Published in final edited form as:

AIDS Behav. 2014 September ; 18(9): 1694–1700. doi:10.1007/s10461-014-0778-z.

Willingness to use HIV pre-exposure prophylaxis among opiate users

Michael Stein^{1,2}, Portia Thurmond^{1,3}, and Genie Bailey^{2,3}

¹General Medicine Research Unit, Butler Hospital, Providence, RI, 02906

²Warren Alpert Medical School of Brown University, Providence, RI, 02912

³Stanley Street Treatment and Resources, Inc., Fall River, Massachusetts 02720

Abstract

Few studies of pre-exposure prophylaxis (PrEP) to prevent HIV infection have focused on drug users. Between February to September 2013, we asked 351 opiate injectors entering detoxification treatment about HIV risk, knowledge about PrEP, and willingness to use a once daily PrEP pill under one of two randomly assigned effectiveness scenarios –40% (low) or 90% (high) effective in reducing HIV risk. Participants were 70% male and 87% non-Hispanic White. Only 7% had heard of a drug to reduce HIV risk, yet once informed, 47% would be willing to take such a pill [35% of those in the low effectiveness scenario and 58% in the high group ($p < .001$)]. Higher perceived HIV risk was associated with greater willingness to take medication. Increasing knowledge of PrEP and the rate of HIV reduction-effectiveness promised will influence its use among targeted high-risk drug users.

Keywords

Pre-exposure prophylaxis; PrEP; HIV/AIDS; injection drug use

INTRODUCTION

The incidence of new HIV infections related to injection drug use has remained at 15–20% in the United States over the past decade (1). While harm reduction practices have stabilized this rate among groups of injectors in the US, new infections continue to be a public health concern (1–3). Encouraging clean needle and syringe use, avoidance of shooting galleries, and more frequent HIV testing are methods used to ameliorate the health risks posed by ongoing drug use (4–6). Substance abuse treatment is also part of this paradigm and has contributed toward decreasing HIV risk among those ready to abstain from drug use (7, 8).

Pre-exposure prophylaxis (PrEP), or using daily oral antiviral therapy as a preventive measure, has been effective in limiting sexual transmission of HIV in several different

---

Corresponding Author: Michael D. Stein, M.D., Professor of Medicine, Health Services, Policy & Practice, Alpert School of Medicine at Brown University, Butler Hospital, 345 Blackstone Blvd., Providence, RI 02906, Telephone: (401) 455-6646, FAX: (401) 455-6618, Michael_Stein@brown.edu.

Trial registered at clinicaltrials.gov; Clinical Trial #NCT01751789

populations. Most studies have recruited persons who are primarily at risk for sexual transmission (9–16). For instance, Grant et al., (12) reported a 44% reduction in HIV incidence among a population of men who have sex with men (MSM) taking tenofovir as PrEP, Thigpen et al., (15) reported a 62% reduction in heterosexual men and women, and Baeten et al., (9) reported a 75% reduction in heterosexual couples. More recently, Choopanya et al. (17) demonstrated a 44% decrease in HIV incidence among injection drug users in Thailand prescribed tenofovir to prevent HIV infection, with a 74% reduction observed in participants with detectable tenofovir concentrations. Based on these trials, the CDC has made recommendations for the use of once-daily, combined tenofovir plus emtricitabine as PrEP in drug injectors at very high risk for HIV acquisition (11). However, given the wide range in reported effectiveness from previous studies, clinicians may be uncertain about how to represent PrEP's effectiveness when first introducing it to a client. This, in turn, could influence a client's willingness to take the medication.

Whether American drug injectors would be interested in receiving PrEP has not been explored (18). According to the National Survey on Drug Use and Health, approximately 2 million persons are opioid dependent, with an estimated 15% receiving treatment (19). The great majority of illicit opioid users, and especially those who use drugs intravenously, do not receive substance abuse treatment and are at high risk for experiencing the adverse health consequences of drug use, including HIV infection (20).

