Drug injection and HIV prevalence in inmates of Glenochil prison

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Abstract

Objective—To determine prevalence of HIV infection and drug injecting behaviour among inmates of Glenochil Prison on a specified date a year after an outbreak of hepatitis B and HIV infection.

Design—Cross sectional: voluntary, anonymous HIV salivary antibody surveillance and linked self completion questionnaire on risk factors.

Setting—Glenochil prison, Scotland, a year after an outbreak of hepatitis B and HIV transmission related to drug injection.

Subjects—352 prisoners, of whom 295 (84%) took part; 284 questionnaires (96%) passed logical checks.

Main outcome measures—HIV prevalence; proportion of all inmates who had ever injected drugs, had ever injected inside prison, had started injecting drugs while inside prison.

Results—More than half (150/284) the current inmates were also in Glenochil Prison during the critical period of January to June 1993, when hepatitis B and HIV were transmitted. Similar proportions of current inmates and men who were also in Glenochil during the critical period were drug users (27% (75/278) v 30% (44/149)). A quarter of injecting drug users (18/72) had first injected inside prison, irrespective of whether they were in Glenochil in January to June 1993 and regardless of the calendar period when they first injected. Significantly more inmates from Glasgow (41%; 56/138) than from Edinburgh (21%; 7/34) or elsewhere (11%; 12/106) were injecting drug users. On testing for HIV, seven saliva samples out of 293 gave positive results—four were presumed to be from inmates known to be infected with HIV, and the others from injecting drug users from Glasgow, all of whom had been in Glenochil during January to June 1993, when two of the three had injected drugs and had been tested for HIV, with negative results. The ratio of overall (2.4%) to disclosed (1.4%) HIV prevalence was 1.7. For men who had injected drugs in Glenochil during January to June 1993, HIV prevalence was estimated at 29%.

Conclusion—Between a quarter and a third of prisoners who injected drugs in Glenochil in January to June 1993 were infected with HIV. There is widespread ongoing risk of bloodborne virus infection within prisons, which is probably long standing but demands urgent attention.

Introduction

Hepatitis B and HIV were transmitted during January to June 1993 inside Her Majesty's Prison Glenochil, Scotland^{1,2}; symptomatic hepatitis B infections were first evident in April 1993.² Overt HIV seroconversion illnesses followed in at least two men. An incident control team was established by public health officials.² Because of men's concerns about the incident control exercise, including the possible implications of individual case finding, 60% of prisoners were counselled in June 1993, but only two fifths of all inmates proceeded to personal testing.

For public health purposes, and as the backdrop to determination of personal infection status, we had proposed anonymous voluntary HIV and hepatitis B testing of saliva samples linked to risk factor questionnaires³—participation being made non-threatening by demonstrable anonymity, use of saliva (not blood) samples, and self completion questionnaires. Frank discussion of the need for public health information plus close attention to methodology for use inside prisons⁴ overcomes inmates' suspicion of authority.

Neither the prison authorities, public health officials,² nor inmates⁶ could not be confident that the extent of HIV transmission of Glenochil prison in January to June 1993 had been delineated by the incident control exercise. Sound estimates were, and remain, a priority in terms of the public health and prisons' duty of care.

Methods

Voluntary anonymous HIV surveillance with risk factor elicitation was conducted on 22 July 1994 at Glenochil prison as detailed in previously published studies⁷⁻⁹ by an external team of 20 volunteers knowledgeable about HIV. Ethical approval for HIV surveillance had been given by Forth Valley Health Board.

SURVEILLANCE DAY

Of the 354 male prisoners present at lock up on the evening of 21 July 1994, 352 were available the next day to participate (two were in court). Five prisoners were known to the Glenochil medical staff to be infected with HIV; four had injected drugs at Glenochil during January to June 1993, and the fifth was also an injecting drug user but had not been in Glenochil at that time. Of the 352 available prisoners, 295 (84%) took part by completing a questionnaire and providing a saliva sample. On the surveillance day, 25 prisoners also requested a confidential personal HIV test.

