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Research Paper

"*I inject less as I have easier access to pipes*" Injecting, and sharing of crack-smoking materials, decline as safer crack-smoking resources are distributed

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Abstract

Among injection drug users (IDUs) in Ottawa, the capital of Canada, prevalence rates of HIV (20.6 percent) and hepatitis C HCV (75.8 percent) are among the highest in Canada. Recent research evidence suggests the potential for HCV and HIV transmission through the multi-person use of crack-smoking implements. On the basis of this scientific evidence, in April 2005, Ottawa's needle exchange programme (NEP) commenced distributing glass stems, rubber mouthpieces, brass screens, chopsticks, lip balm and chewing gum to reduce the harms associated with smoking crack. This study aims to evaluate the impact of this initiative on a variety of HCV- and HIV-related risk practices. Active, street-recruited IDUs who also smoked crack consented to personal interviews and provided saliva samples for HCV and HIV testing at four time points: 6-months pre-implementation ($N = 112$), 1-month ($N = 114$), 6-months ($N = 157$) and 12-months ($N = 167$) post-implementation. Descriptive and univariate analyses were completed. Following implementation of the initiative, a significant decrease in injecting was observed. Pre-implementation, 96 percent of IDUs reported injecting in the month prior to the interview compared with 84 percent in the 1-month, and 78 percent in the 6- and 12-month post-implementation interviews ($p < .01$). Conversely, approximately one-quarter of participants at both the 6- and 12-month post-implementation evaluation points reported that they were smoking crack more frequently since the availability of clean equipment—25 and 29 percent, respectively. In addition to a shift to a less harmful method of drug ingestion, HCV- and HIV-related risks associated with this method were reduced. Among crack-smoking IDUs sharing pipes, the proportion sharing "every time" declined from 37 percent in the 6-month pre-implementation stage, to 31 percent in the 1-month, 12 percent in the 6-month and 13 percent in the 12-month post-implementation stages ($p < .01$). Since distributing safer crack-smoking materials by a NEP contributes to transition to safer methods of drug ingestion and significantly reduces disease-related risk practices, other NEPs should adopt this practice.

Keywords: Crack smoking; Injection drug use; Safer crack use intervention; Transitioning; Harm reduction

Introduction

Increasing numbers of women and men in Canada who inject drugs are also smoking crack, a crystallised form of cocaine. This increase is probably due to crack being more affordable and more accessible than many other street drugs, as well as more practical for those with difficulty finding veins.

Data from *I-Track*, a pan-Canadian surveillance study examining HIV- and HCV-related risk behaviours and practices among people who inject drugs, document that 63 percent of 3,031 active injection drug users (IDUs) reported smoking crack (Public Health Agency of Canada, 2006). Engagement in the practice ranged from 32 percent in Regina, Saskatchewan, to 89 percent in Toronto, Ontario. In Ottawa,

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the capital city of Canada, similar high rates of engagement were observed. In 2003, among 1,186 active IDUs attending Ottawa's needle exchange programme (NEP) and participating in the *SurvIDU Study*, a 7-year (1996–2003) open cohort study, 64 percent of men and 80 percent of women reported smoking crack in the 6 months prior to their baseline interview (Millson, Leonard, Remis, Strike, & Challacombe, 2005). Two years later, among 250 IDUs participating in a needs assessment for a safer injection facility, 93 percent reported ever smoking crack and of these, 91 percent reported smoking crack in the 6 months prior to their interview (Leonard, DeRubeis et al., 2006).

Despite this widespread prevalence of smoking crack among Canadians who inject drugs, the HCV- and HIV-related prevention needs of crack smokers have largely been ignored in the development and implementation of harm reduction programmes for people who inject drugs. Aside from a small number of localized community initiatives such as those implemented in Toronto, Montréal, Vancouver and Winnipeg, few jurisdictions in Canada have implemented an integrated strategy to support crack smokers in taking control of their own health by providing resources to reduce the harms associated with smoking crack.

Ontario guidelines for safer crack smoking recommend a single-use glass tube with a rubber or latex mouthpiece and a small gauge brass mesh screen at the end of the tube on which the rock of crack is placed before heating (Strike et al., 2006). In the absence of access to these resources, "pipes" are made from a number of readily available materials: aluminium pop cans and medicinal inhalers are commonly used; metal piping is used alone or often as the stem of a pipe, the bowl of which is a pill bottle. Heat is conducted intensely and swiftly through the metal pipe or can as the rock of crack is heated and the vapors inhaled.

