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Multiple routes of drug administration and HIV risk among injecting drug users

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Abstract

This study assesses relationships between drug administration routes and HIV serostatus, drug-use and sexual behaviors among current injecting drug users (IDUs) in Tallinn, Estonia. We recruited 350 IDUs for a cross-sectional risk behavior survey. Adjusted odds ratios (AORs) were calculated to explore injection risk behavior, sexual behavior and HIV serostatus associated with multiple route use. Focus groups explored reasons why injectors might use non-injecting routes of administration. Those reporting multiple drug administration routes were less likely to be HIV seropositive (AOR 0.49; 95%CI 0.25-0.97), had almost twice the odds of having more than one sexual partner (AOR 1.90; 95%CI 1.01-3.60) and of reporting having sexually transmitted diseases (AOR 2.38; 95%CI 1.02-5.59).

IDUs who engage in non-injecting drug use may be reducing their risk of acquiring HIV though sharing injection equipment, but if infected may be a critical group for sexual transmission of HIV to people who do not inject drugs.

Keywords

Injecting drug use; HIV; Risk behavior; Illicit drug use; Sexual risk behaviors

1. Introduction

Injecting drug use is a major public health concern since it is associated with many harms and costs: illness (in the form of infectious diseases, particularly HIV infection and

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hepatitis), death (through overdose) and crime experienced by a social system (French et al., 2004; Fischer et al., 2000). Injecting drug users (IDUs) often combine drugs using multiple substances and routes of administration associated with particularly elevated risks (Southwell, 2005). There is evidence that while IDUs are at high risk of HIV through equipment sharing, the specific drugs injected (e.g. cocaine) may increase the risk of HIV infection, and that non-injecting drug use, (particularly crack cocaine and methamphetamine) may increase the risk of sexual acquisition of HIV (DeBeck et al., 2009; Lloyd-Smith et al., 2009; Semple et al., 2010; Strathdee and Stockman, 2010).

In several Eastern European countries, substantial HIV epidemics have emerged among IDUs in the past decade. Estonia has a particularly high prevalence, with about 10,000 people living with HIV, which represents over 1% of the adult population (UNAIDS/WHO, 2009). The majority of these HIV infections have occurred among IDUs. Injecting drug use in Estonia occurs primarily among ethnic Russians, who represent about 85% of IDUs in Tallinn (the capital city) and 98% in Kohtla-Järve (a city near the Russian border). The IDUs in Estonia are mainly male (80%) and aged 20-29 years (70%) (Vorobjov et al., 2009; Lõhmus et al., 2008). Previous studies among IDUs in Estonia have examined HIV prevalence and risk behavior either as a whole or by demographic subgroups. Using administrative data sources the prevalence of injecting drug use has been estimated to be 2.4% among 15-44 year olds and HIV prevalence among IDUs from 45% to 90% in Estonia (Platt et al., 2006; Uusküla et al., 2007a; Uusküla et al., 2007b; Uusküla et al., 2008; Wilson et al., 2007; Abel-Ollo et al., 2009). Fentanyl, produced in illegal drug labs, has been for years the most widely used injected drug on the market in Estonia (Talu et al., 2010). In 2009, there were 36 syringe exchange points in Estonia, with 7,300 clients and in total 2,277,509 needles were distributed (Estonian Monitoring Centre for Drugs, 2010). There are seven treatment centers, which provide methadone substitution treatment, where 1012 clients received treatment in 2009.

Most research on HIV and drug use in Eastern Europe has focused on injecting without considering the potential impact of non-injecting drug use among injectors. There is limited data on the route of administration and on the nature of the harms to which drug users are exposing themselves (Strang et al., 1998). It is possible that non-injecting drug use might have some protective effect. In an epidemic situation in which most HIV transmission is occurring through multi-person use of needles and syringes, substituting non-injecting drug use for injecting drug use could protect against becoming infected with HIV. To expand on previous work involving HIV risk factors among IDUs, we conducted an exploratory study to assess the relationship between routes of administration and HIV serostatus and to identify related sociodemographic and drug-use related factors, and sexual risk behaviors, among current IDUs in Tallinn, Estonia.

