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MEMORANDUM

DATE: April 1, 1998

TO: Steven Fisher, AIDS Action Council
Seth Kilburn, Human Rights Campaign
Todd Summers, National Office on AIDS Policy

FROM: Steven Johnson, Northwest AIDS Foundation

RE: Vancouver Needle Exchange Information

Included in this packet are several documents regarding the recent increase in HIV infection among injection drug users in Vancouver, British Columbia. I hope that they are useful as we develop a coordinated media response to General Mc Caffrey's visit to Vancouver.

- "Needle exchange is not enough: lessons from the Vancouver injecting drug use study," published in *AIDS*;
- "Determinants of HIV seroconversion in injection drug users during a period of rising prevalence in Vancouver," published in the *International Journal of STD & AIDS*;
- "A Study of Risk Factors for HIV Infection among Vancouver's Injection Drug Using Community," a summary of the study results from the Point Project;
- "High Rates of HIV Infection among Injection Drug Users Participating in Needle Exchange Programs in Montreal: Results of a Cohort Study," published in the *American Journal of Epidemiology*;
- Draft op-ed by researchers from the University of British Columbia's Center for Excellence in HIV/AIDS and Montréal's Centre Hospitalier de l'Université de Montréal (**please do not distribute or cite this op-ed until we receive final approval**);
- Overview of the Vancouver BC CDC Site Visit by Seattle counterparts;
- Presentation Summary from "Developing A Washington Response to the Vancouver, BC IDU Seroprevalence Workgroup" held in March, 1998;
- Disease Prevention Fact Sheet on Needle Exchange from the Seattle-King County Department of Public Health;
- Copy of the Foundation's letter to Senator Patty Murray;
- "The crisis next door: HIV infection soars among needle-using drug addicts in Vancouver, BC, prompting alarm in Seattle that cases of the AIDS virus may skyrocket south of the border, too," *Seattle Times*, August 19, 1997.

FAST TRACK

Needle exchange is not enough: lessons from the Vancouver injecting drug use study

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Objective: To describe prevalence and incidence of HIV-1, hepatitis C virus (HCV) and risk behaviours in a prospective cohort of injecting drug users (IDU).

Setting: Vancouver, which introduced a needle exchange programme (NEP) in 1988, and currently exchanges over 2 million needles per year.

Design: IDU who had injected illicit drugs within the previous month were recruited through street outreach. At baseline and semi-annually, subjects underwent serology for HIV-1 and HCV, and questionnaires on demographics, behaviours, and NEP attendance were completed. Logistic regression analysis was used to identify determinants of HIV prevalence.

Results: Of 1006 IDU, 65% were men, and either white (65%) or Native (27%). Prevalence rates of HIV-1 and HCV were 23 and 88%, respectively. The majority (92%) had attended Vancouver's NEP, which was the most important syringe source for 78%. Identical proportions of known HIV-positive and HIV-negative IDU reported lending used syringes (40%). Of HIV-negative IDU, 39% borrowed used needles within the previous 6 months. Relative to HIV-negative IDU, HIV-positive IDU were more likely to frequently inject cocaine (72 versus 62%; $P < 0.001$). Independent predictors of HIV-positive serostatus were low education, unstable housing, commercial sex, borrowing needles, being an established IDU, injecting with others, and frequent NEP attendance. Based on 24 seroconversions among 257 follow-up visits, estimated HIV incidence was 18.6 per 100 person-years (95% confidence interval, 11.1–26.0).

Conclusions: Despite having the largest NEP in North America, Vancouver has been experiencing an ongoing HIV epidemic. Whereas NEP are crucial for sterile syringe provision, they should be considered one component of a comprehensive programme including counselling, support and education.

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Keywords: HIV-1, injecting drug users, incidence, prevalence, needle exchange, needle sharing, harm reduction

Introduction

Vancouver introduced a legal, free-standing needle exchange programme (NEP) and a street nurse pro-

gramme in 1988 and 1989, respectively [1,2]. At that time, the estimated HIV prevalence was 1–2% among the city's population of 6000–10 000 injecting drug users (IDU) [3]. Vancouver's NEP appears to be the

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largest in North America, having exchanged over 1 million needles per year since 1993, and 2.3 million in 1996. Until recently, NEP was considered to be a major factor accounting for Vancouver's low HIV prevalence rate [4]. In 1993, among 16 NEP in North America that were independently evaluated by the US Centers for Disease Control and Prevention, the Vancouver NEP ranked in the top three in terms of the number of syringes exchanged and returned, the estimated proportion of IDU reached, and number of client referrals to drug treatment and support services [5].

However, following an initial period of stable, low HIV prevalence, a rapid increase in HIV infection among IDU has been documented in Vancouver since September 1994. Surveillance of HIV testing data in the province of British Columbia indicated that the proportion of self-identified IDU testing HIV-seropositive rose from 2 to 7% in an 18-month period [6]. As a result, in October 1994 the street nurse programme was bolstered. In addition, centralized bulk purchase of syringes for all 14 NEP in British Columbia was undertaken by the provincial government, allowing NEP to provide syringes in sufficient numbers to meet client needs. Although sterile syringes are exempt from paraphernalia laws in Canada, deregulation of syringe sales in British Columbia pharmacies was undertaken in December 1995 to further expand syringe access to IDU.

An outbreak investigation was conducted in 1995, which found needle sharing and social determinants such as unstable housing to be independently associated with recent HIV seroconversion among Vancouver's IDU [6]. Concern regarding the potential for continued HIV transmission in Vancouver's IDU population prompted the initiation of a new cohort study in 1996. Herein, this study reported upon baseline prevalence of HIV and hepatitis C virus (HCV) and associated risk behaviours among 1006 IDU, as well as first estimates of HIV incidence.

Methods

Study sample

Beginning in May 1996, persons who had injected illegal drugs at least once in the previous month and resided in the Greater Vancouver region were recruited into the Vancouver IDU Study through self-referral and street outreach. Evidence of recent injecting drug use was required by inspection of needle tracks. Eligible subjects provided written informed consent. At the baseline visit and semi-annually thereafter, subjects provided blood samples for HIV and HCV antibody testing, and underwent an interviewer-administered questionnaire. HIV tests reactive on enzyme-linked

immunosorbent assay were confirmed by Western blot. Purified protein derivative (PPD) tuberculin skin testing was also performed at baseline. Subjects were reimbursed CDN\$ 20 for each study visit, at which time referrals were provided for universal medical care, HIV/AIDS care, available drug and alcohol treatment, and counselling.

Study instrument

The study instrument was developed from a questionnaire used in our previous case-control investigation [6,7]. Questionnaires were administered by trained interviewers, all of whom were blind to the HIV serostatus of participants. Questionnaire information pertained to risk behaviours and living conditions in the previous 6 months. Detailed information was collected on demographics, injecting and non-injecting drug use, borrowing and lending of needles and other paraphernalia, re-use of one's own needle, syringe disinfection, source of needles, access and barriers to clean needle use, attendance at two local NEP, incarceration, housing, self-reported frequency of HIV testing, drug treatment, methadone maintenance and other drug/alcohol programmes.

Since our previous investigation revealed that attendance at shooting galleries *per se* was not a common practice [7], respondents were asked whether they had injected in places where they 'generally did not know the people and there was injecting in groups'. Persons who reported injecting for the first time in the previous 2 years were considered new IDU; the remainder were considered established IDU. Sexual behaviour and condom use were assessed for regular, casual and sex trade partners of the same and opposite sexes. Finally, subjects were asked about a variety of mental and social issues, including an abbreviated seven-item version of the Center for Epidemiological Study Depression Scale (CES-D) [8], suicidal ideation, sexual abuse, and self-reported diagnosis of mental illness.

Statistical analysis

IDU who tested HIV-seropositive at enrolment were compared with those who tested HIV-negative using contingency table analysis for categorical variables, and the Wilcoxon rank-sum test for continuous variables. NEP attendance was considered as follows: (i) ever attending any NEP, and (ii) frequent versus less frequent attendance (i.e., more than once per week versus less frequently). The latter categorization was chosen following inspection of the distribution of self-reported attendance. As in previous analyses [6,7], unstable housing was defined as living primarily in a hotel, boarding room, hostel, transition house, jail or on the street in the previous 6 months. CES-D scores were summed, and scores above the 75th percentile were considered to represent elevated depression scores.

Independent predictors of HIV prevalence at baseline were assessed using unconditional logistic regression. Variables that were significant at the 5% level in univariate models were entered into multivariate models in a stepwise, hierarchical fashion. In the final model, all relevant two-way interactions were evaluated. HIV incidence was calculated based on the incidence density approach, in terms of person-years of observation. All 95% confidence intervals (CI) were calculated based on the Poisson distribution.

Results

By February 1997, 1006 eligible IDU had completed baseline interviews and provided blood specimens for HIV and HCV antibody testing. Baseline HIV preva-

lence was 23.2% (95% CI, 20.6–25.8), of whom 58% were previously aware of their HIV-positive serostatus. HCV serology was conducted on the first 500 participants only, among whom HCV prevalence was 88% (95% CI, 85.2–90.8). PPD skin test reactivity was 25%.

Among 257 subjects who tested HIV-negative at baseline and attended their first semi-annual follow-up visit, 24 seroconversions were confirmed among 129.4 person-years of observation, yielding an estimated HIV incidence of 18.6 per 100 person-years (95% CI, 11.1–26.0). As of 28 February 1997, the overall follow-up rate among those who were eligible to return was 83%. Subjects eligible for follow-up who had not yet returned did not differ from those who had returned with respect to gender, ethnicity, frequency of injection, types of drugs used, or frequency of NEP attendance; however, they were significantly younger ($P = 0.01$).

Table 1. Comparison of HIV-positive and HIV-negative injecting drug users (IDU) at baseline in the Vancouver IDU Study ($n = 1006$).

Variable*	n (%)†		Total	P‡
	HIV-positive subjects (n = 233)	HIV-negative subjects (n = 773)		
Sex				
Male	135 (58)	518 (67)	653 (65)	0.02
Female	96 (42)	257 (33)	353 (35)	
Sociodemographics				
Median (range) age (years)	34 (16–55)	35 (14–58)	35 (16–58)	0.64
Ethnicity				0.01
White	139 (60)	518 (67)	657 (65)	
Native	80 (34)	192 (25)	272 (27)	
Other	14 (6)	63 (8)	77 (8)	
Unstable housing	165 (72)	454 (59)	619 (62)	0.001
Education (< high school)	201 (86)	617 (80)	818 (81)	0.03
Incarceration	78 (33)	241 (31)	319 (32)	0.51
High depression score	70 (30)	208 (27)	278 (28)	0.35
Homo-/bisexual activity (men only)	36 (27)	109 (21)	145 (22)	0.20
Non-consensual sex ever	99 (44)	270 (36)	369 (37)	0.03
IDU sex partner	74 (32)	236 (30)	310 (31)	0.72
Been paid for sex	74 (32)	161 (21)	235 (23)	< 0.001
Drug-using behaviours				
Median (range) age at first injection	19 (7–51)	18 (9–51)	18 (7–51)	0.73
Main drug injected				< 0.001
Cocaine	167 (72)	470 (62)	637 (64)	
Heroin	34 (15)	213 (28)	247 (25)	
Speedball	32 (14)	81 (11)	113 (11)	
Injecting with others	178 (76)	512 (67)	690 (69)	0.005
Established IDU (> 2 years)	213 (91)	628 (81)	841 (84)	< 0.001
Attend NEP (ever)	218 (96)	691 (91)	909 (92)	0.01
Frequent NEP attendance (more than once per week)	189 (81)	544 (71)	733 (73)	0.002
NEP most frequent source of syringes	186 (80)	591 (77)	777 (78)	0.33
Obtained syringes from pharmacy	112 (48)	364 (47)	476 (47)	0.79
Cited any difficulties obtaining sterile syringes	64 (28)	176 (23)	240 (24)	0.35
Cited difficulties purchasing syringes from pharmacies	55 (32)	169 (31)	224 (31)	0.70
Borrowed used needles (ever)	175 (76)	509 (67)	684 (69)	0.007
Borrowed used needles	95 (41)	304 (39)	399 (40)	0.69
Lent used needles	88 (39)	293 (40)	381 (40)	0.89
Consistent bleach use‡	10 (11)	76 (25)	86 (22)	0.003
Methadone maintenance (ever)	45 (19)	138 (18)	183 (18)	0.61
Current methadone maintenance	34 (15)	84 (11)	118 (12)	0.12

*Unless otherwise stated, behaviours refer to previous 6 months. †Unless otherwise indicated. ‡Based on χ^2 tests. §Restricted to 381 IDU who reported borrowing used needles. NEP, Needle exchange programme.

Table 2. Final multivariate logistic regression model of predictors of HIV-positive serostatus at baseline among injecting drug users (IDU) in Vancouver.

Variable	Adjusted odds ratio (95% CI)	P
Unstable housing*	1.61 (1.15–2.98)	0.005
Education (< high school)	1.79 (1.14–2.82)	0.006
Commercial sex*	1.66 (1.18–2.35)	0.008
Ever used borrowed needles	1.49 (1.04–2.14)	0.03
Inject with others*	1.62 (1.13–2.32)	0.008
Established injector†	2.24 (1.34–3.74)	0.002
Frequent NEP* attendance (more than once per week)	1.68 (1.13–2.5)	0.011

*Based on previous 6 months. †First injection >2 years previously. NEP, Needle exchange programme.

Demographic and behavioural characteristics at baseline for the 1006 IDU are shown in Table 1. Of these, the majority were men (65%); however, subjects testing HIV-positive at baseline were more likely to be women ($P = 0.02$). Although most subjects were white (65%), HIV-positive subjects were disproportionately of Native origin. HIV-positive subjects were significantly more likely to have less than a high school education, unstable housing, and to reside in a downtown Vancouver neighbourhood, which is the poorest postal district in Canada.

With respect to drug use, the most frequently injected drug was cocaine, which was more common among HIV-positive IDU ($P < 0.001$; Table 1). Relative to HIV-negative IDU, HIV-positive IDU were significantly more likely to be established IDU, were more likely to report engaging in commercial sex work, and

were more likely to inject with others. The proportions of HIV-positive and HIV-negative IDU who reported lending and borrowing used needles in the previous 6 months were nearly identical, regardless of self-reported HIV serostatus. Almost one-half (45%) reported sharing other injection paraphernalia.

HIV-positive IDU were more likely to have ever attended NEP, and to attend NEP on a more regular basis, compared with HIV-negative IDU. However, there were no differences between these groups with respect to self-reported barriers in accessing sterile injection equipment, or difficulties purchasing syringes from pharmacies. Almost one-half of HIV-positive and HIV-negative IDU reported purchasing syringes from pharmacies in the previous 6 months. Despite widespread needle availability, however, subjects reported re-using their own needle a median of three times [interquartile range (IQR), 2–4]. A conservative estimate of injection frequency based on regular drug use patterns was 2.5 injections per day (IQR, 1–6). There were no differences between HIV-positive and HIV-negative IDU in terms of current or previous enrolment in methadone maintenance or other drug/alcohol programmes, or difficulties accessing drug treatment.

Multiple logistic regression was conducted in a hierarchical stepwise fashion to identify independent predictors of HIV-positive serostatus (Table 2). In the final model, sociodemographic variables that remained significantly associated with HIV-positive serostatus were unstable housing and low education. In examining

Table 3. Profile of documented seroconverting injecting drug users (IDU) observed in the Vancouver Injection Drug User Study*.

	Sex	Age (years)	Race	New IDU†	Main source of syringes	Difficulty accessing syringes	Drug of choice	Shared injection equipment	Housing
1	Male	48	White	No	NEP	No	Methadone	Yes	Unstable
2	Female	46	Native	No	NEP	No	Heroin	Yes	Unstable
3	Male	36	Native	No	NEP	No	Cocaine	Yes	Unstable
4	Female	43	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
5	Female	44	White	No	NEP	No	Cocaine/heroin	No	Unstable
6	Male	40	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
7	Male	46	White	No	NEP	Yes	Cocaine/heroin	No	Unstable
8	Male	35	Native	No	NEP	No	Cocaine	Yes	Unstable
9	Male	21	White	Yes	NEP	No	Cocaine/heroin	Yes	Unstable
10	Female	42	White	Yes	NEP	Sometimes	Cocaine/heroin	Yes	Stable
11	Male	43	White	No	NEP	Yes	Heroin/speedball	Yes	Unstable
12	Female	35	Native	No	NEP	No	Cocaine	Yes	Unstable
13	Male	43	White	No	NEP	No	Cocaine	No	Unstable
14	Male	27	White	Yes	Pharmacy	No	Cocaine/speedball	Yes	Unstable
15	Male	29	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
16	Female	40	White	No	NEP	No	Heroin	No	Unstable
17	Female	43	White	Yes	NEP	No	Cocaine	Yes	Unstable
18	Male	32	White	No	NEP	Sometimes	Cocaine	No	Unstable
19	Male	36	Native	No	NEP	No	Heroin/speedball	Yes	Unstable
20	Male	26	Asian	No	NEP	No	Cocaine/heroin	No	Stable
21	Male	32	White	No	NEP	Sometimes	Cocaine	No	Unstable
22	Female	48	White	No	NEP	No	Heroin/speedball	Yes	Unstable
23	Female	31	Native	No	NEP	No	Cocaine/heroin	Yes	Unstable
24	Male	22	Native	No	NEP	No	Cocaine/heroin	Yes	Unstable

*Characteristics refer to the seroconversion interval (i.e., period between baseline HIV-negative test and first HIV-positive test at follow-up).

†Injected for the first time in previous 2 years. NEP, Needle exchange programme.

behavioural variables, commercial sex work, borrowing used needles, injecting with others, being an established IDU, and attending NEP more than once per week were all independently associated with HIV-positive serostatus. These associations were unchanged after adjusting for age, gender, frequency of injecting, main drug injected or other factors. No significant two-way interactions were observed. The likelihood ratio statistic, which tests the global null hypothesis that the coefficients are not significantly different from zero, was highly significant ($P < 0.001$), providing support for adequate goodness of fit.

Although the limited number of HIV seroconversions observed to date precluded a formal statistical analysis, a profile of sociodemographic and behavioural characteristics was generated, based on the period between the last negative HIV test at baseline, and first positive HIV test at follow-up (denoted seroconversion interval; Table 3). Of the 24 seroconverters identified to date, similarities were noted relative to the overall cohort in terms of the proportions who were women, those who were Native, those who were established IDU, and those who most commonly injected cocaine. All but two individuals reported unstable housing, residing primarily in single room occupancy hotels in Vancouver. Only three reported commercial sex work during the seroconversion interval. It is particularly striking that 23 of the 24 seroconverters reported NEP as their most frequent source of sterile syringes, and only five reported having any difficulty accessing sterile syringes.

Discussion

In our prospective study of more than 1000 IDU in Vancouver, baseline prevalence rates of HIV and HCV were very high, at 23 and 88%, respectively. After 8 months of follow-up, our preliminary estimate of HIV incidence was 18.6 per 100 person-years. Such an estimate could have been biased upward by selective return for follow-up of those at highest risk of HIV seroconversion; however, differences in baseline risk behaviour between subjects who did and did not return for follow-up when eligible were not found. The estimate could also have been inflated if individuals who suspected they had become HIV-infected selectively returned for follow-up.

To address these possible biases, the incidence calculation was repeated under a best case scenario, assuming all eligible persons who had not returned would have tested HIV-negative at their 6-month follow-up visit. Even under this optimal scenario, the HIV incidence was 16.5 per 100 person-years (95% CI, 9.9–23.2). Although these incidence estimates were based on small

numbers, even the lower bound of the lowest possible 95% CI (9.9%) was much higher than that observed among prospective IDU studies in Baltimore, Montreal, Amsterdam and New York [9–12]. It was concluded that these preliminary results were entirely consistent with an ongoing and serious outbreak of HIV infection among IDU in Vancouver [6].

Also of great concern in our study was the high level of reported needle-sharing behaviours. The proportions of IDU who reported borrowing and lending used needles were similar to those observed in our 1995 case-control investigation, which was based on the same target population [6,7]. At baseline in the present study, the proportion of HIV-positive IDU who reported lending used needles was nearly identical to that of HIV-negative IDU, regardless of self-reported HIV serostatus. This suggests that little, if any, behaviour change occurred among individuals in our sample who had received an HIV-positive test result. As in our previous study [7], consistent use of bleach among IDU borrowing used needles was low, and sharing of other injection paraphernalia was common.

Our data are particularly disturbing in light of two facts: first, Vancouver has the highest volume NEP in North America; second, HIV prevalence among this city's IDU population was relatively low until recent years. The fact that sharing of injection equipment is normative, and HIV prevalence and incidence are high in a community where there is an established and remarkably active NEP is alarming. A vast body of literature has suggested that NEP are associated with reduced incidence of HIV and HCV and do not lead to increased drug use [5,12–15]. Several studies have also shown NEP to be associated with decreased needle borrowing [9,12,15]. In cities where NEP is part of a comprehensive programme that includes HIV testing, counselling, education and drug treatment options, HIV incidence and associated risk behaviours have declined significantly over time [9,16,17]. Provided that services are available and IDU are willing, NEP can act as a stepping stone to addictions treatment, which can serve as the ultimate prevention if IDU choose to cease injecting.

In Vancouver, NEP was introduced early, but access to drug and alcohol treatment, methadone maintenance and counselling services remains inadequate. As early as 1990, the lack of appropriate services for addictions treatment in British Columbia, especially for cocaine users, was identified as a major barrier encountered by Vancouver's NEP attenders, among whom there was already a marked demand for HIV-related counselling [1]. This situation continues at present [6]. Our results do not argue against the overall effectiveness of NEP as an HIV intervention, but rather, they lead us to propose that without adequate and appropriate community-wide

interventions such as addiction treatment, detoxification and counselling, stand-alone NEP may be insufficient to maintain low HIV prevalence and incidence for an indefinite period. Our study, and recent findings of higher HIV incidence among Montreal's NEP attenders compared with non- or infrequent attenders [10], strongly suggest that the concept of harm reduction requires a broader perspective beyond NEP alone [14,17,18]. Support for this was provided from Amsterdam, where a continuum of harm-reduction activities was associated with lower HIV incidence and needle-sharing behaviours, but there was no evidence of a protective effect for single interventions such as NEP or methadone maintenance [9].

