PrEP Provision and Persistence among Primary Care Providers

Chauna Holder, MSN, BSN, BA, CPH, RN
Leighton School of Nursing, Marian University
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Cathryn Baack, PhD, APRN, FNP-BC
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Abstract

Background and Review of Literature: This study examined individual opinions from healthcare providers in Indiana about their willingness to prescribe Pre-Exposure Prophylaxis (PrEP) for Human Immunodeficiency Virus (HIV). Purpose: Describe facilitators and barriers to provider's willingness to prescribe PrEP in order to inform policies and procedures to improve PrEP use as a prevention tool amongst targeted populations. Methods: Healthcare providers were administered a pre-test assessment to assess current knowledge about PrEP. A brief educational intervention was shared, and post-test administered to evaluate any change in knowledge and attitudes towards PrEP provision. Procedures: Electronic mail, online survey tools and personal interviews were used to obtain information about the willingness to prescribe PrEP to patients and responses were deidentified for confidentiality and anonymity prior to analysis and distribution of results. Pre- and post-test assessments were derived from published tools (used with permission) to assess PrEP attitudes, knowledge, and skills. The survey captured information about healthcare provider demographics, education, and opinions, in addition to knowledge and attitudes about PrEP, including initiation of treatment, prescribing, maintenance and discontinuation of services. Implications/Conclusion: Responses obtained overwhelmingly supported provider education about PrEP, standardized protocols, and policies about PrEP provision at the practice and institution levels and supported expert practitioners on hand within the practice to use as real-time resources when questions arise, consistent with earlier published studies.

Keywords: PrEP, HIV, PEP, protocols, policies

Introduction

HIV (human immunodeficiency virus) is a scourge that has been plaguing the world for more than 40 years. Although treatment and long-term survival after infection have dramatically increased, new cases of HIV continue affecting some populations more than others, namely women, youth, and racial, ethnic and gender minorities, and those who suffer with substance use or work in the commercial sex trades. Pre-exposure prophylaxis (PrEP) is the use of HIV antiretroviral medications to prevent HIV in the uninfected. PrEP has been available by prescription since 2012, and is an effective tool to prevent HIV acquisition, yet is underutilized, especially in those groups that would most benefit. To better recognize the benefits of PrEP, namely prevention of incident HIV cases, healthcare providers who are outside the realm of infectious disease must be familiar with PrEP and recommend appropriate use for those who will most benefit. For more people to have access to PrEP, providers must be made aware of the existence of PrEP, the recommended patient audience and appropriate monitoring. The very paradox that exists with PrEP is that those who are most likely to benefit are the least likely to be aware of its availability.

Background

In 2018, the most recent year for which there is data, there were 37,832 new cases of HIV diagnosed in the United States. Of those cases, 42% were among African Americans, 19% among women and 21% among youth aged 13-24 years (Centers for Disease Control and Prevention [CDC], 2020). In Indiana, for the same year, there were 522 new diagnoses of HIV/AIDS (acquired immunodeficiency syndrome). In Indiana, many cases occurred in the 20-39 years and 40- 50+ years groups, with the next affected group being those aged 13-19 years, respectively (Indiana Department of Health, 2020). In Indiana, African Americans comprise nearly 50% of new cases of HIV/AIDS. Risk factors most represented in Indiana include men

who have sex with men (MSM), heterosexuals, and those with no identified risk, respectively. In the United States, "HIV prevalence rates in urban poverty areas were inversely related to annual household income-the lower the income, the greater the HIV prevalence rate" (Denning & Dinenno, 2010, Results section, HIV Prevalence rate by income). All these data indicate that HIV continues to be a burden, particularly to women, people of color and lower income individuals.

"PrEP is used by people without HIV who are at risk of being exposed to HIV through sexual contact or injection drug use. Two medications have been approved for use as PrEP by the FDA (United States Food and Drug Administration). Each consists of two drugs combined in a single oral tablet taken daily" (CDC, 2020, para. 2). Although infectious disease providers have traditionally been responsible for diagnosing and treating those affected by HIV/AIDS, the wide availability of antiretroviral drugs has dramatically changed the pool of providers who can provide care for those infected. Further, there are no special requirements for healthcare providers to prescribe PrEP. "Primary care providers who routinely see people at risk for HIV acquisition should consider offering PrEP to all eligible patients" (CDC, 2020, HIV prevention guidelines). Finally, "the U. S. Preventive Services Task Force has given PrEP a grade A recommendation…[indicating] that their review found that there is high certainty that the net benefit of this service is substantial" (CDC, 2020, Not enough people who could benefit from PrEP receive it).

