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Willingness to Take, Use of, and Indications for Pre-exposure Prophylaxis Among Men Who Have Sex With Men—20 US Cities, 2014

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Abstract

Background—Pre-exposure prophylaxis (PrEP) is an effective prevention tool for people at substantial risk of acquiring human immunodeficiency virus (HIV). To monitor the current state of PrEP use among men who have sex with men (MSM), we report on willingness to use PrEP and PrEP utilization. To assess whether the MSM subpopulations at highest risk for infection have indications for PrEP according to the 2014 clinical guidelines, we estimated indications for PrEP for MSM by demographics.

Methods—We analyzed data from the 2014 cycle of the National HIV Behavioral Surveillance (NHBS) system among MSM who tested HIV negative in NHBS and were currently sexually active. Adjusted prevalence ratios and 95% confidence intervals were estimated from log-linked Poisson regression with generalized estimating equations to explore differences in willingness to take PrEP, PrEP use, and indications for PrEP.

Results—Whereas over half of MSM said they were willing to take PrEP, only about 4% reported using PrEP. There was no difference in willingness to take PrEP between black and white MSM. PrEP use was higher among white compared with black MSM and among those with greater education and income levels. Young, black MSM were less likely to have indications for PrEP compared with young MSM of other races/ethnicities.

Conclusions—Young, black MSM, despite being at high risk of HIV acquisition, may not have indications for PrEP under the current guidelines. Clinicians may need to consider other factors besides risk behaviors such as HIV incidence and prevalence in subgroups of their communities when considering prescribing PrEP.

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Keywords

HIV; pre-exposure prophylaxis; PrEP; MSM; United States

Men who have sex with men (MSM) are at increased risk of human immunodeficiency virus (HIV) infection. Despite representing only 2% of the US population, MSM accounted for 65% of estimated HIV diagnoses in the United States in 2013 [1]. Among MSM, blacks are disproportionately affected by HIV. In 2010, black MSM accounted for 42% of estimated incident HIV infections attributed to male-to-male sexual contact, whereas blacks accounted for only about 12% of the US population [2, 3]. The largest number of new infections among black MSM (45%) occurred in those aged 13–24 years, and new infections increased 20% in this age group from 2008 to 2010 [2]. These data indicate a need for increased HIV prevention efforts to further reduce new HIV infections, especially among young, black MSM.

Pre-exposure prophylaxis, or PrEP, is an effective prevention tool for people at substantial risk of HIV infection [4]. When taken consistently, PrEP has been shown to reduce new HIV infections by up to 92% among MSM in randomized trials [5]. The US Food and Drug Administration approved a fixed-dose tablet containing tenofovir disoproxil fumarate and emtricitabine for use as daily oral PrEP in 2012, and PrEP is now covered by many health insurance plans [6]. In 2014, the Centers for Disease Control and Prevention (CDC) published clinical practice guidelines for PrEP use in populations at high risk of infection based on sexual or injection drug use behaviors [7]. For MSM, PrEP use is recommended for HIV-uninfected adults with a male sex partner in the past 6 months, for those who are not in a monogamous partnership with an HIV-uninfected man, and for those who meet one of the following criteria: condomless anal sex in the past 6 months, a sexually transmitted infection in the past 6 months, or an ongoing sexual relationship with an HIV-infected male partner.

The CDC's National HIV Behavioral Surveillance (NHBS) system monitors HIV-associated behaviors, including PrEP use, in MSM and other populations at high risk of HIV infection [8]. To monitor the current state of PrEP use among MSM, we report on willingness to take PrEP and use of PrEP among participants in the 2014 MSM cycle of NHBS. To assess whether the clinical guidelines for PrEP use indicate PrEP for the MSM subpopulations with highest HIV incidence and prevalence, we also estimated the number and percentages of MSM with indications for PrEP by demographic characteristics.

