

Predictors of Unsafe Needle Practices: Injection Drug Users in Denver

Robert E. Booth

Addiction Research and Treatment Services, Department of Psychiatry, School of Medicine, University of Colorado Health Sciences Center, Denver, Colorado, U.S.A.

Summary: To identify factors associated with unsafe needle hygiene, we studied 378 injection drug users (IDUs) in Denver, Colorado. The sample was drawn from neighborhoods with large concentrations of injectors and crack smokers. Respondents were questioned about their needle hygiene practices during the 30-day period prior to the interview. Unsafe needle hygiene, defined as injecting with previously used, nondisinfected needles, was reported by more than a third of those interviewed. Unsafe needle practices were associated with a number of factors, including heroin injection, perceived chance of getting AIDS, and lack of exposure to AIDS interventions in the community. The high percentage reporting unsafe needle practices within a 30-day interval points to the grave risk AIDS continues to pose for drug users. We conclude that the apparent success of exposure to AIDS intervention efforts in changing needle practices shows promise for prevention programs targeting drug injectors. **Key Words:** Injection drug users—HIV risk—Heroin injection—Intervention.

Needle sharing by injection drug users (IDUs) is the second most frequent risk factor for human immunodeficiency virus (HIV) transmission in the United States (1). Drug injectors are also at risk of HIV infection through sexual transmission (2-5). Presently, IDUs are the leading source for heterosexual and perinatal transmission of HIV to noninjectors (2,6-9).

In 1985, research on reductions in needle-related HIV risk behaviors by IDUs began to appear in the literature; in 1990, reductions in sex risk practices were reported. These behavior changes occurred both with and without the presence of planned interventions. Early studies noted the illicit marketing

of sterile injection equipment following the dissemination of information on the acquired immunodeficiency syndrome (AIDS) by the mass media and through oral communications within networks of injectors (10-13). These were followed by reports of increased bleach use to disinfect needles, reduced needle sharing (14-17), and reductions in sex risk behaviors (18-20) as a result of interventions.

The present study was conducted with a population of drug injectors, including injectors who also smoked crack cocaine. Its purpose was to identify factors associated with unsafe needle hygiene in a city where planned HIV prevention efforts had been in place for >4 years.

METHODS

Between October 1991 and December 1992, 615 drug users, including 378 injectors, were recruited from street settings in Denver, Colorado. Sampling was conducted in three large inner-

Address correspondence and reprint requests to Dr. R. E. Booth at Addiction Research and Treatment Services, Department of Psychiatry, University of Colorado Health Sciences Center, 1643 Boulder Street, Denver, CO 80211, U.S.A.

Manuscript received July 16, 1993; accepted October 25, 1993.

city neighborhoods selected for their concentration of drug injectors and crack smokers. A "targeted sampling" plan (21) was developed using two types of data, indexed according to the census tract of the individual referenced: public records, including drug-related arrests, IDU treatment admissions, and reported cases of HIV among drug injectors; and observations of drug trade and use in the three neighborhoods. The latter data were obtained by community outreach workers who observed street drug activity over a 3-month period. Both types of information were given equal weight in the model and summed to arrive at an estimate of the total number of drug users. To arrive at recruiting quotas within census tracts, we took the estimated proportion of users in each tract, times the number of subjects designated for the study. Ethnic quotas were established to match the 1990 census. The result was a nonrandom, purposefully selected sample of drug injectors and crack smokers characterized by diversities in age, gender, ethnicity, drug use preferences, and sex risk behaviors.

Residents from targeted neighborhoods were employed as indigenous community outreach workers. As the primary contacts with drug injectors and smokers, their role was to promote HIV risk reduction and to recruit subjects for structured interviews. Interviews were conducted by professionally trained research staff familiar with the drug subculture. Eligibility criteria for study participation were (a) injected drugs in the 30 days prior to the interview and/or smoked crack cocaine within the last 2 days; (b) at least 18 years of age; and (c) no drug abuse treatment in the 30 days prior to the interview. Time limits on drug use were established in order to verify drug status. Verification included visual examination for signs of recent venipuncture (for injectors) and urinalysis (for crack smokers) using Abuscreen ON-TRAK for cocaine (Roche Diagnostic Systems, Montclair, NJ). The 48-h time frame for crack use was necessary due to the relatively brief period following drug intake that cocaine metabolite can be detected in urine. Informed consent was obtained prior to the interview, and respondents were compensated \$20 for their participation. All respondents received HIV testing and counseling. The Risk Behavior Assessment (RBA) questionnaire, developed by the National Institute on Drug Abuse, was used. Risk behaviors were assessed for the 30 days prior to interview.