Chronic cuts, burns, blisters and open sores inside the mouth and on the lips and gums are a frequent consequence of using these makeshift pipes through sustained contact with hot smoke and hot metal (Faruque et al., 1996; Inciardi, 1995; Porter & Bonilla, 1993; Porter, Bonilla, & Drucker, 1997). These injuries to the oral cavity, as well as cuts and burns to the hands, also arise when smoking with a glass stem, splintered and broken through multiple use (Porter et al., 1997). Emerging epidemiologic evidence suggests that these injuries promote the transmission of HCV and HIV through blood-to-blood contact when smoking devices are shared among users (McMahon & Tortu, 2003; Tortu, McMahon, Pouget, & Hamid, 2004).

Clearly, for HCV transmission to occur, HCV RNA must be present in the blood spillover from these oral injuries. People who inject drugs constitute the largest group of persons living with HCV in developed countries, and most new infections are reported among this group. In Canada in 2002, more than half of prevalent Canadian HCV cases and three-quarters of new infections were attributed to injection drug use (Remis, 2004). In Ottawa, high rates of HCV prevalence have been documented among IDUs participating in the *SurvIDU Study* and the *POINT PROJECT*, a 2-year HIV incidence study. In 2003, the overall cumulative baseline HCV prevalence rate among 252 *SurvIDU Study* participants was 76 percent (95 percent CI: 71, 81); in 2004, the HCV prevalence rate among the relatively younger 485 *POINT PROJECT* participants was 58 percent (95 percent CI: 54, 63) (Millson et al., 2005).

The city of Ottawa's Safer Crack Use Initiative

A significant association between smoking crack and HCV infection has been documented in a range of research studies, but with little specification as to the routes of acquisition (McMahon & Tortu, 2003; Nyamathi et al., 2002; Roy et al., 2001; Thorpe, Ouellet, Levy, William, & Monterroso, 2000; Tubaro et al., 1987; Ward, Pallecaros, Green, & Day, 2000). However, recent evidence specifically documenting the potential for HCV transmission through the sharing of implements to smoke crack (McMahon & Tortu, 2003; Tortu, Neaigus, McMahon, & Hagen, 2001) had particular resonance for Ottawa. In addition to the high rates of HCV infection observed in the array of studies detailed above, a high rate of engagement in sharing pipes was observed among younger IDUs. Among 342 IDUs aged 30 or younger participating in the *POINT C PROJECT* who reported smoking crack in the 6 months prior to their interview, 72 percent reported sharing a pipe to smoke crack on at least one occasion in the 6 months prior to their baseline interview and among these participants, near universal engagement (90 percent) in the practice 1 month prior to their baseline interview (Leonard, Meadows, Pelude, Seto, & Medd, 2006).

Ottawa has a long-standing history of significant community opposition towards its harm reduction activities for women and men who inject drugs. In 2004, opposition became so intense that City Council commissioned a review of The Site, Ottawa's NEP. One of the recommendations of the review was the establishment of a Council-appointed Site Programme Departmental Consultative Group (SPDCG) reporting to City Council. As one of its first tasks, in 2004 this advisory body reviewed all harm reduction supplies distributed through the NEP against scientific evidence of effectiveness in reducing the transmission of blood-borne pathogens among substance users. Based on this review, the SPDCG recommended that the Medical Officer of Health support the distribution of cookers, tourniquets and glass stems with mouthpieces; City Council subsequently approved this policy and programme development.

However, reaction in the community to the potential distribution of the safer inhalation equipment forced the reopening of the debate by City Council. In 1 month, local TV and radio stations had covered the issue 82 times and 35 articles appeared in local newspapers. Over 15 presentations were made to City Council in a debate that lasted over eight hours and which saw the Chief of Police and the City's Medical Officer of Health strenuously and publicly arguing on oppo-

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site sides of the debate regarding the prevention capacities of the distribution of safer inhalation equipment.

Ultimately, City Council voted in favor of the distribution and in April 2005, The Site Programme launched its "Safer Crack Use Initiative". Through this initiative, crack kits containing a glass stem, brass screens, a rubber mouthpiece, a chopstick, alcohol swabs, condoms, lubricant, lip balm, gum, hand wipes and material emphasising non-sharing behaviour and safe disposal, were made available at all NEP sites and through some partner agencies. At all locations, there was no restriction on the amounts that could be collected; resources were distributed in the quantities requested by the users. Items in the crack kits were also available individually in the quantities requested. In October 2006, the cost of the materials to the programme were CAD $2.00 for the complete kit, 30 cents for the glass stem, 8 cents for the screens and 4 cents for the mouthpiece.

