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Prevalence and characteristics of users of pre-exposure prophylaxis (PrEP) amongst men who have sex with men, San Francisco, 2014 in a cross-sectional survey: Implications for disparities

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Abstract

Objectives—Pre-exposure prophylaxis (PrEP) has gained a central role in prevention of HIV infection amongst men who have sex with men (MSM), particularly in San Francisco, California, USA. Programmes to enroll men in PrEP are being undertaken by a range of public and private organisations. PrEP will have the largest population impact if it reaches men who are most at risk for HIV infection, and is used in a manner that enables maximal efficacy. Access to PrEP also needs to be equitable. We report on the characteristics of men eligible for and using PrEP.

Methods—Data were from the 2014 implementation of National HIV Behavioural Surveillance (NHBS) amongst MSM in San Francisco. NHBS uses venue-based sampling as the national standard for sampling MSM. We compare proportions of demographic characteristics of MSM using versus not using PrEP who are HIV-negative and meet CDC guidelines to recommend PrEP.

Results—Overall, 64.1 % of HIV-negative MSM in San Francisco would meet guidelines for PrEP use, while 9.2 % of MSM overall and 14.5 % of MSM eligible were using PrEP as of 2014. Men using PrEP are more likely to be White and older age. There were no differences between men using and not using PrEP in terms of education, income and health insurance.

Conclusions—PrEP roll-out efforts should attempt to increase reach for young, Black and Hispanic MSM. Failure to equitably provide access to PrEP could exacerbate the US disparity in new HIV infections for men of colour.

Keywords

Men who have sex with men (MSM); HIV prevention; Pre-exposure prophylaxis (PrEP); demographics; disparities; San Francisco

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CONTRIBUTORS

JS, HFR, Y-HC and WM conceived the study, drafted the paper, made revisions and approved the final draft. Y-HC conducted the analysis. HFR oversaw data collection.

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INTRODUCTION

Pre-exposure prophylaxis (PrEP) has gained a central role in prevention of HIV infection amongst men who have sex with men (MSM) and has been vigorously promoted in San Francisco, California, USA. Our city was an early site for research and the first clinical trial for PrEP [1], open label continuation [2], and now engaged in expanding PrEP offering through private [3] and public PrEP clinics [2, 4]. The safety and efficacy of the preventative medication have been demonstrated in clinical trials, especially amongst MSM [1, 5, 6]. Other research has demonstrated the acceptability and demand for PrEP amongst MSM [7–10]. Less is known about the extent of use of PrEP amongst MSM outside the context of trials, demonstration projects and clinics. In particular, data need to track the use of PrEP in population- or community- based surveys to gauge eligibility and use and to identify disparities in access.

Guidance on which MSM should be recommended PrEP use has been formulated by the Centers for Disease Control and Prevention (CDC) [11]. Recommendations for PrEP use in HIV-negative MSM are: a) has an HIV-infected partner, or b) is not in a mutually monogamous relationship with an HIV-uninfected partner, and c) has condomless anal intercourse or had a sexually transmitted infection (STI) in the past six months. These CDC guidelines do not consider factors such as age and race/ethnicity, which are associated with greater rates of HIV transmission amongst MSM in the US [12].

A better understanding of who is taking up PrEP (vis-à-vis recommended criteria and demographic characteristics) is essential to provide information enabling public health officials and clinicians to better prioritise segments of populations in need of PrEP. Such foundational information will inform current and future efforts to stabilise HIV incidence and close persistent disparities. As an early epicenter of the HIV epidemic amongst MSM and given the vigorous scale-up of PrEP, San Francisco's experience may presage trends elsewhere. We therefore undertook the present analysis to describe PrEP uptake in a community-based sample of MSM in San Francisco.

METHODS

Data source

We used data from the 2014 National HIV Behavioural Surveillance (NHBS) survey conducted in San Francisco amongst MSM [13]. Participants were recruited at community locations such as bars, clubs, parks, and street corners where MSM congregate, using time-location sampling [13]. An extensive roster of venues, days and times where MSM can be found was compiled by the field team. From that roster, venues were selected randomly without replacement to construct a month long sampling calendar. After venues were selected, days and times were randomly selected for each venue and scheduled for sampling events. At each of the four-hour sampling events, study staff enumerated all potentially eligible men at or entering the venue and systematically approached, screened and enrolled eligible men. Men were eligible if they lived in the San Francisco division of the San Francisco metropolitan statistical area, were 18 or older, and identified as gay or bisexual or have had sex with another man in the past 12 months. Men who agreed to participate gave

oral informed consent and completed an interviewer administered survey on a tablet computer.

