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Methamphetamine use, sexual activity, patient–provider communication, and medication adherence among HIV-infected patients in care, San Francisco 2004–2006

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While numerous studies examine methamphetamine use and associated risky sexual behaviors in HIV-uninfected individuals, few studies have surveyed HIV-infected individuals in the health care setting. To assess the frequency and trends of methamphetamine use, sexual activity, injection drug use, patient–provider communication, and medication adherence among HIV-infected persons in care, we administered a one-page anonymous survey in 2004 and 2006. The survey was conducted at the two University of California, San Francisco outpatient HIV clinics: at Moffitt Hospital (Moffitt), serving primarily privately insured patients, and at San Francisco General Hospital (SFGH), a county hospital serving primarily patients who are uninsured or publicly insured. In 2006, 39% of men who have sex with men (MSM), 33% of heterosexual men, and 11% of women reported methamphetamine use in the prior 12 months. Methamphetamine use was significantly associated with an increased number of sex partners among MSM and heterosexual men, and poor anti-retroviral medication adherence. Among MSM, methamphetamine use was more common at the SFGH clinic. Between 2004 and 2006, reported methamphetamine use in the last 12 months decreased among MSM at Moffitt (38 to 20%, $p < 0.01$), but increased at SFGH (40 to 50%, $p < 0.05$). Among methamphetamine users we found a high frequency of injection of methamphetamine, which increased at SFGH from 38 to 55%, $p < 0.05$. Patient–provider communication regarding methamphetamine use has increased from 2004 to 2006 but no significant change has been found for providers asking patients about sexual activity. Overall, we found methamphetamine use to be common among HIV-infected patients in care, and associated with an increased number of sex partners, a high frequency of injection drug use, and poor adherence to anti-retroviral medications. These findings support the need for improved screening and clinic-based interventions to reduce and treat methamphetamine abuse and associated high risk sexual behaviors.

Keywords: methamphetamine use; HIV infection; sexual behavior; injection drug use; medication adherence

Introduction

A large body of literature has established methamphetamine use among men to be associated with risky sexual behavior and an increased likelihood of HIV transmission among men who have sex with men (MSM) (Buchacz et al., 2005; Colfax et al., 2005; Greenwood et al., 2001; Hirshfield, Remien, Walavalkar, & Chiasson, 2004; Mansergh et al., 2001; Plankey et al., 2007; Stall et al., 2001; Wong, Chaw, Kent, & Klausner, 2005). Additionally, methamphetamine use is responsible for a multitude of negative health effects (Urbina & Jones, 2004), and HIV-infected individuals may be more vulnerable to the clinical sequelae of methamphetamine use than non-infected individuals (Nath, Marqagos, Avison, Shmitt, & Berger, 2001; van Gorp & Hinkin, 2005).

Fewer studies have examined methamphetamine use specifically in HIV-infected individuals. A community-based survey of MSM in San Francisco found

that in 2006, 19.9% of HIV-infected and 9% of HIV-uninfected MSM reported using methamphetamine in the last six months (Vaudrey et al., 2007). In both HIV-infected and uninfected MSM, methamphetamine use was significantly associated with high risk sexual behavior (Vaudrey et al., 2007). The EDGE study, a psychosocial intervention designed to reduce sexual risk behavior among methamphetamine using HIV-infected MSM, found a high rate of compulsivity and unprotected sex among study participants – including a high number of unprotected anal sex acts with both serodiscordant and seroconcordant partners (Semple, Patterson, & Grant 2004; Semple, Zians, Grant, & Patterson, 2006).

Our study examines sexual behavior and methamphetamine use among HIV-infected patients in the health care setting in San Francisco. The data presented in this manuscript were collected as a follow up to a survey done in 2004 at two HIV outpatient clinics in San Francisco (Mitchell, Morris,

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Kent, Stansell, & Klausner, 2006), which to our knowledge is the only other study of its kind based in the health care setting. Mitchell et al. (2006) found high rates of methamphetamine use among HIV-infected patients in care in San Francisco and an association between methamphetamine use and increased number of sexual partners.

