AIDS and Behavior, Vol. 4, No. 2, 2000

Intertwining Epidemics: A Review of Research on Substance Use Among Men Who Have Sex with Men and Its Connection to the AIDS Epidemic

Ron Stall[1,3] and David W. Purcell[2]

Received Sep. 1, 1998; revised Feb. 22, 1999; accepted Mar. 1, 1999

This paper reviews the (1) literature on substance use among men who have sex with men (MSM), (2) data that test whether connections between substance use and abuse and high-risk sexual behavior exist among MSM, and (3) ways that HIV interventions might address the effects of substance use on high-risk sexual behavior. We conclude that while alcohol use patterns are not substantially different between gay and heterosexual men, gay men do use more kinds of other drugs. Although there is considerable evidence to support the view that substance use patterns have declined among gay men since the mid-1980s, substance use should still be regarded as a health risk in this population. Although the associations between substance use and sexual risk-taking for HIV are complex, the inclusion of interventions to disentangle substance use and high-risk sexual practices may increase the efficacy of AIDS prevention efforts among gay men.

KEY WORDS: Men who have sex with men; gay men; substance use and abuse; HIV prevention; HIV/AIDS.

Substantial academic and public health interest exists about the complex relationships between substance use and risky sexual behaviors among men who have sex with men (MSM). To explore this topic, we examined (1) the extent of substance use among MSM, (2) the scientific data on the associations between substance use and high-risk sexual behavior among MSM, and (3) what types of prevention activities might work for MSM who have sex under the influence of drugs or alcohol. Throughout the paper, directions for future research, treatment, and AIDS prevention efforts will be suggested.

Before we address these issues, however, it is necessary to define some core terminology and concepts that will be used here. First, the intersections between sexual behavior, orientation, and identity must be understood. Although a person's sexual behavior often corresponds to sexual orientation and sexual identity, this is not always true. For example, men who have sex with other men do not necessarily identify themselves as gay, even though some or all of their sexual behavior is "homosexual." Most broadly, in this paper we address MSM, regardless of their sexual orientation or identification. Thus, men who are married to women or identify themselves as heterosexual but who also have sexual relationships with men are defined as MSM, as are self-identified gay men. Although much of the research in this area has been done with men who identify themselves as gay, we will use the broader term, MSM, to indicate our interest in HIV-related sexual risk among men, regardless of their sexual identity. We will indicate if differences emerge in our conclusions for different subgroups of MSM (e.g., between gay and bisexual men).

Another concept concerns the route of adminis-

[1]Center for AIDS Prevention Studies (CAPS), University of California, San Francisco, San Francisco, California.
[2]Division of HIV/AIDS Prevention, National Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia.
[3]Correspondence should be directed to Ron Stall, Ph.D., M.P.H., Center for AIDS Prevention Studies, 74 New Montgomery Street, San Francisco, California 94105 (e-mail: Rstall@psg.ucsf.edu).

1090-7165/00/0600-0181$18.00/0

tration for drugs (injection versus noninjection). MSM who also inject drugs are an important group to study because they engage in both of the principal risk behaviors by which HIV is spread in the United States. Although we address MSM who are injection drug users (IDUs) and MSM who use drugs but do not inject, our primary focus is on sexual risk behavior, not other drug-related risk behaviors. A third concept concerns the drugs used by MSM. Many substance users, including MSM who use drugs, use many drugs rather than having only one drug of choice (Stall and Wiley, 1988). Thus, it is often not possible to develop separate conclusions for groups such as *alcoholics* or *cocaine users,* as if these men used only one drug. When possible, however, we will distinguish such groups. For example, MSM who use methamphetamine may be at particular risk for the sexual transmission of HIV, regardless of what other drugs they use.

A final concept concerns the terms substance *use* versus *abuse.* Various standards and definitions have been used to distinguish substance use and abuse in treatment settings and research, and detailed exploration of this topic is beyond the scope of this paper. Although it is difficult to find universally agreed-upon definitions of use and abuse, drug or alcohol abuse is generally distinguished from use by measurable physical, social, or psychological harm (Cahalan, 1970). In this review, we will most often use the term substance *use.* Again, if a study described in this paper specifically recruited a particular type of participant or specifically classified participants, we have adopted the terminology used by the authors.

SUBSTANCE USE AMONG MSM

When researchers first began examining questions about substance use among MSM, many assumed that rates would be substantially higher than those for heterosexual men, perhaps as a result of the difficulties of coping with a stigmatized social identity in combination with the development of a new identity within a subculture that has been historically focused on bars. Over the past 25 years, debate has persisted about the extent of substance abuse by MSM. This controversy still affects both the rhetoric and the research in this area. Most of the early researchers focused on alcohol use, which we discuss first. Only more recently have researchers addressed the use of other substances.

