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Predictors of Methamphetamine Injection in Out-of-Treatment IDUs

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Abstract

From 2004–2006, 439 injection drug users were recruited in Denver, Colorado, to participate in a study of drug use and HCV risk. Over two-thirds were male, more than half were white, and 28% were methamphetamine injectors. The Risk Behavior Assessment, which assesses demographics, drug use, and HIV risk behaviors, was used. Variables were assessed for association with methamphetamine (MA) injection. A logistic regression model was built using forward stepwise method to determine independent associations between variables of interest and MA injection. The study's limitations are noted, and implications are described.

Keywords

methamphetamine; HIV risk; Hepatitis C; drug injection; peer education

Introduction

Methamphetamine (MA) is a powerfully addictive stimulant that is a growing problem nationwide. In addition to the ill health affects of drug use, MA users are at risk for HIV and Hepatitis C (HCV) through drug injection and unsafe sex (Corsi, Kwiatkowski, and Booth, 2002; Shoptaw, Reback, Peck, Yang, Rotheram-Fuller, Larkins et al., 2005; Twitchell, Huber, Reback, and Shoptaw et al., 2002). The potential risks of injecting MA versus injecting other drugs are similar, that is, through shared needles and shared injecting equipment, as well as the possibility of unsafe sex while under the influence. This empirically based study compared injectors of MA with non-MA injectors to determine if these two groups differ in ways that put them at risk.

Many studies have documented that high-risk sex behaviors are common among MA-using men who have sex with men (MSM) (Boddiger, 2005; Buchacz, McFarland, Kellogg, Loeb, Holmberg, Dilley et al., 2005; Colfax et al., 2005; Reback, 1999; Shoptaw, Reback, and Freese, 2002; Shoptaw et al., 2005) while other research has shown that heterosexuals also engage in high-risk sex behaviors, such as multiple partners and unprotected sex (Molitor, Truax, Ruiz, and Sun, 1998; Semple, Patterson, and Grant, 2004). Additionally, there are studies showing that heterosexual MA users, and women in particular, experience a heightened sex drive and thus increased sex while on MA (Klee, 1993; Rawson, Washton, Domier, and Reiber, 2002). Heterosexual MA users have been found to engage in more sex-related risk than other drug

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users (Farabee, Prendergast, and Cartier, 2002), including decreased condom use during vaginal and anal sex, exchanging sex for drugs or money, and sex with an IDU (Molitor et al., 1998, 1999). Recent work by Lorvick, Martinez, Wenger, Gee, and Kral (2005) documented that female MA injectors in San Francisco engage in more sex-related risk than opiate injectors, including increased unprotected anal sex, engaging in sex with greater than five partners, and engaging in sex work. HIV has been associated with MA use in at least one study (Wohl, Johnson, Lu, Jordan, Beall, Currier et al., 2002). Other studies have documented that women on MA are highly sexually active, reporting up to seventy-nine sex acts in a 2-month period, with the majority of those acts being unprotected (Semple et al., 2004).

Prior research has examined MA users and users of other drugs and found substantial differences between the two groups. MA users have been found to use drugs on a more regular basis than cocaine users as well as experiencing more severe psychiatric and medical consequences (Rawson et al., 2000). MA users in treatment were found to engage in more risk behaviors than cocaine users, while other work comparing MA users to heroin users showed that heroin users report more needle risk behaviors (Copeland and Sorenson, 2001; Zule and Desmond, 1999). Several studies have shown that MA users have more unprotected sex than heroin injectors, including more sex partners overall (Zule and Desmond, 1999, Molitor et al., 1999; Gibson et al., 2002). Additionally, most studies show that MA users show greater interest in sex and report more risk behaviors such as reporting sex with another drug user (Klee, 1993).

Understanding the risks MA users face with regards to HIV is critical, as studies have shown a combined neurotoxicity of HIV infection and MA use (Jones, 2005; Urbina and Jones, 2004). Cooccurring MA use and HIV infection cause changes in the brain structure, such that people who use MA and are infected with HIV have additional challenges, including difficulty with adherence to medication, cognitive impairment leading to decreased employability, and general difficulties with daily life activities (NIDA, 2005). Additionally, HCV infection has been found to contribute to neuropsychological deficits among HIV-positive MA users (Cherner, Letendre, Heaton, Durelle, Marquie-Beck, Gragg et al., 2005; van Gorp and Hinkin, 2005; Letendre, Cherner, Ellis, Marquie-Beck, Gragg, Marcotte et al., 2005).

