

Barriers and facilitators of Pre-exposure Prophylaxis (PrEP) intention among Chinese Men who have sex with men

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Abstract

Background Despite strengthened efforts on HIV prevention and control, new HIV infections continue to increase among men who have sex with men (MSM) in China. Pre-exposure prophylaxis (PrEP), a highly effective HIV prevention tool, has recently been included in the China's Action Plan of HIV Prevention and Control. To inform future PrEP implementation, this study is to identify barriers and facilitators of PrEP intention among MSM in China. **Methods** A cross-sectional survey was conducted among 300 MSM in Nanjing, Jiangsu Province in 2018. Demographic information, a 7-item high-risk behavior index, PrEP use intention, PrEP-related awareness and accessibility, and a 7-item public HIV stigma scale were included in the questionnaire. Bivariate and multivariate logistic regression analyses were conducted to identify factors associated with PrEP intention. **Results** Overall, just 55.7% of participants had ever heard of PrEP, while 75.3% expressed willingness to use PrEP if efficacy was assured. Beliefs that 'PrEP can prevent HIV if taken as prescribed (aOR=4.84, p<0.001), and 'PrEP can be scaled up in the community'(aOR=3.24, p<0.001), were positively associated with PrEP intention. Concerns of side effects were negatively associated with PrEP intention (aOR=0.32, p =0.006). **Conclusions** Given the relatively low awareness of PrEP-related information in China, interventions on awareness and knowledge targeting high risk individuals and community are needed to scale up of oral PrEP implementation once approved by China FDA. **Keywords** MSM; HIV; PrEP; Intention

Introduction

Despite strengthened efforts on HIV prevention and control, new HIV infections continue to increase among men who have sex with men (MSM) in China. HIV prevalence among MSM populations ranged from 5.0-20% while incidence was reported between 1.6-6.6% [1,2]. Similar trends were also observed in other countries in South-East Asia[3].

Pre-exposure prophylaxis (PrEP), where individuals at high risk for HIV take HIV anti-retrovirals such as Truvada (tenofovir/emtricitabine) (TDF/FTC), is highly effective to prevent HIV acquisition [4]. Clinical trials demonstrated that daily oral TDF/FTC decreases HIV risk by up to 99% when adherence was high [4, 5]. In addition to evidence from clinical trials, a prospective cohort study in Australia showed that PrEP implementation was associated with rapid decline of HIV incidence among MSM at the population level [6]. A mathematical modeling study of Chinese MSM demonstrated that PrEP would be an important and cost-effective biomedical intervention if added to the existing HIV prevention programs in China [7]. Therefore, as a part of combination prevention approach, PrEP implementation has been included in the latest Five-Year Action Plan of HIV Prevention and Control by the Chinese government.

However, while some people with high risk behaviors in China had heard of PrEP, many might not be certain about the efficacy of PrEP due to accessibility issues and insufficient knowledge, and thus do not intend to use it [8]. Both MSM and medical care workers are often concerned with the relationship between high risk sexual behaviors and PrEP use [9, 10]. Individuals who engage in relatively high risk behaviors are more likely to use PrEP [11]. However, previous study also demonstrated that some high-

risk individuals were not willing to use PrEP [12]. It is hence important to explore barriers of PrEP intention among these individuals. In addition, if assessing the risk of acquiring HIV is an indicator of prescribing PrEP by medical care workers, stigmatization might be perceived by those coming to the clinics for uptaking PrEP medicine since those who are suggested to use PrEP by the medical care workers are believed to have more risk to acquire HIV infection than others. In other words, those who are suggested to use PrEP might be judged by others that they have more promiscuous behaviours than others.

In addition to barriers such as insufficient knowledge, lack of prescribing providers, and concerns of side effects, HIV-related stigma is still often experienced by potential and current PrEP users. For example, since antiretrovirals is also used to treat HIV-infected people, PrEP users often have concerns that others may think that they are HIV positive or have socially stigmatized behaviors such as injection drug use, condomless sex and multiple sex partners [13, 14]. They might also be concerned that others may think they have an HIV-infected positive partner, which is stigmatized by the society [15, 16].

