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Injecting alone among young adult IDUs in five U.S. cities:

Evidence of low rates of injection risk behavior

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Abstract

Illicit drug injection typically occurs in private or semi-public settings where two or more injectors are present. In a large sample of young adult injectors (aged 15–30) in five US cities, we describe those who reported consistently injecting by themselves in a recent period. Among 3,199 eligible subjects, 85% were male, median age was 24 years, and median number of years injecting was four. Fifteen percent (n=467) who reported always injecting alone in the previous three months were compared to other IDUs to understand the relationship between this practice and injection risk behavior. IDUs who reported injecting alone were substantially less likely to report injection with a syringe (AOR=0.16, 95% CI 0.1–0.2) or other drug preparation equipment (AOR=0.17, 95% CI 0.13–0.2) previously used by another injector. Markedly low rates of injection risk behavior were observed in IDUs who reported injecting alone; this practice may facilitate safe injection by granting the individual greater control over the injection setting. However, risks may include accidental overdose with severe consequences.

1. Introduction

Illegal drug injection often occurs in groups of two or more injectors (Koester et al., 2005; Curtis et al., 1995). Injections occurring in the presence of others may take place in private or semi-public injection settings such as abandoned buildings or “squats” or among individuals who have pooled their money to buy and inject drugs together, which often involves sharing the same syringe (Neaigus et al., 1994). Preparation of drugs for injection is a somewhat complex, multi-step process requiring attention both to avoid loss or waste of expensive drugs and to avoid cross-contaminating syringes and other injection equipment via contact with the

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blood of others. Cross-contamination of syringes, drug cookers and filtration “cottons” has been implicated in the transmission of hepatitis C virus (HCV); descriptive data suggest that substantial exposure to blood may occur via tourniquets or surfaces where injection or drug preparation occurs (Hagan et al., 2001; Hahn et al., 2002; Thorpe et al., 2002; van Beek et al., 1994).

Ethnographic studies suggest that IDUs may choose to inject alone for several reasons: to avoid sharing drugs; to avoid peer pressure to share their syringes or other injection equipment; or to obviate the need to closely monitor whether other IDUs might contaminate their drug solution or injection equipment (Koester et al., 2005). IDUs who wish to keep their drug use private to avoid possible legal and social consequences may also inject alone as may IDUs who are socially isolated from peers or intervention programs. For other injectors, lack of resources to acquire drugs may limit opportunities to inject alone. This paper describes injecting alone in a large sample of young adult IDUs in five US cities to understand characteristics associated with injecting alone and to examine whether this practice is associated with safer or riskier injection practices. These findings may be helpful for informing the development of intervention programs aimed at reducing harms associated with injection drug use.

2. Methods

The Collaborative Injection Drug Users Study III/Drug User Intervention Trial (CIDUS III/DUIT) was a randomized controlled trial of a behavioral intervention to reduce HIV and HCV infection among young IDUs (Garfein et al., 2006). Eligible individuals were 15–30 years old and reported injection of any illicit drug in the previous six months. Participants were recruited in Baltimore, Chicago, Los Angeles, New York City and Seattle through street and agency outreach, targeted advertising, and respondent-driven recruitment. At the baseline study visit, eligible subjects completed a risk behavior interview via audio computer-administered self-interview (ACASI) followed by a blood draw and counseling and testing for HIV and HCV antibody. HCV antibody testing was performed using an enzyme immunoassay (EIA) test (Abbott Laboratories EIA 2.0 (Chicago, IL), or Ortho Diagnostic Systems EIA 3.0 (Raritan, NJ)). Reactive specimens were retested in duplicate using EIA and were interpreted as anti-HCV positive if either or both specimens were reactive. HIV antibody testing was performed using standard ELISA screening and Western blot confirmation. Total HBV core antibody (anti-HBc) testing was done with CORAB (Abbott Laboratories, Abbott Park, IL).

The questionnaire asked about risk behavior in the previous three-month period, including whether the participant had injected with a syringe previously used by another IDU and about using drug injection or preparation equipment (cookers, “cottons”, and rinse water) together with other IDUs, or using equipment previously used by another injector. Wording of the questions was intended to include the possibility of injecting alone using potentially contaminated syringes or other equipment, e.g., “Even though you were always alone when you injected, did you even once use a needle that someone else had used before you?”. Participants were also asked whether they had consistently injected by themselves during the previous three months – the wording of the question was, “In the last three months, did you ever inject with people who were injecting at the same time you were?”.