We repeated the study in 2006 to track changes in methamphetamine use and sexual behavior between 2004 and 2006 in the setting of intensified HIV prevention programs in San Francisco targeting methamphetamine use among MSM (Vaudrey et al., 2007). This current study provided the opportunity to assess changes in patient-provider communication and changes in methamphetamine use among subgroups of patients by gender, sexual orientation, and socio-economic status all within the health care setting. We hypothesized that we would find an increase in health care providers asking about methamphetamine, in light of the recent focus on methamphetamine use in San Francisco. Assessment of subgroup specific changes of methamphetamine use and patient-provider communication can help guide future clinic and community-based interventions.

Methods

Survey methods

Between 24th January and 25th May of 2006, we systematically distributed English or Spanish versions of a one page, anonymous survey to HIV-infected patients seeking care at the University of California, San Francisco (UCSF) outpatient HIV clinics. The clinic at San Francisco General Hospital (SFGH) is based at a public hospital; SFGH hospital serves primarily uninsured and publicly insured individuals. The clinic at Moffitt is a university-hospital based clinic, serving primarily those with private insurance. In general, patients seen at SFGH are of lower socio-economic status than those at Moffitt, and SFGH serves a higher percentage of indigent and marginally housed patients. Together the UCSF clinics serve a total of 3500 HIV-infected patients; this is the largest group of HIV-infected persons in care in San Francisco.

Survey distribution methods and questions were nearly identical to the distribution in the 2004 study, described elsewhere (Mitchell et al., 2006). As in 2004, surveys were given to patients in the clinic waiting rooms and each patient was informed of the purpose of the study and that the survey was voluntary and anonymous. At SFGH patients were approached by staff from the San Francisco Department of Public

Health, and a daily tally was kept for the number of people who refused to fill out the survey and why. At Moffitt the number of patients is smaller than at SFGH, thus the front desk staff gave the survey to each patient at intake. A snack bar was given as compensation for the patient's time. The survey took most participants less than five minutes to complete. The response rate at SFGH was 77%, and non-participation was not measured at Moffitt. The most common reason for refusal to fill out the survey was "already filled the survey out."

In comparison to the 2004 survey, we made minor changes to the 2006 survey. (1) we added a question on race to the demographics section; (2) we added a question on lifetime methamphetamine use; and (3) we added a five-point scale question regarding adherence to anti-retroviral medication ("How often do you miss your HIV medication?"). Poor adherence was defined as missed anti-retroviral medication once a week or more.

Data analysis

Using STATA SE 7.0 (StataCorp, 1999), we compared two or more categorical variables, using prevalence risk ratios (PR) or frequencies with 95% confidence intervals (CI). *P* values were calculated using the Chi-square test, with $p < 0.05$ as the criterion for statistical significance. The Student's *t*-test was used to compare means and the Wilcoxon Rank Sum Test was used to compare medians. Multivariate models were created using a stepwise logistical regression analysis, removing individual variables that were no longer statistically significantly associated with the outcome at the $p < 0.05$ level. As age was independently associated with methamphetamine use, and the Moffitt 2006 MSM sample was significantly younger than the SFGH 2006 MSM population, the Moffitt 2006 MSM methamphetamine frequency of use was age standardized to the SFGH 2006 population for comparisons between the clinics.

For the analyses, four gender/orientation groups were constructed based on each respondent's gender and the gender of their sex partners: MSM (including bisexual men), transgender – male-to-female, heterosexual men, and women. A subgroup analysis comparing the 12 WSW (including bisexual women) with the 110 heterosexual women respondents revealed no significant differences between the subgroups as in 2004; thus, given the small sample size of WSW and the lack of detected difference, the WSW and heterosexual women subgroups were combined into the single category.

Analysis of the association of methamphetamine use and number of sex partners was only presented

for MSM and heterosexual men. Women were excluded as the absolute number of women who answered the question on number of sex partners and responded yes to the question on methamphetamine use in the prior four months was small ($N=7$). Data analysis for transgenders was also restricted to the frequency of methamphetamine use given the small sample size of 15.

