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Syringe possession arrests are associated with receptive syringe sharing in two Mexico-US border cities

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Abstract

Aims—To identify factors associated with receptive syringe sharing among injection drug users (IDUs) and elucidate the association between syringe possession arrests and syringe sharing.

Design—Cross-sectional study.

Setting—Mexican border cities of Tijuana, Baja California and Ciudad Juarez, Chihuahua.

Participants—IDUs in Tijuana ($n = 222$) and Ciudad Juarez ($n = 206$) were recruited using respondent-driven sampling (RDS). IDUs were ≥ 18 years and had injected illicit drugs in the past month.

Measurements—An interviewer-administered survey was used to collect quantitative data on socio-demographic, behavioral and contextual characteristics, including self-reported syringe sharing and arrests for syringe possession. Associations with receptive syringe sharing were investigated using logistic regression with RDS adjustment.

Findings—Overall, 48% of participants reported ever being arrested for carrying an unused/sterile syringe, even though syringe purchase and possession is legal in Mexico. Arrest for possessing unused/sterile syringes was associated independently with receptive syringe sharing [adjusted odds ratio (AOR) = 2.05; 95% confidence interval (CI): 1.26, 3.35], as was injecting in a shooting gallery (AOR = 3.60; 95% CI: 2.21, 5.87), injecting in the street (AOR = 2.05; 95% CI: 1.18, 3.54) and injecting methamphetamine (AOR = 2.77; 95% CI: 1.41, 5.47) or cocaine (AOR = 1.96; 95% CI: 1.15, 3.36). More than half of participants (57%) had been arrested for possessing a used syringe; in a second model, arrest for used syringe possession was also associated independently with receptive sharing (AOR = 2.87; 95% CI: 1.76, 4.69).

Conclusions—We documented high levels of syringe-related arrests in two Mexican–US border cities and an independent association between these arrests and risky injection practices. Public health collaborations with law enforcement to modify the risk environment in which drug use occurs are essential to facilitate safer injection practices.

Keywords

Arrests; HIV; injection drug use; Mexico; needle sharing; police; shooting galleries

INTRODUCTION

Much of the literature on reducing human immunodeficiency virus (HIV) transmission among injection drug users (IDUs) has focused upon identifying and modifying individual-level risk factors. Increasingly, however, the environment in which drug use occurs has been shown to influence individual injection practices [1–3]. Laws prohibiting pharmacy sales of sterile syringes have been associated with syringe sharing [4], as have legal restrictions on syringe exchange programs [5]. In contrast, legalizing non-prescription syringe sales at pharmacies has been associated with decreases in syringe sharing [6–8].

Structural factors that shape the risk environment also go beyond ‘laws on the books’ to include how these laws are implemented and enforced [9]. In particular, there is growing evidence that policing practices have a substantial impact on IDUs' ability to adhere to safe injection practices. Qualitative studies have shown that fear of police detection and detainment can discourage purchase and carrying of sterile syringes, even in settings where over-the-counter syringe sales and possession are legal, leading to syringe sharing [10–14]. Fears of police detection also lead to hurried injection, particularly in public places, resulting in sharing of syringes and other injection paraphernalia [10–12,14,15]. Further, there is evidence that aggressive policing practices lead to higher utilization of shooting galleries, where drugs can be used hidden from public view and previously used injection equipment is obtained readily [13,16,17].

A smaller number of quantitative studies have sought to demonstrate a relationship between policing practices and injection risk behaviors. In a recent study of 89 metropolitan areas in the United States, Friedman and colleagues [18] showed that higher levels of legal repressiveness (including number of arrests for heroin and cocaine possession) were associated positively with HIV prevalence among IDUs. In Philadelphia, intensified policing activity was associated with a significant reduction in syringe exchange program utilization [19]. At the individual level, a study of 424 IDUs in San Francisco found that those who feared arrest for drug paraphernalia possession were twice as likely to report syringe sharing than IDUs who did not share this concern; however, previous arrest was not associated independently with syringe sharing [20]. A larger study of 1257 IDUs in San Francisco found similarly that those who feared arrest for drug paraphernalia possession were 70% more likely to share syringes [16]. More recently, a study by Rhodes and colleagues [21] conducted among 418 IDUs in Togliatti City, Russia, found that IDUs whose most recent arrest or detainment was drug-related were more than four times more likely than those who had never been arrested/detained to report receptive syringe sharing in the past 4 weeks. However, in this study, having injection equipment confiscated by police in the last 4 weeks was not associated independently with receptive syringe sharing after accounting for confounding variables. We are unaware of any study that has demonstrated a direct association between arrests specifically for syringe possession and increased risk of syringe sharing.

