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Correlates of unsafe injecting among injecting drug users in St Petersburg, Russia

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Abstract

Aims—To assess among injecting drug users (IDUs) in St Petersburg, Russia, the urban environmental, social norms, and individual correlates of unsafe injecting.

Methods—Between December 2004 and January 2007 IDUs (N=446) were interviewed in St. Petersburg, Russia.

Results—Prevalence of HCV was 96% and HIV 44%; 17% reported receptive syringe sharing after an HIV infected IDU (RSS); 49% distributive syringe sharing (DSS); 76% sharing cookers, 73% sharing filters and 71% syringe mediated drug sharing (SMS) when not all syringes were new. Urban environmental characteristics correlated with sharing cookers and SMS; and social norms correlated with RSS, DSS and sharing cookers. Individual correlates included cleaning used syringes (all five dependent variables) and self-report of HIV infection (RSS and DSS).

Conclusion—HIV status disclosure is an unreliable but frequently used HIV prevention method among IDUs in St. Petersburg, who reported alarmingly high levels of injecting equipment sharing. Voluntary counseling and testing should be widely available for this population. Ethnography is needed to assess the effectiveness of the syringe cleaning process. Prevention interventions need to be ongoing among IDUs in St. Petersburg, and should incorporate urban environmental factors and social norms, which may involve peer education and social network interventions.

Keywords

Russia; Injecting drug users; Injecting equipment sharing; HIV infection; Hepatitis infections

Introduction

Russia is among the countries with the most rapidly growing HIV rates, with injecting drug use being the major driving force behind the epidemic [1]. As of 2005, a cumulative total of over 300,000 HIV cases have been reported in the Russian Federation alone, over 80% of which are attributed to drug injecting [1]. Rates of HIV among injecting drug users (IDUs) vary across regions within Russia, ranging from 3% in Volgograd to 30% in St Petersburg and 56% in Togliatti [1–3]. In addition, it has been estimated that about as much as 2% of the population

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in Russia injects drugs [4]. Currently methadone and buprenorphine are prohibited by law in Russia, and only detoxification with heavy medication is available [5].

Little is known about the determinants of drug related infectious disease risk behaviors in Russia. One important aspect is the individual characteristics of IDUs. Studies among Russian IDUs have found an association between syringe sharing and fear of police, a history of being arrested or incarcerated, and female gender and commercial sex work [6–8].

Another important aspect of both blood-borne pathogens, including HIV, and risk behaviors, is the urban environment where injecting drug users reside and/or inject [9]. Many cities in Russia, including St Petersburg, can be characterized by unique urban environments. For example, “communal dwellings” are large formerly upper-class apartments that, in the 1920s, the government transformed into smaller, shared (and crowded) multifamily units [10]. While these communal dwellings are slowly disappearing, many families still live in forced physical proximity with other families. In addition, apartment complexes in the city can be characterized by a labyrinth of interconnected housing complexes, each almost a small city by itself. Little is known about the relationship between urban environment and injecting risk behaviors among IDUs in urban areas of Russia.

Social networks also play an important role in drug related infections by influencing risk behaviors by means of social norms and social influence [11]. For example, prescriptive social norms are norms that describe what individuals should do, while descriptive social norms are perceptions of the behaviors of network members [12]. A unique aspect of social influence related to drug related infections is serosorting and informed altruism. Serosorting is when individuals practice high risk behaviors with other individuals who they believe have the same infection status as themselves [13]. On the other hand, individuals who are infected may practice informed altruism [14], and engage in less high-risk behaviors towards others that they presume to be uninfected [14–16]. To date there is little empirical data on the social norms and social influence among IDUs in Russia.

