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Pre-Exposure Prophylaxis Educational Intervention in Primary Care

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Pre-Exposure Prophylaxis Educational Intervention in Primary Care

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

Harold C. Sarmiento

2022

ABSTRACT OF THE DISSERTATION

Pre-Exposure Prophylaxis Educational Intervention in Primary Care

by

Harold C. Sarmiento

Doctor of Nursing Practice

University of California, Los Angeles, 2022

Professor Wei-Ti Chen, Chair

Background: Around 1.2 million people in the United States (U.S.) are currently infected with Human Immunodeficiency Virus (HIV) (Centers for Disease Control and Prevention [CDC], 2021). Pre-exposure prophylaxis (PrEP), an essential tool in HIV prevention, is safe and highly effective in preventing HIV infection. However, PrEP remains underutilized among primary care providers (PCPs) (CDC, 2021). According to CDC (2021), the low adoption and implementation of PrEP among PCPs is multifactorial, including a lack of knowledge, perceived appropriateness, limited time, and lack of target incentives. Because of these reasons, many PCPs do not prescribe PrEP and refer their at-risk patients to infectious disease (ID) providers. Thus, interventions to increase PCPs' knowledge and prescription of PrEP as an HIV prevention strategy are needed.

Objectives: This PrEP educational intervention (PrEP-EI) aims to provide PCPs an in-depth knowledge of PrEP to help them implement and prescribe PrEP in their clinical practice.

Methods: A comprehensive virtual one-hour PrEP-EI was implemented for PCPs in a large health system in Los Angeles. PrEP-EI was recorded for those PCPs who were unable to attendthe live session. The project design was quasi-experimental and used pre-test and post-test surveys. PCPs' PrEP knowledge was measured and compared pre-and post- PrEP-EI. Paired *t*- test was used to assess the comparison of pre-and post-test surveys.

Results: A total of 35 PCPs attended both PrEP-EI sessions. Paired *t*-test showed a significant difference between the pre-and post-surveys of PrEP knowledge among PCPs ($p<0.05$). Beforethe PrEP-EI, participants had a knowledge score of 60%. After the PrEP-EI, their knowledge score increased to 90.86%.

Conclusion: PrEP-EI has been shown to increase PrEP knowledge among PCPs. This findingsupports the importance of PrEP-EI among PCPs to help them prescribe PrEP to their at-risk patients. Establishing PCPs' knowledge and competence of PrEP is critical to facilitating theiradoption and prescription of PrEP in their clinical practice.

The dissertation of Harold C. Sarmiento is approved.

Colleen Keenan

Mary Ann Lewis

Elizabeth Anne Thomas

Wei-Ti Chen

University of California, Los Angeles

2022

DEDICATION

I dedicate this Doctor of Nursing (DNP) project to my mother, Paulina Sarmiento, who has been battling pancreatic cancer since the beginning of this doctoral journey. Thank you for your unconditional love and being my source of inspiration, courage, and strength throughout this program. A special feeling of gratitude to my father, Roberto Sarmiento, for supporting me in everything I do and being there for mom in good and bad times. Thank you, mom and dad, for your good examples that have taught me to work hard to achieve what I aspire to.

I also dedicate this project to many friends who have been there for us in our cancer journey and supported me throughout my academic journey. Thank you for your support and encouragement during life, work, and graduate school challenges. Thanks for being our cheerleaders! I will always appreciate all you guys have done for my family and me.

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I also want to express my deep appreciation to my classmates and professors for the support and encouragement: Dr. Nancy Jo Bush, Dr. Theresa Brown, Dr. Wei-Ti Chen, Dr. Colleen Keenan, Dr. Mary Ann Lewis, Dr. Elizabeth Thomas, and Soo Kwon. I sincerely thank you for the learning opportunities, support, and guidance.

To the primary care providers of Kaiser Permanente Los Angeles Medical Center, thank you for helping me with this project and allowing a nurse practitioner colleague to educate you. Finally, thank you for teaching me to become a better healthcare provider to my patients.