In qualitative studies conducted in the two Mexico–US border cities of Tijuana, Baja California and Ciudad Juarez, Chihuahua (located across the border from San Diego, California, and El

Paso, Texas/Las Cruces, New Mexico, respectively), IDUs voiced reluctance to carry syringes due to fear of police harassment, detainment and arrest [14,17]—despite the fact that syringes can be purchased legally and possessed without a prescription in Mexico. In the present study, we conducted subsequent cross-sectional studies in those two cities that investigated factors associated with receptive syringe sharing among IDUs. We hypothesized that arrests for syringe possession would be associated independently with this high-risk injection practice.

METHODS

Study population

Between February and April 2005, IDUs were recruited in Tijuana and Ciudad Juarez for a cross-sectional study of behavioral and contextual factors associated with HIV and hepatitis C virus (HCV) infection. Eligibility criteria for the study included: age ≥ 18 years; having injected illicit drugs within the past month, confirmed by inspection of injection stigmata ('track marks'); ability to speak Spanish; willing and able to provide informed consent; and not having been interviewed previously for the study. Subjects gave their written informed consent to participate. Study methods were approved by the Institutional Review Board of the University of California, San Diego and the Ethics Board of the Tijuana General Hospital.

Respondent-driven sampling (RDS) methods were used to recruit participants [22]. Briefly, a diverse group of 'seeds' (heterogeneous by age, gender, drug of choice and recruitment venue) were selected and given three uniquely coded coupons to refer their peers to the study. This study used 15 seeds and 207 recruits in Tijuana ($n = 222$) and nine seeds and 197 recruits in Ciudad Juarez ($n = 206$), as described previously [23], and both seeds and recruits were considered in the analysis. Waves of recruitment continued as subjects returning with coupons were each given three coupons to recruit further members from their own social networks. In Ciudad Juarez, recruitment was based at a clinic run by Programa Compañeros, a trusted and well-respected non-governmental organization (NGO) that has been providing services to and conducting studies of IDUs in the city for decades. In Tijuana, an NGO called Centro de Integración y Recuperación para Enfermos de Alcoholismo y Drogadicción 'Mario Camacho Espíritu', A.C. (CIRAD), which started to work with drug users in 1991, made weekly trips to three geographically diverse *colonias* (neighborhoods) in the city: Zona Norte, Grupo Mexico and Sepanal. Recruitment at these three sites was facilitated through the use of a modified recreational vehicle that operated as a mobile clinic (the *Prevemovihl*).

A total of 428 IDUs at the two study sites were enrolled. Overall, 92% were male and 99% considered themselves Hispanic or Latino. Median age was 34 years [interquartile range (IQR): 28–40] and median time since first injection was 12.5 years (IQR: 8–19).

Data collection

Once enrolled in the study, IDUs completed an interviewer-administered quantitative survey that elicited information on socio-demographic, behavioral and contextual characteristics. Participants were asked about their life-time drug use histories and current (past 6 months) drug use including the types of drugs used, routes of administration, age of first injection and locations where they injected drugs (e.g. at their home, in a shooting gallery). Receptive syringe sharing during the past 6 months was defined using the question: 'In the past 6 months, how often have you used a needle/syringe that you knew or suspected had been used before by someone else?'. The categorical responses 'never', 'sometimes', 'often' and 'always' were re-categorized as a binary variable (i.e. ever versus never) for the purposes of this analysis. Participants who reported receptive syringe sharing were asked from whom they obtained their used syringes (e.g. family member, friend, someone they did not know well). Participants were also asked whether they had ever been arrested; those answering affirmatively were then asked

whether they had ever been arrested for possessing used or unused/sterile syringes, how many times and how recently their last arrest for syringe possession occurred.

Two subjects who did not have a receptive syringe sharing value were excluded from analysis. Of the remaining 426 subjects, more than two-thirds (71%) of the study participants reported engaging in receptive syringe sharing in the past 6 months; 43% said they 'sometimes' injected with syringes used previously by someone else, 19% did so 'often' and 9% did so 'always'. Among those who reported receptive syringe sharing, 83% reported obtaining used syringes from a friend, 20% from a person they did not know very well, 12% from a family member and 7% from a sexual partner. Three-quarters (76%) shared syringes with IDUs from only one of these categories, but 20% reported sharing across two categories and 4% from ≥ 3 categories.