At present, Truvada is in the process of applying the drug as an HIV prevention tool with the Chinese FDA. Once approved, PrEP programming and scale-up will likely be one of China's HIV prevention priorities. Therefore, in order to inform future PrEP prevention efforts, it is critical to identify factors associated with PrEP intention among Chinese MSM. The objective of this study is to identify barriers and facilitators of PrEP intention among MSM in China.

Methods

Participants and procedures

From August to October 2018, study participants were recruited in Nanjing to complete a survey about PrEP use intention and related information. Prior to conducting the cross-sectional survey, a focus group of 15 MSM was conducted where we used an interview guide exploring PrEP knowledge, barriers and facilitators of using PrEP, sexual behaviour and sexual risk. Findings from the focus group were used to develop and refine the survey measures.

We utilized a multifaceted sampling approach to recruit participants –online advertising including social media, referrals from community-based organizations and clinics, and peers of eligible participants who completed the survey. 300 individuals completed an on-line anonymous questionnaire survey. To meet the eligibility criteria, participants needed to be: 1) male sex at birth; 2) be 18 years old or older; 3) sexually active with other men in the past year; 4) HIV-negative or unknown. An informed consent was displayed if the participants met the eligibility screening questions. Participants received a 50RMB pre-paid cellphone card for completing the survey. The study was approved by the Institutional Review Boards of Chinese Center for Disease Control and Prevention in Beijing.

Measures

Background characteristics

Participants were asked about their socio-demographic characteristics including age, educational background, marital status, employment, income, and sexual orientation. Time of the latest HIV test was also asked.

Awareness, knowledge, accessibility and intention to use PrEP

Participants were explained the definition of PrEP in the informed consent. They were asked whether they intent to use PrEP to prevent HIV if used daily or before/after having sex. Four questions assessed PrEP awareness and knowledge: if you had heard of PrEP, percentage of PrEP efficacy, whether PrEP can prevent HIV if taken as prescribed, and whether PrEP may cause serious side effects. Another three questions assessed concerns of accessibility: I don't know where to get PrEP drugs, I don't know whether the doctors will prescribe PrEP drugs if I go to the clinic, and whether PrEP can be scaled up in China,. Except the PrEP efficacy question, response options for all other questions were either Yes or No.

Sexual risk index

We asked participants sexual risk behaviors during the last 6 months including, total number of male partners, total number of positive male partners, number of times having condomless receptive anal intercourse (CRAI) with any HIV status partner, number of times having condomless insertive anal intercourse (CIAI) with positive partners, whether they used amphetamines and poppers. Together with age, the 7-item screening index with a cutoff (if score is 10 or greater, evaluate for PrEP or other intensive HIV prevention services; If score is 9 or less, provide indicated standard HIV prevention services) had been developed [10] and used in prior studies to prioritize individuals for intensive HIV prevention efforts including PrEP [12].

External HIV stigma

Public stigma is the attitudes or reaction that the general population has towards people who have a particular undesirable attribute, such as homosexuality or HIV infection [17]. In this study, public HIV stigma was measured by the 7-item subscale from the Chinese version of HIV and homosexuality related stigma scales [18]. The items includes, 'HIV infected people should be ostracized by their spouse and family members', 'HIV infected people would lose their friends if they knew their HIV status', 'HIV infected people should be forced to leave their villages', etc. The Cronbach's coefficient alpha of the subscale was 0.86 in our sample. The scale was suggested to be used in developing countries and had been used among MSM population in China [19].

Data Analysis

Descriptive statistics including numbers and percentages were calculated for all variables. Bivariate generalized linear modeling with a binary logistic distribution was conducted to examine background variables related to PrEP intention. Background variables that were significant at the bivariate level ($p < 0.05$) were adjusted in further multivariate analysis for factors related to PrEP intention. Results were reported as odds ratios (OR) and adjusted odds ratios (aOR).

