Published in final edited form as:

J Adolesc Health. 2014 November ; 55(5): 684–689. doi:10.1016/j.jadohealth.2014.04.013.

USE OF A MEDICALLY SUPERVISED INJECTION FACILITY AMONG STREET YOUTH

Scott E. Hadland, MD, MPH^{1,2}, Kora DeBeck, PhD^{3,4}, Thomas Kerr, PhD^{3,5}, Paul Nguyen, PhD³, Annick Simo, MSc³, Julio S. Montaner, MD^{3,5}, and Evan Wood, MD, PhD^{3,5}

¹Boston Children's Hospital, Division of Adolescent and Young Adult Medicine, Department of Medicine, 300 Longwood Avenue, Boston, MA, USA, 02115

²Harvard Medical School, Department of Pediatrics, 25 Shattuck St., Boston, MA, USA, 02115

³British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608 - 1081 Burrard Street, Vancouver, BC, Canada, V6Z 1Y6

⁴Simon Fraser University, School of Public Policy, SFU Harbour Centre, 515 West Hastings Street, Suite 3271, Vancouver, BC, Canada, V6B 5K3

⁵University of British Columbia, Faculty of Medicine, 317 - 2194 Health Sciences Mall, Vancouver, BC, Canada, V6T 1Z3

Abstract

Purpose—Supervised injecting facilities (SIFs) provide a sanctioned space for injection drug users and are associated with decreased overdose mortality and HIV risk behaviors among adults. Little is known about SIF use among youth. We identified factors associated with use of the Vancouver SIF, the only such facility in North America, among street youth.

Methods—From September 2005 to May 2012, we collected data from the At-Risk Youth Study (ARYS), a prospective cohort of street youth in Vancouver, Canada. Eligible youth were aged 14–26 years. Participants reporting injection completed questionnaires at baseline and semiannually.

© 2014 Society for Adolescent Medicine. Published by Elsevier Inc. All rights reserved.

Send correspondence to: Evan Wood, MD, PhD, BC Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608 – 1081 Burrard Street, Vancouver, BC, Canada V6Z 1Y6, **Phone:** (604) 806-9116, **Fax:** (604) 806-9044, uhri-ew@cfenet.ubc.ca.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conflict of Interest Statement

Dr. Montaner has received educational grants from, served as an ad hoc advisor to or spoken at various events sponsored by Abbott Laboratories, Agouron Pharmaceuticals Inc., Boehringer Ingelheim Pharmaceuticals Inc., Boreon Pharma AS, Bristol-Myers Squibb, DuPont Pharma, Gilead Sciences, GlaxoSmithKline, Hoffmann-La Roche, Immune Response Corporation, Incyte, Janssen-Ortho Inc., Kucera Pharmaceutical Company, Merck Frosst Laboratories, Pfizer Canada Inc., Sanofi Pasteur, Shire Biochem Inc., Tibotec Pharmaceuticals Ltd. and Trimeris Inc.

Contributors

Drs. Hadland, DeBeck, Kerr, Montaner and Wood designed the study. Drs Hadland, DeBeck and Wood wrote the protocol. Dr. Hadland conducted the literature review and wrote the first draft of the manuscript. Dr. Nguyen and Ms. Simo undertook data management and statistical analyses with additional input from Dr. Hadland. All authors contributed to and have approved the final manuscript.

We used generalized estimating equation logistic regression to identify factors associated with SIF use.

Results—During the study period, 42.3% of 414 injecting youth reported use of the SIF at least once. Of all SIF-using youth, 51.4% went to the facility at least weekly, and 44.5% used it for at least one-quarter of all injections. SIF-using youth were more likely to live or spend time in the neighborhood surrounding the SIF (adjusted odds ratio [AOR], 3.29; 95% confidence interval [CI], 2.38–4.54), to inject in public (AOR, 2.08; 95% CI, 1.53–2.84), or to engage in daily injection of heroin (AOR, 2.36; 95% CI, 1.72–3.24), cocaine (AOR, 2.44; 95% CI, 1.34–4.45), or crystal methamphetamine (AOR, 1.62; 95% CI, 1.13–2.31).

Conclusions—This study, the first examining SIF use among street youth in North America, demonstrated that the facility attracted high-frequency young drug users most at risk of blood-borne infection and overdose, and those that otherwise inject in public spaces.