METHODS

NHBS monitors HIV-associated behaviors and HIV prevalence in 20 cities with high AIDS burden among 3 populations at high risk for infection: MSM, people who inject drugs, and heterosexual adults at increased risk for HIV infection [8]. Cross-sectional data reported in this analysis are from MSM recruited for interviews and HIV testing through venue-based sampling (VBS) in 2014. Characteristics of this sample have been previously published [9]. NHBS VBS procedures have also been previously published and are briefly summarized here [8, 10]. First, staff identified venues frequented by MSM (eg, bars, clubs, gyms, parks, street locations, and social organizations) and days and times when men frequented those

venues. Venues in which 50% of men attending were MSM were eligible for inclusion. Site staff determined venue eligibility through secondary data review, interviews, focus groups, or observations. Second, venues and corresponding day/time periods were selected randomly for recruitment events. Third, staff members systematically approached men at recruitment events to screen for eligibility (aged ≥ 18 years, lived in a participating city, ever had sex with another man, and able to complete the interview in English or Spanish). Interviews were conducted by trained interviewers using a standardized questionnaire. NHBS activities were approved by local institutional review boards (IRBs) in each participating city. NHBS activities were determined to be research in which the CDC was not directly engaged and did not require review by the CDC IRB.

MSM with complete and valid interview data who tested HIV negative in NHBS and who were currently sexually active, defined as having ≥ 1 male partner in the past 12 months, were included in analyses. Validity was assessed by the interviewer's confidence in the respondent's answers. Interviewers received in-person training on administering the questionnaire, and interviews they marked invalid (16 total interviews [0.2%]) were excluded from analysis. The 3 main outcomes were self-reported willingness to take PrEP, PrEP use in the past 12 months, and indications for PrEP. Willingness to take PrEP was ascertained from the question, "Would you be willing to take anti-HIV medicines every day to lower your chances of getting HIV?" PrEP use in the past 12 months was ascertained from the question, "In the past 12 months, have you taken anti-HIV medicines before sex because you thought it would keep you from getting HIV?" Indications for PrEP were adapted from the CDC clinical guidelines and were defined as (1) having ≥ 2 male partners in the past 12 months and either reporting anal sex without a condom or a bacterial sexually transmitted disease (STD; ie, chlamydia, gonorrhea, or syphilis) in the past 12 months, or (2) having 1 main, HIV-infected male partner in the past 12 months.

Bivariate analyses were conducted to explore differences by demographic characteristics (race, age, education, income, and insurance) for the 3 outcomes. We also examined differences by sexual behaviors for willingness to take PrEP and PrEP use, but not for indications for PrEP, as sexual behaviors were used to define this variable. Adjusted prevalence ratios and 95% confidence intervals were calculated from log-linked Poisson regression models with generalized estimating equations. Separate models were built for each covariate and outcome combination. All models were clustered on VBS recruitment event. Covariates associated with the outcomes in bivariate analyses with P values $< .10$ were considered as confounders in the multivariable models and backward elimination was used to reduce models. Willingness to take PrEP models was adjusted for age and city. PrEP use models were adjusted for race/ethnicity, health insurance, and city. PrEP indication models were adjusted for race/ethnicity, age, and city. Analyses were conducted using SAS software, version 9.3 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Of 9640 sexually active MSM who consented to an HIV test as part of their participation in NHBS, 6847 (71%) tested negative and were eligible for inclusion in analyses. After excluding those with missing data (231 MSM missing data on PrEP willingness, 131

additional MSM missing data on risks used to assess indications for PrEP, and 2 additional MSM missing data on PrEP use), 6483 MSM were left for analysis.

Willingness to Take PrEP

Of 6483 MSM, 3940 (61%) reported willingness to take PrEP (Table 1). There were no differences in willingness to take PrEP between Hispanic/Latino and black MSM or between white and black MSM, but those of other race were more willing to take PrEP. Younger MSM were also more willing to take PrEP. There was no difference in willingness to take PrEP by education or annual income, although willingness was slightly more common among those without current health insurance. Those who reported a bacterial STD in the past 12 months were more likely to be willing to take PrEP than those who did not. Willingness was also more common among those with riskier sexual behaviors (eg, more sex partners in the past 12 months and condomless anal sex with an HIV-infected partner at last sexual encounter with a man). MSM who reported casual male sex partners in the past 12 months were more likely to be willing to take PrEP compared with those who reported only main partners. MSM who had participated in a behavioral intervention in the past 12 months, meaning that they talked to a counselor or group about HIV prevention apart from HIV testing, were more willing to take PrEP as well.