Given the crucial role of contaminated injecting equipment in the HIV/AIDS epidemic among IDUs, it is important to identify urban environment and social influence characteristics associated with different types of high-risk injecting in order to develop appropriate interventions. The goal of this analysis was to assess injecting equipment sharing among IDUs in St Petersburg, Russia. We hypothesize that injecting equipment sharing is influenced at three levels: at the urban environmental level (influenced by factors such as neighborhood characteristics and living conditions) [17,18]; at the level of social influence and social norms [11]; and at the individual level (influenced by characteristics such as sociodemographics, type and frequency of drug use, and drug trading). We anticipated different patterns of association between the risk behaviors and these three levels. Delineating these patterns may assist not only in enhancing our understanding of the dynamics of these behaviors, but also in developing appropriate interventions.

Methods

Setting and participants

Participants were recruited into an ongoing network intervention study in St. Petersburg, Russia. The study is a randomized controlled longitudinal trial involving IDUs and their network members, and determines the efficacy of a network-orientated peer-educator intervention to prevent HIV transmission among IDUs and members of their HIV risk network. Participants were recruited using a combination of street outreach (convenience sampling) and network referral (snowball sampling) methods. Those who were 18 years old or older and injected drugs in the past 30 days were eligible to participate. Data on recruitment success were

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not collected or were not possible for those who were invited to participate by participants already enrolled in the study, thus differences between participants and non-participants cannot be assessed. Participants were provided food items (for the equivalent of about USD 10) as an incentive to participate. After pre-test counseling, participants provided blood samples to test for HIV and HCV. HIV antibodies were detected using two consecutive enzyme immunological assays (EIA) (Vironostika HIV Uni-Form II *plus O*, Biomerieux, NL). Positive HIV EIA tests were confirmed with Western Blot (New LAV Blot I, BioRad, France). HCV antibodies were detected using Myrex anti-HCV (version 4.0) based on highly purified antigens which contain sequences from the core, NS3, NS4 and NS5 regions of HCV. The study was approved by the Institutional Review Boards of the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA and the St. Petersburg University, St. Petersburg, Russia. This report is based on data collected at baseline, between December 2004 and January 2007 (N=446), thus the analysis sample is part of the larger sample of the entire network study.

Measures and variables

After providing informed consent, participants were administered a structured, face-to-face interview. Participants may have been intoxicated or undergoing withdrawal during the face-to-face interviews, but all participants were capable of answering interview questions. No information was collected on intoxication/withdrawal during the interview. The dependent variables in this analysis were whether participants in the past 3 months engaged in receptive syringe sharing after an HIV infected IDU (note: HIV infection of the sharing partner was reported by the participant based on his/her knowledge); distributive syringe sharing; sharing cookers (used to mix and heat the drugs) when not all syringes were new (i.e. sterile); sharing filters (small pieces of material used to filter out large particles in the drug solution) when not all syringes were new; and syringe mediated drug sharing (squirting drugs from one syringe to another) when not all syringes were new. All dependent variables had response scales of never, less often than once a week, 1–2 times a week, 3–4 times a week, 5–6 times a week, every day, and were coded as yes (used at least once in the past 3 months) vs. no (did not use in the past 3 months) to indicate any reported risk of disease transmission vs. no reported risk.

Independent variables included urban environment characteristics; social influence and social norms; and individual variables. *Urban environment characteristics* were binary variables (yes vs. no) unless specified otherwise, and included residential location (living in the Central, Northern, Southern or another part of Saint Petersburg), homelessness, living with parents, and obtaining syringes and drugs within the housing complex. *Social influence and social norms* included descriptive social norms item (any of participant's drug using peers talk about AIDS) and prescriptive social norms item (any of participant's drug using peers encouraged participant to share injecting equipment) [11]. *Individual variables* were sociodemographic characteristics (age; gender; being ever arrested), socioeconomic status (having a salary as the source of income; having a total income of 8000 Rubles [about 300 USD] or less per month), drug use variables in the past 3 month (injecting heroin daily; drinking alcohol daily; always cleaning used syringes [with either bleach, alcohol, water only or water and soap]), primary involvement in drug trade (combined variable: selling drugs or being middleman in drug sales), secondary involvement in drug trade (being a "street doctor" [i.e., injecting others with drugs for a fee]); knowledge of HIV status (participant reported not knowing their HIV status; reported being HIV negative; and reported being HIV positive); and selling sex for money or drugs in the past 3 months.

