

HIV-Associated Medical, Behavioral, and Psychiatric Characteristics of Treatment-Seeking, Methamphetamine-Dependent Men Who Have Sex with Men

James A. Peck, PsyD
Steven Shoptaw, PhD
Erin Rotheram-Fuller, MA
Cathy J. Reback, PhD
Bernard Bierman, MD

ABSTRACT. This paper examines medical and psychiatric symptoms and disorders associated with reported HIV serostatus among methamphetamine-dependent, treatment-seeking men who have sex with men (MSM) in Los Angeles. Baseline data from a NIDA-funded, randomized

James A. Peck, Steven Shoptaw, Erin Rotheram-Fuller, Cathy J. Reback, and Bernard Bierman are affiliated with the Friends Research Institute, Los Angeles, CA and the Integrated Substance Abuse Programs, Department of Psychiatry and Biobehavioral Sciences, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, CA. Cathy J. Reback is also affiliated with Van Ness Recovery House Prevention Division, Los Angeles, CA.

Address correspondence to: James A. Peck, PsyD, 11075 Santa Monica Boulevard, Suite 200, Los Angeles, CA 90025 (E-mail: jpeck@mednet.ucla.edu).

This study was supported by a grant from the National Institute on Drug Abuse (R01 DA 11031) through Friends Research Institute (Principal Investigator: Steven Shoptaw, PhD). The first author gratefully acknowledges the support of a NIDA/NRSA postdoctoral fellowship. The authors also gratefully acknowledge the participation of their community partner, the Van Ness Recovery House and its Prevention Division (Director: Cathy J. Reback, PhD), as well as the men who engaged in treatment at their clinic and consented to participate in research.

Journal of Addictive Diseases, Vol. 24(3) 2005
Available online at <http://www.haworthpress.com/web/JAD>
© 2005 by The Haworth Press, Inc. All rights reserved.
doi:10.1300/J069v24n03_10

clinical trial of behavioral drug abuse therapies included medical examinations and behavioral interviews of the 162 randomized participants. Variables identified as significantly associated with HIV infection were entered into a multivariate, hierarchical logistic regression analysis to optimally predict HIV serostatus. The disturbingly high 61% of the sample with reported HIV-seropositive status represents 3-4 times the prevalence for all MSM in Los Angeles County. HIV infection status strongly associated with prior treatment for methamphetamine dependence; unprotected receptive anal intercourse; history of sexually transmitted infections; and health insurance status. Findings demonstrate the powerful connection between methamphetamine dependence and HIV infection, and strongly suggest a need for development of interventions that function as both substance abuse treatment and HIV prevention for this population. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2005 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. HIV, AIDS, methamphetamine, sexual risk behaviors, MSM, substance abuse

INTRODUCTION

By all indicators, methamphetamine use in California rose dramatically through the 1990s¹ and has remained consistent.² In Los Angeles County these indicators included: (1) a 60% increase in patients presenting for methamphetamine treatment from 1995-2000;³ (2) a 60% increase in emergency room admissions due to methamphetamine from 1998-2000;⁴ and (3) a 300% increase in methamphetamine lab seizures between 1992 and 1999.⁵

In this same period, researchers noted methamphetamine as a popular street drug used recreationally among urban non-treatment seeking men who have sex with men (MSM; a descriptive behavioral term that avoids cultural connotations conveyed by labels of gay, bisexual, or homosexual. While some reports cited in this paper use the term “gay or bisexual men,” we utilize MSM throughout to avoid confusion), particularly on the West Coast.⁶⁻⁹ Data from the Urban Men’s Health Study indicate that 11.2% of MSM in Los Angeles and 13.3% of MSM in San Francisco endorsed use of methamphetamine in the past 6 months.¹⁰ Two separate studies report that more than a third of attendees of circuit

parties, a dance party phenomenon unique to MSM, in major North American cities indicate methamphetamine use^{6,7}—a rate fifteen times greater than that of the general population.² There are no indications of abatement. Among over 4,000 substance-using MSM contacted via a street-based HIV prevention program conducted in the Hollywood area by our community partner (the Van Ness Recovery House and its Prevention Division), the percent of MSM reporting methamphetamine use in the previous 30 days remained consistent from 1996 (37%) to 2000 (33%) [VNPDP unpublished data].

Used extensively during World War II as a psychostimulant, amphetamines have a long history of licit use for medical indications, including attention deficit disorder, obesity, and narcolepsy. The side effect profile for using prescribed amphetamines is well characterized and includes loss of appetite (22%), insomnia (17%), abdominal pain (14%), emotional lability (9%), and nervousness (6%).¹¹ These side effects are common for patients taking the prescribed dose, which contrasts with the typical doses of varying purity of amphetamines ingested by illicit users (range: 250-500 mg/day) and that can escalate to a full gram or more per day during a binge. Short-term, low-to-moderate doses of methamphetamine used illicitly generates numerous and common medical effects including increased energy, decreased appetite, euphoria, psychomotor agitation, and for many, a sense of heightened sexuality and interest in pursuing sexual activities.^{12,13}