2. Methods

2.1. Study design, setting, and interventions

An anonymous cross-sectional study of HIV prevalence and related risk behavior among IDUs was conducted in Tallinn, Estonia in 2007. Respondent-driven sampling (RDS) (Heckathorn, 1997; Heckathorn et al., 2002; Malekinejad et al., 2008) was used to recruit 350 current IDUs for a risk behavior survey and biological sample collection for HIV testing. Inclusion criteria were being 18 years or older, Russian or Estonian language speakers, injecting drug use in the previous two months and ability to provide informed consent. The inclusion criterion of injecting drug use within two months was used with the aim of recruiting current IDUs.

Recruitment began with the non-random selection of five 'seeds' representing diverse IDU types (by gender, ethnicity, main type of drug used, engaging in sex for money and HIV status). Eligible participants were provided with coupons for recruiting up to three of their peers. Coupons were uniquely coded to link participants to their survey responses and biological specimens and for monitoring who recruited whom. Participants who completed the study received a primary incentive (a food voucher worth 6.4 EUR) for participation in the study and a secondary incentive (food vouchers worth 3.2 EUR for each eligible person they recruited to the study). The RDS technique uses participants' social networks to access individuals who may not appear in public venues and are not in contact with service providers (Heckathorn, 2002; Salganik and Heckathorn, 2004).

We used an interviewer-administered questionnaire in face-to-face interviews based on the WHO Drug Injecting Study Phase II survey (version 2b (rev.2)) (Des Jarlais et al., 2006). We elicited information on demographics, drug use history, HIV risk behavior, HIV testing, and access and utilization of harm reduction services. Interviews were held in confidence, in a room of the syringe exchange program (SEP), between the IDU participant and the interviewer. Recruitment was conducted and the survey administrated by a team of trained fieldworkers. The study protocol included pre- and post-HIV test counseling for study participants.

Venous blood was collected from participants and tested with commercially available kits for HIV antibodies (using Abbott IMx HIV-1/HIV-2 III Plus from Abbott Laboratories, Abbott Park, Illinois, USA). Such HIV test kits have proved to have high sensitivity and specificity (>99%) (Weber, 1998; Thorstensson, 1998). The testing was conducted at the state HIV/AIDS reference laboratory in Tallinn.

2.2. Statistical analysis

Subjects were classified into exclusive injectors (who reported only injecting drug use in the six months prior to the interview) or non-exclusive injectors (who reported injecting plus other routes of drug administration in the six months prior to the interview). Using multiple routes was defined as injecting during the last six months plus at least monthly use of at least one illicit drug other than by injection. Marijuana use was included as non-injecting drug use, but alcohol use and cigarette smoking were not. HIV serostatus, risk behaviors and characteristics were compared between the two groups.

Descriptive statistics, including mean, standard deviation (SD) and range were used for continuous variables. For categorical variables, percentages and absolute (n) frequencies are presented. Student's t-test was used for continuous variables and chi-square test for categorical variables to explore differences. Odds ratios (OR) and 95% confidence intervals (95%CI) together with p-values were used to compare characteristics and risk factors between groups. Adjusted odds ratios (AORs) were calculated using a logistic regression model, adjusting for gender, age, employment status, age at IDU initiation, years injecting and frequency of injecting per day. Statistical analyses were carried out using Stata for Windows (version 9) software. RDS analysis Tool v. 5.0.1 was used to calculate homophily to examine for possible recruitment bias (Volz et al., 2007).

2.3. Formative research

To inform and guide the analysis and interpretation of the quantitative findings of the study, we conducted qualitative research including focus groups with members of the target population. A total of 16 IDUs took part in four focus groups held between December 2009 and January 2010 in Tallinn. Focus group participants were IDUs recruited via a drop-in center and SEPs. The groups were run by trained moderators using a semi-structured guide.