Statistical analysis

Altogether five sets of analyses were performed (one for each of the dependent variables). For each analysis, univariate analyses were conducted to select candidate variables for inclusion in multivariate analyses. For the univariate analyses, chi-square p-values were used to assess

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association, and univariate logistic regression was used to calculate odds ratios and their 95% confidence intervals. Statistically significant ($p < 0.05$) or marginally significant ($0.05 < p < 0.20$) variables were chosen for multivariate analyses. Multivariate logistic regression models with backwards elimination were used to assess significant associations with the dependent variables. Adjusted odds ratios (aOR) and 95% confidence intervals (95%CI) of the final multivariate regression models are reported.

Results

Sample characteristics

The characteristics of the sample are described in Table 1. Altogether 44% tested positive for HIV: among those who did not know their test results, 47% tested positive and among those who self-reported being HIV negative, 14% tested positive ($p<0.01$; data not shown in table). Almost all (96%) tested positive for HCV. The vast majority of participants (89%) reported at least one sharing behavior. Pearson correlation coefficients (r) and corresponding p-values (data not shown in table) show no correlation between receptive and distributive syringe sharing ($r=0.08$, not significant); significant moderate correlation between syringe sharing (receptive or distributive) and sharing other injecting equipment (sharing cookers or filters, or backloading – r ranging between 0.16 and 0.22); and significant and strong correlation between the different types of other injecting equipment sharing (sharing cookers or filters, or backloading – r ranging between 0.46 and 0.72).

Correlates of injecting equipment sharing

Univariate significant correlates of injecting equipment sharing are shown in Table 2. In multivariate analysis, *urban environment variables* that were significant correlates included living with parents and buying drugs within the housing complex (sharing cookers); and obtaining syringes within the housing complex (syringe mediated drug sharing) (Table 3). Of the significant *social influence and social norms* variables, having drug using peers who encouraged participants to share injecting equipment was associated with both receptive and distributive syringe sharing and with sharing cookers. Significant correlates that measure *individual characteristics* included younger age, which was correlated with both receptive and distributive syringe sharing, injecting heroin daily was associated with distributive syringe sharing; always cleaning used syringes was associated with all five dependent variables; and secondary drug trade involvement (being a street doctor) was associated with sharing filters. Having a salary income was negatively associated both with sharing cookers and with syringe mediated drug sharing; and being employed full time was negatively associated with distributive syringe sharing. Those who self-reported being HIV infected were significantly more likely to report receptive syringe sharing and significantly less likely to report distributive syringe sharing. (Self-report of being HIV negative was not significantly associated with either receptive or distributive syringe sharing, but was kept in the models as a control variable.)

Discussion

In this analysis of IDUs in Saint Petersburg, Russia, we found that high-risk injection behaviors were alarmingly common. We also found high levels of HIV infection in this population, and that many of those who did not self-report being infected with HIV were actually infected. We also discovered different patterns of association between the five injecting equipment sharing behaviors and the levels of urban environmental characteristics, social influence and social norms and individual attributes.

The association of *urban environmental factors* with equipment sharing may highlight issues related to infection disclosure within social networks in small geographical units. For example,

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the association of sharing with obtaining drugs/syringes within the housing district implies potential sharing with friends or acquaintances that live in the same neighborhood, and may involve the issue of trust [19,20]. Disclosure of infection status may be important in such relationships, and as such, it underlines the importance of voluntary counseling and testing (VCT). In addition, it also highlights the importance of social networks not only in risk behaviors, but potentially also in prevention interventions [21,22].

The importance of *social influence and social norms* in injecting equipment sharing has several implications. Our finding that drug buddies' encouraging to share was associated with both receptive and distributive syringe sharing and with sharing cookers highlights the role of social networks. Network interventions should aim at not only encouraging risk reduction communication, but also discouraging communication among network members that would promote risk behaviors [11].