MeSH Terms

drug abuse; adolescent; needle sharing; HIV; hepatitis C

INTRODUCTION

Street youth – young people living or working on the street – are a marginalized population at greatly elevated risk for morbidity and mortality relative to the general youth population [1]. Injection drug use is common among street youth in North America, with reported prevalence varying between 17% and 41% [2–6]. Accidental drug overdose is a leading cause of death among street youth [7], and among those who inject drugs, overdose is alarmingly common [8], as is infection with human immunodeficiency virus (HIV) and hepatitis C virus (HCV) [6, 9, 10]. Such risks may be exacerbated by particular injecting environments, such as public alleys, restrooms, parks, or 'shooting galleries', where drug users may be rushed, lack sterile injection equipment, or be prone to sharing paraphernalia [11, 12].

In 2003, North America's first supervised injection facility (SIF), Insite, was opened in Vancouver, Canada, offering a government-sanctioned space for users to inject pre-obtained drugs under nurse supervision [13]. Similar facilities have been established in Europe and Australia, but to date, no other facility exists in the United States or Canada [14–16]. Vancouver's SIF, open for 18 hours daily (including overnight hours until 4 am), 7 days per week, is staffed by nurses who can intervene in the event of an overdose [13]. Staff also issue clean injecting equipment, offer information on safe injection practices, and provide referrals to health care and addiction treatment services. Vancouver's SIF is a "low threshold" service, in that it is accessible by adolescents so long as there is evidence of active injection drug use.

Among adult drug users, overdose mortality has decreased by 35% in the neighborhood immediately surrounding the SIF since its implementation [17]. Additionally, use of the SIF among adults has been associated with entry into drug detoxification [18], decreased syringe sharing [19], and safer injection practices [20], without significantly reducing rates of drug

use cessation or increasing rates of relapse [21]. At the community level, the opening of Vancouver's SIF has been associated with reductions in public drug use and unsafely discarded syringes [22].

Although Vancouver's SIF is accessible to adolescents and young adults, the acceptability of the facility to street youth remains unstudied. Since most street youth have unstable housing and may have few safe locations to inject, the SIF may provide an alternative to injecting in public [1]. Still, some have questioned whether a SIF would attract the high-risk or hard-to-reach users most in need of the facility's services [23], even despite evidence showing that many Vancouver injection drug users are willing to use the SIF [24]. To reduce morbidity, mortality, and costly treatment associated with overdose and infectious disease transmission, it is critical for clinicians, researchers and policymakers to understand which adolescents and young adults use the SIF, how frequently they use it, what their drug use patterns are, and where they inject when not at the SIF. In particular, high-frequency injecting youth are at greatest risk of overdose and blood-borne infection [7, 9], and might therefore benefit most from on-site harm reduction and treatment services.

We therefore conducted the present study of SIF use among a cohort of actively-injecting street youth in Vancouver. In building on the results of prior studies of adult drug users [25], we hypothesized that the SIF would attract high-frequency injecting adolescents and young adults at greatest risk for overdose and infectious disease transmission who also might otherwise inject in public.

METHODS

The At-Risk Youth Study (ARYS) is an ongoing prospective cohort of street youth in Vancouver, Canada that began enrollment in September 2005. The study has been described in detail previously [26]. Briefly, inclusion criteria were (1) age 14 to 26 years, and (2) use of an illicit drug other than or in addition to marijuana in the 30 days prior to enrollment. Participants were street-involved, defined as being absolutely or temporarily without stable housing, or having accessed street-based youth services in the past six months. Similar conditions have previously been used to define street involvement among youth [3, 8, 27]. Participants were recruited from a range of neighborhoods throughout the city where street youth are known to congregate. Daytime and nighttime street-based outreach and snowball sampling were employed.

Participants provided informed consent and completed an interviewer-administered questionnaire at a storefront location in Vancouver's Downtown South neighborhood. The questionnaire queried sociodemographic details and drug use behaviors, and was completed at baseline and then at six-month interval follow-up visits thereafter. Participants were remunerated \$20 CAN at baseline and at each follow-up visit. ARYS was approved by the University of British Columbia and Providence Health Care Research Ethics Board.

Participants eligible for the sample used in the present analysis included adolescents and young adults reporting injection in the preceding 6 months during the period spanning September 2005 to May 2012, either at baseline or at any semiannual follow-up visit.

Including only actively injecting participants in the sample resulted in a higher mean age (data not shown) because, as has been shown previously, injection drug users in the ARYS cohort tend to be older [28]. The broader ARYS sample from which this subsample of injection drug users was drawn included 1,019 participants for the specified enrollment window.