The focus group discussions were audio recorded with participants' consent, and recordings were transcribed. Sources of qualitative data included notes, summaries, and transcriptions. Content and themes emerging from the qualitative data were analyzed by project staff to guide the analysis and interpretation of the survey findings. We specifically gathered information to determine: (1) why some IDUs are exclusive injectors and some prefer multiple routes of administration; (2) which drugs are administered; (3) all possible routes of administration. We did not address sexual behavior in the focus groups. Informed consent was obtained from the participants. Focus groups were held in Russian, as the majority of IDUs are Russian speakers, and were translated into Estonian for analysis.

The Ethics Review Board at the University of Tartu approved the study procedures.

3. Results

3.1. Participant characteristics

Across the sample of 350 current IDUs, 86% (n=301) administered illicit drugs solely by injection in the last six months, while the rest (14%, n=49) reported other methods of drug administration in addition to injecting. We calculated RDS homophilies to assess the potential overlap in the social networks of studied groups (exclusive injectors and non-exclusive injectors), the homophilies were −0.004 for exclusive injectors recruiting non-exclusive injectors and −0.194 for non-exclusive injectors recruiting exclusive injectors. Both homophilies were near zero, indicating integration of the social network of the exclusive injectors and the non-exclusive injectors.

As shown in Table 1, over 80% of both exclusive and non-exclusive injectors were male (p=0.233), with a mean age of 26 years, ranging from 18 to 54 years. Close to 40% in both groups were under 25 years of age (p=0.776), and most were of Russian nationality (p=0.369). There were no differences between the study groups in terms of marital status (proportion of never married 78% among exclusive injectors and 71% non-exclusive injectors, p=0.324) or education (54% of exclusive injectors having less than nine years of school vs 47% of non-exclusive injectors, p=0.337). Non-exclusive injectors were more likely to have regular or temporary employment than exclusive injectors (67% vs 51%, p= 0.035). (Table 1)

More than half of the IDUs started drug use by a means of administration other than injecting. Mean age at injecting drug use initiation was about 19 years and mean duration of injecting was seven years, both not significantly different between the two groups, but those currently reporting multiple routes of drug administration reported a lower frequency of injecting (proportions of daily injectors 47% vs 72%, p=0.001), Table 1.

3.2. Injection drug use

During the last four weeks, 86% of IDUs (n=301) reported injecting fentanyl (an illicitly manufactured synthetic opioid, n=245, 81%), amphetamine (n=136, 45%), heroin (n=8, 3%), ecstasy (n=6, 2%), sudafed (n=3, 2%), poppy liquid (n=1, 0.3%), cocaine (n=1, 0.3%) or ephedrine (n=1, 0.3%). Almost three-quarters of the exclusive injectors (n=218, 72%) reported injecting daily in the last six months and, of these, 52% (n=113) reported injecting three or more times during the last injecting day.

3.3. Non-injection drug use

Less than a quarter of the IDUs (n=49) reported using illicit drugs by other routes of administration in addition to injecting. Drugs administered by other routes were: cannabis (n=27, 55%), fentanyl (n=18, 37%), ecstasy (n=10, 20%), amphetamine (n=6, 12%), cocaine

(n=2, 4%), methadone (n=2, 4%), ephedrine (n=1, 2%), LSD (n=1, 2%), buprenorphine (n=1, 2%) and heroin (n=1, 2%). Most (38/49) of the non-exclusive injectors reported using only one non-injected drug in the six months prior to the interview, 9/49 reported non-injecting use of two different drugs, and 3/49 reported non-injecting use of three different drugs. Over 40% of the non-exclusive injectors reported using non-injection drugs more frequently than once a week, and quite a few reported daily non-injection drug use (16%), (Table 1).