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Panelist	LGBTQIA+ Spring Nurses Panel	UCLA SON	May 2021
Speaker	Self-care and Resiliency for Teachers Graceville National High School		Mar 2021
Panelist	Just the facts on COVID-19 Vaccines	ANA and PNANC	Oct 2020
Speaker	Management, Diagnosis, Prevention and Control of COVID-19 UST		Oct 2020
Speaker	Celebration of Heroism: Perspective from a Front liner PNANC		Oct 2020
Panelist	Health Disparities and COVID-19	UCLA SON	Oct 2020
Panelist	Working with Vulnerable Population	UCLA SON	May 2017

CHAPTER ONE: INTRODUCTION

Around 1.2 million persons in the United States (U.S.) are currently infected with the Human Immunodeficiency Virus (HIV) (Centers for Disease Control and Prevention [CDC], 2021). According to the CDC (2021), around 36,400 Americans were infected with HIV in 2018. Male-male sexual contact without intravenous drug use (IVDU) was responsible for 67% of the 38,739 new HIV infections in 2018, compared to 3% for male-male sexual contact with IVDU, 24% for male-female sexual contact without IVDU, and 6% for IVDU (CDC, 2021). In the U.S., transgender people accounted for around 2% of all adult and adolescent HIV infections, with transgender women accounting for 92% of all HIV diagnoses. African American women and men made up 62% of the 24% of heterosexual Americans newly diagnosed with HIV (CDC, 2021). HIV infection is disproportionately high among African American and Latino males who have sex with men (MSM) and transgender women (CDC, 2021). This data implies that other HIV prevention methods are needed to avoid new HIV infections among these populations.

Pre-Exposure Prophylaxis (PrEP) is an essential and proven tool for HIV prevention. The U.S. Preventive Services Task Force (USPSTF) has given PrEP its strongest A recommendation, recommending that primary care providers (PCPs) offer PrEP to patients at risk of HIV acquisition (USPSTF, 2019). PrEP medications, tenofovir disoproxil fumarate and emtricitabine (generic) or Truvada® (brand name), and the newer formulation, tenofovir alafenamide and emtricitabine (generic) or Descovy® (brand name), are up to 99% effective in preventing HIV infection from sexual exposure when taken daily (CDC, 2021). Despite the estimated 1.2 million Americans eligible for PrEP, only about 220,000 Americans, or 18% of those who would have benefitted from PrEP, have received it (CDC, 2021). PrEP is a cost-effective and safe way to prevent HIV infection in high-risk individuals, but it is underutilized in primary care (CDC,

2021). According to the CDC (2021), one in three primary care doctors and nurses is unaware of PrEP.

Multiple barriers to the PrEP prescription in primary care have been identified, including a lack of product knowledge, insufficient prescribing experience, and a fluctuating desire to prescribe PrEP (Blumental et al., 2015). In the primary care context, PCPs regard PrEP knowledge and adoption as elective and discretionary, according to Calabrese et al. (2017). According to Blackstock et al. (2016), 92.5% of PCPs had heard of PrEP, but only one-third have prescribed it to their patients. Only one-third of PCPs in predominantly HIV-infected communities in the Southern U.S. region had received PrEP training, according to an online survey conducted by Henny et al. (2017). PCPs who had received PrEP training were more likely to adopt it in their practice. If PCPs' knowledge and training are limited, they are less likely to discuss and prescribe PrEP to their at-risk patients. As a result, a PCP's inclination to implement the PrEP regimen in their clinical practice is correlated with PrEP education and training (Henry et al., 2017). In addition to a lack of education, PCPs appear to have varying comfort levels when conducting sexual history among patients (Petroll et al., 2017). Prescription of PrEP requires a thorough assessment of a patient's sexual habits and risk of HIV infection. PCPs should address the sexual history of all patients as part of a comprehensive HIV prevention plan. Patients recognized as being at risk for HIV infection should be informed about PrEP, and their PCP should prescribe it if there is no contraindication (Petroll et al., 2017).

Problem Statement

The low adoption and implementation of PrEP among PCPs are multifactorial, including a lack of perceived appropriateness, limited time, lack of target incentives, and education. Since patients cannot access the PrEP regimen without a prescription, PCPs' knowledge and implementation of PrEP guidelines are vital to ending the HIV epidemic in the U.S. (CDC, 2021). Because of many reasons indicated in the literature, PCPs at Kaiser Permanente (KP) Los Angeles Medical Center (LAMC) do not prescribe PrEP to their at-risk patients. PCPs at KP LAMC describe unfamiliarity with prescribing antivirals and that PrEP does not fall within their clinical domain. KP patients who are at-risk or interested in starting PrEP are referred to infectious disease (ID) providers. PCPs should receive PrEP educational training that includes skill-building in risk assessment and sexual history. Establishing PCP competence and knowledge of PrEP's side effects, costs, behavior, health repercussions, adherence, and stigma is critical to facilitating PCP's adoption of PrEP in primary care practice (Petroll et al., 2017). Effective educational interventions to help PCPs develop the knowledge and skills to screen patients at risk for HIV and recommend and prescribe PrEP are critical and urgent to end the HIV epidemic (Petroll et al., 2017).