General knowledge of hepatitis and HIV natural history was assessed using eight true/false questions; the number of correct answers were summed to create a general knowledge score (Cronbach alpha=0.7). Knowledge of hepatitis and HIV transmission risk was assessed using thirteen true/false questions, and the number of correct answers were summed to create a risk knowledge score (Cronbach alpha=0.7). To understand underlying psychological factors influencing risk behavior in participants, the Rosenberg Self Esteem scale was included in the assessment (Cronbach alpha=0.9) (Rosenberg, 1989). Depression was measured using the

Brief Symptom Inventory (Cronbach alpha=0.9) (Derogatis and Milisaratos, 1983). The questionnaire also asked about peer norms related to injection risk behavior (e.g., the proportion of their friends who inject with syringes previously used by other IDUs). The study was reviewed and approved by the institutional review boards of the US Centers for Disease Control and Prevention and the individual study sites.

In this analysis, we describe IDUs who report consistently injecting alone during the three months prior to study enrollment; sociodemographic characteristics and drug use, drug treatment, and incarceration histories were compared using chi-square and t-test statistics. A multivariate model was used to examine which of these characteristics were independently associated with injecting alone; stepwise selection was used to choose variables to include in an exploratory model. The second part of the analysis examined whether injecting alone was associated with safer injection in terms of possible exposure to blood-borne viruses via the use of syringes or other drug preparation equipment previously used by another IDU. While we hypothesized that injecting alone was likely to be associated with safer injection, it was conceivable that IDUs could obtain injection equipment previously used by another injector and then inject by themselves. Multivariate logistic regression modeling examined the strength of the association between injecting alone and these drug injection practices, adjusting for other factors found to be associated with injecting alone (age, race, homelessness, injection frequency and history of drug treatment or needle exchange use). Black tar heroin was included in the multivariate model examining use of drug preparation equipment used by another injector because it is a semi-solid material and must be heated (in a cooker) to form a solution that can be evenly divided among injectors; as such, its use was expected to be associated with injecting drugs with one or more persons. Unadjusted associations between injecting alone and contextual, psychological and knowledge variables were examined in univariate analysis to characterize this unique subgroup of IDUs.

3. Results

3.1 Characteristics of IDUs who consistently injected alone during the past 3 months

Of the 3,285 IDUs enrolled in the study; 71 were excluded from this analysis because they had not injected in the past 3 months, and 15 were excluded because of missing data regarding recent injection behavior. Among the remaining 3,199 IDUs, 467 (14.6%) reported that they had always injected alone during the past 3 months (Table 1). Eighty-five percent of subjects were male, median age was 24 years, and the median number of years since first injection was four. The majority of subjects were white (64%), 17% were Hispanic, 7% black, and 11% of other race/ethnicity.

Men were more likely than women to report that they always injected alone in the past 3 months (16% vs. 11% of women). Those who were older than 25 years, Hispanic or black, or lived in New York City were also more likely to report always injecting alone, as were those participants who had a legal source of income or had not finished high school. Homeless subjects were less likely to inject alone, as were those who had ever used a needle exchange or been incarcerated or in a drug treatment program. Those who injected at least once per day were less likely to inject alone (11% vs. 19% of those who injected less often, $p < 0.01$). There was no association between injecting alone and years since first injection or primary injected drug. Black tar injectors were less likely to report always injecting alone in the past three months.

Those who injected alone were substantially more likely to report that they mostly injected at their parent's home or their own place (43%) compared to other IDUs (30%) (Table 2). IDUs who injected with others were more likely to report injecting in public settings, such as cars, streets, parks or abandoned buildings than did those who injected alone (46% vs. 34%). Those

who injected alone were substantially less likely to report having a sex partner who injects (25% vs. 51%). Those who injected alone were also less likely to report using many other non-injected drugs such as marijuana, inhalants, hallucinogens, tranquilizers, street methadone, crack or other cocaine, or methamphetamine. Non-injection use of heroin was reported by the same proportion of subjects in each group (74–75%), and heroin was the primary injection drug for the majority of participants (70%).

Exposure to HIV or HBV was not related to injecting alone (prevalence of anti-HIV was 3% and anti-HBc was 77% in those who injected alone vs. 3% and 78%, respectively, in other IDUs). However, anti-HCV prevalence was lower among IDUs who injected alone (30%) than in those who reported injecting with others (35%, $p < .05$).

Participants who reported always injecting alone in the previous three months reported less frequent or severe occurrence of symptoms of depression, anxiety or hostility toward others. In particular, a higher proportion reported not experiencing these symptoms at all. Subjects who injected with others reported lower self-esteem, and that many or all of their friends inject with syringes or other injection paraphernalia previously used by another IDU. However, those who injected with others also scored higher in terms of general knowledge of HIV and HCV, such as natural history and treatment options, and routes of HIV and HCV transmission.