PrEP Use

PrEP use in the past 12 months was not common among participants—only 3.7% used PrEP (237/6483), and use varied significantly by demographic and behavioral characteristics (Table 1). White MSM were twice as likely to report PrEP use as black MSM. While there was no difference by age, those with higher education and current health insurance were more likely to use PrEP. PrEP use was also more likely among those who reported noninjection drug use or a bacterial STD in the past 12 months. PrEP use increased with increasing number of male sex partners in the past 12 months and was most common among those who reported both casual and main partners. Those who had condomless anal sex with an HIV-infected partner at their last sexual encounter with a man were 5 times as likely to have used PrEP in the past 12 months as those who had anal sex with a condom or with an HIV-uninfected partner at their last sexual encounter with a man. PrEP use in the past 12 months varied by city, with a range from 0.5% in San Juan, Puerto Rico, to 11.3% in San Francisco, California (Figure 1).

Indications for PrEP

More than half (57%) of MSM who participated in NHBS in 2014 would have an indication for PrEP according to our adaptation of CDC guidelines (Table 2). Both white and Hispanic/Latino MSM were more likely to have an indication for PrEP than black MSM. The likelihood of having an indication for PrEP increased with decreasing age. When race and age were combined, 65% of young (aged 18–24 years), nonblack MSM had an indication for PrEP compared with 55% of young, black MSM. Education, annual income, and current health insurance were not associated with having a PrEP indication. When we restricted the sample to the 3721 MSM with an indication for PrEP, 216 (5.8%) reported PrEP use.

DISCUSSION

Whereas more than half of MSM were willing to take PrEP, only about 4% were actually using PrEP in 2014. There was no difference in willingness to take PrEP between black and white MSM. Willingness was associated with riskier sexual behaviors, as was PrEP use. PrEP use, although low, was higher among white MSM compared with black MSM and among those with greater education and income levels. White MSM were also more likely to have an indication for PrEP, as were those in younger age groups. Young, black MSM, despite being at higher risk of HIV acquisition, were less likely to have an indication for PrEP compared with young MSM of other races/ethnicities.

Our findings on willingness to use PrEP are consistent with a recent review of PrEP acceptability as measured by willingness [11]. Of 8 studies that offered numerical findings on willingness, all reported levels of 50% or higher. While one study included in the review found no association between willingness and risk behavior, 4 studies reported an association between willingness to take PrEP and unprotected anal intercourse and an additional study reported an association between willingness and inconsistent condom use.

PrEP use was most common among San Francisco and Washington, D.C., participants, which may be due to their participation in the PrEP Demonstration Project, an open-label PrEP delivery project for MSM and transgender women [12]. The project was launched in late 2012 and completed enrollment in 2014. Although only a few hundred MSM were enrolled at each site (300 in San Francisco, 157 in Miami, and 100 in Washington, D.C.), the Demonstration Project likely increased demand for PrEP beyond the participants, as both San Francisco and Washington, D.C., had enrollment waitlists throughout the project [13]. Miami is also a PrEP Demonstration Project city, but had a much lower prevalence of PrEP use among participants in NHBS (1.6%). This may be due to less demand for PrEP in Miami compared with the other 2 demonstration cities or to the fact that MSM in Miami were less likely to have an indication for PrEP (25% of those approached for the PrEP Demonstration Project were ineligible for behavioral or medical reasons in Miami compared with 8% in San Francisco and 12% in Washington, D.C.) [13]. In our analysis, MSM in Miami were also less likely to have an indication for PrEP (55% compared with 69% in both San Francisco and Washington, D.C.; data not shown).

A recent CDC Vital Signs publication that estimated PrEP indications according to the 2014 guidelines using nationally representative data found that approximately 25% of adult, sexually active MSM would have an indication for PrEP to prevent HIV acquisition [14]. The estimate of indications for PrEP in NHBS was more than double this estimate, at 57%. This difference is likely due to NHBS operating in large urban areas with high AIDS prevalence and to the sampling method for MSM, which recruits venue-using MSM who may report more risky sexual behaviors compared with the general population of MSM. Other reasons for the lower percentage indicated in the nationally representative sample used in the Vital Signs analysis could be the lack of data on MSM with an HIV-infected sex partner or the lack of inclusion of MSM who inject drugs, both of which likely led to a lower percentage having indications for PrEP compared to our analysis. Most MSM (95%) recruited for a web-based HIV Behavioral Surveillance System in cities that also conduct

NHBS reported attending a venue in the past 12 months and could have been potentially recruited to participate in NHBS [15]; we therefore believe NHBS is fairly representative of MSM in core urban areas, according to this comparison. Because program planning for PrEP rollout is currently occurring in these core urban areas, the NHBS estimate of indications for PrEP may be useful for planning purposes.

