

# THE CEDAR PROJECT: PREVALENCE AND CORRELATES OF HIV INFECTION AMONG YOUNG ABORIGINAL PEOPLE WHO USE DRUGS IN TWO CANADIAN CITIES

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## ABSTRACT

**Introduction.** During the past decade, the number of Aboriginal people diagnosed with HIV in Canada has grown more than any other ethnicity. Whereas the majority of infections are related to injection drug use, factors that explain elevated risk and transmission of HIV among Aboriginal young people who use illicit drugs are not well understood.

**Study design.** Observational study.

**Methods.** The Cedar Project is an observational study of Aboriginal youth living in Vancouver and Prince George, BC. Eligibility criteria include age (14–30 years) and self-reported use of non-injection or injection drugs at least once in the month before enrolment. Between October 2003 and April 2005, 512 participants were recruited and completed a questionnaire administered by an Aboriginal interviewer. Multivariable logistic regression analysis was used to model the independent association of demographic and behavioural variables of individuals with HIV infection.

**Results.** Of the participants, 235 resided in Prince George and 277 in Vancouver. Among the 276 participants that used injection drugs, HIV prevalence was significantly higher in Vancouver (17% vs. 7%) but HCV prevalence was higher in Prince George (62% vs. 57%). In Vancouver, 40% of injectors reported daily heroine use compared with 12% in Prince George. In contrast, Prince George participants were more likely to report daily injection of cocaine compared with those in Vancouver (37% vs. 21%). A higher percentage of Prince George participants reported having difficulty accessing clean syringes (22% vs. 8%). History of non-consensual sex, residing in Vancouver and duration of injection drug use were independent factors associated with increased risk of HIV infection.

**Conclusions.** HIV and HCV prevalence are elevated in young Aboriginal drug users residing in Vancouver and Prince George. Heterogeneity exists in these locations with respect to drug of choice and access to clean syringes. Prevention and treatment programs are urgently required in this population. (*Int J Circumpolar Health* 2007; 66(3) 226-240)

**Keywords:** HIV, AIDS, hepatitis C, HCV, Aboriginal, gender, injection, drug use, Canada

## INTRODUCTION

Increasing levels of HIV infection among young Aboriginal people are distressing for many Aboriginal communities and AIDS service providers, not only in small and large city centres but also in rural settings (1). The number of Aboriginal people diagnosed with HIV has grown more rapidly in the past decade than among any other single ethnic group in Canada. In the early 1990s, the majority of known Aboriginal AIDS cases were among two-spirited (gay) men (2). Although Aboriginal people comprise only 3.3% of the Canadian population, as of 2005, an estimated 3,600 to 5,100 Aboriginal people were living with HIV in Canada, representing 7.5% of all prevalent HIV infections and 22% of all new infections. Injection drug use is the primary risk factor for HIV among Aboriginal people, accounting for 58.9% of all prevalent infections between 1998 and 2005 (3).

National HIV/AIDS surveillance data for Indigenous people in Canada is considered to be very limited, largely because of under-reporting and lack of consistent documentation of ethnic status between provinces (3). For these reasons, national surveillance data can offer only a minimum estimate of the number

of infected persons. There are some data to suggest that HIV/AIDS in Aboriginal communities is disproportionately affecting young people. Before 1992, in provinces with reported ethnicity data, 9.7% of Aboriginal AIDS cases were among youth under the age of 30. In 2002, however, 41.2% of the Aboriginal cases reported were among young people. Similarly, between 1998 and 2000, 33% of newly diagnosed HIV-positive Aboriginal people were under the age of 30 compared with only 20% of non-Aboriginal people of the same age (3). Unfortunately, the majority of infections can be attributed to injection drug use, and yet factors that explain elevated risk and transmission of HIV among young Aboriginal people who use illicit drugs are not well understood.

The first nation-wide survey to examine the health and well being of First Nations young people living on-reserve was conducted in 2002–2003. While the authors of ‘The Peoples Report’ caution that young people may be under reporting, the majority of young people surveyed reported no illicit drug use what so ever. Fewer than 4% of youth between the ages of 12 and 17 reported using illicit drugs, including cocaine, crack and morphine. Similarly, 7.3% of young people between the ages of 18 and 30 reported using the same categories of illicit drugs (4).

Unfortunately, the proportion of young people on-reserve who are injecting drugs are not reported. Indeed, much of the current knowledge related to HIV-related vulnerabilities are relevant to only those Aboriginal people, including women and youth, residing in large city centres such as Vancouver's Downtown Eastside who use illicit drugs (5, 6). While Vancouver's Downtown Eastside is unique, the situation is linked by mobility and migration of young people to smaller cities and on-reserve communities. Research to date is inadequate to the task of preventing HIV among vulnerable and drug-dependent youth, particularly in rural areas (7).