In multivariate analysis, participants who were black or Hispanic, or older (i.e., age 26–30 years) were more likely to report always injecting alone in the past three months (Table 3). History of drug treatment or incarceration, daily injection, injection with black tar heroin, having an IDU sex partner, being homeless and having completed high school were inversely related to injecting alone.

3.2 Association between injecting alone and HIV/HCV-related risk behavior

IDUs who reported always injecting alone in the past three months were only 15% as likely to inject with a syringe used by another injector (95% confidence interval (CI) 0.11 – 0.19; Table 4). Similarly, as compared to those who injected with others, they were substantially less likely to report using a drug cooker, filtration cotton or rinse water previously used by another IDU (OR=0.14; 95% CI 0.12 – 0.18). To adjust for characteristics that could conceivably confound the association between “always injected alone in the past three months” and recent risk behavior, age, race, homelessness, injection frequency and history of drug treatment or needle exchange use were included in both of the multivariate logistic regression models. The adjusted odds ratio (AOR) for the association between injecting alone and injection with a syringe previously used by another IDU was 0.16 (95% CI 0.12 – 0.21). The model estimating the association between injecting alone and use of cooker, cotton, or rinse water used by another IDUs was adjusted for injection of black tar heroin in addition to all of the other confounding variables; after adjustment for these factors, the AOR was 0.16 (95% CI 0.13 – 0.21).

4. Discussion

In this large multi-center study conducted in five US cities, one out of seven young adult injectors consistently injected alone during the past 3 months. This subgroup of IDUs differed from other young IDUs in several respects; they tended to be somewhat older, less frequent injectors who avoided settings associated with drug use and public injection settings. Fewer IDUs who injected alone had friends who inject drugs or shared injection equipment, and fewer had a sex partner who injects drugs. This subgroup was also more likely to be black or Hispanic, was less likely to have been arrested and had lower HCV prevalence than other IDUs. Differences in injection risk behavior were substantial, as they were only about 15% as likely as other participants to report using a syringe or other injection equipment used by another

IDU. However, IDUs injecting alone had lesser HIV and HCV knowledge and they were less likely to attend needle exchange programs or drug abuse treatment programs than other IDUs.

These findings may be relevant to the control of HCV transmission. Recent reports of HCV incidence among young IDUs range between 10 and 40 per 100 person years (Judd et al., 2005; Des Jarlais et al., 2003; Hahn et al., 2002). Thus far, there is no clear and consistent evidence that interventions shown to reduce HIV transmission in IDUs also prevent HCV – this includes studies of needle exchange, drug treatment, disinfectant bleach and HCV education and screening (Crofts et al., 1997; Hagan et al., 1995; Hagan et al., 1999; Kapadia et al., 2004; Rezza et al., 1996; Ompad et al., 2002). The prevalence of unsafe injection in the subgroup of IDUs who inject alone was relatively low – only 18% reported receptive syringe sharing, although 42% reported shared use of other paraphernalia (Table 4). In other studies of young IDUs, recent receptive syringe sharing was reported by 43% in San Francisco (Evans et al., 2003), 49% in Chicago (Thorpe et al., 2002), 30% in New York City (Diaz et al., 2001), 48% in London (Hunter et al., 2000), and 38% in Baltimore (Novelli et al., 2004). Use of cookers, cottons, and rinse water previously used by another IDU was reported among 80% of young IDUs in San Francisco (Evans et al., 2003), 75% in London (Hunter et al., 2000), and 69% in Chicago (Thorpe et al., 2002). In addition, anti-HCV prevalence was significantly lower among IDUs who injected alone, although the difference in prevalence was not substantial – 30% vs. 35% in other IDUs. It may be that the “risk environment” as described by Rhodes and colleagues (2004) is subject to greater personal control when no one else is injecting nearby, although it is unclear whether this practice could prevent HCV transmission.

Injecting alone may confer both protection and risk. Benefits to keeping injecting drug use hidden may include avoiding social and legal problems and reduced risk of acquiring blood borne infections. However, risks may include less frequent contact with other IDUs that could reduce opportunities to learn about drug-related health, risk and protective factors, and may also include increased probability of fatal overdose. In a review of 333 accidental overdose deaths in San Francisco, 32% of deceased patients were found in a room locked from the inside (Davidson et al., 2003). Comparison of the San Francisco death review data to the CIDUS/DUIT sample ignores underlying differences and potential confounding, and inferences may only be drawn with appropriate caution. However, the fact that IDUs injecting alone represented only 15% of our participants as compared to 32% of overdose deaths in San Francisco indicates that injecting alone confers serious risks.