Our findings on the disparity in PrEP indications by race/ethnicity are consistent with data from an observational cohort of HIV-uninfected MSM in Atlanta, which found that 65% of black MSM and 88% of white MSM for whom behavioral data were available met indications for PrEP based on the criteria in the guidelines [15]. Black MSM were less likely to have indications for PrEP in both this analysis and our analysis because they reported fewer risk behaviors. Because the increased risk of HIV acquisition for black MSM is associated with social determinants such as poverty and racial discrimination rather than higher-risk sexual behaviors [15, 16], current clinical guidelines will not indicate PrEP for some MSM at highest risk. While the guidelines recommend that clinicians consider offering PrEP as one prevention option to “those whose sexual or injection behaviors *and epidemiologic context* place them at substantial risk of acquiring HIV infection” (emphasis added) [7], epidemiologic context is not taken into account in the operationalization of the guidelines.

A 2012 mathematical model of PrEP impact found that a strategy that targets PrEP to the 20% of MSM considered to be at highest risk for HIV infection prevented twice as many infections over 20 years and at better economic value than a strategy that provides PrEP to 20% of all HIV-uninfected MSM regardless of risk [17]. In the model, the highest-risk group was defined by behavioral risk factors (5 annual partners on average) as well as population-level factors (initial HIV prevalence of 20% and initial annual incidence of 2.3%). Educating providers about how to consider incidence and prevalence data on the MSM subpopulations most affected by HIV in their communities together with behavioral indications for PrEP could ensure that those at highest risk are offered PrEP.

In addition to being less likely to have indications for PrEP when visiting a healthcare provider, it is important to note that significant barriers to accessing healthcare, and therefore PrEP, exist for black MSM. Some of the racial disparity in healthcare access is attributable to black MSM having lower prevalence of health insurance compared with white MSM [15, 18]. If PrEP is then offered more frequently to those who have insurance and access healthcare, the existing differences by race/ethnicity in PrEP use and ultimately HIV incidence may potentially widen [4]. Ongoing changes in the US healthcare system through the Patient Protection and Affordable Care Act of 2010 offer opportunities to improve use of clinical preventive services by MSM and to potentially reduce the disparity in healthcare access [19]. In the meantime, clinicians and MSM should be informed of the medication assistance program and the drug copay program that provide PrEP to uninsured or underinsured individuals, respectively (<https://start.truvada.com/paying-for-truvada>) [20].

Our analyses are subject to several limitations. First, not all of the 2014 PrEP guidelines could be matched directly to variables collected in NHBS. We used having 2 partners in the past 12 months as a proxy for being in a nonmonogamous relationship, but these multiple

partnerships may not have overlapped in time and may therefore have been monogamous. Thus, NHBS data may have overestimated indication for PrEP. Similarly, NHBS variables often ask about behavior in the past 12 months, whereas the PrEP guidelines specify a time period of the past 6 months, also leading to an overestimation of indications for PrEP. Second, NHBS is not a nationally representative sample, so results may not be generalizable to all MSM in participating cities or to all cities. Third, our findings are based on self-reported data and might be subject to social desirability and recall bias. Social desirability may lead to overestimation of prevalence estimates for willingness to take PrEP and PrEP use, while the direction of bias due to recall error is unknown. Finally, data were not weighted to account for the complex sampling methodology used to recruit MSM. Point estimates may therefore be biased by over- or underrepresented subgroups of the population.

PrEP use was not common among MSM in NHBS in 2014, although a racial disparity exists between black and white MSM with respect to PrEP use in our sample. This disparity may be attributable to racial differences in healthcare access rather than a lack of interest in PrEP as both black and white MSM reported high willingness to take PrEP. To prevent racial disparities in PrEP use, it will be important for clinicians to consider epidemiologic context in addition to risk behaviors when considering PrEP indications. This will increase the likelihood that PrEP is offered to those at highest risk of HIV acquisition and that the greatest impact on HIV incidence is achieved.