Measures

The current paper focuses on the prevalence of PrEP eligibility and use by different populations of MSM during the time period following the introduction of PrEP to MSM in San Francisco. That is, the survey was conducted in 2014, two years after FDA licensing of PrEP [14]. Many MSM in San Francisco participated in the blinded and open label trials and demonstration projects prior to licensure. The CDC guidelines were used to classify the proportion of MSM recommended for PrEP in the population as a whole and within demographic groups [11]. Specifically, we classified HIV-negative respondents as meeting guidelines for PrEP over the 12 months prior to the survey if they reported having an HIV-positive partner or were not in a mutually monogamous relationship with an HIV-negative partner AND reported condomless anal sex or an STI in the past 12 months. Of note, the CDC guidelines for STI history are measured with the last six months as the recall period; unfortunately our recall period was the last 12 months.

After classifying men by PrEP eligibility, we further classified them by their self-reported PrEP use with the following introduction and question: “Researchers are studying whether anti-HIV medicine (also called antiretrovirals) -- a pill -- could possibly be taken to prevent HIV infection. “In the past 12 months, have you taken anti-HIV medicines before sex because you thought it would keep you from getting HIV?”. Therefore, our definition of PrEP use potentially capture men who were prescribed PrEP by a clinician as well men who used antiretrovirals from another informal source (e.g., a friend or sex partner). [15, 16]

Analysis

Analysis was guided by the null hypothesis that PrEP use would be equally distributed amongst MSM in San Francisco by demographic characteristics (e.g., age, race/ethnic, education, income) and by health insurance status (as an indicator of access to care) amongst those eligible for PrEP. We restricted analysis to men who self-reported being HIV-uninfected. We first examined the number and per cent of PrEP-eligible individuals in the groups of interest, compared by Fisher’s exact test. We then compared PrEP use amongst those eligible in bivariate and multivariate models to estimate risk ratios and corresponding 95 % confidence intervals. We used generalised linear models with a Poisson family and a log link, and obtained robust standard errors. In our multivariate models, we adjusted for age and race/ethnicity (the model for the association with age group was only adjusted for race/ethnicity, and vice versa). All analysis was conducted using R (R version: 3.2.0). We used a significance level of 0.05 for all statistical tests.

Ethical review and approval was obtained from the University of California, San Francisco, Committee on Human Research (IRB approval # 084556).

RESULTS

San Francisco’s 2014 implementation of NHBS MSM recruited 411 MSM. Of those, 301 (73.2 %) self-reported being HIV-negative (Table 1). A majority was between 25 and 44

years old (60.5 %), White (54.8 %), had at least some college education (86.4 %), or earned $50,000 USD per year or greater (53.4 %). Fully 87.7 % of HIV-negative MSM reported having health insurance. A large proportion of men (64.1 %, 193 men) met the CDC recommended guidelines for PrEP. Age was associated with meeting PrEP guidelines; 80.0 % of young MSM age 18 to 24 years were eligible compared to 28.6 % of those 55 and older ($p<0.001$). No differences in the proportions meeting the guidelines for PrEP were noted by race/ethnicity, education level, income, and health insurance status.

Overall 30 men (9.9 %) reported using PrEP at some point in the past 12 months. Of note, two men (0.7 % of the sample of HIV-uninfected men) were reportedly using PrEP but did not fall under one of the guidelines for PrEP use. Amongst men using PrEP, the majority reported receiving PrEP from their doctor (93.3%). Amongst men who met recommended guidelines, PrEP use significantly differed by age ($p=0.04$) and race/ethnicity ($p=0.02$) (Table 2). No eligible individuals in the youngest age group (18–24 years) reported PrEP use, whereas 30 % of eligible men 55 years of age or older reported PrEP use. Compared to White MSM, fewer in other racial/ethnic groups reported PrEP use. In particular, eligible Hispanic men were less likely than eligible White men to report PrEP use (4.3 % vs. 22.9 %, respectively, age-adjusted risk ratio [RR] comparing Hispanics to Whites 0.2, 95 % confidence interval [CI] 0.0–0.8). Eligible Asian men and eligible Black men were also less likely to report PrEP use: 7.1 % of eligible Asian men and 7.7 % of eligible Black men reported PrEP use, compared to the 22.9 % of eligible White MSM. Eligible White men were over four times as likely as eligible non-White men to use PrEP (age-adjusted RR: 4.4, 95 % CI 1.6–11.9; results not shown in table).