This study has several strengths, including a relatively large sample that yielded a sizable subset of IDUs who had been injecting alone. The use of A-CASI to collect behavioral data and the specificity of the wording in the questionnaire related both to injecting alone and the use of potentially contaminated syringes and other equipment may have decreased measurement error. However, the cross-sectional nature of the study limits our ability to establish a temporal, causal relationship between injecting alone and risk behavior, acquisition of infections or drug overdose. In hindsight, we would have liked to have asked our participants why they chose to inject alone, as we cannot know whether it was a conscious and systematic method to avoid peer pressure and control the injection setting or to avoid others’ knowing that they inject. An early qualitative study showed that many long-term injectors took pains to conceal their drug use, and to distance themselves from users with more chaotic lifestyles (Courtwright et al., 1989). Previous experience of overdose and awareness of overdose risk in these individuals also merits further study.

Achieving personal control over the injection setting and the materials used to prepare and inject drugs appears to be a significant challenge for IDUs and has hampered efforts to prevent HCV transmission. Injection risk behavior among young IDUs who injected alone in this study were remarkably low. However, safety concerns related to overdose risk preclude

recommending this as an infection control strategy. Whether this represents “intravention” – a methodical prevention activity generated by a community at risk (Friedman et al., 2004) – cannot be determined from this study, but these IDUs may have useful ideas to contribute to the development of safe injection practices.

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Table 1
Descriptive characteristics of injection drug users who always injected alone in the past 3 months vs. other participants in the CIDUS III/DUJIT Study¹ of young injectors in 5 US cities

Baseline characteristics	Always injected alone in the past 3 months				p
	n	%	n	%	
Sex					
Male	356	16.0%	1867	84.0%	<0.01
Female	111	11.4%	865	88.6%	<0.01
Age, years					
15–19	40	9.7%	374	90.3%	<0.01
20–24	178	12.6%	1232	87.4%	
25–30	249	18.1%	1126	81.9%	
Race/ethnicity					
Hispanic	113	21.4%	415	78.6%	<0.01
Black, non-Hispanic	69	29.4%	166	70.6%	
White, non-Hispanic	241	11.8%	1810	88.2%	
Other, non-Hispanic	42	11.7%	316	88.3%	
Study site					
Baltimore	134	14.0%	822	86.0%	<0.01
Chicago	119	15.2%	663	84.8%	
Los Angeles	70	13.5%	450	86.5%	
New York City	85	23.1%	283	76.9%	
Seattle	59	10.3%	514	89.7%	
Education					
≤ 11 th grade	220	17.7%	1025	82.3%	<0.01
High School graduate/GED ²	245	12.6%	1705	87.4%	
Usual income					
Legal source	382	15.3%	2108	84.7%	0.02
Illegal source	81	11.8%	608	88.2%	
Homeless					
No	340	18.0%	1550	82.0%	<0.01
Yes	126	9.7%	1174	90.3%	
Residence					
Parents' place	165	15.4%	904	84.6%	NS
Own/someone else's place	151	14.7%	876	85.3%	
Other less stable place	145	13.3%	943	86.7%	
Ever used needle exchange programs					
No	230	17.5%	1086	82.5%	<0.01
Yes	225	12.3%	1607	87.7%	
Ever incarcerated					
No	142	17.0%	695	83.0%	0.02
Yes	325	13.8%	2037	86.2%	
Ever in drug treatment					
No	248	17.9%	1139	82.1%	<0.01
Yes	219	12.1%	1587	87.9%	
Injection frequency					
Less than daily	269	18.7%	1171	81.3%	<0.01
Daily	198	11.3%	1561	88.7%	
Years since first injection					
0–3	196	15.0%	1110	85.0%	NS
4+	264	14.1%	1608	85.9%	
Primary drug injected					
Heroin	330	14.8%	1899	85.2%	NS

Baseline characteristics	Always injected alone in the past 3 months		p
	Yes (n=467)	No (n=2732)	
	n	n	
Heroin with cocaine	53	339	86.5%
Amphetamines	38	269	87.6%
Cocaine, crack, other	25	146	85.4%
Black tar heroin was primary drug injected (alone or in combination)			
No	358	1904	84.2%
Yes	85	736	89.6%

<0.01

¹ Collaborative Injection Drug User Study III/Drug User Intervention Trial Study

² GED = General Equivalency Diploma

Contextual, psychosocial and serological characteristics of injection drug users who always injected alone in the past 3 months vs. others, CIDUS III/DUIT Study⁷