Alcohol Use

Research on alcohol abuse published in the 1970s and early 1980s supported assumptions about elevated rates of alcohol abuse among MSM; that is, about one third of the men sampled in gay bars abused alcohol (Fifield *et al.,* 1977; Lohrenz *et al.,* 1978; Morales and Graves, 1983; Saghir and Robins, 1973). If this rate of alcohol abuse was accurate, then the rate for MSM was one of the highest for any subgroup in the United States, and it was considerably higher than the 10% usually ascribed to the general population. However, these early studies suffered from methodologic flaws, not the least of which was that participants were recruited primarily or exclusively from gay bars.

With the advent of the AIDS crisis in the mid-1980s, more representative samples of MSM were examined (Martin, 1990a; McKirnan and Peterson, 1989b; Stall and Wiley, 1988), and questions about substance use became common. Although these studies also had methodologic limitations (Bux, 1996), the rate of alcohol abuse among MSM was more similar to the rate for heterosexual men, suggesting that the earlier estimates for MSM were probably exaggerated. For example, in a household-based sample of MSM and heterosexual men drawn from the same neighborhood in San Francisco, Stall and Wiley (1988) found that the patterns of alcohol use were not significantly different for MSM and heterosexual men, although the prevalence of heavy drinking was higher for MSM (19%) than for heterosexual men (11%). The investigators in a community study in which psychiatric criteria were used found no difference in the rates of alcohol abuse and dependence disorders for MSM and heterosexual men (Martin, 1990a).

In his review of the studies of alcohol abuse by MSM over the past 25 years, Bux drew the following conclusions: (1) MSM do not seem to be at higher risk for heavy drinking or alcohol abuse than are heterosexual men, (2) MSM seem less likely to abstain from alcohol than are heterosexual men, and (3) the rates of drinking and drinking problems in the gay community have decreased over the past 15 years, perhaps because of the AIDS crisis and changes in community norms about drinking. However, Bux noted that methodologic problems continue to confound the interpretation of recent epidemiologic data on alcohol abuse by gay men: using atypical samples (e.g., men from urban areas and of higher socioeconomic status), ignoring racial and

ethnic differences and variations in sexual identity (e.g., bisexuals), and failing to account for relationship status (e.g., research has shown that coupled persons have lower substance abuse rates than single people).

Research on alcohol use among MSM has been conducted in the context of an important historical fact: gay bars have functioned as de facto community centers and have been one of the very few safe places for MSM to gather in many parts of the United States. Even in this social context, the cross-sectional rates of current alcohol abuse do not seem to differ for MSM and heterosexual men, although the rates for MSM may have been higher historically. Perhaps the most remarkable thing about the cross-sectional rates of current alcohol abuse among gay men is not that they are so high, but rather that they are as low as they are. Further research is needed to determine whether lifetime rates of alcoholism are higher for MSM or if there are episodic or cyclical changes that differ (e.g., more substance use by gay men when coming out). In addition, research to identify factors that may help protect MSM from initiating a substance abuse career and/or factors important to recovery from a substance abuse career may provide insights important to prevention and treatment.

Use of Other Noninjection Drugs

Several trends emerge in the literature on noninjection drug use by MSM. Stall and Wiley (1988) noted that (1) drug-using MSM are more likely to be polydrug users than are heterosexual men, using many different drugs either in combination or sequentially, (2) there may be certain kinds of drugs that are particularly popular among MSM such as amyl nitrate (poppers) and amphetamines, and (3) although MSM use many different kinds of drugs in a year, few men seem to be characterized by the frequent use of one drug at any given time (in ways that might suggest abuse). Thus, drug use by MSM may be more variable; that is, over time, many different drugs are used on specific occasions, but few men use any one drug to excess. Finally, both quantitative and qualitative data suggest that many drugs have a strong sexual meaning for MSM and that understanding the use of such drugs by MSM must take into account the sexual meanings of these drugs (see Reback, 1997, for a description of methamphetamine use by MSM in Los Angeles).

In their household-based study of both gay and heterosexual men who resided in the greater Castro district in San Francisco, Stall and Wiley (1988) found that the prevalence of specific kinds of drug use was significantly higher among MSM for a variety of substances, including marijuana (78%), amyl nitrate/"poppers" (58%), MDA (9%), psychedelics (18%), barbiturates (25%), and amphetamines (28%). Similarly, McKirnan and Peterson (1989b) found higher rates of use of marijuana, cocaine, and poppers among MSM than among heterosexual men. However, when Stall and Wiley (1988) reviewed weekly drug use (suggestive of substance abuse) the prevalence of use fell below 6%, with the exception of poppers (at 15%) and marijuana (at 38%). Thus, it appears that gay men in the mid-1980s used a wider variety of substances, but did not necessarily use these drugs at a level suggestive of widespread substance abuse.

