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## HIV Providers' Perceived Barriers and Facilitators to Implementing Pre-Exposure Prophylaxis in Care Settings: A Qualitative Study

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### Abstract

Oral pre-exposure prophylaxis (PrEP) can reduce HIV incidence among at-risk persons. However, for PrEP to have an impact in decreasing HIV incidence, clinicians will need to be willing to prescribe PrEP. HIV specialists are experienced in using antiretroviral medications, and could readily provide PrEP, but may not care for HIV-uninfected patients. Six focus groups with 39 Boston-area HIV care providers were conducted (May-June 2012) to assess perceived barriers and facilitators to prescribing PrEP. Participants articulated logistical and theoretical barriers, such as concerns about PrEP effectiveness in real-world settings, potential unintended consequences (e.g. risk disinhibition and medication toxicity), and a belief that PrEP provision would be more feasible in primary care clinics. They identified several facilitators to prescribing PrEP, including patient motivation and normative guidelines. Overall, participants reported limited prescribing intentions. Without interventions to address HIV providers' concerns, implementation of PrEP in HIV clinics may be limited.

### Keywords

HIV Prevention; Pre-Exposure Prophylaxis; Healthcare Provider; Implementation

### INTRODUCTION

Recent studies have demonstrated that antiretroviral pre-exposure prophylaxis (PrEP) can reduce HIV incidence among several at-risk populations, including men and transgender women who have sex with men, heterosexual serodiscordant couples, men and women with concurrent or sequential sexual partners, and injection drug users (1–4). Although other studies did not demonstrate efficacy among at-risk women in Africa (5, 6), likely due to

poor adherence, the collective efficacy and safety data from the majority of PrEP studies led the Food and Drug Administration to approve the fixed-dose combination of tenofovir disoproxil fumarate and emtricitabine (Truvada®) for use as a once-daily PrEP regimen in 2012 (7). These studies have also resulted in guidance from the US Centers for Disease Control and Prevention (CDC) for healthcare practitioners who are considering prescribing PrEP to persons at high-risk for acquiring HIV (8–10).

However, implementation of PrEP in clinical settings will depend on whether practitioners are willing to prescribe it, as for other biomedical prevention strategies (11–13). Therefore, a priority for PrEP implementation is to identify groups of clinicians that provide care to at-risk persons and assess their prescribing intentions. Primary care providers (PCPs) (14, 15), providers who work in clinics that specialize in managing sexually transmitted infections (STD clinicians), and HIV specialists are 3 different groups of clinicians that are likely to encounter individuals who may benefit from PrEP. Most at-risk persons who are engaged in care are likely to receive care in primary care clinics, and most STD clinicians are likely to deliver care to populations enriched with persons at highest risk for acquiring HIV. However, PCPs and STD clinicians may have limited experience with prescribing antiretroviral medications. In contrast, HIV clinicians may be most expert at prescribing antiretroviral medications, and they are most likely to have contact with sexual partners of their HIV-infected patients and persons who utilize antiretroviral post-exposure prophylaxis after high-risk exposures to HIV (16). Therefore, HIV clinicians are favorably positioned to act as early adopters among PrEP prescribers, and may influence less experienced non-specialized peers, so studies to understand their perceptions about PrEP are needed.

Preliminary quantitative studies of HIV providers performed soon after the release of PrEP efficacy data suggested that many providers would be willing to prescribe PrEP but that few had actually prescribed PrEP (17–19). To gain a deeper understanding of the factors that influence HIV providers' prescribing behaviors, qualitative focus group discussions were conducted with a sample of HIV practitioners in Boston during 2012.

## METHODS

### Sampling and Recruitment

In May – June 2012, 6 focus groups were convened at Boston clinics that provide longitudinal primary care to HIV-infected patients. Four focus groups were conducted at hospital-based clinics and 2 were held at community health centers, one of which is specialized in the care of lesbian, gay, bisexual, and transgender persons. Healthcare practitioners from these 6 clinics who prescribed antiretroviral medications to HIV-infected patients (i.e., physicians, physician assistants, or advanced nurse practitioners) were eligible to participate. Study participants were recruited by email invitations.

### Data Collection

Verbal informed consent was obtained from all study participants before initiating study procedures. Information about participant demographics, primary practice specialty, and experience providing care to HIV-infected patients was collected through brief quantitative

surveys. Focus group discussions were 60 minutes in duration and were moderated by one of the study investigators (D.K.) using a semi-structured guide. Discussions centered on practitioners' perceived barriers and facilitators to prescribing antiretroviral medications to reduce HIV transmission. Questions regarding PrEP focused on the following topics: (1) attitudes towards PrEP as a preventive intervention; (2) factors that would make it easier or more challenging to provide PrEP; and (3) influence of normative guidance on prescribing practices. Each discussion was audio recorded and then transcribed verbatim.