The primary outcome was self-reported use of the Vancouver SIF at least once in the preceding 6 months. Specifically, participants were asked "In the last six months, have you fixed at the Insite safe injection site?" Of note, the SIF is entirely external to the ARYS study and is located in the Downtown Eastside neighborhood, 2.5 km from the ARYS study storefront site in the Downtown South neighborhood. For those that used the SIF (either at baseline or at follow-up), descriptive data were compiled regarding how often participants used the SIF, the proportion of all injections conducted at the SIF, where participants injected most of the time if not injecting at the SIF, whether participants received new information about safe injection practices they did not already know at the SIF, and whether participants felt the SIF was youth-friendly. These descriptive data were reported for the first time that a participant reported using the SIF. We also obtained blood samples from participants to determine HIV and HCV serostatus among all participants.

We also examined covariates potentially associated with SIF use including: age (as a continuous variable), biologic gender at birth, Aboriginal ancestry, high school education (having completed or currently enrolled in high school), recently (specified for this and all subsequent variables as occurring within the preceding 6 months) having lived or spent time in the Downtown Eastside (the neighborhood immediately surrounding Insite), recent homelessness, recent incarceration, recent sex work (having traded sex for money, drugs, shelter or gifts), recent daily heroin injection, recent daily cocaine injection, recent daily crystal methamphetamine injection, recent drug overdose, recently having dealt drugs, any recent drug injection in a public place (on the street, in a public bathroom, or in a park), recently having needed help injecting from someone else, recently having visited a crack house or a shooting gallery, recently having borrowed a syringe, recently having been 'jacked up' by police (*i.e.*, stopped, searched or detained for presumed drug possession without arrest), and recently having received drug treatment [25, 29].

Baseline sociodemographic characteristics and drug use-related behaviors of the cohort were first compared with regard to SIF use through chi-square tests for categorical variables (or Fisher's exact test when expected cell counts were < 5) and Wilcoxon rank sum scores for continuous variables. The baseline characteristics were examined for the first visit (baseline or follow-up) at which SIF use was reported for those that reported SIF use at any time during the study; for those who never reported SIF use, characteristics were examined for the first visit at which injection drug use was reported.

We then sought to identify sociodemographic and drug use-related variables associated with recent SIF use throughout the follow up period as assessed semiannually. We conducted a longitudinal analysis using bivariate and multivariate generalized estimating equations (GEE) with the logit link function and exchangeable correlation structure [30]. Time-varying sociodemographic characteristics (including recently spending time or living in the

Downtown Eastside, recent homelessness, recent incarceration, and recent sex work) and all behavioral variables were updated with each follow-up visit in analyses. Variables significant at $p < 0.10$ in bivariate analyses were eligible for inclusion in the multivariate model, which employed the quasiliikelihood under the independence model criterion (QIC) statistic with backward stepwise elimination to identify the model of best fit (*i.e.*, the model that resulted in the lowest QIC). Finally, we tested for statistical interaction to determine whether the odds of SIF use were greater among those who lived or spent time in the Downtown Eastside and also engaged in daily injection of heroin, cocaine, or crystal methamphetamine.

Analyses were performed using SAS version 9.3 (SAS Institute, Inc, Cary, North Carolina). Although we hypothesized that higher frequency drug users would be more likely to use the SIF [25], all p values were considered two-sided because the directionality of other relationships were uncertain. Tests were considered significant at $p < 0.05$.

RESULTS

Of 414 actively drug-injecting adolescents and young adults, 140 (33.8%) were female and 95 (22.9%) were of Aboriginal ancestry, with 14 (3.4%) of participants aged 14–17 years, 86 (20.8%) aged 18–20 years, and 314 (75.8%) aged ≥ 21 years at the time of study enrollment. The mean age at first injection drug use was 22.8 years (standard deviation, 2.7 years). At the baseline interview, 299 (72.2%) reported injection drug use, and an additional 115 (27.8%) had never previously injected at baseline but subsequently initiated injection drug use during the follow-up period. At baseline, 10 (2.4%) participants were HIV-seropositive and 145 (35.0%) were HCV-seropositive. Of all participants, 305 (73.7%) returned for follow-up after reporting injection drug use, contributing 763 person-years (mean follow-up, 2.5 years; SD, 1.4 years).

During the study period, 175 (42.3%) used the SIF at least once; of these 175 participants, 125 (71.4%) had recently used the SIF at the time of study enrollment and 50 (28.6%) had not used the SIF but ultimately used the SIF at least once during follow-up. SIF use was reported at 382 (37.5%) of the 1,018 study visits (including both baseline and follow-up visits) at which participants reported injecting. The prevalence of SIF use did not tend to vary within the study window from 2005 to 2012, varying from a minimum of 28.1% in 2005 to a maximum of 45.5% in 2009.