Drug users who may be at risk for HIV, and who could be candidates for PrEP, are identified in a variety of health care settings. Inpatient drug detoxification programs are among the most common sites where drug users, both injectors and non-injectors, initiate substance abuse treatment. The Substance Abuse and Mental Health Services Administration (SAMHSA) estimated in 2001 that one quarter of all inpatient admissions for treatment were to a detoxification facility, of which 33% were for opiate treatment (21). Detoxification provides patients with a medically supervised protocol to mitigate drug withdrawal symptoms, begin counseling, and access further treatment modalities after discharge (22). Relatively brief inpatient substance abuse treatment also provides an excellent time to discuss HIV risk via injection drug use and risky sexual behaviors. This setting may be a place to introduce and initiate PrEP for those at-risk who are entering medical care.

The purpose of the current study was to examine American opioid users' knowledge of, attitudes towards, and willingness to use PrEP. We recruited drug users admitted to a detoxification program in Massachusetts, which has one of the nation's highest rates of opioid addiction (23): 1) to examine the extent to which drug users are knowledgeable of PrEP, 2) whether perceived HIV risk is associated with willingness to take PrEP, and 3) whether level of PrEP effectiveness will influence willingness to take the medication.

METHODS

Participants

Between February 2013 and September 2013, consecutive persons seeking opioid detoxification were approached at the time of admission to Stanley Street Treatment

Addiction and Recovery, Inc. (SSTAR) in Fall River, Massachusetts to participate in a survey research study. SSTAR's program has 38 beds and is a 24-hour medically supervised treatment facility that provides evaluation and withdrawal management. Services are delivered by nursing and counseling staff under a physician-approved protocol with 24-hour physician and psychiatric consultation available. The mean length-of-stay for opioid dependent admissions is 5.9 days.

To be eligible, participants had to be English-speaking opiate users (toxicologically confirmed), 18 years or older, and able to provide verbal informed consent as approved by the Butler Hospital Institutional Review Board. Patients were not compensated for completing the research survey, which took ten minutes to complete. Out of 661 patients admitted to SSTAR during the recruitment period, 489 were opiate users. Twenty-seven refused study participation and 462 completed an in-person interview with research staff. We limited the analysis to the 351 persons who reported drug injection in the past 30 days.

Measures

Data on demographics, drug use history, HIV serostatus, recent sexual partner drug use, and sexual identity were collected. Participants were asked, "What is your risk of becoming HIV infected in the next year?" Response options were: Very High, Moderately High, Average, Low, or No risk at all. Participants were asked, "Have you heard of a pill that is safe and effective in lowering transmission of HIV?" (24, 25).

After assessing perceived risk, participants were then randomly assigned to be asked the following question with one of two different treatment effectiveness levels (90%, 40%) provided: "Would you be willing to take a once a day pill every day to lower your risk 90% (or 40%) of becoming HIV positive?" Response options were "Definitely, Probably, Maybe, Probably Not, Definitely Not." After participants had responded to their willingness to take PrEP, using potential barriers to PrEP noted in other studies (26, 27), participants were asked (regardless of assigned PrEP effectiveness level), "How Likely would it be that you would use this medication IF...": 1) You needed to see a clinician every 3–6 months for a new prescription, 2) You needed to get a blood test every 3–6 months to check if the pill has affected your kidney function, 3) You needed to get a regular HIV test every 3–6 months, 4) You would be charged a co-pay (fee) when you pick up the medication at pharmacy, 5) It will not work as well if you don't use it daily, 6) If a friend found out you were taking it might suggest you were at risk for HIV, 7) You were afraid you'd take more risks than usual because you think you'd be protected, 8) You still needed to use condoms to protect against sex risk. Response options were "Very Unlikely," "Somewhat Unlikely," "Neutral," "Somewhat Likely," and "Very Likely". Finally, participants were asked "How likely would it be that you would share your medication with other people?" Responses were on a 5-point Likert scale, from "Very Likely" to "Very Unlikely."

