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Primary Care Physician Attitudes and Intentions toward Use of HIV Pre-Exposure Prophylaxis in Adolescents in One Metropolitan Region

Tanya L. Kowalczyk Mullins, MD, MS^{a,b}, Caitlyn R. Idoine, BA, BS^{a,c}, Gregory D. Zimet, PhD^d, and Jessica A. Kahn, MD, MPH^{a,b}

^aDivision of Adolescent and Transition Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

^bDepartment of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH

^cCurrent affiliation: University of Cincinnati College of Law, Cincinnati OH

^dDivision of Adolescent Medicine, Indiana University, Indianapolis, IN

Abstract

Purpose: Understanding the attitudes of physicians toward the use of pre-exposure prophylaxis (PrEP) for human immunodeficiency virus (HIV) prevention among youth is critical to improving access to PrEP. We examined PrEP-related attitudes among physicians who provide primary care to 13–21 year-old adolescents.

Methods: Individual, in-depth, semi-structured interviews were conducted with 38 physicians from adolescent medicine, family practice, internal medicine/medicine-pediatrics, obstetrics/gynecology, and pediatrics who care for any adolescents under 18 years-old. Interviews assessed familiarity with PrEP, perceived benefits and barriers to providing PrEP to adolescents, facilitating factors for prescribing PrEP, and likelihood of recommending and prescribing PrEP to adolescents.

Results: Mean age was 44.6 years (SD10.9). Fourteen physicians (37%) reported being somewhat or very familiar with PrEP. Perceived benefits of prescribing PrEP included decreased acquisition/rates of HIV, improved provision of sexual health services, and improved patient awareness of HIV risk. Barriers to PrEP were reported at the patient (e.g., lack of acceptability to patients), provider (e.g., concerns about patient adherence, safety/side effects, parents as a barrier to PrEP use), and systems (e.g., high cost) levels. Facilitating factors for prescribing PrEP included

Corresponding Author: Tanya L. Kowalczyk Mullins, M.D., M.S., Division of Adolescent and Transition Medicine, MLC 4000, Cincinnati Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229, Phone (513) 636-2245, Fax (513) 636-1129, tanya.mullins@cchmc.org.

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Implications and Contribution: Physicians who provide primary care to adolescents identified numerous benefits of, barriers to, and facilitating factors for prescribing PrEP to adolescents. Some barriers were particularly relevant to prescribing PrEP to minor-aged adolescents, including barriers around lack of regulatory approval, parents, and confidentiality.

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low cost/coverage by insurance, physician education about PrEP, patient educational materials, and clinical guidelines for PrEP use in youth. A higher proportion of physicians reported being highly or somewhat likely to *recommend* (N=16, 42%) than *prescribe* PrEP (N=13, 34%).

Conclusions: In this study of primary care physician attitudes toward PrEP prescribing for adolescents, physicians identified numerous barriers to providing PrEP. Addressing these barriers may increase adolescents' access to PrEP.

Keywords

adolescent; prevention; prophylaxis; physicians; HIV

Use of an oral tenofovir-based pre-exposure prophylaxis (PrEP) regimen significantly reduced new human immunodeficiency virus (HIV) infections in efficacy [1–4] and effectiveness studies,[5 6] leading to approval by the U.S. Food and Drug Administration (FDA) in 2012 of a combination antiretroviral medication (tenofovir-emtricitabine) for use as PrEP among adults. More recently in 2018, the FDA expanded approval of PrEP to include adolescents weighing at least 35 kg.[7] In order to guide clinicians who are prescribing PrEP, the U.S. Public Health Service released guidelines for PrEP use.[8] However, despite FDA-approval and available clinical guidelines for use of PrEP in adults, studies of adult primary care providers (PCPs) show slow uptake of PrEP: only 15–17% of providers report having prescribed PrEP.[9 10]

Youth ages 15–24 years comprised 21% of new HIV diagnoses in the U.S. in 2016,[11] making this group an important target for PrEP. Although studies have demonstrated that PrEP is acceptable to youth,[12 13] PrEP was only recently labeled by the FDA for use in adolescents.[7] Thus, until May 2018, prescribing PrEP to adolescents under age 18 was considered off-label. While off-label prescribing is common and legal,[14] physicians may be concerned about medicolegal risks associated with prescribing PrEP off-label.[15] Prescribing PrEP to minor-aged adolescents may present other unique barriers, including provider concerns about confidentiality, adverse effects on bone health, legality of prescribing PrEP to minors, and parental reactions to adolescent PrEP use.[15]