Statistical Analysis

χ^2 Tests for differences in proportions or Fisher's exact tests (two-tailed) were used. Continuous variables were dichotomized, since distributions (Table 1) did not meet the assumptions of normality. We used stepwise forward and backward multiple logistic regression to estimate the independent contribution of demographics, exposure to AIDS prevention efforts, drug treatment, prior HIV testing and counseling, drug use, and high-risk sexual behaviors in predicting unsafe needle hygiene.

"Unsafe" needle use was defined as injecting with a needle or syringe previously used by someone else without first disinfecting with bleach, alcohol, or boiling water. Those who did not inject with a used needle or syringe, or who did so but always disinfected, were considered "safer" in their needle hygiene. Respondents who had smoked crack but who had not injected in the 30 days before the interview were excluded ($n = 237$), leaving 378 injectors for analysis, including 134 who had also smoked crack.

RESULTS

The mean age of the sample was 38 (range, 21-73), 69% were male, 18% African American, 66% Hispanic, and 16% Caucasian. In the 30 days prior to the interview, 65% had injected drugs but not smoked crack, and 35% had injected and smoked crack. Cocaine was the most commonly mentioned injected drug (76%), followed by heroin (70%), and speedballs, a combination of heroin and cocaine (38%). The majority of the study population was sexually active. Nearly 78% reported having sex in the previous 30 days, including 20% who indicated they had more than one partner, 45% whose partner was a drug injector, and 5% who had exchanged sex for drugs and/or money. Previous medical histories for the following conditions were reported: gonorrhea (31%), syphilis (10%), and hepatitis B (27%). At the time of the interview, 41% stated that they had been "given information and/or risk reduction supplies (e.g., bleach, condoms) about AIDS and AIDS prevention by someone in the community," 64% had received treatment or detoxification for drug abuse, and 81% had been tested/counseled for HIV. Among those tested, 2.4% were HIV positive. HIV negative respondents were asked about their chance of getting AIDS: 19% felt that they had "no chance (0%)," 47% "some chance (25%)," 20% a "half chance (50%)," 13% a "high chance (75%)," and 1% a "sure chance (100%)."

Unsafe Needle Hygiene

Unsafe needle use was reported by 34% of 378 respondents who injected drugs in the 30 days prior to the interview (Table 1).

Hispanics reported less consistent needle hygiene than did Caucasians or African Americans ($p < 0.02$). Both heroin and speedball injectors were more likely to report unsafe needle practices than IDUs not injecting these substances ($p < 0.001$ and $p < 0.01$, respectively). Respondents with an IDU sex partner also reported more unsafe needle use than those without a sex partner who was an IDU ($p < 0.01$), as did respondents who exchanged sex for drugs or money compared to those who did not ($p < 0.001$). Neither prior treatment for drug abuse nor HIV testing were related to needle hygiene. Injectors who reported they had not received AIDS education or prevention materials from someone in the community were more likely to report unsafe needle hygiene than those exposed to such inter-

TABLE 1. Reported needle hygiene by selected characteristics among 378 injection drug users

Variable	n	Percentage safer	Percentage unsafe	χ^2	p<
Gender					
Male	256	66.8	33.2		
Female	115	64.3	35.7	.21	NS
Ethnicity					
African-American	62	77.4	22.6		
Hispanic	234	61.1	38.9		
Caucasian	58	70.7	29.3	6.53	0.02
STD					
Yes	127	65.4	34.6		
No	244	66.4	33.6	.04	NS
Smoked crack					
Yes	134	69.4	30.6		
No	237	64.1	35.9	1.06	NS
Injected cocaine					
Yes	278	64.0	36.0		
No	93	72.0	28.0	1.99	NS
Injected heroin					
Yes	258	60.5	39.5		
No	113	78.8	21.2	11.70	0.001
Injected speedball					
Yes	140	57.9	42.1		
No	231	71.0	29.0	6.69	0.01
IDU sex partner					
Yes	167	55.1	44.9		
No	200	75.5	24.5	16.90	0.0001
Sex for money or drugs					
Yes	17	41.2	58.8		
No	354	67.2	32.8	4.90	0.05
Prior drug treatment					
Yes	236	64.8	35.2		
No	135	68.1	31.9	.52	NS
Prior HIV test					
Yes	300	66.3	33.7		
No	70	64.3	34.7	.11	NS
Prior AIDS prevention exposure					
Yes	148	73.0	27.0		
No	221	61.5	38.5	5.10	0.05
Chance of AIDS					
0-25%	240	71.7	28.3		
50-100%	122	54.9	45.1	10.09	0.01

NS, not significant.

vention ($p < 0.01$). Respondents who reported their chance of getting AIDS to be at least 50%, were more likely to report unsafe needle use than those who reported lesser self perceived odds ($p < 0.01$).