Concerns over the paucity of available data and the potential for an explosion of infections in other areas of the province similar to those reported in the mid-nineties in Vancouver's Downtown Eastside prompted the initiation of a new two-city cohort study to address the specific HIV-related vulnerabilities of Aboriginal young people who use illicit drugs (8). To our knowledge, this is the only young and "at risk" Indigenous peoples cohort of its kind in North America. The study is located both in Prince George, a forestry and mining town in the northern interior of British Columbia, and in Vancouver's Downtown Eastside. This paper reports upon baseline HIV and hepatitis C virus infections and explores risk factors associated with HIV positivity among 512 participants enrolled in the study, which is now called the Cedar Project. In this study, young people who self-identify as Aboriginal people are considered to be the descendants of the original First Nation Peoples of Canada and include Métis, Aboriginal, First Nations, Inuit, and status and non-status Indians.

## MATERIAL AND METHODS

Guidelines provided in the *Canadian Tri-Council Policy Statement: Ethical Conduct for Research Involving Human Subjects* were followed in the development and conduct of this study, with particular attention to section 6.0 pertaining to research involving Aboriginal subjects. First Nations' investigators and collaborators, including Aboriginal AIDS service organizations, were involved in the conception, design and implementation of the Cedar Project. They also reviewed the results of this analysis and approved this manuscript for publication. The study was also approved by the University of British Columbia/Providence Health Care Research Ethics Board.

The Cedar Project is an ongoing prospective cohort study involving at risk Aboriginal young people who reside in Vancouver and in Prince George. According to the Census of Canada, 170,025 people in British Columbia self-identified as "Aboriginal" in 2001, approximately 3.6% of the provincial population. In addition, half of the Aboriginal population is less than 25 years old, compared with one-third of the non-Aboriginal population. The Northern Health Authority, which includes the City of Prince George (PG), spans almost two-thirds of the landscape of British Columbia. Vancouver Coastal Health Authority, which includes the City of Vancouver (VAN), covers over 58,560 square kilometres. There are estimated to be 26,890 young Aboriginal people between the ages of 15 and 34 residing in the Northern Health Authority and 11,450 in the Vancouver Coastal Health Authority (9). Our target for enrolment was 300 at-risk subjects in both cities. We define "at risk" as young

people who are either smoking or injecting illicit drugs in either of these locales. Eligibility criteria stipulated that participants were between 14 and 30 years of age, smoked illicit drugs in the last week or injected illicit drugs in the last month, including crystal methamphetamine, crack-cocaine, heroin or cocaine prior to enrolment. Saliva screens (Oral-screen, Avitar Onsite Diagnostics) were used to confirm drug use. Participants were eligible to participate if they had been residing in the greater Vancouver or Prince George regions respectively, and if they provided written informed consent. Participants in both cities were recruited through referral by health care providers, community outreach and by word of mouth. The majority of youth who participated in the study found out about the study by word of mouth (39%) and by outreach staff (32%). It is therefore difficult for us to assess how many young people who heard about the study were eligible and chose not to participate. However, anecdotal information from our research coordinator and outreach workers suggest that the youth who did participate in the Cedar Project appeared to be representative of their non-involved peers.

All participants met with one Aboriginal study coordinator who explained the procedures, sought informed consent and confirmed the participants' eligibility. In the consenting process, all participants were informed of the limitations of research confidentiality, including communicable disease reporting and child welfare legislation regarding current sexual abuse. At enrolment, participants completed an interviewer-administered questionnaire to elicit sociodemographic data and data on non-injection and injection drug use, injection practices, sexual risk behaviours

and service utilization. From the inception of the research process, it was made clear by all involved that study participants must have the opportunity to be interviewed by an Aboriginal person. Since confidentiality issues were a concern, particularly in smaller communities, participants were always given a choice to be interviewed by someone they trusted. Aboriginal study personnel were heavily involved in the design and pilot of the research instrument, including addressing sensitivities related to historical trauma. Different portions of the Vancouver Injection Drug User Study (VIDUS) were tested and included in our baseline questionnaire (10). Venous blood samples were drawn and tested for HIV and hepatitis C antibodies and interviewers were blinded to the HIV and hepatitis C status of the subjects. All eligible participants had private interviews, including pre- and post-test counselling with trained nurses; participants were requested to return for their HIV/HCV serostatus test result at which time referral for HIV/AIDS and hepatitis C care was provided. We actively encouraged young people to return for their results; however, receiving a result was not a requirement of participating in the study. If a young person indicated in the pre-test counselling process that he/she wanted their test results back, we let the nurse make an appointment around the approximate date when the results were in. Personnel also did extensive outreach to let them know when the results came in and we encouraged them to do so. Participants were given a \$20 stipend at each study visit as compensation for their time and to facilitate transportation. Study personnel worked actively with the young people involved in the study in securing the kinds of physical and emotional support they

requested. Requests for help included access to traditional healing support, addiction treatments and secure housing.