Of the 175 SIF-using participants, at the time of first reported SIF use (either at baseline or during follow-up), 90 (51.4%) went to the facility at least weekly, 78 (44.6%) used it for at least one-quarter of all injections, and 39 (22.3%) reported receiving new information about safe injection practices they did not already know. Only 5 (2.9%) SIF users felt the facility was not youth-friendly. When not using the SIF, 65 (37.1%) reported that most of the time, they injected on the street, in a public bathroom, or in a park.

Table 1 shows baseline sociodemographic characteristics and recent drug-related behaviors according to SIF use (at study enrollment for participants who used the SIF at baseline, or for the first visit at which SIF use was reported among those who later initiated SIF use). As

shown, SIF use was associated with older age, recently having lived or spent time in the Downtown Eastside neighborhood surrounding the SIF, daily heroin injection, daily cocaine injection, and having visited a crack house or shooting gallery.

Table 2 displays unadjusted and adjusted odds ratios for sociodemographic characteristics and drug-related behaviors associated with use of the SIF throughout the study (*i.e.*, at baseline and during follow-up). As shown, in the final multivariate model, variables significantly and independently associated with SIF use included having lived or spent time in the Downtown Eastside neighborhood surrounding the SIF, daily heroin injection, daily cocaine injection, daily crystal methamphetamine injection, and having injected in public. Interaction terms to examine whether the odds of SIF use were greater among those who lived or spent time in the Downtown Eastside and also engaged in daily injection of heroin, cocaine, or crystal methamphetamine injection were not significant ($p > 0.05$ for all).

DISCUSSION

In this study of actively drug-injecting street youth, we observed that Vancouver's SIF was used by more than 4 in 10 participants. Of the study participants who used the SIF, more than half used the facility at least weekly and nearly half used it for more than one-quarter of all injections. When not injecting at the SIF, more than one-third reported otherwise injecting publicly. Study participants that used the facility were most likely to be those who had lived or spent time weekly in the Downtown Eastside neighborhood surrounding the SIF, who had injected in public, or who had engaged in daily injection of heroin, cocaine, or crystal methamphetamine. Taken together, these findings suggest that the SIF may provide an important point of contact for Vancouver's street youth with onsite harm reduction measures, public health messaging, and addiction treatment services. Importantly, the street youth that use the SIF appear to be those who inject frequently and may be at greatest risk of overdose death and of HIV or HCV infection.

To date, this is the first study of SIF use by street youth in a North American setting. Our results reveal that Vancouver's SIF provides a critical point of contact with the city's highest risk homeless adolescents and young adults who might otherwise be 'hidden' from other public health efforts [1]. The high-frequency injecting street youth most likely to use the SIF are those that might stand to benefit most from the on-site preventive services, including intervention in case of overdose, provision of clean equipment, and referrals to health care and addiction treatment services [25]. Interestingly, in adjusted analyses, recent overdose was not independently associated with SIF use. Since this variable was associated with SIF use in bivariate analyses, its effect may have been better explained by the daily injection drug use variables significant in the final multivariate model.

Additionally, SIF use was not associated with reduced syringe sharing or recent entry into drug treatment in bivariate or multivariate analyses. In this regard, it is noteworthy that those using the SIF were more likely to engage in daily injection drug use, which one might have expected would imply higher risk of syringe sharing and lesser exposure to addiction treatment. While further research is necessary, these findings may imply benefits of SIF use not captured statistically in the present study, since syringe sharing was not more common

among those using the SIF, and recent drug treatment was not less common. Among adult injection drug users, the opening of Vancouver's SIF has been associated with decreased overdose mortality [17], decreased HIV- and HCV--transmitting behaviors [19, 20] and with increased entry into addiction treatment [18]. Given the absence of data on these same outcomes among youth, future studies should examine whether similar positive public health changes are observed among SIF-using youth.

Vancouver's SIF also appears to confer a benefit to the larger community. More than one-third of street youth who used the SIF reported that when not injecting there, they injected in public locations, such as on the street, in a public bathroom, or in a park. A primary community concern is safe disposal of syringes [31–33]. Although our study did not specifically examine disposal of injecting equipment, since SIF staff collect all equipment following injection, our results indicate the SIF may be responsible for safe syringe disposal for a number of injections by street youth in Vancouver. A commonly reported reason for public injection among adult drug users is lack of an alternative place to inject [34]. Since most street youth are homeless [1], Vancouver's SIF likely provides a safe, non-chaotic injecting environment that many youth might not otherwise be able to access. An important argument in favor of establishing a SIF, therefore, is that it may be associated not only with a public health benefit but also with enhanced public order and decreased injection-related litter, as has been shown previously [22].

