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HIV serodisclosure among men who have sex with men and transgender women on HIV pre-exposure prophylaxis

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Abstract

HIV pre-exposure prophylaxis (PrEP) might lead individuals to view serodisclosure as unnecessary. We examined the prevalence of non-disclosure and lack of knowledge of partner status in a global cohort of men who have sex with men (MSM) and transgender women (TW) enrolled in the iPrEx Open Label Extension (OLE). We calculated prevalence ratios by fitting a logistic model and estimating predicted probabilities using marginal standardization. Prevalence of non-disclosure and lack of knowledge of partner status were highest in Thailand (73% and 74%, respectively) and lowest in the USA (23% and 37%, respectively). In adjusted analyses, PrEP use was not significantly associated with non-disclosure or lack of knowledge of partner status (p -values >0.05). We found that relationship characteristics were significantly associated with both outcomes. Non-disclosure was higher among casual (adjusted prevalence ratio [aPR] 1.54, [95% confidence interval 1.24–1.84]) and transactional sex partners (aPR 2.03, [1.44–2.62]), and among partners whom participants have known only minutes or hours before their first sexual encounter (aPR 1.62, [1.33–1.92]). Similarly, participants were less likely to know the HIV status of casual partners (aPR 1.50, [1.30–1.71]), transactional sex partners (aPR 1.62, [1.30–1.95]), and those they have known for only days or weeks (aPR 1.13, [0.99–1.27]) or minutes or hours (aPR 1.27, [1.11–1.42]). Our findings underscore the role of dyadic factors in influencing serodisclosure. Comprehensive risk reduction counseling provided in conjunction with PrEP that address relationship characteristics are needed to help patients navigate discussions around HIV status.

Keywords

HIV serodisclosure; pre-exposure prophylaxis; PrEP; HIV prevention; men who have sex with men; transgender women

Introduction

HIV pre-exposure prophylaxis (PrEP) using oral emtricitabine-tenofovir disoproxil fumarate (FTC-TDF) has been shown to reduce the risk of HIV transmission in sexually active adults, including men who have sex with men (MSM) and transgender women (TW) (Grant et al., 2014; Grant et al., 2010; Liu et al., 2016; McCormack et al., 2016). In September 2015, the World Health Organization (WHO) released guidelines supporting expanded access to PrEP services for those at substantial risk for HIV (WHO, 2015). However, PrEP's relative novelty has raised concerns about the impact it might have on existing risk reduction strategies, like serodisclosure and seroadaptive behaviors.

HIV serodisclosure is a process that involves informing others of one's HIV status (Obermeyer, Baijal, & Pegurri, 2011). Considering that HIV transmission largely occurs in the context of a serodiscordant partnership where one person is HIV-viremic and the other is HIV-negative, there has been substantial public health effort to encourage communication of HIV status between partners (Kennedy, Fonner, Armstrong, O'Reilly, & Sweat, 2015; Palmer, 2004; Simoni & Pantalone, 2004; UNAIDS, 2000). Serodisclosure can help raise awareness of HIV risk, encourage individuals to seek out regular testing, destigmatize HIV through open communication, and facilitate informed sexual decision making and sexual negotiation (Horvath, Nygaard, & Simon Rosser, 2010; Obermeyer et al., 2011; Smith, Rossetto, & Peterson, 2008). Accurate HIV serodisclosure is also a critical prerequisite to the effectiveness of various seroadaptive behaviors, such as serosorting or seropositioning, that are widely used among MSM and TW (Groves, Rendina, Moody, Ventuneac, & Parsons, 2015a; Snowden, Wei, McFarland, & Raymond, 2014; van Griensven, 2009).

Surveys conducted among MSM have suggested that PrEP could lead to a reduction in HIV risk perception (Brooks et al., 2012; Golub, Kowalczyk, Weinberger, & Parsons, 2010; Groves, Whitfield, Rendina, Ventuneac, & Parsons, 2015b) that, in turn, might cause PrEP users to view discussions on HIV status with sex partners as unnecessary (Gorbach et al., 2004; Rönn, White, Hughes, & Ward, 2014). PrEP should be viewed as a complement to other risk reduction strategies (US Public Health Service, 2014.), so it is important to understand how its use might impact crucial behaviors like serodisclosure and asking partners about their status. To our knowledge, there have been no previous studies that have explored HIV status communication among HIV-negative MSM and TW taking PrEP. To address this gap, we sought to identify in an open label PrEP cohort what factors are associated with non-disclosure and lack of knowledge of partner status. We tested the null hypothesis that PrEP use had no effect on serodisclosure.