Human subjects review

The survey was reviewed by the Centers for Disease Control and Prevention (Human Subjects Review numbers 2004-00133 and 2004-00195) and designated as non-research public health practice in accordance with the Code of Federal Regulations, Title 45, Part 46: The Public Service Act.

Results

Participation

Of the 674 surveys returned, 4% of participants indicated that they had filled out the survey before, and duplicate surveys were excluded from analysis. One percent of the surveys were excluded as less than half of the questions were completed. The total number of complete, non-duplicate surveys was 653. Of the 653 completed surveys, 70% were from SFGH and 30% were from Moffitt. The majority of the participants in 2006 and 2004 were white MSM; demographics are further described in Table 1.

Methamphetamine use, 2006

Overall, methamphetamine use was common in all gender/orientation and race/ethnicity groups (Figure 1A and B). Methamphetamine users in the preceding 12 months compared to non-users tended to be younger (median age 41 years [IQR:37–46] vs. 45 [IQR 39–52], respectively), more likely to be MSM (PR: 2.3, 95% CI = 1.6–3.3), white (PR: 2.1 95% CI: 1.5–3.0) and less likely to be on anti-retroviral medication (PR: 0.82 95% CI:0.71–0.93). Of those who used in the preceding four weeks, 61% met Substance Dependence Scale (Gossop et al., 1995) criteria for dependency. Subgroup analysis did not reveal differences in percent meeting dependency criteria. Of those who met criteria for dependency 60% had reported using methamphetamine once a week or more.

Among MSM, methamphetamine use in the past 12 months was higher at SFGH than at Moffitt (50% vs. 20%, $p < 0.001$). A significant difference between clinic sites was also seen between women: at SFGH 17% of women used methamphetamine in the prior 12 months vs. 2% of women at Moffitt ($p < 0.05$). Overall, age-adjusted methamphetamine use in the past 12 months was more common at SFGH than at Moffitt: 41% vs. 15% ($p < 0.001$).

Routes of methamphetamine use among users were diverse and varied by sexual orientation group (Figure 2). Injection methamphetamine users were more likely to receive health care at SFGH (55.2% vs.

Table 1. Characteristics of HIV-infected patients in San Francisco by survey site and year.

Clinic Site	SFGH		Moffitt		Total	
	2004	2006	2004	2006	2004	2006
Year	$N=435$ (%)	$N=454$ (%)	$N=144$ (%)	$N=189$ (%)	$N=579$ (%)	$N=653$ (%)
Age		$p=0.16$		$p=0.59$		$p=0.24$
Median (IQR)	43 (39–49)	43 (38–49)	45 (40–50)	45 (40–52)	43 (39–49)	44 (39–50)
Race/ethnicity	*		*		*	
White		225 (51)		108 (59)		333 (54)
Black		128 (30)		45 (25)		173 (28)
Latino		50 (11)		20 (11)		70 (11)
Other		32 (7)		9 (21)		41 (7)
Gender/sexual Orientation		$p=0.05$		$p=0.10$		$p=0.15$
MSM	274 (67)	279 (61)	94 (67)	129 (67)	368 (67)	408 (63)
Heterosexual Men	77 (19)	94 (20)	11 (8)	14 (7)	88 (16)	108 (17)
Women	47 (11)	77 (17)	34 (24)	45 (23)	81 (15)	122 (19)
Transgender	13 (3)	9 (2)	2 (1)	6 (3)	15 (3)	15 (3)

*Race/ethnicity was not recorded for the 2004 survey. MSM, men who have sex with men; IQR, interquartile range.