This analysis is based upon data from the baseline questionnaires of all 512 participants recruited from the study's inception in October 2003 and through to its completion in April 2005. Variables of interest included age, income, incarceration and stable versus unstable housing. Participants who reported having stable housing were those living in their own houses or apartments. Unstable housing was defined as living arrangements that included single-room occupancy hotels (SROs), transitional living arrangements ("couch surfing") and homelessness. Participants who reported using injections at enrolment were characterized as "injectors." Risky injection variables included borrowing and lending syringes that had been used by someone else. Drug use behaviours included frequent injections, type of drug, bingeing behaviour and overdose experiences. As in previous reports, we defined frequent cocaine, heroin and speedball users as those who reported injecting cocaine, heroin or speedballs (cocaine and heroin) once or more per day. Frequent opiate use was defined as use of morphine or dilaudids as once or more per day. Bingeing was defined as periods when drugs were used more than their reported usual frequency. Risk factors regarding sexual behaviour included having an HIV-positive sexual partner, having an STD diagnosed in the 6 months prior to the visit and having unsafe sex. Regular and casual partners were defined as those partners with whom the sexual relationship lasted more or less than 3 months. Unsafe sex was defined as not always using condoms with regular partners, casual partners and sex work clients in the 6 months

prior to the visit. Sex work was defined as receiving money, shelter, food or drugs for sex. Sex work clients were defined as those partners with whom sex was exchanged for food, shelter, drugs or money.

### **Statistical analyses**

Point estimates of HIV and HCV prevalence and 95% confidence intervals were obtained for specified populations of interest. Because of the known association of these viruses with parenteral drug use, HIV and HCV prevalence rates were stratified by injection and non-injection drug use, and risk factor analyses were restricted to those reporting injection of drugs. Statistical analyses of bivariable categorical data were conducted using Pearson's chi-squared test. Fisher's exact test was used to analyse bivariable categorical data when 25% or more of the expected cell frequencies in a contingency table were less than 5. Comparisons of numeric variables (e.g., age at enrolment, age at first injection) between participants residing in Vancouver and Prince George were conducted using Wilcoxon's rank-sum test. Multivariable logistic regression analysis was used to model the independent association of demographic variables and behavioural risk factors with HIV infection. Unadjusted odds ratios and 95% confidence intervals were obtained using logistic regression. We used the bootstrap technique to validate the final model (11). For this, we used forward stepwise logistic regression and fit the final model on 2,000 different 512-participant sets sampled from the study population with replacement. Adjusted odds ratios and 95% CI were calculated on the basis of the bootstrapped samples. All reported p-values are two-sided.

## RESULTS

All 512 participants recruited to participate during the period October 2003 to April 2005 completed their enrolment interview and provided a blood specimen for HIV and HCV antibody testing. Of these subjects, 235 (46%) resided in Prince George and 277 (54%) in Vancouver. "Word of mouth" was the predominant method of recruitment in Prince George (63%) whereas study staff recruited approximately 50% of Vancouver participants. Approximately 72% of the participants requested to receive the results of their tests for both HIV and hepatitis C. As seen in Table I, participants from Prince George were younger, more likely to report living in stable housing and less likely to self-identify as bisexual or gay compared

with Vancouver participants. Participants from both cities were similar with respect to gender distribution, marital status and education level.

Almost two-thirds of Cedar Project participants in both cities reported being taken from their biological parents during their lifetime (Table I). The median age at which participants were first taken was 4 years in Vancouver compared with 5 years for participants from Prince George. Almost half of the participants in both cities reported being forced to have sex against their will and/or being molested during their lifetime. Approximately 70% of female participants and 25% of male participants reported experiencing non-consensual sex. The median age at which this first occurred was about 6 years for both males and females. Just

**Table I.** Comparison of demographic and behavioural characteristics between Cedar Project participants in Prince George and in Vancouver.

Characteristic	Prince George n =235 (%)	Vancouver n =277 (%)	p value
Female gender	127 (54)	138 (50)	0.341
Median age at enrolment visit (yrs)	23	24	0.021
(Range)	(14 to 30)	(14 to 31)	
Straight social/sexual identity	219 (93)	237 (86)	0.039
Single marital status	175 (74)	215 (78)	0.642
Did not complete high school	208 (89)	215 (91)	0.432
Unstable housing	76 (32)	154 (56)	<.001
Taken from biological parents (ever)	147 (63)	180 (65)	0.569
Median age first taken from biological parents (range)	5 (1-16)	4 (1-19)	0.031
Non-consensual sex (ever)	114 (49)	130 (47)	0.721
Median age first non-consensual sex (range)	7 (2-25)	6 (1-19)	0.103
Attempted suicide (ever)	92 (39)	95 (34)	0.256
Incarcerated (ever)	142 (60)	200 (72)	0.005
Median age first incarcerated (range)	15 (11-27)	16 (10-28)	0.891
Ever been pregnant (females only)	91 (72)	110 (80)	0.132
Involvement in survival sex work (ever)	81 (34)	114 (41)	0.121
Median age of first involvement in survival sex work (range)	16 (10-28)	16 (10-28)	0.567
Injection drug use	125 (53)	161 (58)	0.263

over one-third of Cedar Project participants reported ever being paid or given food or shelter in exchange for sex. Among female participants, this percentage was 70% compared with less than 10% for males. Vancouver participants were significantly more likely than those living in Prince George to have ever been incarcerated (72% vs. 60%). One-third of the participants reported attempting suicide during their lifetime. Eighty percent of participants reported ever being detained by the police.