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References

1. Centers for Disease Control and Prevention. Diagnoses of HIV infection in the United States and dependent areas, 2013. HIV Surveill Rep. 2015; 25
2. Centers for Disease Control and Prevention. Estimated HIV incidence in the United States, 2007–2010. HIV Surveill Suppl Rep. 2012; 17 [Accessed 5 January 2016] Available at: <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/#supplemental>.
3. US Census Bureau. [Accessed 5 January 2016] Overview of race and Hispanic origin, 2010. 2010 census briefs. Available at: <http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>

4. Kelley CF, Kahle E, Siegler A, et al. Applying a PrEP continuum of care for men who have sex with men in Atlanta, Georgia. *Clin Infect Dis*. 2015; 61:1590–1597. [PubMed: 26270691]
5. 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; 363:2587–2599. [PubMed: 21091279]
6. US Food and Drug Administration. [Accessed 5 January 2016] Truvada approved to reduce the risk of sexually transmitted HIV in people who are infected with the virus. 2012. Available at: <http://www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSActivities/ucm312264.htm>
7. US Public Health Service. [Accessed 5 January 2016] Preexposure prophylaxis for the prevention of HIV in the United States—2014: a clinical practice guideline. Available at: <http://www.cdc.gov/hiv/pdf/guidelines/PrEPguidelines2014.pdf>
8. Finlayson TJ, Le B, Smith A, et al. HIV risk, prevention, and testing behaviors among men who have sex with men—National HIV Behavioral Surveillance System, 21 U.S. cities, United States, 2008. *MMWR Surveill Summ*. 2011; 60:1–34. [PubMed: 22031280]
9. Wejnert C, Xia M, Doyle K, Paz-Bailey G. NHBS Study Group. HIV infection risk, prevention, and testing behaviors among men who have sex with men national HIV behavioral surveillance—20 U.S. cities, 2014. *HIV Surveill Rep Spec Rep*. 2016; 15:1–32.
10. MacKellar DA, Gallagher KM, Finlayson T, Sanchez T, Lansky A, Sullivan PS. Surveillance of HIV risk and prevention behaviors of men who have sex with men—a national application of venue-based, time-space sampling. *Public Health Rep*. 2007; 122(suppl 1):39–47. [PubMed: 17354526]
11. Young I, McDaid L. How acceptable are antiretrovirals for the prevention of sexually transmitted HIV? A review of research on the acceptability of oral pre-exposure prophylaxis and treatment as prevention. *AIDS Behav*. 2014; 18:195–216. [PubMed: 23897125]
12. AIDS Vaccine Advocacy Coalition. Ongoing and planned PrEP demonstration and implementation studies. 2015
13. Fuchs J. Lessons learned from the US PrEP Demonstration Project: moving from the “real world” to the “real, real world.”. [Accessed 5 January 2016] Available at: <http://federalaidspolicy.org/wp-content/uploads/2015/04/Fuchs-FAPP-15-April-15.pdf>.
14. Smith DK, Van Handel M, Wolitski RJ, et al. Vital signs: estimated percentages and numbers of adults with indications for preexposure prophylaxis to prevent HIV acquisition—United States, 2015. *MMWR Morb Mortal Wkly Rep*. 2015; 64:1291–1295. [PubMed: 26606148]
15. Sullivan PS, Rosenberg ES, Sanchez TH, et al. Explaining racial disparities in HIV incidence in black and white men who have sex with men in Atlanta, GA: a prospective observational cohort study. *Ann Epidemiol*. 2015; 25:445–454. [PubMed: 25911980]
16. Millett GA, Flores SA, Peterson JL, Bakeman R. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *AIDS*. 2007; 21:2083–2091. [PubMed: 17885299]
17. Juusola JL, Brandeau ML, Owens DK, Bendavid E. The cost-effectiveness of pre-exposure prophylaxis for HIV prevention in the United States in men who have sex with men. *Ann Intern Med*. 2012; 156:541–550. [PubMed: 22508731]
18. Millett GA, Peterson JL, Flores SA, et al. Comparisons of disparities and risks of HIV infection in black and other men who have sex with men in Canada, UK, and USA: a meta-analysis. *Lancet*. 2012; 380:341–348. [PubMed: 22819656]
19. Kates J. Implications of the Affordable Care Act for people with HIV infection and the Ryan White HIV/AIDS Program: what does the future hold? *Top Antivir Med*. 2013; 21:138–1342. [PubMed: 24225080]
20. Gilead Sciences. Truvada cost assistance. 2016 [Accessed 5 January 2016] Available at: <https://start.truvada.com/paying-for-truvada>.