Occasional use of methamphetamine induces common central nervous system effects that include insomnia, irritability, tremors, and hyperthermia.¹² Regular methamphetamine use causes effects on the cardiovascular system that include increased heart rate and blood pressure, tachycardia, and dysrhythmia.¹³ Methamphetamine can cause damage to the respiratory system that may manifest initially as increased respiration rate but may escalate to pulmonary edema and pulmonary hypertension as lung capacity is gradually reduced with prolonged use; this appears to occur more frequently when the drug is smoked.¹⁴ Less frequent consequences of acute methamphetamine intoxication or overdose are severe hyperthermia and convulsions,¹² rhabdomyolysis leading to acute renal failure,¹⁵ ischemic episodes including stroke,^{16,17} and myocardial infarction.¹⁴

There are numerous neurological and psychological consequences of both incidental and chronic methamphetamine use. The pleasant experiences associated with occasional use (euphoria, behavioral disinhibition, and goal-directed behavior) change as use increases. Chronic users become anxious, hypervigilant, paranoid, and sometimes experi-

ence persecutory delusions that are indistinguishable acutely from paranoid schizophrenia.¹⁸ Tactile hallucinations are also common. When coming down from a methamphetamine “run” users typically experience both subjective and physiological depression that includes severe anhedonia, hypersomnia, and often hyperphagia.

One serious medical correlate of methamphetamine use among MSM is HIV infection, primarily through drug-associated sexual risk behaviors. MSM interviewed in epidemiological surveys who report use of stimulants, particularly methamphetamine, are at statistically significantly higher risk for HIV infection.¹⁹⁻²¹ Drug-injecting MSM, particularly those who inject amphetamines, are at extreme risk.²²

This report examines the medical and psychiatric characteristics of chronic and severe levels of methamphetamine use in a sample of treatment-seeking MSM at baseline of a behavioral methamphetamine dependence treatment research study. We predicted that the medical characteristics of methamphetamine dependence would be expressed primarily by high rates of HIV infection, and that HIV-infected participants would report more medical and psychiatric symptoms than HIV-uninfected participants. To better characterize the relative health threats associated with methamphetamine dependence, we assessed the predictive value of various risk behaviors in this extremely vulnerable population.

METHODS

Participants

A total of 263 men responded to outreach efforts in the Hollywood and West Hollywood areas of Los Angeles and provided voluntary informed consent. Of these potential participants, 162 met all inclusion criteria and were enrolled in an outpatient treatment research project funded by the National Institute on Drug Abuse for MSM who met DSM-IV²³ criteria for methamphetamine abuse or dependence. Participants were required to be: seeking treatment for current methamphetamine abuse or dependence (verified with the Structured Clinical Inventory for DSM-IV²⁴); and willing to participate in the research protocol. Participant demographics, baseline drug use, and HIV-related sexual risk behaviors by reported HIV infection status are presented in Table 1.

TABLE 1. Baseline Demographic, Drug Use, and Sexual Risk Characteristics of 162 Randomized Participants by Reported HIV Serostatus

Variable	HIV-infected (n = 98) Mean (SD) or %	HIV-uninfected (n = 64) Mean (SD) or %	Total sample Mean (SD) or %
Mean age (years)	37.5 (SD = 6.0)	35.4 (SD = 6.8)	36.6 (SD = 6.4)
Education (%)			
At least high school	96.0	95.3	95.7
At least 4-year degree	35.6	48.6	41.0
Ethnicity (%)			
Caucasian	79.6	79.7	79.6
Hispanic	14.3	10.9	12.9
African-American	3.1	3.1	3.1
Asian-American	2.0	4.7	3.1
Native American	1.0	1.6	1.2
Reported drug use behaviors, base- line			
Lifetime methamphetamine use (years)	9.0 (SD = 6.1)	7.3 (SD = 5.6)	8.34 (SD = 5.9)
Lifetime heavy methamphetamine use (years)	3.7 (SD = 4.3)	3.0 (SD = 3.7)	3.4 (SD = 4.1)
Number of other drugs used	2.1 (SD = 1.4)	2.5 (SD = 1.2)	2.3 (SD = 1.4)
Lifetime injection methamphetamine use (%)	37.8	23.4	32.1
Methamphetamine use (times in past 30 days)	9.0 (SD = 7.4)	10.5 (SD = 7.4)	9.6 (SD = 7.4)
\$ spent on methamphetamine (past 30 days)	\$264 (SD = 311)	\$339 (SD = 506)	293.33 (SD = 398)
Sexual risk behaviors			
Sexual partners (# in past 30 days)	11.3 (SD = 24.3)	7.7 (SD = 14.3)	9.9 (SD = 20.9)
Sexual partners (# in past 6 months)	49.4 (SD = 84.0)	36.4 (SD = 68.6)	44.3 (SD = 78.3)
Sex in public place (% in past 30 days)	49.0	35.9	43.8
Unprotected receptive anal intercourse (URAI) with other than primary partner (% in past 30 days)*	48.0	21.9	37.7
URAI that took place while high on methamphetamine (%)	80.9	92.9	83.6
Unprotected insertive anal intercourse (UIAI) with other than primary partner (% in past 30 days)	37.8	35.9	37.0
UIAI that took place while high on methamphetamine (%)	86.5	78.3	83.3

TABLE 1 (continued)