Methods

Participants and Procedures

The current study is a secondary analysis of data from the iPrEx open label extension (iPrEx OLE), described in detail elsewhere (Grant et al., 2014). Briefly, participants were enrolled from three previous randomized clinical trials conducted at 11 sites across Brazil, the Andes (Ecuador and Peru), South Africa, Thailand, and the United States (USA). Participants were male sex at birth, reported having anal sex with men, were at least 18 years of age, and must

have participated in a previous PrEP clinical trial. The study enrolled participants between June 2011 and June 2012, and followed participants for up to 72 weeks. All participants provided informed consent and the iPrEx OLE study protocol was approved by institutional review boards at each site and by relevant regulatory agencies in each country.

At enrollment, all eligible HIV-negative participants were offered daily oral FTC-TDF PrEP. Participants who opted to not take PrEP remained in the study and had the opportunity to start the regimen at any visit during the first 48 weeks of follow-up. Visits were scheduled at 4, 8, and 12 weeks after enrollment, and every 12 weeks thereafter. Since data for this analysis was gathered in the broader context of a PrEP open label study, we limited our inquiry to a cross-sectional examination of demographic and relationship characteristics obtained at baseline and serodisclosure data collected at the 12-week visit. These timepoints provided the most complete information. This also allowed us to objectively determine which participants were using PrEP based on plasma tenofovir levels that were measured within the first 12 weeks. Adherence during this timepoint was found to be highly predictive of subsequent adherence (Glidden et al., 2015).

Measures

Relationship characteristics—Participants were asked to report detailed information on up to three of their most recent sex partners in the last three months using computer-assisted self-interview (CASI). For each sex partner, participants were queried on what best describes the type of relationship they have with that individual (i.e., sexual and emotional, sexual only, transactional) and how long the participant knew the partner before having sex (i.e., minutes or hours, days or weeks, months or years). We limited our inquiry to the three most recent sex partners to limit recall bias and respondent fatigue.

Non-disclosure and lack of knowledge of partner status—For each partner, participants were asked whether or not they serodisclosed (i.e., “Does partner A know that you are HIV-negative”). Responses were coded as non-disclosure if participants responded “No” or “Don’t know.” Participants were also asked if the partner had ever tested positive for HIV. A response of “Don’t know” indicated a lack of knowledge of partner status. Less than 5% of data on disclosure (n=94) and knowledge of partner status (n=112) were missing at the 12-week follow-up visit.

PrEP Use and beliefs on effectiveness of PrEP—Blood samples were tested for plasma tenofovir levels within 12 weeks of starting PrEP to quantify drug adherence. Of those who reported at least one sex partner in the last three months, 54% (644/1,184) had detectable drug and were coded as being “On PrEP – Detectable.” Participants who elected to start PrEP but had plasma drug levels below level of quantification (244/1,184) were coded as “On PrEP – Undetectable.” Those that never started the regimen (281/1,184) were coded as being “Off PrEP.” Less than 2% (15/1,184) of those who elected to start PrEP and had reported at least one recent sex partner did not have their drug levels quantified. Participants were also asked to rate on a 10-point scale how well they believed PrEP works at preventing HIV. A score of one indicated that they believed PrEP was not effective at all,

five meant it was effective half the time, and 10 indicated that they believed PrEP is effective all of the time.

Statistical Analyses

The overall prevalence of non-disclosure and lack of knowledge of partner status was calculated using information reported by participants regarding their three most recent sex partners in the last three months. Using a directed acyclic graph (Weng, Hsueh, Messam, & Hertz-Picciotto, 2009), we hypothesized *a priori* the relationships between demographic factors (age, education, gender), study region, baseline relationship characteristics (relationship status, relationship type, time partner known before sex), PrEP use (off PrEP, on PrEP – undetectable drug, on PrEP – detectable drug), and our two outcomes of interest (non-disclosure and lack of knowledge of partner status). These covariates were evaluated individually in bivariate analyses and as a predictor set using logistic regression, accounting for the repeated observations within participants. Following estimation of the logistic model, we calculated prevalence ratios by estimating predicted probabilities using marginal standardization (Muller & MacLehose, 2014). Confidence intervals were estimated using the delta method (Localio, Margolis, & Berlin, 2007). Interaction terms between PrEP use, relationship type, and time before first sex with partner were statistically uninformative (data not shown). Statistical significance was set at $p < 0.05$ and analyses performed using Stata 14 (College Station, TX).