## Data Analysis

Transcripts were stored in Atlas.ti (version 7) to facilitate data organization and management. Analysis of transcripts utilized an inductive, content-focused approach to develop concepts representing providers' perceived barriers and facilitators to prescribing antiretroviral medications for HIV prevention (20). As this study represents one of the early investigations into HIV provider opinions about implementing PrEP, a variation-oriented, rather than a thematic, approach was chosen. The goal of the variation-oriented approach was to identify as many *different* potential influences on providers' prescribing behaviors as possible, including concepts that occur with varying frequency in the data.

Two members of the study team (D.K. and K.M.) reviewed the raw text for concepts that related to barriers and facilitators to prescribing. Concepts were organized into a codebook comprising categories of barriers and facilitators. Utilizing Atlas.ti, the codebook was used to assign sections of raw data to each of these categories. Data were extracted from the transcripts to illustrate these categories. The completed list of categories was reviewed independently by an additional investigator (N.W.) for clarity, presentation, and detail. This list was reviewed for higher-order concepts relating to PrEP prescribing. The higher-order concepts were used to organize the categories for write-up.

All study procedures were approved by the Institutional Review Board at Beth Israel Deaconess Medical Center, Boston, MA.

## RESULTS

### Participant Characteristics

Thirty-nine healthcare providers participated in the study. Of these, 66% self-identified as White, 21% as Asian or Asian-American, 5% as African-American or Black, 3% as Latino/Latina or Hispanic, and 5% preferred not to state their race or ethnicity; 56% of participants were women (Table 1). Eighty-two percent of participants practiced at hospital-based clinics, and 18% practiced at community health centers. Their specialties included Infectious Diseases (77%), Internal Medicine (18%), and Family Medicine (5%). In terms of experience providing clinical care to HIV-infected patients, 5% had < 1 year of experience, 33% had 1–5 years, 21% had 6–10 years, 8% had 11–15 years, and 33% had > 15 years. When asked to estimate the number of HIV-infected patients to whom practitioners provided clinical care in an average month, participants responded as follows: 1–10 patients per month (21%); 10–19 patients per month (27%); 20–49 patients per month (31%); > 49 patients per month (23%).

## Perceived Barriers to PrEP Provision

Although HIV providers believed that PrEP was efficacious, they reported numerous perceived barriers to implementing PrEP in the course of routine clinical care. These barriers can be grouped according to 3 categories: barriers to “real-world” effectiveness of PrEP outside of clinical trial settings; potential unintended consequences that could result from PrEP provision; and the perception that prescribing PrEP would be more feasible in primary care settings than in HIV clinics (Table 2).

### Barriers to “Real-World” Effectiveness

Participants cited concerns about patient adherence and logistical challenges as threats to successfully implementing PrEP in their practices. Providers were aware that adherence to PrEP was suboptimal in several efficacy studies, and they believed that adherence was likely to be lower among persons using PrEP outside of clinical trials without the intensive counseling that was known to have accompanied PrEP provision in these trials. Participants believed that patients who engage in the riskiest sexual behaviors (“very higher risk behavior type people” [*Hospital-based, Infectious Diseases Specialist*]), and would therefore be most likely to benefit from using PrEP, would face the greatest adherence challenges as a result of personal social circumstances, such as poor engagement in medical care or substance abuse (e.g., uncontrolled use of crystal methamphetamine). They anticipated that many patients would use PrEP intermittently despite counseling to use it on a daily basis, which could reduce or eliminate its protective benefits. Prior experiences with HIV-infected patients who are poorly adherent to antiretroviral treatment, and with HIV-uninfected patients who do not adhere to post-exposure prophylaxis regimens, generated concerns that many patients would not be adherent to PrEP.

“But there are the [HIV-infected patients] who miss two or three doses a week. We see those. And in PrEP I m sure we ll prescribe it for the month, and people will do it on the weekends or when they go to sex parties. So they will do it episodic, even if we prescribe it daily.” [*Hospital-based, Infectious Diseases Specialist*]

“Is someone gonna take something that they don t quote unquote need per se, but do they want it enough, do they feel themselves at risk enough, to take this medication every day, pay the co-pay...go to the pharmacy, get the refills... Our patients who are HIV-positive don t even do that for their own medication... I find it difficult to operationalize PrEP in that world.” [*Community Health Center, Infectious Diseases Specialist*]

Logistical concerns included potentially burdensome clinical and laboratory monitoring of persons using PrEP, as well as time constraints that could limit the amount of adherence and risk-reduction counseling that practicing clinicians could provide to them. Additional concerns included the high cost of antiretroviral medications and uncertainty about insurance coverage for PrEP.