Broad provision of PrEP to those who are at risk for acquiring HIV will be required to increase uptake of PrEP and realize the benefits of prevention efforts. In addition to daily, oral PrEP medication, individuals at risk should still be counseled to reduce behaviors that could lead to HIV infection, including using barrier contraceptives and not sharing equipment used to

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prepare or inject drugs. In addition, PrEP requires high adherence, meaning that it is most effective when taken regularly. Barriers to PrEP provision and persistence, as documented in the literature, include a lack of provider awareness, systemic barriers in the healthcare system (insurance approval, cost of medication, delays in provision, testing delays), and stigma, amongst other issues (Holder, 2020). To overcome these barriers, a coordinated and systematic approach to address pertinent individual issues should be employed for vulnerable populations. Increasing provider awareness of PrEP and addressing concerns about its provision to at-risk clients will result in broader availability of PrEP, increasing the defenses against HIV acquisition and decreasing community burden of HIV/AIDS.

Even though HIV has been a public health problem for more than 40 years, most providers still treat HIV as a specialty disease rather than as a chronic, treatable disease that can be managed by most general practitioners. As Public Health providers have been tasked with Ending the HIV Epidemic (ETE) in the next 10 years, PrEP is an important HIV prevention tool for those at high risk of contracting HIV. Provider education in family practice offices to increase prescribing of PrEP could help to curb additional new cases of HIV. Initially, PrEP was only available to cisgender men, but is now being recommended for both cisgender men and women for prevention of HIV acquisition amongst high-risk individuals, including women of childbearing age. Providers who are unfamiliar with HIV treatment are likely reluctant to offer PREP due to lack of familiarity with its use and may benefit from provider education about appropriate prescribing, monitoring, and discontinuation of PREP.

Problem Statement

For providers of high-risk HIV negative persons, does a provider education intervention about appropriate prescribing, maintenance, and discontinuation of Pre-Exposure Prophylaxis

(PREP) increase willingness to prescribe PrEP (attitude/knowledge) as compared to before the provider education intervention?

Gap Analysis

The review of literature suggests that among targeted populations, heterosexual Black and Latinx males may be overlooked when attempting to provide PrEP to vulnerable populations. The literature also suggests that a paradox exists with PrEP where those most likely to benefit from PrEP are least likely to be aware of its existence and availability. Varying methods may need to be employed to reach providers of these specific populations in order to increase awareness and uptake of PrEP for HIV prevention.

Review of Literature

The Marian University Library electronic database system was used to conduct a literature search using the keywords “PrEP for HIV” and returned 9410 results. The search was then narrowed using full text online, peer reviewed, downloadable article, 2016 through 2020 and English language, which decreased results to 453 items. Articles were selected for consideration based on title and topic, related to the knowledge, awareness, and willingness to prescribe PrEP, down to 46 articles. Of those 46, the articles were grouped manually for relevance to proposed topic, resulting in 30 articles. Of the 30 remaining, 15 were relevant to the intended goal, with 3 articles excluded as editorial, invited article, and one non-research article. The resulting 12 articles were included in the initial review of literature.

Healthcare Provider Pre-exposure Prophylaxis (PrEP) Prescribing

Several factors contribute to a healthcare provider’s willingness to prescribe pre-exposure prophylaxis (PrEP) for the prevention of Human Immunodeficiency Virus (HIV), the overarching barrier being lack of knowledge about the specifics of PrEP. A review of 12 articles

in the current literature about provider and patient barriers and facilitators to uptake of PrEP in HIV negative persons elicited several themes, briefly outlined herein. Overall, a lack of provider education about PrEP was noted to be a significant barrier to prescribing. Bunting, Garber, Goldstein, Ritchie, Batteson & Keyes (2020) found that 83.4% of students in several medical disciplines reported being aware of the existence of PrEP, but 62.2% of those were self-taught, meaning PrEP was not included in their formal education (Calabrese, Magnus, Mayer, et.al, 2016; Koechlin, Fonner, Dalglish, et.al, 2017; Zhang, Mitchell, Xue, et.al, 2020). Over a one-year period, the willingness to prescribe PrEP increased from 51.8% to 65.7% of participants who received training about PrEP (Pinto, Kay, Wall & Choi, 2019) and provider willingness to prescribe PrEP ranged from 9-19% (Koechlin, Fonner, Dalglish, et.al, 2017). There appeared to be an inverse relationship between provider age and willingness to prescribe PrEP; as provider age increased in nurse practitioners (NPs), there was decreased awareness of PrEP, yet NPs were more likely than medical doctors (MDs) to prescribe (Leech, Christiansen, Linas, et.al, 2020). Once PrEP training was completed, providers suggested to include and emphasize education on sexual history taking and sexual minority competence, particularly (Calabrese, Magnus, Mayer, et.al, 2016).