Statistical analysis

Characteristics of IDUs enrolled at the Tijuana and Ciudad Juarez study sites were compared using χ^2 tests for categorical variables and *t*-tests and the Wilcoxon rank sum test for normally and non-normally distributed continuous variables, respectively. A univariate analysis comparing IDUs who reported receptive syringe sharing to those who did not was conducted using the same statistical tests. Variables associated with receptive syringe sharing at a level of $P < 0.10$ were entered into a multiple logistic regression model in a manual stepwise fashion, starting with those with the lowest *P*-value and proceeding through those with the highest value, to identify factors associated independently with receptive syringe sharing. The likelihood ratio test was used to compare nested models to determine which variables were retained in multivariable models at a significance level $< 5\%$.

To determine whether the multivariable model was both generalizable and valid, we undertook two additional analyses to explore potential effects of the RDS recruitment process on our estimates. First, to identify bias that might arise from the RDS sampling process, we generated overall sampling weights based on recruitment weights and degree weights [20] using the RDS analysis tool (version 5.6.0, October 2006, Cornell University) and applied these weights to the logistic regression model using SAS proc surveylogistic (version 9.1.3, SAS Institute Inc., Cary, NC, USA). Secondly, to identify effects that might arise from correlation between recruiters and recruitees, we developed a random effects logistic regression model in which covariates of interest were used as fixed effects (whose prior distributions were normal distributions with mean 0 and variance 1 000 000) and *n* random effects (*n* is the total number of subjects in an RDS sample) whose prior distribution was a normal distribution with mean 0 and the inverse of the variance following a gamma distribution with both shape and scale parameters equal to 0.001; the design matrix of the random effects was an upper triangle matrix indicating who recruited whom. These models were fitted using WinBUGS (version 1.4.1, Imperial College and Medical Research Council, UK, 2004) and results were obtained using two Markov chains. In one chain, initial values of the parameter estimates were taken from the ordinary logistic regression models and in the other chain, the initial values were set to zero. Odds ratios and 95% confidence intervals produced by these two RDS analyses were compared to the estimates from our multiple logistic regression model to identify any significant differences.

RESULTS

Demographic, drug use and criminal justice characteristics of the study population are presented in Table 1. Most were daily injectors and almost all reported recent heroin injection, often in combination with cocaine or methamphetamine. Regarding arrest histories, 93% had been arrested at least once during their life-time and 48% had been arrested for carrying an unused/sterile syringe (median five arrests; IQR: 3–10), of whom 79% had been arrested in

the past 6 months. A majority (57%) had been arrested for carrying a used syringe (median six arrests; IQR: 3–15), with 78% reporting arrest for this reason in the past 6 months.

Table 1 also presents results of the univariate analysis of factors associated with receptive syringe sharing. Demographic factors associated positively with syringe sharing were younger age, living in Tijuana, homelessness and living/working outside Mexico in the past 10 years. A number of drug-related variables were associated positively with syringe sharing, including smoking marijuana and using oral tranquilizers, injecting stimulants, injecting daily and injecting in locations other than the IDU's own home. Arrest experiences that were associated positively with receptive syringe sharing included ever being arrested (95% versus 89%, $P = 0.019$), ever being arrested for carrying unused (55% versus 30%, $P < 0.001$) or used (67% versus 32%, $P < 0.001$) syringes, and a higher median number of arrests for unused syringe possession (five versus four, $P = 0.023$).

In multiple logistic regression analysis to identify factors independently associated receptive syringe sharing, being arrested for carrying unused syringes was associated independently with a twofold increase in the odds of receptive syringe sharing (AOR = 2.05; 95% CI: 1.26, 3.35) (Table 2, model 1). Shooting gallery attendance was the variable associated most strongly with syringe sharing (AOR = 3.60; 95% CI: 2.21, 5.87), followed by injecting in the street, injecting methamphetamine by itself and injecting cocaine by itself. Given the high level of correlation between arrest for unused versus used syringes, we constructed a second model in which we replaced arrests for unused syringe possession with arrests for used syringe possession (Table 2, model 2). Arrest for used syringe possession was also associated independently with receptive syringe sharing (AOR = 2.87; 95% CI: 1.76, 4.69). This substitution did not change the other variables selected into the model, nor did it change their point estimates appreciably.

Given the significant difference in receptive syringe sharing across the two cities (56% Tijuana versus 44% Ciudad Juarez, $P = 0.016$), we tested for interactions between city of residence and other covariates, but none achieved statistical significance. We also tested for interactions with homelessness, which has been associated with receptive syringe sharing in previous studies [24–26], but no statistically significant interactions were detected. The small number of females in our sample ($n = 34$) precluded testing for interactions with gender.