Variable	HIV-infected (n = 98) Mean (SD) or %	HIV-uninfected (n = 64) Mean (SD) or %	Total sample Mean (SD) or %
ASI composite scores (mean score)			
Medical status**	0.37 (SD = .31)	0.23 (SD = .32)	0.32 (SD = .32)
Employment/Support status	0.41 (SD = .28)	0.42 (SD = .29)	0.42 (SD = .28)
Alcohol use	0.08 (SD = .10)	0.10 (SD = .13)	0.09 (SD = .11)
Drug use	0.22 (SD = .08)	0.21 (SD = .08)	0.21 (SD = .08)
Legal status	0.10 (SD = .18)	0.14 (SD = .20)	0.11 (SD = .19)
Family/Social relationships	0.18 (SD = .16)	0.21 (SD = .19)	0.19 (SD = .17)
Psychiatric status	0.34 (SD = .21)	0.28 (SD = .22)	0.32 (SD = .21)

* $\chi^2(1) = 11.22, p = .001$

** $F(1,160) = 8.55, p = .004$

Procedures

The Friends Research Institute West Coast IRB oversaw all research activities to ensure the protection of human participants. All clinical and research activities occurred at a collaborative treatment research clinic (Friends Health Center). Participants responded to a community-wide recruitment effort that targeted venues (e.g., bathhouses, sex clubs, dance clubs) and media (e.g., magazines) favored by MSM likely to use methamphetamine. Interested potential participants were scheduled for intake within 24-48 hours of their inquiry.

At the intake, study participants began an informed consent process and completed an admission form. A two-week baseline period ensued that required completion of measures that characterize this sample and that included a medical history and physical examination conducted by the fifth author. Those who met all inclusion criteria and no exclusion criteria (i.e., medical or psychiatric conditions that precluded safe study involvement, inability to comply with the research requirements, or severity of methamphetamine dependence that required intervention more intensive than outpatient treatment) were randomly assigned to one of four behavioral and cognitive-behavioral treatment conditions using an urn randomization procedure²⁵ that provided multivariate balance across conditions based on level of drug use (heavy versus light) and ethnicity (Caucasian, Hispanic, African American, other).

The four treatment conditions were: contingency management; relapse prevention group counseling; contingency management combined with the

relapse prevention group; and a specially tailored cognitive-behavioral group intervention designed to be culturally appropriate for MSM living in Los Angeles and that included exercises focused on reducing sexual risk behaviors as well as methamphetamine use. Detailed descriptions of the interventions are beyond the scope of this paper and not relevant to this characterization of the entire sample; they are available elsewhere for interested readers.²⁶ Only the 162 participants who completed the baseline period and were randomized to the 16-week intensive outpatient behavioral treatment research were included in these analyses. Ninety-five of the 162 randomized participants (58.6%) completed the full 16-week trial.

Measures

The battery of measures administered during baseline included an admission form for demographics and reported HIV status; the Structured Clinical Inventory for DSM-IV (SCID)²⁴ for psychiatric disorders; the Addiction Severity Index (ASI) for drug lifestyle behaviors; and the Behavioral Questionnaire-Amphetamine (BQA) for sexual risk behaviors.

Admission Form. This eight-page measure²⁷ collects information describing participant demographics, drug use characteristics, drug and alcohol treatment history, sexual risk behaviors, and medical and psychiatric backgrounds. It has been used to describe characteristics of substance abusers in several research reports.²⁷⁻³⁰ Additional questions included: HIV serostatus at last testing, sexual risk behaviors specific to HIV transmission, information on other sexually transmitted infections, and medical information relevant to HIV disease.

Structured Clinical Inventory for DSM-IV. The SCID,²⁴ a semi-structured clinical interview, was conducted by a trained clinician and was used to assess current and historical Axis I psychiatric disorders and Antisocial Personality Disorder.

Addiction Severity Index. The ASI³¹ is a standardized 40-minute clinical interview used in addiction research to quantify problem areas of alcohol/drug user populations. The measure has excellent inter-rater and test-retest reliability as well as discriminant and concurrent validity.³¹ Composite scales measure medical, employment, drug use, alcohol use, legal, family/social, and psychiatric functioning.

Behavioral Questionnaire-Amphetamine. This questionnaire, implemented using an interview format, gathered information on HIV-related drug and sexual risk behaviors for methamphetamine users.³²

Data Analysis

Prior to analysis, we evaluated the distribution of interval level variables and where significant deviations from a normal distribution were observed, collapsed them into categorical variables. Missing data were handled by casewise deletion. This approach was chosen over imputation methods so as to not overemphasize central tendency. Differences between HIV-infected and -uninfected participants along categorical variables were analyzed using chi-square tests. Interval level variables were analyzed using t-tests. Univariate analyses assumed an alpha level of $p < 0.05$. A logistic regression was utilized to examine the relationship between time since HIV seroconversion and reported HIV-related medical symptoms. Variables that significantly associated with HIV infection using univariate analyses were included in a hierarchical logistic regression equation, using a forward-entry procedure that advanced the most significant predictor of HIV serostatus first, then the next strongest significant predictor, until no significant predictors remained. Odds ratios and 95% confidence intervals were included to demonstrate the predictive associations between these variables and HIV serostatus.