Results

Background characteristics and sex risk index score

Table 1 presents characteristics of the sample. A total of 300 individuals participated in the questionnaire survey. 55.7% of the sample were between the ages of 18-28, 70.0% completed some college or higher, 90.0% were single, 79.3% had a full-time job, 52.67% had a monthly income over 5000RMB (\$745), 77.7% self-identified as gay, 81.7% had been HIV tested in the past 6 months, 47.3% participants' sexual risk index score were 10 or greater.

Bivariate correlates of PrEP intention

Only 55.7% of the participants had heard about PrEP, while 75.34% were willing to use PrEP if efficacy of preventing HIV is assured. Table 2 presents the bivariate correlates of PrEP intention with background characteristics, risk behaviour index, knowledge and awareness, and external HIV stigma. All background variables including age, educational level, marital status, employment status, income, sexual orientation and timing of HIV test were not associated with the PrEP intention in bivariate level. The 7-item risk behavior index was also not related to the PrEP intention

Beliefs that 'PrEP can prevent HIV if take as prescribed' (OR=5.41, $p < 0.001$) was positively associated with PrEP intention, while 'PrEP may cause serious side effects' was negatively associated with PrEP intention (OR=0.31, $p = 0.003$).

'Don't know where to get PrEP' and 'Doctor may not prescribe PrEP if I go to the clinic' were not associated with PrEP intention, while 'PrEP can be scaled up in the community' (aOR=3.41, $p < 0.001$), were positively associated with PrEP intention.

Multivariate correlates of PrEP intention

In multivariate analysis controlling for all significant variables in bivariate analysis, Beliefs that 'PrEP can prevent HIV if take as prescribed' (aOR=4.84, $p < 0.001$), and 'PrEP can be scaled up in the

community'(aOR=3.24, $p < 0.001$) remained significantly associated with PrEP intention while concerns of side effect were negatively associated with PrEP intention (aOR=0.32, $p = 0.006$) (Table 3).

Discussion

Improving uptake of oral PrEP as a prevention measure for individuals at high risk of HIV has been challenging since it was first approved in 2012 in the US and other countries. While daily dosing of PrEP could result in significant reduction in HIV incidence and has been widely promoted in developed countries [4], uptake of PrEP has been low despite increasing awareness [20]. In our study, nearly half of the participants never heard of PrEP as one of the approaches to prevent HIV. This estimate is much higher than that in the US where just 20% of MSM had never heard of PrEP [21]. In addition, compare to a 19.1% willingness to use oral PrEP in a study of MSM in Shanghai [22], acceptability of PrEP was much higher in our study. However, the real-world effectiveness of oral PrEP would be determined by pill-taking behavior of the population at high risk for HIV. Although intention to use PrEP has increased, it may not necessarily translate to actual PrEP uptake. In another word, self-reported intentions and actual behaviors can be more or less disconnected in various circumstances [15]. For example, in the clinical trial study in Shanghai, actual uptake was only 2.5% compared to 19.1% of participants who said they were willing to use oral PrEP [22]. Therefore, effective strategies to increase PrEP use should underscore the feasibility of promoting PrEP, including improving awareness of PrEP related knowledge, coverage of medical insurance or adjust the market pricing of PrEP to make it affordable to people who are really in need, and even the characteristics of the PrEP pills (color, size etc.)[23].

Similar to previous findings among MSM in the US and other countries, beliefs of efficacy was associated with the intention of PrEP use [24, 25]. To maximize acceptability of oral PrEP, awareness, correct knowledge and information on PrEP are critical to improving willingness of PrEP use among MSM. Sufficient information distribution and marketing of PrEP from various sources such as CDC, HIV clinics, community organizations and social media has the potential to increase PrEP uptake once PrEP is approved in China.