Because youth commonly access medical care from PCPs,[16] successful dissemination of PrEP will require adoption of PrEP by these physicians.[17] In order for adolescents to benefit from PrEP, they need access to physicians who are willing to prescribe PrEP and provide ongoing monitoring. Although published studies have described the attitudes and behaviors of PCPs who primarily care for adults,[9 10 18] little is known about the attitudes of PCPs who care for adolescents toward the use of PrEP in those younger than 18 years. Among adolescent health providers (the majority of whom were adolescent medicine specialists), 64.8% reported willingness to prescribe PrEP to adolescents, and willingness to prescribe was associated with the provider having sufficient knowledge about PrEP to “safely provide PrEP to adolescents and young adults” and provider belief that youth would adhere to PrEP.[19] Gaining an understanding of the attitudes and intentions of PCPs from the wide variety of specialties which care for adolescents will provide critical information to develop tailored interventions targeting modifiable factors associated with intention to recommend and prescribe PrEP, thereby improving adoption of PrEP by PCPs. Therefore,

we examined PrEP-related attitudes – including benefits of prescribing PrEP, barriers to prescribing PrEP, and facilitating factors for prescribing PrEP – and intentions to recommend and prescribe PrEP among physicians who provide primary care to adolescents.

Methods

These data are from the qualitative phase of a mixed methods study designed to describe PCP attitudes toward use of PrEP and microbicides in adolescents. The study was conducted before FDA-approval of PrEP for use in adolescents. From 8/2014–6/2016, we recruited English-speaking physicians within one metropolitan area and surrounding counties from specialties that provide primary care to adolescents[20]: general pediatrics, family medicine/practice, internal medicine/combined internal medicine-pediatrics, obstetrics/gynecology, and adolescent medicine. Our recruitment goal was 8 physicians per specialty, based on sample size recommendations for qualitative interview studies.[21] A random sample of physicians, stratified by specialty, was drawn from the American Medical Association Masterfile, which includes all U.S. medical doctors and many doctors of osteopathy. Due to slow recruitment, we also recruited participants through 1) snowball sampling, 2) local physician research networks, and 3) random sampling from lists of community physicians maintained by the first author's institution. Because a primary goal of the study was to describe the attitudes of physicians who provide care to minor-aged patients, our other primary inclusion criterion was seeing any 13–17 year-old patients. Invitations to participate were mailed to physicians' business addresses every 3 weeks (up to 3 mailings), with follow-up phone calls by research staff. The study received Institutional Review Board approval from the first author's institution with a waiver of the requirement for signed consent.

One face-to-face individual semi-structured interview was conducted with each participant by a single interviewer (TM). Interview content was guided by the Theory of Planned Behavior and the Diffusion of Innovations Theory.[22 23] During interviews, “adolescent” was defined as including patients 13–21 years of age. Participants were asked 1) their self-rated level of familiarity with PrEP, after which participants were educated about PrEP; 2) open-ended questions about perceived benefits of prescribing PrEP to adolescents, perceived barriers to prescribing PrEP to adolescents, and perceived facilitating factors for prescribing PrEP to adolescents; and 3) their likelihood of recommending and prescribing PrEP to adolescents. Education about PrEP included information about: FDA-approval for use in adults, efficacy, adherence, theoretical potential for viral resistance, side effects, adverse impacts on bone and renal function, and the CDC PrEP guidelines. Interviews lasted on average 57 minutes (SD13.8); participants received a \$75 card. Independent transcriptionists transcribed the audiotaped interviews; transcripts were cleaned by the interviewer. We used a framework analysis approach, consisting of familiarization, identification of thematic frameworks, indexing, charting, and mapping/interpretation.[24] The first author conducted the initial steps of familiarization, indexing and charting the data into preliminary themes using NVivo (version 10; Doncaster, Australia). Initial themes were derived from the interview guide content, and themes and codes were refined iteratively throughout analysis. The co-authors (GZ, JK) reviewed all of the themes, codes, and coded data for clarity and accuracy of coding. Discrepancies were addressed through discussion. Thematic saturation

was reached with no new themes emerging by the final interview. Barriers to prescribing PrEP were assigned to one of three categories based on the level at which the barrier was operating: patient-level, physician-level, or organizational/systems-level.

Results

Participant Characteristics

Of 672 physicians who were sent invitations to participate, 226 (34%) were not eligible to participate. Of 446 eligible physicians, 38 (8.5%) agreed to participate; the vast majority of physicians did not respond to recruitment efforts (361; 81%). Eight physicians (target number) were recruited from each of the following disciplines: pediatrics, family practice, obstetrics/gynecology, and adolescent medicine; 6 physicians were recruited from internal medicine/medicine-pediatrics. Most physicians were female (27; 71%) and white (32; 84%); mean age was 44.6 years (SD10.9; Table 1). Mean number of adolescents cared for per week was 20.7 (SD13.6). Fourteen physicians (37%) reported being somewhat or very familiar with PrEP.

