Surveillance report

HEPATITIS AND HIV IN NORTHERN IRELAND PRISONS: A CROSS-SECTIONAL STUDY

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A study was undertaken in Northern Ireland (NI) prisons to (i) determine prevalence of bloodborne viruses among inmates, (ii) estimate the extent of self-reported risk behaviours. All three prisons in NI were included in the study. Outcome measures included (i) antibodies to hepatitis C (HCV), hepatitis B (HBV) core antigen, HIV, (ii) self-reported risk behaviour. Five prisoners (0.75 %) tested positive for HBV, seven (1.1%) for HCV and none for HIV. Eleven percent reported ever having injected drugs. Of these, 20% had started injecting while in prison, and 12% shared injecting equipment in prison. Two percent had completed HBV immunisation. Injecting drugs was associated with HCV (adjusted prevalence ratio=5.2; 95% CI 0.9-16) and HBV infection (adjusted prevalence ratio=4.1; 95% CI 0.7-23). The low prevalence of bloodborne viruses within NI prisons is not consistent with findings of studies in other countries, possibly reflecting the unique sociopolitical situation in NI. In spite of knowledge of the risks of transmission of bloodborne viruses in prison, high-risk practices are occurring. Preventing risk behaviours and transmission of infection in prisons now poses a challenge for health services in the United Kingdom.

Introduction

Prisons are known to be high-risk environments for the spread of bloodborne viruses. Studies of prison populations in other parts of the United Kingdom (UK) and in the Republic of Ireland (ROI) have shown (i) a high prevalence of hepatitis C (HCV) infection, (ii) evidence of hepatitis B (HBV) and HIV infection, and (iii) risk behaviours for transmission of bloodborne viruses in the prison setting [1-3].

The prevalence of bloodborne viruses among prisoners in Northern Ireland (NI) has not previously been determined. The absence of this information was considered a barrier to the development of appropriate public health interventions, including immunisation policy, and health protection measures. Information on prevalence is also required to inform approaches to securing appropriate clinical services for infected prisoners. Data from other studies are difficult to extrapolate to the NI prison population, as this specific population is likely to differ from that in other European countries, given the unique NI sociopolitical and security situation. Prior to the Good Friday Agreement in 1998, which resulted in cessation of paramilitary activity, the majority of prisoners in NI had been imprisoned for paramilitary activity (criminal activity by members of an illegal armed organisation) [4]. Prior to 1998 prevalence of bloodborne virus infections was low in NI outside prisons, and this was thought to be due, in part, to the prevailing

security situation: injecting drug use and drug dealing were not tolerated by the paramilitary organisations. However, the numbers of diagnoses have been increasing in recent years [5,6].

We conducted a cross-sectional survey to determine the prevalence of HBV [antibodies to hepatitis B core antigen (anti-HBc)], HCV and HIV in NI prisons, and to estimate the extent of self-reported risk behaviours among prisoners.

Methods

All three prisons in NI [a medium security prison, a high security prison and a young offenders centre (age range 17-21 years)] were included in the study. At the time of the study, there was a total of 1,185 prisoners, of whom 15 were women. Ninety percent (n=1,065) of the total prison population was eligible to participate on the study days. Participation was voluntary. The following exclusions applied: (i) Juvenile unit (n=16, as permission from guardians had not been granted), (ii) segregated prisoners (n=14, for security reasons), (iii) all paramilitary prisoners (n=82, as they collectively declined to take part prior to discussion with the researchers) and (iv) patients who were currently admitted to hospital (n=8), from whom consent could not be obtained because of serious mental or physical illness.

Demographic details and data on prison history, history of injecting drug use and smoking heroin, sexual practices, self-reported hepatitis and HIV testing and HBV immunisation history were collected by means of self administered questionnaire. The questionnaire was adapted from those used in prison studies in ROI [1,2] and in England and Wales [3].

Oral fluid samples were collected using OraSure (OraSure Technologies Inc., USA); an oral specimen collection device for HBV, HCV and HIV antibody testing.

All staff and prisoners were briefed in advance, through meetings, posters on communal notice boards and individual information leaflets.

Members of the survey team met prisoners in groups of 10 or fewer in designated rooms, without any prison staff being present. Prisoners were given an introductory talk covering relevant issues including information about bloodborne viruses, confidentiality, anonymity and consent. They were informed that they would not be given their test result. Consent was obtained from all participants.

Prisoners provided an oral fluid specimen and at the same time, completed the questionnaire. In order to minimise non-response due to literacy problems, all prisoners were offered the choice of completing the questionnaire either by themselves or with the help of the interviewers. Participants who completed a questionnaire but refused to provide an oral fluid sample (n=5) were included in the study.