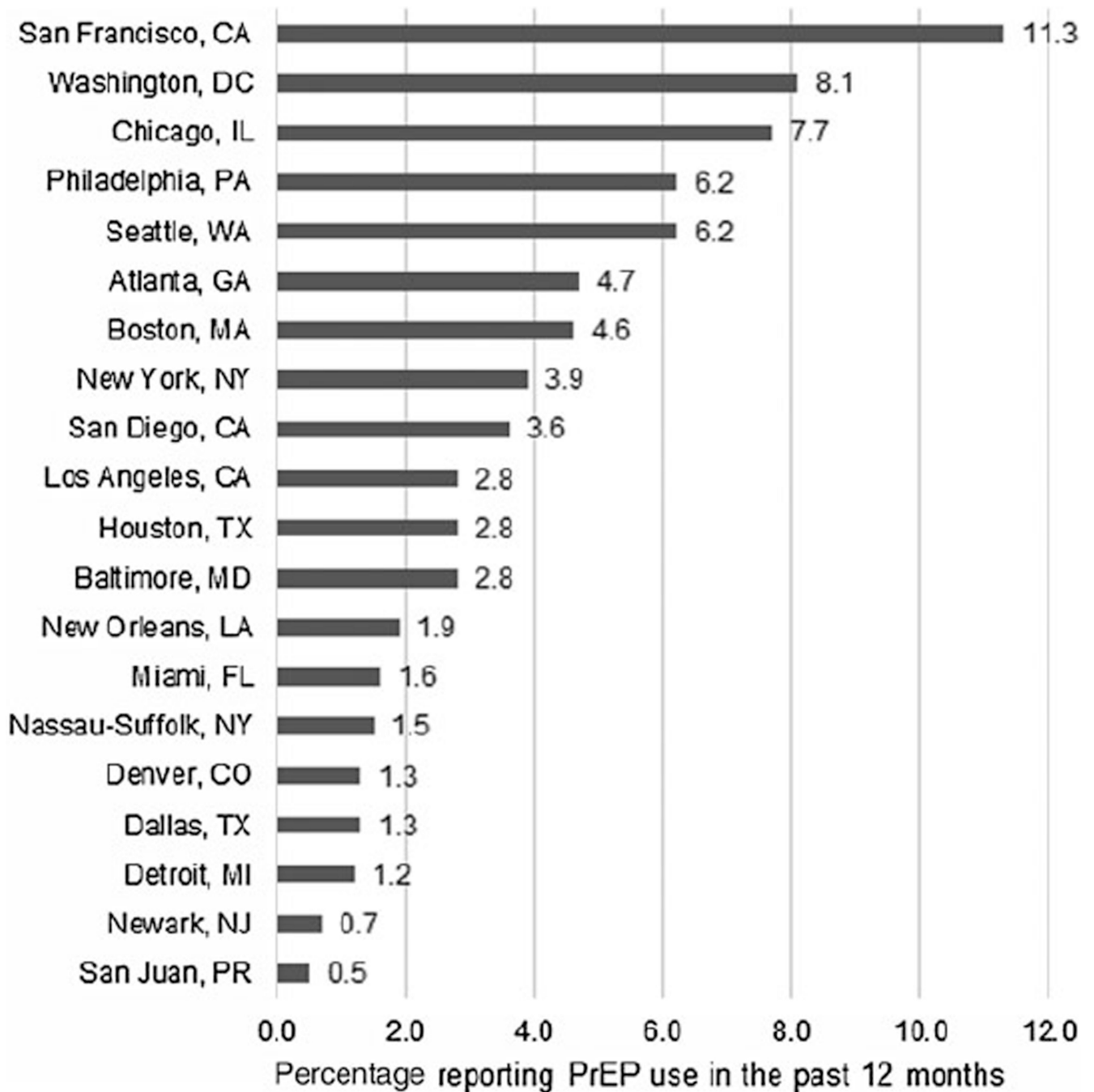


Figure 1.