QUESTIONNAIRE

Prisoners were asked (see table) whether, at any time during January to June 1993, they had been incarcerated in Glenochil prison, had injected drugs in Glenochil, and had been tested for HIV in Glenochil. The questionnaire also included a new question about having started to inject drugs while in prison.

LABORATORY METHODS

Saliva samples were collected, separated, and tested for HIV antibody by GACELISA (Wellcozyme HIV1+2, Murex Diagnostics Ltd, Dartford, Kent) as previously described.^{8,9} Testing was repeated on all reactive samples and confirmed by immunoblot (HIV-1 western blot kit, Organon Teknika, Durham, NC, USA).

Results

INJECTING BEHAVIOUR

Of the 295 completed questionnaires, only 11 (4%) contained logical errors: four gave an inconsistent sentencing history, and the rest were inconsistent for

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injecting history. The table shows answers of the 284 respondents whose questionnaires passed logical checks, of whom 75 (27%) had injected drugs, and for the subset of 150 participants (53%) who had been in Glenochil prison at some time during January to June 1993. In most respects, excepting (obviously) when present sentence began (question 4), time inside since January 1983 (question 9), and HIV test uptake (questions 15 and 16), current inmates and those who had been in Glenochil during January to June 1993 (and still were) had the same demographic characteristics, sentencing history, and sexual behaviour. Proportions of injecting drug users were similar among all current inmates and men who had been in Glenochil during January to June 1993 (27% (75/278) and 30% (44/149) respectively).

Among men who had ever injected drugs, the proportion who had injected while in prison was 42% (13/31) for current inmates who had not been in Glenochil during January to June 1993 but 70% (31/44) among those who had been. Because the proportion of inmates who had ever injected drugs while in prison would be expected to increase with accumulated time in prison, we used our results from Saughton prison⁷ as an external standard to adjust for differential accumulated time. According to the Saughton data and answers to question 10 by Glenochil prisoners (see table), 16.3 out of 31 current injecting drug users who were not in Glenochil during January to June 1993

were expected to have ever injected drugs while in prison (13 did so), and 33.0 out of 44 who were in prison then were expected to have injected drugs (31 did so). Thus injecting drug users who had been in Glenochil prison during January to June 1993 were not more likely to have injected drugs while in prison than were other injecting drug users in the same or a different Scottish prison.

Further evidence that Glenochil's injecting drug users during January to June 1993 did not differ from their counterparts in other Scottish prisons comes from question 13: did you start injecting in prison? Twenty five per cent of injecting drug users in Glenochil (18/72) started injecting in prison, whether or not they had been in Glenochil in January to June 1993 (table) and regardless of the calendar period in which they first injected drugs: before 1983 (4/16), in 1983-8 (5/30), or after 1988 (9/26) ($\chi^2=2.4$, $df=2$, $P=0.30$).

Significantly more inmates who lived in Glasgow were injecting drug users (41%; 56/138) than were those from Edinburgh (21%; 7/34) or elsewhere (11%; 12/106) ($\chi^2=26.9$, $df=2$). The proportion of all injecting drug users who had injected in prison (59%; 44/75) did not differ significantly by town of residence, but a lower proportion of injecting drug users from Glasgow had started injecting in prison (19%; 10/53) compared with those from Edinburgh or elsewhere (42%; 8/19) ($P=0.05$).