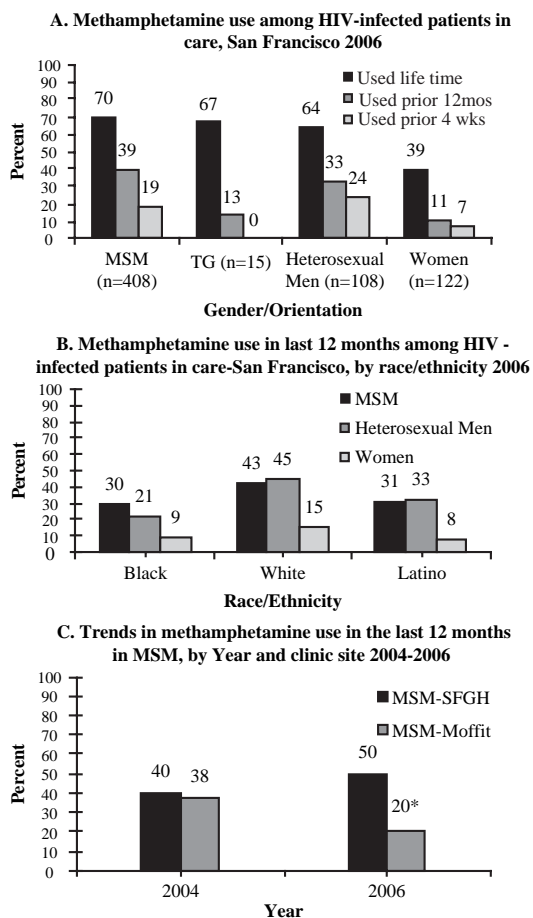


Figure 1. Characteristics of methamphetamine use. 1A: Baseline characteristics of methamphetamine use by gender/sexual orientation subgroups ($p < 0.05$ for all frequencies of use). 1B: Methamphetamine use is common throughout all race/ethnicity groups, however it significantly more common in whites across MSM ($p < 0.05$) and heterosexual men ($p < 0.05$). There was no significant difference found in methamphetamine use of women across race/ethnicity subgroups ($p = 0.29$). 1C: Methamphetamine use by clinic site in 2004 and 2006. *Value displayed is age-standardized to the SFGH 2006 population – unstandardized value for Moffitt-MSM 2006 is 16%. MSM, men who have sex with men; SFGH, San Francisco General Hospital; Moffitt, Moffitt Hospital.

33%, $p < 0.05$), and more likely to have used methamphetamine once a week or more in the last four weeks (66% vs. 42%, $p < 0.01$). Women and heterosexual men more commonly reported injecting methamphetamine than MSM, whereas MSM more commonly reported smoking, snorting, and rectally inserting than women and heterosexual men.

Methamphetamine use, 2004–2006

Overall, methamphetamine use in the preceding 12 months did not change significantly between 2004

and 2006 (35 and 32%, respectively); however, analysis by clinic site and gender/orientation showed significant changes between 2004 and 2006 (Figure 1C). Due to sample size limitations, comparison between survey years was restricted to MSM. Among MSM, methamphetamine use in the preceding 12 months has increased at SFGH by 25% ($p < 0.05$). Conversely, MSM at Moffitt show a 57% decrease ($p < 0.05$). In terms of routes of use, injection of methamphetamine increased between 2004 and 2006, with 34% of MSM methamphetamine users injecting in 2004 and 52% in 2006. Other routes of use did not change significantly between 2004 and 2006.

Methamphetamine use and sexual practices, 2006

Significantly ($p < 0.001$), MSM reported more sex partners (reported as mean \pm standard deviation) in the last four weeks (1.7 ± 3.0) than heterosexual men (0.6 ± 1.4). Methamphetamine using men had a higher number of sex partners when compared to non-methamphetamine using men. MSM who used methamphetamine in the past four weeks had a mean of 3.2 ± 4.8 sex partners and median of 2 (IQR: 1–2); versus a mean of 1.7 ± 3.9 sex partners and median of 1 (IQR: 0–2) among those who did not use methamphetamine in the prior four weeks ($p < 0.005$). Heterosexual men who used methamphetamine in the past four weeks had a mean of 2.3 ± 5.9 sex partners and median of 1 (IQR: 0–1); versus a mean of 0.5 ± 0.6 sex partners and median of 0 (IQR: 0–1) among those who did not use methamphetamine in the prior four weeks ($p < 0.01$).