Perceived Benefits of PrEP Use in Adolescents (Table 2)

Physicians reported that decreased rates of HIV would be a benefit of prescribing PrEP to adolescents (n=19; 50%) and patients would find PrEP acceptable (i.e., taking a pill would be acceptable to youth) (n=13; 34%). Four physicians (11%) reported that the higher efficacy of PrEP versus a topical agent was a benefit, and four physicians (11%) reported that patients may adhere to PrEP because it is a daily oral medication that is not linked to sex: “If you’re taking something on a daily basis, you don’t have to interrupt the romantic activity to get ready for it. You already have the medication on board” (Pediatrics). Physicians reported indirect benefits, including improved provision of reproductive health services and patient-physician communication (n=7; 18%), improved patient awareness of his/her risk of HIV (n=7; 18%), and empowerment of patients to care for their health (n=3; 8%): “It gives the adolescent some empowerment to protect themselves” (Family Medicine). Four physicians (11%) viewed prescribing PrEP as an opportunity to educate patients and communities about HIV/HIV prevention: “Increased knowledge about [HIV] because I’m assuming if you’re going to prescribe something like [PrEP], you’d have to have a more detailed discussion” (Adolescent Medicine).

Perceived Barriers to Prescribing PrEP to Adolescents (Table 3)

Patient-Level Barriers—The most commonly reported patient-level barriers to prescribing PrEP to adolescents was lack of acceptability of PrEP to patients (n=10; 26%) and patients having low perceived risk of HIV (n=8; 21%): “I think with a lot of adolescents now, they don’t think about HIV quite as much as...someone who came of age in the late 80’s, early 90’s where...HIV prevention was like so big” (Family Medicine). Additional barriers included the need for monitoring visits (n=3; 8%), patient concerns about safety (n=3; 8%), lack of patient knowledge about HIV and PrEP (n=2; 5%), and patient discomfort with discussing sexual health (n=2; 5%): “Especially teenagers, they’re not going to tell you...how [sexually] active they are” (Family Medicine). Two physicians (5%) reported that patients needing to see another physician to obtain PrEP would be a barrier: “I

feel like if they required...PrEP, I should refer them out to someone who deals with that more often than me” (Obstetrics-Gynecology).

Provider-Level Barriers—The most commonly reported provider-level barriers were concerns about patient adherence to PrEP (n=30; 79%) and required follow-up visits (n=10; 26%), which would negatively impact the provider’s willingness to prescribe PrEP: “It would have to involve...a serious discussion about, ‘Do you really think you can take this every day? Because if you really don’t think that’s going to happen, then to me, I don’t know that the benefits outweigh the risks’” (Adolescent Medicine) Other commonly cited barriers were concerns about safety and side effects (n=29; 76%) related to the systemic nature of PrEP and potential impact on growth/development: “I don’t know if you can give it to a 13-year-old. Her brain is still developing...what’s that going to mean?” (Pediatrics) Half of physicians (n=19) were concerned about parents being a barrier to prescribing PrEP for adolescents, including that a parent may oppose the physician prescribing PrEP to his/her child: “Most parents don’t really want...their kids to be on medicine at all.” (Pediatrics). Lack of physician education about PrEP was a reported barrier (n=17; 45%), as was lack of FDA-approval for use of PrEP in adolescents (n=13; 34%): “I would probably feel comfortable using it in an 18-plus population. Less than 18, I would not feel comfortable with it currently...because the FDA labeling says ‘adults’” (Internal Medicine). Nine (24%) reported concerns about providing PrEP to adolescents under age 18: “For the under 18 crowd, that’s a little bit tougher because if we’re having really, truly very high risk sexual behaviors...that needs a different level of intervention than me prescribing them [PrEP]” (Internal Medicine). Nine physicians (24%) were concerned about confidentiality: “[Most] of our patients are commercial payers. Their parents will see the bill for what I write them for” (Pediatrics). Six physicians (16%) reported not having appropriate candidates for PrEP in their practice, five (13%) were concerned about how to identify PrEP candidates, and four (11%) reported that low community HIV prevalence limited the utility of PrEP. Other barriers included lack of official guidelines for PrEP use in adolescents (n=4; 11%) and lack of legal clarity about whether PrEP could be provided confidentially without parental involvement (n=6; 16%): “Back to current reality is - could you really prescribe that confidentially to an adolescent patient without parental consent?” (Adolescent Medicine). Physicians were also concerned about negative outcomes of prescribing PrEP to adolescents, including PrEP users participating in riskier sexual behaviors (n=8; 21%) and potential negative impacts of prescribing PrEP on therapeutic relationships with patients and/or their parents (n=5; 13%): “I’m thinking about my social status with my patients and their parents, and that I...have to preserve that because that’s all I have. That relationship is important” (Pediatrics).