In terms of willingness to use PrEP, 145 (48%) of the HIV-negative men reported that they would be willing to take PrEP. The proportion of each race/ethnicity group willing to take PrEP was similar (ranging from 43% to 54%).

DISCUSSION

While nearly two-thirds of MSM in San Francisco are eligible for PrEP, fewer than one in ten were using this prevention method two years after licensure and four years after it was found safe and efficacious [1, 14]. Using a published estimate of the size of the HIV uninfected MSM population in San Francisco [17] we estimate that 32,453 MSM would fall under the CDC guidelines of whom 4,708 were using PrEP in 2014. In other words, an additional 27,745 MSM in San Francisco would meet the guidelines but were not using PrEP.

While we found little difference in willingness to take PrEP across racial groups, we also found disparities in that PrEP use was disproportionately lower amongst young MSM and MSM of colour, particularly Black and or Hispanic men. Having health insurance was not correlated with PrEP use, suggesting that broad access to health care does not account for these disparities. Other studies have noted barriers to PrEP use amongst Black and Hispanic MSM, including perception of side effects [18] and cost [19]. A study of STI clinic attendees, including San Francisco, found MSM of colour less likely to have heard of PrEP and less likely self-refer for PrEP compared to White MSM [9]. Moreover, our data suggest

that there is a discrepancy in the fact that similar proportions were willing to use PrEP by race/ethnic groups yet a paucity of Black and Latino MSM who were using PrEP at the time of the survey. A limitation of our behavioural surveillance-oriented survey is that we did not ask the specific reasons why persons did not use PrEP. We can nonetheless corroborate the potentially emerging PrEP disparity for these groups in the wider population.

Of course, our analysis has other limitations. First, as our data originate from a cross section survey we cannot ascribe causality to PrEP use. Indeed, our analysis does not include risk behaviours as temporality (e.g. cause before effect) cannot be established. However, the comparisons between those that are using and those that are not using PrEP is informative to describe PrEP use in a community-based sample and therefore also closer to a real-world settings. For example, our data can be used to advocate for programmes prioritising young and minority MSM. Second, our data are from 2014 when only a short time from licensure in 2012. The proportion of MSM using PrEP in San Francisco may well be larger at the time of this analysis. Third, although NHBS uses venue-based sampling as the national standard to sample MSM it is possible that our data miss some segments of the population or include those who may be more or less likely to use PrEP. Fourth, sample sizes are small given the low level of PrEP uptake so far, even in San Francisco where promotion has been vigorous. Collectively, these limitations highlight an important area for future research as PrEP use becomes more widespread. Lastly, our data are from San Francisco and do not reflect what may be occurring in other places in the US or internationally. For example, the demographic makeup of San Francisco MSM may differ from other populations of MSM in the U.S. and internationally. Unfortunately, sexual orientation is not yet included in the US Census and the sizes and make-up of MSM populations in the US are uncertain. However, with San Francisco being an early, vocal adopter of PrEP [4], our findings may provide a glimpse of one scenario that may play out elsewhere.

In conclusion, these findings call attention to the need to further monitor the rollout and uptake of PrEP in communities of MSM where it is recommended. PrEP uptake efforts should continue to attempt to reach Black and Latino MSM. If Black and Latino MSM do not take up PrEP use while White men do, it is possible that a greater share of new HIV diagnoses may occur amongst men of colour, exacerbating noted HIV disparities [12, 20, 21].

