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The Australian Study of HIV and Injecting Drug Use. Part II: Predicting exposure to hepatitis C and hepatitis B

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Abstract

Researchers agree that while hepatitis B maybe in control, hepatitis C is present in epidemic proportions among injecting drug users and that current HIV prevention strategies have not been sufficient to halt the spread of this hepatitis virus, although there is some evidence to suggest that incidence rates are stabilizing. Since there is no effective cure and it is unlikely that a vaccine will become available in the foreseeable future all efforts to control the spread of hepatitis C must rely on education and prevention strategies. The Australian Study of HIV and Injecting Drug Use is a cross-sectional national study designed to investigate exposure to and risks for infection with blood-borne viruses. Of those volunteering a usable blood sample for hepatitis C antibody and hepatitis B core antibody testing 55% and 19%, respectively, returned reactive test results. Logistic regression statistical models were used to identify risk factors for hepatitis C and hepatitis B. Risk factors for hepatitis C were identified as duration of use, use of opiates on last injecting occasion, education level, treatment status and having a history of sexually transmissible diseases. Risk factors associated with hepatitis B were duration of use, and use of opiates on last injecting occasion. The lack of identifiable risk factors for hepatitis B suggest that past rather than current injecting and sexual behaviour patterns are required to predict accurately risk of exposure to hepatitis B. In addition to this, one-third of respondents reported being vaccinated against hepatitis B. Respondents perceived themselves to be at greater risk from hepatitis C than from hepatitis B or HIV. A discussion of strategies needed to prevent the spread of the hepatitis viruses will be presented along with recommendations for further research. [Carruthers SJ, Loxley WH, Phillips M, Bevan JS. The Australian Study of HIV and Injecting Drug Use. Part II: Predicting exposure to hepatitis C and hepatitis B. *Drug Alcohol Rev* 1997;16:215–220.]

Key words: HIV/AIDS, hepatitis C, hepatitis B, injecting drug use, epidemiology.

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Introduction

Injecting drug users (IDU) are at increased risk from a number of blood-borne viruses, the most prevalent of which are hepatitis B and the more recently identified hepatitis C. Since an antibody test for hepatitis C became available in 1990, high rates of hepatitis C infection have been identified in almost all IDU populations studied; 90% or more in most methadone clinics Australia wide and 30–80% among research and clinic samples [1]. Even among very young users (less than 21 years of age) 6% of those tested were found to be hepatitis C antibody positive [2]. Hepatitis B prevalence rates, while considerably lower, are still unacceptably high given the availability of an effective vaccine.

Both forms of hepatitis have the potential to result in serious medical consequences 15–20 years after exposure. The most serious of these are cirrhosis, chronic liver disease and primary hepatocellular carcinoma. While the effect of long-term infection with hepatitis C is yet to be precisely determined because of a lack of data on natural history, current evidence suggests that the majority of those exposed become chronically infected and are at risk of continuing liver damage. Unlike hepatitis B, hepatitis C antibodies do not confer future immunity and reinfection or multiple infection is possible. Approximately 5–10% of those exposed to hepatitis B will go on to become carriers or chronically infected. The effects of chronic infection with hepatitis B are similar to those associated with hepatitis C—cirrhosis, chronic liver disease and primary hepatocellular carcinoma. In 1992 it was estimated that approximately 1200 Australians would die of complications associated with hepatitis B infection [3].

While seroprevalence of hepatitis B and hepatitis C has been established in recent years among a number of sub-populations of IDU, the last major national study of injecting drug users (Australian National AIDS and IDU Study—ANAIDUS) measured HIV status only. More recently, the Australian Study of HIV and Injecting Drug Use (ASHIDU) measured HIV, hepatitis C and hepatitis B serostatus among IDU recruited from four Australian cities. The first paper in this series (Part I) reports on the seroprevalence of HIV, hepatitis B and hepatitis C and examines city differences in demographic and drug use variables. This paper reports the injecting risk factors associated with exposure to hepatitis C and hepatitis B among the ASHIDU study group. Risk factors for HIV were not examined due to the small numbers of participants returning a reactive test result.

Method

For a description of methodology see previous paper (Part I), this issue.

Data analysis

Crude associations between blood-borne viral seropositivity and risk factors were identified using bivariate analyses. Logistic regression analysis was then used to remove the influence of confounding factors. All analyses were performed using procedures in SPSS for Unix, Version 5 (SPSS Inc., 1990).

Results

Of the 832 blood samples collected for testing there was sufficient blood for hepatitis C antibody testing in 788 (95%) cases and for hepatitis B core antibody testing in 597 (72%) of cases. More than half (54.8%) the study group returned a reactive hepatitis C antibody test result and 18.9% returned a reactive hepatitis B core antibody test result.

Hepatitis C

Variables associated with returning a reactive hepatitis C antibody test are shown in Table 1. Table 1 shows that both older users and those injecting for 5 years or more were more likely than younger users and those injecting for less than 5 years to return a reactive hepatitis C antibody result as were those who lived in the inner suburbs compared with those from the outer suburbs; those who reported having ever been in treatment compared to those never in treatment; those with a history of gonorrhoea or herpes compared to those with no history; and those who reported last using an opioid compared to those whose last drug was a non-opiate.