Why is it that Vancouver is experiencing an ongoing HIV outbreak despite a high volume NEP and pharmacy access? Although it is too early to draw inferences from our seroconversion data, some clues arise from our analysis of determinants of HIV-positive serostatus at baseline. Like other studies, our study found that factors such as borrowing needles [6,9,10,19-21] and injecting with others [20] were associated with HIV prevalence. It was also found that established IDU were more likely to be HIV-infected relative to new IDU, although this may have been a reflection of duration of exposure. Although cocaine injection *per se* did not appear as an independent risk factor, it is noteworthy that cocaine was more likely to be the drug of choice among HIV-positive IDU. Other studies have reported an elevated risk of HIV seroconversion associated with cocaine injection [22,23]. Indeed, a shift from heroin use to increasing dependence on cocaine may be an important factor in Vancouver's escalating HIV prevalence and incidence, since cocaine is commonly associated with more frequent injections [22]. If the conservative estimate of 2.5 injections per day in our cohort may be generalized to the city's estimated IDU population of 6000-10 000, approximately 5-10 million needles per year would be needed to meet the ideal scenario of 'one-set one-shot'. Whether it is realistic to expect, even with expanded pharmacy access, that this goal can be achieved in cities where cocaine is the drug of choice, remains to be determined. Finally, since commercial sex work was also independently related to HIV prevalence, it may be that sexual transmission plays an important role.

In the midst of an ongoing HIV outbreak, it is important not to overlook social and contextual factors that may be directly or indirectly related to HIV transmission [24-26]. As previously found in this setting [6], unstable housing was independently associated with HIV-positive serostatus. The predominance of single-room occupancy hotel rooms, which have been reported to serve as shooting galleries in Vancouver's poorest neighbourhood, may contribute to needle sharing [6]. Risks associated with less secure injecting

locations have also been noted by others [18,27]. The hypothesis that specific social networks of IDU may be risk factors for HIV seroconversion, possibly as a result of mixing between HIV-negative individuals and those who are newly infected and have high viral loads, is also currently being explored. Ethnographic research is needed in the study of social networks to complement existing quantitative data.

Our study was not intended to evaluate the effectiveness of NEP, since the majority of subjects attended NEP at least once, and there were no estimates of HIV incidence among IDU in Vancouver prior to the introduction of NEP in 1988. In fact, without the presence of an active NEP that was implemented early, HIV incidence among IDU in Vancouver may have been much higher, much earlier. The fact that frequent NEP attendance was independently associated with HIV prevalence should not be interpreted as causal, because risk behaviours and exposure to HIV interventions could have changed following an HIV-positive diagnosis. In addition, NEP attendance was self-reported; validation of self-reports through record linkage with NEP's administrative databases will improve attempts to correlate NEP attendance with HIV incidence. Finally, it has been suggested that NEP attract higher risk IDU [10,28-31]. NEP could thus be associated with HIV infection, even in multivariate models, if residual confounding persists.

If NEP attract higher risk IDU, then an appropriate public health response should be to capitalize on this window of opportunity by using NEP as a vehicle to change social norms surrounding needle sharing. From this perspective, it is crucial that NEP be maintained as a cornerstone in HIV prevention. Appropriate education, counselling and treatment options should be implemented simultaneously with the introduction of NEP. Allocation of adequate resources is required to allow NEP and other community agencies to enhance services other than the sole provision of needles. The present data have suggested that even in cities with sustained low HIV prevalence, outbreaks of HIV can occur. Long-term evaluation of NEP is therefore necessary to allow HIV prevention activities to adapt to changes in the local environment. If the effectiveness of NEP diminish over time, as others have found [29], other complementary strategies will be needed to be bolstered to reduce HIV transmission among IDU populations.

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ORIGINAL ARTICLE

Determinants of HIV seroconversion in injection drug users during a period of rising prevalence in Vancouver

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Summary: To identify determinants of HIV seroconversion among injection drug users (IDUs) during a period of rising prevalence, a case-control investigation was conducted. Cases were IDUs with a new positive test after 1 January 1994, and a negative test within the prior 18 months. Controls required 2 negative tests during the same period. Subjects completed a questionnaire on demographic, psychosocial, and behavioural factors.

Eighty-nine cases and 192 controls were similar with respect to gender, age, ethnicity and inter-test interval. Multivariate analyses of events during the inter-test interval showed borrowing syringes (adj. OR=2.96; $P<0.006$), unstable housing (adj. OR=2.01; $P=0.03$) and injecting ≥ 4 times daily (adj. OR=1.71; $P=0.06$) to be independently associated with seroconversion. Protective associations were demonstrated for sex with opposite gender (adj. OR=0.36; $P=0.001$) and tetrahydrocannabinol use (adj. OR=0.41; $P=0.001$).

There is a need to evaluate programmes dealing with addiction, housing and the social underpinnings of risk behaviours in this population.

Keywords: Drug users, behaviour, epidemiology, HIV infection, seroconversion

INTRODUCTION

HIV infection among IDUs has shown an alarming potential for rapid spread through the sharing of syringes and other drug-using paraphernalia and through associated sexual activity^{1,2}. Yet several cities where needle exchange programmes (NEPs) and educational outreach were introduced at a time of low HIV prevalence have shown little subsequent spread of the virus among drug users³. Such programmes were introduced in Vancouver in 1988-89, when seroprevalence among IDUs reporting for testing was 1-2%⁴⁻⁶. Therefore, it was with grave concern that rapid increases in the

numbers and proportions of IDUs testing HIV positive were indicated by laboratory surveillance in British Columbia from 1993-1995⁷. During that period, an observational cohort of Vancouver IDUs indicated an incidence rate of 5.3%⁸. In 1995, 333 IDUs tested newly positive for HIV and despite an increased volume of testing, prevalence among IDUs voluntarily testing for HIV rose to 7%⁹. In response, street outreach and needle exchange services were bolstered. We report upon a case-control investigation aimed at clarifying the social and behavioural determinants of recent HIV seroconversion in this setting.

METHODS

A case-control investigation took place from 1 April 1995 to 31 August 1995, in Vancouver, British Columbia.

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Study subjects

Eligible cases were IDUs who had a documented reactive ELISA test for HIV confirmed by Western blot after 1 January 1994, and a documented negative HIV test within the 18-month period preceding the first reactive test. Controls were IDUs who had 2 documented negative tests for HIV in the same period. Eligible subjects were required to have reported use of injection drugs during the period between their 2 HIV tests (denoted inter-test interval).

Subjects were recruited from the city of Vancouver and surrounding municipalities. To protect confidentiality, subjects were not directly contacted from the HIV laboratory. Recruitment occurred through referral by health care providers, community outreach, self-referral and word of mouth. During the study period, nurses at British Columbia's non-nominal HIV surveillance unit called physicians who submitted tests from IDUs to prompt referral. All subjects met with one study coordinator who explained procedures, sought informed consent, confirmed eligibility criteria and kept a descriptive log including full name, date of birth and a detailed physical description that served to eliminate the possibility of repeat interviews for one individual.

Study instrument

A structured questionnaire was developed and piloted during a preliminary qualitative study⁹. The study instrument included sections on current demographics and focused on events and behaviour that took place during the inter-test interval. Questions dealt with sexual behaviour, injection and non-injection drug use, syringe borrowing and lending, history of incarceration and nonconsensual sex, access to clean needles, barriers to clean needle use and attendance at a needle exchange. An abbreviated version of the Center for Epidemiologic Study Depression Scale (CES-D) was used¹⁰. Interviewers were blinded to the HIV status of subjects. Those who completed the 45 min questionnaire were compensated \$20 CDN for their time.

Data and statistical management

For the purpose of this analysis, 'unstable housing' was defined as living in a one room downtown hotel, boarding house, house-keeping room, jail or living on the street. 'Syringe borrowing' was defined as using a syringe that someone else has already used. 'Shooting galleries' were defined as sites at which people inject in groups including strangers. 'Binging' was referred to as a pattern where an IDU injects much more frequently than usual and then returns to regular use.

Data analyses were conducted using SAS (Cary, NC) software. Frequencies, odds ratios (OR) and 95% confidence intervals (CI) were calculated.

Distributions of categorical variables were compared using Chi-square or Fisher's exact tests; continuous variables using Student *t*-test. Stratified analyses were conducted to explore the association of potential confounders using the Mantel-Haenszel Chi-square test. The level of significance was set at 0.05.

Variables found to be significant on univariate analysis were first examined in bivariate models which assessed collinear relationships and interactions. Variables which were most predictive of HIV serostatus were then entered into a stepwise multivariate logistic regression model. Unconditional logistic regression was used because this was an unmatched case-control design. Potential interactions between these variables were examined. The Breslow-Day test for homogeneity of the odds ratio was applied to determine if it was valid to collapse summary odds ratios across gender.

RESULTS

Demographics

The number of IDUs in Vancouver is not accurately known but has been independently estimated at 6000-10,000 by police, needle exchange and street outreach services. In the 12-month period encompassing the study, 5997 HIV antibody tests were performed for people self-identifying as IDU of which 396 (6.6%) were reactive.

Of 288 individuals attending for interview, 4 did not complete because of inebriation or violent behaviour and 3 were subsequently determined not to meet all eligibility criteria and were hence excluded. Eighty-nine eligible cases and 192 eligible controls completed the interview and were comparable with respect to gender identity, age, country of birth, ethnicity, education and mean length of the inter-test interval (Table 1). Thirty-seven per cent of cases and 31% of controls were of aboriginal descent ($P=0.61$). The mean time living in Vancouver was 112 months for cases and 125 months for controls ($P=0.44$).

Cases started injection at an older age ($P=0.02$) and had been injecting for a shorter duration than controls ($P=0.30$). All but 4 subjects had used one of 2 local needle exchange programmes at least once. Seventy-six per cent of cases and 74% of controls reported no difficulty with currently obtaining clean needles ($P=0.79$).

Drug using behaviour during the inter-test interval

As expected, syringe borrowing was reported more frequently among cases than controls (OR=2.57; 95%CI: 1.47, 4.49) (Tables 2 and 3). This association was stronger for males (OR=4.04; 95%CI: 1.94, 8.40) than for females (OR=1.24; 95%CI: 0.50, 3.08). Cases were also more likely to report sharing with a known HIV-positive partner (OR=4.11; 95%CI: 1.92, 8.88).

Table 1. Demographics and past history of drug use

	Cases (%) n=89	Controls (%) n=192	P
Gender identity			
Male	60 (67)	129 (67)	0.85*
Female	28 (32)	62 (32)	
Transgender	1 (1)	1 (1)	
Age in years			
Mean	35	35	0.56†
Range	20-55	20-55	
Born in Canada	84 (95)	177 (92)	0.52*
Ethnicity			
White	41 (46)	99 (52)	0.61*
Aboriginal**	33 (37)	60 (31)	
Other ethnicity	15 (17)	33 (17)	
Inter-test interval†† in months			
Mean	6.2	6.4	0.55†
Mean time living in Vancouver (months)	112	125	0.44†
History of drug use			
Mean age of first injection (years)	21.2	19.2	0.02*
Mean duration of injection (years)	12.1	13.2	0.30†
Ever used local needle exchange	89 (100)	188 (98)	0.31†
No difficulty in getting clean needles‡	65 (76)	140 (74)	0.79*

*By Chi-square test

†By Student *t*-test

‡By Fisher's exact test

**Native Indian, Metis or Inuit

††The time interval between 2 HIV tests (see *Methods*)

‡Based on 86 responses from cases and 189 from controls

There were no significant differences between cases and controls with regard to the frequencies with which other drug-using paraphernalia such as cookers, filters and rinse water were shared (all $P > 0.3$), the average number of people present during an episode of injection ($P = 0.60$), the frequency of needle cleaning practices ($P = 0.42$) and the use of full-strength bleach ($P = 0.35$). Self-reported use of shooting galleries was infrequent among cases and controls (25% vs 32% respectively, OR=0.71; 95%CI: 0.38, 1.29). Cases and controls reported re-using syringes a mean of 4.4 and 4.5 times respectively ($P = 0.77$). Injection of any substance 4 or more times per day was associated with seroconversion (OR=1.83; 95%CI: 1.10, 3.03).

On univariate analysis, there was an association between frequency of use of a needle exchange during the inter-test interval and a greater likelihood of seroconversion ($P = 0.02$) (Table 2). The frequency of cocaine injection was associated with seroconversion ($P = 0.01$). The exposure odds ratio associated with injecting cocaine 4 or more times daily was 2.35. When analysis was stratified by gender, this association remained important for women ($P = 0.05$) but less so for men ($P = 0.08$). Injection cocaine use was itself associated with sex with someone of the opposite sex ($P = 0.03$), unstable housing ($P = 0.01$) and borrowing syringes from others ($P = 0.01$). Injections of other substances such as heroin, speedballs (simultaneous injection of heroin and cocaine), methadone, amphetamines,

talwin and ritalin (pentazocine/methylphenidate), tranquillizers, barbiturates and steroid hormones were not significantly associated with seroconversion.

Reported use of a variety of non-injected substances however, was inversely associated with seroconversion (Tables 2 and 3). Stratified by gender, this remained true of alcohol and tetrahydrocannabinol (THC) for women and THC, nasal cocaine and benzodiazepines for men. THC use was marginally associated with fewer bingeing episodes of cocaine use ($P = 0.07$).

Sexual behaviour during the inter-test interval

Both male and female cases were less likely to report sex with an opposite sex partner than controls (Table 4). The same was observed for reports of vaginal sex during the inter-test interval. Reporting of oral or anal sex with opposite sex partners during that time period was not significantly associated with seroconversion in this sample. Although both male and female cases were more likely to report having a regular opposite sex partner who was HIV positive during the inter-test interval, the association was statistically significant only for men (OR=4.10; 95%CI: 1.35, 12.50). Twenty-three men reported same sex partnering but oral or penetrative sex with someone of the same gender during the inter-test

Table 2. Self-reported behaviour and psychosocial factors during the inter-test interval

	Cases (%) n=89	Controls (%) n=192	P
Injection drug using behaviour			
Borrowing syringes	68 (70)	107 (56)	<0.01*
Borrowing syringe from HIV positive	23 (26)	15 (7.8)	<0.01*
Attending shooting gallery	22 (25)	61 (32)	0.23*
Frequency of needle exchange use			
Monthly or less	12 (14)	55 (29)	
1-4 x monthly	19 (21)	36 (19)	0.02*
Daily to weekly	58 (65)	101 (52)	
Frequency of cocaine injection			
None	14 (16)	49 (26)	
Less than daily	17 (19)	43 (22)	
1-3 x a day	15 (17)	36 (19)	0.01*
> 3 x daily	43 (48)	64 (33)	
Inject cocaine regularly	75 (84)	144 (75)	0.08*
Inject heroin regularly	53 (60)	123 (64)	0.47*
Inject 'speedballs' regularly	35 (39)	85 (44)	0.44*
Frequency of injection ≥ 4 x daily	49 (55)	77 (40)	0.02*
Use of non-injected drugs			
Alcohol	50 (56)	134 (70)	0.03*
THC	39 (44)	128 (67)	<0.01*
Nasal cocaine/crack	23 (26)	96 (50)	<0.01*
Speed/ecstasy	3 (3)	28 (15)	0.01*
Valium	41 (46)	124 (65)	<0.01*
Any non-injection drug use	77 (86)	186 (97)	<0.01*
Psychosocial factors			
Unstable housing	71 (80)	120 (62)	<0.01*
Attempted suicide [‡]	34 (38)	77 (40)	0.74*
Medical diagnosis of mental illness [‡]	13 (15)	34 (19)	0.50*

*By Chi-square test

*By Chi-square for trend test

‡At any time up to the end of the inter-test interval

interval was not associated with seroconversion for men ($P=0.74$).

Fifty-six women (62%) reported trading sex for money or drugs. Among these women, the mean number of weekly partners was 37.2 for cases and 24.9 for controls ($P=0.02$). Only 3 male cases and 5 controls reported trading sex for money or drugs. Eighteen per cent of cases and 12% of controls reported a history of ever having a sexually transmitted disease (STD) ($P=0.20$). There was no significant difference in the self-reporting of individual STDs including non-gonococcal urethritis, gonorrhoea, chlamydia, herpes, warts, syphilis, cervicitis and pelvic inflammatory disease (all $P>0.5$).

Psychosocial factors during the inter-test interval

Cases were significantly more likely than controls to report unstable housing arrangements during the inter-test interval (OR=2.37; 95%CI: 1.32, 4.25) (Table 3). While 48% of cases and 41% of controls spent at least one night in prison or jail during the inter-test interval, self reported drug use, needle sharing and sexual activity in prison were too infrequently reported to allow for a meaningful analysis. Forty-four per cent of cases and 41% of

controls had some non-legal source of income (OR=1.12; 95%CI: 0.65, 1.91).

Overall and stratified by gender, there were no significant differences between cases and controls in the reported diagnosis of mental illness, attempted suicide, accidental overdose, and non-consensual sex prior to the date of the second qualifying HIV test (all $P>0.5$). There was also no difference in the depression score derived from recalling symptoms from the inter-test interval ($P=0.52$).

Other medical illness

A self-reported diagnosis of several other infectious complications of IDU during the inter-test interval was associated with seroconversion (data not shown). Pyogenic complications (endocarditis, cellulitis, abscess) ($P=0.04$), hepatitis B ($P=0.05$) and hepatitis A ($P=0.04$) were all more frequently reported by cases.

Logistic regression

The Breslow-Day test for homogeneity of the odds ratios indicated that odds ratios were the same across gender except in the case of needle sharing,

Table 3. Univariate odds ratios (OR) associated with HIV seroconversion during the inter-test interval

	Men OR (95%CI)	Women OR (95%CI)	All OR (95%CI)
Injection drug using behaviour			
Borrowing syringes	4.04 (1.94,8.40)	1.24 (0.50,3.08)	2.57 (1.47,4.49)
Borrowing syringe from HIV-positive person	4.08 (1.70,9.92)	4.00 (0.75,23.23)	4.11 (1.92,8.88)
Shooting gallery use	0.70 (0.34,1.46)	0.68 (0.21,2.17)	0.71 (0.38,1.29)
Frequency of injection $\geq 4 \times$ daily	1.75 (0.94,3.28)	2.40 (0.90,6.41)	1.83 (1.10,3.03)
Use of non-injection drugs			
Alcohol	0.73 (0.35,1.51)	0.28 (0.10,0.81)	0.55 (0.32,0.96)
THC	0.47 (0.25,0.89)	0.20 (0.06,0.63)	0.39 (0.23,0.67)
Nasal cocaine/crack	0.31 (0.16,0.60)	0.44 (0.15,1.26)	0.35 (0.19,0.63)
Speed/ecstasy	0.19 (0.05,0.71)	0.25 (0.01,2.20)	0.20 (0.05,0.73)
Valium	0.45 (0.24,0.84)	0.76 (0.28,2.05)	0.47 (0.27,0.81)
Any non-injection drug use	0.10 (0.03,0.40)	0.41 (0.10,1.17)	0.21 (0.08,0.53)
Psychosocial factors			
Unstable housing*	1.90 (0.92,3.94)	3.55 (1.30,9.69)	2.37 (1.32,4.25)
One night or more in prison	1.54 (0.80,2.98)	1.07 (0.39,2.88)	1.34 (0.78,2.29)
Non-legal income	1.19 (0.62,2.30)	0.98 (0.31,3.04)	1.12 (0.65,1.91)

*A 'downtown hotel', boarding house, house-keeping room, jail or living on the street

CI=confidence interval; THC=tetrahydrocannabinol

where the odds ratio for men was significantly higher than that for women ($P=0.048$). Adjusted odds ratios are depicted in Table 5. Overall, needle sharing (AOR=2.33; $P=0.006$), reporting a regular sex partner of the opposite sex (AOR=0.36, $P=0.001$), unstable housing (AOR=2.01; $P=0.03$) and THC use (AOR=0.41; $P=0.001$) remained independently associated with seroconversion.

Table 4. Frequency of sexual factors and associated univariate odds ratios (OR) for HIV seroconversion during the inter-test interval

	Men			Women		
	Cases (%) n=61	Controls (%) n=129	OR (95%CI)	Cases (%) n=28	Controls (%) n=63	OR (95%CI)
Sex with opposite sex partner	30 (49)	91 (70)	0.40 (0.22,0.75)	22 (79)	59 (94)	0.25 (0.05,1.13)
Regular partner of the opposite sex	18 (30)	54 (42)	0.58 (0.30,1.11)	11 (39)	39 (62)	0.40 (0.14,1.09)
Vaginal sex	28 (46)	91 (71)	0.35 (0.19,0.68)	19 (68)	58 (92)	0.18 (0.05,0.65)
Oral with opposite sex partner	24 (39)	66 (51)	0.62 (0.31,1.23)	20 (71)	52 (83)	0.53 (0.14,2.04)
Anal sex with opposite sex partner	7 (11)	9 (7)	1.73 (0.42,7.05)	4 (14)	11 (17)	0.79 (0.19,3.08)
Sex with an HIV-positive person	10 (17)	6 (5)	4.10 (1.35,12.50)	2 (7)	3 (5)	1.54 (0.17,12.33)
Same sex partner	8 (13)	15 (12)	1.15 (0.42,3.11)	2 (7)	9 (14)	0.46 (0.06,2.56)
Non-consensual sex	16 (26)	36 (28)	0.92 (0.44,1.93)	21 (75)	47 (75)	1.02 (0.33,3.23)

CI=confidence interval

Table 5. Final model from multivariate logistic regression

	AOR (95%CI)	P
Borrowing syringes	2.33 (1.27,4.26)	0.006
Sex with opposite gender	0.36 (0.20,0.65)	0.001
Unstable housing ^a	2.01 (1.07,3.77)	0.031
THC use	0.41 (0.24,0.70)	0.001
Frequency of injection $\geq 4 \times$ daily	1.71 (0.97,3.01)	0.062

AOR=Adjusted odds ratio; CI=confidence interval; THC=tetrahydrocannabinol

^aA 'downtown hotel', boarding house, house-keeping room, jail or living on the street

The Breslow-Day test for homogeneity of the odds ratios failed to reject the null hypothesis that odds ratios are homogeneous across gender except in the case of borrowing syringes ($P=0.048$). The model includes all 281 subjects

Injecting 4 or more times daily achieved border line significance when forced into the model (AOR=1.71; $P=0.06$). Interaction terms utilizing the above 5 variables in various combinations were not significant in the model. After controlling for gender, there were no significant changes in the magnitude or significance of adjusted odds ratios resulting from the model.

DISCUSSION

HIV continues to spread among drug users in Vancouver and other Canadian cities^{11,12}. Borrowing syringes remains common¹³ and is the single most significant behaviour associated with seroconversion among IDUs¹⁴⁻¹⁶. That needle sharing should contribute to HIV seroconversion in Vancouver despite considerable efforts by the community⁴ and public health system⁵ requires explanation. The Vancouver Needle Exchange may be North America's highest volume service with 1.2 million and 1.8 million needles exchanged during 1994 and 1995 respectively (statistics from the Downtown Eastside Youth Activities Society NEP). This NEP has ranked highly against others with respect to the estimated proportion of IDUs reached and the number of syringes exchanged¹⁷. In our investigation, most study subjects reported ease in accessing needles. It was of note however, that needles were reused approximately 4.5 times by both cases and controls in this study. This may indicate that despite perceptions of sufficient availability among users, syringe supply was still not adequate for one syringe to be used once only during the inter-test interval. However, since there was no significant difference in the frequency of syringe reuse between cases and controls, factors other than accessibility of clean syringes must be sought to explain an increase in the rate of

seroconversion. Ethnographic studies which endeavour to explain why known risks are ignored among some IDUs will be crucial to planning revised control strategies.