3.4. Drug use and sexual risk behavior, and HIV serostatus

Those reporting multiple routes of drug administration were more likely to report multiple sexual partners in the previous 12 months (59% vs 43%, p=0.033) and a higher proportion reported a previous diagnosis of a sexually transmitted disease (STI) (20% vs 9%, p=0.019). Non-exclusive injectors had significantly lower HIV prevalence than exclusive injectors (35% vs 59%, p=0.002).

As shown in Table 2, we examined the association between injection and sexual risk behavior, and HIV serostatus with non-exclusive injection drug use. After adjustment for gender, age, employment status, age at IDU initiation, years injecting and frequency of injecting per day, those reporting multiple routes of drug administration still had close to twice the odds for having more than one sexual partner in the previous year (AOR 1.90 95%CI 1.01-3.60) and a higher risk of ever having an STI (AOR 2.38 95%CI 1.02-5.59), but were significantly less likely to be HIV seropositive (AOR 0.49 95%CI 0.25-0.97).

We conducted additional analyses to examine the potential influence of drugs injected and routes of administration on sexual risk behaviors and HIV serostatus. It appeared that exclusive injectors were more likely to inject fentanyl alone or both fentanyl and amphetamine (compared to injecting amphetamine only) in the last six months than non-exclusive injectors (82% vs 67%, p=0.016). Also IDUs who injected fentanyl (only or fentanyl and amphetamine) in the previous six months were more likely to be HIV positive (63% vs 25%, p<0.001). But after controlling for drugs injected (fentanyl or fentanyl plus amphetamine versus amphetamine only) and frequency of injecting, non-exclusive injectors still had a lower risk of being HIV positive (AOR 0.47 95%CI 0.24-0.92) and having more than one sexual partner in the last 12 months (AOR 2.00 95%CI 1.06-3.75), Table 3.

3.5 Focus groups

We held four focus groups in which a total of 16 IDUs took part (14 male and two female), with ages ranging from 22 to 45 years. These groups produced sufficient information that additional groups would have produced little new information.

Fentanyl and amphetamine emerged as the main drugs injected and these same drugs – fentanyl and amphetamine – were also mentioned as the most frequently used by other routes of administration, followed by tobacco, cannabis and alcohol. Routes for administering drugs depended on the substance: fentanyl was smoked or inhaled, amphetamines were taken orally or intranasally, cannabis was smoked with tobacco or as a "water pipe", while the main route of administration for ecstasy and benzodiazepines was oral.

Exclusive injectors preferred injecting to other routes of administration because of its more rapid and intense effects and its convenience. According to participants, smoking fentanyl needs experience, since it may catch fire and the dose may be lost.

"*Injecting stabs you better, screws you totally…*"

"With injecting there is no loss and you can feel all the "*high*"…"

Those reporting multiple routes of drug administration agreed that injecting gives a faster effect than other administration routes, but the desired "rush" is similar. The use of other routes was reported when the injector wanted to experience different effects on mood or behavior, for example amphetamine makes the user alert and energetic, cannabis helps to laugh and relax, while cannabis with alcohol is used to reduce the effect of amphetamine to induce sleep.

Other administration routes were sometimes used to protect the veins or if no syringe was available.

> "Sometimes I just do not have the syringe. For example I just sit with my friend and feel the urge to inject, but it is too late already to have the clean one…"

The IDUs also reported taking drugs by other means of administration as a precaution when the strength or purity of the drug was not trusted since the quality or properties of new products entering the "drug market" vary. For example, in 2009 a new synthetic heroin with the street name "afghan" became available. IDUs claimed that "afghan" was stronger than previously used forms of synthetic heroin (mainly 'China white') and blamed it for an increase in overdoses. Therefore IDUs sometimes try new drugs by other routes before injecting or start by injecting small amounts.

> "Main method to reduce the risk of overdose is reducing the amount and distribution of dosage to smaller parts…"

> "If the new drug appears … it is better to smoke it first, just to try it … like this "afghan" right now…"

Availability of drugs did not affect the administration route, since participants reported that their preferred drugs were quite easy to obtain. However, some mentioned that it was easier to hide drug abuse from family members when using other routes, because it avoided injection marks on the skin.