Analytical Methods

We present descriptive statistics to summarize the characteristics of the cohort. T-tests for continuous variables and Pearson χ^2 -tests for categorical variables were used to compare persons assigned to the low (40%) and high (90%) PrEP effectiveness scenarios across a

range of background characteristics. These procedures were also used to describe and evaluate possible demographic and HIV-risk correlates of willingness to use PrEP. Before evaluating correlates of willingness to use PrEP, we used the likelihood-ratio chi-square statistic to test the hypothesis that these associations were conditional on assigned effectiveness scenario; specifically, we tested the first-order correlate by effective scenario interaction effect on willingness to use PrEP. Since all p-values were $> .05$ we do not report separate statistics for persons assigned to low and high PrEP effectiveness scenarios. Finally, we present descriptive statistics to identify potential barriers to use of PrEP.

RESULTS

Participants averaged 32.2 (± 10.1) years of age and 246 (70.1%) were male (Table 1). Most (86.6%) participants were non-Hispanic Caucasian; ethnicity was dichotomized to contrast non-Hispanic Caucasians to all other racial or ethnic minorities in subsequent analyses. Participants' mean years of education were 11.6 (± 1.9). All participants reported they were HIV negative or had never been tested. Eighty-eight (25.1%) participants said they had a partner who currently injected drugs. Just over half (54.9%) of the participants perceived they were at some risk for HIV. More specifically 137 (39.1%) reported they were low risk, 41 (11.7%) said they were at average risk, 10 (2.9%) reported they were at moderately high risk, and only 4 (1.1%) described their risk of HIV infection as very high; perceived HIV risk was dichotomized to compare those with any perceived risk to those with no perceived risk in subsequent analyses. Twenty-six (7.4%) participants reported they had heard of a drug to reduce HIV risk and 165 (47.1%) reported they would be willing to take a pill that could reduce risk of HIV.

The assigned effectiveness scenario was not associated significantly with age, gender, ethnicity, educational attainment, having a partner who is an injection drug user, or having prior knowledge of PrEP (Table 1). Persons assigned to the high effectiveness scenario were 90% effective were significantly ($p < .05$) more likely to report being at risk for HIV (Table 1).

Willingness to take PrEP was not associated significantly with age, educational attainment, gender, ethnicity, partners' injection status, or prior knowledge of PrEP (Table 2). Rates of being willing to take PrEP were significantly higher ($p < .05$) among persons who perceived being at some risk for contracting HIV; 55.7% of persons who reported some HIV risk compared to 36.1% of persons who said they were not at risk for contracting HIV said they were willing to take PrEP. Additionally, willingness to take PrEP was associated significantly with effectiveness scenario ($p < .05$) (Table 2). Over half (58.2%) of the persons assigned to the high effectiveness scenario were willing to take PrEP compared with only 41.9% of persons assigned to the low effectiveness scenario.

Because effectiveness scenarios were associated significantly with perceived HIV risk, we also evaluated logistic regression models to control for potential confounding. After adjusting for perceived HIV risk, the estimated odds of willingness to take PrEP was 2.45 ($z = -3.83$, $p < .001$) times higher among persons randomized to the 90% effectiveness scenario. In the same model, the expected odds of willingness to take PrEP was 2.10 ($z =$

3.17, $p = .002$) times higher among persons who perceived at least some HIV risk. Finally, we tested the first-order effectiveness scenario by perceived HIV risk interaction; there was no evidence ($OR = 1.00$, $z = 0.00$, $p = .996$) of significant conditional effects.

Participants who reported they were willing to take a medication to reduce the risk of HIV infection were asked to rate how likely or unlikely they would be to take the medication if confronted with requirements that might present barriers to use. Table 3 gives the percentage reporting they would be somewhat or very unlikely to use PrEP if faced with each of these potential barriers. Over 1/3 (36.2%) of persons who expressed a willingness to take PrEP said that being charged a co-pay would make it somewhat or very unlikely that they would take the medication. Other potential barriers with relatively high endorsement rates were being informed that the medication would not work as well if not taken daily (23.3%), and being afraid of taking more risks because they think of themselves as protected (22.7%). Potential barriers such as a need for regular blood tests (11.0%), a need to continue to use condoms (11.8%) to protect against sex risk, a need to regularly see a clinician (9.2%), and a need for regular HIV testing (6.8%) had relatively low rates of endorsement.