RESULTS

HIV and Other Sexually Transmitted Infections

Our findings document that the most prevalent medical condition associated with methamphetamine dependence in this sample of treatment-seeking MSM was HIV infection. Specifically, 61% of the sample reported HIV infection (because these were self-reports of HIV status, we use the terms “infected” and “uninfected” rather than “seropositive” and “seronegative”). Of these, the majority (74.5%) reported they were currently receiving medications for HIV including 28.6% on anti-retrovirals alone, 9.2% on protease inhibitors alone, and 36.7% on combination (HAART) therapy. Fully one-quarter (25.5%) of those reporting HIV infection stated that they were not taking HIV medications or refused to discuss their status regarding HIV medications with the physician.

Consistent with our earlier report,³³ HIV-infected participants reported significantly more lifetime sexually transmitted infections, including genital warts, genital gonorrhea, syphilis, and Hepatitis B, than

HIV-uninfected participants ($M_{\text{HIV}+} = 2.3$, $SD = 1.6$; $M_{\text{HIV}-} = 1.4$, $SD = 1.3$; $t(160) = 4.04$, $p < .001$). HIV-infected participants were more than twice as likely (48.0% vs. 21.9%) as their HIV-uninfected peers to report unprotected receptive anal intercourse (URAI) in the 30 days prior to intake ($\chi^2(1) = 11.22$, $p = .001$). By contrast, HIV-uninfected participants were significantly more likely (50.8% vs. 29.6%) to report lacking health insurance ($\chi^2(1) = 7.33$, $p = .007$) as those with HIV. As one might expect, medical histories of HIV-infected participants showed significantly more medical problems than HIV-non-infected participants, particularly in systems such as genitourinary, gastrointestinal, hematological, and head, ear, eye, nose, and throat (HEENT; Table 2).

Severity of Medical Problems

Not surprisingly, a significantly higher percentage (58.2% vs. 39.1%) of the participants reporting HIV infection reported being bothered by medical problems in the 30 days prior to treatment admission ($\chi^2(1) = 5.65$, $p = .017$) and also indicated more severe levels of medical problems as indicated by the medical composite scale of the ASI. During the 16-week intervention period, a total of 14 participants (8.6% of the sample) reported serious adverse events that required overnight hospitaliza-

TABLE 2. Reported Medical History Problems by Reported HIV Serostatus at Baseline Medical Exam

Medical system	HIV serostatus		Statistic
	Infected (n = 93) % (n)	Non-infected (n = 51) % (n)	
Genitourinary (e.g., herpes)	64.5 (60)	32.7 (17)	$\chi^2(1) = 13.56$, $p < .001$
Gastrointestinal (e.g., diarrhea)	62.4 (58)	42.3 (22)	$\chi^2(1) = 5.43$, $p = .020$
HEENT (e.g., CMV)	40.9 (38)	21.2 (11)	$\chi^2(1) = 5.79$, $p = .016$
Hematological (e.g., thrombocytopenia)	18.2 (8)	0.0 (0)	$\chi^2(1) = 5.53$, $p = .019$
Respiratory (e.g., pneumonia)	26.9 (25)	13.5 (7)	n.s.
Dermatological (e.g., folliculitis)	39.8 (37)	26.9 (14)	n.s.
Psychiatric (e.g., depression)	63.0 (58)	50.0 (26)	n.s.
Endocrinological (e.g., hypothyroidism)	6.5 (6)	9.6 (5)	n.s.
Cardiovascular (e.g., hypertension)	15.1 (14)	19.2 (10)	n.s.
Neurological (e.g., neuropathy)	11.8 (11)	15.4 (8)	n.s.
Musculoskeletal (e.g., back pain)	29.0 (27)	25.0 (13)	n.s.

tion. Origins of these hospitalizations were equally likely to be due to severe problems from methamphetamine abuse ($n = 6$; cardiovascular spasms, chest pains, worsening methamphetamine use) as to general medical conditions ($n = 6$; hemorrhoid surgery; knee surgery) that developed during the period. Only 2 hospitalizations were due to HIV infection (lung infection, diverticulitis).

Severity of Drug Dependence

Most participants reported chronic and severe levels of methamphetamine use with the overwhelming majority (93.7%) meeting criteria for the diagnosis of dependence rather than abuse. Of interest, reports of HIV infection corresponded closely with severity of drug dependence as indicated by nearly 2.5 times more HIV-infected participants (51.1%) reporting prior methamphetamine treatment episodes as HIV-uninfected participants (18.3%; $\chi^2(1) = 16.04, p < .001$). HIV-infected participants were nearly twice as likely (49.0% vs. 28.1%) to meet criteria for dependence (lifetime) for at least one substance other than methamphetamine or alcohol ($\chi^2(1) = 6.50, p = .011$). There was a trend that approached significance with HIV-infected participants (37.8%) more likely to report injection use of methamphetamine than HIV non-infected participants (23.4%; $\chi^2(1) = 3.64, p = .056$).