Results

Study population

The iPrEx OLE cohort included 1,603 HIV-negative individuals; 286 (18%) reported no sex partners in the last three months at their 12-week follow-up and 133 (8%) declined to answer. The final analysis was limited to the 1,184 who reported having at least one recent sex partner. Median age at baseline was 30 years, and most were single, divorced, or widowed (53%), and had completed secondary education or less (53%). Approximately 90% identified as MSM and 10% as TW.

At their 12-week follow-up, participants provided information on a total of 2,382 partners, most of whom were described as casual partners based primarily on a sexual relationship (55%). A small number were reported as clients or transactional sex partners (5%). Approximately 26% of partners were known to participants only within minutes or hours before their first sexual encounter. Participant demographics and relationship characteristics are summarized in Table 1.

Participant non-disclosure

Table 2 summarizes prevalence estimates of non-disclosure. Overall, participants did not disclose their HIV status to 37% (893/2,382) of their three most recent sex partners in the last three months. Participants had condomless sex with approximately 24% (210/893) of partners with whom they did not disclose their HIV status. Non-disclosure varied considerably by study region. Notably, prevalence was highest in Thailand (73%) and lowest

in the USA (23%). Regional differences remained statistically significant even after adjusting for demographic characteristics, relationship factors, and PrEP use.

In adjusted analyses, we found no significant difference in the the prevalence of non-disclosure among participants on PrEP (aPR 1.10; 95% CI 0.85 – 1.35) and those with undetectable drug levels (aPR 1.03; 95% CI 0.76 – 1.29), compared to those off PrEP. We observed a higher prevalence of non-disclosure to casual (aPR 1.54; 95% CI 1.24 – 1.84) and transactional sex partners (aPR 2.03; 95% CI 1.44 – 2.62), compared to those whom participants felt an emotional and sexual connection. Similarly, participants were significantly more likely to not disclose their HIV status to partners whom they have known for only minutes or hours (aPR 1.62; 95% CI 1.33 – 1.92), compared to those whom participants have known for months or years before their first sexual encounter.

To further explore the relationship between PrEP use and non-disclosure, we restricted our analysis to only those who elected to start PrEP. We examined if those who did not disclose viewed PrEP to be more effective at preventing HIV than those that did. Median scores ($Mdn=7$) were not significantly different ($p=0.07$) and suggest both groups equally viewed PrEP to be moderately effective.

Lack of knowledge of partner status

Participants reported not knowing the HIV status of approximately 54% (1,287/2,382) of their most recent sex partners in the last three months. Regional differences were also substantial, with the highest prevalence in Thailand (74%), followed by Brazil (64%), and the Andes (63%). Participants had condomless sex with approximately 26% (332/1,287) of partners whose HIV status they did not know.

In the adjusted model, lack of knowledge of partner status was not significantly different among those on PrEP (aPR 1.08; 95% CI 0.91–1.24) and those with undetectable drug levels (aPR 1.14; 95% CI 0.95–1.34), compared to participants off PrEP (Table 3). Relationship characteristics were statistically significant predictors of not knowing partner status, as participants were more likely to not know the HIV status of casual partners (aPR 1.50; 95% CI 1.30–1.71) and transactional sex partners (aPR 1.62; 95% CI 1.30–1.95) compared to individuals whom participants had an emotional and sexual relationship. Participants were also more likely to not know the HIV status of partners whom they have known for only minutes or hours (aPR 1.27; 95% CI 1.11–1.42) and days or weeks (aPR 1.13; 95% CI 0.99 – 1.27) compared to those they have known for longer before first having sex. When we limited our analysis to only those that opted to start PrEP to evaluate any differences in perceived PrEP effectiveness, median scores were the same among those who reported knowing their partner status and those that did not ($Mdn=7$; $p=0.2$).