The odds ratios and point estimates generated by analyses to account for the potential effects of the RDS recruiting process (data not shown) [27] did not differ significantly from those presented in Table 2. Each of the variables in the RDS-adjusted models retained P -values < 0.05 and in no case did the RDS-adjusted odds ratio differ from the RDS-unadjusted odds ratio by more than 9%.

DISCUSSION

We found high rates of arrest for possession of both unused and used syringes among IDUs in two Mexican–US border cities, and an independent association between these arrests and recent receptive syringe sharing. These findings corroborate observations from our earlier in-depth interviews with IDUs in Mexico [14,17], as well as a growing body of literature that suggests policing practices in many international settings—the United States, Russia, Australia, Canada and now Mexico—have an adverse effect on the ability of IDUs to practice safe injecting behaviors [1,10–12,15,16,20,21,28].

In a recent editorial, Burris & Strathdee [29] speculated that policing practices could have either a direct or indirect effect on IDUs' risk behaviors. For example, police can have a direct effect on where, with whom, when and how IDUs administer their dose. Studies from the United States and elsewhere show that police pressure is associated with use of shooting galleries, where drugs can be injected beyond view of police but syringe sharing is commonplace [13,

16,30]. Similarly, in earlier qualitative interviews [14,17] in Tijuana and Ciudad Juarez, IDUs described attempting to reduce their risk of arrest by obtaining syringes at the location where they purchase and inject their drugs. This suggests that the relationship between arrest and syringe sharing documented in this study indicates a direct relationship between police practices and risky injection practices. Burris & Strathdee also posit that police could have an indirect effect on HIV risk, for example by discouraging IDUs' utilization of syringe exchange programs [28] or displacing IDUs to areas with limited or no access to syringe exchange programs or drug treatment [28,31]. Recent observational evidence from our study site in Tijuana suggests that displacement of homeless IDUs due to heightened police activity may also be contributing indirectly to risky injection practices.

The results of this study are especially troubling given that purchase and possession of sterile syringes without a prescription is legal under Mexican law. The finding that policing practices in these two cities appear inconsistent with prevailing laws suggests that outreach efforts targeting police, not changes in existing laws, are needed to improve the risk environment in which injection drug use occurs. These should include collaborative efforts between public health and law enforcement to provide HIV education for police officers and disseminate information on how policing practices impact community HIV risk. Modifying policing policies and practices (e.g. arrest 'quotas') and monitoring and enforcing these changes at high levels of government would also contribute to changing the risk environment. Programa Compañeros has undertaken efforts to educate police officers in Ciudad Juarez about harm reduction, leading some officers to avoid confiscating syringes from IDUs. Such educational efforts need to be expanded and applied consistently at multiple levels and jurisdictions in both Mexican states, and possibly elsewhere in Mexico.

Shooting gallery use was associated independently with receptive syringe sharing even after controlling for arrest for syringe possession. Several studies have documented an association between shooting gallery use and syringe sharing and/or HIV infection [32–34] and IDUs in Tijuana and Ciudad Juarez have previously reported frequenting shooting galleries to avoid detection by police [14,17]. Harm reduction interventions targeting shooting galleries and the IDUs who use them may help to reduce syringe sharing in this setting; however, changes in policing practices remain a critical strategy for reducing reliance on shooting galleries for provision of injecting equipment.

This study also found that injecting in the street was associated with a twofold increase in receptive syringe sharing. Injecting in public places has been associated with risky injection behaviors and HIV seroconversion in several studies [15,35–37]—a consequence of hurrying injection to minimize risk of police detection and arrest. This is a particularly common practice among homeless IDUs. Although homelessness was not associated independently with receptive syringe sharing after controlling for other variables common among homeless IDUs in this study (e.g. shooting gallery use, injecting in the street), it is worth noting that almost half the IDUs in our study reported homelessness in the past 6 months. This combination of high levels of homelessness, syringe-related arrests and shooting gallery use creates an environment that facilitates high rates of syringe sharing and rapid spread of HIV and other blood-borne infections.

Notably, stimulant use—both methamphetamine and cocaine—was also associated independently with receptive syringe sharing. Previous studies have documented an association between methamphetamine injection and increased likelihood of syringe sharing [38,39], although the factors contributing to this association remain unclear. Bingeing, disinhibition and impaired judgement have been hypothesized as reasons for this association; however, more research is required to characterize the nature of this relationship.