Purpose of study

The first aim of this study was to characterise the operation of the Safer Crack Use Initiative and its acceptability among women and men in Ottawa who inject drugs and smoke crack; and, second to examine the impact of the initiative over time on HIV- and HCV-related drug use practices and behaviours, particularly the multi-person use of crack-smoking implements.

Methods

Personal interviews with women and men who inject drugs

As a component of the *I-Track Study*, street-recruited women and men in Ottawa who had injected drugs in the previous 6 months consented to personal structured interviews. To provide a baseline measure of the evaluation variables of interest, interviews were carried out in October/November 2004, approximately 6 months *prior* to the implementation of the Safer Crack Smoking Initiative. Three further waves of interviews took place *following* the implementation of the initiative; in May 2005 one month following initiative implementation to document immediate impact and two further post-implementation phases of interviews at 6 monthly intervals in November 2005 and May 2006 to document medium- and long-term impact.

This paper reports on the sub sample of 550 *I-Track* participants – out of a cumulative total of 634 – who reported smoking crack in the 6 months prior to their interview: 112 at the 6-month PRE-implementation evaluation point; 114 at the 1-month POST-implementation evaluation point; 157 at the 6-month POST-implementation evaluation point and 167 at the 12-month POST-implementation evaluation point.

As a serial cross-section study, participation in each phase of the evaluation was independent of participation in each of the other phases; crack-smoking IDUs could complete interviews at more than one phase.

Study instrument

Crack-related questions were developed and piloted in collaboration with service providers and current and past crack users to characterise participants' crack smoking history; adverse health effects associated with the use of crack pipes; the shared use of crack pipes; the use and disposal of glass stems and their confiscation by police. Uptake of the initiative was characterised through questions relating to the collection of, and comments on, specific crack-smoking components. The impact of the initiative was examined through questions assessing the frequency of injecting and smoking crack since being able to access new crack-smoking equipment. Self-perceived reasons for any change in frequency were explored in an open-ended question for each behaviour. Participants were also probed on sociodemographic variables, utilisation of needle exchange programmes, injection practices, sexual behaviours, HIV and hepatitis C virus (HCV) testing and treatment.

Data analysis

Statistical analysis of the data was performed using SPSS 12.0. Descriptive statistics were computed to characterise and compare the sociodemographic and behavioural characteristics of participants across the four evaluation phases. Significant differences between the participants across the evaluation phases were determined by one-way analysis of variance (ANOVA) tests for continuous variables. Chi-square (χ^2) tests were completed for categorical variables. Fisher's exact test was used to detect significant associations in tables in which more than 20 percent of cells had an expected count of less than five. Responses to open-ended questions were recorded verbatim and subsequently analysed and grouped according to emergent themes.

Testing for the presence of hepatitis C virus antibodies

At the conclusion of the interview, consenting participants provided a saliva sample for testing for the presence of HCV antibodies using the OraSure HIV-1 Oral Specimen Collection Device. Saliva testing has adequate sensitivity and specificity for HCV prevalence studies (Judd et al., 2003). Labeled with a unique coded identifier, the samples were tested at the Laboratoire de santé publique du Québec using the modified Ortho HCV 3.0 ELISA assay protocol developed by Judd et al. (2003).

Extraction of safer crack use initiative data from needle exchange programme statistics

To characterise the distribution profile of the safer crack-smoking resources, the City of Ottawa provided data at three

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time points, approximating the timing of the three post-implementation phases of evaluation interviews. Data were provided documenting the supplies distributed during the first month of operation (1–30 April 2005), for supplies distributed in the following 6 months (1 May–31 October 2005) and for the 6 months following this second measurement point (1 November–30 April 2006).

Ethical approval

The Research Ethics Committee of Health Canada and the Research Ethics Committee of the City of Ottawa granted ethical approval.

Results

Participant profile

Demographic characteristics

There was very little variation in key demographic variables across the four evaluation phases. As shown in Table 1, the greatest proportion of participants in each evaluation phase were men (68–82 percent); reported a mean age of mid- to late-30s (35–37 years); identified as Canadian (76–86 percent); had not completed high school (43–57 percent); were living in Ottawa at the time of their interview (97–100 percent); had lived in unstable housing in the 6 months prior to their interview (61–65 percent); had used the services of a NEP (88–93 percent); had used the services of the NEP in Ottawa (87–92 percent).