Responses of inmates of Glenochil prison to self completed questionnaire, July 1994. Values are numbers (percentages) of respondents whose questionnaires passed logical checks

Question	Current inmates		Current inmates also in Glenochil prison during January to June 1993		Question	Current inmates		Current inmates also in Glenochil prison during January to June 1993	
	All participants (n=284)	Injecting drug users (n=75)	All participants (n=150)	Injecting drug users (n=44)		All participants (n=284)	Injecting drug users (n=75)	All participants (n=150)	Injecting drug users (n=44)
1 How old are you?					11 In which year did you last inject?				
Under 26 years	114 (40)	36 (48)	56 (38)	24 (55)	Never injected	200		104	
26-30 years	75 (27)	21 (21)	47 (32)	11 (25)	1982-91	22	22 (30)	15	15 (35)
31-35 years	47 (17)	9 (9)	21 (14)	5 (11)	1992 or later	52	52 (70)	29	28 (65)
Over 36 years	46 (16)	9 (12)	25 (17)	4 (9)	Not known	10	1	3	1
Not known	0	0	1	0	12 Have you ever injected while inside?				
2 Where did you live before coming into Glenochil prison?					Yes	44 (16)	44 (59)	31 (21)	31 (70)
Glasgow	139 (49)	56 (75)	76 (51)	35 (80)	No	238 (84)	31 (41)	118 (79)	13 (30)
Edinburgh	35 (12)	7 (9)	20 (13)	4 (9)	Not known	2	0	1	0
Elsewhere	109 (39)	12 (16)	54 (36)	5 (11)	13 Did you start injecting while inside?				
Not known	1	0	0	0	Yes	18 (7)	18 (25)	11 (8)	11 (25)
3 How long is your present sentence?					No	243 (93)	54 (75)	128 (92)	33 (75)
Less than 1 year	3 (1)	0	0	0	Not known	23	0	11	0
Between 1 and 3 years	24 (9)	9 (12)	14 (9)	6 (14)	14 Did you inject in Glenochil prison during January to June last year (1993)?				
More than 3 years	252 (90)	65 (88)	135 (91)	38 (86)	Yes	23 (8)	23 (31)	23 (16)	23 (52)
Not known	5	1	1	0	No	253 (92)	52 (69)	123 (84)	21 (48)
4 When did your present sentence begin?					Not known	8	0	4	0
1994	39 (14)	6 (8)	1 (1)	0	15 Have you ever taken the blood test for HIV?				
1993	104 (37)	28 (37)	37 (25)	11 (25)	Yes	126 (47)	47 (66)	96 (66)	36 (84)
1991-2	98 (35)	30 (40)	81 (55)	26 (59)	No	143 (53)	24 (34)	49 (34)	7 (16)
Before 1991	41 (14)	11 (15)	29 (20)	7 (16)	Not known	15	4	5	1
Not known	2	0	2	0	16 Did you have an HIV blood test in Glenochil prison during January to June last year (1993)?				
5 Were you in Glenochil prison at any time during January to June last year (1993)?					Yes	77 (28)	25 (33)	77 (52)	25 (57)
Yes	150 (53)	44 (59)	150	44	No	202 (72)	50 (67)	71 (48)	19 (43)
No	134 (47)	31 (41)	0	0	Not known	5	0	2	0
6 How many times have you been inside before this sentence?					17 Have you had an acute attack of hepatitis or yellow jaundice?				
Never	90 (32)	9 (12)	43 (29)	5 (11)	Yes	29 (10)	20 (27)	14 (10)	10 (23)
Once	31 (11)	3 (4)	14 (9)	1 (2)	No	248 (90)	54 (73)	133 (90)	33 (77)
2-4 times	68 (24)	20 (27)	35 (24)	12 (27)	Not known	7	1	3	1
5 or more times	92 (35)	43 (57)	57 (38)	26 (59)	18 In the last year before this sentence, how many women did you have sex with?				
Not known	3	0	1	0	None	14 (5)	4 (5)	9 (6)	3 (7)
7 Have you been in a borstal or young offenders' institution?					One	65 (23)	13 (18)	31 (21)	6 (14)
Yes	168 (59)	59 (79)	92 (61)	37 (84)	2-5	132 (47)	40 (53)	72 (49)	25 (57)
No	115 (41)	16 (21)	58 (39)	7 (16)	6 or more	70 (25)	18 (24)	36 (25)	10 (23)
Not known	1	0	0	0	Not known	3	0	2	0
8 Have you ever been charged with a drugs related offence?					19 In the last year before this sentence, how many men did you have sex with?				
Yes	107 (38)	40 (53)	54 (36)	24 (54)	None	271 (98)	69 (97)	141 (98)	40 (98)
No	174 (62)	35 (47)	96 (64)	20 (46)	One or more	5 (2)	2 (3)	3 (2)	1 (2)
Not known	3	0	0	0	Not known	8	4	6	3
9 How much time have you done inside since January 1983?					20 Have you ever accepted money (or goods) for sex?				
Less than 1 year	56 (20)	5 (7)	9 (6)	1 (2)	Yes	4 (1)	1 (1)	3 (2)	1 (2)
Between 1 and 3 years	92 (33)	18 (24)	50 (34)	10 (23)	No	279 (99)	74 (99)	146 (98)	43 (98)
More than 3 years	134 (48)	51 (69)	90 (60)	33 (75)	Not known	1	0	1	0
Not known	3	1	1	0	21 Have you ever paid for sex?				
10 In which year did you first inject drugs (excluding insulin)?					Yes	21 (7)	6 (8)	10 (7)	5 (11)
Never injected	203 (73)	0	105 (70)		No	261 (93)	69 (92)	138 (93)	39 (89)
1982 or earlier	16	16 (21)	11	11 (25)	Not known	2	0	2	0
1983-5	12	12 (16)	8	8 (18)	22 Have you ever been treated for a sexually transmitted disease?				
1986-8	20	20 (27)	9	9 (20)	Yes	35 (12)	11 (15)	20 (14)	6 (14)
1989-91	12	12 (16)	7	7 (16)	No	247 (88)	63 (85)	128 (86)	37 (86)
1992 or later	15	15 (20)	9	9 (18)	Not known	2	1	2	1
Not known	6	0	1	0	23 Have you ever had anal sex with another man in prison?				
					Yes	2 (1)	1 (1)	2 (1)	1 (2)
					No	280 (99)	73 (99)	146 (99)	42 (98)
					Not known	2	1	2	1