Barriers and Facilitators of PrEP

Varied and numerous are the barriers to maximum PrEP prescription to targeted populations. Although adherence to regimen, risk compensation (Calabrese, Magnus, Mayer, et.al, 2016), safety, and effectiveness of the treatment (Koechlin, Fonner, Dalglish, et.al, 2017) were listed, the emphasis was decidedly on broader concerns of financial coverage (Calabrese, Magnus, Mayer, et.al, 2016; Chan, Chappel, Joynt Maddox, et.al, 2020; Koechlin, Fonner, Dalglish, et.al, 2017;Mayer, Agwu & Malebranche, 2020; Pinto, Berringer, Melendez & Mmeje, 2018), eligibility determination (Calabrese, Magnus, Mayer, et.al, 2016; Chan, Chappel,

Maddox, et.al, 2020; Kundu, Martinez-Donate, Karkada, et.al, 2019) implementation logistics (Calabrese, Magnus, Mayer, et.al, 2016; Chan, Chappel, Maddox, et.al, 2020; Skolnik, Bokhour, Gifford, et.al, 2019), side effects (Calabrese, Magnus, Mayer, et.al, 2016; Koechlin, Fonner, Dalglish, et.al, 2017; Mayer, Agwu & Malebranche, 2020) and accessing the primary populations intended to benefit from PrEP (Calabrese, Magnus, Mayer, et.al, 2016; Mayer, Agwu & Malebranche, 2020; Pinto, Berringer, Melendez & Mmeje, 2018; Skolnik, Bokhour, Gifford, et.al, 2019; Vanhamel, Rotsaert, Reyniers, et.al, 2020). In the article by Chan, Chappel, Joynt Maddox, et.al, 2020, those patients receiving PrEP were likely to vary widely from the intended population (i.e. well-resourced, insured, educated persons). Of the 35% of patients who experienced delays in receiving PrEP once prescribed, delays were noted between six weeks and six months (Skolnik, Bokhour, Gifford, et. al, 2019). Other barriers included stigma (either on the part of the provider or the patient) (Koechlin, Fonner, Dalglish, et. al, 2017; Mayer, Agwu & Malebranche, 2020; Pinto, Berringer, Melendez & Mmeje, 2018; Skolnik, Bokhour, Gifford, et.al, 2019), decreased risk perception (Koechlin, Fonner, Dalglish, et. al, 2017; Mayer, Agwu & Malebranche, 2020), the idea that medications are only for "sick" people (Koechlin, Fonner, Dalglish, et. al, 2017), lack of educational attainment, fear of provider bias and distrust of the healthcare system (Mayer, Agwu & Malebranche, 2020). Koechlin, Fonner, Dalglish, et.al, (2017) found that social support, especially of sexual partners, ability to control the method and a simplified, one-pill per day regimen were facilitators of PrEP uptake and persistence among the literature reviewed.

Opportunities

Although eligible by PrEP guidelines, heterosexual men, especially Black and Latinx men, were all but absent from the literature, indicating a population that could benefit from PrEP

if barriers to patient access are overcome (Koechlin, Fonner, Dalglish, et.al, 2017). The approach to increasing provider and patient uptake of PrEP to prevent HIV acquisition must be multifaceted in order to attempt to address the many barriers already identified in the literature.

Theoretical Framework

The Socio-Ecological Model (SEM) is an adaptation of Bronfenbrenner's ecological model of human development, created by Urie Bronfenbrenner in 1977 to help explain the many forces that interact to shape a child's development (Bronfenbrenner, 1977). Bronfenbrenner depicted the model as five concentric circles, each circle representing the level of systematic influence on the child's development. At the center is the child/individual/microsystem. The next surrounding circle contains the mesosystem of localities, communities, and schools. The third circle is comprised of the exosystem and contains mass media, policies, and government institutions. The fourth circle is the macrosystem, containing the ideologies of the culture. The fifth circle, the chronosystem, is comprised of both internal and external elements of time and historical content (Appendix A). The microsystem exerts the most influence on the individual's development, focusing on relationships and interactions at the personal level. With each successive level, there are influences that help to shape development, yet they are further and further removed from the individual's personal experiences and can be both positive and negative forces. The SEM adapted Bronfenbrenner's concept to include health and the major contributors that may influence individual health (Appendix B). "The SEM states that health is affected by the interaction between the characteristics of the individual, the community, and the environment that includes the physical, social, and political components" (Kilanowski, 2017, p. 1). The SEM is also represented as a series of concentric circles with levels increasing from individual to interpersonal, institutions and organizations, community, structures, and systems,

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and has been widely adapted by the Centers for Disease Control and Prevention for application to several public health issues (Kilanowski, 2017), sometimes represented with four levels, but not more than five. The model attempts to account for the many levels of influence that shape an individual's health and health choices, recognizing the interaction between levels to shape individual choice.