“I can t think up any other stuff on the top of my head, another preventative strategy, that needs quite the amount of necessary monitoring [as PrEP].” [*Hospital-based, Infectious Diseases Specialist*]

“Regardless about how we feel personally about it, it s something we have to meet head on, because it s an issue that s not going to go away. It is an expensive medication and the question of who s going to pay for the medication and how much and the monitoring that it s going to require to be given safely.” [Hospital-based, Infectious Diseases Specialist]

Providers anticipated challenges in identifying individuals who would be most likely to benefit from PrEP given their impression that many providers are not skilled at discussing HIV risk behaviors with their patients, and that some patients would not accurately disclose information about their high-risk sexual and/or substance use behaviors to clinicians.

“They probably are not very good about talking with patients about sexual risk behaviors, like most primary care providers.” [Hospital-based, Internal Medicine]

“I haven t come across patients that I feel would be good candidates for [PrEP], but then again who knows how much information I m truly getting. Like I can ask somebody about drug use, and they can tell me no. And we had this discussion about another patient who they told me one thing and they told the other provider something else, so it s hard to really assess if you are not getting an accurate picture.” [Community Health Center, Internal Medicine]

### **Potential Unintended Consequences of PrEP Provision**

Concerns about potential unintended harms that could be associated with PrEP provision limited participants’ prescribing intentions. Providers worried that widespread PrEP use would select for and disseminate drug-resistant viral strains in the community.

“It s a little bit concerning that drug you are using is a mainstay of therapy for people who are infected. What that will actually mean over long periods of time: resistance in the community.” [Hospital-based, Infectious Diseases Specialist]

“I worry that they would use it so infrequently in an episodic approach that we would start seeing significant other primary infections with resistant organisms.” [Community Health Center, Internal Medicine]

Providers were more cautious about prescribing antiretroviral medications for PrEP than for HIV treatment, as they believed that the tolerance for medication-related toxicities should be far lower when prescribing medications for prevention as compared to active disease. This caution manifests in the dichotomy that the exact same medication would be considered to be either safe or toxic depending on whether it was prescribed for prevention or treatment.

“It s almost a contradiction in terms in my head, because I will say if I need to start someone on Atripla or a Truvada-containing regimen, I think, This is a great regimen. Now, if I m thinking about PrEP with Truvada in someone who doesn t have HIV, my number one thought is, Do I want to put them at risk for developing tenofovir toxicity? ” [Community Health Center, Infectious Diseases Specialist]

“It adds basically a whole other layer of complexity to the Treatment as Prevention argument. Because you’re also dealing with an ethical situation: that of giving a

potentially toxic medication to a patient who does not have an active disease.”  
[Hospital-based, Infectious Diseases Specialist]

“All of the side effects in medicines are brought into much greater relief when you are giving it to someone who is otherwise healthy, so I am very hesitant to prescribe PrEP unless it s got a very clear target.” [Hospital-based, Infectious Diseases Specialist]

A line of thinking that appeared during some of the focus groups included misgivings about prescribing PrEP due to a belief that individuals would increase their risky behaviors while using PrEP (i.e., engage in risk compensation), which could potentially increase their overall risk for acquiring HIV. Providers expressed concerns that PrEP could hinder antiretroviral treatment programs by diverting society’s limited financial resources towards prevention. Concerns about diversion of resources were compounded by a belief that early antiretroviral treatment of HIV-infected patients would offer even greater reductions in HIV transmission than PrEP.

### The “Purview Paradox”

Patterns in the data suggested a belief that PCPs would be in a better position to prescribe PrEP than HIV specialists. Participants cited that at-risk persons would be more likely to receive medical care from a PCP than an HIV specialist, and the majority of patients seen by HIV specialists are HIV-infected and therefore not candidates for PrEP. However, the dominant thinking among those participants who practiced substantial amounts of primary care expressed doubt that providing PrEP would be feasible by PCPs due to time constraints and lack of training with prescribing antiretroviral medications. Contrary beliefs about the optimal clinic setting to prescribe PrEP created a “purview paradox” whereby neither HIV specialists nor PCPs considered PrEP implementation to fall within their clinical domain.

“Practical issue number one is that the people who are going to be prescribing these drugs in theory, who are going to be in the best position, are going to be primary care providers with little or no HIV experience. And so if you take that and you take the three or four pages of [Centers for Disease Control and Prevention] interim guidance statements on pre-exposure prophylaxis, you are going to freak out just about everybody who does primary care and doesn’t have HIV experience. And to be honest with you, if I saw those, and I didn’t have HIV experience, I wouldn’t go near the drugs. Nope, no way.” [Hospital-based, Internal Medicine]

“I think that the idea of adding to what I just did this morning [as a primary care physician] and adding a discussion with my patients about what is their, you know, likelihood of having sexual encounters with patients who are HIV-infected, and then on top of that, trying to prescribe and get approved medication like Truvada or some other pre-exposure prophylaxis... I just can’t imagine it working in the hands of a primary care doctor. It’s really tricky.” [Hospital-based, Internal Medicine]

### Perceived Facilitators to PrEP Provision

Despite numerous perceived barriers to implementing PrEP in clinical practice, HIV providers also cited several facilitators to providing PrEP. Categories of facilitators

included: the perception that PrEP is efficacious; patient motivation; and guidelines and peer norms.