Drug use patterns

The pattern of drugs used, not injected, in the 6 months prior to interview was consistent at all four stages of the evaluation. The top four drugs used were cannabis, cocaine, alcohol, and morphine. A similar consistent pattern was observed for drugs injected in the 6 months prior to interview. At all four stages of the evaluation, the top five drugs injected were (powder) cocaine, morphine, crack, dilaudid and oxycodone (Table 1).

Engagement in smoking crack

The average age of commencement of smoking crack among the IDUs participating in the three post-implementation phases of the evaluation was mid- to late-20s (24–27 years), somewhat later than the average age at which these participants had first injected drugs (22–23 years). The average length of time engaging in smoking crack was between 9 and 11 years with a range of between one month and 49 years (Table 1).

HCV testing and status

The majority of IDU crack smokers (83–90 percent) interviewed at all four evaluation points had undergone a blood test for the presence of HCV, testing on average one to two times in the 2 years prior to their interview with the number of tests ranging from no tests to 24 tests (Table 1).

Based on the laboratory testing of saliva for the presence of HCV antibodies, the HCV prevalence rate with 95 percent confidence intervals for the cross sectional sample of IDU crack smokers participating at the pre-implementation phase was 63 percent (95 percent CI: 54, 72); 54 percent (95 percent CI: 45, 63) for those participating at the 1-month post-implementation phase; 51 percent (95 percent CI: 43, 59) for those participating at the 6-month post-implementation phase; 56 percent (95 percent CI: 49, 64) for those participating at the 12-month post-implementation phase.

Operation of the safer crack use initiative

Accessing the safer crack use initiative

After 1 month of operation, the majority (80 percent) of crack-smoking IDUs interviewed at this time point had personally accessed the Safer Crack Use Initiative; this percentage rose to 87 percent at the 12-month evaluation point (Table 2). Combining this group of personal users who directly accessed the Initiative with the small, but increasing, proportion of crack-smoking IDUs who reported that their friend or sexual partner accessed the initiative on their behalf (secondary users), access to the initiative increased significantly over the 12 months of operation with near universal utilisation (94 percent) at the 1 year post-implementation evaluation point ($p < .01$).

Collection of safer crack-smoking materials

Over the period of the evaluation, the collection of individual items took precedence over the complete kits (Table 2). The greatest proportion of crack smokers (90 percent) interviewed 1 month post-implementation had collected complete crack kits, a proportion that declined to 81 percent 6 months later and to 30 percent in the subsequent 6 months. This decline in collection of crack kits was offset however by a marked increase in the collection of the individual items in the kits. Collection of individual glass stems increased from 52 percent of participants at the 1-month evaluation point to almost universal collection (97 percent) at the 6- and 12-month evaluation points. A similar increasing pattern was observed for the collection of brass screens (51–88 percent) and for the collection of chopsticks (40–87 percent). A somewhat lower increase in the proportion of crack smokers collecting rubber mouthpieces was observed, from just over one-third (34 percent) after 1 month of operation to just over one-half at the 6-month (56 percent) and 12-month (52 percent) evaluation points.

Distribution of safer crack-smoking materials

As can be seen in Table 3, the reported pattern of the collection of safer crack-smoking materials was largely replicated in the pattern of distribution of materials documented in data obtained from NEP records. A reduction in the number of distributed crack kits was recorded and for each subsequent

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Table 1
Profile of participants across four evaluation phases: 6 months PRE-implementation (October 2004), 1 month POST-implementation (May 2005), 6 months POST-implementation (November 2005) and 12 months POST-implementation (May 2006)