The SEM framework has been chosen for this project to attempt to characterize and address the many levels of influence that interact with an individual healthcare provider's choice to prescribe pre-exposure prophylaxis (PrEP) and those barriers that the individual who may benefit from PrEP is likely to encounter. When seeking healthcare, often the individual expresses a desire to improve an aspect of their personal health, but various barriers must be overcome in order to achieve that goal. Barriers often include personal knowledge of risks and benefits of continued behavior, time constraints, material resources, access, and stigma, amongst others, and will vary from person to person. In attempting to diversify the patient population prescribed PrEP, the SEM framework will assist in identifying concepts and that interact to shape the choice of the provider to prescribe PrEP and how to overcome barriers to prescription to increase appropriate provision to those most likely to benefit from HIV (human immunodeficiency virus) acquisition.

Goals, Objectives, and Expected Outcomes

The goal of this project is to increase healthcare provider awareness of appropriate prescribing, maintenance, and discontinuation of pre-exposure prophylaxis for the prevention of human immunodeficiency virus acquisition (PrEP for HIV). Student investigator shall complete a pre- and post-test assessment, providing an educational intervention about PrEP according to current clinical practice guidelines, over the DNP II and DNP III courses.

Project Design

Primary care providers and other healthcare providers outside the practice of infectious diseases shall be administered a pre-test assessment to ascertain current knowledge about PrEP. A brief educational intervention will be shared, and post-test administered to evaluate any change in knowledge and attitudes towards PrEP provision. Data will be analyzed for themes and suggestions provided, with results disseminated appropriately.

Project Site

The anticipated location of the project will be individual and group provider practices treating the target populations within Central Indiana and may extend to rural providers who may benefit from the educational intervention.

Methods

Pre- and post-test assessments will be derived from published tools used to assess PrEP attitudes, knowledge, and skills. Paired results will be analyzed for changes in knowledge, skills, attitudes, and willingness to prescribe PrEP.

Measurement Instrument(s)

A standardized pre- and post-test assessment will be used to assess knowledge before and after the educational intervention. The educational intervention will either be taken directly from the CDC PrEP for providers educational materials or materials from the pharmaceutical suppliers, or a combination of these resources.

Data Collection

Data will be collected using either 1:1 interviews or emailed assessments and interventions. In light of the ongoing pandemic, alternative electronic methods may need to be developed to facilitate provider participation.

Data Analysis

Using a pre- post-test analysis, a paired t-test seems appropriate to analyze the data collected. Any suggestions gleaned from personal communication with providers will also be compiled.

Timeline

The project is anticipated to occur over a period of 4-7 months from institutional review board (IRB approval) to dissemination.

Demographic Results

The proposed project differed from the actual project significantly due to COVID-19 accommodations and availability of subjects. Upon receiving IRB approval, the student researcher partnered with the Coalition of Advanced Practice Nurses of Indiana (CAPNI) to distribute the survey to its membership database of over 1500 members. Initially proposed as a pre- and post-test assessment with an educational component, the final survey was comprised of 36 questions regarding demographics, knowledge of PrEP, and perceived barriers and facilitators of PrEP prescribing in primary care settings. Survey questions were chosen from two tools used in a similar study by Dr. Dawn Robinson-Meadows (2019). Distribution using the CAPNI email listserv worked to decrease potential exposures to COVID-19 during face-to-face encounters, facilitated access throughout the state of Indiana and facilitated responses that could be completed at the convenience of the respondent. Respondents self-selected to complete the survey, returning 38 responses (2% response rate), 36 of which were complete and included in

the analysis. Surveys were collected over a period of 5 weeks, from July 22 to August 25, 2021, using Qualtrics software.

Respondents included nurse practitioners who were employed in outpatient settings (89%), provided supervision of trainees (61%), and practiced in the Midwest (95%), comprised of the states of Indiana, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, Oklahoma, and Wisconsin. Respondents classified themselves as providing "patient care" 100% of their time compared to "research", "medical education", "administration" or "other duties". Practices were classified by the respondent as either "rural" (32%), "suburban" (27%) or "urban" (41%). The majority of respondents described their clinical setting as "community health center" (31%) or "clinic at a public hospital" (25%) with the remainder spread amongst "clinic at an academic medical center"(11%), "clinic at a VA hospital" (2%), "inpatient hospital setting" (8%), "private practice" (14%) and "other" (8%), with the focus of the practice being "primary care but no HIV treatment" (50%). All respondents were nurse practitioners; 89% of respondents identified as female, 83% heterosexual, 83% White, aged 26-67 years and not of Hispanic/Latino(a) ethnicity. Respondents had been in practice "less than 5 years" (38%), "5-10 years" (32%), "10-15 years" (11%), "15-20 years" (8%), and "greater than 20 years" (11%).