Systems-Level Barriers—The most commonly reported systems-level barrier to prescribing PrEP to adolescents was concern about high cost and lack of coverage by insurance (n=33; 87%). Fifteen physicians (39%) reported concerns about logistical and clinic systems issues (i.e., insufficient time or staff), while eight (21%) reported that lack of access to PrEP medication (i.e., lack of access to PrEP providers, lack of availability in local pharmacies, pharmacists refusing to dispense PrEP to minors) would be a barrier: “It doesn’t seem to be as much of a problem with...emergency contraception anymore, but I could

potentially see pharmacies not wanting to dispense [PrEP]" (Obstetrics-Gynecology). Four physicians (11%) reported that lack of community awareness and marketing of PrEP was a barrier. Two physicians (5%) each reported that systems financial barriers and lack of an identified provider to prescribe PrEP to adolescents were barriers.

Facilitating Factors for Prescribing PrEP to Adolescents (Table 4)

The most commonly reported facilitating factor for prescribing PrEP to adolescents was low cost and coverage by insurance (n=19; 50%). Several facilitating factors targeted physicians, including physician education (n=13; 34%), clinical guidelines for PrEP use in adolescents (n=10; 26%), systems changes to facilitate prescription (i.e., changes to electronic medical records; n=6; 16%), publication of further adolescent-specific data related to effectiveness and development of viral resistance (n=5; 13%), legal clarification about whether PrEP can be prescribed confidentially to minor-aged adolescents (n=4; 11%), and endorsement of adolescent PrEP use by professional organizations (n=2; 5%). Other reported facilitating factors targeted patients, including educational materials for patients/parents (n=11; 29%), availability of medication (n=7; 18%), favorable product attributes (e.g., few/no side effects, small pill size; n=6; 16%), education of patients and communities about HIV/HIV prevention (n=6; 16%), co-packaging PrEP with condoms or contraception (n=2; 5%), and ability of patients to sample PrEP before committing to longer term use (n=2; 5%).

Physician Reported Likelihood of Recommending PrEP (Table 5)

Pediatrics had the highest number of physicians (n=5; 63% of pediatricians) reporting being highly or somewhat likely to recommend PrEP to an adolescent, followed by adolescent medicine (n=4; 50% of adolescent medicine physicians), obstetrics/gynecology (n=3; 38% of obstetrician/gynecologists), and family medicine (n=3; 38% of family medicine physicians). One internal medicine physician (17% of internists) endorsed this level of likelihood of recommending PrEP to an adolescent.

Physician Reported Likelihood of Prescribing PrEP (Table 5)

Adolescent medicine had the highest number of physicians (n=4; 50% of adolescent medicine physicians) reporting being highly or somewhat likely to prescribe PrEP to adolescents, followed by pediatrics (n=3; 38% of pediatricians) and obstetrics/gynecology (n=3; 38% of obstetrician/gynecologists). Two family medicine physicians (25% of family medicine physicians) and one internal medicine physician (17% of internists) reported that they were highly or somewhat likely to prescribe PrEP.

Discussion

In this study, we examined attitudes about prescribing PrEP to adolescents (benefits, barriers, and facilitating factors) among PCPs of adolescents. Physician-reported intention to recommend and prescribe PrEP to adolescents tended to differ by specialty, though numbers were small in this qualitative study: a higher number of adolescent medicine and pediatrics physicians, compared to family medicine or internal medicine physicians, reported being highly or somewhat likely to recommend or prescribe PrEP. This is one of the first studies, to our knowledge, to describe PrEP-related attitudes and intentions among PCPs from the

various specialties that provide primary care to adolescents. Although a prior study examined the willingness to prescribe PrEP among adolescent health providers who were members of an adolescent health organization,[19] our study recruited physicians from various specialties who provide primary care to adolescents and who do not necessarily have a special interest in adolescent health. Because youth are highly impacted by HIV[11] and are a key target population in the U.S. National AIDS Strategy,[25] this age group would benefit from access to PrEP. PCPs are likely to be the first contact for at-risk adolescents to obtain PrEP; therefore, understanding the attitudes and intentions of these physicians is critical to the development of interventions designed to maximize adolescent access to PrEP services.