Concerns of side effects have been identified as one of the major reasons of not willing to use PrEP among study participants, this was consistent with previous studies among Chinese MSM [26, 27] and MSM in other countries [28]. While there are some side effects when first starting the medication, such as nausea and frequent vomiting, they usually abate after two months into the regimen [4, 29]. However, kidney function decline and bone mineral density decrease were also reported among long-term PrEP users in clinical trials [30, 31]. In addition, traditional Chinese beliefs that medicine is somewhat toxic, would also be a barrier for MSM to take medicine before illness occurs. As a part of China's national HIV/AIDS prevention strategy, PrEP is expected to be scaled up in the coming years. Therefore, in addition to disseminate correct knowledge on the efficacy of PrEP, accurate drug safety information of potential short-term and long-term side effects as well as benefits of using PrEP, which may outweigh side effects, may improve uptake and adherence in the future.

PrEP has been suggested as the most cost-effective and promising way to decrease HIV incidence among at-risk MSM in previous modeling studies [32]. The Clinical Screening Index had been developed to be used to prioritize individuals for PrEP use and used by US CDC [10]. It was found that individuals who had engaged in high risk behavior were more likely to find PrEP acceptable than those who had not [25]. Furthermore, willingness to use PrEP was also associated with perceived risk of acquiring HIV [33]. However, in a trial of PrEP use in the US, it was found that MSM with actual high risk behaviors reported low risk perception and declined to use PrEP [34]. Similarly in our study, high risk score was not significantly associated with PrEP intention. Therefore, to identify the gap between perceived high risk and actual high risk behaviors among MSM would be beneficial to future PrEP implementation. For example, regular targeted HIV and sex education, in combination with accessible PrEP counseling and support could be an effective strategy. Finally, a modified screening index of PrEP use specific to the MSM populations in China may also be needed to accurately identify individuals at high risk for HIV.

Conclusion

Given the low awareness of PrEP-related information in China, structural interventions targeting high risk individuals and communities would benefit scale up of oral PrEP once approved by China FDA. Information on PrEP use can be delivered to people when they are seeking HIV post-test counseling. In addition, potential PrEP users should not only be informed of PrEP efficacy, but also receive counseling on HIV risk reduction, the importance of regular testing, and balancing the benefits and side effects of using PrEP. These findings highlight the importance of a comprehensive package in delivering PrEP, including regular HIV and PrEP education, and further development of feasible intervention strategies to improve uptake and adherence.

Abbreviations

MSM: Men who have sex with men

HIV: Human immunodeficiency virus

AIDS: Acquired immunodeficiency syndrome

PrEP: Pre-exposure prophylaxis

OR: Odds ratio

aOR: Adjusted odds ratios

P: Probability

FDA: Food and Drug Administration

CRAI: condomless receptive anal intercourse

CIAI: condomless insertive anal intercourse

Declarations

Ethical Approval and consent to participate The study protocol was reviewed and approved by the Institutional Review Boards of Chinese Center for Disease Control and Prevention in Beijing, and informed consent was obtained from all individual participants included in the study.

Consent for publication Not applicable.

Availability of data and materials The original data generated from this study and the analyzed results will be available from corresponding author upon reasonable request.

Competing interests All authors declare that they have no competing interests.

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Authors' contributions Xiaoyou Su, Chongyi Wei, Hongjing Yan and Li Yan designed the study. Hongjing Yan and Li Yan implemented the cross-sectional survey in Nanjing. Xiaoyou Su, Mingyu Si, Chongyi Wei and Hongjing Yan analyzed the data, interpreted the results and drafted the manuscript. Yujiang and Yuanli Liu interpreted the data. All authors revised and approved the final version of the manuscript submitted to the journal.

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Tables

Table 1 Background characteristics of men who have sex with men (N=300)

	n	%
Age		
18-28	170	56.67
29+	130	43.33
Education		
High school or less and Technical	88	29.33
College	156	52.00
Advanced degree	56	18.67
Marital status		
Married	30	10.00
Single	270	90.00
Employment		
Full-time	238	79.33
Other (part-time, no job)	62	20.67
Income		
≤2999	68	22.67
3000-4999	74	24.66
≥5000	158	52.67
Sexual orientation		
Gay	233	77.67
Bisexual and others	67	22.33
HIV test in previous 6 months		
Yes	245	81.67
No	55	18.33
sexual risk index score		
≥10	142	47.33
<10	158	52.67