Samples of MSM in substance abuse treatment are also characterized by use of a wide variety of drugs. Paul and his colleagues (1996) found in their sample of men admitted to a gay-identified substance abuse clinic in San Francisco that nearly all of the men used alcohol, more than half used marijuana or stimulants, and at least 20% reported the use of poppers and sedatives or opiates. At intake, these men reported the use of alcohol for a mean of 50 of the past 90 days and a mean use of 3.4 drugs (including alcohol) in that time. Men in this sample who were more sexually active were more likely to continue use, rather than completely eliminate, their substance use over time.

In summary, MSM are characterized by the use of a wide variety of drugs, although rarely the use of any one drug at a frequency level that might suggest abuse. The question of whether there are higher lifetime prevalence rates of drug abuse among MSM compared with heterosexual men remains open.

Injection Drug Use

Relatively little research has focused on MSM who also inject drugs (Battjes, 1994), although there is clear evidence of injection drug use by MSM from the risk behaviors reported by people with AIDS. Of MSM with AIDS, 11% reported injection drug use and 20% of all male injection drug users (IDUs) with AIDS also reported sex with men (Centers for Disease Control and Prevention [CDC], 1996), suggesting that MSM IDUs are at particularly high risk for HIV infection. This high risk may be partly attrib-

utable to the established link between injection drug use and having multiple sex partners, using condoms infrequently, and trading sex for money or drugs (Doll and Beeker, 1996).

Only a few studies have focused on the sexual and drug-use behaviors of MSM IDUs (Crofts *et al.*, 1995; Deren *et al.*, 1996; Ross *et al.*, 1992; Stall and Ostrow, 1989; Waldorf, 1994), and a few others have reported data on the MSM IDUs who happened to be in their sample (Lemp *et al.*, 1994; Osmond *et al.*, 1994; Vlahov *et al.*, 1990). This second group of studies typically suffers from small samples, because most of these analyses depend on finding MSM in a sample of IDUs or finding IDUs in a sample of MSM (see Stall and Ostrow, 1989, for a commentary on sampling issues with MSM IDUs). According to most studies, the drugs of choice for MSM IDUs are cocaine, amphetamines (alone or in combination with heroin), and, more rarely, heroin alone.

Given the sampling problems and the small number of studies, generalizations about MSM IDUs are tentative. As described below, most investigators who have reported data on MSM IDUs have found higher rates of HIV infection and sexual risk-taking behaviors than for MSM who do not inject or heterosexual men who inject (Crofts *et al.*, 1995; Deren *et al.*, 1996; Stall and Ostrow, 1989). Behaviorally bisexual IDUs may be at higher HIV risk: they were found to have been more likely to have shared needles in the previous 6 months and to have traded sex for money and drugs than men who were behaviorally heterosexual or homosexual (Wolitski *et al.*, 1992).

Few statistical differences have been found in the injection risk behaviors of MSM who inject and heterosexual men who inject (e.g., sharing needles, 9% gay men vs. 20% heterosexual men; Deren *et al.*, 1996). Thus, in terms of HIV prevention, sexual behaviors rather than drug-use behaviors may explain the differences in HIV seroprevalence typically found for these two groups. For example, among MSM injection drug users in Melbourne and Sydney (n = 169), HIV seroprevalence was higher than the rates generally found among MSM in these two cities (27% vs. 9%; Crofts *et al.*, 1995). About 15% of the sample reported unprotected anal intercourse with two or more partners in the past month. In another Australian study (Ross *et al.*, 1992), MSM who injected were more likely to have insertive and receptive anal intercourse without a condom than heterosexual injectors, although there were no differences in the injection risk behaviors of these two groups. In a 15-city American study of IDUs and crack smokers (Deren *et al.*, 1996), MSM were more likely to be HIV-infected (57%) than were heterosexual men who shared the same drug risks (7%). MSM also had more sexual partners and were more likely to trade sex for money or drugs. Again, no differences in drug-use risk behaviors were detected. Finally, Stall and Ostrow (1989) reported in the household-based San Francisco Men's Health Study that gay men who injected were highly likely to be HIV-seropositive. Furthermore, although gay men who injected accounted for only 8% of the total sample, they accounted for about 20% of all high-risk acts for the transmission of HIV.

Nearly all of the literature on MSM injectors concerns risks for HIV transmission. This literature has documented not only very high rates of HIV infection within this group, but also very high rates of sexual practices known to transmit HIV. While HIV research is certainly a compelling research agenda for MSM who inject drugs, it is also true that this group has other health needs. In particular, we need to learn more about how MSM injectors access substance abuse treatment and the processes by which long-term sobriety is achieved. Research on the effects, and ways to avoid the effects, of long-term substance use would also be useful. Finally, research on the other infections transmitted through high-risk sexual behaviors and/or needle sharing (notably hepatitis C infection) would be of great utility for this population.

