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ORIGINAL PAPER

Awareness and Attitudes Regarding Microbicides and Nonoxynol-9 use in a Probability Sample of Gay Men

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Abstract A household probability sample of 879 adult gay and other men who have sex with men in San Francisco underwent phone interviews. Approximately, half reported recent unprotected anal intercourse (UAI). Yet, lubricant use was high, a behavior that may facilitate future adoption of topical microbicide delivered by a lubricant gel. Despite warnings against Nonoxynol-9 (N-9), 26% of respondents reported still using it. Microbicide awareness was higher among men reporting UAI than among consistent condom users. Scenarios presenting microbicides ''as effective as condoms,'' ''nearly as effective,'' or ''less effective but better than nothing'' produced wide variability in willingness to use them, which may have implications for microbicide acceptability. HIV-infected men and those who reported UAI showed greater microbicide acceptance.

Keywords Microbicides · Nonoxynol-9 · Gay men · MSM · Condoms

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Introduction

With the appearance of effective treatment regimens for HIV disease, the perceived threat of the illness has somewhat receded among gay men (Morin et al., 2003). Reports have shown a decrease in condom use for anal intercourse (Wolitski, Valdiserri, Denning, & Levine, 2001) and the existence of a subset of gay men who intentionally do not use condoms in situations that may involve risk of HIV transmission (Carballo-Diéguez & Bauermeister, 2004; Halkitis & Parsons, 2003). A review of publications on anal sex practices among MSM indicated that approximately one-third of both uninfected and infected gay and bisexual men report recent condomless anal intercourse (Kalichman, 2000), and there have been speculations about ''condom fatigue'' in recent years (Adam, Husbands, Murray, & Maxwell, 2005).

There continues to be an urgent need to find ways other than condom use to prevent viral transmission during intercourse. Microbicide use holds the promise of being one such solution. Microbicides are agents presented in the form of gels, suppositories, or films that could be applied topically to block transmission of HIV during intercourse. No microbicide is commercially available at this time, although 29 products are actively undergoing preclinical or clinical studies (Alliance for Microbicide Development, 2005).

Nonoxynol-9 (N-9), a common spermicide found in a wide range of lubricants and condom products, was originally thought to be a good microbicide candidate. Shortly after laboratory studies indicated that N-9 could kill HIV in vitro, gay information outlets recommended use of condoms and gels containing N-9 for anal intercourse. Gross, Buchbinder, Celum, Heagerty,

and Seage, (1998) found that 41% of their sample of MSM actively sought products containing N-9 even though the efficacy of N-9 to prevent HIV transmission during anal intercourse had never been proven. Unfortunately, subsequent research established that N-9 could, in fact, increase MSM's risk for HIV infection by causing epithelial disruption in the rectum (Phillips & Zacharopoulos, 1998). Furthermore, a multinational trial found that vaginal use of N-9 increased rather than decreased HIV incidence (Stephenson, 2000). These aggregate results led the CDC to issue warnings for MSM *not* to use anal lubricants containing N-9 (CDC, 2000), eliminating hopes that N-9 could be an effective and acceptable microbicide.

Nevertheless, other microbicide candidates currently under study may be found effective in providing protection against HIV transmission. Therefore, it is important to understand men's views of these products. A few studies have focused on this issue exploring MSM's intentions to use a future topical microbicide during anal intercourse (Carballo-Diéguez et al., 2000), willingness to participate in efficacy trials of new products (Gross et al., 1998), and preferences about the characteristics of future products (Rader et al., 2001). These studies involved convenience samples of MSM and did not examine links between N-9 use and microbicide awareness.

For the current study, telephone interviews were conducted among a probability sample of gay men and other MSM to assess familiarity with and use of rectal lubricants (products similar in many respects to microbicides), knowledge regarding the possible detrimental effects of N-9 use, awareness of microbicides as potential future prevention methods, and attitudes regarding partial effectiveness (relative to condom effectiveness).

Method

Participants and procedures

This study was based on a secondary analysis of data from the 2002 cohort of the Urban Men's Health Study (UMHS, 2002), a project based at the University of California, San Francisco (Catania et al., 2001; Pollack, Osmond, Paul, & Catania, 2005). UMHS 2002 entailed a telephone survey conducted in San Francisco between May 2002 and January 2003 about risk behavior among a large, household probability sample of gay and other MSM. The study sample was derived from a random digit dial telephone sample in which one eligible person within each telephone household was screened. Men aged 18 and older who reported sex of any kind with a man since age 14 or who self-identified as gay or bisexual were considered eligible to participate in the study. A broad definition of gay and other MSM helped ensure enrollment of men who might not otherwise be included on the basis of self-labels for orientation or infrequent same gender sexual activity.

