

Longitudinal Analysis of Key HIV-Risk Behavior Patterns and Predictors in Men Who Have Sex with Men, Bangkok, Thailand

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Abstract The HIV incidence among Thai men who have sex with men (MSM) enrolled in the Bangkok MSM Cohort Study (BMCS) has remained high since its inception in 2006. The purpose of this BMCS analysis was to determine: (1) changes in three HIV-risk behaviors (unprotected anal intercourse (UAI), recreational drug use, and multiple sexual partners i.e., more than four male/transgender partner) over time; and (2) factors associated with each one separately. Thai MSM aged 18 years or older and living in Bangkok were eligible to participate in the BMCS. At each follow-up visit, participants were asked to report their sexual and drug behaviors in the previous 4 months. We conducted a longitudinal analysis using generalized estimating equations logistic regression that included 1,569 MSM who were enrolled from 2006 to 2010 and contributed at least one follow-up visit. For each four-month visit increase, we found a 2, 1, and 1 % decrease in odds for reported UAI, recreational drug use, and multiple sexual partners, respectively. We found significant predictors associated with three HIV-risk behaviors such as binge drinking, participation in group sex, and use of erectile dysfunction drugs. The statistically significant decrease in odds of HIV-risk behaviors among the participants is encouraging; however, continued vigilance is required to address the factors associated with HIV-risk behaviors through currently available interventions reaching MSM.

Keywords MSM · HIV · Risk behaviors · Cohort analysis · Thailand

Introduction

Despite a high level of knowledge and awareness about the protective efficacy of condom use against the acquisition or transmission of human immunodeficiency virus (HIV) infection, HIV prevalence among men who have sex with men (MSM) remains high in many industrialized, middle-income, and some low-income countries (Baral, Sifakis, Cleghorn, & Beyrer, 2007; Beyrer et al., 2010; Griensven & Wijngaarden, 2010; Grulich & Kaldor, 2008).

In many industrialized countries, unprotected anal intercourse (UAI) among MSM, particularly receptive versus insertive UAI, is associated with HIV infection (Elford et al., 2009; Folch, Munoz, Zaragoza, & Casabona, 2009). Thailand's estimates of HIV prevalence in Bangkok MSM have rapidly increased in the last several years. In 2003, the United States Centers for Diseases Control and Prevention and its partners conducted the first cross-sectional venue-based assessment in Thai MSM in Bangkok. The HIV prevalence found among this population was 17.3 % (van Griensven et al., 2005). HIV incidence density, which was estimated for participants aged 15 to 22 years in 2003, 2005, and 2007, was 4.08 per 100 person-years (PY), 6.42 PY, and 7.69 PY (p value <0.05 for trend), respectively (van Griensven et al., 2009). Although the proportion of MSM reporting anal sex and multiple casual partners significantly decreased from 2003 to 2009, the proportion of MSM reporting consistent condom use during anal sex remained stable (64 %) at each assessment. However, the level of overall recreational drug use and recreational drug use during sex significantly increased (van Griensven et al., 2009). In these assessments, high-risk behaviors such as inconsistent condom use during anal sex and multiple sexual partners were associated with social and psychological conditions such as drug and

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alcohol use, social isolation, feeling suicidal, history of coerced sex, and involvement in sex-related work (Chemnasiri et al., 2010; Guadamuz et al., 2011a, 2014; Li et al., 2009; Toledo et al., 2010; van Griensven et al., 2005, 2009). The persistence of these high-risk behaviors is felt to be associated with a high level of HIV prevalence and incidence among MSM and transgender persons in Bangkok (Guadamuz et al., 2014), particularly among young MSM (van Griensven et al., 2009, 2013). In addition, presence of multiple psychosocial health conditions and their synergy increase HIV-risk behaviors and HIV infection (Guadamuz et al., 2014).

In response, in 2006 the CDC in collaboration with the Thai Ministry of Public Health (MoPH) initiated the Bangkok MSM Cohort Study (BMCS). BMCS is an open, longitudinal cohort study aimed at assessing the prevalence, incidence, human immunodeficiency virus type 1 (HIV-1) subtype distribution, and risk factors for HIV infection in Thai MSM in Bangkok. The purpose of these analyses was to determine: (1) changes in three HIV-risk behaviors (UAI, recreational drug use, and multiple sexual partners) over time; and (2) factors associated with each behavior.