Descriptive Statistic Results

Using Qualtrics online data collection and analysis software, the survey questions were formatted using a standard template and distributed via hyperlink using the CAPNI distribution list. Questions included in the survey were chosen from the work of Blumenthal and colleagues (2015) and Robinson-Meadows (2019) to ascertain familiarity with PrEP, patient requests for PrEP, and real or perceived barriers and facilitators to prescribing PrEP in primary care practice.

Questions 3 and 4 regarding existing PrEP knowledge revealed 97% of respondents were familiar with PrEP prior to the survey, with 32% rating their knowledge of PrEP as "good", 26% rating their knowledge as "very good," and 5% rating their knowledge as "excellent"; 37% rated their existing knowledge of PrEP as "fair" or "poor"**.** Question 5 asked respondents to rate their knowledge of PrEP's potential side effects with 45% of respondents answering "fair" or "poor", while 55% responded "excellent", "very good", or "good". Question 6 found that 66% of respondents believed PrEP to be effective in preventing HIV when taken as prescribed. Question 7 returned 74% of respondents agreeing that if a patient reported using condoms consistently and correctly that it was "very important" to still offer PrEP, and no respondents replied that PrEP was "not at all important". Considering the side effect profile for PrEP, all respondents rated PrEP as either "moderately safe" at 60%, or "very safe" at 40%, with no rating lower than "moderately safe".

Considering prescribing habits for PrEP, 34% responded they were "not at all likely" to prescribe PrEP in the next 6 months, while the remaining 66% responded at least "somewhat likely". Comfort with prescribing PrEP yielded similar results with 24% responding that they were "not comfortable," while 76% responded at least "slightly comfortable" or better. 58% of respondents had ever been asked about PrEP by a patient, and 58% have initiated a conversation with a patient about PrEP. 55% of respondents had never prescribed PrEP to a patient, and 58% had never referred a patient for PrEP to be provided by another provider or at another location.

Questions 12 and 13 sought to correlate sexual risk-taking practices with PrEP use, with 14% of respondents indicating "not at all likely" to increase risk behavior, while 86% indicated at least "somewhat likely" to "extremely likely" to increase risky behavior (e.g. decrease condom use). Conversely, 70% of respondents answered that patients may decrease risk-taking behaviors

as a result of using PrEP. When asked about comfort with evaluating PrEP eligibility for clients, respondents reported being most comfortable evaluating heterosexual and homosexual patients compared to those who inject drugs, regardless of sexual preference. Some 8-14% of respondents were consistently reluctant to prescribe PrEP based on risk behavior, while 49-62% were always willing to prescribe. The majority of respondents (50%) reported caring for 1-10 HIV-positive patients in their current practice and reported that of those eligible for routine HIV testing, only 44% report routine testing being offered.

Barriers to PrEP prescribing were rated amongst respondents with “lack of provider training/education regarding PrEP” and “lack of clinic guidelines/protocol for prescribing/monitoring PrEP” being most often chosen as “extremely likely”, “lack of insurance coverage and out-of-pocket patient costs” rated “moderately likely”, and “clinical and lab monitoring requirements” and “staffing/time constraints” rated “somewhat likely”. Facilitators of PrEP prescribing, in descending order, were rated to be “peers who are knowledgeable about or supportive of PrEP provision within the practice,” “practice or institutional willingness to implement new clinical protocols,” “access to resources such as PrEP prescription guidelines and protocols,” and “on-site support”. Respondents thought that the most feasible approach to increasing PrEP prescribing in practice would be to have “all providers in the practice receive training to provide PrEP and prescribe to eligible persons” at 50%, followed closely by “one provider as a PrEP specialist” in the practice at 31%.

Discussion

The results of this study support provider education, practice protocol development and policy implementation around PrEP provision in primary care practices. Initially, the goal of this project was to increase healthcare provider awareness of appropriate prescribing, maintenance,

and discontinuation of pre-exposure prophylaxis for the prevention of human immunodeficiency virus acquisition (PrEP for HIV) using a pre- and post-test format with an educational intervention. Due to the ongoing COVID-19 pandemic, the project was reimagined as an assessment of provider awareness of PrEP, comfort with prescribing, and perceived barriers and facilitators to PrEP prescribing in primary care practice. Responses obtained overwhelmingly supported provider education about PrEP, standardized protocols, and policies about PrEP provision at the practice and institution levels, and expert practitioners on hand within the practice to use as real-time resources when questions arise. These results were consistent with those reported by Robinson-Meadows (2019) and the literature reviewed as indicated above. As provider education and familiarity with PrEP increases, it follows that PrEP will be made more widely available amongst those clients who could most benefit from its use (Logo, et.al, 2017). Additional opportunities for provider education, in cooperation with good policy, will promote uptake of PrEP to prevent additional HIV cases, working to end the HIV epidemic.