Changes in Rates of Substance Abuse over Time

Changes in substance abuse rates over time are of theoretical and practical interest in public health because they represent the interface between historical or cultural processes and epidemiology. Insights gained in the study of community-level processes that appear to lower substance use can be important tools in the design of future substance use prevention programs. The study of reductions in the substance use patterns of MSM over the past 20 years can help us learn how to improve the effectiveness of community-based substance abuse prevention programs.

According to a recent review, alcohol use and related health problems have decreased among MSM (Bux, 1996), although the rates are still at least as high as those in the heterosexual community. To address adequately whether the substance use patterns of MSM have changed, three effects should be considered: (1) aging (e.g., changes in substance use patterns

in one cohort as the men age), (2) cohort membership (e.g., changes in the substance use patterns of men who came of age during the 1960s as opposed to those who came of age during the 1980s), and (3) history (e.g., changes in substance use patterns that may have resulted from historical events such as the AIDS epidemic). To offer a simple summary statement for a reasonably complicated literature, there is some evidence that all three effects may have contributed to reduced rates of substance use among MSM.

Regarding age, there is a well-established decline in substance use as a concomitant of older age among the general population. Some studies have found a similar, though less substantial, decline for MSM or a different pattern of substance use among older MSM compared to older heterosexual men. For example, Stall and Wiley (1988) found that the prevalence of substance use declined with increasing age both for MSM and heterosexual men, but the older (45+ years) MSM had substance use profiles that more closely resembled those of younger MSM than those of their heterosexual male neighbors. Thus, many substance-abusing gay men may "age out" of heavy use (Remien *et al.*, 1995). Such a life-course change in the patterns of substance use may have direct and indirect effects on health outcomes for MSM.

There is also evidence of reductions in substance use across generations (cohorts) of MSM. Crosby and his colleagues (1998) analyzed data from the 1984 San Francisco Men's Health Study and the 1992 San Francisco Young Men's Health Study. Both cohorts included men aged 25–29 years and similar measures of substance use, allowing a direct comparison of levels of drug and alcohol use that controlled for age. The use of alcohol, marijuana, poppers, cocaine, barbiturates, heroin, amphetamines, and ethyl chloride by young MSM declined significantly from 1984 to 1992. An increase was found only for ecstasy and no differences were found for hallucinogens. These authors cautioned, however, that although rates of substance use declined between these two cohorts, substance use is still a significant problem among MSM, and it is related to HIV seroconversion among this population.

Finally, the evidence of reductions in substance use due to the effects of history (e.g., the AIDS epidemic) is found in a series of papers based on AIDS cohort data (Martin *et al.*, 1989; Ostrow *et al.*, 1990). The reductions were so substantial and rapid that neither cohort effects nor the potential confounding of aging seem likely to explain the decline. The remaining possibility—the effects of history, specifically the effects of the AIDS epidemic—has been widely accepted as the primary explanation for the decrease in substance use among these cohorts of MSM (Remien *et al.*, 1995).

Although substance use among MSM seems to have decreased, it is important not to minimize substance use as a problem for this population. Because it is generally acknowledged that alcohol and drug use are problems in American society, it is also fair to assume that MSM also have health and social problems attributable to substance abuse, despite this apparent decline to levels more nearly like those of heterosexual men.

Research Directions in the Epidemiology of Substance Use Among MSM

Although the scientific literature on the epidemiology of substance use among MSM has grown as a result of research on AIDS, some basic questions remain unanswered. First, research must extend beyond the quantification of substance use to the social and medical problems that MSM experience in connection with substance use. Conversely, understanding how MSM resolve their problem use (that is, a health rather than a disease focus) might teach us a great deal about how to design more effective treatment regimens. Both these issues suggest the need to understand the factors that may contribute to substance use across the lifespan. A third important issue concerns identifying the predictors of substance abuse among MSM because, with the exception of a few studies (e.g., McKirnan and Peterson, 1989c), investigators have not focused on the characteristics of people who are most likely to abuse substances. Fourth, research has focused almost entirely on White populations; thus we know very little about whether the epidemiologic profile of MSM of color is the same as or different from that of White MSM. In addition, most studies have focused on self-identified gay men, so our knowledge about differences among MSM with different sexual identities or behavior is limited (Doll and Beeker, 1996).

A final question is why changes in substance use patterns appear across cohorts of MSM, changes that may demonstrate the power of culture in changing individual behavior. By understanding more about how cultural and social shifts shape individual behavior, we may learn a great deal about how to design

more effective community-level interventions. The questions outlined here—not directly relevant to explaining the spread of HIV or the natural history of AIDS—are nonetheless very important in prioritizing public health interventions for MSM.