Prevalence of pre-exposure prophylaxis (PrEP) use in the past 12 months by city among human immunodeficiency virus (HIV)-uninfected, sexually active men who have sex with men in the National HIV Behavioral Surveillance system, 2014. Abbreviations: CA, California; CO, Colorado; DC, District of Columbia; FL, Florida; GA, Georgia; IL, Illinois; LA, Louisiana; MA, Massachusetts; MD, Maryland; MI, Michigan; NJ, New Jersey; NY, New York; PA, Pennsylvania; PR, Puerto Rico; TX, Texas; WA, Washington.

Willingness to Take Pre-exposure Prophylaxis (PrEP) and Prevalence of PrEP Use in the Past 12 Months Among Human Immunodeficiency Virus (HIV)-Uninfected, Sexually Active Men Who Have Sex With Men in the National HIV Behavioral Surveillance System—20 US Cities, 2014

Table 1

Characteristics	Overall ^a N = 6483	Willing to Take PrEP, No. (%) n = 3940 (60.8)	Adjusted ^b PR (95% CI)	Used PrEP, No. (%) n = 237 (3.7)	Adjusted ^c PR (95% CI)
Race/ethnicity					
Black	1458	859 (58.9)	Ref	36 (2.5)	Ref
Hispanic/Latino ^d	1812	1139 (62.9)	1.0 (.9–1.1)	47 (2.6)	1.5 (.9–2.3)
White	2660	1588 (59.7)	1.0 (.9–1.1)	142 (5.3)	2.0 (1.4–3.0)
Other ^e	521	338 (64.9)	1.1 (1.0–1.2)	12 (2.3)	0.8 (.4–1.6)
Age, y					
18–24	1492	966 (64.8)	1.2 (1.2–1.3)	40 (2.7)	0.9 (.6–1.5)
25–34	2518	1584 (62.9)	1.2 (1.1–1.3)	113 (4.5)	1.3 (.9–2.0)
35–44	1149	696 (60.6)	1.2 (1.1–1.2)	37 (3.2)	0.9 (.6–1.5)
45	1324	694 (52.4)	Ref	47 (3.6)	Ref
Education					
High school or less	1618	986 (60.9)	Ref	24 (1.5)	Ref
More than high school	4864	2953 (60.7)	1.0 (.9–1.0)	213 (4.4)	2.1 (1.4–3.2)
Annual income					
<\$20 000	1809	1119 (61.9)	Ref	46 (2.5)	Ref
\$20 000–\$39 999	1543	964 (62.5)	1.0 (.9–1.1)	44 (2.9)	1.0 (.7–1.6)
\$40 000–\$74 999	1652	989 (59.9)	1.0 (.9–1.0)	56 (3.4)	1.0 (.7–1.5)
\$75 000	1389	810 (58.3)	1.0 (.9–1.0)	90 (6.5)	1.5 (1.0–2.2)
Current health insurance					
Yes	4963	2955 (59.5)	0.9 (.9–1.0)	210 (4.2)	2.0 (1.4–3.0)
No	1508	981 (65.1)	Ref	26 (1.7)	Ref
Used noninjection drugs, past 12 mo					
Yes	3624	2314 (63.9)	1.1 (1.1–1.2)	167 (4.6)	1.7 (1.3–2.3)
No	2859	1626 (56.9)	Ref	70 (2.5)	Ref

Characteristics	Overall ^a N = 6483	Willing to Take PrEP, No. (%) n = 3940 (60.8)	Adjusted ^b PR (95% CI)	Used PrEP, No. (%) n = 237 (3.7)	Adjusted ^c PR (95% CI)
Bacterial STD, past 12 mo ^f					
Yes	736	544 (73.9)	1.2 (1.2–1.3)	88 (12)	4.3 (3.4–5.6)
No	5743	3394 (59.1)	Ref	149 (2.6)	Ref
No. of male sex partners, past 12 mo					
1	1267	626 (49.4)	Ref	10 (0.8)	Ref
2–4	2426	1430 (58.9)	1.2 (1.1–1.3)	48 (2)	2.6 (1.3–5.0)
5–7	1032	665 (64.4)	1.3 (1.2–1.4)	31 (3)	3.4 (1.7–6.9)
8	1758	1219 (69.3)	1.4 (1.3–1.5)	148 (8.4)	9.0 (4.8–16.9)
Condomless anal sex with HIV-infected last male sex partner					
Yes	143	122 (85.3)	1.4 (1.3–1.5)	28 (19.6)	5.1 (3.5–7.4)
No	5535	3301 (59.6)	Ref	184 (3.3)	Ref
Unknown	790	508 (64.3)	1.1 (1.0–1.1)	25 (3.2)	1.1 (.7–1.7)
Type of male sex partners, past 12 mo					
Main only	1130	566 (50.1)	Ref	16 (1.4)	Ref
Casual only	2419	1452 (65.5)	1.3 (1.2–1.4)	71 (2.9)	2.0 (1.2–3.4)
Main and casual	2934	1922 (60)	1.2 (1.1–1.3)	150 (5.1)	3.2 (1.9–5.3)
Received an HIV behavioral intervention ^g					
Yes	1528	1010 (66.1)	1.1 (1.1–1.2)	109 (7.1)	3.0 (2.4–3.9)
No	4955	2930 (59.1)	Ref	128 (2.6)	Ref