Our observations suggest that street youth using the SIF are those who lived or spent time weekly in the vicinity of the facility. Street youth may not be willing or able to travel great distances to a SIF, and as a result, the positive effects of the facility may attenuate with distance from the facility. Indeed, in a large study of Vancouver adult injection drug users, the reduction in overdose mortality observed was greatest in the neighborhood immediately surrounding the SIF [17]. We cannot exclude that our snowball sampling approach may have recruited youth who both use the SIF and also live in the Downtown Eastside neighborhood immediately surrounding the SIF. It also remains unclear whether street youth were drawn to the SIF, or whether the SIF was located in an area that street youth already frequented. It should be noted, however, that a large portion of Vancouver's street youth spend a significant portion of their time in the Downtown South, a neighborhood distinct from the Downtown Eastside that requires significant travel to and from the SIF [35]. Future studies should attempt to delineate how far street youth may be willing to travel for safe injection, since this may help determine the ideal location for similar facilities in other settings.

This study has several limitations. First, study recruitment involved snowball sampling to recruit street youth, who are frequently homeless and are a population 'hidden' from population-based sampling methods. Although the ARYS sample is not truly random [26], the characteristics of the cohort are similar to those from other studies of high-risk youth [5, 36]. Second, interviews relied on self-report, which may have resulted in social desirability bias. Such bias would have likely underestimated the true prevalence of risk behaviors queried, and perhaps overestimated the true prevalence of SIF use. Finally, because sociodemographic and drug use-related covariates were determined within the same six-month window period as a participant's SIF use, we cannot determine the temporality of the

relationship between these covariates and SIF use. However, analyses conducted among adult injection drug users employing time-lagged analyses strongly suggest that the SIF attracts the highest risk drug users, rather than SIF use leading to higher risk drug use behaviors [21, 25].

In summary, we found that the behaviors associated with use of North America's first and only SIF among street youth were precisely those risk factors associated with overdose and with transmission of HIV and HCV. Additionally, when not at the SIF, street youth reported injecting on the street, in alleys or in parks, highlighting that the SIF provides a safe environment for adolescents and young adults who might otherwise inject in public and engage in unsafe disposal of syringes. Strategically located SIFs may offer a crucial point of contact with addiction services and public health messaging for street youth, whose health needs are often unmet and who are often otherwise difficult to reach. The Vancouver SIF has an onsite medical detoxification, long-term treatment and other healthcare resources available to its clients. As governments consider novel approaches to prevent and mitigate the harms of injection drug use [37–40], these data support the implementation of SIFs as a way of promoting public health and community safety.

Acknowledgments

The authors thank the study participants for their contribution to the research, as well as current and past researchers and staff. We would specifically like to thank Sabina Dobrer, Cody Callon, Jennifer Matthews, Deborah Graham, Peter Vann, Steve Kain, Tricia Collingham, and Carmen Rock for their research and administrative assistance. We also appreciate support from Dr. Jean Emans and the Division of Adolescent and Young Adult Medicine at Boston Children's Hospital.

Role of Funding Source

The study was supported by the US National Institutes of Health (R01DA028532) and the Canadian Institutes of Health Research (MOP-102742). This research was undertaken, in part, thanks to funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Inner City Medicine which supports Dr. Evan Wood. Dr. Scott Hadland received financial support from the Division of Adolescent and Young Adult Medicine at Boston Children's Hospital and the Leadership Education in Adolescent Health Training Program T71 MC00009 (MCH/HRSA). Dr. Kora DeBeck is supported by a MSFHR/St. Paul's Hospital-Providence Health Care Career Scholar Award. Dr. Julio Montaner has received an Avant-Garde award (DP1DA026182) from the National Institute of Drug Abuse, US National Institutes of Health.

References

1. [cited 2009 16 Jun] Street youth in Canada: findings from the enhanced surveillance of Canadian street youth, 1999–2003. 2006. Available from: http://www.phac-aspc.gc.ca/stdmts/reports_06/pdf/street_youth_e.pdf
2. DeBeck K, Kerr T, Marshall BD, et al. Risk factors for progression to regular injection drug use among street-involved youth in a Canadian setting. *Drug Alcohol Depend.* 2013; 133(2):468–472. [PubMed: 23910434]
3. DeMatteo D, Major C, Block B, et al. Toronto street youth and HIV/AIDS: prevalence, demographics, and risks. *J Adolesc Health.* 1999; 25(5):358–366. [PubMed: 10551667]
4. Kral AH, Lorvick J, Edlin BR. Sex-and Drug-Related Risk Among Populations of Younger and Older Injection Drug Users in Adjacent Neighborhoods in San Francisco. *JAIDS.* 2000; 24(2):162–167. [PubMed: 10935692]
5. Ochnio JJ, Patrick D, Ho M, et al. Past infection with hepatitis A virus among Vancouver street youth, injection drug users and men who have sex with men: implications for vaccination programs. *CMAJ.* 2001; 165(3):293–297. [PubMed: 11517645]