Characteristics of Injection Users

Reflecting the internal validity of drug dependence markers, those admitting injection use were significantly more likely to report prior treatment for methamphetamine (50.0%) than non-IDU's (33.0%; $\chi^2(1) = 4.28, p = .039$). Injection users also reported longer lifetime use of methamphetamine ($M_{\text{IDU}} = 6.44$ years, $SD = 5.55$; $M_{\text{non-IDU}} = 4.36$ years, $SD = 4.68$; $t(160) = -2.48, p = .014$) and significantly longer histories of heavy use of methamphetamine than non-injection users ($M_{\text{IDU}} = 4.87$ years, $SD = 5.94$; $M_{\text{non-IDU}} = 2.67$ years, $SD = 2.43$; $t(155) = -3.29, p = .001$). While injection users ($M_{\text{IDU}} = 2.54$ STI's, $SD = 1.64$) reported histories of more sexually transmitted infections than non-injection users ($M_{\text{non-IDU}} = 1.65$ STI's, $SD = 1.39$; $t(160) = -3.61, p < .001$), they were equally likely to engage in sexual risk behaviors in the 30 days prior to study admission as measured by any unprotected anal intercourse or sex in public places such as a bathhouse.

Psychiatric Characteristics

Several psychiatric differences were detected between HIV-infected and -uninfected participants (Table 3). Participants with HIV infection were significantly more likely to meet criteria for current and lifetime

TABLE 3. Psychiatric Diagnostic Impressions by Reported HIV Serostatus at Baseline

	Self-reported HIV-infected (n=98)	Self-reported HIV non-infected (n=57)	Total
Methamphetamine dependence diagnosis			
Current	Dependence 96.9%	Dependence 98.2%	Dependence 97.4%
Participants with any Axis I diagnosis, excluding substance abuse or dependence			
Current	34.7%	24.6%	31.0%
Lifetime	50.0%	43.9%	47.7%
Participants with any Mood Disorder			
Current	28.6%	28.1%	28.4%
Lifetime	55.1%	47.4%	52.3%
Participants with Bipolar I Disorder			
Current	4.1%	0.0%	2.6%
Lifetime*	7.1%	0.0%	4.5%
Participants with any Anxiety Disorder			
Current**	24.5%	8.8%	18.7%
Lifetime***	34.7%	17.5%	28.4%
Percent of participants with any substance-induced disorder, excluding substance abuse and dependence			
Current	20.4%	19.3%	20.0%
Lifetime	44.9%	35.1%	41.3%
Percent of participants with alcohol dependence or abuse diagnosis			
Current	11.2%	10.5%	11.0%
Lifetime	63.3%	63.2%	63.2%
Percent of participants with Substance Dependence diagnoses other than Amphetamine and Alcohol Dependence			
Current	15.3%	8.8%	12.9%
Lifetime****	49.0%	28.1%	41.3%
Percent of participants with Antisocial Personality Disorder			
Met criteria	15.5%	12.3%	14.3%

Note: a total of 7 HIV-uninfected participants failed to complete the SCID

* $\chi^2(1) = 4.26, p = .039$

** $\chi^2(1) = 5.85, p = .016$

*** $\chi^2(1) = 5.21, p = .022$

**** $\chi^2(1) = 6.50, p = .011$

diagnoses of anxiety disorders than those not reporting HIV infection. Moreover, all of the participants meeting lifetime criteria for bipolar I disorder were HIV-infected. Although not statistically significant, nearly twice as many HIV-infected participants (29.6% vs. 17.5%; $\chi^2 (1) = 3.02$, $p = .082$) reported a previous suicide attempt as HIV-uninfected participants. By contrast, HIV-uninfected participants were almost 4 times more likely to endorse current suicidal or homicidal ideation (19.7%) as HIV-infected participants (5.1%; $\chi^2 (1) = 8.50$, $p = .004$).

In order to characterize the relative strength of the associations with HIV status of variables identified as being statistically significant univariate predictors of HIV status in this sample, we conducted a logistic regression analysis. Table 4 provides the odds ratios and confidence intervals for those variables that remained significant predictors of HIV infection. This process winnowed the psychiatric variables from the significant predictors and yielded a hit rate of 73.58% in predicting HIV status, correctly predicting 81.44% of HIV-infected cases and 61.29% of HIV-uninfected cases.

DISCUSSION

HIV and Other Sexually Transmitted Infections

The primary medical correlate of methamphetamine dependence in this sample of treatment-seeking MSM at admission to a clinical research trial was HIV infection. By the time these men sought outpatient treatment at this research site, fully 61% reported being HIV-infected, which contrasts with a background HIV prevalence of 15%-20% for MSM who live in Los Angeles County.^{34,35} Of interest, multiple markers of length of heavy use of methamphetamine positively corresponded

TABLE 4. Logistic Regression Equation for Univariate Predictors of HIV Serostatus

Variable	β	SE	Wald	OR	95% CI	Sig.
Prior methamphetamine treatment	1.5	0.4	11.8	4.3	1.9, 10.0	.0006
Unprotected receptive anal intercourse	1.3	0.4	8.0	3.5	1.5, 8.3	.0046
History of sexually transmitted diseases	0.4	0.1	8.0	1.5	1.1, 2.0	.0047
Suicidal/homicidal ideation at admission	1.9	0.7	7.6	6.5	1.7, 24.4	.0057
Health insurance status	1.1	0.4	7.5	3.0	1.4, 6.7	.0060

with HIV infection even among those in this sample who were using the drug at chronic and high levels at baseline. Implications to these data are clear: HIV-uninfected MSM who use methamphetamine at levels representing dependence are at exceptionally high risk for HIV infection. Their peers who are already HIV-infected frequently engage in sexual risk behaviors that efficiently transmit the virus. Both HIV-infected and -uninfected MSM with methamphetamine dependence are groups whose behaviors, if not addressed, could well lead to a resurgence of the HIV/AIDS epidemic,³⁶ and as such, deserve special attention toward intervention. Given the efficiency with which substance abuse treatment reduces HIV-related risk behaviors among MSM,^{10,37} it seems clear that such treatment should be considered a means of primary prevention for HIV and other sexually transmitted infections in this group.