This study demonstrated a protective association between the use of a variety of non-injected substances and seroconversion among IDUs. This may at first seem counterintuitive, especially since the use of some drugs has been associated with an increase in high-risk sexual behaviour¹⁸. Yet IDUs who use drugs by other routes may conceivably inject less often. In this study, users who also used non-injection drugs were less likely to be frequent injectors (OR=0.21; 95%CI: 0.06, 0.71) and injecting 4 or more times daily was independently associated with seroconversion (AOR=1.71, $P=0.06$). Users of THC in this study were less likely to report bingeing episodes of cocaine use. Such associations require study among IDUs who do not routinely access voluntary HIV testing. If they prove reproducible, it would be worthwhile evaluating the medical delivery of non-injectable substances to help users gain better control over their addiction while reducing harm from injection. While many North American programmes have provided limited delivery of methadone, other programmes¹⁹⁻²¹ have taken a more comprehensive approach. In addition to influencing frequency of syringe borrowing and HIV seroconversion, programmes of medical drug provision may also help to assure that addicts use substances of known formulation and strength, thereby reducing the risk of overdose death.

Social determinants are powerful predictors of health²². Poverty, race and socioeconomic status correlate with HIV infection in the USA²³ and unstable housing has been associated with increased risk for HIV in the Netherlands²⁴. In support of this finding, those IDUs with the poorest categories of housing in this study were twice as likely to develop HIV. Shooting galleries, a well established focus of transmission¹⁶, were not associated with seroconversion in this study. However, on site inspections⁹ suggest that group sharing in hotels with one-room accommodation replaces identified 'shooting gallery use' as a critical focus for HIV transmission in Vancouver and that IDUs may not be defining these locales as galleries. Poorer housing also correlates with a higher likelihood of injecting in less secure locations which has also been shown to increase risk for HIV¹⁴.

Unlike other studies²⁵, this investigation did not uncover appreciable evidence of sexual transmission among IDUs of either gender. Even after multivariate modelling, users who reported having a sex partner of the opposite sex during the inter-test interval were less likely to seroconvert. Others have shown that people with a sex partner in their social network are at lower risk for HIV²⁶. Clearly, opposite sex partnering is more likely to represent a marker for social and behavioural stability than to

pose a biological mechanism for protection. A reciprocal higher risk for persons who had sex partners of the same gender was not observed in this sample but this may have been a result of lower power. Others have described significantly increased reporting of unprotected vaginal and rectal intercourse in seroconverters^{25,27} but reporting of these activities did not correlate with seroconversion in this study.

The literature differs as to the increased risk for HIV posed by sex trade work for female IDUs^{28,29}. Our study agrees with others in that increased risk is associated with a higher number of client partners³⁰. Sex trade workers who are also IDUs are more likely to acquiesce to requests to have unprotected sex in return for more money⁹. A lack of association between seroconversion and a history of STD in this sample may reflect the low prevalence of STDs in British Columbia which bear the highest association with HIV transmission. Other than genital herpes, genital ulcer disease is currently rare in British Columbia³¹.

As recently reported³², frequency of NEP use has been associated with seroconversion. Although such an association was evident on univariate analysis of these data, it did not retain significance after adjusting for other factors. Most reviews and evaluations of syringe exchange programmes^{3,17,33-35} conclude that these services do not lead to detectable increases in the injection of illicit drugs and that participation in syringe-exchange programmes is associated with a reduction in HIV risk behaviour and blood-borne infections. Observations in this study do not contradict such findings but do raise questions about what features of NEPs lead most certainly to success and about whether needle exchange alone is sufficient to halt the spread of HIV among IDUs.

Crack cocaine has been associated with HIV seroconversion^{14,36} but rates of use of that preparation in Vancouver are low. However, there has been a historical symmetry between the increasing rate of injection cocaine use and the spread of HIV among Vancouver's IDUs. Injected cocaine has been associated with HIV seropositivity in a cross sectional survey³⁷ and with HIV seroincidence in cohort studies^{14,18}. In this Vancouver study, frequency of cocaine injection was associated with seroconversion on univariate analysis but not after adjusting for other factors. Nevertheless, the finding is of interest in that existing treatment programmes are limited with respect to modalities influencing cocaine addiction. Even though methadone maintenance programmes can lead to fewer incident HIV infections¹⁵, they have also been associated with increased cocaine use³⁷.

Sharing of other drug using paraphernalia (cookers, rinse water, filters, cotton) though shown to be significant elsewhere^{38,39} was not significantly associated with seroconversion in this sample. While proper use of full strength bleach can effectively remove HIV from syringes, the diffi-

culty many IDUs have with adhering to recommended cleaning procedure⁴⁰ may account for why this study and others⁴¹ have failed to show a protective effect of bleach use for IDUs.

High-risk injecting behaviour may lead to a variety of infectious complications other than HIV²⁵. Medical practitioners should note that hepatitis B infection and the likelihood of skin infections and endocarditis indicated a higher risk for HIV in this study. In particular, hepatitis A virus infection was also associated with HIV infection. This infection spreads by the fecal-oral route under conditions of poverty and poor hygiene.

Given the widespread expectation of confidentiality of HIV test results, this study recruited subjects indirectly by seeking referrals from health care workers. While this may lead to limits on generalizability, the outbreak under investigation was identified in that group of drug users who presented for testing. Due to Canada's universal health care system, free HIV testing services are readily available in the downtown neighbourhoods most heavily affected. This is attested to by the nearly 6000 HIV tests obtained from an estimated six to ten thousand users in a single 12-month period. Our results may not be wholly generalizable to countries with different accessibility to health care. This study did not uncover a significant effect of unsafe injection behaviour in jail on HIV seroconversion. However, there was limited access to prisoners and the study's short duration meant that comparatively few people were interviewed following prolonged incarceration.

This study employed a case-control design because it could be rapidly deployed, did not require the observation of new infections before drawing conclusions and could be used to assess multiple hypotheses of causation. While cases and controls were similar with respect to most demographic factors, the high proportion of aboriginal persons in both groups is a cause for concern. Aboriginal British Columbians make up an estimated 3% of the provincial population but contribute 13% of incident cases overall and 21% of incident cases among women⁴². Similar observations have been made in an adjacent province⁴³. This study demonstrated no significant difference between cases and controls in the length of time living in Vancouver. But because it recruited incident cases, it can provide no insight into the migration to Vancouver of IDUs living with HIV for some time. Clinical experience in Vancouver suggests that most new HIV infections, even among those arriving from out of province are acquired locally⁷.

Some features of case-control methodology may limit interpretation of these results. Although staff were largely blinded to client HIV serostatus, cases may have had differential recall of events than controls. Such recall bias is especially likely when discussing needle and sexual partnerships with

HIV-positive individuals during the risk interval. Self-reported behaviour from drug users has been evaluated in treatment programmes where as much as 50% of reported behaviour change has been called into question by checking with objective evaluation tools such as urinalysis⁴⁴. However, studies where an in-depth interview is employed, as in the present study, report higher rates of accuracy than cursory clinical questionnaires⁴⁵.

This study focused on incident cases of HIV and systematically excluded populations in which HIV is already highly prevalent. This explains under-representation of groups such as the street-involved transgendered, male sex trade workers and male drug users who have sex with other men. It may also explain why activities such as rectal intercourse were not associated with seroconversion in this sample. Statistical power was limited with respect to the ability to do subgroup analyses. As a result, fewer conclusions could be drawn about particular risks for women. Odds ratios for most variables were homogeneous across gender. This may imply that the most pressing risks in this population are related to factors that do not discriminate biologically between men and women, including underlying social determinants.

Factors associated with seroconversion in Vancouver such as borrowing syringes and unstable housing have features in common with those shown to predict seroconversion in cities of both high and low HIV prevalence¹⁴. This might be expected in a city with increasing prevalence rates despite its early implementation of needle exchange and street outreach services. In the face of such a challenge, there is a pressing need to evaluate programmes which deal more comprehensively with addiction, housing and the social underpinnings of high-risk behaviour leading to HIV infection in this population. Discussions with funding bodies and recruitment to an ongoing observational cohort study are underway with those goals in mind.

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The Point Project

A Study of Risk Factors
for HIV Infection among
Vancouver's Injection Drug Using Community

Summary of Final Results

April 15, 1996

A total of 89 HIV-positive and 192 HIV-negative persons were included in the case-control component of the study. HIV-positive and HIV-negative respondents were similar with respect to age, gender, ethnicity, and the time period between their two HIV tests. One third of both HIV-positive and HIV-negative respondents were of Aboriginal descent, which is consistent with the proportion of Aboriginals attending the DEYAS needle exchange [see Table 1 for a summary of the demographic characteristics].

Limitations of the Study

Because this project was a case control study, it cannot provide any information about HIV prevalence or incidence, nor about trends or changes in behaviour that a longitudinal study would provide. In addition, the study asked participants to recall or remember their behaviour prior to an event (in this case, their last HIV test). Persons responding may be affected by this event, which may affect their recall and bias the results.

The study's eligibility criteria required people to have been tested for HIV at least twice. Persons who chose not to be tested for HIV were thus not represented in the study sample, and results may not be generalized to this group. Persons who had first tested HIV-positive several years ago or for whom a prior HIV-negative test was not available also could not be included in the study. The proportion of some subgroups in the community (i.e. transsexuals, male sex trade workers) was therefore low. The number of female participants in the study was approximately 35%. This figure, although significant, limited the ability to detect factors that were specifically related to the risk of HIV infection in women.

Finally, the interview itself may have led to under-reporting on some questions in our study. Although the interviewers were trained to be sensitive to and respectful

of all participants, discussing high risk behaviours in conjunction with HIV/AIDS is highly sensitive and can be stigmatizing.

Overview of results:

i) Qualitative component:

The in-depth interviews from the qualitative component of the study identified several themes. These are depicted in Figure 1. Except for issues relating to needle use and social support, responses from HIV-positive and HIV-negative respondents are similar. There was an overwhelming perception that Vancouver's addiction problems had grown and become more severe in the last few years. Drug use was also an issue related to the participants' stated lack of control over their environment and their personal decision-making. Respondents consistently reported that the need to satisfy one's addiction was more urgent than always ensuring the use of clean needles and condoms. Cocaine was the drug of choice, but most of the study participants used a combination of heroin and cocaine (speedballs) intravenously.

Another major issue which emerged was one of stigmatization. It was observed that HIV and AIDS carry a strong stigma among the drug-using community. This creates an environment where members of that community are not discussing HIV on the streets, and therefore someone who is HIV-positive may not refuse to share needles for fear of having their serostatus suspected. There was also a fear amongst HIV-positive respondents that their use of certain health services implied their HIV status and that peer relationships were negatively affected by this. Many stated that they would rather not access the service or would pretend that they were accessing the service for something else, rather than admit their HIV-positive status.

Housing was a critical issue for the participants. Being homeless or living in downtown hotels was seen as unsafe and dirty, and an unhealthy living environment. The respondents believed that it was a direct contributor to one's mental health, and an indirect contributor to their personal drug choices. Many believed that their lack of

appropriate housing directly affected their decisions to participate in high risk behaviours such as having sex without a condom (which can provide more money) or even sharing needles and drugs with someone else in their hotel room simply to have shelter.

Discrimination on the basis of race or drug use was described by the participants. Many had negative experiences with different social and health services and they felt that discrimination acted as a barrier in accessing certain services. For example, 8 of 16 respondents reported that needles had been confiscated by police in non-arrest situations.

There was also an indication that interprovincial migration may be a factor in the IDU epidemic in Vancouver; only 3 of 16 respondents were born in this province, the rest originating from other regions in Canada. However, this study and HIV testing results from the B.C. Ministry of Health suggest that the majority of HIV infections among injection drug users are occurring in B.C.

ii) Social and demographic profile:

The case control component of the study interviewed a total of 281 persons. A social and demographic profile of these persons is summarized below, and in Table 1.

- Only 1 out of every 3 persons was born in Vancouver.
- The majority (60%) of the participants were transient, having lived in more than one place over the last 6 months.
- 1 in every 5 participants first injected drugs between the ages of 8 and 14. 29% of these persons cited curiosity and/or peer pressure as reasons for starting to inject drugs.
- On average, participants had been injecting drugs for over 12 years.

ii) Social and demographic profile: (cont'd)

- 45% of participants injected cocaine only, 26% injected heroin only, whereas 70% injected combinations of drugs simultaneously (e.g. speedballs).
- Almost 2/3 of all participants had attempted suicide. 70% of these suicide attempts were by drug overdose.
- Over half of the participants (55 % of HIV-positive and 51% of HIV-negative persons) had overdosed by accident.
- 88% of the participants received financial assistance, but most persons enhanced their monthly income and their drug use through illegal and sex trade activities.
- Almost one-quarter of the HIV-positive persons accessed medical or clinical services at least once a week.
- 100% of HIV-positive users and 98% of HIV-negative users had used the DEYAS needle exchange at least once.
- Over 40% of all participants (75% of females and 27% of males) had been forced to have sex against their will. Approximately 1 out of 5 of these persons stated that this happened prior to their 12th birthday.

ii) Social and demographic profile: (cont'd)

- Over half (52%) of those borrowing used needles reported having been forced to have sex, compared to 31% of those not borrowing needles. Females were more likely to report having been forced to have sex than males, but males were significantly more likely to report forced sex under age 12.
- Persons using used needles were more likely to have higher levels of depression, compared to those reporting never borrowing used needles.
- Male participants reporting having had sex with the same sex were three times as likely to borrow injection equipment as those who reported only heterosexual contact.

iii) Factors contributing to Recent HIV Seroconversions:

The following factors associated with the risk of becoming infected with HIV arose from the case control component of the study.

- Sharing needles was associated with a 3-fold increased risk of testing HIV-positive (i.e. seroconverting).
- Persons who injected cocaine more than 4 times per day were 2.4 times more likely to seroconvert than those who did not use cocaine.
- Those with unstable housing were twice as likely to seroconvert.

- Seroconverters were more likely to be frequent attenders of the needle exchange program.
- Injection drug users who also used non-injection drugs were 5 times less likely to seroconvert.
- Female sex trade workers who were HIV-positive reported more tricks per week (sexual contacts with non-partner) than HIV-negative women. In the qualitative component of the study, many persons stated that once they were infected with HIV, they felt no sense of obligation to protect their sex trade clients.
- HIV-positive persons were more likely to have had endocarditis and Hepatitis A and B, and were more likely to have been hospitalized than HIV-negative persons.

iv) Factors Contributing to Needle Sharing:

The case control study also identified the most important factors related to borrowing used needles, which are summarized below.

- Users injecting more than one drug (e.g. speedballs) and those injecting more than 4 times a day were 3 times more likely to use a borrowed needle.
- Subjects who reported having been forced to have sex against their will were 3 times more likely to use a borrowed needle.
- Males who reported having sex with other males were 3 times more likely to use a borrowed needle. (This finding was not entirely explained by involvement in the sex trade).

- Females who lived with a partner were 4 times more likely to use a used needle; females were much more likely than males to report borrowing needles from a regular sexual partner.
- Factors related to access to clean needles or barriers against clean needle use were not related to the borrowing of needles.
- Although 90% of persons who reported borrowing needles also reported cleaning them before injecting, only 20% of these subjects reported always cleaning them with undiluted bleach.

Figure 1: Main themes emerging from qualitative analysis (16 participants)

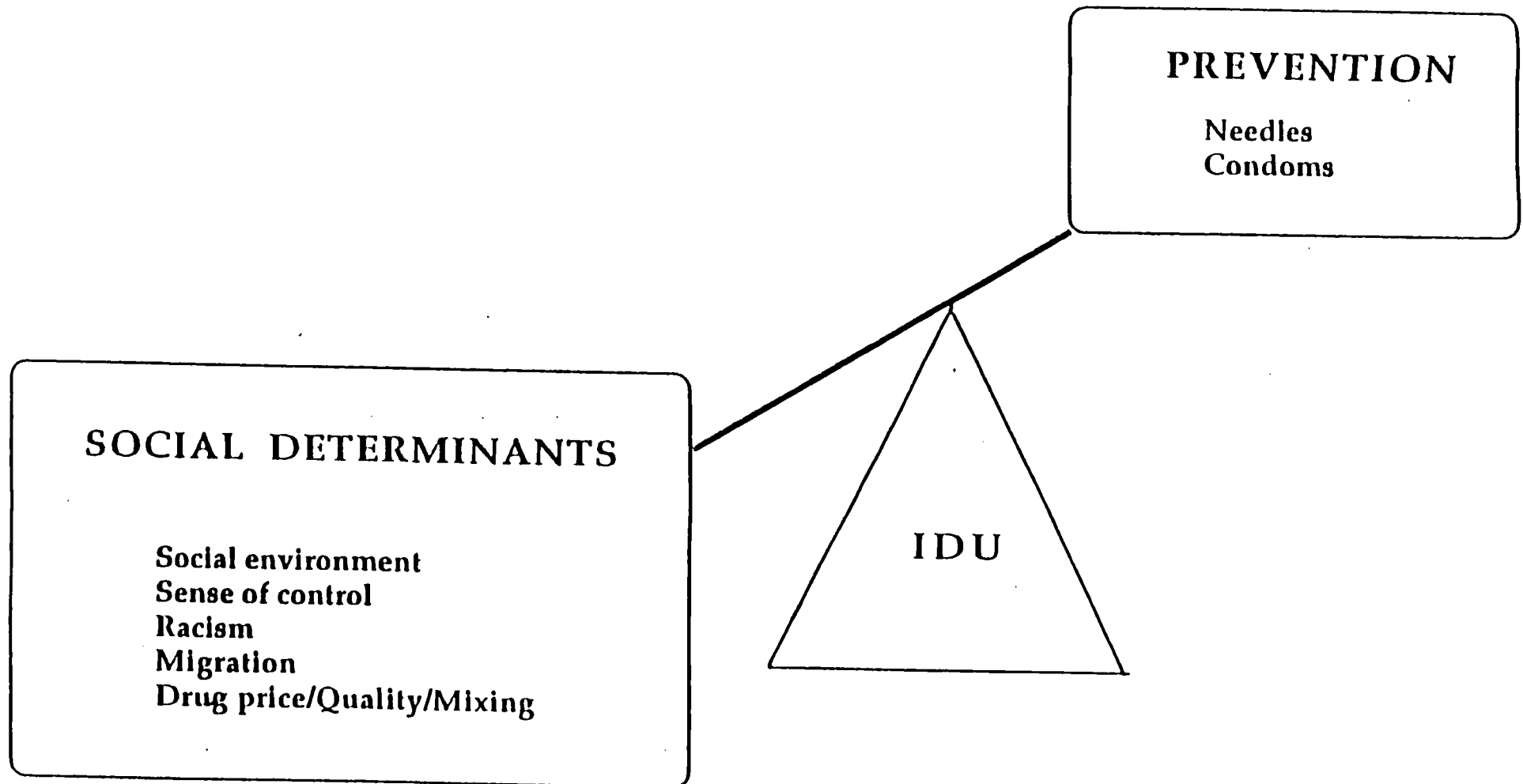


Table 2. (cont) Current Drug-Using Behaviour.

	HIV + N (%)	HIV - N (%)
"Hard to get clean needles!"* (NO)	65 (76)	140 (74)
Lending Used Needle (Yes)	25 (31)	75 (39)
Behaviour of lenders (100%)		
Always	2 (8)	1 (1)
Usually	5 (20)	13 (17)
Sometimes/Occasionally	18 (72)	60 (81)
Never	0	1 (1)
Borrowed Used Needle (Yes)	37 (46)	119 (62)
Behavior of borrowers (100%)		
Always	1 (3)	0 (0)
Usually	3 (8)	8 (11)
Sometimes/Occasionally	33 (89)	64 (89)
Never	0 (0)	0 (0)
Most Common Source of Sterile Needles		
Needle Exchange**	68 (83)	147 (77)
Pharmacy/drug store	8 (10)	21 (11)
Nurse/Doctor/Hospital	2 (2)	0 (0)
Other***	4 (5)	22 (12)

* Preliminary results about access to needles led to extended outreach by DEYAS needle exchange workers

** DEYAS fixed site or van, or Surrey Needle exchange;

*** friends, dealer, "off the street"

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Project Coordinator:

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Recommendations:

- In view of the strong link between poor housing and the risk of HIV seroconversion, more appropriate, safe and stable housing must be equitably accessible to all persons, especially injection drug users who are already at high risk of seroconversion and other health risks. Programs and services should be in place to ensure equal access for injection drug users.
- Emphasize amongst health care providers and other service providers the importance of risk reduction education for injection drug users.
- Provide harm reduction education to injection drug users and to service agencies regarding non-injection drug use. We must support the implementation of a relevant and accessible substance abuse ^{treatment} program for IDUs.
- Most of the injection drug users are accessing the Needle Exchange Program but there is a need to develop education strategies for hard-to-reach injection drug users.
- Enhance safer sex education for sex trade workers and continue to ensure the widespread availability of condoms, lubricants and female-controlled barrier methods as they become available.
- Develop and incorporate mandatory in-service and orientation training packages for all police and police services who may have contact with injection drug users. Encourage ongoing communication s between police, needle exchange personnel and public health officials.

Table 1. Profile of Injection Drug Users Participating in the Point Project

VARIABLE	HIV+		HIV-	
N	89		192	
Gender				
Male	60		129	
Female	28		62	
Transgender	1		1	
Mean age (yrs)	35		35	
Age range	20 - 55		20 - 55	
Ethnicity*	M	F	M	F
White	33	14	81	35
Native	21	13	37	23
Other	11	4	27	7

*Some persons identified with more than one ethnic group, so totals exceed the number of participants in the study.