6. Roy E, Haley N, Leclerc P, et al. Prevalence of HIV infection and risk behaviours among Montreal street youth. *Int J STD AIDS*. 2000; 11(4):241–247. [PubMed: 10772087]
7. Roy E, Haley N, Leclerc P, et al. Mortality in a cohort of street youth in Montreal. *JAMA*. 2004; 292(5):569–574. [PubMed: 15292082]
8. Kerr T, Marshall BD, Miller C, et al. Injection drug use among street-involved youth in a Canadian setting. *BMC Public Health*. 2009; 9:171. [PubMed: 19493353]
9. Roy E, Haley N, Leclerc P, et al. Risk factors for hepatitis C virus infection among street youths. *CMAJ*. 2001; 165(5):557–560. [PubMed: 11563207]
10. Werb D, Kerr T, Buxton J, et al. Crystal methamphetamine and initiation of injection drug use among street-involved youth in a Canadian setting. *CMAJ*. 2013; 185(18):1569–1575. [PubMed: 24130244]
11. Rhodes T, Kimber J, Small W, et al. Public injecting and the need for 'safer environment interventions' in the reduction of drug-related harm. *Addiction*. 2006; 101(10):1384–1393. [PubMed: 16968336]
12. Roy E, Arruda N, Bourgois P. The growing popularity of prescription opioid injection in downtown Montreal: new challenges for harm reduction. *Subst Use Misuse*. 2011; 46(9):1142–1150. [PubMed: 21370963]
13. Wood E, Kerr T, Lloyd-Smith E, et al. Methodology for evaluating Insite: Canada's first medically supervised safer injection facility for injection drug users. *Harm Reduct J*. 2004; 1(1):9. [PubMed: 15535885]
14. de Jong W, Weber U. The professional acceptance of drug use: a closer look at drug consumption rooms in the Netherlands, Germany and Switzerland. *Int J Drug Policy*. 1999; 10(2):99–108.
15. Dolan JK, Craig Fry, David McDonald, John Fitzgerald, Franz Trautmann, Kate. Drug consumption facilities in Europe and the establishment of supervised injecting centres in Australia. *Drug Alcohol Rev*. 2000; 19(3):337–346.
16. Kimber J, Dolan K, van Beek I, et al. Drug consumption facilities: an update since 2000. *Drug Alcohol Rev*. 2003; 22(2):227–233. [PubMed: 12850909]
17. Marshall BD, Milloy MJ, Wood E, et al. Reduction in overdose mortality after the opening of North America's first medically supervised safer injecting facility: a retrospective population-based study. *Lancet*. 2011; 377(9775):1429–1437. [PubMed: 21497898]
18. Wood E, Tyndall MW, Zhang R, et al. Attendance at supervised injecting facilities and use of detoxification services. *N Engl J Med*. 2006; 354(23):2512–2514. [PubMed: 16760459]
19. Kerr T, Tyndall M, Li K, et al. Safer injection facility use and syringe sharing in injection drug users. *Lancet*. 2005; 366(9482):316–318. [PubMed: 16039335]
20. Stoltz JA, Wood E, Small W, et al. Changes in injecting practices associated with the use of a medically supervised safer injection facility. *J Public Health (Oxf)*. 2007; 29(1):35–39. [PubMed: 17229788]
21. Kerr T, Stoltz JA, Tyndall M, et al. Impact of a medically supervised safer injection facility on community drug use patterns: a before and after study. *BMJ*. 2006; 332(7535):220–222. [PubMed: 16439401]
22. Wood E, Kerr T, Small W, et al. Changes in public order after the opening of a medically supervised safer injecting facility for illicit injection drug users. *CMAJ*. 2004; 171(7):731–734. [PubMed: 15451834]
23. Wood E, Kerr T, Montaner JS, et al. Rationale for evaluating North America's first medically supervised safer-injecting facility. *Lancet Infect Dis*. 2004; 4(5):301–306. [PubMed: 15120347]
24. DeBeck K, Kerr T, Lai C, et al. The validity of reporting willingness to use a supervised injecting facility on subsequent program use among people who use injection drugs. *Am J Drug Alcohol Abuse*. 2012; 38(1):55–62. [PubMed: 21834612]
25. Wood E, Tyndall MW, Li K, et al. Do supervised injecting facilities attract higher-risk injection drug users? *Am J Prev Med*. 2005; 29(2):126–130. [PubMed: 16005809]
26. Wood E, Stoltz JA, Montaner JSG, et al. Evaluating methamphetamine use and risks of injection initiation among street youth: the ARYS study. *Harm Reduct J*. 2006; 3:18. [PubMed: 16723029]
27. Boivin JF, Roy E, Haley N, et al. The health of street youth: a Canadian perspective. *Can J Public Health*. 2005; 96(6):432–437. [PubMed: 16350867]