The sample was weighted for differential probabilities of selection and non-response. The weighting process started with creating initial baseweights for each case, which was equal to the inverse of the probability of selection of that telephone number from its telephone exchange (area code plus 3-digit prefix). The initial base weight was then adjusted by multiplicative factors that accounted for sub-sampling, screener non-response, multiple telephones in the household, multiple MSM in the household, and extended interview non-response. The final weighting adjustment scaled weights so that the weights totaled the number of completed UMHS-3 interviews (n = 879). All data in this report are weighted (see Westat, 2003 for more information).

One to 3 weeks prior to the initial call attempt, advance letters describing the study were mailed to sampled households with obtainable addresses. During the call, the interviewer confirmed whether he or she had reached a household in the city, then screened for and selected an eligible MSM in the household. Those who provided consent were interviewed by extensively-trained interviewers using computer-assisted telephone interview software. Interviews were conducted in English or Spanish and took 30–45 min to complete. Respondents were sent a $25 check for their time and effort. Study materials and methods have been described elsewhere (Catania et al., 2001).

Measures

Demographic Information

Respondents were asked to provide basic demographic information, including age, ethnicity, education, annual income, as well as whether they were HIV positive, HIV negative, or had not been tested.

Sexual Risk Behavior

Men were asked if they had engaged in sexual activity with a male partner in the preceding year and whether protection was used. If they reported unprotected anal intercourse (UAI), they were asked about lubricant use during UAI, number of partners, and whether they were the receptive or insertive partner.

Microbicide Awareness and Attitudes Toward Use

After an initial question exploring whether the respondents had ever heard about substances called ''microbicides,'' respondents were told that microbicides were ''Chemical agents added to gels or foams capable of destroying bacteria or viruses.'' Respondents were then asked if they had ever heard or read that microbicides might be used to reduce the risk of getting or giving HIV through sexual contact. Subsequently, they were asked, ''In a situation where either you or your sexual partner may be at risk for HIV infection, how effective would a microbicide have to be against HIV for you to consider using it during anal sex without a condom?'' Respondents could answer *yes* or *no* to questions describing microbicides as ''as effective as using a condom,'' ''nearly as effective as using a condom,'' or ''less effective than using a condom, but better than using nothing.''

Nonoxynol-9 (N-9) Use

Respondents were asked if they had ever heard of N-9, which was defined for all respondents. They were then asked whether they had ever used a lubricant containing N-9 for anal intercourse, either with or without condoms, and the number of occasions of use in the preceding 9 months. Respondents rated the following statements from 1—*strongly agree* to 4—*strongly disagree*: Using a lubricant containing N-9 during anal intercourse will prevent HIV transmission; will irritate or injure a person's rectal tissue; will increase the risk of getting HIV.

Data Analyses

For the full sample, frequency counts were used to characterize demographic backgrounds, sexual risk behaviors, histories of lubricant use, microbicide awareness, and N-9 use and awareness. Chi-square analyses were conducted to compare differences in the proportions of men who reported UAI on the basis of HIV-status. Chi-square analyses were then used to compare men's reports of N-9 awareness, N-9 use, and their microbicide awareness on the basis of HIV status (collapsing HIV-negative and untested men) and on the basis of sexual risk histories. The reported *P*-values were obtained using the STATA SVY TABULATE procedure. Ordinary least squares regression analysis (using the STATA SVY REGRESS procedure) was used to evaluate a possible interaction between HIV status and sexual risk history on willingness to use microbicides.

Results

Sample Characteristics

Of 1,193 eligible contacts, 879 men agreed to participate in the telephone interviews (response rate 74%). Over half were between 40 years of age or older (Mean = 43.6; Median = 43.0; Range = 18–90). Most were European American (80%), the rest being Latino (9%), Asian Pacific Islander (5%), African American (4%), or other (2%). The majority (66%) had at least a 4-year college degree and most (62%) made less than $60,000 a year. Over one-quarter (27%) reported being HIV-positive; the remainder reporting either HIV-negative status (69%) or having never been tested (4%).

Sexual Risk Behaviors and Lubricant Use in Year Preceding Study

Of the total sample of 879 men, 762 (87%) reported engaging in sexual activity with a male partner in the preceding year. Of these 762 men, 617 (81%) reported engaging in anal intercourse. Unprotected receptive anal intercourse (URAI) was reported by 274 of the 762 men (36%). Of these 274 men, most (243 or 89%) reported using a lubricant and and 118 (43%) had had URAI with multiple partners. Unprotected insertive anal intercourse (UIAI) was reported by 340 of the 761 men (45%). Of these 340 men, 152 (45%) had had UIAI with multiple partners, the majority (299 or 88%) reporting lubricant use.

