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Awareness of post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) is low but interest is high among men engaging in condomless anal sex with men in Boston, Pittsburgh, and San Juan

Curtis Dolezal[1], **Timothy Frasca**[1], **Rebecca Giguere**[1], **Mobolaji Ibitoye**[2], **Ross D. Cranston**[3], **Irma Febo**[4], **Kenneth H. Mayer**[5], **Ian McGowan**[6], and **Alex Carballo-Diéguez**[1]

[1]HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, USA

[2]Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University, New York, USA

[3]Department of Medicine, University of Pittsburgh, Pittsburgh, PA, USA

[4]Department of Pediatrics, Gama Project, University of Puerto, Rico Medical Sciences Campus, San Juan, Puerto Rico

[5]The Fenway Institute, Fenway Health, and Harvard Medical School, Boston, MA, USA

[6]Magee-Womens Research Institute, University of Pittsburgh, Pittsburgh, PA, USA

Abstract

This study examines awareness of and experiences with post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) among 228 men recruited in Boston, Pittsburgh, and San Juan between 12/2010–6/2012. All of them reported having condomless anal sex with a man in the prior year. Overall, 41% had heard of PEP, ranging from 16% in San Juan to 64% in Boston. Only 21% had heard of PrEP, ranging from 8% in San Juan to 36% in Boston. Three had used PEP, and none had used PrEP. After the methods were described to participants, interest in both was high, with intentions to use PEP and PrEP respectively at 9.1 and 7.7 (10-point scale). Increased public education is needed to raise awareness of these HIV prevention methods, especially among MSM who acknowledge potential risk behavior. It also seems likely that many such men would use these methods once they become aware of them.

Keywords

PEP; PrEP; MSM; HIV-prevention

Corresponding author: Curtis Dolezal, Tel: 646-774-6908, dolezal@nyspi.columbia.edu.

INTRODUCTION

For the first years of the HIV epidemic, condom use was practically the only method available for preventing HIV transmission through sexual contact. In recent years, researchers have made considerable progress with alternative prevention methods, such as post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP).

PEP involves taking antiretroviral drugs after being exposed to HIV. This practice was initially evaluated in health care workers with occupational exposure to HIV. An early study reported an 81% reduction in the risk for becoming HIV infected when workers were treated with zidovudine following needle stick injuries (Katzenstein et al., 2000). Subsequently, PEP was demonstrated to be safe and feasible to treat non-occupational exposures as well (Kahn et al., 2001; Schechter et al., 2004). In 2005, the U.S. Centers for Disease Control and Prevention (CDC) recommended a 28-day course of highly active antiretroviral therapy for anyone who has a non-occupational exposure to blood or genital secretions from a known HIV-positive individual (Smith et al., 2005).

PrEP involves a daily dose of antiretroviral drugs (currently tenofovir with or without emtricitabine are the only medications with demonstrated efficacy for this indication) to reduce the likelihood of HIV transmission from subsequent exposures. An early demonstration of this approach used ziovudine to reduce maternal–infant transmission (Connor et al., 1994). In the iPrEx study, an international randomized clinical trial involving 2441 men who have sex with men (MSM), PrEP was associated with a 44% reduction in HIV acquisition (Grant et al., 2010). When analyses were limited to those with detectable levels of the drugs in blood tests, the reduction was as high as 92%. A later study, the Partners PrEP trial of 4,758 serodiscordant heterosexual couples (Baeten et al., 2012) showed 66% efficacy for women and 84% for men among those taking combination PrEP. PrEP was also demonstrated to be effective among heterosexual men and women in Botswana (Thigpen et al., 2012) and IDUs in Thailand (Choopanya et al., 2013). Although some studies failed to produce statistically significant effects, this was typically attributed to poor medication adherence (e.g., the FEM-PrEP trial, Van Damme et al., 2012 and VOICE, Marrazzo et al., 2013). A recent meta-analysis of seven randomized, controlled trials showed PrEP was effective at reducing HIV infections in high-risk populations (Jiang et al., 2014). Early results from a recent trial among MSM in the UK found PrEP so protective against HIV that the study design was modified to provide PrEP to the deferred treatment arm ahead of schedule (PROUD, 2014). In May, 2014, the U.S. Public Health Service published guidelines that recommended PrEP be considered for all HIV-uninfected individuals who are at risk for HIV. This includes those in HIV serodiscordant relationships, those in non-monogamous relationships, gay and bisexual men who engage in condomless anal sex, and people who inject drugs (CDC, 2014).