Method

Participants and Procedure

The BMCS has been described elsewhere in detail (van Griensven et al., 2013). We recruited participants from venues patronized by MSM, and from HIV and voluntary counseling and testing (VCT) services provided at the Silom Community Clinic (SCC). Potential participants were approached during regular outreach activities by local MSM community-based organizations, and referred to the study site. The study was also promoted and information provided at popular Thai MSM websites. Inclusion criteria for eligibility in the BMCS included: Thai national, male at birth, at least 18 years of age, resident of Bangkok or neighboring provinces, reporting penetrative oral or anal sex with another man in the preceding six months of inclusion, committed to 60 months of follow-up at 4 months intervals, and willing and able to provide written informed consent.

At enrollment, all MSM were screened for HIV-1, hepatitis infection, and STIs, and completed sexual behavior and drug use questions about the previous four months using an audio computer-assisted self-interview (ACASI). After the baseline visit, participants were expected to return for a follow-up visit every four months. At each of these follow-up visits, participants completed an ACASI for key behavioral variables (i.e., UAI, recreational drug use, number of sexual partners) and other sexual behavior and drug use questions. Participants underwent HIV and STI testing and counseling in an MSM-friendly setting, with participants testing HIV-positive referred for care, support, and treatment services. At each follow-up visit, participants received

500 Thai Baht (about US\$ 16) compensation for their time and transportation expenses.

For the analyses, we excluded participants who were lost to follow-up, i.e., participants who had never returned for any follow-up visit. The observation period extended between their initial visit and 36 months of follow-up visits.

Measures

For the ACASI interview at each follow-up visit, participants provided information for the 4 months prior to the current visit. All questions originally adapted from the CDC's Young Men's Survey (MacKellar et al., 1996) and had been validated with MSM in Thailand (Guadamuz et al., 2011b, 2014; Mansergh et al., 2006b). Male/transgender partners were classified into four types and defined as: steady, casual, sex worker, and client. Time-independent variables measured at baseline included sociodemographic characteristics such as age, education level, employment status, living situation, sexual orientation, and risk behaviors. Behaviors without a period restriction at baseline including "existence of social support" (existence of someone in family or friend to talk to: yes/no), "ever thought or attempted suicide" (ever seriously thought about committing suicide or tried to commit suicide: yes/no), "history of coerced sex" (ever been forced to have sexual intercourse against his will: yes/no), "comprehensive knowledge about HIV transmission" (the correct answer to all 4 questions, i.e., condom can protect HIV transmission during vaginal sex, condom can protect HIV transmission during anal sex, HIV can be transmitted through sharing needles and syringes, and a person living with HIV can look healthy), "had a HIV test" (yes/no), "ever had sex with female" (yes/no), and "ever had sex with transgender individual(s)" (yes/no). The following variables were asked at every follow-up visit and included data from the previous four months: "binge drinking" (alcohol intoxication: becoming drunk 2–3 times per week or more); "erectile dysfunction (ED) drug use (e.g., ViagraTM)" (yes/no); "participated in group sex" (yes/no), recreational drug use (use of one or more of the following drugs: cannabis, ecstasy, methamphetamine, ketamine, cocaine, gamma-hydroxybutyrate (GHB), amyl nitrite (poppers), and benzodiazepine); number of male/transgender sexual partner; and UAI (any anal intercourse without a condom with steady/casual/sex worker/client).

HIV Antibody Testing

At each visit, participants were tested for HIV infection using OraQuick[®] (OraSure Technologies Inc., Oregon, USA) on oral fluid. If reactive, three different HIV rapid tests (DetermineTM HIV 1&2, Abbott, Japan; DoubleCheckTM II HIV 1&2 Organics Ltd., Israel; and CapillusTM HIV-1/HIV-2, Trinity Biotech, USA, which after November 2008 was replaced with CoreTM

HIV-1/2, UK) were performed on blood. If all three tests were reactive, HIV infection was confirmed, and the result given to the participant during post-test counseling.