> "I am married and I have to hide injecting from my wife I am like on the leash I have to smoke not to inject because of the injection marks. That's why I smoke but sometimes I inject also"

4. Discussion

To our knowledge this is the first study to describe different drug administration routes and their association with HIV prevalence among IDUs in Eastern Europe. We found that a small but significant subset of current IDUs also took illicit drugs by other routes. These IDUs who also used other administration routes had lower HIV prevalence than IDUs who only injected, but had higher rates of sexual risk behavior.

The focus group interviews suggested several reasons for preferring one route of administration over another, depending on the desired effect (e.g. speed and intensity), effect on mood or behavior, convenience, avoiding possible harms (e.g. infections, overdoses), need to protect the veins, avoiding injection marks or personal preference. Although additional research on the personal, social, situational and structural determinants of non-injecting drug use among IDUs is clearly needed, our results suggest that non-injecting illicit drug use may protect against becoming infected with HIV. Also our study findings are similar to a recent study of injecting drug users in New York City, who reported intranasal use of heroin in addition to injecting drugs (Des Jarlais et al., in press). The New York City injectors who reported intranasal heroin use were significantly less likely to be HCV seropostive than those injectors who did not report intranasal heroin use (AOR=0.52, 95%

CI 0.33-0.82). Thus, substituting non-injecting drug use for injecting drug use may be having a protective effect against infection with blood-borne viruses in multiple locations.

The substitution of non-injecting drug use for injecting drug use may be a potentially important new method for reducing HIV transmission through multi-person use of drug injection equipment. There is evidence that reverse transition may occur, with IDUs switching to non-injecting (Southwell, 2005; Des Jarlais et al., 2007). IDUs using multiple routes could be a potential group for targeting such transition. Additional interventions might incorporate promoting alternatives to injecting, social marketing campaigns to reinforce the positive identity of non-injectors, non-injecting treatment options to encourage reverse transition or short-term prescribing to lower the tolerance (Southwell, 2005). The possibility that some laws and policies may promote injecting as a route of transmission should also be considered. For example, laws against opium smoking in Thailand led to an increase in injecting dug use (Westermeyer, 1976).

Those reporting other routes besides injecting appeared to be more socially integrated and were more likely to have a temporary or regular job. At the same time, they exhibited more risky sexual behavior in terms of a higher number of sexual partners and higher number of self-reported sexually transmitted diseases, which is consistent with other data that sexual risk behavior may depend on the drug used and route of administration (Celentano et al., 2008). One possible explanation of the relationships in the present study is that very frequent injection of an opioid such as fentanyl may reduce sexual libido and/or sexual performance in males. The substantial HIV prevalence (35%) and the high rates of sexual risk behavior among the non-exclusive injectors suggest that these IDUs may play a critical role in sexual transmission to people who do not inject drugs. Possible interventions for non-exclusive IDUs exhibiting high sexual risk behaviors might include HIV testing with counseling; STI testing and treatment, and, in the light of recent studies, timely initiation of HAART, if infected, may further help to reduce sexual transmission of HIV (Cohen et al., 2011).

Although there were no differences between the groups in terms of the frequency of overdoses, we found a high overall rate of reported overdoses (over 60%) which requires attention. We found that some IDUs take drugs by other routes for precautionary reasons, when the strength or purity of the drug was not trusted, reflecting the fact that the quality or properties of new products entering the “drug market” vary. Nevertheless there is need for overdose prevention training among IDUs perhaps including greater access to naloxone (Green et al., 2008). At present, naloxone is available only in emergency care and there are no overdose prevention programs in Estonia.