Of course, for these methods to have an impact on the HIV epidemic, people must be aware that they are available and use them as indicated. For example, for PEP to be effective, treatment must begin within 72 hours after exposure. Similarly, to initiate a PrEP regimen, an individual must seek healthcare; therefore, awareness of these methods is an important first step in incorporating them into HIV prevention strategies.

Awareness of PEP and PrEP is surprisingly low even among populations that might have strong motivations to learn of and use these methods. For example, among gay and bisexual men awareness of PEP ranged from 19 percent of men at a London genitourinary clinic (de Silva, Miller, and Walsh, 2006) and 28 percent in a Boston-based survey (Mimiaga, Case, Johnson, Safren, and Mayer, 2009) to 47 percent in a larger, California-based sample (Liu et al., 2008). By contrast, people already HIV-infected sometimes reported much higher awareness, such as 52 percent in a London survey of men attending an HIV clinic (de Silva, Miller, and Walsh, 2006) and 70 percent of sexually active clients of an HIV clinic in France (Rey et al., 2007). However, higher knowledge among HIV-positive persons was not consistent: another London-based study found that only 20 percent of women attending an HIV clinic had heard of PEP (Samuel et al., 2008).

Reported awareness of PrEP is even lower, ranging from only 12 percent of men attending a Toronto HIV testing clinic (Leonardi, Lee, and Tan, 2011), 16 and 19 percent respectively in the California and Boston studies cited above (Liu et al., 2008; Mimiaga, et al., 2009), to 22 percent of a gay sample in Washington State (Barash and Golden, 2010). Curiously, an online sample of 329 MSM in New York City found much higher awareness at 38 percent of the total (Rucinski et al., 2013) while 63 percent of men in serodiscordant couples sampled in San Francisco reported knowing of PrEP although this figure was probably inflated due to confusion between PEP and PreP (Saberi et al., 2012). In summary, PrEP awareness remains very low among gay and bisexual men who, when asked, simultaneously report high levels of interest in using the method (Leonardi, Lee, and Tan, 2011).

This study examines awareness of and experiences with PEP and PrEP in a sample of MSM. Unlike the previously reported studies, we only selected participants who reported engaging in recent condomless anal sex and would therefore meet the current guidelines to be considered for PrEP use. Participants were recruited in three American cities: Boston, Pittsburgh, and San Juan.

METHODS

These analyses are based on the baseline sample from a multi-stage project designed to study rectal microbicide safety and acceptability in young MSM (AUTHORS). Participants were recruited between December, 2010 and June, 2012 at three sites: Fenway Health in Boston, MA; the University of Pittsburgh in Pittsburgh, PA; and the University of Puerto Rico in San Juan, PR. The study received IRB approval from all three participating institutions. The sample was recruited through advertisements in newspapers and on Craigslist, social media, postings to MSM websites, and face-to-face recruitment in clinics, bars, clubs, and social events.

To be eligible for the first stage of this study, men had to be from 18 to 30 years of age, be sexually active (at least one occasion of receptive anal intercourse in the past month), and report potential sexual risk (at least one occasion of condomless, receptive anal intercourse in the past year). Men agreed to complete a physical exam (including an anorectal exam), testing for several STDs including HIV, and surveys of their medical history and sexual behavior. As part of their baseline assessment, men completed a computer-assisted self-