As the study was anonymous, no identifiers were recorded in the questionnaire or on the oral fluid specimen. Questionnaires and oral fluid specimens were linked using a numbering system.

Specimens were transported to the Sexually Transmitted and Bloodborne Virus Laboratory, Health Protection Agency, London, and were tested for antibodies to hepatitis B core-antigen (Anti-HBc), antibodies to hepatitis C virus (anti-HCV) and antibodies to HIV (anti-HIV). The anti-hepatitis B core test used had a sensitivity of 82% (18% false negative) and specificity greater than 99% (less than 1% false positive). The sensitivity and specificity of anti-HCV test was 92% and 99% respectively [7]. For the antibody test to HIV, both sensitivity and specificity were almost 99% (manufacturer's data).

The questionnaires were scanned using FORMIC r4 Capture and Process programme (Formic Ltd, UK). Analysis was performed using SPSS 12 for Windows (SPSS Inc, Chicago, USA) and STATA 7.0 for Windows (Stata Corporation, Texas, USA). Prevalence ratios (PR) and their 95% confidence intervals (95%CI) were used to compare proportions in independent groups of categorical variables. Multiple logistic regression models were developed to identify risk factors associated with positive test results and 95% confidence intervals were calculated for adjusted PR.

The study was approved by the University of Ulster Research Ethics Committee.

Results

Six hundred and sixty-three (62.2%) prisoners completed a questionnaire and 658 (61.8%) provided an oral fluid sample. Response rates varied across prisons [young offenders 89%; prisoners serving life sentence 76%; female prisoners 83%; high security prison (adult male) 65%; medium security prison (adult male) 41%]. Respondents did not differ significantly from non-respondents in terms of age ($P=0.157$) or length of prison sentence ($P=0.386$).

The median age of respondents was 26 years (range: 16-66 years). Eleven (1.66%) participants were women. Forty-three percent (n=287) reported being in prison for the first time and remand prisoners represented 38% (n=249) of the total participants.

Seventy-one (11%) prisoners [58 (12%) adult males; 10 (6%) young offenders; three (27%) females] reported ever injecting drugs. Thirty-three (46%) of those had also smoked heroin in the past year. Prisoners under 35 years of age were twice more likely to have injected drugs (PR 2; 95% CI 1.1-4.02). Reported drug use was more common in the high security prison (PR 2.1; 95% CI 1.1-4.1) and by those who had been in prison more than once (PR 2.4; 95% CI 1.43-4.07).

Seventy percent (45/64) of the injectors had started injecting before the age of 24. The median length of drug use was five years, ranging from a few months to 23 years. Twenty percent (14/70) of

injectors said that they first started injecting drugs while in prison and 12% (8/65) reported sharing injecting equipment (such as needles, syringes and filters) in prison. However, injectors were significantly more likely to have shared needles or syringes outside than inside the prison (Pearson $\chi^2=4.182$, $P=0.041$).

The majority (90%) reported heterosexual activity in the year prior to committal. Nine (1.4%) men reported that they had ever had anal sex with men and of these, three (33%) reported anal sex while in prison. Thirty-three percent (196/599) of those who had heterosexual intercourse reported using condoms (always or sometimes), while 5 (63%) out of the eight male respondents said that they used condoms during homosexual intercourse. Fourteen percent (88/636) of the respondents had been treated for sexually transmitted infections (STI). The prevalence of STI treatment was almost 3 times higher in injecting drug users (IDUs) than in non-IDUs (PR=2.68; 95% CI 1.8-4.5).

Nine percent (41/468) had begun courses of vaccination for HBV, with 1.7% (8/468) completing the three-dose course. Thirteen (13/34; 38%) prisoners reported having been vaccinated in prison with the majority of those (11/13; 85%) having been immunised in the high security prison. Young offenders reported 5.8% (7/121) vaccine coverage, with only one reporting having been vaccinated in prison. IDUs were more likely to have begun vaccination for

TABLE 1

Number (%) of positive hepatitis C, hepatitis B tests by age, prison history, injecting drug use and sexual practices. Northern Ireland prisoners, Northern Ireland, 2004