1

VANCOUVER BC CDC SITE VISIT; May 12-13, 1997
(Final, 6/25/97)

Visitors:

Russell Campbell
(Seattle Needle
Exchange Program)
Dr. Jim McGough
(RAVEN study)
Dr. Bob Wood,
(Director, HIV/AIDS
Program, SKCDPH)

Visited:

Dr. Michael Rekart
Dr. David Patrick
Dr. Steffanie Sthrathdee
Anne McNabb
John Turvey, Judy McGuire
Richard, Liz, Ann, Byron
Dr. Michael O'Shaughnessy
Dr. Martin Schechter

Representing:

BC Center for Disease Control (BC CDC)
BC Center for Disease Control
BC Center for Excellence HIV/AIDS
Street Nurse, BC CDC
Downtown Eastside Youth Activities Soc.
Needle Exchange Comm. Advisory Board
BC Center for Excellence HIV/AIDS
BC Center for Excellence HIV/AIDS

Summary Bullets:

- The HIV epidemic among injection drug users (IDUs) in Vancouver's Downtown Eastside community is clearly a major public health emergency for that city, and a major threat to other areas of Canada and to adjacent US cities. This area within Vancouver looks a lot like New York City's lower Eastside, where similarly ill persons could (in 1990) also be seen shooting drugs up in public.
- This major epidemic of HIV among IDUs within the Downtown Eastside of Vancouver, is evidenced by an HIV seroprevalence among IDUs which has risen there from 3-4% to over 23% in the Vancouver Injection Drug User Study (VIDUS, N=1006), with a seroincidence up to 20 per 100 person-years, about 2 seroconversions a week recently. At that rate BC Center for Disease Control (BC CDC) public health officials and BC Center for Excellence in HIV/AIDS researchers fear that seroprevalence rates could reach 60-70% within several years, before the incidence would drop. Even if major efforts were effective at reducing transmission, an HIV seroprevalence of 40-50% could still be reached in the near future.
- Downtown Eastside Vancouver is an approximately 15 block area (2-3 blocks wide by about 5 blocks) which is reported to contain about 12,000 persons, 5,000 of whom are estimated to be IDUs, of whom perhaps 3,000 are fairly stable residents and the rest are transient with migration back and forth to other areas of Canada (especially by the Native Americans to their reservations) and up and down the west coast of North America. Many of the rest of the inhabitants of this area are said to be hooked on other drugs but not currently injecting. This is reportedly the poorest postal code in Canada. About two-thirds of HIV+ VIDUS subjects reside in this area.
- Many of the people packed into this increasingly geographically restricted area live on the streets or in single room occupancy (SRO) hotels, categorized as "unstable housing" by VIDUS, carried out by the BC Center for Excellence in HIV/AIDS. These hotels were said to function as "shooting galleries," since they are typically centers of drug sales, injection, and needle-sharing.
- Cocaine appears to have become the chief drug of use since the early 1990s because it was said to be cheap and easily accessible, and because of a generally reported high level of police tolerance (although regional judicial and police headquarters are located within the Downtown Eastside, right across the street from the main needle exchange site). Also, Vancouver was said to have become a major center of international drug trade routes, and to receive at least some of its cocaine imported directly by air shipment, or from Eastern Canada, not smuggled overland through Washington State.
- This Vancouver epidemic is occurring in the face of what is probably the largest needle exchange program (NEP) in North America, run by the Downtown Eastside Youth Activities Society (DEYAS) which exchanged 2.3 million syringes in 1996, suggesting to BC officials and researchers that NEPs by themselves are insufficient to curtail epidemic spread.

Injection Drug Users:

Drugs of use do appear to differ substantially between Seattle & Vancouver:

- Injected cocaine use has reportedly increased greatly in recent years in Vancouver, and is the most commonly used drug, often with heroin. It is notable that cocaine has also been reported to have a pivotal role in rising HIV infection in other Canadian cities, including Montreal, and less urban areas like Cape Breton, Nova Scotia.
- Heroin in Vancouver is predominantly china white, while black tar heroin is Seattle's predominant variety, suggesting that the drug trafficking patterns for the two cities are distinct. One Vancouver source believes most probably comes to their city by air.
- People interviewed in Vancouver described many cocaine users injecting with great frequency, with many partners, and with greatly impaired judgment.

Drug users differ between our cities as well:

- 25% of Vancouver users are Native Americans (data from VIDUS), while about 25% of Seattle's are African-Americans (RAVEN data).
- Vancouver NEP and VIDUS staff reported a recent increase in Latinos, reportedly "recruited" to Vancouver from Mexico with the news that Vancouver is a wonderful city offering free health care and legal services, easy access to cheap drugs, and police tolerance.
- IDUs were also said to be attracted to Vancouver from other parts of Canada because this is Canada's west coast city, the weather is better than many other Canadian cities, social services are perceived to be better (BC is reputed to have the most open-minded, progressive, and non-conservative government of all the provinces). Native Americans (aboriginals) migrate in from reservations. Nevertheless, at least 95% of VIDUS subjects are Canadian citizens. Some apparently brought HIV to Vancouver from eastern cities.
- Vancouver IDUs on the street appear younger than Seattle's IDUs, and VIDUS data suggest that their average age is in fact more youthful.
- Vancouver IDUs on the streets of the Downtown Eastside look significantly more ill than those seen around Seattle's Downtown NEP, with visible blemishes, scabs, and emaciation.
- Vancouver IDUs appear to be more densely packed into the Downtown Eastside area, perhaps creating more of a critical mass, whereas Seattle's IDUs seem to live in more widely distributed areas. [We will be reviewing data from our RAVEN Study to investigate this further.]
- Comparing VIDUS and RAVEN data, Vancouver IDUs have a lower educational level than those in Seattle.
- A higher proportion Vancouver IDUs in VIDUS report being paid for sex.
- High proportions in the VIDUS study participants reported ever having non-consensual sex (but not necessarily in the recent past); we do not have Seattle data for comparison here.
- A December 1995 report by BC Pharmacists on IDUs estimated that there were some 15,000 IDUs in the lower mainland of BC, about 5% HIV+. Lower estimates noted in materials reviewed before the site visit seemed quite low, but probably mostly reflect the population of the Downtown Eastside. Population estimates for the two cities are actually quite comparable. DEYAS has separately registered 6,000 IDUs at the fixed site NEP, and in 1996 on an average month about 2,000 different clients were served at the fixed site. Few of their registered IDUs are Asians, while 25% of Vancouver's population is Asian, suggesting that they may not be capturing this population, that it is not using their NEPs, that drug injection is not very prevalent in the Asian population, or some combination of the above. They are trying to get a better handle on numbers within jurisdictions using capture/recapture methods. Estimates of the number of IDUs in King County (between 12,000-18,000) are also uncertain.
- Vancouver Native American IDUs migrate between rural reservations and the city, and the non-aboriginals migrate from many areas in more eastern Canada, from the states and from Mexico.
- Vancouver IDUs in VIDUS were reported to not feel that they are at great risk of HIV, which suggested to us initially that Vancouver wasn't effectively warning the Downtown Eastside population of the high risk of disease there. However, according to further information from Dr. Strathdee information has been disseminated through flyers and the DEYAS "bad date sheet" regarding Hepatitis C, materials on HIV/AIDS available at many street agencies including DEYAS, and two handouts prepared by VIDUS and its predecessor, the Point Project, reporting study results (including VIDUS prevalence rates of HIV, HCV, TB skin test reactivity, and levels of needle sharing). From preliminary follow-up data, we believe IDUs are aware of the risk of HIV transmission in Vancouver, but nevertheless do not implement personal efforts at risk reduction. Dr. Rekart notes that a number of formal and informal avenues have been used to make

IDUs aware of the epidemic and its expansion. Statements in qualitative studies suggest that for many, the risks of living as IDUs, in the Downtown Eastside neighborhood, with minimal social support, appear to outweigh concerns about HIV.

- We're not yet sure from VIDUS or RAVEN data whether needle sharing is more commonly reported in Vancouver vs. Seattle; however, if sharing is more common, it seems likely that it could result from Vancouver's crowded social situation, and their reported recently increased use of cocaine. An injector interviewed by an ethnographer said that it was safer to shoot in alleyways, where one had more control over shooting partners, than in their SRO hotel residences, since so many more people are likely to be present or have room access.
- At the 1997 San Diego North American Needle Exchange meeting, Vancouver NEP staff described their IDUs as switching from heroin to cocaine, but on further questioning, it appears that most probably still use heroin; it's just that they're using more cocaine with or in addition to it.

Vancouver Needle Exchange Programs (NEPs):

- There are reportedly 14 NEPs in the province of BC, but each program may exchange through multiple sites. Other than the DEYAS and Street Nurse programs, in Vancouver, on the lower mainland the closest fixed site NEP is in Surrey, which has restricted hours and no limits. In New Westminster, exchanging occurs through outreach only at this point. Other programs are scattered around the mainland and Vancouver Island.
- The largest fixed NEP site, by far -- perhaps the largest in all of North America is located across Main street from a municipal court building and kitty-corner to a police station, also on Main Street.
 - The NEP is funded by the BC Ministry of Health through a contract to the Downtown Eastside Youth Activities Society (DEYAS), whose founder/director, John Turvey, is himself a recovered IDU. He and his agency have apparently had major political clout within the BC government, although influence on the more conservative Vancouver political process is felt to be more limited.
 - This DEYAS fixed site program began in early 1988 and has grown steadily since, increasing its volume of syringes by about 20% each year.
 - Clients are registered with such codes as initials, date of birth, and other information that the IDU can remember or easily reconstruct, but no names are collected. Demographic data, including age and race are kept, and with each contact a computer screen is used to update the client's recorded number of syringes returned and taken.
 - Syringes are given out with small variously colored stickers which IDUs pick & affix themselves to their rigs to help them keep track of which syringes are theirs, it is reported. In this way, they're less likely to mix up their rigs with others' avoiding inadvertent sharing.
 - Volumes of syringes exchanged reached about 1 million by 1994, and in 1996 2.3 million syringes were exchanged by DEYAS, about half at the fixed site, and the rest from three mobile vans which are coded as traveling the East, City, AM, Day, and Portland routes all areas serving this 15 block area. Needle exchange access is maintained 24 hours daily.
 - In addition to syringes, clients can take condoms, alcohol swabs, and bleach (in unusually large bottles), but cottons, or other paraphernalia involved in indirect sharing are not yet provided. Numbers of these items distributed were not obtained.
 - DEYAS staff differed somewhat in describing rules on the numbers of syringes which could be exchanged at one time. Flyers say that a maximum of 14 syringes/day and 42/week can be obtained per client; however, Judy McGuire, manager of the NEP, can (and often does) authorize larger and bulk exchanges for persons on a case-by-case basis. Since program inception, BC CDC officials urged DEYAS to make no limits on needles exchanged. Reasons for restrictions offered were that clients would then have more opportunities to interact with staff (getting education, referral, and other assistance); however, at neither the storefront operation nor in the vans did staff appear to have much individual prolonged contact no more than Seattle NEP staff seem to have.
 - Actually about 1.2% more needles are collected by DEYAS than are distributed, a fact that they considered important; needle exchange staff said that in their risk-reduction education they strongly emphasized getting used needles turned in and out of circulation, and cited support from community groups, including schools, since fewer syringes were found in parks and playgrounds. Few visitors to Vancouver (including us in our tours of the area) apparently report seeing discarded

- needles.
- Nearly 600 new clients registered for the DEYAS program in 1996.
- Of DEYAS registered IDUs who used services in 1996 at the fixed site NEP: 72.8% are males, 26.7% female, and 0.5% transgendered. Age-wise: 0.4% are teens (13-19 year olds), 4.9% are in their 20s, 83.5% in their 30s, and 11.2% in their 40s. Race-wise: 70.5% are Caucasians, 24.2% Native Americans, 2.0% Black, 0.7% Latinos, 1.3% Asians, and 1.2% other.
- DEYAS is not the only source of sterile syringes to this and other Vancouver populations.
 - "Street Nurse" vans began operation at about the same time as the start of the fixed site DEYAS NEP program, and began including sterile syringes to clients, some likely not registered with DEYAS. Unlike DEYAS, Street Nurses have placed no limit on the number of needles which can be exchanged, a practice which reportedly was criticized by DEYAS. After several years of exchanging needles in addition to providing medical assistance, the street nurses ceased needle exchange activity and left needle exchange to DEYAS until, in 1994, they began exchanging again, and now also provide bulk exchanges. During April, 1997 these nurses reported that they exchanged an additional 140,000 syringes on their own.
- How the NEPs have changed since inception:
 - From the first NEP at DEYAS, sites in the Downtown Eastside, Vancouver, lower mainland, and BC as a whole have proliferated, and include some organizations within reservations.
 - Hours of operation have also been gradually increasing, so that needles are available in the Downtown Eastside from 8:30am to 8 p.m. at the DEYAS fixed-site office, and from 5:30 p.m. to 1:30 am via one van route, 5:45 p.m. to 11:45 p.m. via a second van, and from 12:30 a.m. to 8:30 a.m. via the overnight route. (24-hour coverage.) Van exchanges are supposedly limited to 5 rigs per client, but exceptions were said to be common, few records are kept, and a single client could make multiple contacts, exchanging at each.
 - Volumes increased about 20% per year over time, as described above.
 - We are not aware of any changes to the registration requirements, but only the DEYAS program appears to keep close track of these registration numbers & volumes.
 - Some staff are clearly peers, and most are otherwise well matched with clients.

Other HIV Prevention Interventions Targeting IDUs:

- HIV counseling & testing (C/T) has been quite successful in the Downtown Eastside population, and was the means for initial recognition of increasing numbers of HIV seropositives among this population beginning in mid-1994. Testing is now obtained in the open-ended VIDUS longitudinal cohort study which sees clients every 6 months. Also available from the nursing offices above DEYAS, and for a time in the nurse van. HIV counseling and testing is promoted by the Street Nurses along their van routes, but they have found that actual blood draws and post-test counseling cannot be satisfactorily conducted in a van on the street, so they direct interested parties to one or another of their fixed site for those services.
- Street Nurses (8.5 FTE) provide outreach and home visits, including clinical assessment and care to persons too disabled (or for other reasons unable or unwilling) to make it to one or another of the fixed clinical sites in the area. Services include evaluations for STDs and HIV including counseling & testing, limited on-site (fixed office and van) care and referrals, and packets of materials for wound/abscess care (costing about \$C3.50). HIV counseling and testing services are also available at some other sites within the area.
- The Street Nurses have a store-front over the DEYAS offices, and two others as well, all in the Downtown Eastside area.
- Street Nurses sponsor and conduct workshops dealing with vein care, pet care, and legal issues.
- As in Seattle, access to methadone treatment in Vancouver (as a substitute for heroin addiction) is felt to be grossly inadequate, although with recent changes in legislation several hundred new licenses for methadone prescription were recently made available for private medical practitioner in Vancouver to treat up to 40 patients., but we were told that only three of them have been exercised by MDs anywhere near the Downtown Eastside neighborhood. Although these physicians regularly discuss treatment options, initiate and maintain primary care for their clients, refer to counseling services and assist with income support, social work referrals, etc.; in the states, methadone clients would often be required to engage in treatment programs including groups, social work services, urine testing, etc. Dr. Strathdee writes that "there are

currently 2800 persons enrolled in methadone maintenance programs in BC (the highest number per province in Canada).” With 1800 filled slots in Seattle (5 licenses @ 350 each + 100 Veterans’ Affairs Medical Center slots, and about 50 slots unfilled), methadone treatment per capita in the two cities is probably similar. Treatment capacity or numbers for addiction to cocaine and other drugs was not assessed.

- There are some formal linkages to care programs, especially for persons with symptomatic HIV infection, and through the Street Nurse vans and fixed-site nursing clinics. Although over 95% of VIDUS subjects were Canadian citizens and thus eligible for comprehensive medical care, many medical care providers were said to be reluctant to treat IDUs in their practices, and access to comprehensive primary care for this population appears quite limited in practice.
- We didn’t see HIV/AIDS educational materials prepared for IDUs, and got the impression that while there may have been educational campaigns, there may not have been any systematic or comprehensive norm-changing campaigns targeting Vancouver IDUs, along the lines of our projects NEON, OutLOUD, or Girlfriends Talkin’.
- The outreach activities which we learned most about were the NEP services, and direct clinical services. However, there are numerous agencies with this as their primary or secondary mission. The Street Outreach Program, for example, has a primary mandate to do education, prevention, and referral. According to Dr. Rekart, “Every day of the year 6-8 registered nurses are doing outreach and education to street involved persons including IDUs and two additional healthcare workers are educating people.” Outreach service agencies are also represented on the NEP CAB.
- In 1993 the BC provincial government:
 - allocated an additional \$150,000 per year to needle exchanges;
 - expanded the Street Outreach Program to add one nurse and two healthcare workers;
 - assumed responsibility for purchasing and distributing free-of-charge all the supplies required by NEPs, including needles, condoms, bleach, etc. & freeing up supply budgets that were re-directed to enhance services;
 - VIDUS is funded to a total of \$750,000;
 - initiated a community consultation resulting in a revised British Columbia AIDS Strategy.
- In addition to the rapidly expanding volumes of sterile syringes made available for exchange, and the increasing sites for exchanges to take place, access to sterile injecting equipment was further enhanced in 1995 by:
 - liberalization of pharmacy sales laws which now permit pharmacies to sell syringes to IDUs. Some pharmacies were already doing this before the laws changed however, and many pharmacies do not make their operations welcome sites for IDUs in spite of the liberalized laws. Further, no pharmacies receive and dispose of used injection equipment, nor do they provide free condoms or other needs of the population.
 - removing paraphernalia laws.

Community/Contextual Issues:

- Law enforcement, particularly laws bearing on drug users and laws restricting prostitution, appear to be more tolerant in Vancouver than in Seattle, although enforcement also was reported to be inconsistent at times.
 - Local police, with experience in Vancouver’s Downtown Eastside, are said to treat IDUs with some understanding of their addiction, often with compassion and assistance; however, outside police, brought in from other jurisdictions from time to time, are less understanding, tolerant, and friendly to those who live in this area, and are reported to be frequently abusive, occasionally requiring NEP and nursing staff to report them to their commanders.
 - DEYAS staff describe considerable police tolerance of both individual drug use and sales, although there are occasional crack-downs. Simple possession of small amounts of drug for personal use seems to be permitted *de facto* (and, see below, recent recommendations for possession to be made legal). The police were quoted as having said that if they tried to arrest everyone in possession of any drugs, they would have to time to do anything else.
 - Unfortunately, we did not learn much about law enforcement regarding drug pushers or traffickers.
- At times, usually just before the monthly welfare checks are expected to be delivered on a Wednesday late in each month (and most Downtown Eastside residents are eligible to receive these), drug dealers are

described "setting up shops" on streets, corners, and within changing hotels and bars. At other times, clients were reportedly able to walk into bars and be presented with arrays of drugs for sale. Drugs were said to be available for purchase at front desks of some single-room-occupancy hotels.

- We were told that prostitution is not illegal in Vancouver, and we saw a very large number and high density of street-walkers in parts of the Downtown Eastside neighborhood. Soliciting for prostitution, however, is illegal, and we were told that the police use that fact as a tool to harass prostitutes to make them move on when there are too many neighborhood complaints about their presence. The police were said to make known to prostitutes the areas that they must stay out of if they want to avoid arrest for solicitation, but the areas are always changing, and they are not told which areas are OK. We did not hear of anything more similar to Seattle's SOAP regulations (or SODA, for that matter).
- A Canadian National IDU Task Force (including Dr. O'Shaughnessy and a police chief who reportedly solicited responses from all chiefs of police) recently issued a report providing 92 recommendations to reduce HIV infection rates, including recommendations to decriminalize possession of drugs currently considered illegal, and providing "specific exemptions under the legislation to ensure that physicians may prescribe narcotics (e.g. heroin, cocaine) to drug users in an effort to medicalize drug use and reduce harm".
- The VIDUS study cites "unstable housing" as one of the key predictors of drug abuse and HIV prevalence in their cohort; however, persons who live within these single rooms of the hotels of this district of the Downtown Eastside are included among those having unstable housing. Visitors heard reports that many of the occupants are frequently booted out of their rooms for violating hotel residency codes, thus losing their month's rent (permitting managers to rent the one room to several clients each paying for a full month). VIDUS has found that residence in the Downtown Eastside and unstable housing are very highly correlated and generate almost identical results in their multivariate logistic model.
- Some we interviewed conveyed that government would simply prefer to sweep this problem population under the rug, into this 15 block district, which is gradually being encroached upon by Gas Town and other "gentrifying" areas. However, BC and Vancouver have openly wrestled with this increasing problem, worked hard to publish the results of studies of the population involved, and have successfully sought to bring more resources to bear on the problem.
- Convinced by the earlier "Point Project" and by preliminary data from VIDUS, the BC government has recently allocated \$C3 million to the problem. These funds will be distributed by a community panel which includes input from the BC CDC, researchers, and other professionals. Some suggestions for the uses of these funds obtained in our visits with various stakeholders included:
 - housing (said to be high on the panel's agenda);
 - programs to catch newcomers to the area and to divert them into better social situations;
 - some thoughts about a media campaign to warn district residents, especially newcomers, that an epidemic of HIV is raging in this area and to be aware that sharing a needle here confers perhaps a 50% chance of HIV infection (others, however, thought this might be akin to quarantining the area, and might be counter-productive); and
 - expansion of the NEPs was felt to be unlikely by BC CDC officials.
- Dr. O'Shaughnessy in our closing meeting noted that all of the inpatients that day (5/13/97) on the AIDS ward at St. Paul's Hospital (Vancouver's main hospital providing inpatient care to persons with HIV/AIDS) were IDUs, costing \$27,000 a day just to keep the ward operating (not including the additional expenses of medicines, tests, etc.).

Surveillance/Studies/Data:

- Although the BC Province has not implemented named HIV reporting, for the past two years the Ministry of Health has begun capturing the coded identities of all persons newly found to be HIV seropositive (including patient initials, date of birth, and gender). This is made relatively easy since the Provincial laboratories apparently perform all confirmatory tests for HIV. BC officials believe this to be the best surveillance system currently in place in Canada. Apparently none of the communities or advocates for persons with HIV have had objections to this means of surveillance.
- Like VIDUS investigators themselves, we believe the VIDUS data are not representative of all Vancouver IDUs, but rather mostly persons from the Downtown Eastside, where the epidemic appears to be breaking out. Even though this community may not represent all of Vancouver's IDUs, an outbreak of this magnitude within this sector of their city is highly significant, and a great danger to public health.

- Their HIV C/T data also appear to be drawn pretty much from IDUs in the Downtown Eastside.
- We explored current research/surveillance interests in Vancouver and compare to Seattle's:
 - Both sides have a strong interest in developing common instruments and in sharing access to their IDU populations.
 - We are both testing for most of the same blood-borne pathogens (HIV, HBV, HGV, HTLV-I, etc.) it appears.
- We could fashion a study to compare and contrast Vancouver and Seattle, and given our proximity there seemed to be some interest in this; however, Drs. O'Shaughnessy, Schechter, and Strathdee, who are leading these investigations in the BC Center for Excellence in HIV/AIDS wanted first to know whether NIDA funds the recent application (5/1/97) their first priority.
- VIDUS defines "speedball" as combining cocaine and heroin in the same rig.