Of the 879 men, 370 reported no UAI in the prior year. These men were as likely as those reporting UAI to indicate that they had sex only with a primary partner in the preceding year, and as likely to report secondary partners. Of the 370 men reporting no UAI, 145 (39%) indicated that they had not engaged in any anal intercourse during the prior year, but had engaged in other same-sex sexual activities.

Nonoxynol-9 Use and Awareness of Harmful Effects by HIV Status and Sexual Risk Behavior

The majority of men (83%) had heard of N-9. A little over half (56%) of all 879 respondents reported that they had used a lubricant containing N-9 at least once in the past and, of note, a substantial minority (26%) had done so in the preceding year. Although at the time of the interview, just 7% of the sample viewed N-9 use as an effective method for preventing HIV transmission, only 39% of the men were aware that N-9 use could injure rectal tissue thereby increasing the risk of HIV infection.

A significant difference emerged for the chi-square analysis comparing proportions of men who reported UAI on the basis of HIV-status, χ^2 (1, N = 762) = 5.55, $P < 0.05$. This analysis indicated that a higher proportion of HIV-positive men reported that they had engaged in UAI versus had not engaged in UAI (16% vs. 11%, respectively among 762 participants).

Although there appears to be some overlap in the groups of HIV-positive and UAI reporters, we present them separately below as they are independently interesting (see Table 1). In the analyses comparing reports of N-9 awareness and past use by HIV-status (HIV-positive versus HIV-negative/untested), a greater proportion of HIV-positive men reported that they had heard or read about N-9, had ever used a lubricant with N-9, and believed that using a lubricant with N-9 during anal intercourse would irritate or injure rectal tissue and increase the risk of becoming infected with HIV. Of interest, a higher proportion of HIV-positive men compared to HIV-negative reported that N-9 might also prevent HIV transmission; however, these proportions are small and the vast majority of both groups did not endorse this belief. No differences were noted between the two HIV-status groups in the proportions who reported recent (past year) use of a lubricant with N-9. Men who reported UAI in the year preceding the study were more likely to have heard or read about N-9 and to have used a lubricant with N-9 ever and in the past year compared to men who did not report UAI. They did not, however, differ significantly in terms of beliefs associated with the use of lubricants with N-9.

Microbicide Awareness and Attitudes by HIV Status and Sexual Risk Behavior

Over half (59%) of the total sample of 879 respondents had heard or read that microbicides might reduce the risk of HIV transmission through sexual contact. When asked under which conditions they would use microbicides in place of condoms for protection, 65% said they would use microbicides if they were as effective as condoms (which was presented just as a reference point, since microbicides are unlikely to be that effective), 22% said they would use them if they were nearly as effective as condoms, and only 15% would use them if they were less effective than condoms but better than nothing.

In the analyses comparing men on the basis of HIV-status and sexual risk histories, no differences were found between HIV-positive and HIV-negative/untested men with regard to having heard or read about microbicides. However, higher proportions of HIV-positive men reported that they would use a microbicide if it were nearly as effective as condoms or less effective but better than nothing (see Table 1). When comparing men who had engaged in UAI in the preceding year to those who had not, greater proportions of men who reported UAI indicated that they would use a microbicide at all three levels of posited effectiveness.

To explore further variations in willingness to use a microbicide on the basis of HIV serostatus and sexual risk histories, a multiple regression was conducted with HIV-status, reports of UAI, and an interaction term of these two variables. The categories of willingness to

Table 1 Nonoxynol-9 use and awareness and attitudes toward microbicides by HIV status and sexual risk histories (Chi-square results)

Response Item	HIV status			Sexual risk histories		
	Positive (n = 235)	Negative or never tested (n = 643)	X^2	UAI in past 12 months (n = 392)	No UAI in past 12 months (n = 370)	X^2
Heard or read about N-9	87.3	81.4	4.35*	88.1	80.6	8.01*
Ever used lubricant with N-9	65.1	52.5	11.13**	67.6	52.6	17.69**
Used lubricant with N-9 in past year	30.9	24.9	3.09	35.5	24.1	11.71**
Believes lubricant with N-9 during anal sex will:						
Prevent HIV transmission	9.6	5.4	4.84*	7.4	5.1	1.72
Irritate or injure rectal tissue	39.1	31.4	4.58*	37.0	31.9	2.16
Increase risk of HIV	29.3	24.2	2.31	29.4	25.0	1.89
Irritate/injure tissue and increase risk of HIV	46.4	36.1	7.79**	42.7	37.3	2.27
Heard or read microbicides can reduce risk	64.3	56.6	4.21	59.2	58.6	0.03
Would use microbicide without condom if it were						
As effective as using a condom	66.5	64.0	0.47	76.4	56.0	35.50**
Nearly as effective as using a condom	29.8	19.5	10.64**	33.4	12.0	48.90**
Less effective than using a condom, but better than nothing	20.4	13.0	7.45**	24.1	6.9	41.91**