interview (CASI) that included questions on demographics, sexual behavior, HIV testing history, STIs, and PEP/PrEP. A brief explanation of PEP and PrEP preceded questions on those methods. For PEP, “Another HIV-prevention method that is being explored is called Post-Exposure Prophylaxis, also known as PEP or ‘morning after pill(s).’ People who may have been exposed to HIV take anti-HIV drugs after the fact to avoid, or at least decrease, the chances of becoming infected, although the ability of this method to prevent sexually transmitted HIV-infections in humans has not been clearly demonstrated.” And for PrEP, “Another HIV-prevention method being studied is called Pre-Exposure Prophylaxis, or PrEP. People who use Pre-Exposure Prophylaxis, or PrEP, might have to take a pill either every day or at least a couple of hours prior to sex, to counteract or at least decrease the chances of becoming infected if they came in contact with HIV.” Participants were then asked if they had ever heard about the method. If yes, they were asked questions about their experiences with the method, including when and how they first heard of it, if they or their friends had ever used it and, if so, which medication they took and how they got it; for PEP, additional questions included how concerned they would be about side effects, if they would know how to access it, and if they could afford it. All participants were asked how likely they would be to use PEP (“How likely would you be to use PEP if you suspected you may have been exposed to HIV?”) and PrEP (“If PrEP were available, how likely would you be to use it?”).

Data Analysis

For demographic and sexual behavior variables, descriptive statistics were generated for the total sample and separately by study site. The 3 sites were compared using ANOVAs for continuous variables and chi-square tests for dichotomous/categorical variables. Due to skewed distributions, sexual behavior variables were log-transformed prior to statistical analyses. In these comparisons, awareness of PEP/PrEP was found to differ dramatically by site. Therefore, logistic regressions were used to determine whether demographic/sexual history data would statistically explain the awareness differences found among the 3 sites. Two regressions were conducted predicting the odds of having heard of PEP or PrEP. All demographic, sexual behavior, frequency of HIV testing, and history of an STI variables were included in these regressions (except race/ethnicity because of the high degree of overlap with site). Site was dummy-coded specifying San Juan as the reference category. Finally, for those who had heard of PEP or PrEP, additional descriptive data were reported regarding their knowledge of and experience with the products.

RESULTS

A description of the sample is shown in Table 1. There were some significant differences among the three sites. Boston participants had been tested more frequently for HIV (7.6 times compared to 4.5 for Pittsburgh and 4.9 for San Juan). Puerto Rican participants, who obviously were more likely to report being Latino, were also less likely to report ever having an STD (15% compared to 30% for Pittsburgh and 35% for Boston). Whereas a majority of the Boston participants (64%) and nearly half (47%) of Pittsburgh participants had heard of PEP, only 16% of those in San Juan knew of it. Knowledge of PrEP was lower across all

sites and followed a similar pattern: lowest levels of awareness were among Puerto Ricans (8%), compared to 19% of Pittsburgh participants and 36% of those in Boston.

After reading a brief description of these methods, all participants were asked about the likelihood that they would use them in the future. Participants were especially likely to say they would use PEP in the future, scoring an average of 9.1 (on a 10-point scale, with 10 being extremely likely). Intentions were also quite high for PrEP use in the future (7.7).

Two logistic regressions (data not shown) were conducted predicting having heard of PEP or PrEP. Since bivariate analyses showed major differences in knowledge among the 3 sites, these regressions were conducted to determine whether site differences could be explained by the demographic and sexual behavior/history variables in Table 1 (except race/ethnicity, due to the overlap with site) which were included as IVs in the regression models. In the model predicting having heard of PEP, site was the only significant predictor. Compared to Puerto Rican participants, those in Pittsburgh were 5.7 times more likely to have heard of PEP (CI = 2.1–15.5; p = .001) and those in Boston 10.1 times more likely (CI = 3.7–27.5; p < .001). In the regression predicting awareness of PrEP, Boston participants were 6.4 more likely to know of this method than Puerto Ricans (CI = 2.0–20.1; p = .002). The only other significant predictor was having had an STD (OR = 2.7; CI = 1.0–7.5; p = .049).

Table 2 shows additional data from the 2 subsamples who had heard of PEP (n=94) and PrEP (n=48). Actual experience using either product was extremely low: 3 had used PEP, and none had ever used PrEP. In addition, very few had friends who had used these products. Common sources of information about PEP were the media, friends, medical providers, and the Internet. Only 11% were concerned about PEP side effects; while most (68%) felt they would know how to get PEP, nearly two-thirds anticipated that they would not be able to afford it. (These three questions were not asked about PrEP, since it was not yet available at the time of the study.)