### Efficacy of PrEP

Based on their knowledge of published clinical trials, participants believed that PrEP was efficacious if used on a consistent basis, though further studies would be needed to assure them that it “works” in all populations, given conflicting efficacy data among women. Perception of efficacy engendered providers with a duty to offer PrEP to patients in specific clinical scenarios for which these providers believed that PrEP would be an appropriate intervention. The scenarios that appeared repeatedly in the data included persons who had used post-exposure prophylaxis repeatedly, HIV-uninfected members of serodiscordant couples who were wishing to conceive children, sex workers, and individuals who lacked empowerment to negotiate alternative protective methods (e.g., condoms).

“I would prescribe it. It obviously works.” [Hospital-based, Infectious Diseases Specialist]

“I think the PrEP data regardless of the gender study that was performed, I think really show that PrEP works, when it s used correctly.” [Community Health Center, Infectious Diseases Specialist]

“We ve had PrEP discussions with our repeat PEP [post-exposure prophylaxis] offenders. It s a group that s kind of interesting, because they appreciate their risk. They come for care, yet they don t comply with other prevention things. So the question is, will they comply with this prevention method? We still offer it, because it seems to be effective when you re compliant with it, for the very high risk people.” [Hospital-based, Infectious Diseases Specialist]

### Patient Motivation

Patient requests for PrEP, patient motivation (“buy-in”) to use PrEP, and anticipation that individual patients would be highly adherent to daily medication would enhance providers’ prescribing intentions. However, contrary to providers’ expectations, they had encountered almost no requests for PrEP. The lack of requests was attributed in part to community apathy around HIV prevention. Those providers who had discussed PrEP with patients or who had prescribed it tended to encounter patient ambivalence about using PrEP.

“I have not yet prescribed PrEP, and I don t see situations in the foreseeable future where I probably would. Unless a patient kind of came in and said, I am very interested in this, and let s kind of talk it through. ” [Hospital-based, Internal Medicine]

“I have several HIV-negative primary care patients, and nobody has ever asked me for it. I brought it up to a couple of people, and I have never had anybody interested in it. So I actually don t think it s a real practical dilemma. I don t think anybody s interested.” [Hospital-based, Infectious Diseases Specialist]

“I m actually surprised by the almost zero inquisitiveness of patients around PrEP. At least, it was like one patient brought it up in a very peripheral way to me, and

wasn't pushing for it, just was kind of interested in what I thought. And nobody else has said a word, which is kind of surprising to me. And I wonder if it's the same in, you know, practices where a higher percentage of patients may be at risk for HIV acquisition. I don't know. But the silence has been deafening." [Hospital-based, Internal Medicine]

"I just think that it used to be that there was a more intense community conversation around everything having to do with HIV prevention. And HIV prevention in the gay community I think has lost its urgency... And I am a little surprised, that you know, sort of, people who are clearly sexually active, clearly at risk, are not sort of looking on it as more of a crutch." [Hospital-based, Internal Medicine]

### Guidelines and Peer Norms

Prescribing guidelines from normative bodies, particularly the CDC, would enhance providers' willingness to provide PrEP. They tended to trust and appreciate the opinion of the CDC when approaching an intervention such as PrEP with which providers had little prior experience. Guidelines would increase their comfort by providing specific indications for PrEP and a roadmap for safety monitoring of patients who are using it, and by potentially minimizing providers' liability. Knowledge that trusted colleagues were prescribing PrEP would also increase providers' willingness to prescribe it themselves. In contrast to CDC guidelines and peer norms, providers did not think that FDA approval of antiretroviral medications for use as PrEP would influence their practice, given their ability to prescribe these medications in an off-label manner.

"[How would guidelines affect] our willingness to prescribe PrEP? I think it would be huge." [Community Health Center, Internal Medicine]

"I think [CDC] is a pretty trusted group, thoughtful, for a really complicated problem. Like personally for me, I felt uncomfortable on top of all the literature, to base a decision. I would be very sympathetic to guideline recommendations." [Hospital-based, Infectious Diseases Specialist]

"I think that a lot of providers would feel far more comfortable [with guidelines]. I think [PrEP] would be one of those points that would almost come up, you know. I think we all quick track about certain things to discuss with certain patients. I know that for me, perhaps this would pop up kind of like doing an anal pap here pops up on a lot of people's differential for what we need to discuss. Maybe then PrEP would also become one of those things we feel comfortable saying, Let's talk about this." [Community Health Center, Infectious Diseases Specialist]

"I feel like you'll get a lot more information from other clinicians. Because I think part of working in a group is we talk to each other and say, Hey have you tried this, or, What has your experience been with this? And so if the CDC were to bring this topic up and more people were prescribing it, then it wouldn't really matter what the FDA put on their indication list." [Community Health Center, Internal Medicine]



“I depend on my colleagues a lot. We are in a field in which we value colleagues opinions and their practices, and we re bouncing ideas off of each other all the time. So I think that s very helpful to have your colleague have experience or just talk about what they are doing.” [Community Health Center, Infectious Diseases Specialist]

In general, perceived facilitators and barriers to prescribing PrEP were similar when comparing providers from hospital-based clinics and community health centers.