	Hepatitis C positive tests		Hepatitis B positive tests	
	n/total (%)	PR (95% CI)	n/total (%)	PR (95% CI)
Being <30 years old				
Yes	3/273 (1.1)	2.3 (0.4-13.7)	4/273 (1.5)	6.1 (0.7-54.5)
No	2/385 (0.5)	Ref. group	1/385 (0.3)	Ref. group
Having been in prison more than once				
Yes	3/375 (0.8)	0.6 (0.1-2.5)	4/375 (0.1)	3 (0.3-27)
No	4/286 (1.4)	Ref. group	1/286 (0.3)	Ref. group
Having spent more than three years in prison in the last 10 years				
Yes	1/202 (0.5)	0.4 (0.1-3.1)	4/202 (1.9)	9 (1-80)
No	6/457 (1.3)	Ref. group	1/457 (0.2)	Ref. group
Being on remand				
Yes	5/249 (2)	4.1 (0.8-21)	2/249 (0.8)	1 (0.2-6.5)
No	2/410 (0.5)	Ref. group	3/410 (0.7)	Ref. group
Injecting drug user				
Yes	2/71 (2.8)	5.2 (0.9-16)	2/71 (2.8)	4.1 (0.7-23)
No	4/578 (0.7)	Ref. group	3/578 (0.5)	Ref. group
Heterosexual Intercourse in the year before				
Yes	5/589 (0.8)	0.2 (0-1.2)	4/594 (0.6)	0.3 (0.4-3.3)
No	2/56 (3.5)	Ref. group	1/56 (1.7)	Ref. group
Ever been treated for Sexually Transmitted Infection				
Yes	1/88 (1.1)	1.2 (0.1-10.5)	1/88 (1.1)	1.55 (0.2-14)
No	5/547 (0.9)	Ref. group	4/547 (0.7)	Ref. group

PR: Prevalence ratio (95% Confidence Interval)

Ref. group: Reference group in the calculation of the prevalence ratio

HBV (PR 2.9; 95% CI 1.5-5.4) and to have completed the full course (PR 5.3; 95% CI 1.3-21.5). However, 93% of IDUs did not complete a course of HBV vaccination.

Seven prisoners (1.06%) tested positive for HCV, 5 (0.76%) for HBV and none (0%) for HIV. Prevalence varied by prison type, with the highest prevalence in the high security prison (1.71% for anti-HCV and 1.14% for Anti-HBc). Adult male prisoners under 30 years of age were more likely (but not significantly) to test positive for anti-HCV and anti-HBc [Table 1]. The prevalence of anti-HCV was 4 times higher in remand prisoners (prisoners awaiting sentencing) (2%) compared with sentenced prisoners (0.5%).

Almost 3% (n=2) of IDUs tested positive for HCV and HBV [Table 1]. Both reported that they had started injecting drugs outside prison. One (1/2) of the IDU prisoners, who tested positive for HCV and none (0/8) of those who tested positive for HBV reported having shared equipment while in prison. These small numbers do not allow the detection of possible associations between the prevalence of these infections and different patterns of injecting drug use.

After adjusting for possible confounding factors (logistic regression modelling), the prevalence ratio of anti-HCV remained high for injecting drug use (adjusted PR 5.2; 95% CI 0.9-16), being on remand (adjusted PR 7.2; 95% CI 0.2-66) and age < 30 years old (adjusted PR 2.7; 0.4-17); while HBV was associated with injecting drug use (adjusted PR 4.1; 95% CI 0.7-23), age < 30 years (adjusted PR 5.3; 95% CI 0.6-47) and having spent more than three years in prison in the last 10 years (adjusted PR 1.9; 0.9-3.9). However, the results were not statistically significant, possibly due to very small numbers, and references from these models are limited.

Three participants reported that they had previously tested positive for HCV (0.45%), two for HBV (0.3%) and none for HIV. Seventy-one percent (5/7) of those who tested positive for HCV were unaware of their infection. One of the three (33%) respondents who claimed a previous positive HCV result had a negative oral fluid specimen [Table 2]. One of the five (20%) HBV positive prisoners reported a previous positive HBV result. One other (20%) reported a previous negative test for HBV and the remaining three (60%) did not know their HBV infection status [Table 2]. None of those reported having been vaccinated. One of the two (50%) who reported being positive for HBV tested negative. Possible reasons for these discrepancies include: false positive or false negative oral test results, mistakes in completing the questionnaire, deliberate misclassification of the infection status by the respondents, or change in antibody status since the previous test.

Discussion

This is the first prevalence study of bloodborne viruses in NI prisoners. The incidence of bloodborne viruses has increased in NI in recent years [4,5] but no information had previously been available on these infections in prisoners.

