years at risk	Number newly diagnosed	Incidence per 100 person years	95% confidence intervals
2009	59.9	6	10.0	4.5, 22.3
2010	88.7	6	6.8	3.0, 15.1
2011*	63.9	5	7.8	3.3, 18.8
Total	**212.5**	**17**	**7.9**	**4.9, 12.8**

*October 2011 inclusive

Cumulative HCV incidence by site (Nov 2008 - Oct 2011)

- All sites: 7.9/100 py
- South Western Sydney: 8.6/100 py
- Western Sydney: 8.2/100 py
- Inner Sydney: 5.0/100 py.

HCV incidence: Adjusted cox proportional hazards model, October 2011 (n=126)HITS-c

	n	%	AHR	95% CI	p
Age					
≥27 years	65	6	1.00		
< 27 years	61	21	5.10	1.54, 16.81	0.007
Injecting frequency last 6 months					
<Daily	94	7	1.00		
≥Daily	32	31	3.91	1.13, 13.94	0.031
Receptive syringe sharing last 6 months					
No	109	11	1.00		
Yes	17	29	1.03	0.26, 4.07	0.964
OST last 6 months					
Yes	49	18	1.00		
No & mainly injected heroin	30	59	4.42	1.02, 19.20	0.047
No & mainly injected other drugs	47	24	1.76	0.39, 8.04	0.466

Summary HITS-c

- Results suggest substantial decline in the HCV infection rate in PWID over the last decade: 7.9 vs. 31.1/100 py
- Results consistent with other data sources and indicating the epidemiology of HCV in Australia is changing
- Younger age strongly associated with incident infection (not accounted for by risk behaviour) – suggesting broader social and structural factors remain important for this group
- Higher frequency injecting may be a marker of increased exposure to injecting with a contaminated syringe
- Protective effect of OST among heroin injectors encouraging.

Conclusions

- Changing HCV epidemic
  - Ageing cohort of HCV infected PWID
- Changes in drug markets
  - Natural history, cyclical nature of drug epidemics, reduced availability
- Decrease in PWID population size
  - Exit due to Rx, mortality, spontaneous remission, decline in initiation to injecting
- Increase in NSP and OST coverage

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