Participants were also asked about their willingness to share the medication with others; 10 (6.1%) reported they were very likely to share, and 11 (6.7%) that they were somewhat likely.

DISCUSSION

In this sample of opiate dependent drug injectors, few participants were aware of PrEP medication to decrease HIV risk, suggesting that a greater dissemination of recent research and clinical options to at-risk populations is needed. Still, when presented with information about a medication that could reduce HIV risk, 47% of drug users indicated they would be willing to use this preventive therapy. The perception of being at any risk for acquiring HIV and greater presumed effectiveness of the medication was each associated with greater willingness to use PrEP. Previous surveys have assessed awareness of PrEP primarily in cohorts of men who have sex with men (MSM). Rates of having heard of PrEP were lower in our group of drug users compared to earlier MSM studies (24–26, 28–31).

Limited knowledge of PrEP may be due to a low proportion of MSMs in this cohort (although these data were not collected) or to low rates of HIV in this locale, providing less experience with PrEP as a preventive strategy. In addition, the FDA had approved a label indication for use of a PrEP pill for MSMs and heterosexually active men and women in July 2012, only nine months prior to the start of our data collection. In June 2013, mid-way through our data collection period, interim CDC guidelines recommended providing PrEP to IDUs “at very high risk for HIV acquisition.” With the completion of intervention trials and CDC guidelines suggesting use of PrEP in high-risk populations, interest in PrEP should expand in the US. Increasing awareness of PrEP will be important for drug injectors, and information should be delivered in settings where drug users seek substance abuse treatment and HIV testing.

The overall perception of HIV risk among respondents was low in this cohort of primarily drug injectors. Still, we found that injectors perceived themselves to be at higher HIV risk than non-injectors and were more willing to use PrEP. While our survey did not assess specific HIV drug risk behaviors (sharing drug paraphernalia), or sex risk behaviors (frequency of condom use), injectors and those whose romantic partners were injection drug users also reported greater willingness to use PrEP. These findings suggest that participants are making logical assessments of their own and their partner's HIV risks when deciding about PrEP use (18). We identified no sociodemographic characteristics that were associated with potential uptake of PrEP among drug users. Other studies have suggested that women at increased risk for HIV may be more likely to use PrEP (32).

A novel aspect of this study was our investigation of whether willingness to use PrEP would be associated with a given estimate of preventive effectiveness. We used two levels of medication effectiveness that approximated levels noted in prior studies. We proposed a reduction of 40% based on sexual risk intervention studies, which was close to the rate later reported in a Thai study of drug injectors, and a rate of 90% based on reductions reported among subpopulations in PrEP sexual risk trials where participants were highly medication adherent (12, 16, 17). We found, as predicted, that higher estimated medication effectiveness was associated with greater willingness to use PrEP, and multivariate analysis indicated that both perceived risk and estimated medication effectiveness had independent associations with willingness. How clinicians frame the effectiveness of PrEP to potential recipients — varying by the decision of which findings from which trials to discuss — will influence patient preferences. Using intent-to-treat data from trials or results limited to participants with detectable tenofovir concentrations will likely produce different acceptance rates from high-risk persons.

We were also interested in factors related to taking a once-daily medication that might discourage persons from using PrEP. Similar to findings described in previous studies (27, 32), cost will likely be the major barrier to PrEP among drug users. The monthly cost of PrEP will be substantial and it is unlikely that state health departments will devote meaningful parts of their funds to this purpose; whether private insurance companies are willing to cover PrEP remains to be seen. The risks of medication non-adherence and being afraid of taking more behavioral risks while on PrEP were also barriers to acceptance. Medication adherence can be problematic among HIV-positive drug injectors, particularly those who continue to inject cocaine (33), and close follow-up after provision of PrEP will be in order. Of interest was respondents' concern that PrEP might provide the opportunity to engage in drug equipment sharing and unprotected sex; such behavioral dis-inhibition and risk compensation has also been noted by MSMs (25, 27). Unlike findings in other studies about willingness to take PrEP, more frequent HIV testing, frequent prescription renewal, and blood testing for renal function were not barriers to acceptance (18, 30, 32, 34, 35). We did not assess whether or which medication side effects would be important barriers to PrEP use. Finally, we found that a majority of participants willing to take the medication reported not being willing to share their medication in contrast to what is reported in the literature in other at-risk populations (26). If sharing were to occur it implies that there will be some degree of non-adherence by the study participant; sharing may also put the recipient at some risk for side effects. Whether intermittent sharing with another high-risk person has some

protective effect for that person as well is uncertain. The risks posed by sharing or borrowing antiretrovirals will need to be described at the time of prescription.