Project Barriers and Facilitators

The most significant barrier to this project was the low response rate. Of the available more than 1500 nurse practitioners in the CAPNI email listserv, only 38 responses were generated over a 5-week period with one reminder prompt being sent, which generated a final 5 respondents. Beyond the response rate, provider fatigue undoubtedly played a role in providers being willing to respond to any additional tasks asked of them in light of the ongoing demands of the current pandemic. At the time the survey was issued, providers and first-line workers in all fields, had been battling COVID-19 some 16 months without relief. Finally, not all providers in the CAPNI database are actively employed in healthcare and may not specialize in primary care, further reducing the number of targeted respondents available. Additionally, barriers to PrEP

may be perceptions about the time investment required to learn how to take a proper sexual history or comprehensive risk inventory. Although respondents for this survey did not indicate staffing or time constraints as high-ranking barriers, additional requirements of providers must be considered when implementing or promoting a new practice protocol, including time, material resources, and educational needs.

Facilitators

Using an online software program for survey development and coding, coupled with unlimited access facilitated responses from busy providers. Access to a database of specifically trained individuals allowed for rapid deployment and the unique data signature created with each response allowed for remarkable data quality over traditional methods. A relatively short survey, with a total of 36 questions, 16 of which were regarding respondent demographics, leaving 20 to focus on PrEP knowledge, services and attitudes hopefully kept respondents engaged and focused on the task at hand. A personal introduction to the survey from an aspiring nurse practitioner student may also have contributed to respondent willingness to complete the survey.

Implications for Practice

Nurse practitioners are frequently primary care providers who are charged with holistic care of the individual. Doctor of Nursing Practice Essentials enumerate the use of research in practice, innovation, and quality improvement in disease prevention and health promotion (American Association of Colleges of Nursing, 2006). To that end, screening for preventable conditions is a priority for all patients, including behaviors associated with injection drug use and sexually transmitted diseases. Routine screening for HIV is recommended by the United States Preventive Services Task Force (USPSTF), including offering PrEP to individuals at risk for

acquiring HIV (USPSTF, 2019). The gap between provider education and practice implementation must be closed in order to realize the benefits of PrEP in reducing the overall burden of incident cases of HIV amongst individuals at risk.

Recommendations and Conclusions

Consistent with previous studies, this study determined that nurse practitioners are familiar with the concept of PrEP for HIV prevention, providers more education about appropriate screening and referral for PrEP initiation and maintenance and believe that PrEP is an effective tool to prevent new HIV infections. As stated, the gap between knowledge and action must be closed to increase uptake and provision of PrEP to appropriate patients. Nurse practitioners are poised to close the gap and improve the outlook of patients at risk for HIV acquisition with the support of appropriate policy and practice protocols.

Future research may focus on successful implementation of rapid PrEP assessment and access, cost containment measures associated with PrEP initiation and maintenance, and comprehensive sexual history and health inventory as part of routine primary care. Dissemination of successful PrEP implementation models in primary care settings may further facilitate uptake and innovation in service delivery. Additional research is warranted in order to maximize the benefits of widespread PrEP availability and appropriate use to prevent new HIV infections.

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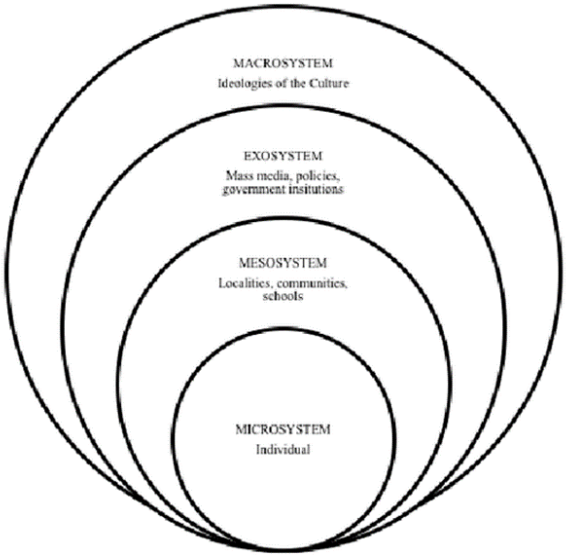
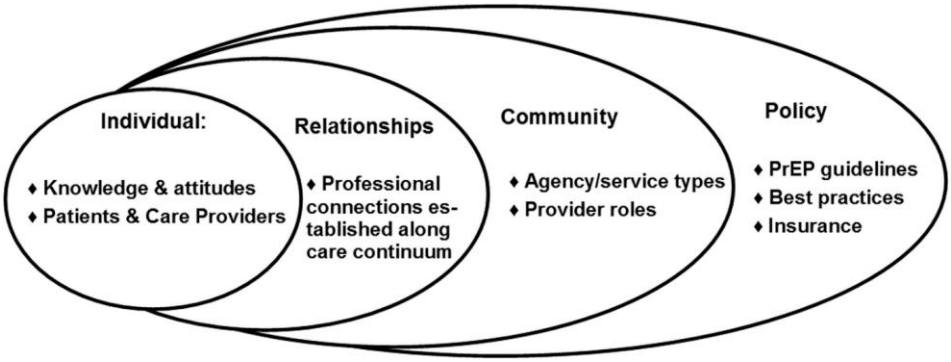
Appendices



Appendix A: Ecological Model of Human Development, Bronfenbrenner, U. (1994)

Socio- ecological model adopted from Bronfenbrenner's ecological model of human development. Source: "Ecological Models of Human Development," by U. Bronfenbrenner, 1994, in International Encyclopedia of Education (pp. 37-42), Oxford, UK: Elsevier.