Methamphetamine use and adherence, 2006

Two thirds of respondents were on anti-retroviral medication and 13% of those on anti-retrovirals had poor adherence. Methamphetamine use in the preceding four weeks was associated with poor adherence (27% vs. 13%, $p < 0.05$; PR = 2.2, 95% CI: 1.3–3.5), and methamphetamine users in the last 12 months were less likely to be on anti-retroviral medication (57.5% vs. 70%, $p < 0.02$; RR = 0.7, 95% CI: 0.6–0.9). The only route of use associated with poor adherence in methamphetamine users was injection (PR: 2.1, 95% CI: 1.0–4.6).

Patient–provider communication, 2004–2006

In 2006 health care providers asked respondents about their methamphetamine use 58% of the time, with MSM being asked more than heterosexual men and women and patients at SFGH being asked more than patients at Moffitt. Providers asked patients who used methamphetamine in the last 12 months

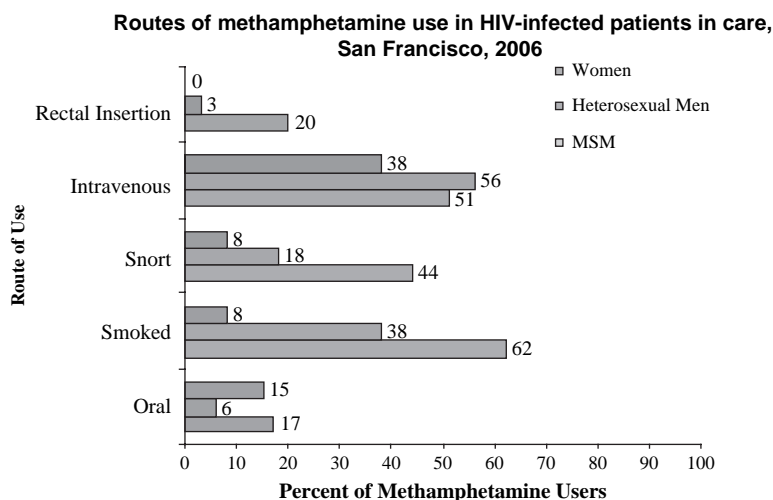


Figure 2. Routes of methamphetamine use among those who have used methamphetamine in the last 12 months. Users could select more than one route of use. $p = <0.001$ for all routes when gender/orientation were compared, except for oral which had a $p < 0.05$.

about their methamphetamine use more than patients who have not used in the last 12 months (80% vs. 48%, $p < 0.001$).

Trends in provider–patient communication show an increase in providers asking about methamphetamine use between 2004 and 2006 (38% vs. 58%, respectively, $p < 0.001$). Subgroup analysis reveals that this increase was consistent among MSM and heterosexual men, but no significant change was found among providers asking women about methamphetamine use.

In 2006 only 45% of patients were asked about sex at each visit; by subgroup, 46% of MSM, 33% of heterosexual men, and 51% of women were asked ($p < 0.01$). No significant change was found in the percentage of providers who asked their patients about sex during each visit (47% in 2004 vs. 45% in 2006, $p < 0.4$).

Discussion

This study found methamphetamine use and dependence to be common regardless of race, gender, or sexual orientation in a group of HIV-infected patients in care in San Francisco, though most common among white MSM. The association between methamphetamine use and an increased number of sex partners and poor medication adherence supports prior data demonstrating the role of methamphetamine in HIV transmission (Plankey et al., 2007; Wong et al., 2005) and anti-retroviral non-adherence (Hin-kin et al., 2007; Reback, Larkins, & Shoptaw, 2003).

In contrast to the 2004 data (Mitchell et al., 2006), the 2006 data showed statistically significant differences in methamphetamine use among MSM at

SFGH in comparison to MSM at Moffitt. Not only did we find the frequency of methamphetamine use unchanged at SFGH between 2004 and 2006, but the frequency value itself is strikingly high with 50% of MSM using methamphetamine in the prior 12 months. There are methodological limitations with the comparability of the frequency of methamphetamine use found in our study, but a crude comparison suggests that the frequency at SFGH is consistent with and possibly higher than the frequency reported in community-based studies in San Francisco (Das-Douglas et al., 2008; Vaudrey et al., 2007), and significantly higher than the reported methamphetamine use men nationwide (0.7% of men age 12 and older from 2002–2004) (SAMHSA, 2005).