Compared to their uninfected peers, the medical histories observed in the methamphetamine-dependent MSM who were living with HIV infection showed frequent and high rates of other sexually transmitted infections. While there was a weak positive association between injection drug behaviors and HIV infection, the association between HIV infection and report of sexual risk behaviors was much stronger, indicating the nature of the epidemic in this population. More similar to heterosexual samples³⁸ than to prior reports of injection drug use in MSM samples,³⁷ injection behavior in our sample marked the severity of methamphetamine dependence and corresponded strongly with reported length of methamphetamine use, rather than with HIV infection.

The quantity and severity of reported medical problems in the histories of the HIV-infected men (i.e., gastrointestinal, HEENT, and hematological) likely reflected expected medical conditions associated with HIV infection and (at least in part) side effects of medical treatments for HIV. In contrast to other reports of medical care utilized by heterosexual cocaine abusers with HIV infection,³⁹ nearly all of the HIV-infected men in this sample accessed medical care provided for those living with HIV. Moreover, only a minority of participants (25%) refused HIV medications during episodes of methamphetamine use. Independent of whether individuals informed their physicians about their drug problem or whether methamphetamine use introduced problems with compliance, the vast majority of HIV-infected individuals in our sample presented for treatment having been recently prescribed HIV medications that ranged from antiretrovirals alone to HAART.

Medical Problems During Drug Abuse Treatment

Despite differences in medical histories by HIV infection, observed acute and serious medical problems during behavioral treatment for methamphetamine dependence were largely unrelated to HIV. The severity of the methamphetamine problem in this sample is highlighted by the fact that only two participants met criteria for methamphetamine abuse vs. dependence. Nevertheless, it is startling that over the study period nearly 10% of the sample experienced an event requiring a minimum of overnight hospitalization, with three times as many serious adverse events attributable to conditions related to methamphetamine use as to HIV infection. The associational nature of these data precludes causal inference on the relative role of methamphetamine in these adverse events, however. A self-selection bias could have operated in which HIV-infected participants chose to enroll in this methamphetamine treatment research study during periods of fewer active medical problems.

Psychiatric Comorbidity

The careful assessment of psychiatric status in this sample revealed a high degree of comorbidity among these methamphetamine-dependent MSM. Prevalence of current and especially lifetime psychiatric diagnoses in this sample was higher than that observed in the US general population,⁴⁰ particularly for mood and anxiety disorders. Although psychiatric diagnoses were not retained as significant predictors of HIV infection in the multivariate logistic regression, HIV-infected men clearly presented with anxiety disorders at rates higher than men who were not infected. Moreover, all participants diagnosed with Bipolar I disorder were HIV-infected. Despite the pronounced effects of dysphoric mood in methamphetamine withdrawal, current rates of mood disorders were higher, but not substantially so, than population prevalence estimates. It is curious that the primary indicator that significantly predicted HIV-uninfected participants was the report of *current* suicidal or homicidal ideation at baseline. There may exist differing psychological factors that explain this finding. For example, HIV-infected participants may become somewhat inured to coping with threats to health due to HIV disease and methamphetamine dependence, while their uninfected peers may be relatively more sensitive to the distress imposed by consequences of heavy methamphetamine use and concomitant decisions to enter treatment. Among both infected and uninfected men, our disturb-

ingly high reported prevalence of previous suicide attempts (29.6% and 17.5%, respectively) far exceeds the less than 1% rate for the general population⁴¹ and the nearly 7-8% rate for the general population suffering from panic disorder and depressive disorders.⁴² Instead, this estimate approximates that reported in a similar-sized sample of Australian HIV-infected and uninfected MSM.⁴³ Hence, these high rates may represent an additive effect of the depressive syndrome that typically manifests during early withdrawal from methamphetamine with the mental health consequences of HIV infection in this population.

Conclusion and Limitations

We began this analysis to examine the medical and psychiatric characteristics of methamphetamine dependence in our sample of MSM. Participants generally were men who used methamphetamine heavily for several years, who initiated injection behaviors as severity of dependence progressed, and who engaged in a set of behaviors that evolved into a lifestyle featuring powerfully connected, high-risk sexual behaviors and drug use marked by multiple sexually transmitted diseases including HIV. The higher number of prior drug abuse treatment episodes and recent instances of unprotected receptive anal intercourse among the HIV-infected men speaks to the ease with which this drug insinuates itself into their lifestyle and facilitates a mode of sexual expression that is largely unavailable when not under the influence.⁸ This likely exacerbates the already difficult process of initiating and maintaining abstinence from methamphetamine use, and creates challenges for both medical and substance abuse treatment providers. Demonstrating this point, HIV-risk and methamphetamine use variables strongly combined to predict HIV infection (over 80% hit rate for HIV-infected men), while only the desire to hurt oneself or others significantly predicted being HIV-uninfected.