Methods

Recruitment and Eligibility

From 2004 through 2006, 439 out-of-treatment IDUs were recruited through street outreach in Denver, CO, to participate in a research study aimed at reducing HCV risk through peer education. Targeted sampling methods used indicators such as drug-related arrests and drug-user treatment admissions among IDUs to estimate the number of drug users in each of the city's census tracts. Street and community outreach methods were used to recruit clients, including setting up tables for distribution of prevention materials in high drug-use areas and walking through neighborhoods where drugs were known to be used. Materials that were provided included free condoms, bleach, and informational brochures describing the project. Outreach workers who were familiar and comfortable with the drug-using population, as well as being knowledgeable about drug use and the environment, recruited study participants by approaching prospective clients on the street and striking up a conversation and offering them condoms.

Once rapport had been established, the outreach worker then began describing the research project and providing the individual with more information, asking whether he or she might know of someone who would be interested and eligible for the research. If someone was interested in the study, they were briefly screened on the street and scheduled for an interview at the research site if they were considered eligible upon initial screening. Additionally, clients

brought in members of their peer group who were screened for eligibility. Final eligibility criteria were determined through previous, empirically based studies by this research group and others who have worked with IDUs. Eligibility was determined at the research site before the start of the interview through meeting the following criteria: (1) self-reported injection of drugs (opiates, cocaine, or methamphetamine) in the 30 days prior to the interview; (2) 18 years of age or older; and (3) not too intoxicated or otherwise impaired to provide informed consent. Drug injection was confirmed by urinalysis and inspection for evidence of recent venipuncture. Overall, 448 clients were contacted through street outreach recruitment and agreed to do the study. Of those, however, sixteen were deemed ineligible by not meeting one of the above criteria. Eligible participants were provided informed consent and compensated monetarily for their time as research subjects. The interview used a computer-assisted structured interview (audio-CASI) to minimize social desirability and increase validity of responses. Study procedures were approved by the Institutional Review Board of the University of Colorado School of Medicine and in accord with the Helsinki Declaration of 1975. Outreach workers also provided interventions and recontacted clients for follow-up interviews. Outcome data on intervention effects are still being collected and are not reported here.

Interviewers were trained in the research protocol and familiar with the drug sub-culture. Instruments included the Risk Behavior Assessment (RBA), developed by a cooperative agreement consortium with the National Institute on Drug Abuse (NIDA). It assesses demographics, drug use, criminal and medical histories, and HIV-related sex and drug risk behaviors. The risk period assessed with the RBA included the 30 days prior to the interview. Reliability and validity studies of the instrument support its adequacy as a research instrument with this population (Dowling-Guyer, Johnson, Fisher, Needle, Watters, Andersen et al., 1994; Weatherby, Needle, Cesari, Booth, McCoy, Watters et al., 1994).

Statistical Procedures

Interview data were entered, edited, and analyzed using SPSS. The primary comparison variable was MA injection, operationally defined as having injected amphetamines (speed, methamphetamine, crank) at least once in the month prior to the interview. Demographics, drug-related and sex-related risk variables were assessed for their association with MA injection using chi-square and *t*-test analyses. Following this, a logistic regression model was built using the forward stepwise method to determine the independent associations between the variables of interest and MA injection. Odds ratios, 95% confidence intervals and *p*-values are presented for the variables in the final logistic regression model (see Table 1).

Sample Description

Of the 439 participants interviewed for this study, 122 (27.8%) were MA injectors. Table 1 shows the general descriptive statistics for the entire sample and for MA and non-MA injectors separately. The mean age of participants was 42 years; nearly one-third were female. Over half were white, about a fifth were Hispanic, and 10% were African-American. Nearly half had received their high school diploma or GED. Almost 15% reported being gay, lesbian, or bisexual. Over two-thirds considered themselves homeless. Less than 5% had been told by a health care professional that they had HIV, but two-thirds had been told they had HCV. They had been injecting for over 20 years and had done so on an average of ninety-six times in the prior month (about 3× per day). Heroin was the most commonly injected drug, followed by cocaine and MA. Almost half reported using a needle after someone else had used it, but only 15% reported doing so without cleaning it first. Over two-thirds shared other drug paraphernalia, such as cotton, cooker, and water. A similar percentage reported splitting the drug solution. With regard to sex-related risk variables, 40% reported having unprotected vaginal sex, but only 7% had unprotected anal sex. Sixteen percent reported having more than one sex partner in the past month (not necessarily simultaneously).