Statistical Analyses

We used counts and proportions to describe sociodemographic characteristics and risk behaviors at baseline. We performed logistic regression using the Generalized Estimating Equations (GEE) approach to test predictors of each of the three HIV-risk behaviors as dependent variables, unprotected anal intercourse, recreational drug use, and more than four male/transgender sexual partners, all occurring during the previous four months between visits for the longitudinal study. This allowed us to account for correlations within subjects measured at different time points using robust standard errors. Key variables with a p value ≤ 0.10 in bivariate analyses (adjusted on “visits”) were entered into the model. Statistical significance was evaluated using a two-sided p -value of 5 %. All the analyses were performed with Stata® (Version 11).

Ethical Review

The Ethical Review Committee for Research in Human Subjects of the Thailand Ministry of Public Health, and an Institutional Review Board of CDC reviewed and approved the protocol.

Results

Sociodemographic and Behavioral Characteristics at Baseline Visit

From April 2006 to November 2010, we enrolled 1,744 Thai MSM into the study, including 175 (10 %) who were eventually lost to follow-up. Of the remaining 1,569 participants, the median age was 26.0 years (range 18–56), and 805 (51 %) had secondary or vocational education. Most were either employed or studying (96 %), and identified themselves as homosexual, gay, or bisexual (96 %). Fifty-six percent of study participants reported engaging in unprotected anal intercourse, and 16 % in recreational drug use, and the median number of sexual partners reported was four (IQR 2, 9). A total of 312 participants were HIV infected (20 %) (Table 1).

Changes in Key HIV-Risk Behaviors Across Visits

Of the 1,569 participants remaining in the study in October 2013, 91 % completed the 12-month visit, 68 % completed the 24-month visit, and 48 % completed the 36-month visit. For numbers of visits, 164/1569 (10 %) came for only 2 visits (enrollment and any other one follow-up visit), and 183/1569 (12 %) came for only 3 visits (enrollment and any other two follow-up visits). We

Table 1 Sociodemographics behavioral characteristics at baseline among Thai MSM enrolled in the Bangkok MSM Cohort Study, Thailand 2006–2010

	<i>N</i>	%	Median (IQR)
Total	1,569	100.0	
Age at entry			26 (23,31)
18–21 years old	258	16.4	
22–29 years old	851	54.2	
≥30 years old	460	29.3	
Educational level			
Primary or less	34	2.2	
Secondary/Technical/Vocational	805	51.3	
University or higher	730	46.5	
Working/studying Status			
Unemployed	69	4.4	
Studying or studying and working	564	36.0	
Working only	936	59.7	
Cohabiting with			
Steady partner	243	15.5	
Alone or with roommate	710	45.2	
Family	616	39.3	
Sexual identity			
Bisexual	260	16.6	
TG	50	3.2	
Homosexual/Gay	1,249	79.6	
Heterosexual	10	0.6	
Role in anal sex			
Receptive	279	17.8	
Insertive and receptive	1,002	63.9	
Insertive	288	18.4	
History of coerced sex			
Yes	269	17.1	
No	1,300	82.9	
Existing social support			
Yes	1,358	86.6	
No	211	13.4	
Comprehensive knowledge on HIV transmission			
Yes	639	40.7	
No	930	59.3	
Ever thought or attempted suicide			
Yes	404	25.7	
No	1,165	74.3	
Ever had HIV test			
Yes	818	52.2	
No	750	47.8	
Binge drinking ^a			
Yes	173	11.3	
No	1,396	89.0	
Recreational drug use ^b			
Yes	246	15.7	

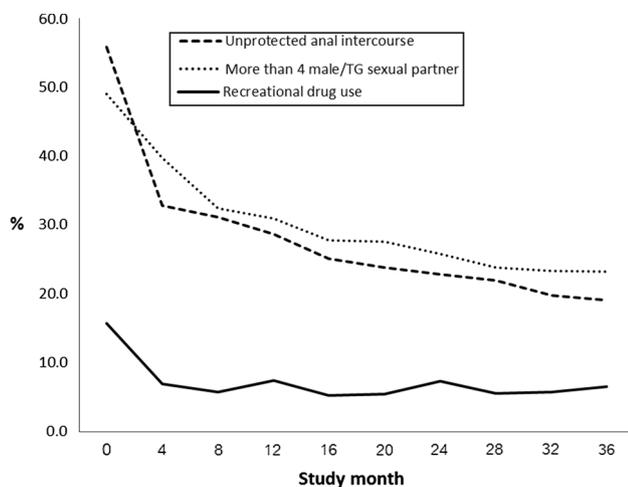
Table 1 continued

	<i>N</i>	%	Median (IQR)
No	1,323	84.3	
Erectile dysfunction drug use			
Yes	177	11.3	
No	1,392	88.7	
Number of male/TG sexual partners			4 (2, 9)
HIV status			
Positive	312	19.9	
Negative	1,257	80.1	
Participated in group sex			
Yes	575	36.7	
No	993	63.3	
UAI with male/TG			
Yes	876	55.8	
No	693	44.2	