This study had several limitations. First, the participants asked to participate in this study were opiate dependent persons presenting for detoxification at one treatment program. Second, a large proportion of the sample was white and non-Hispanic, and our findings may not generalize to other ethnic groups. Third, participants may under-report stigmatized behaviors such as drug injection. Fourth, we did not ask participants to report their willingness to use PrEP after taking into account their full list of potential barriers to use; this strategy would likely have resulted in a lower willingness to use PrEP. Finally, willingness to take PrEP may not predict actual acceptance of PrEP. Still, intention often predicts health behaviors, and the Theory of Reasoned Action/ Planned Behavior (36) has been helpful in predicting the acceptance of other HIV prophylactic behaviors (37).

Our list of potential barriers to use would offer some insight into why drug injectors might not use PrEP if it were available. In addition to patient factors, insurance coverage and the difficulty of finding providers who would offer treatment and follow patients receiving PrEP will also be a challenge. If widely administered, the impact of PrEP on HIV incidence would depend on its effectiveness in community-based (non-research) samples. PrEP could reduce both drug-related and sex-related HIV transmission, but understanding PrEP's effect on HIV drug and sex risk behaviors will be critical. One of the risks of PrEP is that IDUs will reduce their use of proven prevention strategies such as avoiding sharing of injection equipment or condom use. Because no single strategy will be 100% effective, the use of all available methods — pharmacological, medical and behavioral — will be necessary.

Our findings shed light on the acceptability of PrEP among a population of injection drug users in New England. Although there have been several studies assessing acceptance of PrEP among persons engaging in risky sexual behaviors, this is the first examination of attitudes regarding PrEP among a group of drug users, who might have injection drug risk as well as sexual risk, the very population that Choopanya et al's (17) recent studies addressed in Asia. These data should assist in counseling discussions of ways to decrease HIV risk. Clinical discussion of possible PrEP use must occur in parallel to a discussion of HIV risk. Increasing physician's awareness of patients' perceived and real barriers to PrEP is important and likely to improve treatment planning to maximize preventive outcomes. Public health officials will need to make recommendation as to how to target the use of PrEP to those most likely to benefit from this intervention, which will likely include drug injectors in some locales.

Acknowledgments

This study was funded by the National Institute on Drug Abuse (RO1 DA034261). Dr. Stein is a recipient of a NIDA Mid-Career Investigator Award (K24 DA00512).

References

1. Hall HI, Song R, Rhodes P, et al. Estimation of HIV incidence in the United States. *JAMA*. 2008; 300(5):520–9. [PubMed: 18677024]