Injection drug use was reported by 286 (56%) of 512 participants at their enrolment interview. The proportions of young people who used drugs in each city were similar with 161 (58%) of Vancouver participants reporting using injection drugs compared with 125 (53%) of 235 participants from Prince George. The median age at which study participants reported injecting for the first time was 17 years (range: 11 to 29) in Prince George, compared with 18 years (range: 11 to 29) in Vancouver. The median duration of injection drug use among Prince George participants was 2 years compared with 3 years for Vancouver participants, but this difference was not statistically significant.

The proportion of participants who frequently injected specific drugs (defined as once or more daily) is shown in Table II. Of note, the proportion that frequently injected cocaine was significantly higher in Prince George than Vancouver. Young people who injected drugs in Prince George were significantly more likely than those in Vancouver to report borrowing and sharing needles during the previous 6 months, and to report difficulty accessing clean needles (Table II). Approximately 1 in 5 participants who injected from Prince George reported experiencing difficulty

accessing clean needles compared with less than 10% of the participants from Vancouver. The average number of times a rig was reportedly used by Prince George participants was 2.6 compared with 1.3 times by Vancouver participants. Similar percentages of participants from these cities reported using a syringe exchange program on a daily basis.

Among participants that used injection drugs in the past 6 months, approximately 75% reported ever having alcohol or other drug treatment. Prince George youth who reported injection drug use were significantly more likely to report receiving such treatment during their lifetime (87% vs. 69%) and to report current enrolment in any kind of alcohol or drug treatment (34% vs. 15%). In contrast, Vancouver participants who injected drugs were more likely than those in Prince George to report ever being in a methadone treatment program during their lifetime (32% vs. 19%) and to be receiving current methadone treatment (14% vs. 6%). Similar percentages of participants who used injection drugs in Prince George and Vancouver reported being unable to access drug treatment during the previous 6 months (17% vs. 15%).

As seen in Table II, 44 (8.6%) of 512 participants tested positive for the HIV antibody (95% CI: 4.3%, 7.3%). Thirty-five (12.6%) Vancouver participants were HIV positive compared with 9 (3.8%) from Prince George. When restricted to those who used injection drugs, the corresponding prevalence rates were 17.4% and 7.2%, respectively. There were 178 (34.8%) Aboriginal young people in the cohort who tested positive for the HCV antibody (95% CI: 30.6%, 38.9%). The prevalence of HCV infection was similar in Prince George and Vancouver. Prevalence rates were markedly

higher when restricted to those who used injection drugs (62.4% and 57.1% in Prince George and Vancouver, respectively). Overall there were 34 participants (7%) who were HIV and HCV positive at baseline. In Prince George there were 9 (4%) co-infected participants and in Vancouver there were 25 (9%) co-infected participants.

Table IV summarizes the associations with HIV infection among injection drug users for demographic and behavioural variables, and

other putative factors. In unadjusted analyses, statistically significant elevations in risk of HIV infection were noted for participants who reported current attendance in a methadone treatment program, experienced non-consensual sex in their lifetime, injected speedballs, cocaine or heroin on a daily basis, and received money for sex. Duration of injection drug use was associated with increased risk of HIV infection. Injection drug users residing in Vancouver were at higher risk than those

**Table II.** Comparison of drug- and sex-related vulnerability during previous 6 months by Cedar Project participants who used injection drugs in Prince George and in Vancouver.

Description	Prince George n=125 (%)	Vancouver n=161 (%)	p value
Median age of first injection (yrs)	17	18	0.155
(Range)	(11-29)	(11-29)	
Median duration of injection drug use (in months)	24	36	0.509
(Range)	(1-168)	(1-180)	
Require help injecting	43 (34)	47 (29)	0.361
Needle sharing	25 (20)	14 (9)	0.006
Needle borrowing	30 (24)	19 (12)	0.007
Number of times rig is used			
Mean	2.6	1.3	
Median	1	1	<0.001
Range	1-30	1-5	
Difficulty accessing clean needles	28 (22)	13 (8)	0.007
Fixed-syringe exchange site	98 (78)	77 (48)	<0.001
Mobile (van) syringe exchange	15 (12)	98 (61)	<0.001
Daily use of syringe exchange	33 (26)	35 (22)	0.445
Current drug/alcohol treatment	43 (34)	24 (15)	<0.001
Current methadone maintenance treatment	8 (6)	23 (14)	0.025
Unable to access drug treatment	21 (17)	24 (15)	0.679
Daily or more heroin injection	15 (12)	64 (40)	<0.001
Daily or more opiate injection	16 (13)	2 (1)	<0.001
Daily or more speedball injection	8 (6)	18 (11)	0.094
Daily or more cocaine injection	46 (37)	34 (21)	0.002
Ever had a sexually transmitted infection	57 (46)	80 (50)	0.492
Had a sexually transmitted infection	16 (12)	14 (9)	0.261
Unsafe sex with regular partners	63 (50)	55 (34)	0.008
Unsafe sex with casual partners	20 (16)	97 (60)	0.973
Unsafe sex with clients*	3 (2)	10 (6)	0.125
Sex with injection drug user	44 (35)	32 (20)	0.004
Sex with HIV-positive partner	6 (5)	5 (3)	0.542

\*Restricted to participants who reported having vaginal sex with their client sexual partners.