These data are from a large, single clinical trial in Los Angeles, and thus generalizability may be limited. Treatment-seeking methamphetamine-dependent MSM represent a unique subset of the entire population of methamphetamine users in the MSM community whose behaviors may not be representative of that population. In some cases, it was difficult to identify medical or psychiatric symptoms and issues as being primarily attributable to methamphetamine dependence, HIV infection, or a combination of the two. As well, the demands of the project to comply with thrice-weekly intensive outpatient procedures may have excluded those participants more severely medically and/or psychiatrically.

cally impaired. Another limitation to the generalizability of these data is that they were gathered using a single, cross-sectional measurement, as medical exams were conducted only at study admission. Given the importance of these findings, follow-up evaluations of these participants would provide a description of the natural history of medical and psychiatric correlates of methamphetamine dependence in this high-risk sample and an initial point in estimating the effects of behavioral methamphetamine dependence treatment as a mediating influence. Still, these data provide an important descriptive profile of this population that may prove useful for both healthcare and substance abuse treatment providers.

REFERENCES

1. Cunningham J, Thielemier M. Trends and Regional Variations in Amphetamine-Related Emergency Admissions: California, 1984-1993. Irvine: Public Statistics Institute; 1995.
2. National Institute on Drug Abuse. Community Epidemiology Work Group epidemiologic trends in drug abuse. Available at: <http://www.nida.nih.gov>. Accessed on 1/12/02.
3. Los Angeles County Health Services, Alcohol and Drug Services Administration. Available at: www.lapublichealth.org/adpa/index.html. Accessed on 12/04/01.
4. Drug Abuse Warning Network. The DAWN Report: Club Drugs, March 2000. Available at: <http://www.samhsa.gov/oas/clubdrugs.pdf>. Accessed on 1/12/02.
5. Attorney General's Office, State of California. A look at the growing methamphetamine drug problem. Available at: <http://caag.state.ca.us/publications>. Accessed on 12/18/2001.
6. Mattison AM, Ross MW, Wolfson T, Franklin D. Circuit Party attendance, club drug use, and unsafe sex in gay men. *J Subst Abuse*. 2001; 13: 119-126.
7. Mansergh G, Colfax G, Marks G, Rader M, Guzman R, Buchbinder S. The Circuit Party Men's Health Survey: Findings and implications for gay and bisexual men. *Am J Public Health*. 2001; 91: 953-958.
8. Reback CJ. The social construction of a gay drug: Methamphetamine use among gay and bisexual males in Los Angeles. City of Los Angeles, AIDS Coordinators Office. 1997.
9. Gorman EM, Morgan P, Lambert EY. Qualitative research considerations and other issues in the study of methamphetamine use among men who have sex with other men. *NIDA Research Monographs*. 1995; 157: 156-181.
10. Stall R, Paul JP, Greenwood G, Pollack LM, Bein E, Crosby GM, Mills TC, Binson D, Coates TJ, Catania JA. Alcohol use, drug use and alcohol-related problems among men who have sex with men: the Urban Men's Health Study. *Addiction*. 2001; 96: 1589-1601.
11. Catalytica Pharmaceuticals Inc. Adderall XR Full Prescribing Information. Available at: http://www.adderallxr.com/asset/full_prescribing_information.pdf. Accessed on 03/28/02.

12. Hoffman BB, Lefkowitz RJ. Catecholamines and sympathomimetic drugs. In: Gilman AG, Rall TW, Nies AS, Taylor P eds. Goodman and Gilman's the pharmacological basis of therapeutics, 8th edition. New York: McGraw-Hill, 1993:187-220.
13. National Institute on Drug Abuse. NIDA Notes: Facts About Methamphetamine. Available at: http://www.nida.nih.gov/NIDA_Notes/NNVol11N5/Tearoff.html. Accessed on 10/30/2001.
14. Hong R, Matsuyama E, Nur K. Cardiomyopathy associated with the smoking of crystal methamphetamine. JAMA. 1991; 265: 1152-1154.
15. Lan KC, Lin YF, Yu FC, Lin CS, Chu P. Clinical manifestations and prognostic features of acute methamphetamine intoxication. J Formos Med Assoc. 1998; 97: 528-533.
16. Perez JA, Arsur EL, Strategos S. Methamphetamine-related stroke: Four cases. J Emerg Med. 1999; 17: 469-471.
17. Wang Y, Hayashi T, Chang CF, Chiang YH, Tsao LI, Su TP, Borlongan C, Lin SZ. Methamphetamine potentiates ischemia/reperfusion insults after transient middle cerebral artery ligation. Stroke. 2001; 32: 775-782.
18. Sekine Y, Iyo M, Ouchi Y, Matsunaga T, Tsukada H, Okada H, Yoshikawa E, Futatsubashi M, Takei N, Mori N. Methamphetamine-related psychiatric symptoms and reduced brain dopamine transporters studied with PET. Am J Psychiatry. 2001; 158: 1206-1214.
19. Chesney MA, Barrett DC, Stall R. Histories of substance use and risk behavior: Precursors to HIV seroconversion in homosexual men. Am J Public Health. 1998; 88: 113-116.
20. Molitor F, Truax SR, Ruiz JD, Sun RK. Association of methamphetamine use during sex with risky sexual behaviors and HIV infection among non-injection drug users. West J Med. 1998; 168: 93-97.
21. Weber AE, Chan K, George C, Hogg RS, Remis RS, Martindale S, Otis J, Miller ML, Vincelette J, Craib KJ, Masse B, Schechter MT, LeClerc R, Lavoie R, Turmel B, Parent R, Alary M. Risk factors associated with HIV infection among young gay and bisexual men in Canada. JAIDS. 2001; 28: 81-88.
22. Bluthenthal RN, Kral AH, Gee L, Lorvick J, Moore L, Seal K, Edlin BR. Trends in HIV seroprevalence and risk among gay and bisexual men who inject drugs in San Francisco, 1988 to 2000. JAIDS. 2001; 28:264-269.
23. Diagnostic and statistical manual of mental disorders DSM-IV-TR (4th ed.). Washington, DC: American Psychiatric Association, 1994.
24. Spitzer RL, Williams JB, Gibbon M, First MB. The structured clinical interview for the DSM-IV (SCID). Washington DC: American Psychiatric Press, 1995.
25. Stout RL, Wirtz PW, Carbonari JP, Del Boca FK. Ensuring balanced distribution of prognostic factors in treatment outcome research. J Stud Alcohol 1994; (Suppl)12:70-75.
26. Shoptaw S, Reback CJ, Peck J, Yang, X, Rotheram-Fuller E, Larkins S, Veniegas RC, Hucks-Ortiz C. Behavioral treatment approaches for methamphetamine dependence and HIV-related sexual risk behaviors among urban gay and bisexual men. Drug and Alcohol Dependence. 2005; 78(2): 125-134.