2. Centers for Disease Control and Prevention. HIV Surveillance Report, 2008. Vol. 20. Atlanta, U.S: Jun. 2010 [1/4/12]
3. Prejean J, Song R, Hernandez A, et al. Estimated HIV incidence in the United States, 2006–2009. *PLoS One*. 2011; 6(8):e17502. [PubMed: 21826193]
4. Coyle SL, Needle RH, Normand J. Outreach-based HIV prevention for injecting drug users: a review of published outcome data. *Public Health Rep*. 1998; 113 (Suppl 1):19–30. [PubMed: 9722807]
5. Metzger DS, Navaline H. HIV prevention among injection drug users: the need for integrated models. *J Urban Health*. 2003; 80(4 Suppl 3):iii59–66. [PubMed: 14713672]
6. Vlahov D, Junge B. The role of needle exchange programs in HIV prevention. *Public Health Rep*. 1998; 113 (Suppl 1):75–80. [PubMed: 9722812]
7. Avins AL, Lindan CP, Woods WJ, et al. Changes in HIV-related behaviors among heterosexual alcoholics following addiction treatment. *Drug Alcohol Depend*. 1997; 44(1):47–55. [PubMed: 9031820]
8. Gossop M, Marsden J, Stewart D, Treacy S. Reduced injection risk and sexual risk behaviours after drug misuse treatment: results from the National Treatment Outcome Research Study. *AIDS Care*. 2002; 14(1):77–93. [PubMed: 11798407]
9. Baeten JM, Donnell D, Ndase P, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med*. 2012; 367(5):399–410. [PubMed: 22784037]
10. Interim guidance: preexposure prophylaxis for the prevention of HIV infection in men who have sex with men. *MMWR Morb Mortal Wkly Rep*. 2011; 60(3):65–8. [PubMed: 21270743]
11. Update to Interim Guidance for Preexposure Prophylaxis (PrEP) for the Prevention of HIV Infection: PrEP for injecting drug users. *MMWR Morb Mortal Wkly Rep*. 2013; 62(23):463–5. [PubMed: 23760186]
12. Grant RM, Lama JR, Anderson PL, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. 2010; 363(27):2587–99. [PubMed: 21091279]
13. Marrazzo, JM.; Ramjee, G.; Nair, G., et al., editors. Pre-exposure prophylaxis for HIV in women: daily oral tenofovir, oral tenofovir-emtricitabine, or vaginal tenofovir gel in the VOICE Study (MTN 003); The 20th Conference on Retroviruses and Opportunistic Infections (CROI 2013); 2013; Atlanta, GA.
14. Mayer KH, Mimiaga MJ, Gelman M, Grasso C. Raltegravir, tenofovir DF, and emtricitabine for postexposure prophylaxis to prevent the sexual transmission of HIV: safety, tolerability, and adherence. *J Acquir Immune Defic Syndr*. 2012; 59(4):354–9. [PubMed: 22267017]
15. Thigpen MC, Kebaabetswe PM, Paxton LA, et al. Antiretroviral preexposure prophylaxis for heterosexual HIV transmission in Botswana. *N Engl J Med*. 2012; 367(5):423–34. [PubMed: 22784038]
16. Van Damme L, Corneli A, Ahmed K, et al. Preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. 2012; 367(5):411–22. [PubMed: 22784040]
17. Choopanya K, Martin M, Suntharasamai P, et al. Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial. *Lancet*. 2013; 381(9883):2083–90. [PubMed: 23769234]
18. Baral SD, Stromdahl S, Beyrer C. The potential uses of preexposure prophylaxis for HIV prevention among people who inject drugs. *Curr Opin HIV AIDS*. 2012; 7(6):563–8. [PubMed: 23076122]
19. Substance Abuse and Mental Health Services Administration. Results from the 2007 National Survey on Drug Use and Health: National findings. Rockville, MD: Office of Applied Studies; 2008. NSDUH Series H-34 DHHS Publication No. SMA 08–4343 ed
20. Stein MD, O'Sullivan PS, Ellis P, Perrin H, Wartenberg A. Utilization of medical services by drug abusers in detoxification. *J Subst Abuse*. 1993; 5(2):187–93. [PubMed: 8104569]
21. Substance Abuse and Mental Health Services Administration. The DASIS Report: Admissions for detoxification, 2001. Rockville, MD: Office of Applied Studies; 2004.
22. Center for Substance Abuse Treatment. SAMHSA/CSAT Treatment Improvement Protocols. Rockville (MD): Substance Abuse and Mental Health Services Administration; 1995. TIP 19:

- Detoxification From Alcohol and Other Drugs: Treatment Improvement Protocol (TIP) Series 19; DHHS Publication No. (SMA) 95–3046.
23. Substance Abuse and Mental Health Services Administration. Results from the 2006 National Survey on Drug Use and Health: National Findings. Rockville, MD: Office of Applied Studies; 2007. NSDUH H-32 DHHS Publication No. SMA 07–4293 ed
  24. Barash EA, Golden M. Awareness and use of HIV pre-exposure prophylaxis among attendees of a seattle gay pride event and sexually transmitted disease clinic. *AIDS Patient Care STDS*. 2010; 24(11):689–91. [PubMed: 20863247]
  25. Golub SA, Kowalczyk W, Weinberger CL, Parsons JT. Preexposure prophylaxis and predicted condom use among high-risk men who have sex with men. *J Acquir Immune Defic Syndr*. 2010; 54(5):548–55. [PubMed: 20512046]
  26. Smith DK, Toledo L, Smith DJ, Adams MA, Rothenberg R. Attitudes and program preferences of african-american urban young adults about pre-exposure prophylaxis (PrEP). *AIDS Educ Prev*. 2012; 24(5):408–21. [PubMed: 23016502]
  27. Brooks RA, Kaplan RL, Lieber E, Landovitz RJ, Lee SJ, Leibowitz AA. Motivators, concerns, and barriers to adoption of preexposure prophylaxis for HIV prevention among gay and bisexual men in HIV-serodiscordant male relationships. *AIDS Care*. 2011; 23(9):1136–45. [PubMed: 21476147]
  28. Liu AY, Kittredge PV, Vittinghoff E, et al. Limited knowledge and use of HIV post- and pre-exposure prophylaxis among gay and bisexual men. *J Acquir Immune Defic Syndr*. 2008; 47(2): 241–7. [PubMed: 18340656]
  29. Mansergh G, Koblin BA, Colfax GN, McKirnan DJ, Flores SA, Hudson SM. Preefficacy use and sharing of antiretroviral medications to prevent sexually-transmitted HIV infection among US men who have sex with men. *J Acquir Immune Defic Syndr*. 2010; 55(2):e14–6. [PubMed: 20859085]
  30. Mimiaga MJ, Case P, Johnson CV, Safren SA, Mayer KH. Preexposure antiretroviral prophylaxis attitudes in high-risk Boston area men who report having sex with men: limited knowledge and experience but potential for increased utilization after education. *J Acquir Immune Defic Syndr*. 2009; 50(1):77–83. [PubMed: 19295337]
  31. Mehta SA, Silvera R, Bernstein K, Holzman RS, Aberg JA, Daskalakis DC. Awareness of post-exposure HIV prophylaxis in high-risk men who have sex with men in New York City. *Sex Transm Infect*. 2011; 87(4):344–8. [PubMed: 21357600]
  32. Wingood GM, Dunkle K, Camp C, et al. Racial differences and correlates of potential adoption of preexposure prophylaxis: results of a national survey. *J Acquir Immune Defic Syndr*. 2013; 63 (Suppl 1):S95–101. [PubMed: 23673895]
  33. Malta M, Magnanini MM, Strathdee SA, Bastos FI. Adherence to antiretroviral therapy among HIV-infected drug users: a meta-analysis. *AIDS Behav*. 2010; 14(4):731–47. [PubMed: 19020970]
  34. Whiteside YO, Harris T, Scanlon C, Clarkson S, Duffus W. Self-perceived risk of HIV infection and attitudes about preexposure prophylaxis among sexually transmitted disease clinic attendees in South Carolina. *AIDS Patient Care STDS*. 2011; 25(6):365–70. [PubMed: 21470046]
  35. Aghaizu A, Mercey D, Copas A, Johnson AM, Hart G, Nardone A. Who would use PrEP? Factors associated with intention to use among MSM in London: a community survey. *Sex Transm Infect*. 2012
  36. Ajzen, I.; Fishbein, M. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall; 1980.
  37. Fisher WA, Fisher JD, Rye BJ. Understanding and promoting AIDS-preventive behavior: insights from the theory of reasoned action. *Health Psychol*. 1995; 14(3):255–64. [PubMed: 7641667]

Table 1

Background Characteristics by Assigned Probability of Protection.