SUBSTANCE USE AND SEXUAL BEHAVIOR

In this section, we first discuss the relationship between the use of substances, sexual activity, and sexual risk-taking for HIV infection. Then we examine the impact of "recovery" from substance abuse on sexual activity for all men. Finally, we will review data on the relationship between substance use and high-risk sexual activity and explore the implications of these data. Although it is beyond the scope of this paper to review in detail the epidemiology of HIV infection among gay men, a paper by Holmberg (1996) provides an excellent review that places the epidemiology of AIDS among gay men in a national context; Mills and colleagues (1997) provide additional commentary on Holmberg's analysis regarding the importance of geographical place in understanding the AIDS epidemic among gay men.

Substance use and sex have been linked throughout Western history and across many cultures in literature, art, and music. Some drugs are said to act as aphrodisiacs because of their direct pharmacologic effects on sexual arousal or performance (e.g., poppers and ecstasy). The cognitive expectations about the effects of a drug, as well as the context in which people learn to use a drug, also can be powerful factors in determining whether a drug is used in a sexual situation (Ostrow, 1996). It has been argued that substance use and sex may be particularly linked for MSM because (1) the center of gay community life, historically, has been gay bars, (2) breaking the social taboo against same-sex behavior may initially be easier with substance use, (3) men who first have sex with other men while under the influence may repeat this pattern, and (4) certain drugs such as poppers, ecstasy, and methamphetamine are used by MSM specifically to enhance sex (Lewis and Ross, 1995). Although some of these reasons may apply to heterosexuals, the combination of these factors is unique to MSM.

For men who have used substances repetitively to decrease anxiety, being able to express their sexuality after starting substance abuse treatment or "recovery" from substance abuse can be difficult. Not only do such men need to focus on ending a pattern of substance use pattern, but they must learn new social skills to meet other MSM and have sex while sober. Many MSM in recovery also report that having sex evokes many drug-using cues, especially for men whose sexual expression typically include the use of substances. One slogan used in drug treatment to express this idea is "new playmates, new playgrounds" (e.g., men who are used to meeting other men in bars or other settings of high substance use and having sex with other men who use substances may have difficulty figuring out how to express their sexuality in new settings and with new people).

One of the strategies that MSM in recovery use is finding social settings other than bars in which to meet men. Thus, in many American cities, cafes are becoming new meeting grounds, especially for MSM in recovery. New social networks that are accepting of the need for men to avoid the use of alcohol or other drugs are often constructed in such settings. Other men join clubs organized around activities that do not include substance use (e.g., athletic contests, political or religious groups). One can get a sense of the extent to which substance use permeates gay male culture by observing the extent to which MSM in recovery must strategize to find ways to participate in gay culture, if they so desire, without risking their new-found sobriety.

Substance Use and High-Risk Sexual Behavior

Over the past decade, several empirical papers have been published about whether MSM who combine alcohol or drugs with sex are more likely to engage in high-risk sexual behavior (see Leigh and Stall, 1993, for a review of this literature). If so, interventions to prevent the combination of substance use and sexual behavior might prevent the continuing spread of HIV infection. However, finding have been inconsistent: some studies have found a statistical relationship between substance use during sex and the likelihood of participating in high-risk sex (Crosby *et al.*, 1998; Davidson *et al.*, 1992; Martin, 1990b; McKirnan and Peterson, 1989a; McKusker *et al.*, 1990; Ostrow *et al.*, 1990; Siegal *et al.*, 1989; Stall *et al.*, 1986); other studies have not found such evidence for alcohol alone (Bolton *et al.*, 1992; Weatherburn *et al.*, 1993).

One possible cause of the inconsistencies may be the measures of sex under the influence of substances. Leigh and Stall (1993) divided research on this issue into studies reporting three types of results: (1) asso-

ciations between overall measures of alcohol or drug use and the likelihood of having high-risk sex (global measures), (2) associations between the proportion of all sexual behavior conduced under the influence of drugs or alcohol and likelihood of having high risk sex (situational measures), and (3) associations between high-risk sex and substance use at the level of a specific set of sexual event (event measures). In general, global and situational measures tend to detect a positive association between patterns of substance use and high-risk sexual behavior. Most of theses studies reported cross-sectional correlations between various substance-use patterns and the likelihood of having high-risk sex. Under this kind of research design, substance use could cause sexual behavior, sexual behavior could cause drug use, or some third variable (such as having a "risk-taking personality" or some other characteristic) could cause both substance use and high-risk sex (Kalichman *et al.,* 1996). However, event-level measures, which are most useful for determining whether a causal relationship exists between substance use and high-risk sex, have not historically tended to report a positive association between patterns of substance use and high-risk sex (Leigh and Stall, 1993).

The inconsistency of these findings has given rise to controversy over whether there is a link between alcohol or drug use and high-risk sex and whether other variables underlie any observed relationship between substance use and high-risk sex. At the extreme, some people have argued that if it cannot be established that substance use causes unsafe sex, interventions should not address this purported connection. There is, however, a second question, which focuses on the relationships between substance use and HIV seroconversion itself among gay men.