Our study has some limitations. The cross-sectional study design does not allow us to establish causal relationships, particularly as we were not able to study transitions between injecting only and injecting plus other routes with non-injecting drug use. Additionally, some of the factors associated with routes of drug administration, such as ever having an STI, probably occurred prior to the six months before the interview, the time period for which routes of drug administration were assessed. However, failure to measure transitions and routes of administration over long time periods would generally tend to weaken associations between behavior in the last six month (drug administration) and lifetime events (ever having an STI, becoming infected with HIV). Thus, the associations reported here were observed despite the attenuating effects of the different measurement periods. In addition, the numbers of IDUs reporting multiple routes of drug administration were modest. Regardless of this fact we were able to describe significant differences between the study groups.

Our sampling method may have affected the representativeness of the study. However RDS was used for recruitment because it has proved to be an efficient sampling technique for hard-to-reach groups (Heckathorn, 1997). Another limitation was that alcohol use was not measured in this survey and data on alcohol use warrant further analysis. The results of the study may have been affected by self-reporting bias, however to diminish this potential bias responses were anonymous and interviews were conducted by trained interviewers in an environment familiar to the respondents.

This study shows that important differences between exclusive injectors and non-exclusive injectors exist. In particular, those injecting exclusively were more likely to inject daily, and to be HIV positive, while non-exclusive injectors were more likely to be employed, to have multiple sexual partners, and to have had a sexually transmitted disease. However the data collection for this cross-sectional study took place during a period of rapid spread of HIV through injecting drug users in Tallinn and thus, injecting related behaviors were more strongly related to HIV status than were sexual risk behaviors. The high HIV prevalence among both exclusive and non-exclusive injectors warrants attention and measures to prevent heterosexual transmission of HIV into the general population and raises the need for tailored harm-reduction services.

There is a need for more research on patterns of drug use among drug injectors, including cohort studies, personal histories of drug users using techniques such as timeline follow-back. There is also a need to tailor HIV prevention and prevention for HIV-positive IDUs by patterns of injecting and non-injecting drug-use and by sexual behavior. Finally, there is also a need for more research on the sexual behavior of amphetamine users and among exclusive injectors and multiple route users. The relevant message from this study is that HIV prevention programs for IDUs need to address non-injection as well as injection drug use.

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Table 1

Univariate comparison of exclusive injectors and non-exclusive injectors in Tallinn, Estonia, 2007

	Exclusive injectors		Non-exclusive injectors		OR	95%CI	p-value
Variable	**n**	**%**	**n**	**%**			
Gender:							
Male	250	83.06	44	89.80	1.0		
Female	51	16.94	5	10.20	0.56	0.21-1.47	0.233
Age (mean):	301	(26.5)	49	(26.8)	-	-	0.737*
Ethnicity:							
Russian	249	85.57	37	80.43	0.69	0.31-1.54	0.369
Estonian	42	14.43	9	19.57	1.0		
Marital status:							
Single	232	77.85	35	71.43	0.71	0.36-1.40	0.324
Married or cohabiting	66	22.15	14	28.57	1.0		
Educational level (years):							
<9	163	54.33	23	46.94	0.74	0.41-1.36	0.337
10–12	137	45.67	26	53.06	1.0		
Main source of income in last 6 months:							
Regular or temporary job	154	51.16	33	67.35	1.0		
Other	147	48.84	16	32.65	0.51	0.27-0.96	0.035
Drug use initiation:							
Injecting	101	33.55	11	22.45	0.57	0.28-1.17	0.126
By other means of administration	200	66.45	38	77.55	1.0		
Age at IDU initiation (mean)	299	(18.6)	49	(19.6)	-	-	0.149*
Duration of injection career (mean)	299	(7.9)	49	(7.2)	-	-	0.256*
Frequency of injecting:							
Less than daily	83	27.57	26	53.06	1.0		
Daily	218	72.43	23	46.94	0.33	0.18-0.62	0.001