**Table III.** Prevalence of HIV and HCV infection among Cedar Project participants in Prince George and in Vancouver stratified by injection drug use.

<b>HIV Prevalence</b>			
Group	Prince George PE (%) [95% CI] (# Infected/Total N)	Vancouver PE (%) [95% CI] (# Infected/Total N)	p value
All participants	3.8 [1.4, 6.3] 9/235	12.6 [10.0, 14.5] 35/277	<0.001
Injectors	7.2 [2.7, 11.7] 9/125	17.4 [11.5, 23.2] 28/161	0.011
Non-injectors	0.0 [0, 2.7] 0/110	6.0 [2.5, 12.0]** 7/116	0.014*
<b>HCV Prevalence</b>			
All participants	34.5 [28.4, 40.5] 81/235	35.0 [29.4, 40.6] 97/277	0.896
Injectors	62.4 [53.9, 70.9] 78/125	57.1 [49.5, 64.8] 92/161	0.369
Non-injectors	2.7 [0.6, 7.8]** 3/110	4.3 [1.4, 9.8]** 5/116	0.722*

\* Based on Fisher's Exact Test \*\* Exact Binomial Confidence Interval

**Table IV.** Unadjusted odds ratio estimates for risk factors associated with HIV infection among injection drug users.

Variable	Odds Ratio	95% CI
Currently in a methadone treatment program	6.6	2.8, 15.3
Non-consensual sex (ever)	3.0	1.4, 6.6
Frequent speedball injection (one or more per day)	3.0	1.2, 7.7
Location (Vancouver vs. Prince George)	2.7	1.2, 6.0
Received money for sex (ever)	2.3	1.1, 4.8
Frequent heroin injection (one or more per day)	2.2	1.1, 4.6
Frequent cocaine injection (one or more per day)	2.2	1.1, 4.6
Gender (female vs. male)	2.0	0.9, 4.2
Taken from biological parents (yes vs. no)	2.0	0.9, 4.4
Ever been in a prison/jail/detention centre overnight	1.4	0.6, 3.3
Duration of injection drug use (per month)	1.02	1.01, 1.02

**Table V.** Adjusted odds ratio estimates for risk factors associated with HIV infection among injection drug users.

Variable	Odds Ratio	95% CI
Non-consensual sex (ever)	3.7	1.5, 9.1
Location (Vancouver vs. Prince George)	3.2	1.3, 7.7
Duration of injecting (per month)	1.02	1.01, 1.03

living in Prince George. Marginal, but not significant, elevations in risk of HIV infection were noted for female participants and among those who were taken from their biological parents. In multivariable analysis (Table V), non-consensual sex, geographical location (Vancouver vs. Prince George) and duration of injection drug use were independently associated with increased risk of HIV infection among young people who use injection drugs.

## DISCUSSION

In the present study, we found an independent association between HIV positivity and non-consensual sex, duration of injection and residing in the City of Vancouver among young Aboriginal people who use injection drugs. Our findings suggest that the prevalence of HIV infection among young Aboriginal people who inject drugs in this study is still lower in Prince George than in Vancouver. This is not an unexpected finding given that Vancouver has been an epicentre of the HIV epidemic in British Columbia and Canada since the early 1980s. However, the finding that the prevalence of HCV has reached approximately 60% in both cities was unexpected and reflects the greater efficiency with which HCV spreads among individuals who inject drugs. Viewed in this way, hepatitis C infection among people who inject drugs is a harbinger of HIV/AIDS. That its prevalence has reached 60% in the northern community and that risk factors such as needle borrowing and difficulty accessing clean needles are more prevalent there suggest that all of the ingredients for a significant HIV epidemic

are present. The fact that HIV prevalence has remained lower in Prince George thus far suggests that a window of opportunity still exists for significant HIV prevention in northern communities. Ominously, the relatively high prevalence of HCV and the high levels of vulnerability found in the present study warn that this window may not be open for long.

The HIV epidemic that has occurred in Vancouver among people who use injection drugs has been related to needle sharing, which is exacerbated by frequent use of injection cocaine (12). We find it very concerning that the use of injection cocaine appears to be more frequent among participants in the northern community than in the urban south. The fact that more young people reported more frequent use of the fixed-syringe exchange program (SEP) in Prince George should not be taken to mean that service is adequate. Due to lack of resources, the hours of operation of the syringe exchange program remained limited, policies were restricted to syringe-for-syringe exchange rather than distribution and there was no mobile service available to youth, day or night. It is likely for these reasons that youth in Prince George reported greater difficulty accessing clean syringes and were more likely to report reusing already used syringes. It should be noted here that while some young people in Prince George reported having used a mobile van that offered a syringe program, many went back and forth between Vancouver and Prince George and did access mobile services while in Vancouver.