Of the *individual factors*, self-reported HIV infection was a strong positive correlate of receptive syringe sharing and a strong negative correlate of distributive syringe sharing. This finding suggests that knowledge of seropositive status may not only lead to one's own risk reduction, but it may also lead to risk reduction towards others. A study among Hungarian IDUs found that those who self-reported being HCV infected and not having an IDU sex partner were more likely to practice receptive syringe sharing [23]. While such "informed altruism" [14] may serve to protect those who do not self-report being HIV infected, it also indicates that IDUs rely on a prevention method that is ineffective. Because of the high incidence of HIV among IDUs in St. Petersburg, IDUs who have tested negative in the past are not necessarily currently uninfected. In addition, our finding that those who self-reported being uninfected with HIV were as likely as those who did not know their HIV status to use a syringe after an HIV infected person, is also worrisome. Interventions among IDUs need to include access to confidential testing services, rely on and emphasize existing norms of HIV disclosure, and highlight the value of being uninfected with HIV [19]. Furthermore, VCT programs should offer training in risk reduction as it relates to both self and others, as well as information on serostatus and access to medical care. However, given the high level (over one third) of distributive sharing among the positives who knew their status, it is likely that expanded VCT will not be a sufficient mechanism to reduce syringe sharing.

Always cleaning used syringes was associated with all of the dependent variables in this analysis, suggesting that prevention messages about injecting equipment cleaning may be reaching their target. However, the question arises concerning the effectiveness of cleaning. For example, Zule and colleagues suggest that the type of syringe used for injecting may influence the efficacy of pathogen transmission: the detachable needle type (two-piece) syringe retains more blood than the integral cannula type (one-piece) syringe, and is thus a more effective vehicle of HIV transmission [24,25]. In addition, our unpublished ethnographic findings in the region show that different types of syringes may be used for different types of drugs: heroin is more often injected with one-piece syringes, while drugs purchased in liquid form are almost always injected with two-piece syringes. Additional ethnographic studies are needed to assess the injecting equipment cleaning process and its potential effectiveness in preventing infection transmission [26,27], with a special emphasis on assessing the types of syringes/needles used for the injecting process.

Of the other individual factors that were associated with injecting equipment sharing, being a street doctor, being employed full time, and having a salary income are noteworthy. Sharing filters may occur either during the injecting event while also using the same cooker, or after the injecting event by retaining the filter and reusing it later [19]. Used filters, which contain a small amount of drugs, are given to other drug users and may serve as a form of payment or as trading favors [23]. As such, street doctors may be paid with used filters. Prevention

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programs need to address the potential of infection risk associated with non-sterile filters [28]. In this study, the protective effect of being employed full time and having a salary income suggests that higher socio-economic status IDUs may engage in lower-risk behaviors (and may have lower odds of getting infected). They may have the resources to purchase drugs alone or obtaining sterile equipment, or purchase more expensive, solid drugs instead of liquid drugs in pre-loaded syringes that may require distributive syringe sharing or syringe mediated drug sharing. Thus, focusing prevention programs on low socio-economic status IDUs and also improving the socio-economic status of IDUs by promoting their social integration may lead to risk reduction [29]. In addition, as Russia becomes a more prosperous country, higher standards of living for most Russians may result in a general lowering of overall transmission risk among IDUs.

The correlation patterns among five injecting equipment sharing variables and the different patters of association between these behaviors suggest that different dynamics may be involved in different types of injecting equipment sharing. The similarities suggest general approaches for intervention, but the differences highlight that certain groups (e.g. daily heroin injectors and IDUs who are not employed full time), may benefit from additional counseling related to specific types of injecting equipment sharing (e.g. distributive syringe sharing).

One limitation of this analysis is the measurement error of all five dependent variables. Using a syringe after an HIV infected IDU may be underreported since IDUs may not know that they or their drug partners are infected. While self-reported HIV infection was the strongest correlate of using a syringe after an HIV infected person, one might argue that this should be self-evident since they were infected through sharing. However, syringe sharing in this study was reported for the past 3 months, hence infected participants' knowledge of their HIV infection most probably preceded syringe sharing in this analysis. It is also possible, however, that individuals who know that they are seropositive tend to report more receptive syringe sharing due to greater recollection of sharing episodes and less distributive syringe sharing due to social desirability. Another study limitation is that IDUs may not be aware that the syringes that are used to share drugs are not new. Such measurement bias may result in obtaining lower levels of association between the dependent and the independent variables, or finding no association when there is one. Furthermore, for easier interpretation of our findings we recoded the original scales to binary variables, and we did not assess associations related to frequency of sharing. In addition, this sample was not a representative random sample of injecting drug users in St Petersburg, Russia.