PICOT Question

The slow adoption of PrEP in primary care has helped formulate the following population (P), intervention (I), comparison (C), outcome (O), and time (T) (PICOT) question for the proposed Doctor of Nursing Practice (DNP) Scholarly Project: Among primary care providers, does a Pre-Exposure Prophylaxis (PrEP) educational intervention compared to no educational intervention, increase their PrEP knowledge and prescriptions in a primary care setting in three months?

CHAPTER TWO: THEORETICAL FRAMEWORK

In 1962, at the University of New Mexico, E. M. Rogers established the Diffusion of Innovation (DOI) theory. It began in communication to explain how an idea or product develops traction and spreads (or diffuses) over time within a population or social system (Rogers, 2003). Diffusion products are people who adopt a new concept, habit, or product (Rogers, 2003). Adoption denoted a change in behavior from the participant's previous behavior (Rogers, 2003). Adoption depends on the participant's perception of the concept, behavior, or product as novel or inventive. Adopting a new idea, action, or innovation is a process that does not occur independently. Some people are more prepared to adapt than others. Embracing innovation is influenced by a person's qualities and the communication channels used to convey new ideas or innovations (Rogers, 2003). According to the DOI theory, while new products, ideas, and behaviors arise, their acceptance does not happen simultaneously (LaMorte, 2019).

The innovation-decision process has five steps, and an individual must go through each step to successfully embrace an invention (Rogers, 2003). These processes involve learning about the innovation, being persuaded to decide, adopting (or rejecting) the innovation, implementing or using the invention for the first time, and confirming or continuing to use the innovation (Rogers, 2003). Furthermore, it is understood that an individual may reconsider their decision to accept an innovation (Rogers, 2003). As a result, the theory has identified five distinct categories of adopters and tactics for persuading each.

- *Innovators* – These are people who are willing to attempt new things. They are risk-takers and pioneers. To persuade them, little or no effort is required (Lamorte, 2019; Rogers, 2003). These are the researchers and scientists who invented a new biomedical intervention, such as PrEP, in the healthcare field.

- *Early Adopters* - are leaders that see the need for change and are open to experimenting with new ideas. How-to manuals and implementation instructions are two practical techniques to appeal to this demographic (LaMorte, 2019; Rogers, 2003). These are healthcare leaders who see the need to alter their approach to HIV prevention. PCPs who work directly with HIV patients - ID experts and HIV specialists – make up this group.

- *Early Majority* – They are rarely the ones in charge, but they are the first to pick up fresh ideas. Before people are willing to adopt an invention, they must see proof or evidence that it works. Success tales and credible proof of the innovation's usefulness are two strategies for converting this group (LaMorte, 2019; Rogers, 2003). Regular PCPs in academic medical facilities, teaching hospitals, and clinics can be considered.

- *Late Majority* – are skeptics of change and will only adopt an innovation if the bulk of people has already done so. To persuade them, statistics on how many individuals have tried and accepted the invention should be presented (LaMorte, 2019; Roger, 2003). Regular PCPs who work in small group practices and non-academic contexts can be part of these groups.

-*Laggards* - are change doubters, old school, tradition-bound, and staunch conservatives. They are the folks who are the most difficult to persuade. To persuade them, they must be presented with convincing statistics, a sense of urgency, and peer pressure (Rogers, 2003; LaMorte, 2019). PCPs who have been out of school for an extended period, operate in private practices, and live in remote areas may fall into this category.

The DOI hypothesis discusses how PCPs incorporate new or innovative ideas into clinical practice, such as new knowledge or treatment procedures. The approach has been utilized to successfully implement public health programs, particularly those aimed at inducing behavioral changes in social systems (LaMorte, 2019). The DOI idea can be used to spread a

new HIV prevention strategy like PrEP into primary care settings. According to this theory, the diffusion of the invention can be divided into innovation and dissemination. New ideas, techniques, goods, services, or gadgets that benefit individuals or communities are called innovation (Rogers, 2003). The innovation will be the PrEP educational intervention. Adopting new ideas and changing the attitudes and behaviors of individuals or organizations are all examples of innovation (Rogers, 2003). Transmitting a new concept or innovation over time is known as "diffusion.". These individuals can distribute this invention throughout their social groups by sharing knowledge through a particular route, resulting in a certain amount of unity. When employing the steps of the innovation-decision process, it is vital to assess PCPs' awareness of PrEP (knowledge), explore and identify their perceived and possible impediments (persuasion), and support them in implementing PrEP in their clinical practice (confirmation and implementation).