The most commonly identified benefit of prescribing PrEP to adolescents was decreased rates of HIV, but physicians described other benefits. PCPs reported that adolescents would find PrEP acceptable, and studies support this opinion.[12 13] PCPs reported that patients may be more adherent to a daily pill than to a prevention strategy that is linked to sex; this is supported by a study of adult PrEP users which demonstrated greater adherence to fixed interval dosing (e.g., daily dosing) than post-coital dosing.[26] Consistent with the emphasis of primary care on education and prevention, PCPs viewed PrEP provision as an opportunity to educate patients about HIV and HIV prevention. PCPs viewed PrEP provision as an opportunity to improve their delivery of sexual health services and communication with patients. Adolescents desire more and better communication from physicians about sexual health;[27] therefore, incorporating PrEP into practice, with the necessary related discussions about sexual health, may enhance physician comfort and skills in providing these services.

PCPs identified patient-level, physician-level, and systems-level barriers to prescribing PrEP to adolescents. Some barriers were similar to those identified in studies of adult-focused PCPs and HIV specialists, including concerns about adherence to medication and monitoring visits,[28] lack of physician education about PrEP,[10 29] risk compensation,[28 29] lack of PrEP candidates in the practice,[29] how to identify PrEP candidates,[18] limited utility of PrEP due to perceived low community HIV prevalence,[17] high cost and lack of coverage by insurance,[10 18 28 29] and logistical/clinic systems issues.[10 29] HIV specialists who care for youth voiced concerns about poor adherence among adolescent and young adult PrEP users[15]- similar to the present study. Evidence suggests that adolescents may benefit from more frequent follow-up than adult PrEP users to optimize adherence,[13 30] thereby improving the effectiveness of PrEP.[31] Concerns about safety and side effects related to PrEP use have been voiced by clinicians caring for adults,[28 29] and HIV specialists caring for adolescents reported specific concerns about potential negative impacts of PrEP on bone.[15] Physicians in this study did not report concerns about bone health, which may be due to limited knowledge about PrEP. Adults using PrEP have decreases in bone density,[32 33] although no fractures were observed in one study[32] and there was no significant difference in fractures between groups in the other study.[33] The observed decrease in bone density tends to recover after stopping PrEP.[34] Similar longitudinal studies in adolescents would provide important information to clinicians considering prescribing PrEP.

PCPs in this study identified barriers that are more salient to prescribing PrEP to adolescents. PCPs reported concerns about adolescent ability to access PrEP, including patients needing to see another physician for PrEP, lack of an identified local provider who prescribes PrEP to adolescents, and stigma associated with seeing an HIV specialist for PrEP. These barriers could be negated by PCPs themselves prescribing PrEP. Several of the physician-level barriers to prescribing PrEP to adolescents under age 18 that were noted in our study have not been described by providers caring for adults. PCPs reported that lack of FDA-approval for use of PrEP in adolescents was a barrier to prescribing PrEP; therefore, the recent FDA-approval of PrEP for use in adolescents may improve prescribing. Concerns related to parents were common, including concerns that parents may be an active barrier to PrEP use among adolescents, concerns about maintaining confidentiality for adolescent PrEP users, and lack of legal clarity about whether PrEP could be provided without parental involvement; such concerns were also common in a study of HIV clinicians who care for adolescents.[15] Published studies report infrequent incidents of parents requesting youth terminate participation in a PrEP study[30] or threatening to evict the youth due to his PrEP use.[13] Concern about maintaining confidentiality has been cited by adolescents as a reason to forgo health care,[35] and adolescents report that they would forgo sexual or reproductive care if parental notification of youth receiving such services was mandated.[36] Although no states specifically prohibit prescription of PrEP to minors, state laws regarding minor access to STI treatment and prevention services vary,[37] likely contributing to physician uncertainty about whether PrEP can be provided confidentially. Clinicians should engage youth in discussions about involving parents in PrEP-related care, considering the potential positive and negative outcomes of involving parents on a case-by-case basis. Interestingly, PCPs discussed concerns about a potential negative impact of prescribing PrEP on therapeutic relationships with patients and/or parents, fearing that prescription of PrEP may be perceived as judgment of the patient's behaviors. Finally, PCPs reported concerns about pharmacists refusing to dispense PrEP to patients under age 18, similar to barriers adolescents faced accessing emergency contraception.[38] Education of pharmacists about PrEP and issues of adolescent consent and confidentiality[39] could address this barrier.