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KEY POINTS

- In the first two years after licensure for preventing HIV infection, Pre-exposure prophylaxis (PrEP) was being used by 9.3 % of HIV-negative MSM in San Francisco.
- PrEP was less likely to be used by MSM of colour, particularly Black and Hispanic, and by younger MSM.
- The emerging pattern of PrEP use may foreshadow a further widening disparity in HIV prevalence amongst MSM of colour in the US unless measures to reach these populations are prioritised.

Table 1

Characteristics of survey participants and those who meet guidelines for pre-exposure prophylaxis (PrEP) use, HIV-negative men who have sex with men (MSM), San Francisco, 2014

	All HIV-negative men N = 301		Meets guidelines for PrEP N = 193			
	n	**column %**	**n**	**column %**	**row %**	**p-value***
Age						<0.001
18–24	30	10.0	24	12.4	80.0	
25–34	121	40.2	87	45.1	71.9	
35–44	61	20.3	43	22.3	70.5	
45–54	54	17.9	29	15.0	53.7	
55+	35	11.6	10	5.2	28.6	
Race/ethnicity						0.13
Asian	22	7.4	14	7.3	63.6	
Black	18	6.0	13	6.7	72.2	
Hispanic	76	25.4	47	24.4	61.8	
White	164	54.8	105	54.4	64.0	
Other	6	2.0	1	0.05	16.7	
Mixed	13	4.3	11	5.7	84.6	
Education						0.38
Grade 12 or lower	41	13.6	26	13.5	63.4	
Some college	90	29.9	64	33.2	71.1	
Bachelor’s degree	103	34.2	61	31.6	59.2	
Any post-graduate studies	67	22.3	42	21.8	62.7	
Income per year (USD)						0.77
$0 – $25,000	74	24.8	50	25.9	67.6	
$25,001 – $50,000	65	21.8	41	21.2	63.1	
>$50,000	159	53.4	100	51.8	62.9	
Health insurance						0.14

	All HIV-negative men N = 301		Meets guidelines for PrEP N = 193			
	n	column %	n	column %	row %	p-value*
Yes	264	87.7	165	85.5	62.5	
No	37	12.3	28	14.5	75.7	

*Fisher exact test for meeting vs. not meeting guidelines for PrEP use

Table 2

Profile of PrEP users among MSM eligible for PrEP, San Francisco, 2014

	Per cent using PrEP	p	Risk ratio (95 % CI)	Adjusted risk ratio (95 % CI)*
Age group (years)		0.04		
18–24	0.0		0.0 (NA)	0.0 (NA)
25–34	12.6		0.4 (0.1, 1.3)	0.6 (0.2, 1.9)
35–44	23.3		0.8 (0.3, 2.3)	1.1 (0.4, 3.3)
45–54	13.8		0.5 (0.1, 1.7)	0.6 (0.2, 2.0)
55+	30.0		Reference	Reference
Race/ethnicity		0.02		
Asian	7.1		0.3 (0.0, 2.1)	0.4 (0.1, 2.8)
Black	7.7		0.3 (0.0, 2.3)	0.3 (0.0, 2.4)
Hispanic	4.3		0.2 (0.0, 0.8)	0.2 (0.0, 0.8)
Other	0.0		0.0 (NA)	0.0 (NA)
White	22.9		Reference	Reference
Mixed	0.0		0.0 (NA)	0.0 (NA)
Education		0.26		
Grade 12 or lower	3.8		Reference	Reference
Some college	12.5		3.2 (0.4, 24.7)	1.7 (0.2, 13.3)
Bachelor’s degree	18.0		4.7 (0.6, 34.5)	1.8 (0.2, 13.3)
Any post-graduate	19.0		5.0 (0.7, 37.4)	1.5 (0.2, 12.6)
Annual income		0.18		
$0–25,000	12.0		Reference	Reference
$25,000–50,000	7.3		0.6 (0.2, 2.3)	0.5 (0.1, 2.2)
$50,000+	19.0		1.6 (0.7, 3.7)	1.0 (0.4, 2.1)
Have health insurance		1.00		
Yes	14.5		1.0 (0.4, 2.7)	0.9 (0.3, 2.4)
No	14.3		Reference	Reference

*Adjusted for age and race (model for association with age is adjusted for race while model for association with race is adjusted for age).

Abbreviations: CI, confidence interval; NA, not applicable.