Variable	Six months PRE ($N = 112$) N (%)	One month POST ($N = 114$) N (%)	Six months POST ($N = 157$) N (%)	Twelve months POST ($N = 167$) N (%)
Gender[a]				
Male	87 (78)	78 (68)	128 (82)	128 (77)
Female	25 (22)	36 (32)	29 (19)	39 (23)
Age	Mean = 37 ($SD = 10$)	Mean = 35 ($SD = 10$)	Mean = 37 ($SD = 10$)	Mean = 37 ($SD = 9$)
Identified as Canadian[b]	95 (86)	88 (81)	118 (76)	132 (81)
Highest level of education				
Less than high school	49 (44)	49 (43)	84 (54)	95 (57)
Completed high school	28 (25)	34 (30)	43 (27)	42 (25)
Some post-secondary	35 (31)	31 (27)	30 (19)	30 (18)
City of residence at time of interview				
Ottawa	109 (97)	112 (98)	157 (100)	165 (99)
Outside Ottawa	3 (3)	2 (2)	0	2 (1)
Lived in unstable housing 6 months prior to interview[c]	73 (65)	73 (64)	101 (64)	101 (61)
EVER used a needle exchange programme in any city	99 (88)	106 (93)	139 (89)	152 (91)
EVER used a needle exchange programme in Ottawa[d,e]	98 (92)	N/A	137 (87)	150 (90)
Drug used, not injected, at least once in 6 months prior to interview				
Cannabis	94 (84)	92 (81)	125 (80)	133 (80)
Cocaine	79 (71)	71 (62)	59 (38)	78 (47)
Alcohol	77 (69)	88 (77)	100 (64)	110 (66)
Morphine	69 (62)	51 (45)	46 (29)	54 (32)
Drugs injected at least once in 6 months prior to interview				
Cocaine	94 (84)	80 (70)	104 (66)	114 (68)
Morphine	76 (64)	64 (56)	83 (53)	89 (53)
Crack	68 (61)	70 (61)	76 (48)	77 (46)
Dilaudid	37 (33)	30 (26)	36 (23)	45 (27)
Oxycodone	8 (7)	17 (15)	32 (20)	45 (27)
Age first smoked crack[f,g]	N/A	Mean = 24 (range = 13–54)	Mean = 27 (range = 7–54)	Mean = 25 (range = 7–48)
Less than 18 years		35 (32)	28 (18)	39 (23)
18 years or older		76 (69)	129 (82)	128 (77)
Duration of smoking crack (years)[f,h]	N/A	Mean = 9 (range = 1 month–31 years)	Mean = 10 (range = 6 months–36 years)	Mean = 11 (range = 6 months–49 years)
Age first injected	Mean = 22 (range = 11–45)	Mean = 22 (range = 11–53)	Mean = 23 (range = 13–55)	Mean = 22 (range = 11–44)
EVER had a blood test for HCV[i]	96 (87)	91 (84)	129 (83)	150 (90)
Number of HCV tests in the past 2 years[j]	Mean = 1.3 (range = 0–10)	Mean = 1.5 (range = 0–10)	Mean = 1.5 (range = 0–20)	Mean = 1.6 (range = 0–24)

[a] Female, includes one transwoman participant in all but the 1 month POST.
[b] Data missing for $n = 1$, 5, 2 and 4 participant(s), in 6 months PRE, 1 month POST, 6 months POST and 12 months POST, respectively.
[c] Unstable housing defined as living in: a hotel/motel room, a rooming/boarding house, a shelter/hostel, on the street, or in an abandoned building.
[d] The 6 months PRE, includes only those $n = 107$ participants who knew of the needle exchange in Ottawa.
[e] Question was not asked in 1 month POST questionnaire.
[f] Question was not asked in 6 month PRE questionnaire.
[g] Data missing for 3 participants, in 1 month POST.
[h] Data missing for 1 participant, in 1 month POST.
[i] Data missing for 3, 6, 1 and 1 participant(s), in PRE, 1 month POST, 6 months POST and 12 months POST, respectively.
[j] Data missing for 3, 1 and 1 participant(s), in 1 month POST, 6 months POST and 12 months POST, respectively.

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Table 2
Participant's uptake of the 'Safer Crack-Smoking Initiative': access and collection of supplies

Variable	One month POST ($N = 114$) N (%)	Six months POST ($N = 157$) N (%)	Twelve months POST ($N = 167$) N (%)
Personally accessed the initiative (personal user)[a]			
Yes	91 (80)	126 (80)	146 (87)
No	23 (20)	31 (20)	21 (13)
Personal user or friend/partner accessed the initiative on IDUs' behalf (secondary user)[b]			
Yes	92 (81)	135 (86)	157 (94)
No	22 (19)	22 (14)	10 (6)
Materials collected by personal users of the initiative			
Crack kits[c]	82 (90)	101 (81)	43 (30)
Glass stems[d]	47 (52)	122 (97)	141 (97)
Brass screens[e]	45 (51)	111 (88)	129 (88)
Chopsticks[e]	36 (40)	107 (85)	127 (87)
Rubber mouthpieces[e]	30 (34)	70 (56)	76 (52)

[a] No significant difference between participants across the four evaluation phases ($p = .139$).
[b] Significant difference between participants across the four evaluation phases ($p = .003$).
[c] Data missing for 1 participant in 6 months POST.
[d] Data missing for 1 participant in 1 month PRE.
[e] Data missing for 2 participants in 1 month PRE.