TG transgender person, UAI unprotected anal intercourse (any anal intercourse without a condom with steady/casual/sex worker/client)

^a Alcohol intoxication: becoming drunk 2–3 times per week or more

^b Use of one or more of the following drugs: cannabis, ecstasy, methamphetamine, ketamine, cocaine, gamma-hydroxybutyrate (GHB), amyl nitrite (poppers), and benzodiazepine (sedative)

**Fig. 1** Changes in key HIV-risk behaviors across visits

examined changes in key HIV-risk behaviors from the baseline to the 36-month visit (Fig. 1). A similar pattern of decreasing risk was observed for all three HIV-risk behaviors. The proportion of participants who reported any UAI was 56 % at baseline, and decreased to 19 % by the 36-month visit.

Forty-nine percent of participants reported having had more than four sexual partners at baseline; by the 36-month visit the proportion had decreased to 23 %. Recreational drug use at baseline was reported by 16 % of participants, but declined to 7 % by the first four-month post-enrollment visit, and remained stable for the remaining visits (Fig. 1). The multivariate analyses

showed that the odds of the three HIV-risk behaviors significantly decreased with each one-unit increase in number of subsequent follow-up study visits (2 % for UAI, 1 % for recreational drug use, and 1 % for multiple sexual partners) (Table 2). Through the 36-month period, 72 % of participants reported no recreational drug use, 33 % reported having fewer than four sexual partners, and 23 % reported not having UAI. In contrast, for consistent risky behaviors, the proportion of participants was 2 % for UAI, 1 % for recreational drug use, and 4 % for having more than four sexual partners.

Longitudinal Analyses of HIV-Risk Behaviors

Unprotected Anal Intercourse

In bivariate analyses, younger age, binge drinking, having used recreational drugs, HIV infection, having participated in group sex, having had more than four partners, ED medication use, and suicidal ideation were associated with reports of engaging in unprotected anal intercourse ($p < 0.05$). We included these variables in the multivariate analyses, together with a coercive sex experience variable ($p \leq 0.10$). Table 2 presents results from the final multivariate model.

Recreational Drug Use

Multiple predictors were associated with recreational drug use over time in bivariate analyses. After controlling for covariates in the final model, all predictors included in the model remained significantly associated with the outcome ($p < 0.05$) except age at cohort enrollment (Table 2).

Multiple (i.e., More than Four) Sexual Partners

Similarly, multiple predictors were associated with having more than four sexual partners over time in bivariate analyses (Table 2). Age at entry, HIV infection, existence of social support, and comprehensive knowledge were not related to having more than four sexual partners over time. All other predictors were included in the multivariate model ($p \leq 0.10$).

Discussion

We found that over a 36-month period, the frequency of HIV-risk behaviors in Thai MSM enrolled in the BMCS declined. The odds for UAI, recreational drug use, and having more than four sexual partners in the past four months decreased by 2, 1, and 1 %, respectively, for each additional four-month visit study participants attended. However, throughout the study period only one-quarter of the participants reported maintaining consistently safe behaviors for unprotected anal intercourse, and one-third having fewer than four sexual partners during the four

Table 2 Multivariate generalized estimating equations logistic regression analysis of predictors for key HIV-risk behaviors of Thai MSM enrolled in the Bangkok MSM Cohort Study from 2006 to 2010, Thailand, $N = 1,569$