The individual variables associated with returning a reactive hepatitis C antibody test result were entered into a multiple logistic regression to identify which variables were independently associated with exposure to hepatitis C. Since age and duration of injecting drug use were highly correlated ($r = 0.62$)

Table 1. *Factors associated with reactive hepatitis C antibody test*

Variable	Reactive (*n*)	Prevalence reactivity (%)	χ^2	*p*
Age (*n* = 431)			152.6	< 0.001
Up to 25 years	90	20.9		
Over 25 years	341	79.1		
Duration of use (*n* = 431)			211.1	< 0.001
Up to 2 years	14	3.2		
3–4 years	25	5.8		
5–8 years	73	16.9		
More than 8 years	319	74.0		
Treatment (*n* = 418)			104.2	< 0.001
Never	40	9.6		
Ever	378	90.4		
City (*n* = 432)			33.5	< 0.001
Adelaide	102	23.2		
Melbourne	115	26.6		
Perth	76	17.6		
Sydney	139	32.2		
Last drug injected (*n* = 432)			86.8	< 0.001
Non-opiate	136	31.5		
Opioid	296	68.5		
Prison history (*n* = 430)			83.9	< 0.001
Prison history	224	52.1		
No prison history	206	47.9		
Location (*n* = 432)			4.0	0.04
Inner	260	60.2		
Outer	172	39.8		

age as an independent variable was excluded. The variable "city" was included as an independent variable in the regression analysis to control for city differences.

Predictors of risk for exposure to hepatitis C

The identified predictors of risk, odds ratios and 95% confidence intervals are presented in Table 2. As shown in Table 2, for both men and women duration of injecting (up to 8 years compared with over 8 years) was the strongest predictor of exposure to hepatitis C with odds ratios being higher for women compared to men (9.6 cf. 2.5). When duration of injecting was used as a continuous variable the odds for exposure to hepatitis C increased 19% (95% CI 14–25) per year for men and 21% (95% CI 14–29) per year for women.

Last drug injected (opiate compared to non-opiate) and having a prison history were also independently associated for both men and women. For men there was an additional association with the first drug used such that those who reported first using an opiate were at greater risk than those whose first injected drug was a non-opiate.

Hepatitis B

Returning a reactive hepatitis B core antibody test result was associated with a number of variables, as shown in Table 3. Table 3 summarizes the variables associated with returning a reactive hepatitis B core antibody test result. None of the variables relating to current sexual behaviour or current injecting behaviours were associated with hepatitis B seropositivity.

Predictors of risk for exposure to hepatitis B

The individual variables associated with returning a positive hepatitis B core antibody test result were entered into a multiple logistic regression to identify which variables were independently associated with exposure to hepatitis B. Age was excluded as an independent variable and "city" was included to control for city differences due to varying recruitment strategies. The results are summarized in

Table 2. *Predictors of risk for exposure to hepatitis C for men and women*

Risk predictor	Proportion reactive	Odds ratio reactive	95% CI
Men			
First drug used			
non-opiate	39.5	1.0	4.0–10.0
opiate	72.8	6.34	
Duration of injecting			
up to 8 years	27.8	1.0	
More than 8 years	78.5	2.45	1.5–3.9
Last drug used			
non-opiate	40.8	1.0	
opiate	66.8	2.20	1.4–3.5
Prison history			
No	40.7	1.0	
Yes	74.8	2.20	2.2–5.5
Women			
Duration of injecting			
up to 8 years	30.3	1.0	
More than 8 years	83.5	9.64	5.0–18.4
Last drug used			
non-opiate	40.9	1.0	
opiate	61.7	2.67	1.4–4.9
Prison history			
No	44.3	1.0	
Yes	80.3	3.61	1.6–8.0

Table 4. After adjusting for the effects of other variables, duration of use was the only variable associated with returning a reactive hepatitis B core antibody test result such that for the total study group the odds of exposure to hepatitis B increased 13% (95% CI 9–17) per year. The increase in odds for men (15%; 95% CI 10–20) was slightly higher than for women (11%; 95% CI 6–17).

Discussion

There is a substantial body of evidence showing that changes in injecting behaviour among IDU associated with the discovery of HIV during the early 1980s have been sufficient to prevent the spread of HIV [4–6]. However, it is clear that the changes made have not been sufficient to halt the spread of hepatitis C or, to a lesser extent, hepatitis B.

Exposure to hepatitis C through injecting drug use appears to be almost inevitable. The prevalence data presented in this paper confirm other findings that relate exposure to hepatitis C with the duration of injecting drug use [1]. Current scientific knowledge, although not complete, indicates that the risk of hepatitis C transmission through sexual and household means is low. This leads to the conclusion that for this study group it is the process of injecting which provides the greatest opportunity for hepatitis C transmission, in particular the sharing of contaminated needles and syringes. Although there is some evidence that equipment other than needles and syringes are implicated in the spread of hepatitis C, the primary item presenting the greatest potential risk remains the needle and syringe.