Discussion

Our findings offer three important insights that may be particularly salient in the context of ongoing discussions about how PrEP can be effectively integrated into existing prevention frameworks and how it might impact longstanding efforts, like serodisclosure. First, we found that PrEP use was not significantly associated with either non-disclosure or not

knowing the HIV status of a sex partner. When we examined participants' beliefs about the effectiveness of PrEP, we found that those that did not disclose and those that did not ask their partners about their HIV status viewed PrEP to be just as effective as those that did. This suggests that inflated perceptions of PrEP as a panacea are not driving these behaviors. Most studies thus far have not observed substantial changes in behavior among PrEP users (Grant et al., 2014; Hojilla et al., 2016; Liu et al., 2016; Marcus et al., 2013; McCormack et al., 2016). It is important to remember that PrEP is only one tool in a growing list of evidence-based risk reduction strategies, and apprehensions about patients changing behavior should not preclude the provision of PrEP.

Second, we observed substantive differences in the prevalence of non-disclosure and lack of knowledge of partner status across study regions. Prevalence for both were particularly high in Thailand, the Andes, and Brazil. These findings are consistent with previously reported data (Nagaraj et al., 2013; Wei, Lim, Guadamuz, & Koe, 2012; Zea, Reisen, Poppen, & Díaz, 2003) and stress the need for greater work in identifying challenges and effective strategies to encourage mutual serodisclosure. The differences across regions may reflect a complex array and interaction between structural barriers (e.g., availability of testing services), and sociocultural factors (e.g., attitudes towards disclosing or asking HIV status, homophobia, HIV stigma) (Altman et al., 2012; Churcher, 2013; Das & Horton, 2012; Gari et al., 2013; Zea et al., 2003). A prerequisite of accurate disclosure is knowing one's status through testing but various reports have noted the low prevalence of HIV testing in these regions (Brazilian Ministry of Health, 2014; Jacobson et al., 2014; Lee et al., 2015; Thailand National AIDS Committee, 2015). Although participants received regular HIV testing as part of their participation in the study, the need to disclose or ask partners about their status may be irrelevant if there is a high likelihood that partners have not been tested anyway. This may partly explain why we observed a higher overall prevalence of lack of knowledge of partner status compared to non-disclosure.

Lastly, the significant associations between relationship characteristics and discussions about HIV status underscore the importance of how dyadic factors influence HIV prevention efforts. The prevalence of non-disclosure and lack of knowledge of partner status were highest among casual (i.e., sexual only) and transactional sex partners, and among partners whom participants have known only briefly before their first sexual encounter (e.g., minutes or hours). These findings are consistent with studies among HIV-positive persons that suggest discussions about HIV status are largely influenced by the context of the individual's relationship with the partner (Gorbach et al., 2004; Przybyla et al., 2013; Simon Rosser et al., 2008). In one study, men reported that not knowing each other very well was a primary reason for not disclosing (Serovich & Mosack, 2003). Risk reduction counseling provided in conjunction with PrEP that take these dyadic factors into account are needed to help patients develop feasible strategies to reduce their risk.

These findings should be interpreted with the understanding of some limitations. The use of self-reported disclosure and knowledge of partner status may be prone to recall and social desirability bias. We attempted to limit this by using CASI, which may allow for more candid responses. Additionally, study sites were trained on strategies to foster a sex-positive, nonjudgmental environment to ensure participants felt they could provide honest responses

to behavioral questions. There were also missing data related to our predictors and outcomes of interest. We conducted sensitivity analyses assuming various scenarios for participants that had missing data on PrEP use, disclosure, and knowledge of partner status. Differences in point estimates across all models were minor and not qualitatively meaningful (data not shown). Additionally, we were limited in our ability to measure relevant social and cultural constructs, like stigma and homophobia, as well as event level variables, like drug and alcohol use. Future studies will need to incorporate these factors to more clearly understand the individual and societal level correlates of disclosure in this population. Some of the study sites (e.g., Thailand, South Africa) had smaller sample sizes. To better understand serodisclosure behavior across regions, studies with more representative samples are needed. Lastly, iPrEx OLE occurred relatively early in the dissemination of PrEP so it is possible that behaviors have shifted as PrEP has become more widely used. As PrEP becomes more integrated and available in the broader community we need to track whether or not individuals will become more, less, or equally inclined to disclose and talk about HIV in the context of PrEP.

Despite these limitations, this study is among the first to examine serodisclosure in the context of PrEP. Our findings suggest that PrEP use and perceptions around its effectiveness are not associated with serodisclosure. Relationship characteristics, like relationship type and time before first sexual encounter, may be more important in influencing mutual serodisclosure among PrEP users. Comprehensive risk reduction counseling provided in conjunction with PrEP that address relationship characteristics may help patients more effectively navigate serodisclosure with sex partners.

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Table 1.