Table 2 Bivariate correlation of socio-demographics, awareness, accessibility and HIV stigma predicting PrEP use intention (N=296)

	PrEP use intention				
	Intend(%)	Not intend(%)	aOR	95%CI	p
Socio-demographics					
Age					
18-28	132(78.11%)	37(21.89%)	1		
29+	91(71.65%)	36(28.35%)	0.71	0.42,1.21	0.20
Education					
High school or less and Technical	62(72.09%)	24(27.91%)	1		
College	120(77.92%)	34(22.08%)	1.37	0.75,2.50	0.31
Advanced degree	41(73.21%)	15(26.79%)	1.06	0.50,2.25	0.88
Marital status					
Married	22(75.86%)	7(24.14%)	1		
single	201(75.28%)	66(24.72%)	0.97	0.40,2.37	0.95
Employment					
Full-time	177(75.32%)	58(24.68%)	1		
Other (part-time, no job)	46(75.41%)	15(24.59%)	1.01	0.52,1.93	0.99
Income					
≤2999	51(76.12%)	16(23.88%)	1		
3000-4999	52(72.22%)	20(27.78%)	0.82	0.38,1.75	0.60
≥5000	120(76.43%)	37(23.57%)	1.02	0.52,1.99	0.96
Sexual orientation					
Gay	174(75.00%)	58(25.00%)	1		
Bisexual and others	49(76.56%)	15(23.44%)	1.09	0.57,2.09	0.80
HIV test in previous 6 months					
Yes	180(74.69%)	61(25.31%)	1		
No	43(78.18%)	12(21.82%)	1.21	0.60,2.45	0.59
awareness of PrEP					
Knowledge on Efficacy of PrEP (NA=129)					
No	45(73.77%)	16(26.23%)	1		
Yes	81(76.42%)	25(23.58%)	1.15	0.56,2.38	0.70
Whether PrEP can be scaled up					
Disagree	28(53.85%)	24(46.15%)	1		
Agree	195(79.92%)	49(20.08%)	3.41	1.82,6.40	<0.001**
PrEP can prevent HIV if take as requested					
No	11(40.74%)	16(59.26%)	1		
Yes	212(78.81%)	57(21.19%)	5.41	2.38,12.30	<0.001**
PrEP may cause serious side effects					
No	64(88.89%)	8(11.11%)	1		
Yes	159(70.98%)	65(29.02%)	0.31	0.14,0.67	0.003*
accessibility of PrEP					
Heard of PREP					
No	97(75.19%)	32(24.81%)	1		
Yes	126(75.45%)	41(24.55%)	1.01	0.60,1.73	0.96
Don't know how to get PrEP					
No	24(75.00%)	8(25.00%)	1		
Yes	199(75.38%)	65(24.62%)	1.02	0.44,2.38	0.96
Doctor may not prescribe the PrEP					

Yes	153(72.86%)	57(27.14%)	1		
No	70(81.40%)	16(18.60%)	1.54	0.84,2.96	0.18
Risk score					
low	115(74.19%)	40(25.81%)	1		
high	108(76.60%)	33(23.40%)	0.99	0.57,1.75	0.50
Public HIV stigma					
low	104(76.47%)	32(23.53%)	1		
high	109(72.67%)	41(27.33%)	0.89	0.52,1.53	0.68

*p<0.05,**p<0.001

Table 3 Multivariate predictors of Prep Intention (N=296)

	n(%)	aOR	95%CI	p
Whether PrEP can be scaled up				
Disagree	52(17.57)	1		
Agree	244(82.43)	3.24	1.67,6.32	<0.001**
PrEP can prevent HIV if take as requested				
No	27(9.12)	1		
Yes	269(90.88)	4.84	2.03,11.54	<0.001**
PrEP may cause serious side effects				
No	72(24.32)	1		
Yes	224(75.68)	0.32	0.14,0.73	0.006*

*p<0.05,**p<0.001