6-month period, the number of glass stems and brass screens distributed increased. There was virtually no increase in the number of rubber mouthpieces distributed between the first and second 6-month periods.

Impact of the initiative on drug use patterns and behaviours

Engagement in injecting drugs

While injecting drugs in the 6 months prior to interview was a study eligibility criterion, reports of injecting in the month prior to interview decreased over the period of the evaluation. Decreasing proportions of participants reported that they had injected drugs in the month prior to their interview: 96 percent pre-implementation; 84 percent 1-month post-implementation and 78 percent of participants at the 6- and 12-month post-implementation evaluation points ($p < .001$) (Table 4).

During the 6- and 12-month post-implementation evaluation interviews, IDUs who personally accessed the initiative and those secondary users whose friends or partners went on their behalf were asked to qualitatively assess the impact of the availability of new, unused crack-smoking equipment on their engagement in injecting drugs. These participants were asked to compare their current engagement in injecting drugs when new, unused crack-smoking supplies were available, with their engagement in injecting drugs when these supplies were not available and to explain any difference.

The majority of participants (56 percent) at both the 6- and 12-month post-implementation evaluation points reported that their level of engagement in injecting drugs had not changed. The increased availability and accessibility of safer crack-smoking resources had not impacted their level of engagement in injecting drugs: "*Having glass stems doesn't effect how much I inject*." For many, the explanation given for this lack of effect was that injection was their preferred method of drug ingestion: "*Prefer to inject – availability of safe crack equipment doesn't effect*."

A substantial proportion of participants however reported that their level of engagement in injecting drugs had declined: 41 percent of participants at the 6-month post-implementation evaluation point and 40 percent at the 12-month point. While stated intentions to decrease overall engagement in injecting drugs and a preference for smoking over injecting as the route of administration were the main reasons given for this decline, the third ranked reason for injecting less was access to safer smoking supplies:

> "*Now stems are more accessible I have stopped my injection use.*"

Table 3
Distribution of safer crack-smoking materials by Ottawa's needle exchange programme

Material	One month POST 1–30 April 2005	Six months POST 1 May 05–31 October 2005	Twelve months POST 1 November 05–30 April 2006	Cumulative 1 April 2005–30 April 2006
Crack kits	1,065	533	35	1,633
Glass stems	2,555	18,495	25,902	46,952
Rubber mouthpieces	1,129	8,482	8,955	18,566
Brass screens	2,707	32,535	46,425	81,667

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Table 4
Impact of the initiative on drug use patterns and behaviours across four evaluation phases, 6 months PRE-implementation (October 2004), 1 month POST-implementation (May 2005), 6 months POST-implementation (November 2005) and 12 months POST-implementation (May 2006)

Variable	Six months PRE ($N = 112$) *N* (%)	One month POST ($N = 114$) *N* (%)	Six months POST ($N = 157$) *N* (%)	Twelve months POST ($N = 167$) *N* (%)
Injected drugs in month prior to interview[a]				
Yes	107 (96)	96 (84)	123 (78)	130 (78)
No	5 (5)	18 (16)	34 (22)	37 (22)
Frequency of injecting since clean crack-smoking supplies available (among personal and secondary initiative users)[b,c]				
More			4 (3)	7 (5)
Less	N/A	N/A	54 (41)	59 (40)
Same			73 (56)	83 (56)
Frequency of smoking since clean crack-smoking supplies available (among personal and secondary initiative users)[b,d]				
More			34 (25)	45 (29)
Less	N/A	N/A	14 (10)	19 (12)
Same			86 (64)	90 (58)
Shared used equipment to smoke, inhale or sniff drugs in the 6 months prior to interview[e]				
Yes	95 (85)	96 (85)	126 (80)	134 (80)
No	17 (15)	17 (15)	31 (20)	33 (20)
Frequency of sharing (among sharers)[e,f]				
Every time	35 (37)	30 (31)	15 (12)	18 (13)
Usually/sometimes	59 (62)	61 (64)	106 (84)	111 (83)
Once	1 (1)	5 (5)	5 (4)	5 (4)
Frequency of sharing (among shares who were personal initiative users)[e,f]				
Every time	N/A	25 (33)	10 (10)	17 (14)
Usually/sometimes		50 (66)	86 (85)	97 (82)
Once		1 (1)	5 (5)	4 (3)

[a] Significant difference between participants across the four evaluation phases ($p = .000$).
[b] Question was not asked in 6 months PRE or 1 month POST questionnaires.
[c] Included 131 and 149 participants, in 6 months POST and 12 months POST, respectively.
[d] Included 134 and 154 participants, in 6 months POST and 12 months POST, respectively.
[e] Data missing for 1 participant in 1 month POST.
[f] Significant difference between participants across the three evaluation phases ($p = .001$).