HIV TEST UPTAKE

Uptake of HIV tests during the infection control exercise was modest. Among prisoners in Glenochil during January to June 1993, 57% (25/44) of injecting drug users and 50% (52/104) of non-users were tested. Uptake of HIV tests by injecting drug users, who were the focus of transmission and thus of the incident control exercise, does not seem to have been greatly enhanced. Determination of personal HIV status was most likely by those whose present sentence began before 1991 (linear logistic coefficient=1.5 (SE=0.5)) or in 1991-2 (0.9 (0.4)), and by those who reported they had had acute hepatitis (1.1 (0.7); $P=0.14$); it was somewhat resisted by inmates from Glasgow (-0.6 (0.4); $P=0.08$). Men who had injected drugs in Glenochil during January to June 1993 showed only a modest and non-significant additional tendency to come forward for a personal HIV test (0.6 (0.6); $P=0.32$).

SALIVA TESTING AND HIV PREVALENCE

Of 295 saliva samples received, 293 were tested for HIV antibodies; two were insufficient samples. Positive results obtained on seven saliva samples were confirmed by western blot analysis. HIV prevalence among participants on 22 July 1994 was therefore 2.4%. Five inmates were known to be infected with HIV: one (from Edinburgh) had been infected before the January to June 1993 period, and the four others are presumed to have acquired their HIV infection in Glenochil, where they injected drugs during January to June 1993. Four of these five prisoners are considered to have participated in the current study because their demographic characteristics and sentencing and injecting histories matched closely the responses on questionnaires linked to four samples that gave positive results. The three other samples with positive results were from injecting drug users from Glasgow, all of whom had been in Glenochil prison during January to June 1993, when two had injected drugs and had negative results on HIV testing.