Appendix B: Socio-ecological model of barriers to PrEP implementation

Pinto, R. M., Berringer, K. R., Melendez, R., & Mmeje, O. (2018). Improving PrEP implementation through multilevel interventions: A synthesis of the literature. *AIDS and Behavior*, 22, 3681-3691. https://doi.org/10.1007/s10461-018-2184-4

Appendix C: PrEP Provision Among Primary Care Providers

PrEP Provision Among Primary Care Providers

Q1. Do you currently provide direct clinical care in an outpatient setting?

- ○ Yes
- ○ No

Q2. Do you currently supervise trainees in an outpatient setting?

- ○ Yes
- ○ No

Q3. Before today, had you heard of PrEP?

- ○ Yes
- ○ No

Q4. Before today, how would you rate your knowledge of PrEP?

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Q5. Before today, how would you rate your knowledge of PrEP's potential side effects (e.g., renal dysfunction)?

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Q6. How effective do you think PrEP is in preventing acquisition of HIV among people who take it every day as prescribed?

- ○ Not effective at all
- ○ Slightly effective
- ○ Moderately effective
- ○ Very effective

Q7. If a patient says he/she is using condoms consistently and correctly, how important is it to offer PrEP in addition to condoms?

- ○ Not at all important
- ○ Slightly important
- ○ Moderately important
- ○ Very important

Q8. Based on your understanding of PrEP side effects, how safe is PrEP?

- ○ Not at all safe
- ○ Slightly safe
- ○ Moderately safe
- ○ Very safe

Q9. How likely are you to prescribe PrEP in the next 6 months?

- ○ Not at all likely
- ○ Somewhat likely
- ○ Moderately likely
- ○ Very likely

Q10. If you identified a patient at high risk for HIV acquisition, what is your level of comfort with prescribing PrEP?

- ○ Not comfortable
- ○ Slightly comfortable
- ○ Moderately comfortable

- Very comfortable

Q12. How likely do you think the patient would be to increase his/her sexual risk-taking practices (e.g., decrease condom use) as a result of being on PrEP?

- Not at all likely
- Slightly likely
- Moderately likely
- Extremely likely

Q13. How likely do you think the patient would be to decrease his/her sexual risk-taking practices (e.g., increase condom use) as a result of being on PrEP?

- Not at all likely
- Slightly likely
- Moderately likely
- Extremely likely

Q14.

Have you ever been asked about PrEP by a patient?

- Yes
- No

Q15. Have you ever initiated a conversation about PrEP with a patient?

- Yes
- No

Q16. Have you ever prescribed PrEP to a patient?

- Yes
- No

Q17. Have you ever referred a patient for PrEP (e.g., to a PrEP provider or HIV clinic)?

- Yes
- No

Q18. Rate the degree to which each of the following is a potential barrier to prescribing PrEP at your primary clinic

	Not likely	Somewhat Likely	Moderately likely	Extremely likely
Lack of provider training/education regarding PrEP	○	○	○	○
Lack of clinic guidelines/protocol for prescribing/monitoring PrEP	○	○	○	○
Clinical and lab monitoring requirements (e.g., seeing patient and obtaining HIV tests and STI screening every 3 months; checking renal function every 6 months)	○	○	○	○
Staffing/time constraints related to risk reduction and PrEP adherence counseling (also medication knowledge/counseling re: Truvada, adverse effects, etc.)	○	○	○	○
Lack of insurance coverage and out-of-pocket patient costs for PrEP and related care (e.g., lab work)	○	○	○	○

Q19. Rate the degree to which each of the following would facilitate your prescribing PrEP at your primary clinic

	Not at all likely	Somewhat likely	Moderately likely	Extremely likely
Access to resources such as PrEP prescription guidelines and protocols	○	○	○	○
On-site support (i.e., risk reduction or adherence counselors, social workers)	○	○	○	○
Practice or institutional willingness to implement new clinical protocols	○	○	○	○
Peers who are knowledgeable about or supportive of PrEP provision within your practice	○	○	○	○

Q20. In your opinion, which approach do you think would be most feasible to implement PrEP in your clinical practice setting?