## DISCUSSION

Despite several recent randomized controlled trials demonstrating the efficacy of antiretroviral chemoprophylaxis in preventing HIV transmission in diverse at-risk populations (1, 2, 4), this study of Boston area HIV specialists suggests that they perceive substantial barriers to prescribing PrEP in clinical practice, and that they do not envision themselves to be primarily responsible for prescribing PrEP. In this study, some provider misgivings about PrEP were theoretical, including worries that patients would use PrEP in a manner that could compromise effectiveness (e.g., intermittent dosing) and/or that PrEP use could cause unintended harms (e.g., dissemination of drug-resistant viral strains, toxicities in healthy individuals, or behavioral risk compensation), even though none of these issues were noted in trials involving thousands of at-risk persons (1–5, 21). Other concerns were pragmatic, such as whether it would be logistically feasible to provide PrEP in already busy HIV clinics. A notable manifestation of HIV specialists’ practical concerns about prescribing PrEP was the belief that primary care clinics should be the principal venue for PrEP implementation, even though participants who also practiced primary care appeared to espouse contradictory beliefs (i.e., PrEP would be best prescribed by specialists), creating a “purview paradox.” Despite numerous perceived barriers, HIV providers believed that PrEP is efficacious if used consistently and that patient requests and normative guidelines would motivate them to prescribe it. Yet providers noted infrequent requests for PrEP, suggesting that PrEP provision will also be limited. Ironically, prior to the period of the study, the CDC had issued provisional guidance regarding the use of PrEP in men who have sex with men (9), suggesting the need for wider provider education by the CDC and other normative bodies to inform clinicians about their recommendations regarding PrEP.

Some HIV provider beliefs about PrEP were influenced by their experiences prescribing antiretroviral medications for treatment or for post-exposure prophylaxis. Providers had encountered HIV-infected patients who did not adhere to life-sustaining treatment and HIV-uninfected patients who did not adhere to post-exposure prophylaxis regimens despite an awareness that they are at high-risk for HIV acquisition. In light of these experiences and knowledge that adherence to PrEP was suboptimal in some efficacy studies (5, 6), providers anticipated that adherence to PrEP would be low in their care settings, particularly as patients may consider daily PrEP to be less essential than treatment or post-exposure prophylaxis, especially if their risks are episodic.

In contrast, some HIV clinicians’ prior successes with prescribing antiretroviral medications and supporting adherence were not mentioned as reasons to be optimistic about providing

PrEP successfully. It is possible that providers presumed that HIV-infected individuals who initiated medication to prevent the development of AIDS might be more adherent to medication than those who were healthy and needed to take the pill to prevent an unlikely HIV transmission event. Further studies to better understand this discrepancy could help inform interventions to facilitate PrEP provision by HIV clinicians.

Although prior studies also found that HIV providers perceive hypothetical barriers to providing PrEP, including potential harms associated with PrEP use (e.g., toxicities, drug-resistance) (17–19, 22, 23) and patient non-adherence (18, 19), and that patient requests and guidelines from normative bodies would increase HIV providers' willingness to prescribe PrEP (17), this analysis extends the findings of prior studies by illustrating additional perceived barriers and facilitators that have not previously been well-described and merit further study. These include provider perceptions of patient ambivalence and community apathy regarding PrEP because of lack of PrEP requests, and that clinicians would be more willing to prescribe PrEP if they learned that their peers were doing so.

Taken together, these findings, as well as those from prior studies, suggest several strategies that might enhance HIV clinicians' willingness to prescribe PrEP. Educational interventions that provide additional safety and efficacy information about PrEP could assuage clinicians' concerns about potential unintended harms associated with PrEP use, and could remind them of the benefits for at-risk persons. Providing clinicians with readily accessible summaries of normative guidelines, such as existing guidance regarding PrEP provision from CDC (8–10), may encourage them to incorporate discussions about PrEP into routine care. Training clinicians to utilize brief, evidenced-based adherence interventions that have been developed for PrEP (24) could increase providers' self-efficacy that they can successfully counsel patients to adhere to PrEP, without requiring too much time and effort.