Abbreviations: CI, confidence interval; HIV, human immunodeficiency virus; PR, prevalence ratio; PrEP, pre-exposure prophylaxis; Ref, reference; STD, sexually transmitted disease.

^aNumbers may not sum to total N due to missing values.

^bSeparate Poisson regression models with generalized estimating equations run for each characteristic of interest; each model included characteristic of interest, age and city; models were clustered on recruitment event.

^cSeparate Poisson regression models with generalized estimating equations run for each characteristic of interest; each model included characteristic of interest, race/ethnicity, current health insurance, and city; models were clustered on recruitment event.

^dHispanic/Latinos can be of any race.

^eIncludes men who have sex with men reporting American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

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^fIncludes syphilis, gonorrhea, or chlamydia.

^gIncludes a one-on-one conversation with an outreach worker, counselor, or prevention program worker or participation in an organized session involving a small group of people to discuss ways to prevent HIV.

Table 2

Indications for Preexposure Prophylaxis Among Human Immunodeficiency Virus (HIV)-Uninfected, Sexually Active Men Who Have Sex With Men in the National HIV Behavioral Surveillance System—20 US Cities, 2014

Characteristic	Overall ^a N = 6483	PrEP Indicated ^b , No. (%) n = 3721 (57.4)	Adjusted ^c PR (95% CI)
Race/ethnicity			
Black	1458	782 (53.6)	Ref
Hispanic/Latino ^d	1812	1052 (58.1)	1.1 (1.0–1.2)
White	2660	1558 (58.6)	1.1 (1.1–1.2)
Other ^e	521	310 (59.5)	1.1 (.9–1.2)
Age, y			
18–24	1492	930 (62.3)	1.5 (1.4–1.6)
25–34	2518	1564 (62.1)	1.4 (1.3–1.6)
35–44	1149	646 (56.2)	1.3 (1.2–1.4)
45	1324	581 (43.9)	Ref
Race and age combined			
Black, 18–24 y	457	253 (55.4)	Ref
Black, 25 y	1001	529 (52.9)	0.9 (.8–1.0)
Non-black, 18–24 y	1027	671 (65.3)	1.2 (1.0–1.3)
Non-black, 25 y	3966	2249 (56.7)	1.0 (.9–1.1)
Education			
High school or less	1618	896 (55.4)	Ref
More than high school	4864	2824 (58.1)	1.0 (.9–1.1)
Annual income			
<\$20 000	1809	1037 (57.3)	Ref
\$20 000–\$39 999	1543	901 (58.4)	1.0 (.9–1.0)
\$40 000–\$74 999	1652	945 (57.2)	1.0 (.9–1.0)
\$ 75000	1389	792 (57)	1.0 (.9–1.1)
Current health insurance			
Yes	4963	2826 (56.9)	1.0 (.9–1.1)
No	1508	886 (58.8)	Ref

Abbreviations: CI, confidence interval; HIV, human immunodeficiency virus; PR, prevalence ratio; PrEP, pre-exposure prophylaxis; Ref, reference.

^aNumbers may not sum to total N due to missing values.

^bPrEP indicated defined as having (1) 2 male sex partners in the past 12 months AND a bacterial sexually transmitted disease in the past 12 months or condomless anal sex in the past 12 months, or (2) 1 main HIV-infected partner in the past 12 months.

^cSeparate Poisson regression models with generalized estimating equations run for each characteristic of interest; each model included the characteristic of interest, race/ethnicity, age, and city; models were clustered on recruitment event.

^dHispanic/Latinos can be of any race.

^eIncludes men who have sex with men reporting American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

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