DISCUSSION

More than half of the men had not heard of PEP, even though they were surveyed several years after PEP had been recommended for non-occupational exposures. It is less surprising that awareness of PrEP was low (only one-fifth of the men had heard of taking a pill daily to prevent HIV), given that the surveys took place prior to the 2014 CDC/Public Health Service guidelines for its use (although interim guidelines had existed previously). Given the advances that have taken place since then, it seems very likely that awareness of PrEP would be higher if the survey were conducted today. These findings are consistent with other studies that have reported low levels of awareness of PEP and PrEP (de Silva, Miller, and Walsh, 2006; Liu et al., 2008; Mimiaga, Case, Johnson, Safren, and Mayer, 2009; Mimiaga, et al., 2009; Barash and Golden, 2010; Leonardi, Lee, and Tan, 2011). However, given that our eligibility criteria included having had condomless intercourse in the prior year, our findings provide a unique insight in the low levels of awareness about PEP and PrEP in the population that could profit the most of these methodologies.

Knowledge of PEP and PrEP varied widely by site, with lowest levels found in San Juan. The vast majority of men in San Juan had not heard of either method. Highest levels of awareness were found in Boston. Fenway Health is a hub of services, research, and education specifically for the LGBT community, so it is reasonable that men recruited in this setting might have more access to HIV-related information. Fenway Health was a site for the first two PrEP studies in MSM in the US, the CDC PrEP safety study and the iPrEX study. Nevertheless, even at this site, a third of the men had never heard of PEP and two-thirds had never heard of PrEP.

The use of medications to prevent HIV is an important development in the fight against the disease. However, their availability is of no value if people are not aware of their existence. Our findings clearly indicate the need for increased education to raise awareness about these alternative prevention methods. Health departments, community organizations, and health care providers can all contribute to such efforts.

The CDC has webinars and programs, as well as funding, to support state and local health departments in PrEP implementation. They also provide extensive information on PEP and PrEP online which can be a good resource for education/outreach programs. A substantial proportion of the men who knew of PEP/PrEP had learned of them through the media or online; social media also could provide channels for disseminating information. In addition, many (22–23%) of these men heard about the methods from a medical provider. Physicians should be encouraged to discuss them with patients who may be at risk for HIV and to provide materials describing their use and effectiveness.

Information about cost and payment options is also crucial. Nearly two-thirds of men who had heard of PEP assumed they could not afford it. Although these drugs are very expensive, there are a variety of options for people who receive a prescription but cannot afford it. For victims of sexual assault, PEP may be reimbursed through the Office for Victims of Crime (http://www.ojp.usdoj.gov/ovc/map.html). For others, PEP and PrEP are covered by most health insurance policies and by Medicaid in some states. For those who do not have insurance that covers outpatient medications, health care providers can apply to medication assistance programs (e.g., Gilead’s Prescription Assistance).

One encouraging finding is that these methods seem to be very appealing to these men. Most said they would be very likely to use them in the future, suggesting that lack of awareness is a primary barrier.

This study has several limitations. First, data were collected in 2010–2012. Although PEP had been recommended for non-occupational HIV-exposures since 2015, the effectiveness of PrEP was still being tested at the time of this study, and was not widely recommended for use in the U.S. until 2014. Much more information on these methods has become available since 2010-12, so it is very likely that knowledge of their availability is currently much more widespread.

In addition, our study is based on a convenience sample and is not generalizable to all US MSM. To qualify for the study, men had to be engaging in substantial sexual risk and be willing to participate in a study that involved using a rectal microbicide. These criteria may

select men who are more open to alternative prevention methods than men who would not agree to this study. So interest in using methods such as PEP/PrEP, may be naturally higher among our study participants than MSM in general. Furthermore, the recruitment sites were quite different from each other. Because Fenway has an important history of serving the gay community, exposure to information was more likely at that site than among the larger population even of MSM in Boston. It is possible that in all three cities, men accessible to each recruitment site are not necessarily even representative of other MSM in that city. A larger, representative sample could provide a more accurate estimate of actual PEP/PrEP awareness among MSM.

Finally, these data come from a study with a primary focus on the safety and acceptability of a microbicide gel. PEP and PrEP use and experiences were assessed in a relatively brief section of the study's baseline survey. As a result, we cannot provide a more extensive analysis of attitudes, facilitators, barriers, peer norms, strategies for use, etc. for these methods. So this paper provides only basic information about knowledge of and experiences using PEP/PrEP. Finally, data from those who had actually heard of the methods (Table 2) were available for only a small subsample of our participants and, although only descriptive, should be interpreted with caution.