We did not collect socio-economic data, but the clinic site can be viewed as a proxy for socio-economic status, as patients at SFGH have a lower socio-economic status than at Moffitt. Although we are unable to assess causality due to the cross-sectional design of this study, these results raise concerns of whether current intervention methods are less effective for certain groups, such as the poor and injection drug users. Further research could help determine the optimal risk reduction and substance use treatment interventions for vulnerable populations.

While we found a positive trend in patient–provider communications regarding methamphetamine use, our data that there were still many missed screening opportunities, especially around sexual behavior. Less than 50% of all patients were asked about sex at each visit, and we did not find a significant increase in providers asking about sex from 2004 to

2006. Thirty-eight percent of methamphetamine users were not asked about methamphetamine use.

Counseling from a health care provider can be an effective intervention for reducing a patient's risk of spreading HIV. The Center for Disease Control has documented the need for providers to discuss risk reduction with their HIV-infected patients (Mansergh et al., 2006), as screening and counseling in the health care setting has been shown to be effective in decreasing high risk sexual behaviors (Fisher et al., 2006; Golin et al., 2006; Koblin, Chesney, & Coates, 2004; Richardson et al., 2004). For example, Fisher et al. (2006) demonstrated that clinicians at an HIV clinic can effectively deliver an intervention to reduce unprotected sexual behavior of HIV-infected patients.

Behavioral interventions in clinic and community-based programs have also been shown to decrease methamphetamine use and associated risky sexual behaviors (Koblin et al., 2004; Richardson et al., 2004; Shoptaw et al., 2005). Recently, contingency-management programs have emerged as a promising means of harm-reduction and decreasing methamphetamine use, at least in the short term (Roll et al., 2006; Shoptaw et al., 2006; Strona et al., 2006). Outpatient treatment programs have shown prolonged success among HIV-infected individuals, such as with the EDGE study (Mausbach, Semple, Strathdee & Patterson, 2007) and the Matrix treatment program (Rawson et al., 2002).

This study had several limitations: the cross-sectional design cannot address causality, the relatively small sample sizes of women, transgender, and heterosexual men limit statistical power, and non-participation was not tracked at Moffitt. The anonymous format should have limited social desirability bias, and the high rate of self-reported methamphetamine use suggests that social desirability bias was not too influential. It is possible that the social desirability bias at Moffitt was stronger than at SFGH given the socio-economic differences between the clinics. Recall bias was limited by the cross-sectional design by simultaneously obtaining information on sexual partners, methamphetamine use, and patient provider, and by confining recall times to the last week, month or year. In terms of sampling, the demographics of the study correspond closely to the actual clinic demographics at SFGH, suggesting representative sampling. Our analysis of the association between HIV transmission risk and methamphetamine use is limited by not being able to determine the rate of unprotected sex, and thus we can only infer an increased HIV transmission risk from the increase in risky sexual behavior (marked by an increased number of sex partners). Future studies

should include questions on unprotected sex and methamphetamine use and number of sex partners to explore this relationship further. Lastly, our sample of HIV-infected patients in care in San Francisco may not be representative of other HIV-infected populations.

Despite its limitations, this study presents evidence of a high frequency of methamphetamine use among HIV-infected persons in medical care in San Francisco, regardless of patient gender and sexual orientation. The decline in methamphetamine use among HIV-infected MSM at Moffitt may represent positive outcomes of public health interventions in place, particularly for MSM. This finding is consistent with recent trend data showing decreased methamphetamine use in MSM in San Francisco from 2003 to 2006 (Vaudrey et al., 2007). Conversely, the increase in methamphetamine use among MSM at SFGH, in particular IDU, suggests the need for outreach and surveillance to those with lower socioeconomic status. The association between methamphetamine use and multiple sex partners, decreased adherence, and a high frequency of IDU points to the importance of routinely screening patients on methamphetamine use, sexual activity, and medication adherence. Knowledge among health care providers of methamphetamine use and its associated behavioral and health risks can facilitate risk reduction and access to treatment, thereby minimizing HIV transmission and the poor health effects associated with methamphetamine use.

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