28. Hadland SE, Werb D, Kerr T, et al. Childhood sexual abuse and risk for initiating injection drug use: A prospective cohort study. *Prev Med*. 2012; 55(5):500–504. [PubMed: 22954518]
29. Marshall BD, Kerr T, Livingstone C, et al. High prevalence of HIV infection among homeless and street-involved Aboriginal youth in a Canadian setting. *Harm Reduct J*. 2008; 5:35. [PubMed: 19019253]
30. Liang K-Y, Zeger SL. Longitudinal data analysis using generalized linear models. *Biometrika*. 1986; 73(1):13–22.
31. Cleland CM, Deren S, Fuller CM, et al. Syringe disposal among injection drug users in Harlem and the Bronx during the New York State Expanded Syringe Access Demonstration Program. *Health Educ Behav*. 2007; 34(2):390–403. [PubMed: 16816027]
32. Springer KW, Sterk CE, Jones TS, et al. Syringe disposal options for injection drug users: a community-based perspective. *Subst Use Misuse*. 1999; 34(13):1917–1934. [PubMed: 10540978]
33. Wood E, Spittal PM, Small W, et al. Displacement of Canada's largest public illicit drug market in response to a police crackdown. *CMAJ*. 2004; 170(10):1551–1556. [PubMed: 15136548]
34. Fry C, Fox S, Rumbold G. Establishing safe injecting rooms in Australia: attitudes of injecting drug users. *Aust N Z J Public Health*. 1999; 23(5):501–504. [PubMed: 10575772]
35. Fast D, Small W, Wood E, et al. Coming 'down here': Young people's reflections on becoming entrenched in a local drug scene. *Soc Sci Med*. 2009; 21:21.
36. Miller CL, Strathdee SA, Kerr T, et al. Factors associated with early adolescent initiation into injection drug use: implications for intervention programs. *J Adolesc Health*. 2006; 38(4):462–464. [PubMed: 16549314]
37. [cited 16 Aug 2010] A Framework for Action: A Four-Pillar Approach to Drug Problems in Vancouver. 2001. Available from: <http://vancouver.ca/fourpillars/pdf/Framework.pdf>
38. Beyrer C, Malinowska-Sempruch K, Kamarulzaman A, et al. Time to act: a call for comprehensive responses to HIV in people who use drugs. *Lancet*. 2010; 376(9740):551–563. [PubMed: 20650515]
39. GCODP. [cited 2013 6 October] War on Drugs: Report of the Global Commission on Drug Policy. 2011. Available from: http://www.globalcommissionondrugs.org/wpcontent/themes/gcdp_v1/pdf/Global_Commission_Report_English.pdf
40. Wood E, Werb D, Kazatchkine M, et al. Vienna Declaration: a call for evidence-based drug policies. *Lancet*. 2010; 376(9738):310–312. [PubMed: 20650517]

IMPLICATIONS AND CONTRIBUTION

Street youth who injected daily were the most likely to use North America's first supervised injection facility, and when not injecting there, instead injected in public places. Supervised injection facilities may prevent accidental overdose and transmission of blood-borne infection among youth while also helping communities by reducing public drug use.

TABLE 1

Characteristics^a of 414 actively injecting youth, according to use of a supervised injection facility (SIF) in the preceding 6 months: At-Risk Youth Study (ARYS), Vancouver, British Columbia, 2005–2012.