In terms of patient interest as a facilitator, prior studies indicate that many persons who are likely to benefit from PrEP report interest in using it (25–29), so educating providers about the results of these studies could modify their misconceptions about PrEP interest among at-risk communities. In addition, public health campaigns that encourage patients to initiate discussions about PrEP with their providers and empower patients to directly request PrEP if they would like to utilize it could facilitate PrEP prescribing. Finally, given HIV providers' desires to learn about peer practices when approaching prescribing decisions, informing HIV clinicians that members of their peer group have already prescribed PrEP in routine practice (17, 18) and creating opportunities for providers to discuss prescribing experiences with colleagues could increase prescribing rates. Learning that trusted colleagues have prescribed PrEP could alter HIV specialists' beliefs about whether they should also prescribe PrEP to at-risk patients.

The suggestion that groups of HIV clinicians and primary care providers may be reluctant to adopt PrEP prescribing into their clinical purview highlights a potentially critical barrier to implementing PrEP. Given the central role that these 2 groups of providers are likely to fulfill in efforts to provide PrEP in diverse care settings, additional studies that assess HIV clinician and primary care provider attitudes and perceptions regarding PrEP are needed to track the diffusion of this innovation among these gatekeepers. Future studies are needed to

develop interventions for providers who are hesitant to prescribe PrEP. Additional studies are also needed to assess prescribing intentions among other groups of providers who deliver care to persons who may benefit from PrEP, including STD clinicians, obstetrician-gynecologists, pediatric and adolescent medicine specialists who care for at-risk youth, and specialists in the care of men who have sex with men and transgender women. It is encouraging that a qualitative study of HIV specialists, primary care providers, and STD clinicians seeing high numbers of MSM or transgender women in their practices suggested that these 3 groups of providers might be willing to prescribe PrEP with additional training and funding (22).

The findings of this study should be considered in light of the study design. As the focus group participants were recruited only from clinical sites in Boston, the results of this study may not be generalizable to providers from other communities. Focus group discussions are well-suited to gathering qualitative data on provider norms regarding PrEP, but practitioners with countervailing viewpoints may be less willing to express these in front of their colleagues, because of social desirability bias. In-depth one-on-one qualitative interviews with HIV clinicians may be a useful complement to focus group discussions to tap into any potential minority opinions that were not fully elucidated. The variation-oriented approach for this analysis was selected to characterize the range of factors that may influence HIV providers' prescribing practices regarding PrEP, but quantitative studies will be needed to measure the frequency with which these factors apply to providers in the community. This study was conducted during May-June 2012, and the results of major efficacy (3, 6) and safety studies (30) of PrEP have been reported subsequently, in addition to updated CDC guidance for prescribing PrEP and FDA approval of tenofovir-emtricitabine for use as PrEP (7, 8, 10), so providers' views may have evolved since the time of this study. However, a survey of Infectious Diseases physicians in the US and Canada in 2013 conducted after these developments found that 74% of respondents support the provision of PrEP, but that only 9% had prescribed it (23), which suggests a substantial likelihood that many providers would have comparably low levels of familiarity with PrEP prescribing currently as compared to mid-2012, and that the need for interventions to enhance PrEP prescribing persists. Periodic reassessments of provider views about PrEP will be important to have an accurate and current understanding of the factors influencing their prescribing behaviors.

As rates of PrEP prescribing remain low despite positive attitudes among providers (17–19, 23) and groups of at-risk patients (25–29), domains from the current study that may be most relevant for the development of provider interventions currently include those related to practical aspects of PrEP provision. These include capitalizing on the effects of patient motivation (e.g., empowering patients to approach providers with requests for PrEP), overcoming barriers to real-world effectiveness (e.g., creating tools to optimize provider risk assessments and devoting resources to support PrEP uptake, monitoring, and adherence in busy practices), and addressing the Purview Paradox (e.g., encouraging providers to rethink their potential role in PrEP provision).

## CONCLUSIONS

HIV providers perceive substantial theoretical and logistical barriers to prescribing PrEP in clinical practice, but several facilitators could motivate prescribing behaviors. PrEP implementation in HIV clinics may be limited unless interventions are developed that can address provider concerns. Additional studies to develop and test such interventions are warranted.