Because of its cross-sectional design, we cannot establish definitively temporality between arrest for syringe possession and receptive syringe sharing. We used life-time history of syringe possession arrest as the exposure variable rather than arrest in the previous 6 months to elucidate more clearly a temporal association, if one existed. However, in a subanalysis to explore this relationship further, more recent arrest for syringe possession (within the last 6 months) was associated more strongly with receptive syringe sharing than arrests that occurred at more distant time-points. We did not detect a dose–response relationship, i.e. increasing number of arrests for syringe possession was not associated with increased likelihood of receptive syringe sharing. Another potential weakness is that our study enrolled a relatively small number of IDUs in both cities. However, use of RDS to recruit study participants provides confidence that our findings are generalizable to the populations of IDUs in each city, and our sensitivity analyses suggest that RDS succeeded in this objective.

This study found a direct relationship between arrests for syringe possession and receptive syringe sharing among IDUs in two Mexican border cities. Such risky injection practices increase the risk of HIV transmission among IDUs in a geographic region that is poised for a more generalized HIV epidemic. In Mexico, where syringes can be obtained legally without a prescription, changing ‘laws on the books’ is unlikely to reduce syringe sharing. Rather, changes in street-level policing practices are needed to facilitate positive changes in injection behavior. As Maher & Dixon have stated [40], ‘public health considerations should be a prime determinant of drug policing activity’. Effective HIV prevention interventions among IDUs in these Mexican border cities and elsewhere will require collaborations between public health professionals and law enforcement to change the risk environment in which drug use occurs.

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Table 1
Univariate associations with receptive syringe sharing among injection drug users in Mexico.

	Total (n = 426)	Shared syringes (n = 302)	Did not share syringes (n = 124)	P-value
Demographics				
Median age in years (IQR)	34 (28–40)	33 (28–39)	36 (32–43)	0.001
Male	92.0	93.1	89.5	0.222
Never married	59.1	61.1	54.0	0.176
Completed high school	29.8	29.5	30.7	0.810
City of residence				
Tijuana	51.9	55.6	42.7	
Ciudad Juarez	48.1	44.4	57.3	0.016
Homeless (past 6 months)	43.0	50.3	25.0	< 0.001
Lived/worked outside Mexico (past 10 years)	35.3	39.2	25.8	0.009
Crossed the US border (past 6 months)	13.6	13.3	14.2	0.818
Drug use (past 6 months)				
Smoked marijuana	50.5	53.7	42.6	0.039
Used oral tranquilizers	33.3	37.7	22.8	0.003
Smoked methamphetamine (meth)	26.3	28.1	22.0	0.193
Injected drugs				
Any meth	36.9	43.1	21.5	< 0.001
Meth and heroin	34.4	40.3	19.8	< 0.001
Meth alone	23.2	28.5	10.5	< 0.001
Any cocaine	49.1	52.5	40.5	0.026
Cocaine and heroin	44.5	47.5	37.2	0.055
Cocaine alone	30.6	33.9	22.6	0.022
Heroin alone	97.4	97.4	97.6	0.892
Injected daily (any drugs)	79.3	82.0	72.7	0.033
Injection locations (past 6 months)				
IDU's home	51.3	48.0	59.4	0.034
Someone else's home	37.2	42.4	24.4	< 0.001
Shooting gallery	60.5	71.5	33.3	< 0.001
Construction site	26.8	31.1	16.3	0.002
Alleyway	28.0	33.4	14.6	< 0.001
On the street	37.2	44.0	20.3	< 0.001
Arrest history				
Ever arrested	93.2	95.0	88.7	0.019
Ever arrested for carrying unused syringes	47.8	55.0	30.1	< 0.001
Arrest within the past 6 months	78.9	80.9	70.3	0.154
Median number of arrests (IQR)	5 (3–10)	5 (3–10)	4 (2–10)	0.023
Ever arrested for carrying used syringes	57.1	67.2	32.0	< 0.001
Arrest within the past 6 months	78.3	80.6	66.7	0.054
Median number of arrests (IQR)	5 (3–10)	5 (3–11)	5 (3–10)	0.251

IQR: interquartile range.

Table 2Factors associated independently with receptive syringe sharing among injection drug users in Mexico ($n = 426$)*
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	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)
Ever arrested for carrying unused syringes	2.05 (1.26, 3.35)	—
Ever arrested for carrying used syringes	—	2.87 (1.76, 4.69)
Injected in a shooting gallery	3.60 (2.21, 5.87)	3.09 (1.88, 5.09)
Injected in the street	2.05 (1.18, 3.54)	2.02 (1.16, 3.51)
Injected methamphetamine alone	2.77 (1.41, 5.47)	2.55 (1.28, 5.07)
Injected cocaine alone	1.96 (1.15, 3.36)	2.06 (1.19, 3.57)

AOR: adjusted odds ratio.

* All values $P < 0.05$.