"*Sooner just smoke crack—I inject less as I have easier access to pipes.*"

Engagement in smoking crack

When asked to assess the impact of the availability of safer crack-smoking resources on their level of engagement in smoking crack, the majority of participants in both the 6-month (64 percent) and the 12-month (58 percent) post-implementation evaluation interviews reported their engagement in smoking crack had not changed. Several participants explained that in the absence of clean equipment, pipes would be fashioned from other sources: "*Makes no difference to how much you smoke – if you want to smoke crack you will make a pipe*." Other participants explained that while the availability of clean equipment had not affected their level of engagement in crack smoking, they acknowledged that the provision of clean materials had made their practices safer: "*Doesn't effect amount I smoke, but safer for health*."

In contrast, approximately one-quarter of participants at both the 6- and 12-month post-implementation evaluation points reported that they were smoking more since the availability of clean equipment—25 and 29 percent, respectively. The greatest proportion of these participants at the 6-month post-implementation evaluation point did attribute their increased engagement in smoking crack to the availability of new equipment: "*Because I inject less now that I can get clean glass stems*." However, the greatest proportion of participants at the 12-month post-implementation evaluation point attributed the increase to the availability of crack: "*Lots more crack around*."

Engagement in the practice of using previously-used equipment

In the context of increasing numbers of people who inject drugs also smoking crack, examination of engagement in the practice of sharing equipment that had already been used by someone else to smoke, inhale or sniff drugs was of particular importance. Over the four evaluation phases, a modest downward trend was documented in the practice; however, engagement in the practice remained at a high level. As shown in Table 4, more than three-quarters of crack smokers at each evaluation point reported engaging in this practice.

However, a significant decline in the frequency of engagement in this practice over the four evaluation phases was observed. Among all crack smokers who continued to share,

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the proportion reporting doing so every time declined significantly from 37 percent at the pre-implementation evaluation point to 13 percent at the 12-month post-implementation evaluation point ($p = .001$). Among crack users who continued to share and who reported personally accessing the Safer Crack Use Initiative, sharing also declined significantly from 33 percent at the 1-month post-implementation evaluation point, to 10 percent at the 6-month post-implementation evaluation point and 14 percent at the 12-month post-implementation evaluation point ($p = .001$).

Discussion

The main limitations of this study are that the sample is drawn from a series of cross-sectional studies with convenience samples, precluding generalisability to the wider population of IDUs who smoke crack. Examining independent samples collected at each time point, with no attempt in this study to follow-up subjects, precludes the possibility of determining within-individual drug use changes. The results characterise the collective sample of crack smokers at each phase rather than individual crack smokers. However, the range of times and different locations in which the interviews were conducted may have helped to diversify the sample. The possibility that the results are limited by recall bias cannot be discounted; events may not always be remembered with accuracy and the inherent difficulties with self-reported behaviours must also be acknowledged, although previous research has shown that IDUs are able to report most drug use behaviours with reasonable accuracy and reliability (Darke, 1998). As smoking crack was not a criterion for inclusion in the main *I-Track Study* from which this study sample was drawn, accuracy of self-reports of frequency of engagement in this practice may have been heightened.

Uptake of the Safer Crack Use Initiative by people in Ottawa who inject drugs and also smoke crack was immediate, high and sustained—demonstrating a high level of unmet need for resources to reduce the harms associated with smoking crack. Although there was only a modest decline in sharing implements to smoke crack, the frequency with which these devices were shared declined significantly suggesting gradual behaviour change. Perhaps the most compelling results however, are those related to the significant decline in injecting drugs and the increase in smoking crack.