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## References

1. Thigpen MC, Kebaabetswe PM, Paxton LA, Smith DK, Rose CE, Segolodi TM, et al. Antiretroviral preexposure prophylaxis for heterosexual HIV transmission in Botswana. *N Engl J Med.* 2012; 367(5):423–34. [PubMed: 22784038]
2. Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med.* 2010; 363(27):2587–99. [PubMed: 21091279]
3. Choopanya K, Martin M, Suntharasamai P, Sangkum U, Mock PA, Leethochawalit M, et al. Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial. *Lancet.* 2013; 381(9883):2083–90. [PubMed: 23769234]
4. Baeten JM, Donnell D, Ndase P, Mugo NR, Campbell JD, Wangisi J, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med.* 2012; 367(5):399–410. [PubMed: 22784037]
5. Van Damme L, Corneli A, Ahmed K, Agot K, Lombaard J, Kapiga S, et al. Preexposure prophylaxis for HIV infection among African women. *N Engl J Med.* 2012; 367(5):411–22. [PubMed: 22784040]
6. Marrazzo, JM.; Ramjee, G.; Nair, GB.; Palanee, T.; Mkhiza, B.; Nakabiito, C., et al. Pre-exposure Prophylaxis for HIV in Women: Daily Oral Tenofovir, Oral Tenofovir/Emtricitabine, or Vaginal Tenofovir Gel in the VOICE Study (MTN 003). Conference on Retroviruses and Opportunistic Infections; Atlanta. 3–6 March 2013; Accessed at <http://www.retroconference.org/2013b/Abstracts/47951.htm>
7. Truvada approved to reduce the risk of sexually transmitted HIV in people who are not infected with the virus. U.S. Food and Drug Administration; Jul 16. 2012 Accessed at: <http://www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSActivities/ucm312264.htm> [3 April 2014]
8. Interim guidance for clinicians considering the use of preexposure prophylaxis for the prevention of HIV infection in heterosexually active adults. *MMWR Morb Mortal Wkly Rep.* 2012; 61(31):586–9. [PubMed: 22874836]
9. Interim Guidance: Preexposure Prophylaxis for the Prevention of HIV Infection in Men Who Have Sex with Men. *MMWR Morb Mortal Wkly Rep.* 2011; 60(3):65–8. [PubMed: 21270743]
10. Update to Interim Guidance for Preexposure Prophylaxis (PrEP) for the Prevention of HIV Infection: PrEP for injecting drug users. *MMWR Morb Mortal Wkly Rep.* 2013; 62(23):463–5. [PubMed: 23760186]
11. Warren MJ, Bass ES. From efficacy to impact: an advocate's agenda for HIV pre-exposure prophylaxis implementation. *Am J Prev Med.* 2013; 44(1 Suppl 2):S167–70. [PubMed: 23253762]

12. Cohen SE, Liu AY, Bernstein KT, Philip S. Preparing for HIV pre-exposure prophylaxis: lessons learned from post-exposure prophylaxis. *Am J Prev Med.* 2013; 44(1 Suppl 2):S80–5. [PubMed: 23253767]
13. Edelman EJ, Fiellin DA. Moving HIV pre-exposure prophylaxis into clinical settings: lessons from buprenorphine. *Am J Prev Med.* 2013; 44(1 Suppl 2):S86–90. [PubMed: 23253768]
14. Norton WE, Larson RS, Dearing JW. Primary care and public health partnerships for implementing pre-exposure prophylaxis. *Am J Prev Med.* 2013; 44(1 Suppl 2):S77–9. [PubMed: 23253766]
15. Trent-Adams S, Cheever LW. Providing HIV pre-exposure prophylaxis: lessons learned from the Ryan White HIV/AIDS Program. *Am J Prev Med.* 2013; 44(1 Suppl 2):S147–50. [PubMed: 23253757]
16. Mimiaga MJ, White JM, Krakower DS, Biello KB, Mayer KH. Suboptimal awareness and comprehension of published preexposure prophylaxis efficacy results among physicians in Massachusetts. *AIDS Care.* 2014; 26(6):684–93. [PubMed: 24116985]
17. White JM, Mimiaga MJ, Krakower DS, Mayer KH. Evolution of Massachusetts physician attitudes, knowledge, and experience regarding the use of antiretrovirals for HIV prevention. *AIDS Patient Care STDS.* 2012; 26(7):395–405. [PubMed: 22694239]
18. Tellalian D, Maznavi K, Bredeek UF, Hardy WD. Pre-exposure prophylaxis (PrEP) for HIV infection: results of a survey of HIV healthcare providers evaluating their knowledge, attitudes, and prescribing practices. *AIDS Patient Care STDS.* 2013; 27(10):553–9. [PubMed: 24053478]
19. Puro V, Palummieri A, De Carli G, Piselli P, Ippolito G. Attitude towards antiretroviral Pre-Exposure Prophylaxis (PrEP) prescription among HIV specialists. *BMC Infect Dis.* 2013; 13:217. [PubMed: 23672424]
20. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005; 15(9):1277–88. [PubMed: 16204405]
21. Abdool Karim Q, Abdool Karim SS, Frohlich JA, Grobler AC, Baxter C, Mansoor LE, et al. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. *Science.* 2010; 329(5996):1168–74. [PubMed: 20643915]
22. Arnold EA, Hazelton P, Lane T, Christopoulos KA, Galindo GR, Steward WT, et al. A qualitative study of provider thoughts on implementing pre-exposure prophylaxis (PrEP) in clinical settings to prevent HIV infection. *PLoS One.* 2012; 7(7):e40603. [PubMed: 22792384]
23. Karris MY, Beekmann SE, Mehta SR, Anderson CM, Polgreen PM. Are we prepped for preexposure prophylaxis (PrEP)? Provider opinions on the real-world use of PrEP in the United States and Canada. *Clin Infect Dis.* 2014; 58(5):704–12. [PubMed: 24319083]
24. Amico KR, McMahan V, Goicochea P, Vargas L, Marcus JL, Grant RM, et al. Supporting study product use and accuracy in self-report in the iPrEx study: next step counseling and neutral assessment. *AIDS Behav.* 2012; 16(5):1243–59. [PubMed: 22460228]
25. Krakower DS, Mimiaga MJ, Rosenberger JG, Novak DS, Mitty JA, White JM, et al. Limited Awareness and Low Immediate Uptake of Pre-Exposure Prophylaxis among Men Who Have Sex with Men Using an Internet Social Networking Site. *PLoS One.* 2012; 7(3):e33119. [PubMed: 22470438]
26. Mustanski B, Johnson AK, Garofalo R, Ryan D, Birkett M. Perceived likelihood of using HIV pre-exposure prophylaxis medications among young men who have sex with men. *AIDS Behav.* 2013; 17(6):2173–9. [PubMed: 23128980]
27. Mimiaga MJ, Case P, Johnson CV, Safren SA, Mayer KH. Preexposure antiretroviral prophylaxis attitudes in high-risk Boston area men who report having sex with men: limited knowledge and experience but potential for increased utilization after education. *J Acquir Immune Defic Syndr.* 2009; 50(1):77–83. [PubMed: 19295337]
28. Golub SA, Gamarel KE, Rendina HJ, Surace A, Lelutiu-Weinberger CL. From efficacy to effectiveness: facilitators and barriers to PrEP acceptability and motivations for adherence among MSM and transgender women in New York City. *AIDS Patient Care STDS.* 2013; 27(4):248–54. [PubMed: 23565928]
29. Fuchs JD, Sobieszczyk ME, Madenwald T, Grove D, Karuna ST, Andrasik M, et al. Intentions to use preexposure prophylaxis among current phase 2B preventive HIV-1 vaccine efficacy trial participants. *J Acquir Immune Defic Syndr.* 2013; 63(3):259–62. [PubMed: 23614998]