The sharing of primary injecting equipment in the ASHIDU study group was low with only 3% reporting sharing on the last occasion and 13% in the month prior to interview. Exposure to hepatitis C was not associated with any of the measures of injecting risk, such as the use of used needles or the number of injecting occasions over the past month. However, it is obvious that risky behaviour is sufficient to allow the spread of hepatitis C from and between injectors. The risk of exposure to hepatitis C for this study group increases the equivalent of 19% per year for men and 21% for women, lower than other figures previously published where

Table 3. *Factors associated with reactive hepatitis B core antibody test*

Variable	Reactive (*n*)	Prevalence reactivity (%)	χ^2	*p*
Age ($n = 113$)			40.4	< 0.0001
Up to 25 years	14	6.1		
Over 25 years	99	27.0		
Duration of use ($n = 113$)			54.4	< 0.0001
0–2 years	4	5.5		
3–4 years	3	4.2		
5–8 years	12	8.5		
> 8 years	94	30.2		
Last drug injected ($n = 113$)			6.1	0.04
Non-opiate	36	14.9		
Opiate	77	21.7		
First drug injected ($n = 113$)			18.7	< 0.0001
Non-opiate	37	12.1		
Opiate	76	26.0		
Treatment history ($n = 112$)			17.0	< 0.0001
Ever	104	23.9		
Never	8	6.7		
Prison history ($n = 113$)			12.7	< 0.0003
Yes	53	14.4		
No	60	26.2		

the odds for exposure increased more for men than women (27% for men cf. 24% for women) [1].

The association for men and women with a prison history and exposure to hepatitis C can be explained in two ways. Those with a longer history of IDU are more likely to have been dysfunctional at some time and therefore have been in contact with the law. More than a third of the ASHIDU study group reported having served a custodial sentence and more than half of these had been sentenced for drug-related incidents—either possession and selling or crime related to acquiring drugs [7]. However, there is also an independent risk associated with being in prison; that of injecting while in prison. The lack of sterile injecting equipment and poor access to cleaning products in custodial institutions lead to high rates of sharing and increased risk of exposure to all blood-borne viruses. Reduced access to personal items in prison may also result in the sharing of personal items, such as razors and toothbrushes, which are implicated in the spread of hepatitis C.

Hepatitis B

Hepatitis B is efficiently transmitted by both blood-to-blood contact and sexual contact [8]. The findings of this study identified that the only predictor of risk associated with exposure to hepatitis B was duration of injecting such that the likelihood of exposure increases with increasing duration of use.

While there were a number of injecting behaviour variables independently associated with being hepatitis B antibody positive, surprisingly, there were none relating to current sexual behaviour. Behavioural data collected in this study related to current (past month) sexual behaviour only, suggesting that details of past sexual behaviour are needed to determine the risk of being exposed to hepatitis B. There were also significantly more hepatitis B core antibody reactive respondents over the age of 25 years and a higher proportion of younger compared to older respondents reporting being vaccinated against hepatitis B, further confounding the results [7].

Conclusions and recommendations

That both hepatitic blood-borne viruses continue to spread within IDU populations indicates that more innovative prevention interventions are required. In relation to hepatitis B, it will be necessary to per-

Table 4. *Predictors of risk for hepatitis B for the total sample and men and women*

Risk predictor	Proportion reactive	Odds ratio	95% CI
Total Study Group			
Duration of use			
up to 8 years	27.8	1.0	
More than 8 years	78.5	5.85	3.4–9.9
Men			
Duration of use			
up to 8 years	4.9	1.0	
More than 8 years	30.8	8.34	3.8–18.2
Women			
Duration of use			
up to 8 years	9.1	1.0	
More than 8 years	29.0	3.91	1.8–8.3

suade health authorities to introduce vaccination for all adolescents in conjunction with universal vaccination at birth.

In relation to hepatitis C, halting transmission may be more difficult. Other research centres are estimating hepatitis C antibody incidence figures to provide a more accurate estimation of the present spread of hepatitis C. There appears to be a lack of identifiable risk factors that go beyond the sharing of needles and other injecting paraphernalia. More social research is needed to establish precise behaviours within social networks that may increase the risk of exposure to hepatitis C within sub-populations of IDU.

From the information currently available it appears that exposure to hepatitis C for IDU is almost inevitiable. Certainly for the ASHIDU study group, more than half have been exposed and evidence of the more serious health consequences of infection are already being seen in WA hospitals and probably in hospitals throughout Australia. It has been suggested that perhaps the only means of controlling the hepatitis C epidemic among IDU is to encourage all users to use their drugs in alternative ways, hence eliminating the highest risk behaviour—the process of injecting. While this suggestion has obvious merit the processes and policies required to achieve such a change will no doubt be fraught with difficulties and are likely to take a long time. In the meantime there is a need to continue the promotion of current harm reduction strategies and to encourage the development of new strategies in line with newly emerging scientific knowledge of the virus, in an attempt to reduce the spread of hepatitis C among IDU.

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