CONCLUSIONS

PEP and PrEP can be important parts of public health efforts to prevent the spread of HIV. All of the men in this study had engaged in recent unprotected anal sex with men, so they are one of the populations explicitly noted in the Public Health Service guidelines as potential candidates for PrEP use. Yet most were not even aware that these methods were available. Hopefully increased public outreach and education will address this deficiency so that PEP and PrEP can fulfill their public health potential.

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Table 1

Sample description and site comparison of men who have sex with men from Boston, Pittsburgh, and San Juan, 2010–2012.

	Total (N=228)	**Boston (N=81)**	**Pittsburgh (N=62)**	**San Juan (N=85)**	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p[1]
Age	23.1 (3.3)	23.8 (3.4)	22.7 (3.2)	22.8 (3.2)	.070
Education[2]	4.3 (1.1)	4.3 (1.2)	4.2 (1.0)	4.3 (1.0)	.987
Annual income	14,249 (14,646)	18,516 (15,198)	16,123 (15,140)	7,766 (11,097)	<.001
Times tested for HIV	5.7 (8.5)	7.6 (12.8)	4.5 (3.8)	4.9 (4.9)	.044
	Median (Range)	Median (Range)	Median (Range)	Median (Range)	p[1]
Number of male partners, 3 mo.[3]	3 (1–70)	3 (1–50)	2.5 (1–20)	4 (1–70)	.099
Frequency of unprotected receptive anal sex, 3 mo.[3]	3 (0–160)	3 (0–50)	2 (0–78)	3 (0–160)	.228
Frequency of unprotected insertive anal sex, 3 mo.[3]	1 (0–150)	1 (0–40)	1 (0–35)	2 (0–150)	.386
	%[4]	%[4]	%[4]	%[4]	p[1]
Race/Ethnicity					<.001
White	41	58	74	1	
Latino	44	20	2	99	
African American	9	7	23	0	
Other/mixed	6	15	2	0	
Sexual self-label					.252
Gay	80	74	85	82	
Bisexual	20	25	15	18	
Straight[5]	1	1	0	0	
Currently employed	61	57	73	57	.099
Currently student	45	36	52	50	.096
Ever had an STD	26	35	30	15	.010
Ever heard of PEP[6]	41	64	47	16	<.001
Ever heard of PrEP[6]	21	36	19	8	<.001

	Total (N=228)	Boston (N=81)	Pittsburgh (N=62)	San Juan (N=85)	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p[1]
How likely to use PEP[7]	9.1 (1.9)	9.2 (1.5)	9.4 (1.5)	8.8 (2.4)	.121
How likely to use PrEP[7]	7.7 (2.4)	7.3 (2.4)	7.7 (2.4)	8.2 (2.5)	.065

[1] p-values comparing 3 sites using ANOVAs for continuous and chi-square tests for categorical variables

[2] Measured using a 7-point scale: 5=college graduate

[3] Values log-transformed prior to ANOVA due to skewed distributions

[4] Percents are of those with non-missing data

[5] One straight identified man excluded from chi-square test

[6] PEP = post-exposure prophylaxis; PrEP = pre-exposure prophylaxis

[7] Measured on a 10-point scale: 10 = extremely likely

Table 2

Experiences with PEP/PrEP[1] among men who have sex with men from Boston, Pittsburgh, and San Juan, 2010–2012.

	Heard of PEP (N=94)	Heard of PrEP (N=48)
	%[2]	%[2]
Have used in the past	3	0
Have friends who have used	10	2
Source of PEP/PrEP knowledge		
Media	28	29
A friend	26	23
Medical provider	22	23
Online	20	21
A sex partner	5	8
Would not use due to concern about side effects	11	NA[3]
Would know how to get it	68	NA[3]
Could not afford	62	NA[3]

[1] PEP = post-exposure prophylaxis; PrEP = pre-exposure prophylaxis

[2] Percent of those who had heard of PEP/PrEP with non-missing data

[3] NA = not asked