27. Rawson RA, Shoptaw S, Obert JL, McCann MJ, Hasson A, Marinelli-Casey P, Brethen PR, Ling W. An intensive outpatient approach for cocaine abuse treatment: The Matrix model. *J Subst Abuse Treat.* 1995; 12: 117-127.
28. Frosch D, Shoptaw S, Huber A, Rawson RA, Ling W. Sexual HIV risk among gay and bisexual male methamphetamine users. *J Subst Abuse Treat.* 1996; 13: 483-486.
29. Huber A, Ling W, Shoptaw S, Gulati V, Brethen P, Rawson, R. Integrating treatments for methamphetamine abuse: A psychosocial perspective. *J Addict Dis.* 1997; 16: 41-50.
30. Shoptaw S, Rawson RA, McCann MJ, Obert JL. The Matrix model of outpatient stimulant abuse treatment: Evidence of efficacy. *J Addict Dis.* 1994; 13: 129-141.
31. McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the Addiction Severity Index. *J Subst Abuse Treat.* 1992; 9:199-213.
32. Twitchell GR, Shoptaw S, Huber A, Reback CJ. Comparison of global and detailed behavioral HIV risk assessments among methamphetamine abusers. *AIDS Behav. AIDS and Behavior.* 2002; 6(2): 153-162.
33. Shoptaw S, Reback CJ, Freese TE. Patient characteristics, HIV serostatus, and risk behaviors among gay and bisexual males seeking treatment for methamphetamine abuse and dependence in Los Angeles. *J Addict Dis.* 2002, 21; 91-105.
34. Anderson-Mahoney PJ, Wohl A, Yu-Harlan, MS. An epidemiologic profile of HIV and AIDS in Los Angeles County. Available at: <http://lapublichealth.org/hiv/reports/epipro/2000/epipro00.pdf>. Accessed on 3/27/02.
35. Catania JA, Osmond D, Stall RD, Pollack L, Paul JP, Blower S, Binson D, Canchola JA, Mills TC, Fisher L, Choi KH, Porco T, Turner C, Blair J, Henne J, Bye LL, Coates TJ. The continuing HIV epidemic among men who have sex with men. *Am J Public Health.* 2001; 91: 907-914.
36. Halkitis PN, Parsons JT, Stirratt MJ. A double epidemic: Crystal methamphetamine drug use in relation to HIV transmission among gay men. *J Homosex.* 2001; 41: 17-35.
37. Paul JP, Barrett DC, Crosby GM, Stall RD. Longitudinal changes in alcohol and drug use among men seen at a gay-specific substance abuse treatment agency. *J Stud Alcohol.* 1996; 57: 475-485.
38. Domier CP, Simon SL, Rawson RA, Huber A, Ling W. A comparison of injecting and noninjecting methamphetamine users. *J Psychoactive Drugs.* 2000; 32: 229-232.
39. Metsch LR, Pereyra M, Brewer TH. Use of HIV health care in HIV-seropositive crack cocaine smokers and other active drug users. *J Subst Abuse.* 2001; 13: 155-167.
40. Narrow WE, Rae DS, Robins LN, Regier DA. Revised prevalence estimates of mental disorders in the United States. *Arch Gen Psychiatry.* 2002; 59: 115-123.
41. United States Mental health: a report of the surgeon general. (1999). Available at: <http://www.surgeongeneral.gov/Library/MentalHealth/home.html>. Accessed on 03/06/02.
42. Johnson J, Weissman MM, Klerman GL. Panic disorder, comorbidity, and suicide attempts. *Arch Gen Psychiatry.* 1990; 47: 805-808.
43. Kelly B, Raphael B, Judd F, Perdices M, Kernutt G, Burnett P, Dunne M, Burrows G. Suicidal ideation, suicide attempts, and HIV infection. *Psychosomatics.* 1998; 39: 405-415.