Based on the results of this analysis, we recommend that prevention interventions among IDUs in St. Petersburg address urban environmental characteristics by means of structural interventions, and also involve social network interventions and individual counseling [30]. Structural interventions may include preventing initiation of drug injecting by providing meaningful activities for at-risk youth, and, for current IDUs, increasing the availability of effective drug treatment programs, and working with the police and public health authorities to enhance a public health oriented approach to drug use [6]. In addition, certain neighborhoods, such as the South Side of St Petersburg, may be more characterized by risk environments than other neighborhoods. Prevention work, such as greater access to syringe exchange and pharmacies and access to one-piece syringes, need to be expanded in these neighborhoods. For example, clean syringe distribution centers could be placed within housing complexes that have a high prevalence of injection drug use, or injectors within these housing complexes could be trained to serve as secondary syringe exchangers and to promote social norms that discourage sharing of injection equipment. Lastly, disclosure of serostatus may play an important role in this population. Thus, free and confidential HIV testing and counseling should be more readily available for IDUs in St. Petersburg, including sending mobile testing units to high-risk housing complexes and reducing stigma that may be associated with HIV infections.

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Table 1

Sample characteristics

Characteristic	N (%)
Total	446 (100)
Age	
under 30	245 (54.9)
30 or above	201 (45.1)
Gender	
male	298 (66.8)
female	148 (33.2)
Education - high school or above	247 (55.4)
Neighborhood	
Center	116 (26.0)
North	135 (30.3)
South	176 (39.5)
Other	19 (4.3)
Marital status	
single	207 (46.4)
married	70 (15.7)
living with a partner	120 (26.9)
other	49 (11.0)
Has main partner	107 (24.0)
Has children	280 (62.8)
Homeless	1 (0.2)
Living with parents	236 (52.9)
Currently in school	11 (2.5)
Salary income	180 (40.4)
Employment status	
employed full time	63 (14.1)
employed part time	112 (25.1)
unemployed	271 (60.8)
Total income 8000 Rubles (USD 300) or less per month	198 (44.4)
Ever arrested	118 (26.5)
Self-reported HIV infection status	
don’t know	168 (37.7)
self-reported HIV negative	187 (41.9)
self-reported HIV positive	91 (20.4)
Laboratory confirmed HIV infection (n=404)*	177 (43.8)
Laboratory confirmed HCV infection (n=404)*	388 (96.0)
Daily heroin injector in past 3 months	243 (54.5)
Receptive syringe sharing after an HIV infected IDU	77 (17.3)
Distributive syringe sharing	217 (48.7)

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Characteristic	N (%)
Shared cookers when not all syringes were new	339 (76.0)
Shared filters when not all syringes were new	327 (73.3)
Syringe mediated drug sharing (squirting drugs from one syringe to another) when not all syringes were new	315 (70.6)
Reported any sharing (syringe, cookers, filters, backloading)	397 (89.0)

Note:

* 42 people did not have blood test results

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Table 2

Univariate significant correlates of engaging in unsafe injecting

Characteristic	Total (N)	Receptive syringe sharing[a] (%)	Distributive syringe sharing (%)	Shared cooker[b] (%)	Shared filter[c] (%)	SMS[d] (%)
Total	446	17.3	48.7	76.0	73.3	70.6
Urban environmental characteristics						
Neighborhood of residence						
Center	116	12.1	43.1	73.3	72.4	66.4
North	135	14.8	45.9	73.3	70.4	66.7
South	176	22.2	54.0	80.2	77.3	77.3*
Other	19	21.0	52.6	68.4	63.2	63.2
Obtained syringes within housing complex						
No	340	16.8	47.4	75.9	74.1	67.6
Yes	106	18.9	52.8	76.4	70.8	80.2*
Obtained drugs within housing complex						
No	398	16.6	47.7	74.6	72.1	69.3
Yes	48	22.9	56.3	87.5*	83.3	81.3
Social influence and social norms						
Any drug buddies encourage sharing						
No	373	15.0	44.5	74.0	71.6	70.8
Yes	73	27.3*	69.9*	86.3*	82.2	69.9
Individual characteristics						
Age						
Under 30	245	21.6	58.0	78.4	74.7	73.9
30 and above	201	11.9*	37.3*	73.1	71.6	66.7
Daily heroin injector in past 3 months						
No	203	18.7	41.9	74.9	71.4	70.0
Yes	243	16.0	54.3*	77.0	74.9	71.2
Always cleaned used syringes						
No	324	12.3	42.9	73.1	69.8	65.4
Yes	122	30.3*	63.9*	83.6*	82.8*	84.4*
Sold drugs or acted as middleman in drug sales						

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Characteristic	Total (N)	Receptive syringe sharing[a] (%)	Distributive syringe sharing (%)	Shared cooker[b] (%)	Shared filter[c] (%)	SMS[d] (%)
No	188	13.8	47.8	70.2	68.1	67.6
Yes	258	19.8	52.5	80.2*	77.1*	72.9
Street doctor						
No	366	18.6	47.8	74.6	70.8	69.1
Yes	80	11.3	52.5	82.5	85.0*	77.5
Self-reported HIV status						
Does not know	168	10.7	47.6	78.0	74.4	70.8
Negative	187	9.1	54.5*	75.4	71.1	66.8
Positive	91	46.2*	38.5*	73.6	75.8	78.0

Notes

[a] Receptive syringe sharing after an HIV infected IDU

[b] Shared cookers when not all syringes were new

[c] Shared filters when not all syringes were new

[d] Syringe mediated drug sharing (squirting drugs from one syringe to another) when not all syringes were new

* $p < 0.05$

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Table 3

Multivariate correlates of engaging in unsafe injecting

Characteristic	Receptive syringe sharing[a]	Distributive syringe sharing	Shared cooker[b]	Shared filter[c]	SMS[d]
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Urban environmental characteristics					
Live with parents	-	-	1.7 (1.1, 2.6)	-	-
Obtained syringes within housing complex	-	-	-	-	1.9 (1.1, 3.2)
Obtained drugs within housing complex	-	-	2.6 (1.1, 6.4)	-	-
Social influence and social norms					
Any drug buddies encourage sharing	2.2 (1.1, 4.3)	2.8 (1.6, 4.0)	2.1 (1.0, 4.3)	-	-
Individual characteristics					
Age – 30 and above	0.6 (0.3, 1.0)	0.5 (0.3, 0.7)	-	-	-
Salary income	-	-	0.6 (0.4, 0.9)	-	0.6 (0.4, 0.9)
Employed full time	-	0.5 (0.3, 0.9)	-	-	-
Daily heroin injection	-	1.5 (1.0, 2.3)	-	-	-
Always cleaned used syringes	2.8 (1.6, 4.9)	2.5 (1.6, 4.0)	2.0 (1.2, 3.5)	2.2 (1.3, 3.8)	3.0 (1.7, 5.2)
Street doctor	-	-	-	2.5 (1.3, 4.9)	-
Self-reported HIV status					
Does not know	(reference)	(reference)	-	-	-
Negative	0.8 (0.4, 1.6)	1.3 (0.8, 2.0)	-	-	-
Positive	7.0 (3.6, 13.6)	0.5 (0.3, 0.9)	-	-	-

Notes

[a] Receptive syringe sharing after an HIV infected IDU

[b] Shared cookers when not all syringes were new

[c] Shared filters when not all syringes were new

[d] Syringe mediated drug sharing (squirting drugs from one syringe to another) when not all syringes were new