On a global scale, the historical trauma associated with the process of colonizing Indigenous people is commonly consid-

ered to be the explanation for the profound health disparities they experience all over the world (13–16). Many Aboriginal communities in Canada have faced removal from traditional lands and territories and have endured the multigenerational legacy of the forced removal of children and placement in the residential school system (boarding schools) (17, 18). British Columbia had the highest number of residential schools in the country, and currently there are an estimated 35,000 survivors of the system living in the province. As former students raise children and grandchildren, the intergenerational effects of abuse and familial fragmentation become evident among Aboriginal families and communities where substance abuse has been identified as a critical health issue (19). It is well established in the literature that young Aboriginal people in Canada are disproportionately affected by poverty, traumatic injury, suicide and other mental and emotional health concerns (20, 21). The full impact of the multigenerational effects of the residential school system as they relate to HIV infection have yet to be determined; however, the rapidly increasing rates of HIV and HCV infection are commonly considered a reflection of the complex effects of addiction, social dislocation, discrimination, human rights violation and poverty (22, 23). Viewed in this way, the unusually high proportions of young people enrolled in this study who reported being apprehended as children and sexually abused as children, and who attempted suicide and had early encounters with the criminal justice system is of grave concern.

The fact that non-consensual sex was significantly associated with HIV infection

in this study in both univariable and multivariable analyses is alarming. Most often, forced sex began many years before the study at a median age of 6 to 7 years, so it is unlikely that this represents the mechanism of HIV acquisition. The fact that forced sex remained significantly associated with HIV despite adjustment for more proximal acquisition factors such as syringe sharing and cocaine injection is remarkable. Much of the established research addressing the health care needs of survivors of sexual trauma have focused upon high rates of substance use and abuse, traumatic depression, post-traumatic stress syndrome and injection and sexual risk exhibited later in life (24, 25). These findings have clear implications for both clinicians and outreach workers. Many Aboriginal AIDS service organizations recognize the importance of “culture as intervention” and support intervention programming based upon histories of resilience and resistance (26, 27). However, many communities are still grappling with the legacy of physical and sexual trauma. With significant increases in resources, acknowledging this trauma and this unresolved emotional pain may be one way that community-based health representatives (CHRs), addiction specialists and other practitioners can begin to mitigate the potential impact of the epidemic currently threatening their communities.

The prevalence of HCV to levels above 60% in a group of young people who inject drugs reflects how rapidly this virus can spread, even in the early period just after injection begins (28, 29). Thus, prevention of injection among young people and programming for injection safety for young people who have recently transitioned to

injection drug use must be prioritized (30). However, when designing new programming, service providers must remain cognizant of the complex interplay between race, disease, colonization and community attitudes, including histories of mistrust towards both regional and federal authorities (31, 32). Any efforts to help alleviate the impact of drug-related harm in both rural and urban settings must be inclusive of the perspectives of youth, and youth must be afforded the opportunity to provide leadership in the decisions made about programming so that it reflects their needs.

The inadequate access to drug and alcohol treatment, methadone maintenance and counselling services identified by youth in this study is of great concern. Methadone maintenance treatment (MMT) has been shown to be effective at preventing HIV infection among people who are retained in methadone treatment programs (33). At baseline very few young people were enrolled in methadone programming despite significant proportions who reported frequent use of opiates, including morphine and dilaudid. In Vancouver, efforts have been made to greatly expand access to alcohol and addiction treatment programming, by increasing availability in community health clinics located throughout the city. However, due to the sheer volume of people who require access to treatment services, problems with waiting lists and capacity persist. In Prince George there appears to be major strains on treatment providers and significant barriers to attracting young people into treatment. While rapid expansion of easily available treatment options must occur, including increasing the number of methadone maintenance treat-

ment slots and detoxification capacity, these demands come at a time of fiscal restraint and, for many service providers, uncertain funding. In 2003, the British Columbia First Nations Health Survey reported that the majority of the 1,984 survey participants, many of whom were young people, ranked substance abuse as the number one health problem and that "no progress" had been made in combating drug and alcohol problems in their communities (19). Taken together, these findings suggest that support for community-based addictions programming built solidly upon Indigenous values and strategies for healing must be prioritized in order to build community capacity to respond to the epidemic (22, 34). As indigenous scholars have noted, many First Nations families continue to express their ceremonial rites and obligations despite over 500 years of missionary activities and colonial suppression (26). In order to develop early community-based responses to the sexual and drug-related vulnerabilities faced by Aboriginal young people, participatory research and programming processes that address the importance of ceremonial and familial obligations related to the safety of Aboriginal children and young people must be prioritized.