Action Plan:

- Identify resources to better monitor HIV among IDUs. This outbreak emphasizes the need for continued and improved local surveillance of IDUs, especially younger IDUs, Latinos, and Native Americans, as identified in the Vancouver data. This should include focus groups to study IDUs' attitudes, beliefs, barriers to harm reduction. We are especially concerned, as the resources for our current study of these populations are coming to an end shortly.
- Increase access to drug treatment, which is still inadequate locally, especially for persons without insurance coverage. This should include: easy access to additional methadone maintenance slots, treatment for cocaine addiction, and for mental illness. It is more cost effective to pay for drug treatment now than to pay for vastly more expensive AIDS care later.
- Develop media campaigns/materials targeting our local IDUs to include information about the epidemic occurring in Vancouver has been completed. Pilot messages and campaigns need to be tested.
- Further decentralize needle exchange services to avoid becoming magnets for concentrated, high risk populations.
- Continue to decentralize human services to high risk populations including housing for our region's poorest persons and resources for homeless persons. Compared to other regions in the country, King County has a long tradition of intermingling of the wealthy and poor, preventing neighborhood deterioration such as occurred in Vancouver. This strategy of integrating poorer populations within mixed-income neighborhoods in small, manageable numbers has helped protect us from a Vancouver-like rapid increase of infection and helped preserve the entire area's business and social growth.
- Improve King County outreach to Latinos, Native Americans, youth.
- Explore and strengthen connections between our two cities' programs to assure that IDUs know about services, research opportunities; help our two cities' programs with follow-up, and coordinate instrument designs so that comparisons between our cities can be accomplished.
- Explore possible public health jurisdiction collaborations along the I-5 corridor, including the State Department of Health, Everett's needle exchange, and reported clusters of IDUs in Mt. Vernon, Bellingham.



ORIGINAL CONTRIBUTIONS

High Rates of HIV Infection among Injection Drug Users Participating in Needle Exchange Programs in Montreal: Results of a Cohort Study

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Needle exchange programs (NEPs) are designed to prevent human immunodeficiency virus (HIV) transmission among injection drug users. Although most studies report beneficial effects in terms of behavior modification, a direct assessment of the effectiveness of NEPs in preventing HIV infection has been lacking. A cohort study was conducted to assess the association between risk behaviors and HIV seroprevalence and seroincidence among injection drug users in Montreal, Canada. The association between NEP use and HIV infection was examined in three risk assessment scenarios using intensive covariate adjustment for empirical confounders: a cross-sectional analysis of NEP use at entry as a determinant of seroprevalence, a cohort analysis of NEP use at entry as a predictor of subsequent seroconversion, and a nested case-control analysis of NEP participation during follow-up as a predictor of seroconversion. From September 1988 to January 1995, 1,599 subjects were enrolled with a baseline seroprevalence of 10.7%. The mean follow-up period was 21.7 months. The adjusted odds ratio for HIV seroprevalence in injection drug users reporting recent NEP use was 2.2 (95% confidence interval 1.5–3.2). In the cohort study, there were 89 incident cases of HIV infection with a cumulative probability of HIV seroconversion of 33% for NEP users and 13% for nonusers ($p < 0.0001$). In the nested case-control study, consistent NEP use was associated with HIV seroconversion during follow-up (odds ratio = 10.5, 95% confidence interval 2.7–41.0). Risk elevations for HIV infection associated with NEP attendance were substantial and consistent in all three risk assessment scenarios in our cohort of injection drug users, despite extensive adjustment for confounders. In summary, in Montreal, NEP users appear to have higher seroconversion rates than NEP nonusers. *Am J Epidemiol* 1997;146:994–1002.

cohort studies; HIV; needle exchange programs; substance abuse; substance abuse, intravenous

Injection drug use is now recognized as one of the major routes for transmission of HIV infection. For the past 15 years, several strategies have been developed to reduce HIV transmission among drug users, and needle exchange programs (NEPs) have constituted one of the most favored (1). These programs aim at increasing accessibility to sterile needles and syringes and removing circulating contaminated injecting material (2).

There are many difficulties and pitfalls in trying to assess the effectiveness of NEPs in reducing HIV transmission. Accessibility to the injecting drug user

(IDU) population is difficult because of legal barriers surrounding drug use. Random assignment of participants to interventions can rarely be achieved, introducing potential for selection bias in subsequent program evaluations. NEPs are often initiated in the community along with other intervention measures, causing difficulties in the interpretation of the specific effects for each component of the entire intervention program. Such considerations have been recently and extensively reviewed by a panel of experts (3).

The first studies on NEPs were conducted in Europe, mostly among heroin users, and they showed

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Abbreviations: CI, confidence interval; HIV, human immunodeficiency virus; IDU, injection drug user; NEP, needle exchange program; OR, odds ratio.

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encouraging results. In London, England, and Glasgow, Scotland, a significant reduction in injecting behaviors was observed among recent NEP attenders (4-6). In the United Kingdom, a prospective survey between 1987 and 1988 reported higher levels of risk behaviors among nonattenders and a decrease in syringe sharing from 34 to 27 percent among attenders (7). In Australia, there was no increase of intravenous drug use due to the implementation of a NEP among clients of a methadone maintenance unit (8).

In North America, several studies have been conducted in recent years. In Hartford, Connecticut, and in New York City, NEP attenders reported decreased equipment sharing (9, 10). In Tacoma, Washington, in a case-control study among IDUs entering a methadone program, the nonuse of the NEP was associated with a significant risk for hepatitis B and hepatitis C (11, 12). A 4-year study evaluating the impact of NEPs among IDUs admitted for treatment in San Francisco, California, detected no negative consequences (13).

As stated earlier, changes in the rate of HIV infection among NEP attenders have been difficult to monitor. In Sweden, a small NEP was found useful in maintaining a low HIV seroprevalence among heroin and amphetamine IDUs (14). In the NEP of Portland, Oregon, one HIV seroconversion was observed in 162 person-years at risk (15). Kaplan and Heimer (16) used an innovative, albeit indirect, method of assessing HIV transmission by testing the returned syringes; and they estimated that incidence had declined among IDUs attending a NEP in New Haven, Connecticut. In Amsterdam, the Netherlands, where a large NEP was established in 1984, HIV seroprevalence remained at approximately 30 percent; and the seroconversion rate decreased from 9.2 percent in 1986 to 2.5 percent per year in 1992 (17). This decrease in incidence could not be directly attributed to the impact of the NEP. In two recent reviews by individuals commissioned to study the impact of NEP (1, 3), the authors concluded that such programs are generally useful in halting the progression of HIV infection in IDUs.

In Canada, implementation of NEPs started in 1989—almost simultaneously in Vancouver, Toronto, and Montreal. In 1988, our group began to accrue subjects in a cohort investigation of active IDUs in downtown Montreal. This cohort is an observational study and was not designed to study or evaluate NEPs. However, preliminary results on risk factors as predictors for HIV seroconversion among IDUs recruited in this cohort indicated a significant independent association between HIV seroconversion and the following variables: street recruitment, previous imprisonment, cocaine as drug of choice, number of injections in the last month, having two or more sharing partners in the

last month, sharing with an HIV-seropositive partner, having HIV-seropositive acquaintances, and finally, having attended a NEP at least once in the last 6 months (18). Because of the potential consequences of these findings on policies and prevention of HIV among IDUs, we present herein an extensive analysis of the association between NEP use and baseline HIV seroprevalence and cumulative seroincidence in our cohort.

MATERIALS AND METHODS

Subjects

Cohort members were actively recruited from three main sources. The Detoxification Unit of Saint-Luc Hospital in downtown Montreal contributed 33 percent of the recruitment, and referral from collaborating institutions catering to the needs of IDUs in the city such as shelters, private and public readaptation centers, therapeutic communities, and community-based agencies including city street workers contributed 5 percent of the cohort. With IDU groups gradually becoming aware of our ongoing investigation, direct self-referral became more and more important with 62 percent of the total recruitment. A \$10 fee (in Canadian dollars) was given at each visit as an incentive to participate in the study. Recruitment is ongoing and has been stable, with a mean of 23 new subjects enrolled each month.

IDUs were eligible if they had injected drugs within the last 6 months. After providing an informed consent at admission, subjects underwent a structured, questionnaire-based interview to elicit detailed information on sociodemographic characteristics, knowledge and attitudes concerning HIV infection, drug use, and sexual behavior. A follow-up questionnaire probed for similar information during all subsequent returns. All interviews were conducted by trained nurses with extensive experience with drug users. The first follow-up return was scheduled at 3 months and subsequent visits, every 6 months thereafter. A venous blood sample was drawn at each visit for serologic testing. Presence of anti-HIV antibodies was detected with a commercial enzyme-linked immunoassay (BioChem ImmunoSystems Inc., Montreal, Canada) and confirmed at the Quebec Provincial Public Health Laboratory by Western blot or radioimmunoprecipitation assay.

Of the 1,599 subjects enrolled from September 1988 to January 1995, 171 were seropositive at enrollment, for a seroprevalence rate of 10.7 percent. Subjects included in the cohort are those who have been followed up at least once after their initial visit. Among the initially seronegative subjects, 377 (26.4 percent)

were lost to follow-up. The present cohort analysis includes 974 HIV-negative subjects after elimination of 77 enrolled after October 1994 to ensure that all participants had been followed for at least 3 months. The mean follow-up period was 21.7 months, with a median of 15.4 months and intervals ranging from 3 months to 5 years, and with each subject contributing follow-up information since the date of entry until the date of a positive HIV serology for seroconverters or until the date of the last visit for those remaining seronegative.

Regression analyses

Three risk assessment scenarios were used to study the association between NEP use and HIV infection. In the first scenario, as subjects were enrolled into the cohort, their initial serologic status was ascertained along with baseline questionnaire information on risk factors. NEP use in the entry questionnaire is a dichotomous variable, and the subject was asked whether he or she had attended a NEP to get his/her equipment in the past 6 months or in the past 3 months in the case of the follow-up questionnaire. This scenario is akin to a cross-sectional study of NEP use at entry as a marker associated with baseline HIV seroprevalence, and it also allowed a comparison of NEP attenders with nonattenders.

After eliminating those who were seropositive at entry, a cohort of seronegative individuals was assembled for continued surveillance. In this second scenario, NEP use reported in the entry questionnaire was treated as a possible predictor of subsequent seroconversion during follow-up.

In the third scenario, NEP participation during follow-up at the time of seroconversion was examined as a predictor of seroconversion in the cohort. A nested case-control design was used, whereby seroconverters were considered cases and up to four matched controls were randomly chosen from among those of the same gender, age (5-year groups), language (French vs. other), and year of enrollment who remained seronegative at the time their index case seroconverted. Information on NEP use was obtained from the interview at the time of the first visit, when the subject tested seropositive for cases, and from the last follow-up interview, for controls.

The odds ratio (OR), computed in unconditional logistic regression models, measured the magnitude of the association between NEP use at entry and HIV seroprevalence (first scenario) (19, 20). The hazard ratio, computed in Cox's proportional hazards regression models, was the estimate of effect for NEP use in all cohort analyses (second scenario) (21, 22). For the nested case-control analyses, due to the matched na-

ture of the data, conditional logistic regression models were computed to derive ORs for the association between NEP use and HIV risk (third scenario) (19, 20).

Adjustment for confounders

A major concern in the assessment of a statistical association between NEP participation and risk of HIV seropositivity is the potential existence of confounders related to drug utilization and sexual practices. Confounders were identified empirically, i.e., by comparing the magnitude of the association between NEP use and HIV risk in regression models containing NEP use adjusted for the covariate of interest with that observed in crude models where NEP was the sole variable. The ratio between the adjusted and the crude estimates gauged the magnitude of the confounding effect for a given variable. An empirical confounder was considered any variable whose model produced an adjusted estimate for NEP that was either higher or lower than the crude estimate for NEP by at least two specified thresholds, 10 percent and 4 percent. Multivariate models of increasing complexity were computed by adding the confounders selected at the 10 percent level followed by those at the 4 percent level, corresponding respectively to models 2 and 3 in tables 2-5. In all analyses, covariate data were always derived from the same interview eliciting information on NEP use.

RESULTS

Seroprevalence analysis

Most subjects recruited in the study were male ($n = 1,274$, 79.7 percent). The mean age at entry was 32.2 years (median 32 years). Women were slightly younger (28.9 vs. 33 years) with half of them (162 of 325) reporting involvement in prostitution. Most participants reported consumption of multiple drugs lasting an average of 9.1 years, with cocaine the drug of choice for 64.2 percent of them; 82 percent reported having injected drugs in the previous month. Seven hundred sixty-seven (48 percent) IDUs reported NEP attendance at entry.

In table 1, the differences between NEP attenders and nonattenders are outlined, and NEP attenders are defined as those who reported having obtained their clean equipment at least once in a NEP in the 6 months before enrollment in the study. Prevalences of HIV and hepatitis B markers were significantly higher among NEP attenders; they were younger, had a lower income, and had been in treatment for addiction less frequently. They reported homo- or bisexual orientation and involvement in prostitution activities more frequently. In general, NEP attenders reported higher frequencies of risk behaviors related to drug injection.

TABLE 1. Characteristics of subjects according to their needle exchange program (NEP) attendance at study entry among intravenous drug users in Montreal, Quebec, Canada, 1988-1995*

Variables	NEP attenders (n = 767) (48%)	NEP non- attenders (n = 832) (53%)	p value†
HIV‡ seropositive	16	5.8	<0.001
anti-HBC‡ positivity	59	45.7	<0.001
Gender			
Male	81	78.5	0.22
Female	19	21.5	
Age (years)			
≤25	21.8	14.5	0.002
26-30	23	26.8	
31-35	25.8	27.8	
≥36	29.5	30.9	
Income (Canadian dollars)			
<10,000	38.7	32.4	0.003
10-24,999	32.5	30.3	
25-49,999	15.5	21.8	
≥50,000	13.4	15.5	
Homo-/bisexual reported orientation	11.1	7.5	0.01
Have ever engaged in prostitution activity	26.6	19	<0.001
Cocaine as drug of choice (vs. other)	65.4	63.2	0.6
Presently in treatment for addiction	37.4	61.3	<0.001
No. of injections previous month			
0	13.3	22.1	<0.001
1-29	24.1	28.5	
30-100	34.2	26.1	
>100	28.4	23.3	
Borrowed IV‡ equipment in the last 6 months	78.2	72.1	0.005
Disinfected IV equipment with "javel" last 6 months	57.4	25.7	<0.001
Used IV drugs in shooting galleries last 6 months	22.9	12.7	<0.001
Practiced booting in the last 6 months	25.7	18.8	<0.001
No. with three or more HIV- positive acquaintances	30.4	16.9	<0.001
Shared IV equipment with HIV-positive partner	14.7	6.9	<0.001

* All data shown are percentages.

† Significance from chi-square test.

‡ HIV, human immunodeficiency virus; HBC, hepatitis B core antigen; IV, intravenous.

There were no significant differences between the two groups for language, living status (alone vs. with other people), schooling, number of recent sexual partners, drug of choice, drug use in prison, and number of recent intravenous users from whom they had borrowed syringes. Borrowing was defined as either borrowing a used syringe from another person or using a used syringe from an unknown origin. Borrowing

from an HIV-seropositive person is based on the reported HIV status of the lender.

In table 2, the association between NEP participation and seropositivity at entry for all subjects and for males only, with additional stratification for sexual orientation, is shown. All minimally adjusted ORs (controlling for age, entry period, gender, and language, taken as a priori confounders) indicate moderate but significant higher risks associated with NEP use that were of comparable magnitude across all sexual strata. The additional and incremental two-step adjustment for empirical confounders (10 percent threshold for OR2 and 4 percent threshold for OR3 as described in Methods) reduced the magnitude of the associations but still revealed consistent risk elevations in all subsets.

Incidence analysis

Seronegative subjects included in the cohort study ($n = 974$) were different from those lost to follow-up ($n = 377$) on the following parameters: the proportion of male subjects (81 vs. 74 percent) and francophones (80 vs. 72 percent), declaring a lower income (11.5 vs. 21 percent), cocaine as drug of choice (64 vs. 57 percent), sharing in the last 6 months (78 vs. 68 percent), having more than two sharing partners in the last month (23 vs. 17 percent), and getting syringes and needles at the drug dealer (57 vs. 33 percent). Subjects lost to follow-up more often reported sharing with an HIV-positive partner (11 vs. 7 percent). There were no differences for the following variables: mean age, prostitution, getting syringes and needles from pharmacies, injecting in shooting galleries, and attending a NEP.

With 89 incident cases of HIV seroconversion during follow-up, overall incidence was 5.1 per 100 person-years (95 percent confidence interval (CI) 4.1-6.2). Incidence was 7.9 per 100 person-years (95 percent CI 6.0-10.2) among NEP attenders and 3.1 per 100 person-years (95 percent CI 2.1-4.4) among non-attenders. The cumulative probability of HIV seroconversion during follow-up according to NEP participation can be seen in figure 1. The difference between the two curves is highly significant ($p < 0.0001$, log rank test). In table 3, it can be seen that although the nearly threefold elevation in risk associated with NEP use at entry is considerably reduced upon adjustment by empirical confounders, hazard ratios remain significantly greater than unity for all subjects and for males only, indicating that NEP use during the 6 months before entry is a predictor for HIV seroconversion during follow-up in the cohort.

TABLE 2. Odds ratios (ORs) and 95% confidence intervals (CIs) of human immunodeficiency virus (HIV) seropositivity among injection drug users at enrollment associated with participation in needle exchange program within the last 6 months in Montreal, Quebec, Canada, 1988–1995

Subjects included in the analysis	No.	OR1*	95% CI	OR2†	95% CI	OR3‡	95% CI
All subjects	1,599	3.1	2.2–4.5	2.3	1.6–3.4	2.2	1.5–3.2
Heterosexuals	1,147	2.9	1.8–4.6	2.3	1.4–3.7	2.1	1.3–3.5
Homosexuals and prostitutes	447	2.7	1.5–4.8	2.0	1.1–3.7	1.9	1.0–3.6
All male subjects	1,274	3.6	2.4–5.3	2.7	1.8–4.1	2.5	1.6–3.8
Heterosexuals	1,000	3.3	2.0–5.4	2.6	1.5–4.3	2.4	1.4–4.1
Homosexuals and prostitutes	270	3.0	1.5–6.1	2.4	1.1–5.2	2.4	1.0–5.4

* Adjusted for age, entry period, gender (for all subjects only), and language.

† Adjusted for variables above and additionally for number of acquaintances known to be HIV positive, treatment for addiction, and other sources of intravenous (IV) equipment (pharmacy, shooting gallery, dealer) in the last 6 months.

‡ Adjusted for all of the above and additionally for number of times IV drugs were used in previous month, number of times new IV equipment was used in previous month, sharing IV equipment with an HIV-positive person, living status, and drug of choice.

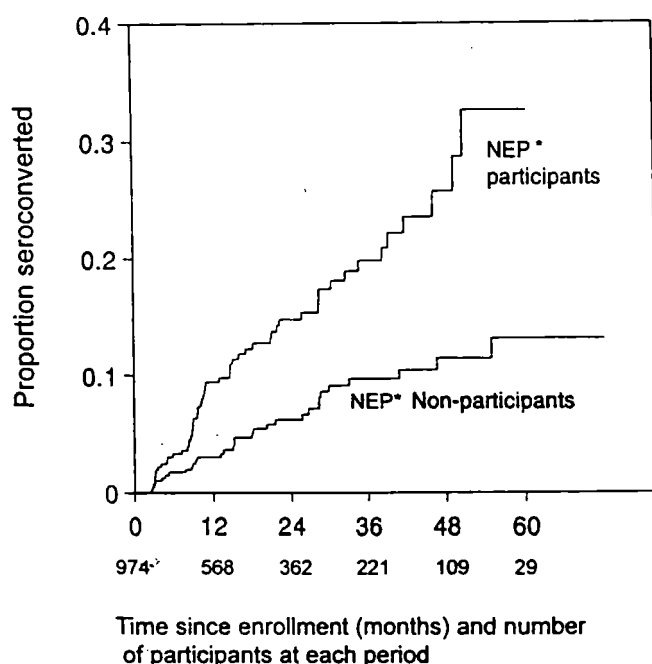


FIGURE 1. Cumulative human immunodeficiency virus seroconversion among needle exchange program (NEP*) participants and nonparticipants in the Montreal Saint-Luc cohort, Canada, between 1988 and 1995.

Nested case-control analysis

In table 4, the results of the nested case-control analysis can be seen, with 88 seroconversion cases and their 320 matched controls (one case that had no controls fulfilling the matching criteria was excluded) based on use of the questionnaire at the time of seroconversion. In the nested case-control analysis, participation was further categorized as exclusive or nonexclusive, depending on whether subjects also obtained their intravenous equipment from sources other than the NEP, e.g., pharmacies, dealers, friends, and in shooting galleries. There were substantial risk eleva-

tions among NEP users, both exclusive and nonexclusive, that persisted after adjustment for confounders, for all subjects, and for males only.

We also investigated whether consistency of NEP attendance influenced risk of HIV seroconversion in the cohort using the information on NEP attendance from baseline and follow-up interviews. Consistent attenders were defined as those who reported some NEP attendance at all visits, whereas those with no reported NEP attendance in any of the interviews were considered nonattenders. Those reporting intermittent NEP attendance were subdivided according to the proportion of interviews with reported NEP attendance. Consistent attenders, when compared with nonattenders and intermittent attenders at baseline, were more likely to identify cocaine as their drug of choice (84.6 percent), had injected more often in the last month (76 percent with 30 injections or more), had more sharing partners in the last month, reported more booting in the last 6 months, and reported getting their equipment less often at shooting galleries. However, they had used brand new equipment more often in the previous month and had disinfected their equipment more often in the last 6 months. As shown in table 5, there was a clear tendency for risks of seroconversion to increase with frequency of NEP use over time. Upon adjustment for confounders, significant elevations remained only among self-reported consistent users for all subjects and for males only.

In searching for interaction effects between NEP attendance and other variables, period of admission into the cohort was found to yield a marginally significant interaction with NEP ($p = 0.06$). The association between HIV seroconversion and NEP attendance appears to have decreased in magnitude for those recently admitted into the cohort. After stratifying the cohort by entry periods, the following crude hazard ratios for NEP attendance were found: Septem-

TABLE 3. Hazard ratios (HRs) and 95% confidence intervals (CIs) of becoming seropositive to the human immunodeficiency virus during follow-up associated with participation in a needle exchange program within the last 6 months at entry in a cohort of injection drug users in Montreal, Quebec, Canada, 1988–1995*

Subjects Included in the analysis	No.	HR1†	95% CI	HR2‡	95% CI	HR3§	95% CI
All subjects	974	2.6	1.7–4.0	1.8	1.1–2.9	1.7	1.0–2.7
Males only	787	3.1	1.9–5.0	2.1	1.3–3.5	1.9	1.1–3.3

* Results by Cox proportional hazards regression.

† Adjusted for age, entry period, gender (for all subjects only), and language.

‡ Adjusted for variables above and additionally for drug use during occasional encounters in last 6 months, ever having borrowed intravenous (IV) equipment from an HIV-positive person, treatment for addiction, and other sources of IV equipment (pharmacy, shooting gallery, dealer) in the last 6 months.

§ Adjusted for all of the above and additionally for drug of choice, number of times IV drugs were used in previous month, drugs used with regular partners in last 6 months, drug used at dealer's in previous month, number of times new IV equipment was used in previous month, number of acquaintances known to be HIV positive, living status, and practice of disinfection.