Characteristics	Unprotected anal intercourse ^a Multivariate			Recreational drug use ^a Multivariate			More than four sexual partners ^a Multivariate		
	AOR	95 % CI	<i>p</i> value	AOR	95 % CI	<i>p</i> value	AOR	95 % CI	<i>p</i> value
Visits	0.98	0.974–0.982	<0.001	0.99	0.98–0.9996	.04	0.99	0.985–0.993	<0.001
Age categories									
18–21 years old	1.5	1.2–1.9	<0.001	1.7	1.1–2.5	.01	N/S		
22–29 years old	1.4	1.1–1.6	<0.001	1.4	1.0–1.9	.05			
≥30 years old	1								
Binge drinking ^a									
Yes	1.3	1.03–1.5	.02	3.7	2.8–4.8	<0.001	1.7	1.4–2.1	<0.001
No				1			1		
UAI with male or TG ^a									
Yes	N/A	N/A	N/A	1.5	1.2–1.8	<0.001	1.4	1.3–1.6	<0.001
No				1			1		
Recreational drug use ^a									
Yes	1.5	1.2–1.8	<0.001	N/A	N/A	N/A	1.6	1.3–2.0	<0.001
No	1						1		
Current HIV status									
Positive	0.5	0.4–0.6	<0.001	1.5	1.2–2.0	<0.01	N/S		
Negative	1								
Participated in group sex ^a									
Yes	1.6	1.4–1.8	<0.001	1.5	1.2–1.9	<0.01	6.6	5.7–7.5	<0.001
No	1						1		
>4 sexual male/TG partners ^a									
Yes	1.4	1.3–1.6	<0.001	1.7	1.3–2.1	<0.001	N/A	N/A	N/A
No	1			1					
Erectile dysfunction drug use ^a									
Yes	1.4	1.2–1.7	<0.001	7.2	5.7–9.1	<0.001	1.7	1.4–2.1	<0.001
No									
Existence of social support									
Yes	N/S			N/S			N/S		
No									
Ever thought or attempted suicide									
Yes	1.2	1.02–1.4	.03	1.4	1.1–1.9	<0.01	N/S		
No				1					
History of coerced sex									
Yes	N/S			N/S			1.3	1.05–1.5	.01
No									
Comprehensive knowledge									
Yes	N/S			N/S			N/S		
No									

AOR adjusted odd ratio, CI confidence interval, N/S non-significant $p > 0.05$, TG transgender person, N/A not applicable, UAI unprotected anal intercourse

^a Timeframe is past 4 months

months preceding their visit. Thus, despite the decreases, we found a significant proportion of MSM reported consistently engaging in high-risk behaviors. This finding may explain the persistent high level of HIV incidence we observed in the cohort (van Griensven et al., 2013).

These analyses identified HIV-risk behaviors among MSM and factors related to those behaviors. Reporting having multiple partners was identified as a significant predictor for UAI and recreational drug use. This demonstrates the known link between drug use and high-risk behaviors (Colfax et al., 2005; Guadamuz

et al., 2014; Halkitis, Mukherjee, & Palamar, 2009). Another statistically significant finding was the strong association between use of ED and recreational drugs. This combination of high-risk behaviors may be contributing to the ongoing number of HIV infections in this cohort population. Recruitment of MSM sexual partners through the Internet is commonly associated with high-risk behaviors (Blackwell, 2008; Mettey, Crosby, DiClemente, & Holtgrave, 2003; Wei et al., 2014), and MSM who utilize the Internet to recruit partners are more likely to report group sex (Mettey et al., 2003). In Thailand, the Internet provides many opportunities for recruiting sexual partners. There is an abundance of local and international websites where sexual partners can be solicited. In addition, announcements for “sex parties” (“*moo gan*” or “*seks moo*” in Thai colloquial language) with or without “high sex” (i.e., use of recreational drugs) are on the Internet. Using ED drugs were identified as a significant predictor for recreational drug use, which is associated with having multiple partners, similar to previous findings (Chu et al., 2003; Mansergh et al., 2006a; Ostrow et al., 2009; Sanchez & Gallagher, 2006). Recreational drug use during “sex parties” among MSM has been described elsewhere as well (Pantalone, Bimbi, & Parsons, 2008; Semple, Zians, Strathdee, & Patterson, 2009). These “sex parties” usually include mixing use of alcohol, recreational drugs, and ED drugs to promote sexual disinhibition and openness to sexual experiences. In addition, getting “high” is reported to increase pleasure by maintaining erections when using a condom, and for having prolonged or marathon sex.