Among women and men in Ottawa who inject drugs, powder cocaine has consistently been the drug most frequently injected, so increasing prevalence in administering the drug in another form is perhaps not particularly surprising. What is surprising however is the concomitant decline in injecting the drug as powder cocaine—transitioning from one route of administration to another. The injected route carries heightened risk. Overdoses are more likely to occur and there are many stages in the preparation of the skin and the drug for injection as well as the act of injection, which increase the potential for HIV and HCV acquisition and transmission (Crofts & Kerger, 2000; Hagan et al., 1999; Shah et al., 1996; Strike et al., 2006; Thorpe, Ouellet, Hershow et al. 2000; Thorpe et al., 2002; Vlahov et al., 1997). Consequently, reducing or preventing the use of the injected route and facilitating the transition to other routes of administration are important public health objectives (Bruneau, Brogly, Tyndall, Lamothe, & Franco, 2004; de la Fuente, Barrio, Royuela, & Bravo, 1997; Stimson, 1992).

Transitioning, the phenomenon whereby one route of drug administration is subsequently substituted for another (Dunn & Laranjeira, 1999), is considered to be a result of the interaction between individual, social and market factors (Bravo et al., 2003). Individual factors such as the health-related concerns of acquiring HIV and other infections, overdose and dependence have been found to be associated with transition to a non-injection route among Spanish heroin users (Bravo et al., 2003; de la Fuente et al., 1997), among Australian amphetamine users (Darke, Cohen, Ross, Hando, & Hall, 1994) and among Brazilian cocaine users (Dunn & Laranjeira, 1999). Other health-related factors such as concerns over vein damage have also been found to be associated with transitioning away from injection as the preferred route particularly among women who use drugs (Bravo et al., 2003; Darke et al., 1994; Dunn & Laranjeira, 1999), and these factors are consistent with the findings in this study.

Social forces, such as the influence of the preferred drug administration route of a sexual partner or that of sexual or drug-using networks have been documented in some studies to be associated with transitioning to non-injection drug use (Bravo et al., 2003; van Ameijden & Coutinho, 2001). However, the influence of the social environment was not raised spontaneously by the participants in this study as an explanation for their decrease in injecting or for their increase in smoking crack.

In other studies, the market forces examined and found to be associated with transitioning to non-injection drug use are the relative availability and price of alternative forms of the preferred drug or alternate drugs that can be administered by a non-injection route (Bravo et al., 2003; van Ameijden & Coutinho, 2001). Our study supports these findings particularly in the most recent post-implementation evaluation phase where the increased availability of crack was cited as a reason for more frequent engagement in crack smoking.

However, where our study is unique is in documenting a change in the risk environment as an important driver of transitioning to a less harmful route of drug administration. At the population level, we documented a significant decline in recent injecting. At the individual level, active IDUs who also smoke crack assessed their own level of injecting drugs and smoking crack since the implementation of the Safer Crack Use Initiative and many attributed their reduction in injection frequency and increase in crack smoking to the new availability of safer crack-smoking supplies.

In Bruneau et al. (2004) work examining the determinants of sustained injection cessation (≥7 months) among IDUs

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in Montréal, Québec, participants who injected cocaine frequently were less likely to stop injecting whereas smoking crack was associated with a higher frequency of injection cessation. This is an important observation, suggesting that interventions to facilitate transition away from cocaine injection to smoking crack may lead to eventual injection cessation with its diminution of health-related harms including HIV and HCV transmission and, as suggested by the work of Bouhnik et al. (2004), a general decrease in addiction practices such as alcohol and cannabis consumption and unsafe sexual behaviours.

Providing the structural conditions, the availability and accessibility of safer crack-smoking resources, appears in this study to facilitate the transition in route of drug administration away from the injection route with documented disease transmission and acquisition risk to the non-injection route with lower associated risks. Providing these resources in sufficient quantities to reduce multi-person use will not only enhance the ability of injection drug users smoking crack to take control of their own health, it will resolve the harm reduction paradox that exists in much of Canada and elsewhere of responding to the HIV- and HCV-related risks inherent in only one route of drug administration.

Scaling up harm reduction programmes in this way would prove popular to the majority of Canadians. A national poll conducted in January 2007 by the Innovative Research Group found 65 percent of 3,000 respondents believed that the federal government should treat drug use as a medical problem requiring more prevention and treatment programmes (O'Neil, 2007). In Ottawa however, the debate over the prevention and harm reduction capacity of the city's Safer Crack Use Initiative continues. As one of the recently elected Mayor's campaign promises was to cancel the Safer Crack Use Initiative, the future of the Initiative and the health and well-being of people in Ottawa who inject drugs and smoke crack remain vulnerable.

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