TABLE 4. Odds ratios (ORs) and 95% confidence intervals (CIs) of becoming seropositive to the human immunodeficiency virus during follow-up in a cohort of injection drug users between 1988 and 1995, associated with participation in a needle exchange program 3 months before the last visit*

Needle exchange program use	No.	OR1†	95% CI	OR2‡	95% CI	OR3§	95% CI
All subjects	408						
Nonusers	273	1.0	Referent	1.0	Referent	1.0	Referent
Users, nonexclusive	104	6.8	3.9–12.1	3.3	1.6–6.7	4.2	1.6–11.0
Users, exclusive	31	7.8	3.1–19.2	4.2	1.5–11.5	6.5	1.8–23.8
Males only	367						
Nonusers	240	1.0	Referent	1.0	Referent	1.0	Referent
Users, nonexclusive	96	6.1	3.4–11.1	3.5	1.6–7.5	4.2	1.5–12.2
Users, exclusive	31	7.2	2.9–17.9	4.3	1.5–12.1	10.0	2.3–43.9

* Results from the nested case-control analysis by conditional logistic regression.

† From analysis conditioned on age, gender, year of admission, and language.

‡ Adjusted additionally for intravenous (IV) drug use since last visit, number of times IV drugs were used in previous month, borrowed IV equipment since last visit, number of times new IV equipment was used in previous month, and practice of disinfection.

§ Adjusted for variables above and additionally for drug of choice, drug use alone in last 3 months, drug use with regular partners in last 3 months, drug use during occasional encounters in last 3 months, drug use with friends in last 3 months, number of partners from whom IV equipment was borrowed in last month, borrowed IV equipment from an HIV-positive person since last visit, number of acquaintances known to be HIV positive, practiced booting in last 3 months, drug use while in prison, and living status.

ber 1988 through September 1991, 2.73 (95 percent CI 1.6–4.6); January 1991 through December 1993, 3.7 (95 percent CI 1.2–11.1); January 1994 through January 1995, 0.7 (95 percent CI 0.16–2.8).

DISCUSSION

As shown by the seroprevalence data at entry into the cohort, the Montreal NEP appears to have attracted subpopulations of IDUs with a higher baseline rate of HIV and hepatitis B infections. Consistent NEP attenders also have a higher profile of high risk behaviors than other IDUs.

In spite of these differences among NEP attenders and nonattenders, a positive association between NEP attendance and risk of HIV infection emerged consistently in the three risk assessment scenarios of this study. Recent NEP attendance, a single exposure vari-

able, was a strong predictor of the risk of seroconversion during follow-up among those initially seronegative. In addition, NEP attendance during follow-up was also predictive of seroconversion. Most of the excess risk appeared to be experienced by those reporting consistent and exclusive attendance at NEPs, which was their primary source of new intravenous equipment.

We hypothesized initially that the direction of this association represented simply the net confounding effect by behavioral characteristics biasing the NEP use-risk association toward an effect that would be opposite from the expected protective one. Interviews conducted at entry and on multiple opportunities during follow-up elicited detailed information on numerous potential confounders. These variables were identified empirically by comparing crude and adjusted

TABLE 5. Odds ratios (ORs) of becoming seropositive to the human immunodeficiency virus during follow-up among injection drug users associated with overall history of participation in a needle exchange program in Montreal, Quebec, Canada, 1988–1995*

Needle exchange program	No.	OR1†	95% CI	OR2‡	95% CI	OR3§	95% CI
All subjects	408						
Nonusers	129	1.0	Referent	1.0	Referent	1.0	Referent
Users <50% of time	110	1.3	0.5–3.2	0.9	0.3–2.7	0.7	0.7–2.5
Users ≥50% of time	104	3.9	1.7–8.7	2.6	1.0–6.7	2.2	0.6–5.7
Consistent users	65	22.9	8.4–62.3	10.2	3.3–31.5	13.1	2.7–41.0
Males only	367						
Nonusers	116	1.0	Referent	1.0	Referent	1.0	Referent
Users <50% of time	95	1.4	0.5–3.8	0.9	0.3–2.8	0.7	0.2–2.8
Users ≥50% of time	93	4.0	1.7–9.6	2.7	1.0–7.4	2.9	0.6–6.5
Consistent users	63	21.8	7.7–61.5	10.2	3.1–33.1	19.1	2.6–50.1

* Results from the nested case-control analysis by conditional logistic regression.

† From analysis conditioned on age, gender, year of admission, and language.

‡ Adjusted for intravenous (IV) drug use since last visit, number of times IV drugs were used in previous month, borrowed IV equipment since last visit, number of times new IV equipment was used in previous month, and practice of disinfection.

§ Adjusted for variables above and additionally for drug of choice, drug use alone in last 3 months, drug use with regular partners in last 3 months, drug use during occasional encounters in last 3 months, drug use with friends in last 3 months, number of partners from whom IV equipment was borrowed in last month, borrowed IV equipment from HIV-positive person since last visit, number of acquaintances known to be HIV positive, practiced booting in last 3 months, drug use while in prison, and living status.

estimates of effect for the NEP-risk association. All plausible sociodemographic, behavioral, and drug consumption variables available were examined as potential confounders.

Because of the low threshold for selecting empirical confounders, the regression models included an extensive list of covariates. This may have decreased the precision of the estimates of effect for NEP attendance, further adding an element of conservatism to our strategy. The fact that the association between NEP attendance and HIV infection risk persisted after being scrutinized with such a conservative analytical approach bolsters our conclusion that it is internally valid and merits further attention.

Before we address the possible implications of our study, it is important to consider its limitations. Our study is observational and was not specifically designed to evaluate the efficacy of NEP in preventing HIV infection. We cannot generalize its findings to other IDU populations in Montreal or elsewhere because of the type of recruitment and of the differences between participants and those lost to follow-up. It is also possible that despite the exhaustive data-driven process to identify confounders, some had been left unaccounted for in the analysis because they were absent from the list of variables derived from the interviews. However, this is unlikely, at least for individual variables, because our questionnaires probed repeatedly for detailed information on risk behaviors and other HIV determinants. Any irrelevant variable with respect to HIV risk that could be linked to NEP attendance would be unlikely to confound the associ-

ation because confounding ensues only if a factor is associated with the outcome as well as with the exposure.

Misclassification bias could explain our results if we assume that at least one of the following conditions occurred: 1) HIV-positive attenders falsely reported NEP participation, or 2) HIV-negative NEP attenders underreported participation. These are unlikely to have occurred, however, because subjects were unaware of their serologic status before the follow-up interviews.

Substantial misclassification of confounder variables would also lead to a decreased ability to control for their effects in the regression analysis. The extent of the impact of such a misclassification is difficult to predict.

Apart from the statistical issues described above, what are the possible explanations for our results? In our cohort, subject recruitment has relied mostly on self-selection based on informal word-of-mouth advertisement about the existence of our investigation. One possibility is that this method may have led to oversampling of high risk (HIV infection-prone) individuals among NEP attenders in the cohort, affecting the external validity of our study. Even if subjects lost to follow-up did not differ on NEP attendance, differential attrition might have occurred. However, it is reassuring that an independent study among IDUs recruited at CACTUS-Montreal has found seroprevalence and seroincidence rates comparable with those in our study despite use of a different methodology (23).

Differences in baseline prevalence between groups of IDUs have already been pointed out as a predictor for seroconversion in a study of HIV incidence in different cities of the United States (24). This study may have targeted a subpopulation of IDUs attending NEP who are at particularly high risk for the propagation of HIV.

NEPs are often developed within a global organization of prevention and care for drug users. In Montreal, NEPs have been implemented in an environment where needles and syringes are readily available through pharmacies and where policies encouraging pharmacists to sell intravenous equipment to IDUs were introduced in 1988, a year before the first NEP (25). Among opiate users from Manchester in the United Kingdom, the access to sterile equipment through local pharmacies was thought to have reduced the effects of a NEP on sharing habits (26).

It is also conceivable that through a combination of factors, the dynamics in Montreal might have favored HIV acquisition among NEP attenders. NEPs were developed as multifaceted prevention programs offering additional services such as primary health care, support, and counseling. To achieve these goals, the exchange of needles and syringes in the various programs was deliberately limited in an effort to encourage multiple visits and binding to the program. CACTUS, the largest NEP in Montreal, has a needle and syringe exchange policy based on a ratio of one for one, with a maximum of 15 syringes exchanged per person per night. In view of the high risk population attending NEPs, the number of needles distributed may have been less than the actual number needed. Because of availability of clean equipment through pharmacies, which are often conveniently located in the neighborhood, NEPs might have attracted existing core groups of marginalized, high risk individuals. More importantly, NEP implementation, through new socialization among IDUs, also may have facilitated formation of new sharing networks, with the programs becoming gathering places for isolated IDUs. Nonuniform needle sharing among core group members of NEP attenders also may have contributed to the risk differentials seen in our study. The trends toward a decrease of the association over time in our study might be related to changes in the social dynamics around NEPs as well as to long-term effects of such programs.

In view of the higher baseline prevalence for NEP attenders, the risk of HIV acquisition per sharing episode with another NEP attender may be higher than for nonattenders. With a greater incidence around NEPs, sharing during the seroconversion phase may contribute further to HIV transmissibility because of

the high viral load in the donor blood during that period (27–29). The predominance of closely related and possibly more infectious HIV strains among NEP attenders is also another hypothesis to consider (30).

In summary, Montreal NEP users appear to have higher HIV seroconversion rates than NEP nonusers. This study also indicates that at least in Montreal, HIV infection is associated with NEP attendance. These findings cannot be explained solely on the basis of the concentration around NEPs of a higher risk IDU population with a greater baseline HIV prevalence. Since NEPs have been viewed as a credible preventive intervention for drug users who continue to inject (1, 2), we believe that caution is warranted before accepting NEPs as uniformly beneficial in any setting. Our investigation was not designed to address a possible causal relation between NEP attendance and HIV infection; its conclusions were derived purely from an observational rather than an experimental study design. NEP implementation involves complex dynamics of individual and collective behaviors that may have different and possibly deleterious effects on HIV transmission. The impact of NEPs may be much more context sensitive and locally dependent than previously realized. It is also possible that the apparent impact of a NEP might diminish over time (31). In Amsterdam, a comparison of the injecting behavior of drug users who seroconverted for HIV with a control group that did not seroconvert yielded no evidence overall of a protective effect, except possibly in the early stages of the program (32). It may be possible also that impact of a NEP may have a longer latency period.

Public health authorities have been informed of our findings, and measures have already been implemented at CACTUS since January 1995—notably, removal of the individual quota on syringe distribution. Our work firmly suggests that NEP programs should be fine-tuned to local needs. More studies are needed to elucidate the mechanisms implicated on the transmission of HIV around NEPs in Montreal or elsewhere and to further assess the potential advantages of this intervention. Such expanded studies should include viral load measures, molecular epidemiology analyses of HIV strains, and qualitative investigations of risk behaviors and networking around NEPs.

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Possible Title: Exchanging Ideas about Exchanging Needles

(Experiences from Canada with Drug Users and AIDS)

The Presidential Advisory Council on HIV/AIDS recently requested that Secretary Shalala issue a finding in support of needle exchange programs (NEPs). This was the latest in a series of efforts aimed at establishing a federal role in the funding of NEPs.

Although most Western democracies have embraced needle exchange as part of HIV prevention, a consensus has not emerged in the United States. This fall, after lengthy and contentious debate, Congress extended the existing ban on federal funding for NEPs. Among arguments Congressional opponents offered were studies we conducted in Montreal and Vancouver, both cities with large NEPs. Critics pointed to our studies as evidence that NEPs are ineffective at reducing the spread of HIV infection, and may even exacerbate the problem.

The result most misinterpreted from our studies is that we found drug users who use the NEPs have higher rates of HIV than those who don't. In Vancouver, when we tested over 1000 drug users, the HIV prevalence was 32% in those who ever used the needle exchange compared to 14% in those who never did. In Montreal, we found the rate of new infections was 8% per year in needle exchange attendees compared to 3% in non-attendees.

Have these findings finally revealed the true harmfulness of NEPs in spreading HIV as opponents would suggest? Not at all - indeed these results are not even surprising. *That's because we found the drug injectors who attend our NEPs are precisely those who practise the riskiest behaviors - sharing used needles with several other people. In Montreal and Vancouver, upscale drug users at lower risk of HIV can purchase clean needles from pharmacies. This together with the location of our NEPs in our inner cities means they cater to those at highest risk for HIV. That's a good thing - it means the intervention is targeted at those who need it most.*

Evaluating the effect of NEPs without accounting for other interventions and changes in the dynamics of the epidemic may prove to be a perilous exercise. In our cities, injected cocaine seems to be of paramount importance in HIV transmission. Consider this simple

observation: a sterile syringe from a NEP is only sterile until the first user injects. But during episodes of cocaine bingeing, users can inject up to 40 times daily. Place this in the context of homelessness or crowded, unfit housing, and one can see how social and environmental factors may be so potent that they can outweigh any protective effects of NEP or needle access at pharmacies.

Another contentious issue is that Vancouver has recently experienced a severe HIV outbreak among drug users despite a highly rated NEP which exchanges over 2 million needles annually. How, critics ask, could this have occurred unless the NEP was ineffective, or even harmful? The answer is not that NEPs cause harm, it is that they do not suffice.

In each of our cities, we estimate that five to ten million needles per year would be needed to meet the goal of having a clean needle used with every injection. Moreover, NEPs should be adjusted and linked to local settings, and we now understand that without adequate and accessible detoxification, counseling, treatment for addiction and health care, NEPs alone cannot stop the spread of HIV. Indeed, our public health officials are not rushing to close our NEPs; on the contrary, they are expanding them by adding more exchange sites, outreach services, and treatment and health care access. Perhaps, they are finally learning from the Dutch and Swiss that only a full continuum of harm reduction activities can ultimately address this complex problem.

To learn the impact of a NEP, the question is not whether its attendees have higher or lower rates of HIV than non-attendees; rather, it is whether the rate of HIV in all drug users would be higher or lower if there wasn't any NEP at all. Last year, a global study found that in 29 cities with NEPs, HIV in drug users decreased an average of 5.8% annually, while it increased an average of 5.9% annually in 51 cities without NEPs. For this and other reasons, at least six U.S. government funded reports have supported the effectiveness of NEPs.

We submit this for your consideration recognizing that as non-Americans, it is not our role to interfere in your country's domestic affairs. However, if our studies are being used in your debate, we simply ask that you interpret them correctly and we hope that you use them wisely.

(750 Words)

Dr. Julie Bruneau

Dr. Martin T. Schechter



March 5, 1998

Senator Patty Murray
U.S. Senate
111 Russell Senate Office Building
Washington, D.C. 20510

RE: Public Health Determination on Needle Exchange

Dear Senator Murray:

We are writing to encourage you to contact Secretary Shalala regarding the important role needle exchange efforts play in stemming the spread of HIV in Washington State. As you are aware, efforts to remove the Secretary's authority to lift the ban on federal funding for needle exchange programs were stalled during the last Congressional session. You were instrumental in reaching the compromise which established the current moratorium on the Secretary's ability to exercise her authority, but allowed for future action to be taken. As the nation's chief public health official, the Secretary still has the power to make a much-needed public health determination recognizing that needle exchange programs help prevent the spread of HIV among injection drug users and do not promote drug use. Making this determination sooner, rather than later, will help ensure that the debate over needle exchange programs focuses on science and public health, not politics. Please ask Secretary Shalala to make her public health determination on needle exchange immediately.

As a Washington State Senator, you are in a unique place to request the Secretary's public health determination. The first needle exchange program in the country was started in Tacoma, WA in 1988, and Washington is internationally recognized as a model for effective HIV prevention among injection drug users. Currently, there are needle exchange programs operating in Clark, King, Pierce, Snohomish, Spokane, Thurston, and Yakima counties. The success of needle exchange programs in Washington is clear to see. Seattle, which started a needle exchange program early in the epidemic, has an infection rate among injection drug users of 2-4%. On the other hand, cities that delayed or resisted the implementation of needle exchange programs, such as New York and Miami, have experienced HIV infection rates among drug users at 40-60%.

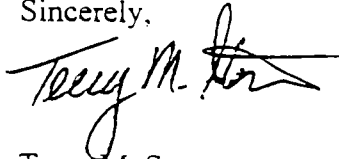
In addition to preventing the transmission of HIV, needle exchange programs are cost effective and act as a direct source of referral for drug treatment and other support services. The average lifetime cost of medical care for a single individual living with HIV/AIDS is approximately \$119,000, as opposed to an average of 10 cents for a clean needle which can prevent a new infection. In 1995, for example, the Tacoma-Pierce County Department of Public Health spent less than \$270,000 to dispense nearly one million clean needles. Clearly, prevention is a far less costly alternative to expensive AIDS care services. Studies conducted around the world, and by the United States Government itself, indicate that there is no evidence that needle exchange programs promote illegal drug use. In fact, needle exchange programs often recruit injection drug users into drug treatment programs. In Washington, the needle exchange program in

Tacoma is the single largest source of drug treatment referrals in all of Pierce County. In Seattle, needle exchange programs have helped more than 275 people enter drug treatment programs over the last three years.

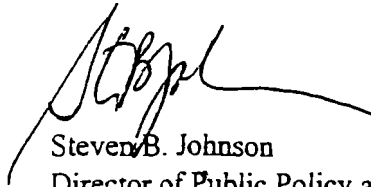
Public support for needle exchange is strong. According to a joint poll by the Republican polling agency "The Tarrance Group", and Democratic polling agency Lake Sosin Snell & Associates, a majority (55%) of Americans support needle exchange. A public opinion survey administered by the Kaiser Family Foundation and sponsored by the Department of Health found that a majority of Washington State residents (62% in 1995) support needle exchange programs as an HIV prevention effort. Clearly, both public health officials and the greater community recognize the mutual benefits needle exchange programs can deliver in the fight against the twin epidemics of substance abuse and HIV infection.

The success of needle exchange programs in Washington State can be replicated. We encourage you to contact Secretary Shalala and ask her to make an immediate determination regarding the clear public health benefits of needle exchange programs. In doing so, you will help ensure that public policy regarding needle exchange programs focuses on scientific research and evidence, rather than politics. Other states should have the opportunity to achieve the same benefits from needle exchange as we have experienced in Washington. Senator Murray, your leadership can help provide that opportunity. We look forward to your continued cooperation on this issue.

Sincerely,



Terry M. Stone
Executive Director



Steven B. Johnson
Director of Public Policy and Communications

Developing A Washington Response to the Vancouver, BC IDU Seroprevalence Workgroup Presentation Summary

On March 2, 1998, representatives from the Washington State Department of Health, AIDSNet Regions, Governor's Advisory Council on HIV/AIDS, Governor's Council on Substance Abuse, local health officers, and substance abuse treatment providers met to plan a statewide response to the recent outbreak of HIV among injection drug users (IDUs) in Vancouver, BC. Because of Vancouver's proximity and the likelihood of travel by IDUs and their sex partners along the I-5 corridor, there is widespread concern that HIV might spread into similar high-risk populations in Washington State. The purpose of this interagency planning session was to identify factors which contributed to the outbreak in Vancouver, to examine existing sources of data among IDU in Washington State, to identify gaps in our current ability to monitor the spread of HIV and its determinants, and to augment surveillance and prevention activities targeting the communities at high risk of infection.

HIV seroprevalence among IDUs in Vancouver is estimated to have risen from < 3% prior to 1994 to 23% in 1996, despite the presence of the largest needle exchange program in North America. By mid-1997, the incidence of new infections in a cohort of 1,006 IDUs had risen to two per week (18.6% annual incidence rate).¹ The incidence of new infections in the Vancouver cohort began to decline after mid-1997 and is currently at 3-4% per year.

Don Des Jarlais, a chemical dependency expert from Beth Israel Hospital, New York, NY, reported that HIV epidemics of this magnitude among IDUs are not uncommon. Within a one-year period, seroprevalence rose from <10% to 30% among IDUs in New York City and from 2% to 40% in Bangkok, Thailand; in the year following introduction of HIV into the IDU community, seroprevalence rose to 40% in Edinburgh, Scotland, and to >50% in areas of northeastern India. He identified three factors which have been shown to contribute to rapid spread of infection: low AIDS awareness among IDUs, a high prevalence of venues such as "shooting galleries" and single room occupancy (SRO) hotels which promote shared injection equipment, and restricted access to sterile syringes.

Public health officials from Vancouver, BC, and representatives of the Downtown Eastside Youth Activities Society, which directs Vancouver's fixed-site and mobile needle exchange programs (NEPs), cited as determinants of the Vancouver outbreak the increased concentration of IDUs in a shrinking urban core; the high prevalence of unstable or transient housing (including SROs); an increase in the use of cocaine, which is associated with a greater frequency of injection than heroin; inadequate law enforcement contributing, among other things, to increased drug availability and a decline in the price of cocaine; lack of referral services for medical and addiction treatment; and elimination of funding in 1994 for the mobile needle exchange van which serviced one of the highest-risk IDU populations within the city.

Representatives of the Washington State Department of Health and the Seattle-King County Department of Public Health presented HIV counseling and testing data and results from blinded seroprevalence surveys conducted at STD clinics, drug treatment clinics, and state correctional facilities which suggest that seroprevalence among IDUs in Washington State and Seattle-King County (S-KC) has remained stable at $\leq 2\%$. Results of an ongoing cohort survey among more than 3,000 IDUs in Seattle-King County show an incidence of HIV infection of 0.2% from June 1994 through

1997, a rate of infection dramatically lower than in Vancouver. Some of the differences between the two communities cited by Kris Nyrop, Executive Director of Street Outreach Services, and other speakers were a preferential use of heroin over cocaine among IDUs in S-KC, a declining frequency of cocaine use in recent years among those enrolled in the survey, stricter law enforcement policies, a relative absence of "shooting galleries" and SRO hotels, a local IDU culture with minimal drug-sharing behaviors, and a more geographically dispersed drug-using community.

Dr. Stephanie Strathdee, of the BC Center for Excellence in HIV/AIDS, noted that 30 (2.5%) of the individuals in the Vancouver cohort survey reported being from Seattle, while nearly 1% of the cohort have reported that they have been to the Seattle area at least once since they enrolled in the survey. Of the 30 individuals who reportedly were from Seattle, the median age was 32 years, 87% were male, and 63% were Hispanic. The seroprevalence and seroincidence of HIV in these individuals was not different from the rest of the cohort.