Note: *$P < 0.05$ and **$P < 0.01$

use a microbicide were recoded on a scale of 0 (none) to 3 (high, i.e., willing to use a microbicide even if it is less effective than using a condom). The interaction term was significant, $t = 2.40$, SE = 0.17, $P < 0.01$. In general, men who reported UAI were more likely to express a willingness to use a microbicide compared to those men who did not report UAI, and this effect is more pronounced among the HIV positive compared to the HIV negative men. For men who did not report UAI, HIV status was unrelated to reports of their willingness to use microbicides (Ms = 0.69 and 0.75 for HIV-positive and HIV-negative/untested, respectively). However, for men who did report engaging in UAI, those who were HIV-positive reported higher willingness to use microbicides than did those who were HIV-negative or untested (Ms = 1.58 and 1.19, respectively).

Discussion

In the current study, 81% of the sexually active sample reported that they had engaged in anal intercourse with a male partner in the preceding year. Although this figure does not reveal how frequently anal intercourse occurred, it does show that in a random sample of gay and other MSM who were sexually active, four out of five report anal intercourse. Just less than half had engaged in UAI during this time frame. Although HIV risk may not be automatically assumed, since intercourse may have taken place among uninfected men, this figure is still of concern considering the prevalence of HIV among gay and other men who have sex with men in San Francisco. Most of the men who engaged in UAI reported lubricant use. This behavior, if modified, could result in frequent use of topical microbicides. Yet, since mircrobicide use will likely differ in some key respects from lubricant use (e.g., volume required and delivery system), additional research is needed.

A notable number of men continued to use N-9 during anal intercourse, which placed them at increased risk of acquiring or transmitting HIV. This was particularly true among those reporting recent UAI. Public health specialists may have presumed that most people were informed about the increased infection risk associated with N-9 use, but this was not borne out here. Although this is a worrisome fact that points out the need to better inform people about the negative effect of N-9, it may also indicate that people who have UAI are seeking non-condom based means of protection.

Compared to HIV-negative/untested men, HIV-positive men were more likely to report lifetime, but not recent use of N-9, suggesting they might have discontinued its use. They also had greater awareness of N-9, including its associations with rectal damage. It is likely that men who are infected follow HIV-related medical news more closely than the uninfected, which may be a positive factor when needing to popularize use of an effective microbicide once it becomes available.

Over half of the participants had heard of microbicides before the study, which is notable because microbicides are not on the market yet and have not been subject to promotional campaigns. Information appears to be shared efficiently within networks of gay men. Two-thirds of the participants reported that they would use a microbicide that were as effective as condoms. This may be in line with general dissatisfaction with condoms and a need for methods that interfere less with sexual pleasure. The finding that more men who reported UAI would be willing to use such a product than those who did not report UAI shows a good predisposition to new forms of protection. The remaining one-third, if comfortable using condoms, might not switch even if assured that another product is as effective as condoms at preventing HIV transmission. The number of participants willing to use a microbicide without condoms drops dramatically when the question is posed not as their being ''as effective as condoms,'' but only ''nearly as effective.'' This is important from the point of view of microbicide acceptability: people may be willing to switch condoms for a product that offers the same benefit, but may be reluctant to do it if the benefit is any lower. Given that microbicides are unlikely to be as effective as condoms, this result indicate that there will probably not be a heavy migration from condom use to microbicide use.

Relatively few respondents, even among those who reported UAI, endorsed using a microbicide that was less effective than a condom but better than nothing. As one would expect that some protection is better than no protection, this is a puzzling finding that requires more exploration. However, it is encouraging that HIV-positive respondents and those who had UAI in the preceding year were more likely to respond affirmatively to this question.

There are some limitations regarding the sample. It is a household sample of adult MSM living in San Francisco. To the extent that MSM youth and homeless or institutionalized MSM are not represented, and that the San Francisco MSM population may have unique characteristics, the findings may be limited in generalizability to other groups of MSM. Even so, the data

represent a randomly selected sample of gay and other MSM. Most studies of this hard-to-reach population rely on convenience samples, which have far more significant limitations in terms of generalizability.

In sum, a large number of MSM, including those who are HIV-positive, have had UAI in the previous year. Of these, a relatively high number used N-9, suggesting a willingness on the part of some MSM to use alternative HIV prevention options in lieu of condoms. Microbicides might be one alternative. Yet, the expectation many have that microbicides will be as effective as condoms in preventing HIV transmission will be difficult to meet at this point.

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