Table 2

	Always injected alone in the past 3 months		No (n=2732)		p
	Yes (n=467)	n	%	n	
Primary injection setting					
Parent's place	92		20.0%	372	<0.01
Own place	105		22.8%	439	
Friend/partner's	78		17.0%	515	
Dealer's place	10		2.2%	75	
Car/vehicle	44		9.6%	471	
Public streets, parks	67		14.6%	493	
Abandoned bldg	43		9.3%	314	
Other	21		4.6%	35	
Had an injecting sex partner					
No	345		74.8%	1311	<0.01
Yes	116		25.2%	1390	
Any non-injection use of these drugs in the past 3 months					
Marijuana	285		62.5%	1994	<0.01
Inhalants	43		9.4%	466	<0.01
Hallucinogens	79		17.3%	739	<0.01
PCP	48		10.5%	359	0.01
Tranquilizers/barbituates	107		23.5%	1265	<0.01
Street methadone	89		19.5%	791	<0.01
Crack cocaine	192		42.1%	1636	<0.01
Medhamphetamines	92		20.2%	880	<0.01
Heroin	338		74.1%	2031	NS
Cocaine	188		41.2%	1536	<0.01
Other	51		11.2%	607	<0.01
Depression – bothered by symptoms:					
Not at all	142		31.9%	567	
A little bit	168		37.8%	985	
Moderately	81		18.2%	676	
Quite a bit	43		9.7%	344	
Extremely	11		2.5%	88	
Anxiety – bothered by symptoms:					
Not at all	168		37.8%	637	<0.01
A little bit	160		36.0%	1153	
Moderately	83		18.7%	601	
Quite a bit	25		5.6%	216	
Extremely	9		2.0%	54	
Hostility – bothered by symptoms:					
Not at all	189		42.4%	704	<0.01
A little bit	161		36.1%	1144	
Moderately	61		13.7%	549	
Quite a bit	24		5.4%	216	
Extremely	11		2.5%	56	
Self-esteem					
1 Lower self-esteem	1		0.2%	17	<0.01
2	85		19.4%	779	
3	294		67.1%	1587	
4 Higher self-esteem	58		13.2%	243	
Friends inject w/ used needles					
None of them, or none inject	228		52.2%	720	<0.01

	Yes (n=467)		Always injected alone in the past 3 months		No (n=2732)		p
	n	%	n	%	n	%	
Fewer than half	118	27.0%	904	34.7%			
About half	42	9.6%	421	16.2%			
More than half	30	6.9%	376	14.4%			
All of them	19	4.3%	184	7.1%			
Friends inject w/ used paraphernalia							
None of them	175	39.1%	390	14.6%			<0.01
Fewer than half	113	25.2%	683	25.5%			
About half	57	12.7%	565	21.1%			
More than half	51	11.4%	638	23.8%			
All of them	52	11.6%	402	15.0%			
General HIV/HCV knowledge							
<75% correct	156	33.4%	700	25.6%			<0.01
≥75% correct	311	66.6%	2032	74.4%			
HIV/HCV risk knowledge							
<75% correct	336	71.9%	1624	59.4%			<0.01
≥75% correct	131	28.1%	1108	40.6%			
Anti-HIV status							
Negative	438	96.5%	2598	97.3%			NS
Positive	16	3.5%	71	2.7%			
Anti-HCV status							
Negative	318	69.9%	1722	64.5%			0.02
Positive	137	30.1%	949	35.5%			
Anti-HBc							
Negative	106	23.5%	583	22.1%			NS
Positive	346	76.5%	2060	77.9%			

¹ Collaborative Injection Drug User Study III/Drug User Intervention Trial Study

Table 3
Multivariate analysis of factors associated with always injecting alone, CIDUS III/DUIT Study¹

	AOR ²	95% Confidence Interval
Age		
15–19	1.0	
20–24	1.5	(0.97–2.3)
25–30	1.9	(1.2–2.9)
Race/ethnicity		
White	1.0	
Hispanic	1.6	(1.2–2.1)
Black	1.9	(1.3–2.9)
Other	1.0	(0.7–1.5)
Homeless		
Yes	1.0	
No	0.6	(0.4–0.8)
Education		
HS grad/GED	1.0	
≤ 11th grade	0.7	(0.5–0.9)
Ever in jail		
Yes	1.0	
No	0.7	(0.6–0.97)
Ever in drug treatment		
Yes	1.0	
No	0.7	(0.5–0.8)
Injects daily or more often		
Yes	1.0	
No	0.6	(0.5–0.8)
Have a sexual partner who also injects		
Yes	1.0	
No	0.4	(0.3–0.5)

¹ Collaborative Injection Drug User Study III/Drug User Intervention Trial Study

² Adjusted odds ratio