Characteristic	Recent SIF Use		OR (95% CI)	p Value
	Yes (%) (n = 175)	No (%) (n = 239)		
Sociodemographic factors				
Median age, years (IQR)	23.4 (21.5, 25.1)	22.7 (20.4, 24.5)	1.14 (1.05 – 1.22)	0.003
Male	112 (64.0)	162 (67.8)	0.85 (0.56 – 1.27)	0.422
Aboriginal ancestry	45 (25.7)	50 (20.9)	1.31 (0.83 – 2.07)	0.252
High school education	67 (40.4)	94 (39.8)	1.02 (0.68 – 1.53)	0.915
Spent time in DTES ^{c,d}	143 (81.7)	114 (47.7)	4.90 (3.09 – 7.76)	<0.001
Homeless ^d	127 (73.0)	179 (75.2)	0.89 (0.57 – 1.39)	0.610
Incarcerated ^d	45 (25.9)	51 (21.4)	1.28 (0.81 – 2.03)	0.293
Sex work ^d	24 (13.7)	33 (13.8)	0.99 (0.56 – 1.75)	0.978
Drug use-related behaviors				
Daily heroin injection ^d	76 (43.4)	49 (20.5)	2.98 (1.93 – 4.59)	<0.001
Daily cocaine injection ^d	11 (6.3)	5 (2.1)	3.14 (1.07 – 9.20)	0.029
Daily crystal meth injection ^d	36 (20.6)	34 (14.2)	1.56 (0.93 – 2.62)	0.089
Overdose ^d	29 (16.6)	40 (16.7)	0.99 (0.59 – 1.67)	0.965
Dealt drugs ^d	94 (53.7)	115 (48.1)	1.25 (0.85 – 1.85)	0.261
Any public injection ^{d,e}	129 (73.7)	147 (65.0)	1.51 (0.98 – 2.33)	0.063
Needed help injecting ^d	56 (32.0)	90 (40.0)	0.71 (0.47 – 1.07)	0.099
Visited crack house or shooting gallery ^d	65 (39.9)	67 (29.8)	1.56 (1.02 – 2.39)	0.038
Borrowed syringe ^d	29 (16.6)	42 (18.7)	0.87 (0.51 – 1.46)	0.586
‘Jacked up’ by police ^d	68 (39.3)	90 (38.0)	1.06 (0.71 – 1.58)	0.784
Received drug treatment ^d	68 (39.3)	80 (33.8)	1.27 (0.85 – 1.91)	0.248

^aFor the 175 youth who reported SIF use, characteristics are shown for the first visit (baseline or follow-up) at which SIF use was reported; for 239 who never reported SIF use, characteristics are shown for the first visit at which injection drug use was reported

^bPrior completion of or current enrollment in high school

^cLived or spent time in the Downtown Eastside neighborhood, the area immediately surrounding Vancouver's SIF

^dDuring the preceding six months

^eOn the street, in a public bathroom, or in a park

TABLE 2

Unadjusted and adjusted odds ratios (OR) for factors associated with use of a supervised injection facility (SIF) in the preceding 6 months among 414 actively injecting youth: At-Risk Youth Study (ARYS), Vancouver, British Columbia, 2005–2012.

Characteristic	Unadjusted OR ^a (95% CI)	Adjusted OR ^a (95% CI)	<i>p</i> Value
Sociodemographic factors			
Age (per year older)	1.04 (0.98 – 1.10)	–	–
Male gender	0.91 (0.63 – 1.32)	–	–
Aboriginal ancestry	1.25 (0.85 – 1.85)	–	–
High school education ^b	1.01 (0.75 – 1.35)	–	–
Spent time in DTES ^{c,d}	3.33 (2.51 – 4.41)	3.29 (2.38 – 4.54)	<0.001
Homeless ^d	1.39 (1.09 – 1.76)	–	–
Incarcerated ^d	1.28 (0.98 – 1.67)	–	–
Sex work ^d	1.40 (0.91 – 2.15)	–	–
Drug use-related behaviors			
Daily heroin injection ^d	2.93 (2.16 – 3.97)	2.36 (1.72 – 3.24)	<0.001
Daily cocaine injection ^d	3.36 (1.89 – 5.97)	2.44 (1.34 – 4.45)	0.004
Daily crystal meth injection ^d	1.46 (1.09 – 1.94)	1.62 (1.13 – 2.31)	0.008
Overdose ^d	1.42 (1.05 – 1.92)	–	–
Dealt drugs ^d	1.21 (0.93 – 1.58)	–	–
Any public injection ^{d,e}	2.61 (1.99 – 3.44)	2.08 (1.53 – 2.84)	<0.001
Needed help injecting ^d	1.59 (1.19 – 2.12)	–	–
Visited crack house or shooting gallery ^d	1.89 (1.45 – 2.47)	–	–
Borrowed syringe ^d	1.41 (0.97 – 2.03)	–	–
‘Jacked up’ by police ^d	1.38 (1.07 – 1.79)	–	–
Received drug treatment ^d	1.03 (0.80 – 1.34)	–	–

^aBolded text indicates statistical significance at $p < 0.05$

^bDenotes completion of or current enrollment in high school

^cLived or spent time in the Downtown Eastside neighborhood, the area immediately surrounding Vancouver's SIF

^dDuring the preceding six months

^eOn the street, in a public bathroom, or in a park