The findings from a series of AIDS natural history studies on self-reported substance use and incident HIV seroconversions converge to show that gay men with higher levels of noninjection substance use at baseline are more likely to become infected with HIV over time (Buchbinder *et al.,* 1994; Burcham *et al.,* 1989; Chesney *et al.,* 1998; Penkower *et al.,* 1991; Silvestre *et al.,* 1989). Because there is little or no error in measuring HIV status, HIV seroconversion is a more valid as well as medically meaningful outcome variable in trying to understand the divergent findings discussed previously. Studies that demonstrate a link between higher levels of nonintravenous substance use and later HIV infection may be most relevant to considering whether the relationship between substance use and high-risk sexual behavior is an appropriate part of AIDS risk reduction efforts. However, even with the use of longitudinal designs that can link nonintravenous substance use patterns to subsequent HIV seroconversion, it should be pointed out that detected relationships remain correlational in nature and therefore vulnerable to multiple causal interpretations.

Research Directions on the Association Between Substance Use and High-Risk Sex Among MSM

Because the use of experimental designs to study the effects of substance use on consequent sexual risk-taking would be unethical in this field of study (Stall and Leigh, 1994), considerable thought has been devoted to finding nonexperimental approaches to detecting whatever contributions substance use may make to unsafe sexual behaviors. Attention has primarily focused on refining measurement approaches, the use of statistical analyses to detect underlying variables that may explain detected correlations between substance use and unsafe sex, and the use of experimental outcome data to identify whether changes in substance use patterns correlate with sexual risk reductions.

The development of new measurement approaches might resolve some of the questions that make the behavioral literature so difficult to interpret. For example, one problem with event-level measures is that as a general rule, one set of sexual events (e.g., the most recent safe and unsafe events) is measured for an entire sample without regard to whether the sexual events are typical for a respondent. If nonrandom recall or reporting bias exists in the selection of sexual events by respondents in a sample, then the event-level measures of the association between substance use and high-risk sexual behavior are flawed. Assessing whether the sexual events are "typical" is one way to approach this problem.

Statistical reanalysis of existing data sets to identify whether "underlying" or confounded variables explain any relationships between substance use and unsafe sex might resolve some of the intrepretational problems in this field. This kind of reanalysis can be conducted to search not only for individual-level variables, but also social-level variables, such as whether historical time period effects are important to understanding this relationship. For example, a sensitivity analysis could determine whether the association between substance use and high-risk sex was

easier to detect earlier in the epidemic, when levels of substance abuse were also higher among gay men. In addition to searching for covariates at the level of civic response to the AIDS epidemic, variables at the level of the individual, such as "cognitive disengagement" or "sensation seeking" (McKirnan *et al.*, 1996; Kalichman *et al.*, 1996) and/or childhood sexual abuse (Carballo-Dieguéz and Dolezal, 1995; Doll *et al.*, 1992; Jinich *et al.*, 1998) have also received considerable interest of late as potential explanatory variables for explaining observed relationships between substance use and high-risk sexual behavior.

Another research agenda would be to collect data from a set of careful outcome evaluations of the effectiveness of AIDS prevention efforts that employ different strategies to attempt to weaken the link between substance use and high-risk sexual behavior among gay men. The point of this exercise would be to test whether reductions in substance use patterns in conjunction with sexual expression result in changes in high-risk sexual behaviors. Although this analysis could not be used to determine whether substance use holds a causal relationship to high-risk sexual behavior, this analysis could be used to test whether interventions designed to disentangle substance use and sexual behavior have any pragmatic utility. This research should also be designed not only to determine whether particular approaches are "effective," but also to test the theory underlying distinct intervention approaches.

Finally, qualitative contributions to the study of this relationship also are overdue. Inductive, qualitatively derived theory building may generate specific hypotheses that will prove invaluable in explaining the correlations that have been detected in the relationships between substance use and high-risk sex as well as the studies in which correlation is absent. For example, qualitative research could be used to test hypotheses about men who engage in different sexual behaviors depending on whether they or their partner has used substances.

HIV Prevention for MSM Who Have Sex Under the Influence

It is unlikely that a single HIV prevention intervention or message will change the behavior of all MSM who have sex under the influence of alcohol or drugs. There is undoubtedly a need in HIV prevention for a variety of approaches, ranging from individual-level to community-level interventions. Interventions designed for specific populations might be particularly effective (e.g., separate interventions for MSM who inject drugs versus those who use noninjection drugs at weekend dance parties).