- ○ All providers in the practice receive training to provide PrEP and prescribe to eligible patients
- ○ One provider in the practice is appointed as a PrEP specialist (i.e., a provider who receives specific training on PrEP and to whom all eligible patients in the practice are referred)
- ○ No providers in the practice receive training or provide PrEP; rather, patients are referred outside the practice (e.g., to an Infectious Disease Clinic or STD clinic)
- ○ Other (please specify)

Q21. For each of the following risk behavior categories, how comfortable are you evaluating eligibility for PrEP?

	Not at all uncomfortable	Somewhat uncomfortable	Moderately comfortable	Extremely comfortable
Women who have sex with men	○	○	○	○

	Not at all uncomfortable	Somewhat uncomfortable	Moderately comfortable	Extremely comfortable
Men who have sex with women	○	○	○	○
Men who have sex with men	○	○	○	○
People who inject drugs	○	○	○	○

Q22. For each of the following risk behavior categories, how willing are you to prescribe PrEP to an eligible individual, assuming a recent negative HIV test and equal access to medication?

	Not at all willing	Somewhat willing	Moderately willing	Extremely willing
A female with a current male partner known to be HIV-positive	○	○	○	○
A female who has unprotected sex with male partners with unknown HIV status who are at high risk of HIV infection (e.g., partner(s) who has sex with other males or uses injection drugs)	○	○	○	○
A male with a current female partner known to be HIV-positive	○	○	○	○
A male who has unprotected sex with male partners with unknown HIV status who are at high risk of HIV infection (e.g., partner(s) who has sex with other males or uses injection drugs)	○	○	○	○

	Not at all willing	Somewhat willing	Moderately willing	Extremely willing
A male with a current male partner known to be HIV-positive	○	○	○	○
A male who has sex with multiple male partners and has had unprotected anal sex	○	○	○	○
A person who has injected drugs in the past 6 months and shared injection equipment	○	○	○	○
A person who has been on methadone maintenance for the past 6 months but has continued injection drug use	○	○	○	○

Q23. In what region of the country do you practice? (Choose only one)

- ○ Mountain West (AZ, CO, NV, NM, UT, AND WY)
- ○ Midwest (IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, OK, SD, WI)
- ○ California-Hawaii
- ○ Northwest (AK, ID, MT, OR, WA)
- ○ Southern (AL, AK, FL, GA, KY, LA, MS, NC, SC, TN, TX, VA, and WV)
- ○ Mid-Atlantic (DE, Washington, DC, MD, NJ, NY, PA, Puerto Rico)
- ○ New England (CT, ME, MA, NH, RI, VT)

Q24. How would you classify the area or region where you practice? (Choose only one)

- ○ Urban
- ○ Suburban
- ○ Rural

Q25. What percent of your time do you spend doing each of the following (should total 100%)?

- Direct clinical care
- Research
- Medical education (i.e., teaching or supervising medical trainees)
- Administration
- Other (please specify)

Q26. What is the single best setting that describes where you care for patients? (Choose only one)

- Clinic at an academic medical center
- Clinic at a public hospital
- Clinic at a VA hospital
- Clinic at substance abuse treatment center in the community
- Community health center
- Inpatient/hospital setting
- Private practice (unaffiliated with an academic medical center and in the community)
- Other (please specify)

Q27. What is the main focus of the clinic/office where you care for patients? (Choose only one)

- General medical care/Primary Care (but NO HIV care/treatment)
- General medical care/Primary Care (WITH HIV care on-site)
- Infectious diseases (including HIV care)
- Substance abuse treatment
- LGBT-focused primary care clinic
- Other (please specify)

Q28. Of the patients you currently provide care for at your clinic/office, approximately how many patients are HIV-positive?

- 0

- 1-10
- 11-20
- 21-50
- 51-100
- 101-200
- >200

Q29. Of the patients you currently provide care for at your office, what percent of those who are eligible for routine HIV testing have been offered testing?

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-100%
- Not applicable (i.e., all of my patients are HIV+)

Q30. With respect to gender, how do you self-identify?

- Female
- Male
- Transgender
- Gender non-conforming
- Choose not to answer

Q31. With respect to sexual orientation, how do you self-identify?

- Heterosexual
- Gay
- Lesbian
- Bisexual
- Other (please specify)

Q32. What is your current role?

- ○ MD
- ○ DO
- ○ NP
- ○ PA

Q33. I have been in practice _____ years.

- ○ Less than 5
- ○ 5-10
- ○ >10-15
- ○ >15-20
- ○ >20

Q34. Please enter the year in which you were born.

- ○ Birth year (please specify)

Q35. With respect to race, how do you self-identify? (Check all that apply)

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian or Asian American
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other (please specify)

Q36. Do you self-identify as being Hispanic/Latino(a)?

- ○ Yes
- ○ No