Dr. Steye Jones, from the Centers for Disease Control and Prevention (CDC), reported that every state in the US has state or local drug paraphernalia and/or syringe prescription laws which prohibit the sale, possession, or distribution of syringes. Most of these regulations were enacted prior to the HIV epidemic. He cited evidence that decriminalization of possession of syringes results in decreased needle-sharing among IDUs and reduces the risk of transmission of HIV, hepatitis, and other blood-borne diseases among injection drug users (IDUs), their sexual partners, and their children.ⁱⁱ

Dr. Holly Hagan reported results from an ongoing evaluation of the Seattle-King County NEP which show a high rate of entry into drug treatment programs among new NEP users. New NEP users represent highest-risk users, with more frequent injections (3x/day) and a higher prevalence of needle-sharing (63%) in the previous month than regular or former NEP users. Results also suggest that there is a time-dependent effect of NEP on risk behaviors, with in-migration of high-risk users and out-migration of lower risk users. The most common reason cited by study participants for leaving the NEP was "not using drugs anymore."

According to Dr. Hanne Thiede, NEP users who entered drug treatment programs reduced their frequency of injections by 74%, as compared to a 32% reduction among those not in treatment. The effect of drug treatment translates into a reduction of sharing opportunities and a corresponding reduction in risk of disease transmission. The lowest incidence rate of hepatitis B was in former needle exchange users.

ⁱ Strathdee SA, Patrick DM, Currie SL, Cornelisse PGA, et al. Needle exchange is not enough: lessons from the Vancouver injecting drug use study.

ⁱⁱ Gostin LO, Lazzarini Z, Jones TS, Flaherty K. Prevention of HIV/AIDS and other blood-borne diseases among injection drug users. *Journal of the American Medical Association*, 1997;277:53-62.

DISEASE PREVENTION FACT SHEET
NEEDLE EXCHANGE
SEATTLE-KING COUNTY DEPARTMENT OF PUBLIC HEALTH

January, 1997

Q What is needle exchange?

A Needle exchange is a public health program for drug users. It is an important component of a comprehensive set of programs designed to reduce the spread of HIV/AIDS and other blood-borne infections among injection drug users, their families and communities. AIDS is the leading cause of death among American men aged 25 to 44. Nationally, about 2/3 of all new HIV infections stem from injection drug users: half from sharing needles, and the rest either from unprotected sex with an injection drug user or transmission from an infected mother to her fetus or newborn child.

Needle exchange programs provide new, sterile syringes in a one-for-one exchange for used, contaminated syringes. But needle exchange programs are not just about syringes. They also help drug users get into drug treatment and health care and provide important risk reduction information. Other services include counseling and testing for HIV infection and distribution of condoms.

Seattle's program began operating in 1989. Currently, the Health Department conducts exchange programs at three sites within Seattle and two sites in South King County. Two additional sites are operated by community-based service agencies in the University and Broadway Districts. Exchanges are staffed by paid Health Department employees and volunteers from the community.

Q Why are needle exchange programs offered?

A Needle exchange is one of the most effective AIDS prevention programs currently available for injection drug users who are not in treatment. Without a vaccine or a cure, prevention is the only tool we have to control the spread of HIV. The Health Department runs a needle exchange program for four basic reasons:

- Needle exchange reduces blood-borne diseases in our communities without increasing drug use. Studies have shown decreases in both the number of persons who become infected with HIV and the number of people who get hepatitis in communities that have needle exchange programs.
- Preventing HIV infection in injection drug users also prevents HIV in women and newborn children. Many women are at risk for HIV because of their own injection drug use or because they are sexual partners of injection drug users.
- By working with injection drug users, we can help them get into drug treatment.
- Finally, the Health Department safely disposes of all contaminated syringes turned in to the exchange. This reduces the number of discarded syringes on our sidewalks and in our bus stops, yards, parks and play grounds. Our goal is to get used syringes out of circulation as quickly as possible. The longer a syringe remains in circulation, the more opportunities there are for that syringe to pass on a blood-borne disease.

Q Are needle exchange programs successful?

A Yes. A recent study compared cities that had low rates of HIV infection among drug injectors with cities in which drug injectors had high rates of infection. The study found that each of the low rate cities had started needle exchange and prevention outreach programs early in the AIDS epidemic before AIDS could get a foothold. Most cities that responded early in the epidemic by implementing comprehensive needle exchange programs have kept infection rates among drug injectors below 5%, while rates of infection in cities like New York and Miami (where needle exchange began late or not at all) are between 40% and 60%. Infection rates among injection drug users in Seattle have remained stable over the last

seven years. The Health Department estimates that 2 to 4% of local drug injectors are infected with HIV. While there are many factors at work here, these figures strongly suggest that needle exchange has helped keep the numbers of infected low.

Q How much does needle exchange cost?

A Combined cost for needle exchange programs in Seattle-King County in 1997 is \$475,000. This compares with \$110,000 to \$120,000 in medical costs to care for just one person with AIDS from the time of infection to death. By preventing infections in just five people per year, the needle exchange more than pays for itself. By preventing HIV infections in just 1% of the injection drug users in King County, the program saves over \$17 million in AIDS-related medical costs. In this light, the exchange provides both a public health and an economic benefit to the citizens of Seattle and King County.

Q Who pays for the needle exchange?

A The needle exchange is funded by disease prevention funds provided by Washington State, King County and the City of Seattle. Relying on volunteer staff helps keep the cost of the needle exchange program low.

Q Is it legal to give out syringes?

A The Health Department doesn't give out syringes, we EXCHANGE them. And exchanging them was ruled legal by Washington State's Supreme Court in 1992. In a case filed by Spokane County, the court held that exchange programs are an appropriate HIV prevention measure and are legally sanctioned within the broad powers given to Public Health Officers to control disease in communities.

Q Is there any reason to think that needle exchange increases drug use?

A No. Evidence from several research studies shows that because of syringe exchange, more people get into drug treatment and that drug use does not increase. Every needle exchange in the United States recruits drug users into treatment. In Tacoma, the needle exchange is the single largest source of treatment referrals in all of Pierce County. In the last three years, Seattle's needle exchange has helped more than 275 people get into treatment.

Q Do most people support the syringe exchange program?

A Yes. The Washington State Department of Health conducted a series of random telephone surveys of Washington State residents over 18 years of age to describe people's knowledge, attitudes and beliefs about AIDS. The survey was conducted in 1988, 1991, 1993, 1995 and it is on-going. When state residents were asked if they would support a needle exchange program, 53% of persons interviewed in 1988 said yes. This support grew to 62% in 1995. In King County, 72% of those interviewed in 1995 reported support for needle exchange.

Virtually every scientific body that has studied needle exchange programs supports them: the U.S. Centers for Disease Control, National Research Council, National Commission on AIDS, General Accounting Office, National Academy of Sciences, American Medical Association and the American Public Health Association.

For further information on needle exchange, contact:

Seattle-King County Department of Public Health
Needle Exchange Program
400 Yesler Way, third floor
Seattle, Washington 98104

phone: (206) 296-4568
fax: (206) 296-4803





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Local News : Tuesday, Aug. 19, 1997

The crisis next door: HIV infection soars among needle-using drug addicts in Vancouver, B.C., prompting alarm in Seattle that cases of the AIDS virus may skyrocket south of the border, too

by Warren King
Seattle Times medical reporter

VANCOUVER, B.C. - Melba is about to jump out of her skin. Turning her head from side to side, a perpetual smile on her face, she sits down, stands up, then sits down again on the filthy windowsill of a battered hotel.

"I've been on a four-day run," she explains, embarrassed and flying high in the mid-afternoon heat of the Downtown Eastside, Vancouver's seamy drug district. "That's the only reason I'm so jumpy."

Melba, 28, is high on cocaine. She has been injecting about 20 hits a day, and her arms and legs are scarred with needle tracks and patches of dried blood.

She is also struggling with another threat to her life: the AIDS virus that courses through her thin body. It's the result, she says, of "somebody using my rig (syringe) when I was passed out in the alley."

Melba is at the center of what Vancouver health officials call a major public-health emergency: The HIV infection rate among needle-using drug users has jumped from 3 percent to 25 percent in less than three years. The rate could reach 60 to 70 percent in a few years, experts believe.

The increase is strongly linked to the increased availability of cocaine, which provides a relatively short high and leads to more frequent injections and sharing of infected needles.

Across the border and down Interstate 5, health officials in

Seattle are watching the situation in Vancouver with deep concern.

"We're quite worried," says Alonzo Plough, director of the Seattle-King County Department of Public Health. "I've seen before how quickly infection rates can change and how difficult they are to lower."

King County health workers already have passed out fliers warning drug users about the Vancouver epidemic and urging them not to share needles. And the King County Board of Health is meeting next month to discuss a plan to head off an epidemic.

Some worrying signs in Seattle

For now, the HIV infection rate among King County drug users is about 3 percent - where it has been for nearly 10 years. That's below the 10 percent level where the virus typically takes off and spreads quickly among addicts, their sexual partners and unborn babies.

But there are signs Seattle may be increasingly vulnerable to the escalating epidemic that has enveloped Vancouver's addict population:

-- An extensive Health Department study of Seattle drug users found that among Latinos and Native Americans, about 10 percent say their primary partners for sharing needles or for sex are from out of state. The rate is about 6 percent for others.

Officials don't know where most of the partners are from, but even a relatively low number from a highly infected area like Vancouver can send the infection rate here climbing. "It may be the beginnings of a trend," said Dr. Bob Wood, King County AIDS Control Officer.

-- Drug-treatment centers and the federal Drug Enforcement Agency in Seattle report a recent increase in the use of injected methamphetamines and heroin in the Seattle area. Methamphetamine, like cocaine, provides a relatively short high, and that leads to the use of many needles and a greater risk of sharing.

-- Hepatitis C, which is spread by sharing needles, infects about 90 percent of drug users both in Vancouver and Seattle. While it shows needle-sharing is occurring, officials hope the wider dispersal of drug users in King County would help prevent the rapid spread of HIV.

5,000 drug addicts in small area

Vancouver's drug users are anything but dispersed.

Walk southwest down West Hastings Street from Main, toward the popular tourist area, Gastown, and you think you're in New York's lower East Side, not squeaky-clean Vancouver. It is the

heart of the Downtown Eastside, where a 15-block area contains an estimated 5,000 drug addicts.

Cheap, dilapidated hotels that dot the area serve as drug "shooting galleries" and sites for drug dealing. Health workers say even small groceries and pawnshops have been caught selling drugs. Most stores are boarded up and almost all are covered with protective steel bars.

Police mostly leave the drug users alone, even when they shoot up in alleys and on the streets, but the heat is occasionally turned up on the dealers.

At 221 Main St., the Downtown Eastside Youth Activities Society operates the largest needle exchange in North America. Funded by British Columbia, the agency last year exchanged more than 2.3 million syringes in the small storefront and through three vans that cruise the city.

On a weekday, in the middle of the afternoon, traffic through the exchange is a steady stream of the desperately addicted. Fidgety and intense, they are eager for the next fix to help them feel normal again.

Seven users line up to drop handfuls of used syringes in the top compartment of a Plexiglas box. Each person recites a registration number, which has no name but lists birth date, sex and ethnicity, so the exchange can keep track of trends in drug use.

"I missed your smiling face yesterday," a tall young woman in sunglasses announces to exchange worker David, as he pulls a lever to drop the syringes into the lower compartment. He quickly keys her number, 2672, into the computer with one hand and gives her five new syringes with the other. "Good to see you, too," he said.

Number 6214, high on heroin, meticulously and very slowly caps every needle in his handful of syringes before dropping them in the box. "Take care," David gently tells the young man in shorts and white dress shirt. "What?" he said, seemingly puzzled by the advice. "Oh yeah, I will."

"Get more, get more condoms," a young woman tells her male companion, as she rubs her nose repeatedly and pulls at her T-shirt.

Many of the women support their habits with prostitution and almost all who visit the exchange grab a handful of condoms from a box on the counter. Other customers take small bottles of bleach and water to clean their "rigs" if they run out of new syringes.

A swarthy man with a ponytail argues with David when he won't supply him with dry, non-lubricated condoms, which are used by dealers to carry drugs. "If he can afford to deal drugs, he can afford to buy his own condoms," said Judy McGuire,

exchange manager.

Exchanges only part of the plan

With the Vancouver HIV rate steadily climbing, some critics have questioned whether needle exchanges are effective. Others in Canada and the United States have argued that government should have no part in facilitating illegal activity. A ban on the use of U.S. federal funds for needle exchanges has been in effect since 1988.

But McGuire and other health officials point out that after the Vancouver exchange was established, the HIV infection rate among needle users stayed at 3 percent for nearly nine years. Still, they concede more is needed.

"We've argued for years that needle exchanges are not a silver bullet," McGuire said. "They're necessary, but they're not sufficient to stop an epidemic."

A study led by Dr. Steffanie Strathdee of the University of British Columbia found this year that among 1,006 injection-drug users in Vancouver, about 40 percent of both groups - HIV-positive and HIV-negative users - had shared needles within the past six months. Major independent predictors of infection were the use of cocaine and unstable housing.

Needle exchanges "should be considered one component of a comprehensive program, including counseling, support and education," the researchers concluded.

The exchanges can be key factors in steering users toward drug detoxification and treatment. But the availability of help is far short of the demand. Only about 1 in 10 can get into detoxification in Vancouver, and only about 2,800 of the estimated 10,000 injection-drug users in British Columbia are in treatment.

King County has an estimated 12,000 to 18,000 users, but only 1,800 methadone-treatment slots for heroin users, who are the majority of needle users here. That includes the major treatment facilities, Evergreen Treatment Services and Therapeutic Health Services.

Advocating for increased state funding for treating uninsured users is one of the top proposals to be discussed by the King County Board of Health next month. Treatment is far more economical than the average \$140,000 it takes to treat a person with AIDS.

"If treatment on demand is the ideal, we're far from the ideal," said Plough, of the Seattle-King County Department of Public Health.

Other recommendations being presented to the board include:

-- Assessing the effectiveness of the county's five needle-exchange sites.

-- Continuing the county's tradition of decentralizing human services, including low-income housing and homeless shelters.

-- Improving outreach to Latinos and Native Americans, who appear to be at slightly higher risk of infection, and to youth, who are using hard drugs at younger ages.

-- Exploring and strengthening connections between King County's and Vancouver's HIV-prevention programs, so drug users will know about them and information can be better exchanged among health officials.

-- Exploring collaborations among health departments and facilities along the I-5 corridor.

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"There are clear differences between Seattle and Vancouver," said Plough. "But there's a lot of travel up and down I-5, and this is about as urgent a public-health issue as I've seen lately."

Warren King's phone message number is 206-464-2247. His e-mail address is: wkin-new@seattimes.com

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Needle exchange is not enough: lessons from the Vancouver injecting drug use study

Steffanie A. Strathdee^{*‡}, David M. Patrick^{†§}, Sue L. Currie^{*},
Peter G.A. Cornelisse^{*}, Michael L. Rekart^{†§}, Julio S.G. Montaner^{*§¶},
Martin T. Schechter^{*‡} and Michael V. O'Shaughnessy^{*¶#}

Objective: To describe prevalence and incidence of HIV-1, hepatitis C virus (HCV) and risk behaviours in a prospective cohort of injecting drug users (IDU).

Setting: Vancouver, which introduced a needle exchange programme (NEP) in 1988, and currently exchanges over 2 million needles per year.

Design: IDU who had injected illicit drugs within the previous month were recruited through street outreach. At baseline and semi-annually, subjects underwent serology for HIV-1 and HCV, and questionnaires on demographics, behaviours and NEP attendance were completed. Logistic regression analysis was used to identify determinants of HIV prevalence.

Results: Of 1006 IDU, 65% were men, and either white (65%) or Native (27%). Prevalence rates of HIV-1 and HCV were 23 and 88%, respectively. The majority (92%) had attended Vancouver's NEP, which was the most important syringe source for 78%. Identical proportions of known HIV-positive and HIV-negative IDU reported lending used syringes (40%). Of HIV-negative IDU, 39% borrowed used needles within the previous 6 months. Relative to HIV-negative IDU, HIV-positive IDU were more likely to frequently inject cocaine (72 versus 62%; $P < 0.001$). Independent predictors of HIV-positive serostatus were low education, unstable housing, commercial sex, borrowing needles, being an established IDU, injecting with others, and frequent NEP attendance. Based on 24 seroconversions among 257 follow-up visits, estimated HIV incidence was 18.6 per 100 person-years (95% confidence interval, 11.1–26.0).

Conclusions: Despite having the largest NEP in North America, Vancouver has been experiencing an ongoing HIV epidemic. Whereas NEP are crucial for sterile syringe provision, they should be considered one component of a comprehensive programme including counselling, support and education.

AIDS 1997, 11:F59–F65

Keywords: HIV-1, injecting drug users, incidence, prevalence, needle exchange, needle sharing, harm reduction

Introduction

Vancouver introduced a legal, free-standing needle exchange programme (NEP) and a street nurse pro-

gramme in 1988 and 1989, respectively [1,2]. At that time, the estimated HIV prevalence was 1–2% among the city's population of 6000–10 000 injecting drug users (IDU) [3]. Vancouver's NEP appears to be the

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Date of receipt: 28 February 1997; revised: 21 March 1997; accepted: 25 March 1997.

largest in North America, having exchanged over 1 million needles per year since 1993, and 2.3 million in 1996. Until recently, NEP was considered to be a major factor accounting for Vancouver's low HIV prevalence rate [4]. In 1993, among 16 NEP in North America that were independently evaluated by the US Centers for Disease Control and Prevention, the Vancouver NEP ranked in the top three in terms of the number of syringes exchanged and returned, the estimated proportion of IDU reached, and number of client referrals to drug treatment and support services [5].

However, following an initial period of stable, low HIV prevalence, a rapid increase in HIV infection among IDU has been documented in Vancouver since September 1994. Surveillance of HIV testing data in the province of British Columbia indicated that the proportion of self-identified IDU testing HIV-seropositive rose from 2 to 7% in an 18-month period [6]. As a result, in October 1994 the street nurse programme was bolstered. In addition, centralized bulk purchase of syringes for all 14 NEP in British Columbia was undertaken by the provincial government, allowing NEP to provide syringes in sufficient numbers to meet client needs. Although sterile syringes are exempt from paraphernalia laws in Canada, deregulation of syringe sales in British Columbia pharmacies was undertaken in December 1995 to further expand syringe access to IDU.

An outbreak investigation was conducted in 1995, which found needle sharing and social determinants such as unstable housing to be independently associated with recent HIV seroconversion among Vancouver's IDU [6]. Concern regarding the potential for continued HIV transmission in Vancouver's IDU population prompted the initiation of a new cohort study in 1996. Herein, this study reported upon baseline prevalence of HIV and hepatitis C virus (HCV) and associated risk behaviours among 1006 IDU, as well as first estimates of HIV incidence.

Methods

Study sample

Beginning in May 1996, persons who had injected illegal drugs at least once in the previous month and resided in the Greater Vancouver region were recruited into the Vancouver IDU Study through self-referral and street outreach. Evidence of recent injecting drug use was required by inspection of needle tracks. Eligible subjects provided written informed consent. At the baseline visit and semi-annually thereafter, subjects provided blood samples for HIV and HCV antibody testing, and underwent an interviewer-administered questionnaire. HIV tests reactive on enzyme-linked

immunosorbent assay were confirmed by Western blot. Purified protein derivative (PPD) tuberculin skin testing was also performed at baseline. Subjects were reimbursed CDN\$ 20 for each study visit, at which time referrals were provided for universal medical care, HIV/AIDS care, available drug and alcohol treatment, and counselling.

Study instrument

The study instrument was developed from a questionnaire used in our previous case-control investigation [6,7]. Questionnaires were administered by trained interviewers, all of whom were blind to the HIV serostatus of participants. Questionnaire information pertained to risk behaviours and living conditions in the previous 6 months. Detailed information was collected on demographics, injecting and non-injecting drug use, borrowing and lending of needles and other paraphernalia, re-use of one's own needle, syringe disinfection, source of needles, access and barriers to clean needle use, attendance at two local NEP, incarceration, housing, self-reported frequency of HIV testing, drug treatment, methadone maintenance and other drug/alcohol programmes.

Since our previous investigation revealed that attendance at shooting galleries *per se* was not a common practice [7], respondents were asked whether they had injected in places where they 'generally did not know the people and there was injecting in groups'. Persons who reported injecting for the first time in the previous 2 years were considered new IDU; the remainder were considered established IDU. Sexual behaviour and condom use were assessed for regular, casual and sex trade partners of the same and opposite sexes. Finally, subjects were asked about a variety of mental and social issues, including an abbreviated seven-item version of the Center for Epidemiological Study Depression Scale (CES-D) [8], suicidal ideation, sexual abuse, and self-reported diagnosis of mental illness.

Statistical analysis

IDU who tested HIV-seropositive at enrolment were compared with those who tested HIV-negative using contingency table analysis for categorical variables, and the Wilcoxon rank-sum test for continuous variables. NEP attendance was considered as follows: (i) ever attending any NEP, and (ii) frequent versus less frequent attendance (i.e., more than once per week versus less frequently). The latter categorization was chosen following inspection of the distribution of self-reported attendance. As in previous analyses [6,7], unstable housing was defined as living primarily in a hotel, boarding room, hostel, transition house, jail or on the street in the previous 6 months. CES-D scores were summed, and scores above the 75th percentile were considered to represent elevated depression scores.

Independent predictors of HIV prevalence at baseline were assessed using unconditional logistic regression. Variables that were significant at the 5% level in univariate models were entered into multivariate models in a stepwise, hierarchical fashion. In the final model, all relevant two-way interactions were evaluated. HIV incidence was calculated based on the incidence density approach, in terms of person-years of observation. All 95% confidence intervals (CI) were calculated based on the Poisson distribution.

Results

By February 1997, 1006 eligible IDU had completed baseline interviews and provided blood specimens for HIV and HCV antibody testing. Baseline HIV preva-

lence was 23.2% (95% CI, 20.6–25.8), of whom 58% were previously aware of their HIV-positive serostatus. HCV serology was conducted on the first 500 participants only, among whom HCV prevalence was 88% (95% CI, 85.2–90.8). PPD skin test reactivity was 25%.

Among 257 subjects who tested HIV-negative at baseline and attended their first semi-annual follow-up visit, 24 seroconversions were confirmed among 129.4 person-years of observation, yielding an estimated HIV incidence of 18.6 per 100 person-years (95% CI, 11.1–26.0). As of 28 February 1997, the overall follow-up rate among those who were eligible to return was 83%. Subjects eligible for follow-up who had not yet returned did not differ from those who had returned with respect to gender, ethnicity, frequency of injection, types of drugs used, or frequency of NEP attendance; however, they were significantly younger ($P = 0.01$).

Table 1. Comparison of HIV-positive and HIV-negative injecting drug users (IDU) at baseline in the Vancouver IDU Study ($n = 1006$).