Several limitations of this study should be acknowledged. Attaining a probabilistic sample is considered to be a challenge with this population. However, as described above we used a variety of recruitment methods to acquire a representative sample, including snowball sampling. Studies have shown that if referral-chains can be made sufficiently long and thereby penetrate sufficiently deeply into the networks of a hidden population, snowball sampling can draw non-biased samples

of the population. Thus, while we cannot rule out selection bias and its impact on our parameter estimates, we are confident that our sample is representative of Aboriginal young people who use illicit drugs in both cities (35). We must acknowledge that the complexity of risk factors within vulnerable subpopulations such as Aboriginal young people who use drugs may not be adequately measured with our current instruments. This analysis used prevalent HIV infections, therefore temporality and causality may be difficult to infer. For example, it is likely that the association of current methadone maintenance treatment with HIV infection may very well be due to the individual receiving care for the latter. It should be noted that Indigenous communities all over the world have a diversity of experiences in relation to drug use, therefore patterns of drug use observed in this study may not necessarily be reflected among other Indigenous peoples living in resource-rich or resource-poor countries.

In summary, the present data demonstrate that there is an elevated prevalence of HIV and HCV among Aboriginal youth who use drugs in both southern and northern communities, and that the risk behaviours necessary for spreading HIV much wider are certainly present. Comparable data from around the world are not widely available; however, what evidence there is suggests that young Indigenous people who use drugs in the United States, New Zealand and Australia may also be highly vulnerable to HIV infection (36, 37). Currently, in British Columbia there is an increasing recognition by federal, provincial and Aboriginal authorities that HIV/AIDS and HCV are multijurisdictional issues and that jurisdictional barriers diminish the impact

of programming (38). Part of the planned response in the short term is a newly formed interdisciplinary Aboriginal Youth in Crisis Task Force funded by First Nations and Inuit Health Branch (FNIHB), the federal agency responsible for the delivery of public health and health promotion activities services on-reserve and in Inuit communities. This effort is supported by Aboriginal leadership from Northern communities and is inclusive of the Provincial Ministry of Child and Families, the Provincial Ministry of Health and the Royal Canadian Mounted Police (RCMP). It is important to note that the Task Force has secured funding for a pilot mobile service initiative to be implemented in Prince George.

#### **Contributors**

Drs. Schechter, Craib and Spittal were responsible for the design of the analysis. Dr. Spittal, Ms. Catherine Baylis, Ms. Mary Teegee and Chief Wayne Christian were responsible for the interpretation of the findings and the literature review. Dr. Spittal wrote the manuscript. Dr. Craib and Mr. AKM Moniruz-zaman conducted the analyses, contributed to the writing of the results and methods section and were involved in revising the paper. All authors approved the final version of the manuscript.

#### **Conflict of Interest Statement**

We declare that we have no conflict of interest.

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## REFERENCES

- O'Neil J. Research on HIV/AIDS in Aboriginal people: a background paper. Ottawa: Medical Services Branch, Health Canada 1998. p. 4–41.
- Canadian Public Health Association. Situational analysis: a background paper on HIV/AIDS and Aboriginal people. Ottawa: Special Working Group on Aboriginal Issues, Ministerial Council on HIV/AIDS; 2001 [cited 2007 Mar 13]. Available from: <http://pubs.cpha.ca/PDF/P7/18997.pdf>.
- PHAC. HIV/AIDS among Aboriginal peoples in Canada: a continuing concern. HIV/AIDS Epi Update. Ottawa: Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada; 2006.
- First Nations Information Governance Committee. First Nations Regional Longitudinal Health Survey (RHS) 2002–2003: our voice, our survey, our future; 2004 [cited 14 Mar 2007]. Available from: [http://www.naho.ca/firstnations/english/regional\\_health.php](http://www.naho.ca/firstnations/english/regional_health.php).
- Miller CL, Spittal PM, Laliberte N et al. Females experiencing sexual and drug vulnerabilities are at elevated risk for HIV infection among youth who use injection drugs. *JAIDS* 2002;30:335–341.
- Craib KJP, Spittal PM, Wood E et al. Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver. *CMAJ* 2003;168(1):19–24.
- Vernon I. Killing us quietly: Native Americans and HIV/AIDS. Lincoln, NB: University of Nebraska Press; 2002. p.60–81.
- Fournier S. HIV rates in northern BC worrisome. *The Province* 2004 Dec 1;A26.
- The Government of British Columbia. Statistical profile of Aboriginal peoples 2001: with emphasis on children, labour market and post-secondary issues; 2002 [cited 18 Mar 2007]. Available from: <http://www.bcstats.gov.bc.ca/DATA/cen01/abor/CR08.pdf>.
- Spittal PM, Craib KJP, Wood E et al. Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver. *CMAJ* 2002;166(7):894–899.
- Efron B, Tibishirani R. An introduction to the bootstrap. New York: Chapman and Hall; 1993. p. 1–204.
- Tyndall MW, Currie S, Spittal P.M. et al. Intensive injection cocaine use as a primary risk factor in the HIV-1 epidemic in Vancouver. *AIDS* 2001;17(6):887–893.
- O'Neil J. The politics of health in the fourth world: a northern Canadian example. *Human Organ* 1986;45:119–128.
- O'Neil J, Reading J, Leader AC. Changing the relations of surveillance: the Development of a discourse of resistance in Aboriginal epidemiology. *Human Organ* 1998;57(2): 230–237.
- Browne A, Smye V, Varcoe C. The relevance of post-colonial theoretical perspectives in Aboriginal health. *Can J Nurs Res* 2005;37(4):16–37.
- Walters K, Simoni J. Reconceptualizing Native Women's health: an Indigenist stress coping model. *Am J Public Health* 2002;92(4):520–524.
- Fournier S, Crey E. Stolen from our embrace: the abduction of First Nation's children and the restoration of Aboriginal communities. Vancouver: Douglas and McIntyre; 1997. p. 111–224.
- Horton R. Indigenous peoples: time to act now for equity and health. *Lancet* 2006; 367(9524):1705–1707.
- Pointe S. Our nations on the edge of a new century: B.C. First Nations Regional Health Survey; 2000 [cited 18 Mar 2007]. Available from: [www.nearbc.ca/documents.rhs.pdf](http://www.nearbc.ca/documents.rhs.pdf).
- Adelson N. The embodiment of inequity: health disparities in Aboriginal Canada. *Can J Public Health* 2005;96(S2):S45–S60.
- Waldrum, J, Herring AD, Kue Young T. Aboriginal health in Canada: historical, cultural and epidemiological perspectives. Toronto: University of Toronto Press; 1997. p. 66–96.