The typical participant in this study was a white man in his forties. He probably did not have his own home and was more likely to be gay than a man in the general population. He had been injecting drugs (mostly heroin) for about 20 years, sometimes three times a day. He had HCV but probably not HIV. He shared needles sometimes but usually cleaned it first and used condoms for anal sex much more than for vaginal sex. Anecdotal information from MA-injecting clients indicates that in this population, MA in the form of “ice” is dissolved in water with cotton and if it is “good dope,” then it will all dissolve. It is not heated and participants in this study report using it one or two times per day (see Table 2).

Results

When MA injectors were compared to non-MA injectors they were shown to be significantly younger and were more likely to be white. They were also more likely to have some post-high school education. They were nearly two and a half times more likely to be gay, lesbian, or bisexual. While they were equally likely to have been told they had HIV, they were significantly less likely to have HCV. Consistent with their younger age, they had been injecting for fewer years than non-MA injectors. They injected heroin significantly less than non-MA injectors. They were significantly more likely to share needles, but equally likely to share them without cleaning them. With regard to sex risks, they were substantially more likely to have unprotected vaginal sex, unprotected anal sex, and multiple sex partners.

The variables in Table 1 were entered into a logistic regression model, with the exception of shared needles without cleaning and the variables indicating times injected individual drugs, to avoid multicollinearity with other variables in the model. The variables for ethnicity was collapsed into white and non-white. Also variables for knowledge of HIV and HCV status and homelessness were omitted in the logistic regression due to missing data. Variables included in the final model, in the order in which they entered the model, were: younger age (OR = 1.04, CI = 1.02-1.07, $p = .001$), unprotected vaginal sex (OR = 2.51, CI = 1.56-4.04, $p < .001$), white ethnicity (OR = 2.66, CI = 1.55-4.55, $p < .001$) and gay, bisexual, or lesbian orientation (OR = 2.11, CI = 1.16-3.82, $p = .014$).

Discussion

Injection of MA is a growing issue that is slowly moving eastward, across the United States. In the past decade, both the production of MA and its use have increased nationwide (SAMSHA 2007a; U.S. Department of Justice 2007; Lineberry and Bostwick, 2006). Rural areas and predominantly western states have been disproportionately affected by MA distribution and use, according to the National Survey on Drug Use and Health [NSDUH] as well as other surveys (Lineberry and Bostwick, 2006; SAMHSA, 2007a). This may be due to the fact that rural areas provide relative isolation, which may make it easier to make MA without detection. Amphetamine use in the United States originated in Hawaii in the 1950s and was succeeded by a conversion to the liquid form of methamphetamine in the 1960s (Anglin, Burke, Perrochet, Stamper, and Dawud-Noursi, 2000). As evidenced by recent national surveys, it is a formidable drug problem in this country with at least ten million people in the United States reporting trying MA at least once in their lifetime (NIDA, 2006). In 2005, the NSDUH reported that 1.3 million people 12 years of age or older had used MA in the past year, with approximately 43% of them being female (SAMHSA, 2007b). Examination of predictors of MA injection may help public health and treatment professionals develop effective strategies to prevent the use of MA and then to deal with getting people clean from MA once they are using it.

In comparing MA to non-MA injectors, we found MA injectors to be younger, more likely to be white and to have more education than non-MA injectors. This demographic, as well as the finding in our study that MA injectors were more likely to report being gay/lesbian or bisexual

than non-MA IDUs, mirrors the national profile of MA users. Having this information allows us to target intervention and prevention efforts to the most vulnerable segments of the population before they contract HIV or HCV.

Although these demographic characteristics are not surprising, some of the injection and sex-related risk behaviors are. First, more non-MA IDUs were told that they had HCV, which makes sense for an older population who have been injecting for a significantly longer period of time. However, MA injectors report more risk behaviors, such as sharing needles, having unprotected sex and multiple sex partners, indicating that they are at higher risk for contracting HIV and HCV. Because these MA users are younger, it is possible that interventions might prevent transmission of HCV and HIV.