Of the 352 available inmates on 22 July 1994, 347 were not known (by prison medical officers) to be infected with HIV. The prevalence of HIV in the 289 of these inmates who were tested was 1% (3/289), there having been two insufficient saliva samples and few positive samples associated with inmates who were known to be HIV positive. Undiagnosed HIV infections were therefore estimated at 3.6 ($=347 \times 3/289$); combining these with Glenochil's five known HIV infections gave an estimated total of 8.6, and overall HIV prevalence of 2.4%. Thus there was a ratio of 1.7 of overall to disclosed HIV prevalence in Glenochil prison in July 1994.

Assuming a uniform 84% participation rate, we estimated HIV prevalence for three important subsets of inmates. In current inmates who were in Glenochil prison during January to June 1993 the estimated overall HIV prevalence was 4% and the ratio of overall to disclosed HIV infection was 1.9. In current inmates who were in Glenochil prison during January to June 1993 and were Glasgow residents the estimated overall HIV prevalence was 7% and the ratio of overall to disclosed HIV infection was 2.2. In current inmates who injected drugs in Glenochil prison during January to June 1993 the estimated overall HIV prevalence was 24% and the ratio of overall to disclosed HIV infection was 1.6.

Discussion

The risk behaviour estimates that emerged from the infection control exercise in 1993 and our surveillance a year later were similar: 36% (76/210) and 30% (44/149) of prisoners who were in Glenochil during

January to June 1993 had ever injected drugs, and 43% (33/76) and 52% (23/44) of injecting drug users had injected drugs in Glenochil during January to June 1993. The two approaches also agreed that 16% of inmates had injected drugs in Glenochil prison during January to June 1993, or 60 men at the time of the infection control exercise, when 14 had had positive results on HIV testing and eight were within a three month window period.² Therefore, the infection control exercise could estimate that HIV prevalence in injecting drug users injecting in Glenochil during January to June 1993 was in the range of 23% (14/60 (estimated total)) to 48% (14/29 (actually tested)), or higher if those in the window period subsequently seroconverted. The lower estimate assumes that all inmates in June 1993 who had been exposed to HIV chose to be tested, and the upper estimate assumes that the 29 men who were tested were a random sample. As the visibility of HIV seroconversion illnesses and acute hepatitis B infections during the outbreak probably encouraged other inmates in the same needle sharing network to present for counselling and testing, we consider that the true incidence of HIV was probably at the lower end of the range derivable from the infection control exercise.

A year after being tested, one of the 14 infected inmates who had recognised markers for rapid disease progression had died of AIDS. Four remained in Glenochil and eight were freed before 22 July 1994, six directly and two after prison transfers. Only one infected inmate was continuing his sentence at another prison. If the deceased prisoner and one HIV infected man who remains in prison elsewhere are taken into account, then the estimated number of inmates on 22 July 1994 who injected drugs in Glenochil during January to June 1993 is 29.4 (not 27.4), of whom 8.5 (not 6.5) were infected with HIV, giving an overall prevalence of 29% (not 24%) (further details available from authors). We thus estimate that of the prisoners who injected drugs in Glenochil during January to June 1993 (60 inmates, plus 10 or so men who injected then but were released or transferred before the infection control exercise in June 1993), 20 are infected with HIV.

A significantly higher proportion of prisoners in Glenochil (27%; 75/278) were injecting drug users than in Saughton (18%; 66/358; $P<0.02$).⁷ The difference was largely explained by the higher proportion of injecting drug users among inmates of Glenochil who came from Glasgow (41%; 56/138) as compared with those from Edinburgh (21%; 7/34) and elsewhere (11%; 12/106). A quarter of all injecting drug users in Glenochil had started to inject in prison regardless of their year of first injection and so, by implication, could have started in establishments other than Glenochil.