Several of the facilitating factors reported by PCPs in this study have been reported by adult clinicians, including low cost/coverage by insurance,[40] education of physicians[10 18 40]and patients/communities[18 40] about PrEP, further data on effectiveness,[18] and clinical guidelines to support PrEP use.[18 40] The U.S. Public Health Service guidelines primarily address PrEP provision to adults: the first recommended indication for PrEP is being an adult. These guidelines note that clinicians may choose to prescribe PrEP to adolescents under age 18 after weighing the risks and benefits of PrEP and considering potential local legal restrictions.[8] While some facilitating factors - such as development of clinical guidelines, endorsement of PrEP use in adolescents by professional organizations, and legal changes to support PrEP use in adolescents - may take time to achieve, other changes - such as enhancements to electronic medical records, education of physicians and communities about PrEP, and development of educational materials for adolescents/parents - can be accomplished locally at a faster pace.

Variability by specialty in physician-reported likelihood of recommending and prescribing PrEP to adolescents was noted, with a greater number of general pediatricians and

adolescent medicine specialists in this sample reporting intention to recommend or prescribe PrEP. Pediatricians and adolescent medicine specialists likely have more training in treating adolescents and more adolescent patients as compared to physicians in other specialties. More physicians endorsed intention to recommend PrEP than endorsed intention to prescribe PrEP, a pattern also seen among adult clinicians.[10] PCPs may be more comfortable recommending a medication and then referring the patient to another physician to receive the prescription and ongoing management, particularly given the barriers to prescribing PrEP to adolescents that were noted in our study.

Our study included several limitations. Participants were recruited in a single metropolitan area; however, we enhanced diversity by including physicians from various practice types and locations. Selection bias may have resulted from our relatively low participation rate and from elements of our sampling strategy that were used to enhance recruitment – including snowball sampling and sampling from institutionally maintained lists. Participant knowledge about PrEP was not objectively measured; however, all participants were read an informational paragraph about PrEP in order to ensure that they had sufficient knowledge with which to consider the questions during the interviews. Our small sample size precludes the ability to examine associations between attitudes and intention to recommend or prescribe PrEP. The small sample size also precludes the ability to draw definitive conclusions about differences in reported willingness to recommend and prescribe PrEP by physician specialty; the presented numerical data and comparisons are exploratory and hypothesis-generating. Although our sample size is relatively small compared to those of quantitative studies, the purpose of this qualitative study was to generate an in-depth understanding of the range of attitudes toward the use of PrEP in adolescents among PCPs and not to produce generalizable results. In addition, the findings of qualitative studies help to generate hypotheses that can be tested in a larger, quantitative study. The findings of this study will inform creation of a survey instrument that will be administered to a larger study sample, resulting in data that are more generalizable and enabling us to determine more definitively if there are significant differences in attitudes by clinician specialty.

Conclusion

PCPs caring for adolescents identified patient, provider, and systems barriers to, and facilitating factors for, prescribing PrEP to adolescents. Because adolescents at risk of HIV are most likely to receive medical care from PCPs, addressing PCP perceived barriers to providing PrEP will be a critical step to improving access for adolescents. Strategies to improve PrEP provision among PCPs could include publication of further longitudinal safety and effectiveness data on PrEP use in adolescents, educating physicians about the recent FDA-approval of PrEP for use in adolescents weighing at least 35 kg, development of clinical guidelines specifically targeting provision of PrEP to adolescents, ensuring that PrEP is financially accessible to adolescents, clarifying legal statutes to allow confidential provision of PrEP to minors, and educating clinicians about PrEP and evidence-based recommendations about provision of PrEP to adolescents.

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Abbreviations:

PrEP	pre-exposure prophylaxis
HIV	human immunodeficiency virus
FDA	U.S. Food and Drug Administration
PCP	primary care provider

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Table 1:**Participant and Practice Characteristics (n=38)**

Characteristic	N (%)	Mean (SD)
Age		44.6 (10.9)
Gender - female	27 (71)	
Race, self-reported		
White	32 (84)	
African-American/Black	3 (8)	
Other	3 (8)	
Hispanic ethnicity	1 (3)	
Years since graduation from medical school		19.0 (9.9)
Region of residency training		
Midwest	30 (79)	
Northeast or Southeast	8 (21)	
Practice location ^a		
Suburban	19 (50)	
Urban	18 (47)	
Rural	2 (5)	
Practice type		
Private practice	18 (47)	
Academic	17 (45)	
Other (i.e., federally qualified health center, hospital based, academically oriented private practice)	3 (8)	
Patient race ^b		
Majority white	20 (53)	
Majority black/African-American	12 (32)	
Even distribution between white and black/African-American	6 (16)	
Patient insurance status ^c		
Majority private insurance	19 (50)	
Majority public insurance	12 (32)	
Even distribution between private and public insurance	5 (13)	
Number of youth cared for per week		20.7 (13.6)
Ever provided any medical care to HIV-infected patients	30 (79)	
Number of HIV-infected adolescents (13–21 years) currently ^d		
None	21 (70)	
1–4	8 (27)	
5 or more	1 (3)	
Number of HIV-infected adults (>21 years) currently ^{d,e}		
None	14 (47)	
1–4	8 (27)	
5 or more	6 (20)	