Multivariate Analysis of Unsafe Needle Hygiene

In stepwise logistic regression, five independent factors predicted unsafe needle hygiene (Table 2). These were: injecting heroin ($p < 0.001$); having a sex partner who was also an IDU ($p < 0.0000$); exchanging sex for drugs or money ($p < 0.02$); a perceived chance of getting AIDS of $>50\%$ ($p < 0.01$), and no exposure to AIDS community interventions ($p < 0.02$). The odds ratio for unsafe needle hygiene for respondents injecting heroin, com-

pared to injectors of drugs other than heroin, was 3.0 (CI 1.7-5.5).

DISCUSSION

Three major findings emerged from this study. First, heroin injection was independently associated with unsafe needle practices. The relative risk of injecting heroin is inconsistent with other research reports where cocaine injection was found significantly related to needle risk, as well as to HIV (22-25). These studies were conducted in large metropolitan areas, including San Francisco, Chicago, and New York City, where drug prices are likely lower than prices in Denver. The smallest quantity of heroin sold in Denver, enough for a sin-

TABLE 2. Logistic regression analysis of factors associated with unsafe needle hygiene among 378 injection drug users

Variable	Adjusted odds ratio	95% Confidence interval	p<
Injecting heroin	3.01	1.66-5.49	0.001
Drug-injecting sex partner	2.89	1.76-4.74	0.0000
Exchanging sex for drugs or money	4.76	1.44-15.87	0.02
Perceived chance of AIDS >50%	2.12	1.28-3.52	0.01
AIDS intervention exposure	0.54	0.32-0.91	0.02

gle injection, costs \$25. This is the same price as the smallest amount of cocaine sold, which is sufficient for several injections. Thus, addicts pooling their resources to purchase drugs would be more likely to share syringes if the drug injected was heroin than cocaine. In addition, most of the heroin sold in Denver is black tar, a gummy substance difficult to divide equally without liquefying. Once liquefied, the drug can be divided by using the calibrations on the syringe barrel (26). Another possible explanation for the significance of heroin as a risk factor, and not cocaine, may be related to what an earlier ethnographic study observed: cocaine users focused more on their own subjective experience and were less willing to share syringes, because they required them so often and because of a sense of mistrust, a side effect of using cocaine (27).

Second, we found a significant association between exposure to AIDS prevention efforts in the community and needle hygiene: respondents who had received AIDS educational and/or risk reduction materials were twice as likely as those who had not to report safer needle use. At the time recruitment began for this study, community outreach workers had been providing AIDS intervention in the city for over four years. While participants in the current study had not previously been interviewed, they could, and likely were, seen by outreach staff. Of related interest was the failure of prior drug treatment, as well as HIV testing and counselling, to account for safer needle practices.

Third, the relationship between perceived risk of AIDS and practicing unsafe needle hygiene may have important implications for prevention efforts. Others have noted the necessity of providing basic information about AIDS in order to generate motivation for risk reduction; however, knowledge alone was not sufficient without available means for behavioral change (28). Our research in Denver,

where possession of a syringe without a prescription is illegal, has found that the means for practicing safer injection are not readily available (26,29).

There are several limitations to this study that should be considered. First, the sample was drawn exclusively from Denver and the results may not be generalizable to other locations. Second, respondents were not randomly selected. Acceptance rates cannot be calculated in target samples due to their dependence on chain-referrals. Selection bias likely over-represents IDUs who had the time to participate and those for whom the modest stipend was worth the effort. Third, results were based on self-reports, which may have been affected both by recall and social desirability. The relatively brief time period respondents were asked to recall should have minimized recall error. Although affects due to socially desirable responding cannot be ruled out, it is unlikely that the main findings were influenced by this factor.

In conclusion, results from this study suggest that heroin injection may be as significant a risk factor for HIV in some cities as cocaine injection has been found to be in others. Perceived likelihood of getting AIDS is not sufficient to change these behaviors. On the other hand, the association between exposure to interventions and safer needle practices shows promise for interventions efforts with this population.

Acknowledgment: I wish to acknowledge the assistance provided by John K. Watters, Ph.D., Richard Needle, Ph.D., M.P.H., Steve Koester, Ph.D., Ken Anderson, M.A., and Francesca Pinto, M.P.H. This study was supported by grant no. U01 DA06912 from the National Institute on Drug Abuse. The helpful suggestions of the two anonymous reviewers who read an earlier version of this article are greatly appreciated. Parts of this paper were presented at the IX International Conference on AIDS/IVth STD World Congress, Berlin, June 7-11, 1993.

REFERENCES

- Centers for Disease Control. *Update: acquired immunodeficiency syndrome—United States, 1992*. Atlanta, GA: CDC, July 23, 1993.
- Guinan ME, Hardy A. Epidemiology of AIDS in women in the United States, 1981 through 1986. *JAMA* 1987;257:2039-42.
- Lewis DK, Watters JK. Sexual risk behaviors among heterosexual intravenous drug users: ethnic and gender variations. *AIDS* 1991;5:77-83.
- Moss A, Vranizan K, Bacchetti P, Gorter R, Osmond D, Broadie B. Seroconversion for HIV in intravenous drug users in treatment, San Francisco 1985-1990. Paper presented at the Vth International Conference on AIDS, San Francisco, 1990.