Variable ^a	n (%) ^b		Total	P ^c
	HIV-positive subjects (n = 233)	HIV-negative subjects (n = 773)		
Sex				
Male	135 (58)	518 (67)	653 (65)	0.02
Female	96 (42)	257 (33)	353 (35)	
Sociodemographics				
Median (range) age (years)	34 (16–55)	35 (14–58)	35 (16–58)	0.64
Ethnicity				0.01
White	139 (60)	518 (67)	657 (65)	
Native	80 (34)	192 (25)	272 (27)	
Other	14 (6)	63 (8)	77 (8)	
Unstable housing	165 (72)	454 (59)	619 (62)	0.001
Education (< high school)	201 (86)	617 (80)	818 (81)	0.03
Incarceration	78 (33)	241 (31)	319 (32)	0.51
High depression score	70 (30)	208 (27)	278 (28)	0.35
Homo-/bisexual activity (men only)	36 (27)	109 (21)	145 (22)	0.20
Non-consensual sex ever	99 (44)	270 (36)	369 (37)	0.03
IDU sex partner	74 (32)	236 (30)	310 (31)	0.72
Been paid for sex	74 (32)	161 (21)	235 (23)	< 0.001
Drug-using behaviours				
Median (range) age at first injection	19 (7–51)	18 (9–51)	18 (7–51)	0.73
Main drug injected				< 0.001
Cocaine	167 (72)	470 (62)	637 (64)	
Heroin	34 (15)	213 (28)	247 (25)	
Speedball	32 (14)	81 (11)	113 (11)	
Injecting with others	178 (76)	512 (67)	690 (69)	0.005
Established IDU (>2 years)	213 (91)	628 (81)	841 (84)	< 0.001
Attend NEP (ever)	218 (96)	691 (91)	909 (92)	0.01
Frequent NEP attendance (more than once per week)	189 (81)	544 (71)	733 (73)	0.002
NEP most frequent source of syringes	186 (80)	591 (77)	777 (78)	0.33
Obtained syringes from pharmacy	112 (48)	364 (47)	476 (47)	0.79
Cited any difficulties obtaining sterile syringes	64 (28)	176 (23)	240 (24)	0.35
Cited difficulties purchasing syringes from pharmacies	55 (32)	169 (31)	224 (31)	0.70
Borrowed used needles (ever)	175 (76)	509 (67)	684 (69)	0.007
Borrowed used needles	95 (41)	304 (39)	399 (40)	0.69
Lent used needles	88 (39)	293 (40)	381 (40)	0.89
Consistent bleach use ^d	10 (11)	76 (25)	86 (22)	0.003
Methadone maintenance (ever)	45 (19)	138 (18)	183 (18)	0.61
Current methadone maintenance	34 (15)	84 (11)	118 (12)	0.12

^aUnless otherwise stated, behaviours refer to previous 6 months. ^bUnless otherwise indicated. ^cBased on χ^2 tests. ^dRestricted to 381 IDU who reported borrowing used needles. NEP, Needle exchange programme.

Table 2. Final multivariate logistic regression model of predictors of HIV-positive serostatus at baseline among injecting drug users (IDU) in Vancouver.

Variable	Adjusted odds ratio (95% CI)	P
Unstable housing*	1.61 (1.15-2.98)	0.005
Education (< high school)	1.79 (1.14-2.82)	0.006
Commercial sex*	1.66 (1.18-2.35)	0.008
Ever used borrowed needles	1.49 (1.04-2.14)	0.03
Inject with others*	1.62 (1.13-2.32)	0.008
Established injector*	2.24 (1.34-3.74)	0.002
Frequent NEP* attendance (more than once per week)	1.68 (1.13-2.5)	0.011

*Based on previous 6 months. *First injection >2 years previously. NEP, Needle exchange programme.

Demographic and behavioural characteristics at baseline for the 1006 IDU are shown in Table 1. Of these, the majority were men (65%); however, subjects testing HIV-positive at baseline were more likely to be women ($P = 0.02$). Although most subjects were white (65%), HIV-positive subjects were disproportionately of Native origin. HIV-positive subjects were significantly more likely to have less than a high school education, unstable housing, and to reside in a downtown Vancouver neighbourhood, which is the poorest postal district in Canada.

With respect to drug use, the most frequently injected drug was cocaine, which was more common among HIV-positive IDU ($P < 0.001$; Table 1). Relative to HIV-negative IDU, HIV-positive IDU were significantly more likely to be established IDU, were more likely to report engaging in commercial sex work, and

were more likely to inject with others. The proportions of HIV-positive and HIV-negative IDU who reported lending and borrowing used needles in the previous 6 months were nearly identical, regardless of self-reported HIV serostatus. Almost one-half (45%) reported sharing other injection paraphernalia.

HIV-positive IDU were more likely to have ever attended NEP, and to attend NEP on a more regular basis, compared with HIV-negative IDU. However, there were no differences between these groups with respect to self-reported barriers in accessing sterile injection equipment, or difficulties purchasing syringes from pharmacies. Almost one-half of HIV-positive and HIV-negative IDU reported purchasing syringes from pharmacies in the previous 6 months. Despite widespread needle availability, however, subjects reported re-using their own needle a median of three times [interquartile range (IQR), 2-4]. A conservative estimate of injection frequency based on regular drug use patterns was 2.5 injections per day (IQR, 1-6). There were no differences between HIV-positive and HIV-negative IDU in terms of current or previous enrolment in methadone maintenance or other drug/alcohol programmes, or difficulties accessing drug treatment.

Multiple logistic regression was conducted in a hierarchical stepwise fashion to identify independent predictors of HIV-positive serostatus (Table 2). In the final model, sociodemographic variables that remained significantly associated with HIV-positive serostatus were unstable housing and low education. In examining

Table 3. Profile of documented seroconverting injecting drug users (IDU) observed in the Vancouver Injection Drug User Study*.

	Sex	Age (years)	Race	New IDU†	Main source of syringes	Difficulty accessing syringes	Drug of choice	Shared injection equipment	Housing
1	Male	48	White	No	NEP	No	Methadone	Yes	Unstable
2	Female	46	Native	No	NEP	No	Heroin	Yes	Unstable
3	Male	36	Native	No	NEP	No	Cocaine	Yes	Unstable
4	Female	43	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
5	Female	44	White	No	NEP	No	Cocaine/heroin	No	Unstable
6	Male	40	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
7	Male	46	White	No	NEP	Yes	Cocaine/heroin	No	Unstable
8	Male	35	Native	No	NEP	No	Cocaine	Yes	Unstable
9	Male	21	White	Yes	NEP	No	Cocaine/heroin	Yes	Unstable
10	Female	42	White	Yes	NEP	Sometimes	Cocaine/heroin	Yes	Stable
11	Male	43	White	No	NEP	Yes	Heroin/speedball	Yes	Unstable
12	Female	35	Native	No	NEP	No	Cocaine	Yes	Unstable
13	Male	43	White	No	NEP	No	Cocaine	No	Unstable
14	Male	27	White	Yes	Pharmacy	No	Cocaine/speedball	Yes	Unstable
15	Male	29	White	No	NEP	No	Cocaine/heroin	Yes	Unstable
16	Female	40	White	No	NEP	No	Heroin	No	Unstable
17	Female	43	White	Yes	NEP	No	Cocaine	Yes	Unstable
18	Male	32	White	No	NEP	Sometimes	Cocaine	No	Unstable
19	Male	36	Native	No	NEP	No	Heroin/speedball	Yes	Unstable
20	Male	26	Asian	No	NEP	No	Cocaine/heroin	No	Stable
21	Male	32	White	No	NEP	Sometimes	Cocaine	No	Unstable
22	Female	48	White	No	NEP	No	Heroin/speedball	Yes	Unstable
23	Female	31	Native	No	NEP	No	Cocaine/heroin	Yes	Unstable
24	Male	22	Native	No	NEP	No	Cocaine/heroin	Yes	Unstable

*Characteristics refer to the seroconversion interval (i.e., period between baseline HIV-negative test and first HIV-positive test at follow-up).

†Injected for the first time in previous 2 years. NEP, Needle exchange programme.

behavioural variables, commercial sex work, borrowing used needles, injecting with others, being an established IDU, and attending NEP more than once per week were all independently associated with HIV-positive serostatus. These associations were unchanged after adjusting for age, gender, frequency of injecting, main drug injected or other factors. No significant two-way interactions were observed. The likelihood ratio statistic, which tests the global null hypothesis that the coefficients are not significantly different from zero, was highly significant ($P < 0.001$), providing support for adequate goodness of fit.

Although the limited number of HIV seroconversions observed to date precluded a formal statistical analysis, a profile of sociodemographic and behavioural characteristics was generated, based on the period between the last negative HIV test at baseline, and first positive HIV test at follow-up (denoted seroconversion interval; Table 3). Of the 24 seroconverters identified to date, similarities were noted relative to the overall cohort in terms of the proportions who were women, those who were Native, those who were established IDU, and those who most commonly injected cocaine. All but two individuals reported unstable housing, residing primarily in single room occupancy hotels in Vancouver. Only three reported commercial sex work during the seroconversion interval. It is particularly striking that 23 of the 24 seroconverters reported NEP as their most frequent source of sterile syringes, and only five reported having any difficulty accessing sterile syringes.

Discussion

In our prospective study of more than 1000 IDU in Vancouver, baseline prevalence rates of HIV and HCV were very high, at 23 and 88%, respectively. After 8 months of follow-up, our preliminary estimate of HIV incidence was 18.6 per 100 person-years. Such an estimate could have been biased upward by selective return for follow-up of those at highest risk of HIV seroconversion; however, differences in baseline risk behaviour between subjects who did and did not return for follow-up when eligible were not found. The estimate could also have been inflated if individuals who suspected they had become HIV-infected selectively returned for follow-up.

To address these possible biases, the incidence calculation was repeated under a best case scenario, assuming all eligible persons who had not returned would have tested HIV-negative at their 6-month follow-up visit. Even under this optimal scenario, the HIV incidence was 16.5 per 100 person-years (95% CI, 9.9–23.2). Although these incidence estimates were based on small

numbers, even the lower bound of the lowest possible 95% CI (9.9%) was much higher than that observed among prospective IDU studies in Baltimore, Montreal, Amsterdam and New York [9–12]. It was concluded that these preliminary results were entirely consistent with an ongoing and serious outbreak of HIV infection among IDU in Vancouver [6].

Also of great concern in our study was the high level of reported needle-sharing behaviours. The proportions of IDU who reported borrowing and lending used needles were similar to those observed in our 1995 case-control investigation, which was based on the same target population [6,7]. At baseline in the present study, the proportion of HIV-positive IDU who reported lending used needles was nearly identical to that of HIV-negative IDU, regardless of self-reported HIV serostatus. This suggests that little, if any, behaviour change occurred among individuals in our sample who had received an HIV-positive test result. As in our previous study [7], consistent use of bleach among IDU borrowing used needles was low, and sharing of other injection paraphernalia was common.

Our data are particularly disturbing in light of two facts: first, Vancouver has the highest volume NEP in North America; second, HIV prevalence among this city's IDU population was relatively low until recent years. The fact that sharing of injection equipment is normative, and HIV prevalence and incidence are high in a community where there is an established and remarkably active NEP is alarming. A vast body of literature has suggested that NEP are associated with reduced incidence of HIV and HCV and do not lead to increased drug use [5,12–15]. Several studies have also shown NEP to be associated with decreased needle borrowing [9,12,15]. In cities where NEP is part of a comprehensive programme that includes HIV testing, counselling, education and drug treatment options, HIV incidence and associated risk behaviours have declined significantly over time [9,16,17]. Provided that services are available and IDU are willing, NEP can act as a stepping stone to addictions treatment, which can serve as the ultimate prevention if IDU choose to cease injecting.

In Vancouver, NEP was introduced early, but access to drug and alcohol treatment, methadone maintenance and counselling services remains inadequate. As early as 1990, the lack of appropriate services for addictions treatment in British Columbia, especially for cocaine users, was identified as a major barrier encountered by Vancouver's NEP attenders, among whom there was already a marked demand for HIV-related counselling [1]. This situation continues at present [6]. Our results do not argue against the overall effectiveness of NEP as an HIV intervention, but rather, they lead us to propose that without adequate and appropriate community-wide

interventions such as addiction treatment, detoxification and counselling, stand-alone NEP may be insufficient to maintain low HIV prevalence and incidence for an indefinite period. Our study, and recent findings of higher HIV incidence among Montreal's NEP attenders compared with non- or infrequent attenders [10], strongly suggest that the concept of harm reduction requires a broader perspective beyond NEP alone [14,17,18]. Support for this was provided from Amsterdam, where a continuum of harm-reduction activities was associated with lower HIV incidence and needle-sharing behaviours, but there was no evidence of a protective effect for single interventions such as NEP or methadone maintenance [9].

Why is it that Vancouver is experiencing an ongoing HIV outbreak despite a high volume NEP and pharmacy access? Although it is too early to draw inferences from our seroconversion data, some clues arise from our analysis of determinants of HIV-positive serostatus at baseline. Like other studies, our study found that factors such as borrowing needles [6,9,10,19-21] and injecting with others [20] were associated with HIV prevalence. It was also found that established IDU were more likely to be HIV-infected relative to new IDU, although this may have been a reflection of duration of exposure. Although cocaine injection *per se* did not appear as an independent risk factor, it is noteworthy that cocaine was more likely to be the drug of choice among HIV-positive IDU. Other studies have reported an elevated risk of HIV seroconversion associated with cocaine injection [22,23]. Indeed, a shift from heroin use to increasing dependence on cocaine may be an important factor in Vancouver's escalating HIV prevalence and incidence, since cocaine is commonly associated with more frequent injections [22]. If the conservative estimate of 2.5 injections per day in our cohort may be generalized to the city's estimated IDU population of 6000-10 000, approximately 5-10 million needles per year would be needed to meet the ideal scenario of 'one-set one-shot'. Whether it is realistic to expect, even with expanded pharmacy access, that this goal can be achieved in cities where cocaine is the drug of choice, remains to be determined. Finally, since commercial sex work was also independently related to HIV prevalence, it may be that sexual transmission plays an important role.

In the midst of an ongoing HIV outbreak, it is important not to overlook social and contextual factors that may be directly or indirectly related to HIV transmission [24-26]. As previously found in this setting [6], unstable housing was independently associated with HIV-positive serostatus. The predominance of single-room occupancy hotel rooms, which have been reported to serve as shooting galleries in Vancouver's poorest neighbourhood, may contribute to needle sharing [6]. Risks associated with less secure injecting

locations have also been noted by others [18,27]. The hypothesis that specific social networks of IDU may be risk factors for HIV seroconversion, possibly as a result of mixing between HIV-negative individuals and those who are newly infected and have high viral loads, is also currently being explored. Ethnographic research is needed in the study of social networks to complement existing quantitative data.

Our study was not intended to evaluate the effectiveness of NEP, since the majority of subjects attended NEP at least once, and there were no estimates of HIV incidence among IDU in Vancouver prior to the introduction of NEP in 1988. In fact, without the presence of an active NEP that was implemented early, HIV incidence among IDU in Vancouver may have been much higher, much earlier. The fact that frequent NEP attendance was independently associated with HIV prevalence should not be interpreted as causal, because risk behaviours and exposure to HIV interventions could have changed following an HIV-positive diagnosis. In addition, NEP attendance was self-reported; validation of self-reports through record linkage with NEP's administrative databases will improve attempts to correlate NEP attendance with HIV incidence. Finally, it has been suggested that NEP attract higher risk IDU [10,28-31]. NEP could thus be associated with HIV infection, even in multivariate models, if residual confounding persists.

If NEP attract higher risk IDU, then an appropriate public health response should be to capitalize on this window of opportunity by using NEP as a vehicle to change social norms surrounding needle sharing. From this perspective, it is crucial that NEP be maintained as a cornerstone in HIV prevention. Appropriate education, counselling and treatment options should be implemented simultaneously with the introduction of NEP. Allocation of adequate resources is required to allow NEP and other community agencies to enhance services other than the sole provision of needles. The present data have suggested that even in cities with sustained low HIV prevalence, outbreaks of HIV can occur. Long-term evaluation of NEP is therefore necessary to allow HIV prevention activities to adapt to changes in the local environment. If the effectiveness of NEP diminish over time, as others have found [29], other complementary strategies will be needed to be bolstered to reduce HIV transmission among IDU populations.

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Deconstructing Vancouver

Beginning May 1996, Canadian researchers began recruiting an IDU cohort for a study of HIV and hepatitis C incidence and prevalence and risk behaviors. Of the 1,000 IDUs recruited 92% reported having used the NEP. Vancouver researchers report that HIV incidence continued to occur despite the availability of a syringe exchange program. HIV incidence was extremely high based (18.6 per 100 person years) on the 257 follow-up visits; this represented 83% of those eligible for follow-up but only 255 of the cohort. Independent predictors

Frequent injectors, and frequent users of cocaine, were the most frequent users of NEPs.

Commentary.

"Sick people go to hospitals but it does not follow that, in general, hospitals cause sickness. The prospective cohort design of the study permits identifying risk behaviors associated with HIV and hepatitis C, distinguishing between those who seroconvert and those who remain HIV negative, but does not permit causal inference to be drawn about the relationship between NEP participation and HIV serostatus. Findings reported in this study are based on a limited number of follow-up visits of IDUs in the cohort. NEP participation was a dichotomized variable. Frequent attendance was reported as more than one visit per week. No data is not reported nor analyzed to permit interpretation of a dose response relationship between NEP attendance and the likelihood of seroconverting. No data is reported about the length of time that the NEP has been used by the participants. No data is reported about changes in behaviors overtime for those using the NEPs. All of this data will help us get a better understanding of the risks and or the protective effects of NEPs.

One can hypothesize that frequent NEP users are at higher risk for HIV than less frequent users, and it is also possible that relative to the number of times they inject and number of times they reused needles, they reduced, but did not eliminate their risks, and consequently were exposed to HIV at a time when the prevalence of HIV was increasing. I

It has been reported that the NEP operations have changed since these findings were reported. Vans are operating more regularly in combination with fixed site NEPs, and they are attracting different subgroups of the risk population- younger injectors more likely to use the vans.

(83% of those eligible at that time but roughly only 25% of the cohort. More recent follow-up data from this cohort is available and reported below in the

The design does not permit the researchers to examine the relationship between syringe exchange program and HIV infection from a causal perspective.

the 257 follow-up visits represented 83% of those eligible for follow-up and about 25% of the overall cohort.

92% of the entire cohort participants reported having used the needle exchange program.

Researchers dichotomize NEP participation. Frequent NEP attendance is operationalized as using the NEP more than one time per week. Clearly a dose-response analysis was not reported.

VANCOUVER

Strathdee SA, Patrick DM, Currie SL et al. Needle Exchange is Not Enough: Lessons From The Vancouver Injecting Drug Use Study. AIDS 1997; 11:F59-F65.

Beginning May 1996, Canadian researchers began recruiting an IDU cohort for a study of HIV and hepatitis C incidence and prevalence and risk behaviors. Of the 1000 IDUs recruited, data are available on 257 follow-up visits. This is an ongoing study. Estimated HIV incidence was 18.6 per 100 person years. Independent predictors of HIV positive serostatus were low education, unstable housing, commercial sex, borrowing needles, being an established IDU, injecting with others, and frequent NEP attendance. HIV positives compared to HIV negative IDUs were more likely to frequently inject cocaine. This study highlights the fact that NEP alone is not enough when dealing with high risk injection drug users, particularly cocaine injectors. The authors state that these results do not argue against the overall effectiveness of NEP as an HIV intervention, but rather lead them “to propose that without adequate and appropriate community-wide interventions such as addictions treatment, detoxification and counseling, stand-alone NEP may be insufficient to maintain low HIV prevalence and incidence for an indefinite period.”

An Update of this data is provided below:

Patrick DM, Schechter MT, Strathdee SA et al. HIV Incidence in Vancouver IDUs Follows a Predictable Decline. Abstract Submitted to 12th World AIDS Conference, July 1998.

HIV incidence among IDUs recruited into the Vancouver IDU Study declined from 17.7 to 4.4 per 100 person years between the first and second halves of 1997. This trend was consistent with epidemic saturation, as predicted through epidemic modeling. HIV testing volume slowly increased for IDUs between 1995-1997.

Archibald CP, Ofuer M, Strathdee S et al. Factors Associated with Frequent Needle Exchange Program Attendance in Injection Drug Users in Vancouver, Canada. In Press. JAIDS.

Data from a case control study of IDUs in Vancouver was examined to identify factors associated with frequent NEP attendance. 89 IDUs with documented HIV seroconversion after January 1994, and 192 HIV-negative IDUs were asked about drug injection and sexual behavior, NEP

attendance, and demographic and social information. Among men, frequent cocaine injection was the only variable independently associated with NEP attendance. Among women, frequency of any drug injection and having a nonlegal source of income were associated with NEP attendance. The NEP in Vancouver attracts IDUs who are frequent injectors, especially using cocaine, and who have high-risk behaviors or an unstable lifestyle. The authors conclude this finding reinforces the role of NEPs as potential focal points for intervention in this hard-to-reach population.

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The Politics of Needles and AIDS

By Julie Bruneau and
 Martin T. Schechter

Debate has started up again in Washington about whether the Government should renew its ban on subsidies for needle-exchange programs, which advocates say can help stop the spread of AIDS. In a letter to Congress, Barry McCaffrey, who is in charge of national drug policy, cited two Canadian studies to show that needle-exchange plans have failed to reduce the spread of H.I.V., the virus that causes AIDS, and may even have worsened the problem. Congressional leaders have cited these studies to make the same argument.

As the authors of the Canadian studies, we must point out that these offi-

clals have misinterpreted our research. True, we found that addicts who took part in needle exchange programs in Vancouver and Montreal had higher H.I.V. infection rates than addicts who did not. That's not surprising. Because these programs are in inner-city neighborhoods, they

Canadian findings are distorted.

serve users who are at greatest risk of infection. Those who didn't accept free needles often didn't need them since they could afford to buy syringes in drugstores. They also were less likely to engage in the riskiest activities.

Also, needle-exchange programs must be tailored to local conditions. For example, in Montreal and Vancouver, cocaine injection is a major source of H.I.V. transmission. Some users inject the drug up to 40 times a

day. At that rate, we have calculated that the two cities we studied would each need 10 million clean needles a year to prevent the re-use of syringes. Currently, the Vancouver program exchanges two million syringes annually, and Montreal, half a million.

A study conducted last year and published in *The Lancet*, the British medical journal, found that in 29 cities worldwide where programs are in place, H.I.V. infection dropped by an average of 5.8 percent a year among drug users. In 51 cities that had no needle-exchange plans, drug-related infection rose by 5.9 percent a year. Clearly these efforts can work.

But clean needles are only part of the solution. A comprehensive approach that includes needle exchange, health care, treatment, social support and counseling is also needed. In Canada, local governments acted on our research by expanding needle exchanges and adding related services. We hope the Clinton Administration and Congress will provide the same kind of leadership in the United States. □

Julie Bruneau is an assistant professor of psychiatry at the University of Montreal. Martin T. Schechter is a professor of epidemiology at the University of British Columbia.