Our finding that inmates who injected drugs in Glenochil during January to June 1993 were as likely to have ever injected in prison as were Glenochil's prisoners now and injecting drug users in Saughton in 1991 is strong evidence that the outbreak of hepatitis B and HIV transmissions could have occurred anywhere in the prison system. The arrival of a carrier of hepatitis B or HIV within any of the needle sharing networks common within British prisons is all that is required to start such an outbreak. To prevent further outbreaks, the size of needle sharing groups within prisons must be reduced, or these groups must be eliminated; a range of options should be formally evaluated.

From a quarter to a third of prisoners who injected in Glenochil prison in January to June 1993 were infected with HIV; not all are aware of their infection. Particularly for injecting drug users from Glasgow, having injected in Glenochil in January to June 1993 is a major

Key messages

- A high participation rate in anonymous HIV surveillance resulted from frank discussion with prisoners, use of saliva samples, and, for study purposes, self completion questionnaires
- The proportion of injecting drug users differed according to residence before prison: 41% of Glasgow residents, 21% of Edinburgh residents, and 11% of those resident elsewhere
- A quarter of injecting drug users in Glenochil prison had started injecting while in some prison
- Between a quarter and a third of men who injected drugs in Glenochil prison in January to June 1993 became infected with HIV while in prison
- Widespread risk of bloodborne virus infections in British prisons demands urgent attention

risk factor for recent HIV infection and should be asked about in future HIV surveillance of injecting drug users or when HIV is diagnosed.

The predilection of prison populations for bloodborne virus infections is not a new observation. Because of a more than 10 times higher prevalence of previous hepatitis B infection and carriage rates among prison inmates the UK Blood Transfusion Services ceased donor sessions in prisons in the early 1980s (J Barbara, T Wallington, personal communications). This study emphasises a widespread ongoing risk of bloodborne virus infection within prisons which demands urgent attention in order to safeguard future inmates and the community.

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Short stature and diabetic nephropathy

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Recent studies have suggested that low birth weight is associated with a reduced number of nephrons and hypertension in later life,^{1,2} both well known risk factors for renal disease. An inverse correlation between microalbuminuria and height, the latter known to vary directly with birth weight,³ has been shown in non-diabetic men.⁴ We investigated the association between adult height and diabetic nephropathy in a cross sectional study of a cohort of insulin dependent diabetic patients attending the Steno Diabetes Center in 1984.⁵

Patients, methods, and results

We selected patients according to the following criteria: age ≥ 18 years, a duration of diabetes ≥ 5 years, and age at onset of diabetes ≤ 40 years. In all, 951 patients (500 men; mean age 40 (SD 13) years; mean age at onset 18 (10) years) were enrolled (97% of those eligible). We examined urinary albumin excretion rate

(24 hour urine collections, radioimmunoassay) and height (to the nearest centimetre and given as integers). On the basis of urinary albumin excretion rate the patients were stratified into three groups: those with normal rate of excretion (normoalbuminuria) (≤ 30 mg/24 h, $n=563$); with microalbuminuria (> 30 and < 300 mg/24 h, $n=214$); and with macroalbuminuria (indicating diabetic nephropathy) (≥ 300 mg/24 h in two out of three consecutive samples, $n=174$). Men and women were analysed separately owing to differences in height. Results were analysed with the programs of the SAS Institute (Cary, North Carolina).

Men with macroalbuminuria were significantly shorter (mean height 175.3 (SD 7.3) cm, $n=98$) than patients with microalbuminuria (177.0 (6.1) cm, $n=113$) or with normoalbuminuria (177.9 (6.9) cm, $n=289$) ($P=0.004$). As height and age at onset of diabetes and current age were associated a multiple logistic regression analysis was performed with patient group (ordered categorical variable normoalbuminuria, microalbuminuria, macroalbuminuria) as dependent variable and height, age, and age at onset of diabetes as independent variables. Height was included in the final model, with a reduction in the risk of developing diabetic nephropathy of 3.3% (95% confidence interval 0.77% to 5.8%) per centimetre increase in height.

Poor glycaemic control is a risk factor both for the development of incipient diabetic nephropathy (indicated by microalbuminuria) and overt diabetic

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