Variable	Exclusive injectors n	Exclusive injectors %	Non-exclusive injectors n	Non-exclusive injectors %	OR	95%CI	p-value
Other routes of administration:							
Less than daily	-	-	41	83.67	-	-	-
Daily	-	-	8	16.33	-	-	-
Intensity of injecting per day:							
One	49	16.33	12	24.49	1.0		
More than one	251	83.67	37	75.51	0.60	0.29-1.24	0.167
Main drug injected during last 6 months:							
Fentanyl	219	73.99	30	62.50	0.59	0.31-1.11	0.101
Amphetamine	73	24.66	17	35.42	1.67	0.88-3.20	0.121
Ever had overdose:							
No	110	36.54	18	36.73	1.0		
Yes	191	63.46	31	63.27	0.99	0.53-1.86	0.980
Sharing syringes during last 6 months:							
No	189	63.00	34	72.34			
Yes	111	37.00	13	27.66	0.65	0.33-1.29	0.217
Sharing paraphernalia during last 6 months:							
No	231	77.00	38	79.17	1.0		
Yes	69	23.00	10	20.83	0.88	0.42-1.86	0.739
Number of sexual partners during last 12 months:							
None or one	171	57.38	20	40.82	1.0		
More than one	127	42.62	29	59.18	1.95	1.06-3.61	0.033
Condom use with casual partner during last 6 months:							
Always	63	57.27	16	69.57	1.0		
Never /Occasionally	47	42.73	7	30.43	0.59	0.22-1.54	0.278
Condom use with primary							

Variable	Exclusive injectors		Non-exclusive injectors		OR	95%CI	p-value
	n	%	n	%			
partner during last 6 months:							
Always	48	33.80	9	30.00	1.0		
Never /Occasionally	94	66.20	21	70.00	1.19	0.51-2.80	0.688
Self-reported STI (syphilis, gonorrhea, chlamydia, genital herpes):							
No	274	91.03	39	79.59	1.0		
Yes	27	8.97	10	20.41	2.60	1.17-5.79	0.019
Disease serostatus:							
HIV+	175	58.72	17	34.69	0.37	0.20-0.70	0.002

* t-test

Table 2

Adjusted odds ratios (AOR) for selected risk factors associated with usage of other routes of administration besides injecting

Variable	AOR[a]	95%CI	p-value
Route of drug use initiation:			
Injecting	1.0		
Other	1.62	0.76-3.47	0.209
Intensity of injecting per day:			
One	1.0		
More than one	0.84	0.39-1.82	0.670
Main drug injected during last 6 months:			
Fentanyl	0.54	0.26-1.10	0.091
Amphetamine	1.37	0.72-2.62	0.339
Sharing syringes during last 6 months:			
No	1.0		
Yes	0.66	0.33-1.36	0.263
Sharing paraphernalia during last 6 months:			
No			
Yes	0.92	0.43-1.99	0.834
Number of sexual partners during last 12 months:			
None or one	1.0		
More than one	1.90	1.01-3.60	0.049
Condom use with causal partner during last 6 months:			
Always	1.0		
Never /Occasionally	0.70	0.26-1.91	0.487
Condom use with primary partner during last 6 months:			
Always	1.0		
Never /Occasionally	1.16	0.48-2.84	0.736
Self-reported STI (syphilis, gonorrhea, chlamydia, genital herpes):			
No	1.0		
Yes	2.38	1.02-5.59	0.046
Disease serostatus:			
HIV+	0.49	0.25-0.97	0.040

[a]Adjusted for gender, age, employment status, age at IDU initiation, years injecting and frequency of injecting per day

Table 3

Adjusted odds ratios (AOR) for drugs injected associated with usage of other routes of administration besides injecting for selected variables

Variable	AOR[a]	95%CI	p-value
Disease serostatus:			
HIV+	0.47	0.24-0.92	0.027
Self-reported STI (syphilis, gonorrhea, chlamydia, genital herpes):			
No			
Yes	2.21	0.97-5.06	0.060
Number of sexual partners during last 12 months:			
None or one			
More than one	2.00	1.06-3.75	0.032

[a]Adjusted for drugs injected (fentanyl or fentanyl and amphetamine versus amphetamine only) and frequency of injecting per day