Baseline demographic and relationship characteristics of HIV-negative participants who reported at least one sex partner at the 3-month follow-up visit (N = 1,184)

	Median	(range)
Demographics		
Age, in years	30	(19–70)
	n	(%)
Study Region		
Andes ^a	706	(60)
Brazil	153	(13)
South Africa	36	(3)
Thailand	44	(4)
USA	245	(21)
Race/Ethnicity		
Mixed/Other	741	(63)
White	274	(23)
Black	115	(10)
Asian	54	(5)
Gender		
Men who have sex with men	1,063	(90)
Transgender women	121	(10)
Education		
Completed secondary or less	619	(52)
Post-secondary	555	(47)
Relationship Status		
Single/Divorced/Widowed	586	(50)
In a primary relationship	512	(43)
Relationship Characteristics (n = 2,382 partners)		
Relationship type		
Sexual relationship only	1,314	(55)
Sexual and emotional	612	(26)
Client/transactional sex	112	(5)
Time partner known before first sex		
Months or years	874	(37)
Days or weeks	632	(27)
Minutes or hours	616	(26)

^aAndes includes sites in Ecuador and Peru

Table 2.

Prevalence of non-disclosure by HIV-negative participants at 3-month follow-up visit

	Prevalence	Adjusted PR [^]	(95% CI)	p-value
Study region				
USA	23%	Reference		
South Africa	30%	1.77	(0.84 – 2.71)	0.10
Brazil	38%	1.71	(1.11 – 2.32)	0.02
Andes	45%	1.95	(1.38 – 2.51)	0.001
Thailand	73%	3.19	(2.15 – 4.23)	<0.001
Gender				
Men who have sex with men	38%	Reference		
Transgender women	45%	0.91	(0.63 – 1.20)	0.54
Relationship type				
Sexual and emotional	24%	Reference		
Casual/sexual only	42%	1.54	(1.24 – 1.84)	<0.001
Transactional	59%	2.03	(1.44 – 2.62)	<0.001
Time partner known before sex				
Months or years	32%	Reference		
Days or weeks	35%	1.12	(0.92 – 1.33)	0.24
Minutes or hours	46%	1.62	(1.33 – 1.92)	<0.001
PrEP use				
Off PrEP	42%	Reference		
On PrEP – undetectable drug	38%	1.03	(0.76 – 1.29)	0.83
On PrEP – detectable drug	40%	1.10	(0.85 – 1.35)	0.43

[^] Adjusted for baseline age, education, and relationship status

PR: prevalence ratio

CI: confidence interval

PrEP: pre-exposure prophylaxis

On PrEP – undetectable drug: participants who elected to start PrEP but had plasma tenofovir levels below level of quantification

On PrEP – detectable drug: participants who elected to start PrEP and had detectable plasma tenofovir

Table 3.

Prevalence of lack of knowledge of partner status by HIV-negative participants at 3-month follow-up visit

	Prevalence	Adjusted PR [^]	(95% CI)	p-value
Study region				
USA	37%	Reference		
South Africa	48%	1.13	(0.50 – 1.76)	0.69
Brazil	64%	1.80	(1.41 – 2.19)	<0.001
Andes	63%	1.76	(1.39 – 2.12)	<0.001
Thailand	74%	2.01	(1.46 – 2.56)	<0.001
Gender				
Men who have sex with men	56%	Reference		
Transgender women	66%	0.97	(0.77 – 1.17)	0.77
Relationship type				
Sexual and emotional	37%	Reference		
Casual/sexual only	63%	1.50	(1.30 – 1.71)	<0.001
Transactional	70%	1.62	(1.30 – 1.95)	<0.001
Time partner known before sex				
Months or years	50%	Reference		
Days or weeks	55%	1.13	(0.99 – 1.27)	0.06
Minutes or hours	59%	1.27	(1.11 – 1.42)	<0.001
PrEP use				
Off PrEP	59%	Reference		
On PrEP – undetectable drug	61%	1.14	(0.95 – 1.34)	0.16
On PrEP – detectable drug	55%	1.08	(0.91 – 1.24)	0.34

[^] Adjusted for baseline age, education, and relationship status

PR: prevalence ratio

CI: confidence interval

PrEP: pre-exposure prophylaxis

On PrEP – undetectable drug: participants who elected to start PrEP but had plasma tenofovir levels below level of quantification

On PrEP – detectable drug: participants who elected to start PrEP and had detectable plasma tenofovir