MA users are known to take more sex-related HIV risks, and with the additional burden of HCV transmission for injectors, it is important that the prevention messages get into the MA community. Other studies have shown that while MA and heroin users may know well what the risks are, they fail to take precautions when high or needing to get high (Zule and Desmond, 1999). This points to the vulnerability of the population, even with high knowledge, to transmission of infectious diseases.

There are limitations to these findings. The recruitment of the study population used a targeted sampling plan, an approach that is less rigorous than a random sample. However, prior research has supported it as an appropriate technique for IDU recruitment (Watters and Biernacki, 1989; Booth, 1995). Generalizability, however, is not assured for all populations of IDUs due to the lack of randomness in sampling procedures. Another limitation is that all risk-related behaviors and background information collected were based on self-report, which could lead subjects to respond with socially desirable answers (Latkin, Vlahov, and Anthony, 1993). Having respondents use computer-assisted self-interview techniques minimized this bias, as this method of interviewing has been shown to encourage more accurate reporting of HIV risk behavior, as well as to increase reporting of drug use (Des Jarlais, Paone, Milliken, Turner, Miller, Gribble et al., 1999; Lessler, Caspar, Penne, and Barker, 2000). Additionally, self-report has been found to produce valid data for research among IDUs (Shillington, Cottler, Mager, and Compton III, 1995). To improve the validity in drug use reporting, drug use was confirmed by urinalysis. This behavioral research provides no direct benefit to the subject, except for the monetary compensation that they receive for their time as research subjects; however most clients report that they want to help other drug users and that is why they are participating in the research.

Due to the burgeoning MA use in the United States and worldwide, in addition to the risks that it carries for infectious disease transmission, researchers need to examine behavioral clues of individuals who use MA in order to determine prevention and treatment solutions. This study examines how we can identify certain segments of the population to then find ways to target them for prevention of HIV risk behavior and eventually reduction of MA use. More research is needed on how to assist MA users in reducing risk, which may include injection and sex-related behavior as well as reduction of MA use altogether. Future studies will examine this further.

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Biographies

Karen F. Corsi, Sc.D., M.P.H., is an Assistant Professor of Psychiatry at the University of Colorado School of Medicine. She has served as Principal Investigator on NIDA-and SAMHSA-funded HIV prevention studies among drug users in Denver, CO. She has several published papers and has presented at local and national conferences. Her research interests include HIV prevention among IDUs, public health, and methamphetamine use.

Carol F. Kwiatkowski received her Ph. D., in Experimental Psychology in 1995. She has over 10 years of experience in statistical analysis and study design. Until 2006 she was an assistant professor at the University of Colorado School of Medicine, where she published numerous peer-reviewed journal articles on behavioral interventions for AIDS prevention. Her interests include statistical analysis and health services research.

Robert E. Booth, Ph.D., a social psychologist, is a Professor of Psychiatry at the University of Colorado School of Medicine. For more than 30 years Dr. Booth has devoted his career to evaluating the effectiveness of interventions designed to address various social problems. For the last 20 years this work has focused on interventions to prevent the spread of HIV among drug users. He is widely published in this area. He has served on NIDA review study sections for more than 19 years and from 1998-2002 was a member of the Office of AIDS Research Advisory Council. Since 1999, he has worked with injection drug users in Ukraine, where he currently is conducting research to prevent the spread of HIV among drug injectors in Kiev, Donetsk, and Odessa.