It should also be noted that there has been debate regarding the actual message(s) to present in HIV prevention programs for men who are actively abusing substances. For example, some have argued that it is dangerous to present messages that enforce the general perception that one is not responsible for high-risk sex if one is drunk or stoned because men may then get intoxicated *in order* to have high-risk sex (Bolton *et al.*, 1992; Stall *et al.*, 1986: 369). Recent theoretical formulations to explain observed relationships between substance use and high-risk sexual behavior have also emphasized that it is the cultural belief that substances cause certain behaviors (or that behaviors that occur under the influence of substances are excused) that is central to understanding this relationship (McKirnan *et al.*, 1996). Thus, interventions that attempt to disentangle substance use and high-risk sexual behavior may instead focus on attributions about substance use, rather than substance use itself, or target venues where men are known to combine sexual expression with substance use, yet without a strong emphasis on the substance use itself. Outcome evaluations of these approaches would provide valuable data to test these theoretical formulations.

In the next sections, we address HIV prevention for men in substance abuse treatment versus those who are not in treatment. Most MSM who abuse substances are not in treatment at any given time and have not been in treatment recently (Grant, 1997). Thus, it is important to design interventions for men who differ widely in their substance use and in their willingness to stop using substances. There are other distinctions that we will not address here, but that may be important when tailoring interventions or prevention messages: sexual orientation or identity (e.g., MSM versus bisexual versus gay-identified men), drug of choice (e.g., methamphetamine versus alcohol), and route of drug administration (e.g., injection versus noninjection drug use).

MSM in Substance Abuse Treatment

Because there is strong evidence that MSM with higher levels of substance use are more likely to be-

come HIV-seropositive than gay men who do not, the question becomes: How can we best design AIDS interventions for these men that take into account drug and alcohol use? One approach to intervening in the relationship between HIV seroconversion and heavy alcohol or drug use would be to focus our intervention efforts on MSM who are or recently were heavy substance users. For example, recent rates of high-risk sex reported by MSM in substance abuse treatment (55%) approached the rates recorded before the AIDS epidemic (Paul *et al.*, 1993, 1994).

HIV prevention conducted in conjunction with substance abuse treatment can be considered from at least two perspectives. First, substance abuse treatment itself can be thought of as an HIV prevention strategy because effective treatment can reduce the direct and indirect risks for HIV infection. Evaluations of a variety of substance abuse treatment programs have shown overall effectiveness in improving the lives of participants across a broad array of domains (McLellan *et al.*, 1994; see also Academy for Educational Development [AED], 1997). These improvements have led to a decrease in risky injection drug-use behaviors (AED, 1997). Few studies of treatment outcome looked at changes in sexual behavior as a treatment outcome (Shoptaw and Frosch, 2000). For MSM, it may be particularly important to focus on sexuality during treatment: some men report never having had sex with a man without being high and, for some men, sexual identity and substance use are tightly connected (Reback, 1997).

Second, beyond the effect of treatment itself, substance abuse treatment programs provide the opportunity to implement specific HIV prevention programs for MSM who use substances, and potentially for their sex partners and broader social networks. That is, MSM in treatment may provide access to a larger network of sex partners and friends who abuse substance, but who are not in treatment (AED, 1997). In addition, because substance dependence is a potentially chronic condition for which repeated treatment may be needed, some of the men in treatment (and some in recovery) are likely to relapse. This reality has led to some conflict over teaching "harm-reduction" approaches as part of HIV prevention programs in treatment. Because injection drug users in treatment may relapse, some substance abuse specialists think that clients should be taught the importance of using a clean needle every time they inject and, as a less desirable alternative, how to clean needles (a harm-reduction approach).[4] Others argue that such a prevention message violates one of the core values to be learned during treatment—the importance of abstinence from drugs and alcohol. Thus, they argue against any discussion of future safe needle use during treatment.

Although the idea of using substance abuse treatment services to reach gay male substance abusers may seem to be a promising idea, it should also be pointed out that incorporating HIV prevention efforts into substance abuse services will not be without difficulties. First, only a small number of gay-identified substance abuse treatment facilities exist in North America. Outside of such agencies, reaching gay men will involve navigating whatever homophobic impulses may manifest among substance abuse treatment staff. Second, even when barriers relating to discrimination against gay men are not an issue, many treatment personnel feel strongly that the only emphasis of substance abuse treatment agencies should be that of treating addiction. Even in cases where the risks of HIV are acknowledged, some treatment staff may feel strongly that HIV risk-taking is secondary to the primary challenge of resolving an addictive career and so oppose any "watering down" of treatment emphasis at their agency. Third, HIV prevention requires sensitivity to sexuality issues and comfort during frank conversations about one's sexual behavior. Many substance abuse treatment personnel have not yet had the opportunity to gain these skills and will need to be trained in basic AIDS prevention methods, a training that may not be readily available in some locales (see Paul *et al.*, 1993, for a review of some of these issues).