We identified an association between suicidal ideation and/or suicide attempts and recreational drug use (Guadamuz et al., 2014; Mustanski, Garofalo, Herrick, & Donenberg, 2007). Because data were not available regarding the mental health histories of participants, we are unable to discuss these findings and interpret the relationship between the participant’s mental health status and high-risk behaviors. Suicidal ideation and suicide attempts may be associated with social rejection and isolation, stigmatization related to homophobia, HIV infection, or having experienced coercive sex (Biello et al., 2014; Guadamuz et al., 2014; King et al., 2008; Meyer, 2003; Mustanski et al., 2007; Pan et al., 2013). Further research in this area is needed.

We found age to be positively associated with UAI but not with reporting having more than four sexual partners, or with recreational drug use. Participants under 30 years of age were more likely to engage in UAI, a finding consistent with the high level of HIV incidence among MSM aged 18–21 years previously reported in this cohort (van Griensven et al., 2013).

We found that HIV infection had a statistically significant negative association with UAI, i.e., the odds of UAI for an HIV-infected participant decreased at each visit. However, a meta-analysis highlighted that the level of unprotected anal and vaginal intercourse among study participants substantially declined after being notified of a HIV-positive test result (Marks, Crepaz, Senterfitt, & Janssen, 2005). In the BMCS, all participants were aware of their HIV status.

We found a positive and significant association between HIV infection and recreational drug use as described elsewhere (Pantalone et al., 2008; Semple, Patterson, & Grant, 2002). However, we found that recreational drug use was strongly associated with HIV infection. This suggests that an HIV-infected participant using recreational drugs may also engage in high-risk behaviors. Semple et al. identified plausible explanations of recreational drug use, particularly methamphetamine, among HIV-infected MSM; they included coping with the HIV-positive diagnosis and the shadow of death, providing an escape from HIV infection, managing negative self-perceptions and social rejection, and using it as a remedy for HIV-related health issues such as fatigue. In addition, only half of the participants had ever had an HIV test before they enrolled in the study. Further investigations examining HIV-risk behaviors over time among HIV-positive MSM are needed.

This study included several limitations. Our study demonstrates that the patterns of HIV-risk behaviors declined as previously reported from a Chicago cohort (Ostrow, Beltran, & Joseph, 1994). This change may have resulted from the longitudinal aspect of the study, that participants have been asked about sexual behavior, recreational drug use and alcohol consumption and were informed about their HIV status together with sexual risk-reduction counseling at each follow-up visit. This finding suggests that the results of our study may have limited generalizability to MSM community. We omitted interaction testing in our analyses because predictors and key-risk behaviors were correlated, thereby limiting our understanding of any effect modification that may have occurred among key variables. Additionally, we assumed that missing data were random, and performed longitudinal analyses with a population-average model. We acknowledge that these missing data may have led to underestimating the effect for some key predictors. Indeed, when examining the factors associated with loss to follow-up during follow-up, we found that “younger age (i.e., 18–21 years),” “HIV-positive status at entry,” “less than university education,” “recreational drug user,” and having a history of HIV testing were associated with being classified as lost to follow-up (data not shown). These findings suggest that the profile of the participants who missed visits or were lost to follow-up is similar to that of high-risk sexually active young Thai MSM. Achieving effective and sustainable programs, i.e., youth-friendly services, is crucial to adequately serving HIV-positive youth. In addition, a multiple-partner variable was a composite of any possible combination of male/transgender sexual partner as well as the UAI variable. These limitations impede the ability to investigate into what partner types the participants predominately have. Lastly, we must consider social desirability bias, which may have caused under-reporting of sexual and drug use behaviors despite the use of ACASI. We used careful language in constructing questions likely to elicit socially desirable responses. However, our report of UAI and history of HIV testing were consistent with a previous study conducted among Thai MSM (Wheelock et al., 2013). The social desirability bias may be particularly relevant in Thailand

where it is commonplace to report socially acceptable behaviors (Jenkins & Kim, 2004). In Thai culture, consonance in social interaction is the norm, and creating dissonance is unexpected and considered inappropriate.

We found significant predictors positively associated with key HIV-risk behaviors selected for our study. The trend over time suggests a significant reduction in self-reported HIV-risk behaviors. However, the persistence of these high-risk behaviors is worrisome, and these behaviors may not be reduced without the development of a more comprehensive package of HIV-risk reduction interventions reaching MSM in Bangkok, such as the introduction of pre-exposure prophylaxis.

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