SD: standard deviation; HIV: human immunodeficiency virus

^a. One participant reported practice location as both urban and suburban.

^b. Percents do not add to 100 due to rounding.

^c. Missing = 2

^d. Of those with experience providing care to HIV-infected patients (n=30)

^e. Excludes pediatrics specialty.

Table 2:

Physician Reported Benefits of Prescribing PrEP to Adolescents (n=38)

Benefit	N^a (%)
Decreased HIV acquisition/rates of HIV	19 (50)
Acceptability of PrEP to patients	13 (34)
Improved reproductive health provision and patient-physician communication	7 (18)
Improved patient awareness of personal risk of HIV	7 (18)
Effectiveness (i.e., more effective than a topical agent)	4 (11)
Education of patient and community about HIV and PrEP	4 (11)
Greater adherence to a daily, oral product that is not linked to sex	4 (11)
Empowerment of patient to protect his/her health	3 (8)
Patient controlled prevention method	2 (5)
Follow-up visits for PrEP provide opportunities to address other healthcare needs	2 (5)
Decrease in other STIs	2 (5)
Improved HIV screening	1 (3)
Improved communication between HIV-infected patients and partners	1 (3)
PrEP as part of a larger harm reduction framework for sexual health	1 (3)
Patients on PrEP may be more adherent to oral contraceptives	1 (3)
Patient feels protected from HIV	1 (3)

HIV: human immunodeficiency virus; PrEP: pre-exposure prophylaxis; STI: sexually transmitted infection

^aNumber of participants who reported each benefit.

Table 3:

Physician Reported Barriers to Prescribing PrEP to Adolescents (n=38)

Barrier	N ^a (%)
Patient-Level Barriers	
Lack of acceptability of PrEP to patient	10 (26)
Patient has low perceived risk of HIV	8 (21)
Need to return for monitoring visits	3 (8)
Patient concerns about safety and side effects	3 (8)
Lack of patient, community knowledge about HIV and PrEP	2 (5)
Patient discomfort discussing sexual health with physician	2 (5)
Patients who would adhere to PrEP are those who are likely to consistently use condoms (thus at lower risk of HIV)	2 (5)
Need for patients to see another physician who was more comfortable with PrEP to obtain prescription	2 (5)
Potential inability of adolescents to understand how to use PrEP	1 (3)
Lack of at-risk patients being engaged with the medical system	1 (3)
Stigma associated with seeing an HIV specialist vs. PCP in order to obtain a prescription for PrEP	1 (3)
Potential cultural barriers to PrEP (i.e., populations that would be resistant to PrEP)	1 (3)
Lack of available samples for patients to assess their tolerance to medication before committing to long term use	1 (3)
Physician-Level Barriers	
Physician concerns about patient adherence to PrEP	30 (79)
Physician concerns about safety and side effects	29 (76)
Physician concerns about parents being a barrier to PrEP	19 (50)
Lack of physician knowledge about PrEP	17 (45)
Lack of FDA approval for PrEP use in adolescents	13 (34)
Physician concerns about patient adherence to follow-up visits and laboratory monitoring	10 (26)
Physician concerns about confidentiality	9 (24)
Physician concerns related to prescribing to patients <18	9 (24)
Physician concerns about patients taking PrEP participating in riskier sexual behaviors	8 (21)
Lack of legal clarity about whether PrEP can be prescribed without parental involvement (e.g., confidential care)	6 (16)
Lack of appropriate candidates for PrEP	6 (16)
Potential negative impact of prescribing PrEP on therapeutic relationships with patients and/or their parents	5 (13)
Physician concerns about identifying candidates for PrEP	5 (13)