Research is necessary to evaluate new intervention strategies to reduce high-risk sex and drug use among MSM in treatment. Studies with injection drug users show that HIV prevention interventions are more successful at reducing risky drug-use behaviors than at reducing sexual risk behaviors (Battjes *et al.*, 1995; Lewis and Watters, 1994; Wiebel *et al.*, 1996), suggesting that we must learn more about how to reduce sexual risk behavior. Evaluation, however,

[4]In May 1997, the CDC, the National Institute on Drug Abuse of the National Institutes of Health (NIDA), and the Center for Substance Abuse Treatment of the Substance Abuse and Mental Health Services Administration (CSAT) published a bulletin indicating that health professionals should inform injection drug users that using a sterile syringe is safer than reusing syringes, including those that have been disinfected with bleach (CDC/NIDA/CSAT, 1997).

should answer more than the question of whether the intervention reduced sexual risk taking. Rather, the evaluation should be designed so that we understand more about (1) the predictors or mediators of sexual risk reduction and (2) how to translate that understanding into more effective interventions. In addition, the issue of harm-reduction approaches in treatment should be examined. Addressing the variety of research questions addressed here may improve not only the quality of AIDS prevention services for gay men who abuse substances, but also the quality of substance abuse treatment for this population.

MSM Not in Substance Abuse Treatment

As noted earlier, most substance-using and abusing MSM are not currently in treatment, even if they may have had treatment in the past. Thus, the work of reaching such men is made more complicated by the necessity of obtaining a near-ethnographic understanding of the venues where gay men combine substance use and sexual expression. It is also plain that interventions that attempt to reach such men in these venues that emphasize abstinence from either sex or substance use are likely to fail. Thus, many interventions for substance-using men use a harm-reduction approach that encourages men to reduce their sexual risk in the context of continuing to use substances. For example, prevention packets have been designed for MSM who use methamphetamines and have sex, with the primary message being that the men should plan their drug use so that the tools for safer sex are available and easily accessible. Some approaches have been venue-specific, such as early-morning outreach services that pass out safe-sex materials at circuit parties. Other approaches to HIV prevention have only recently been attempted, such as interventions to raise levels of gay community awareness of the health costs of amphetamine use or specific outreach to affect peer norms among men who typically have sex under the influence.

Research Directions

The overall research task should be to find ways to design and evaluate interventions that lower the rates of high-risk sex in populations that use substances. A first step might be to conduct basic research on the mechanisms underlying the established relationship between substance use and high-risk sex. Although this relationship has been examined at the level of the sexual event in some quantitative studies (Leigh and Stall, 1993), to our knowledge only one completed study has used a qualitative approach. In this study—funded by the San Francisco AIDS Foundation—nearly 200 MSM were asked in open-ended qualitative interviews to describe the circumstances leading up to a safe and then an unsafe anal sex act. By determining the differences between safe and risky events for the same individual, the usual knowledge, attitude, and belief items that are used to explain sexual risk taking are controlled. Probes were included in these qualitative discussions to examine the prelude to the sexual event—the participant's mood, the relationship with the sex partner, the setting, use of drugs or alcohol, reasons for using or not using condoms, perceived HIV status of the partner, and how the respondent felt about the sexual event later. Analysis revealed that a cluster of circumstances distinguished the risky events, including emotional distancing during sex and an intense regret and concern about the sexual risk taking after it occurred. Drug and alcohol use was sometimes part of the constellation of distancing events that preceded the risky behavior (Diaz, 1996). Continuing qualitative work to understand the place of drug and alcohol use in the prelude to unsafe sex seems to be indicated.

We also need research on interventions to lower the rates of sexual risk taking among MSM who abuse substances, but who are not in substance abuse treatment. An understanding of community process and the effectiveness of community-level interventions will be useful in this task. Harm-reduction approaches to sexual behavior may also prove to be an important contributor to low rates of new infection in this population. For example, if a prevention program cannot motivate MSM who abuse substances to seek treatment, a prevention goal might be to help these men engage in safer behaviors when under the influence of drugs or alcohol. Applying these approaches to the study of men in heavy substance using and high-risk sexual networks may work to lower HIV incidence rates not only among MSM who abuse substances, but also in the larger community of MSM.

CONCLUSIONS

Our understanding of the forces behind substance use and high-risk sexual behavior among MSM is still evolving. New insights about the relationship

between substance use and HIV infection among MSM can be expected. The research directions that we have proposed will help to advance our understanding not only of the epidemiology of substance use among gay men, but also of the intersection of substance use and the AIDS epidemic in this population, and how prevention interventions can best address these two problems.

ACKNOWLEDGMENTS

This review was supported in part by a grant from the Centers for Disease Control and Prevention, the Center for AIDS Prevention Studies (CAPS), the National Institute of Mental Health (MH 42459), and the National Institute on Alcohol Abuse and Alcoholism (AA10194). Our ability to conduct this research depends on the continuing contributions of gay men to public health research endeavors, and their contributions to our work are gratefully acknowledged here.

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