30. Grohskopf LA, Chillag KL, Gvetadze R, Liu AY, Thompson M, Mayer KH, et al. Randomized Trial of Clinical Safety of Daily Oral Tenofovir Disoproxil Fumarate Among HIV-Uninfected Men Who Have Sex With Men in the United States. *J Acquir Immune Defic Syndr.* 2013; 64(1): 79–86. [PubMed: 23466649]

**Table 1**

HIV specialist (n=39) demographics and practice characteristics, Boston, 2012.

		N	%
Gender	Female	22	56
	Male	17	44
Ethnicity	Hispanic or Latino	1	3
Race	Asian	8	21
	Black or African- American	2	5
	White	26	66
	Prefer not to say or Not indicated	3	8
Practice setting	Community Health Center	7	18
	Hospital-based Clinic	32	82
Primary Medical Specialty	Family Medicine	2	5
	Internal Medicine	7	18
	Infectious Diseases	30	77
Professional status	Attending Physician	30	77
	Clinical Fellow (Infectious Diseases)	7	18
	Physician Assistant	2	5
Experience as HIV clinician	< 1 year	2	5
	1–5 years	13	33
	6–10 years	8	21
	11–15 years	3	8
	> 15 years	13	33
Volume of patients with HIV infection	1–10 patients/month	8	21
	11–19 patients/month	10	27
	20–49 patients/month	12	31
	>49 patients/month	9	23

Percentages are rounded to nearest integer.

**Table 2**

HIV specialists' perceived barriers and facilitators to prescribing PrEP, Boston, 2012.

<b>Perceived Barriers to Prescribing PrEP</b>	
<b>Category</b>	<b>Sub-categories</b>
Barriers to "real-world" effectiveness	Suboptimal adherence outside of clinical trial settings
	Logistical concerns (burdensome clinical and lab monitoring; time constraints; high cost of antiretroviral medications; uncertainty about insurance coverage)
	Challenges in identifying persons most likely to benefit from PrEP use (lack of provider skills in discussing HIV risk behaviors; inaccurate disclosures about risk behaviors by patients)
Potential unintended consequences of PrEP provision	Possible selection for and dissemination of drug-resistant viral strains
	Concerns about medication toxicities in otherwise healthy persons
	Belief that some individuals may increase risky behaviors while using PrEP
	Diversion of resources from HIV treatment programs
PrEP prescribing more feasible in primary care practices than HIV clinics	
<b>Perceived Facilitators to Prescribing PrEP</b>	
<b>Category</b>	<b>Sub-categories</b>
Belief that PrEP is efficacious	
Patient motivation	Patient requests for PrEP prescription
	Anticipation that individual patients would be adherent to daily medication
Professional guidance	Prescribing guidelines from normative bodies (e.g., U.S. Centers for Disease Control and Prevention)
	Peer norms