22. BC Aboriginal AIDS Taskforce. The redroad: pathways to wholeness: an Aboriginal strategy for HIV/AIDS in BC; 2002 [cited 25 Nov 2006]. Available from: [www.healthservices.gov.bc.ca/cpa/publications/redroad.pdf](http://www.healthservices.gov.bc.ca/cpa/publications/redroad.pdf).
23. Barlow JK. Examining HIV and AIDS among the Aboriginal population in Canada: in the post residential school era. Ottawa: Aboriginal Healing Foundation; 2003 [cited 15 Mar 2007]. Available from: <http://www.ahf.ca/publications/research-series>.
24. Kue Young T, Katz A. Survivors of sexual abuse: clinical, lifestyle and reproductive consequences. *CMAJ* 1998;159(4):329–334.
25. Wyatt G, Myers J, Williams K. Does a history of trauma contribute to HIV risk for women of color? Implications for prevention. *Am J Public Health* 2002;92(4):660–666.
26. Duran B, Walters K. Prevention in “Indian Country”: current practice, Indigenist etiology models, and post colonial approaches to change. *AIDS Educ Prev* 2004;16(3):187–201.
27. Majumdar B, Chambers T, Roberts J. Community based, culturally sensitive HIV/AIDS education for Aboriginal adolescents: implications for nursing practice. *J Transcult Nurs* 2004;15(1):187–201.
28. Patrick DM, Cornelisse PG, Sherlock CH et al. Incidence of hepatitis C virus infection among injection drug users during an outbreak of HIV infection. *CMAJ* 2001;165(7):889–895.
29. Miller CL, Johnston C, Spittal PM et al. Opportunities for prevention: hepatitis C prevalence and incidence in a cohort of young injection drug users. *Hepatology* 2002; 36(3):737–742.
30. Doherty MC, Garfein RS, Monterroso E et al. Correlates of HIV infection among young adult short-term injection drug users. *AIDS* 2000;14(6):717–726.
31. Harris R, Tobias M, Jeffries M et al. Effects of self-reported racial discrimination and deprivation on Maori health and inequalities in New Zealand: a cross sectional study. *Lancet* 2006;367:2005–2009.
32. Browne A, Fiske J. First Nations women’s encounters with mainstream healthcare services. *West J Nurs Res* 2001;23(2):126–147.
33. Gibson DR, Flynn MN, McCarthy JJ. Effectiveness of methadone treatment in reducing HIV risk behavior and HIV seroconversion among injecting drug users [editorial]. *AIDS* 1999;13(14):1807–1818.
34. Walters K, Simoni J, Evans Campbell T. Substance use among American Indians and Alaska Natives: incorporating culture in an Indigenist stress coping paradigm. *Public Health Reports* 2002;117(Suppl 1):S104–S117.
35. Magnani R, Sabin K, Saidel T et al. Review of sampling hard to reach populations. *AIDS* 2005;19(Suppl 2):S67–S72.
36. Simoni J, Sehgal S, Walters K. Urban American Indian women’s sexual trauma, injection drug use and HIV sexual risk behaviors. *AIDS and Behaviour* 2004;8(1):33–45.
37. Wright M, Giele C, Dance PR et al. Fulfilling prophecy? Sexually transmitted infections and HIV in Indigenous people in Western Australia. *MJA* 2005;183:124–128.
38. Matiaton S. HIV/AIDS and Aboriginal people: problems of jurisdiction and funding. Toronto: Canadian HIV/AIDS Legal Network and the Canadian Aboriginal AIDS Network; 1999 [cited 21 Mar 2007]: [p. 49]. Available from: <http://www.aidslaw.ca/EN/publications/index.html>.

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