5. Schoenbaum EE, Hartel D, Selwyn PA, et al. Risk factors for human immunodeficiency virus infection in intravenous drug users. *N Engl J Med* 1989;321:874-9.
6. Friedland GH, Klein RS. Transmission of the human immunodeficiency virus. *N Engl J Med* 1987;317:1125-35.
7. Des Jarlais DC, Friedman SR. HIV infection among intravenous drug users: epidemiology and risk reduction. *AIDS* 1987;1:67-76.
8. Ginzberg HM. Intravenous drug users and the acquired immune deficiency syndrome. *Public Health Rep* 1984;99:206-12.
9. Drucker E. AIDS and addiction in New York City. *Am J Drug Alcohol Abuse* 1986;12:165-81.
10. Des Jarlais DC, Friedman SR, Hopkins W. Risk reduction for the acquired immunodeficiency syndrome among intravenous drug users. *Ann Intern Med* 1985;103:755-9.
11. Des Jarlais DC, Hopkins W. "Free" needles for intravenous drug users at risk for AIDS: current developments in New York [Letter]. *N Engl J Med* 1985;313:1476.
12. Friedman SR, Des Jarlais DC, Sotheran JL, Garber J, Cohen H, Smith D. AIDS and self-organization among intravenous drug users. *Int J Addict* 1987;22:201-19.
13. Friedman SR, Sotheran JL, Abdul-Quader AS, et al. The AIDS epidemic among blacks and hispanics. *Millbank Q* 1987;65:455-99.
14. Watters JK. Preventing human immunodeficiency virus contagion among intravenous drug users: the impact of street-based education on risk behavior. Paper presented at the IIIrd International Conference on AIDS, Washington, D.C., 1987.
15. Chaisson RE, Osmond D, Moss AR, Feldman HW, Biernacki P. HIV, bleach, and needle sharing. *Lancet* 1987;1:1430.
16. Watters JK. Responses to AIDS education efforts among intravenous drug users. Paper presented at the American Psychological Association Annual Meeting, Atlanta, 1988.
17. Watters JK, Downing M, Case P, Lorvick J, Fergusson B. AIDS prevention for intravenous drug users in the community: street-based education and risk behavior. *Am J Community Psychol* 1990;18:587-96.
18. Abdul-Quader AS, Tross S, Friedman SR, Kouzi AC, Des Jarlais DC. Street-recruited intravenous drug users and sexual risk reduction in New York City. *AIDS* 1990;4:1075-9.
19. Rhodes F, Wolitski RJ, Thornton-Johnson S. An experimental program to reduce AIDS risk among female sex partners of injection drug users. *Health and Social Work* 1992;17:261-72.
20. Neaigus A, Sufian M, Friedman SR, Stepherson B, Mota P, et al. Effects of outreach intervention on risk reduction among intravenous drug users. *AIDS Educ Prev* 1990;2:253-71.
21. Watters JK, Biernacki P. Targeted sampling: options for the study of hidden populations. *Social Problems* 1989;36:416-30.
22. Chaisson RE, Bacchetti P, Osmond D, Brodie B, Sande MA, Moss AR. Cocaine use and HIV infection in intravenous drug users in San Francisco. *JAMA* 1989;261:561-5.
23. Guydish JR, Abramowitz A, Woods W, Black DM, Sorenson JL. Changes in needle sharing among intravenous drug users: San Francisco, 1986-88. *Am J Public Health* 1990;80:995-7.
24. Wiebel W, Ouellet L, Guydan C, Samairat N. Cocaine injection as a predictor of HIV risk behaviors. Paper presented at the Vith International Conference on AIDS, San Francisco, 1990.
25. Friedman SR, Rodriguez A, Zunzunegui V, et al. Similarities in syringe sharing among drug injectors in Madrid and New York City. Paper presented at the American Public Health Association Annual Meeting, San Francisco, 1993.
26. Booth RE, Koester SK, Reichardt CS, Brewster JT. Quantitative and qualitative methods to assess behavioral change among injection drug users. *Drugs and Society* 1993;7(3/4):161-83.
27. Friedman SR, Des Jarlais DC. Will bleach decontaminate needles during cocaine binges in shooting galleries [Letter to the Editor]? *JAMA* 1989;262:7.
28. Des Jarlais DC, Friedman SR. The psychology of preventing AIDS among intravenous drug users. *Am Psychol* 1988;11:865-70.
29. Koester SK. Copping, running and paraphernalia laws: contextual variables and needle risk behavior among injection drug users in Denver. *Hum Organization* 1994;53(3) (in press).