Glossary

Helsinki Declaration of 1975, The Declaration of Helsinki was developed by the World Medical Association (WMA) as a set of ethical principles for the medical community regarding human experimentation. It is widely regarded as the cornerstone document of human research ethics.; Hepatitis C, Hepatitis C is a disease of the liver caused by the hepatitis C virus (HCV). People at risk for hepatitis C may have experienced and of the following: (1) received blood from a donor who later tested positive for hepatitis C; (2) have ever injected illegal drugs; (3.) received a blood transfusion or solid organ transplant before July, 1992; (4) was a recipient of clotting factor(s) made before 1987; (5) have ever been on long-term kidney dialysis, and/or (6) have evidence of liver disease.; HIV, Human immunodeficiency virus (HIV) is a retrovirus that can lead to acquired immunodeficiency syndrome (AIDS), a condition in humans in which the immune system begins to fail, leading to life-threatening opportunistic infections. Infection with HIV occurs by the transfer of blood, semen, vaginal fluid, pre-ejaculate, or breast milk.; HIV-related risk behaviors, HIV-related risk behaviors include: unprotected sexual intercourse, injection drug use, sharing of injection equipment (including needles and paraphernalia), use of crack cocaine, and sex with an injection drug user.; Ice, Methamphetamine hydrochloride, clear chunky crystals resembling ice, which can be inhaled by smoking, is referred to as “ice,” “crystal,” “glass,” and “tina.”; Institutional Review Board (IRB), An institutional review board (also known as ethical review board), is a group that has been formally designated to approve, monitor, and review biomedical and behavioral research involving humans with the aim to protect the rights and welfare of the subjects. An IRB performs critical oversight functions for research conducted on human subjects that are scientific, ethical, and regulatory.; Methamphetamine, Methamphetamine, popularly shortened to meth or ice, is a psychostimulant and drug. It is also used illegally for weight loss and to maintain alertness, focus, motivation, and mental clarity for extended periods of time, and for recreational purposes. “Crystal meth” refers to the crystalline, smokeable form of the drug and is not used for the drug in pill or powdered form..

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Table 1

Logistic regression predicting MA injection

Variable	Adjusted Odds Ratio (AOR)	Confidence Interval (CI)	p-value
Younger age	1.04	1.02-1.07	$p = .001$
Unprotected vaginal sex	2.51	1.56-4.04	$p < .001$
White ethnicity	2.66	1.55-4.55	$p < .001$
Gay, bisexual, or lesbian	2.11	1.16-3.82	$p = .014$

Table 2

Description of total sample and comparison of MA versus non-MA injectors

Variable ¹	Total sample (n = 439)	MA injectors (n = 122)	Non-MA injectors (n = 317)	Test statistic MA versus non-MA
Age	42.0 (10.6)	37.5 (9.7)	43.7 (10.4)	$t = 5.70^{***}$
Female	27.8%	32.8%	25.9%	$X^2 = 2.10$
Ethnicity			49.8%	$X^2 = 33.85^{***}$
White	57.6%	77.9%	25.6%	
Hispanic	21.6%	11.5%	14.8%	
African-American	11.2%	1.6%	9.8%	
Other	9.6%	9.0%		
Education				$X^2 = 6.12^*$
Less than high school	21.9%	18.9%	23.1%	
High school graduate/GED	47.5%	41.8%	49.7%	
Post-high school	30.6%	39.3%	27.2%	
Gay/lesbian/bisexual	14.9%	25.4%	10.9%	$X^2 = 14.62^{***}$
Homeless	68.8%	60.7%	72.3%	$X^2 = 3.68$
Ever-told HIV positive	4.9%	5.3%	4.7%	$X^2 = 0.70$
Ever-told HCV positive	62.5%	50.0%	67.0%	$X^2 = 9.23^{**}$
No. of years injecting	21.0 (11.8)	16.4 (11.3)	22.8 (11.6)	$t = 5.19^{***}$
Times injected	95.5 (87.6)	92.4 (93.6)	96.7 (85.3)	$t = 0.46$
Times injected amphetamine.	6.1 (17.2)	21.8 (50.4)	0	na
Times injected cocaine	22.9 (50.8)	25.6 (51.8)	21.9 (50.4)	$t = 0.70$
Times injected heroin	50.7 (54.5)	32.8 (50.9)	57.6 (54.4)	$t = 4.36^{***}$
Shared needles	45.0%	57.4%	40.1%	$X^2 = 10.51^{**}$
Shared needles without cleaning	14.9%	18.8%	13.4%	$X^2 = 1.99$
Shared other paraphernalia	68.3%	68.6%	68.2%	$X^2 = 0.01$
Shared drug solution	68.0%	68.6%	67.8%	$X^2 = 17.88$
Had unprotected vaginal sex	39.8%	55.8%	33.6%	$X^2 = 0.03^{***}$
Had unprotected anal sex	6.6%	13.9%	3.6%	$X^2 = 15.17^{***}$
Had multiple sex partners	15.9%	23.8%	12.8%	$X^2 = 7.85^{**}$

¹ Note. Mean (standard deviation) or %.* $p < .05$;** $p < .01$;*** $p < .001$.