		Probability of Protection		t (p =) or χ^2 (p =)
		40%	90%	
	<i>Mean (± SD) or n (%) (n = 351)</i>	<i>Mean (± SD) or n (%) (n = 167)</i>	<i>Mean (± SD) or n (%) (n = 184)</i>	
Age (Years)	32.2 (± 10.1)	32.9 (± 11.7)	31.7 (± 8.5)	−1.12 (.263)
Gender (Male)	246 (70.1%)	115 (68.9%)	131 (71.2%)	0.63 (.633)
Ethnicity				
non-Hispanic Caucasian	304 (86.6%)	143 (85.6%)	161 (87.5%)	
African-American	9 (2.6%)	4 (2.4%)	5 (2.7%)	0.48 (.923)
Hispanic	27 (7.7%)	14 (8.4%)	13 (7.1%)	
Other	11 (3.1%)	6 (3.6%)	5 (2.7%)	
Education (Years)	11.6 (± 1.9)	11.7 (± 1.8)	11.5 (± 1.9)	−1.31 (.192)
Knowledge of PrEP (Yes)	26 (7.4%)	12 (8.4%)	12 (6.5%)	0.44 (.506)
Partner IDU (Yes)	88 (25.1%)	44 (23.9%)	44 (26.4%)	0.29 (.599)
Perceived HIV Risk (Yes)	192 (54.9%)	81 (48.8%)	111 (60.3%)	4.69 (.030)

Table 2

Willingness to Take PrEP by Demographic Characteristics and Indicators of HIV Risk (n = 351).

Correlate	WILLING TO TAKE PrEP		<i>t</i> (<i>p</i> =)
	No	Yes	
	<i>Mean</i> ($\pm$ <i>SD</i>) (<i>n</i> = 186)	<i>Mean</i> ($\pm$ <i>SD</i>) (<i>n</i> = 165)	
Age (Years)	32.7 ($\pm$ 11.5)	31.8 ($\pm$ 8.4)	0.81 (.418)
Education (Years)	11.6 ($\pm$ 1.9)	11.5 ($\pm$ 1.9)	0.56 (.573)
	<i>n</i> (% ^a)	<i>n</i> (% ^a)	χ^2 (<i>p</i> =)
Gender			
Female	52 (49.5%)	53 (50.5%)	0.72 (.395)
Male	134 (54.5%)	112 (45.5%)	
Ethnicity			
Caucasian	164 (54.0%)	140 (46.0%)	0.83 (.361)
Minority	22 (46.8%)	25 (53.2%)	
Partner IDU			
No	146 (55.5%)	117 (44.5%)	2.68 (.102)
Yes	40 (45.5%)	48 (54.6%)	
Perceived HIV Risk			
No	101 (63.9%)	57 (36.1%)	13.44 (<.001)
Yes	85 (44.3%)	107 (55.7%)	
Knowledge of PrEP			
No	173 (53.2%)	152 (46.8%)	0.10 (.751)
Yes	13 (50.0%)	13 (50.0%)	
Effectiveness Scenario			
Low (40% Effective)	109 (65.3%)	58 (34.7%)	19.28 (<.001)
High (90% Effective)	77 (41.9%)	107 (58.2%)	

^aPercentages were calculated within rows and should be compared within rows.

Table 3

Potential Barriers to Taking a Pill to Reduce Risk of HIV Infection Among Persons Willing to Take a Pill (n = 165^a).

Item ^b	n (%) Very or Somewhat Unlikely
You would be charged a co-pay (fee) when you pick up the medication at the pharmacy?	59 (36.2%)
It would not work as well if you don't use it daily?	38 (23.3%)
You were afraid you'd take more risks than usual because you think you'd be protected?	37 (22.7%)
A friend found you were taking it, and it might suggest you were at risk for HIV?	27 (16.7%)
You needed to get a blood test every 3–6 months to check if the pill has affected your kidney function?	18 (11.0%)
You still needed to use condoms to protect against sex risk?	19 (11.8%)
You needed to see a clinician every 3–6 months for a new prescription?	15 (9.2%)
You needed to get a regular HIV test every 3–6 months.	11 (6.8%)

^a Observed n ranged from 161 to 165 due to item-specific missing values.

^b Participants were asked the following stem: "Would you be willing to take a once a day pill every day to lower your risk of becoming HIV positive? How likely would it be that you would use this medication IF..."