Barrier	N ^a (%)
Lack of official recommendations/guidelines for PrEP use in adolescents	4 (11)
Physician perceived low HIV prevalence in the community limits utility of PrEP	4 (11)
Lack of effectiveness data specific to adolescents	3 (8)
Physician concerns about whether adolescents can understand risks/benefits sufficiently to provide informed consent	2 (5)
Competing priorities at visits may prevent discussion of PrEP	2 (5)
Physician concerns that the published efficacy rates for PrEP were too low to support prescribing to adolescents	2 (5)
PrEP is outside of the physician's scope of practice	2(5)
Physician concerns about availability of PrEP on the street	1 (3)
Physician concerns about need to deliver social interventions to youth who are high risk enough to warrant PrEP	1 (3)
Physician concerns that PrEP does not provide protection against other STIs (as is afforded by condom use)	1 (3)
Physician perception that PrEP is a subspecialty service	1 (3)
Discussions about sexual health do not consistently occur	1 (3)
Need for follow up visits is a barrier for physician	1 (3)
Physician concerns about reimbursement for PrEP services	1 (3)
Physician concerns about potential medical/legal risks to physician and practice associated with providing PrEP	1 (3)
Physician concerns that prescribing PrEP may be construed as condoning high risk behavior	1 (3)
Physician preference for other behavioral interventions (i.e., abstinence, limiting partners, condom use)	1 (3)
Physician concerns about HIV viral resistance	1 (3)
Physician concerns about contradictory messages in encouraging long-acting contraception but a daily pill for HIV prevention	1 (3)
Physician concerns that patient may need prolonged use of PrEP due to ongoing risk behaviors	1 (3)
Physician concerns about whether a pelvic exam would need to be done prior to prescribing PrEP	1 (3)
Physician concerns about how to ensure patient is HIV-uninfected before starting PrEP	1 (3)
Physician concerns about poor use of healthcare dollars if patient fills prescription but is not adherent to medication	1 (3)
Systems-Level Barriers	
Cost and lack of coverage by insurance for PrEP	33 (87)
Logistical and clinic systems barriers	15 (39)
Lack of access to medication or PrEP prescribers	8 (21)
Lack of community awareness, marketing about PrEP and HIV	4 (11)
Systems financial barriers (i.e., cost of staff resources)	2 (5)
Lack of identified provider for PrEP to minors	2 (5)
Need to access PrEP outside of PCP practice	1 (3)

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PrEP: pre-exposure prophylaxis; HIV: human immunodeficiency virus; FDA: U.S. Food and Drug administration; PCP: primary care physician

^aNumber of participants who reported each barrier.

Table 4:

Physician Reported Facilitating Factors for Prescribing PrEP to Adolescents (most frequently reported facilitating factors; n=38)

Facilitating Factors	N ^a (%)
Low cost/coverage by insurance	19 (50)
Physician education	13 (34)
Educational materials for patients/parents	11 (29)
Clinical guidelines for PrEP use in adolescents	10 (26)
Availability of PrEP medication locally	7 (18)
Favorable attributes of PrEP medication	6 (8)
Education of patients, communities about HIV, HIV prevention	6 (8)
Systems changes to facilitate prescription (i.e., EMR changes)	6 (8)
Additional data/studies on effectiveness and viral resistance; adolescent specific data	5 (13)
Legal clarification about whether PrEP can be delivered confidentially to minor-aged adolescents	4 (11)
Endorsement of adolescent PrEP use by professional organizations	2 (5)
Co-package with other HIV prevention methods (i.e., condoms) and/or contraception	2 (5)
Ability of patients to sample PrEP before committing to longer-term use	2 (5)
Method to document that patient understands risks associated with PrEP use	1 (3)
Phone app for patients to use	1 (3)
Availability of trained, non-physician staff member to counsel patient about PrEP	1 (3)
Support by institution	1 (3)
Discussion with professional peers about PrEP	1 (3)
Longer time on the market	1 (3)
Limiting prescribing of PrEP to patients who have adhered to daily medication in the past	1 (3)

PrEP: pre-exposure prophylaxis; HIV: human immunodeficiency virus; EMR: electronic medical record

^aNumber of participants who reported each facilitating factor.

Table 5:

Physician Reported Likelihood of Recommending and Prescribing PrEP

Specialty	Outcome: Percent Reporting Highly or Somewhat Likely	
	Recommend PrEP N (%)	Prescribe PrEP N (%)
Adolescent Medicine (n=8)	4 (50)	4 (50)
Family Practice (n=8)	3 (38)	2 (25)
Internal Medicine/Internal medicine-pediatrics (n=6)	1 (17)	1 (17)
Obstetrics/Gynecology (n=8)	3 (38)	3 (38)
Pediatrics (n=8)	5 (63)	3 (38)
TOTAL	16 (42)	13 (34)

PrEP: pre-exposure prophylaxis