The overall response rate (62%) was lower than that observed in other similar studies and this may have introduced selection bias. However, low participation was observed only in the medium security prison (41%), which, in common with the study findings, is perceived by the NI prison service to be a low-risk environment with a low drug use population. A high level of participation was achieved in both of the other establishments (89% in the young offenders centre, 65% in the high security prison, among prisoners

TABLE 2

Self-reported results and oral fluid test results of HBV, HCV and HIV. Northern Ireland prisoners, Northern Ireland, 2004

	Self-reported status	Oral fluid test Result		Total
		Positive	Negative	
Hepatitis C	Positive	2	1*	3
	Negative	0	39	39
	Don't know	5†	577	582
	Total	7	617	624
Hepatitis B	Positive	1	1*	2
	Negative	1†	54	55
	Don't know	3‡	574	577
	Total	5	629	634
HIV	Positive	0	0	0
	Negative	0	83	83
	Don't know	0	563	563
	Total	0	646	646

* Participant who reported positive previous HBV or HCV result, but tested negative

† Participant who reported negative previous HBV or HCV result, but tested positive

‡ Participant who tested positive but did not know his infection status

serving life sentence (86%) and among women prisoners (83%). In addition, respondents and non-respondents did not differ significantly in terms of age and length of prison sentence

This study has shown that the prevalence of anti-HCV (1.06%), anti-HBc (0.75%) and anti-HIV (0%) are currently low within the NI prison population. It has also shown that more than 10% of prisoners have injected drugs, a fifth of whom started injecting while in prison and 12% of whom had shared injecting equipment in prison.

The low prevalence of bloodborne viruses in NI prisons is not consistent with similar studies carried out in other countries, where very high levels of infection, particularly with HCV, have been reported [1-3;8-10]. This may be due to current low prevalence of these infections in the NI community [5]. It may also reflect the distinctive political and cultural characteristics of the prison population in NI, whereby the unique security situation over three decades prior to the Good Friday Agreement resulted in the creation of different patterns of behaviour and attitude to those seen elsewhere [4]. This included a 'zero tolerance' approach to injecting drug supply and use. The prison population rate in NI is considerably lower than in Great Britain (England, Scotland and Wales) or ROI [11]. In addition, the rate of injecting and other drug use is considered lower in NI community than in other parts of the UK or Ireland [12,13].

The prevalence of drug use among NI prisoners was 11%, compared with 43% and 24% recorded during similar studies in ROI and Great Britain respectively [1, 2,3]. This may well start to change now as evidence points to increasing levels of injecting drug use in the community [12-15].

Although self-reported injecting drug use was not as high as in other prisons in the UK or ROI, it was twice as common in those

who had previously been in prison and more than 10% of the injectors reported sharing equipment while in prison. This provides evidence that there is continuing drug use and ongoing high-risk injecting drug behaviour in NI prisons. A worrying finding was that 20% of the injectors started injecting while in prison. Similar high percentages were found in ROI and Scottish prisons with high levels of bloodborne virus infections [1,2,8,16]. This is a striking figure, which requires special attention. Initiation of injecting in prison at this level means that the levels of drug use in prisons may rise dramatically in the coming years. This gives considerable cause for concern and needs to be addressed.

Fewer than 2% of prisoners reported having been fully immunised against HBV. This very low coverage is an issue of concern. Prisoners are a high-risk group for acquiring HBV and current UK policy states that hepatitis B immunisation is recommended for all sentenced prisoners and all new inmates entering prison [17]. However, this policy had not been implemented in NI prisons at the time of the study. Findings from this study, although based on self-reported vaccination status, suggest that there is an urgent need for improvement. Of note, prison is the most common source of hepatitis B vaccination among IDUs in Great Britain [18].

A high percentage of those who tested positive for HBV (80%) and HCV (71%) were unaware of their infection. Prisoners' knowledge of their infection status has implications for them, in terms of receiving appropriate treatment and advice on preventing onward transmission. It also has serious public health implications as unaware prisoners may engage in activities likely to transmit infections to others. All prisoners should have access to information on bloodborne viruses and the opportunity to request testing directly from the prison doctor and post-test counselling should be available to all those with a positive test result. In addition prisoners should have access to specialist treatment services for these infections, similar to the general population.

Although the prevalence of bloodborne viruses in the NI prison population remains low at the present time, this should not be a reason for complacency.

This study illustrates that high-risk practices, known to facilitate the spread of these infections, already occur in NI prisons. Policies to minimise transmission of these viruses should be put in place in order that the current low prevalence of infection can be sustained.

On 1 April 2006, responsibility for the health of prisoners was transferred to the National Health Service (NHS). This study demonstrates evidence of ongoing risk behaviours for bloodborne virus transmission in prisons. Service commissioners and providers will need to give due consideration to these as part of their approach to preventing and controlling bloodborne virus transmission among the prison population.

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