The necessity of assessing the target group and implementing proper techniques to affect this population, according to DOI, cannot be overstated. PCPs are included in the target demographic of the PrEP educational intervention. Dissemination is the deliberate act of informing potential adopters about an intervention. Diffusion among PCPs may occur because of dissemination. Diffusion enhances the possibility of an evidence-based intervention, such as PrEP, being recognized, favorably viewed, accessed, tried, and then adopted, implemented, and sustained in clinical practice (Dearing et al., 2013). According to Dearing et al. (2013), HCPs in the primary care sector must first adopt PrEP before it can be administered to and utilized by at-risk patients. Potential adopters and providers must be engaged early in the PrEP implementation process. Before and during implementation, it is critical to identify and address their possible and perceived hurdles and concerns. It's also vital to learn about the provider's PrEP knowledge,

training, and HIV prevention experience. Some PCPs are recent graduates who are up to speed on HIV prevention and Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) health issues, while others have been in practice for years and are very traditional and conservative in their approach. By examining these PCPs' qualities and past experiences and how relevant factors influence their decision-making process about PrEP adoption, it is possible to assess their acceptance rate to incorporate PrEP in their practice.

Individual decision-making is usually faster than decision-making in a group or organization (Rogers, 2003). As a result, to increase the rate of innovation acceptance, we must change the decision-making process to prioritize the views of system leaders by using their authority to influence others. Rogers believes that innovation should be disseminated in both mass and intimate formats. By building and addressing PrEP intervention components in the health system, influential clinical and practice leaders can help spread the word. Providing an educational intervention on PrEP at PCP's monthly meetings, either in person or online, can help communication. Appendix A.

CHAPTER THREE: REVIEW OF LITERATURE

Evidence Search

Multiple databases were examined to find published research focusing on PrEP prescription among healthcare professionals in the United States, including PubMed, CINAHL Plus, Web of Knowledge, and Google Scholar. The search terms used for probing data in databases were – *pre-exposure prophylaxis, PrEP, HIV prevention, primary care provider, and primary care clinic.* Research articles were searched with the application of Boolean operators "OR" and "AND" with primary terms "*pre-exposure prophylaxis," "PrEP," "HIV prevention," "primary care provider," and "primary care clinic."* The literature search in PubMed using

keywords "Pre-exposure prophylaxis in primary care" as search terms yielded 17723 related articles. Filtrated articles date with the recent five years (from 2015 till 2021) produced 9778. The use of additional keywords "prescription" and "implementation" resulted in 1872 studies. The articles' choice includes studies about PrEP implementation in primary care in the United States (U.S.). Studies done outside the U.S. and those that did not focus on PrEP adoption or prescription were excluded. All eight studies were conducted and written in English and were published in the U.S. between 2015 and 2020. Articles were extracted between October 19, 2020, to August 6, 2021. Several research articles were chosen to examine PCPs' PrEP knowledge and prescription in their clinical practice. Appendix F.

Blackstock et al. (2016) surveyed 266 PCPs to assess PrEP awareness, adoption, and factors associated with adoption. According to their study, 92.5% of participants have heard of PrEP in the past, yet just one-third of them have prescribed or referred their patients for PrEP. PCPs who adopted PrEP were more likely to prescribe PrEP in the following six months than those who did not have excellent, very good, or good self-rated knowledge of PrEP and its side effects. Adopters were also less likely than non-adopters to believe that PrEP could increase risk behaviors significantly (12.5 percent vs. 28.8%, p=0.02).

Blumenthal et al. (2015) conducted a survey to examine provider knowledge and experience with PrEP. They compared PrEP knowledge across HIV and non-HIV clinicians, the prescriptions for PrEP at a current rate, opinions regarding future PrEP use, barriers, and motivators to PrEP adoption. The participants were ID experts, HIV specialists, community health clinics, sexually transmitted disease (STD) clinic providers, and family planning clinic providers. Before the survey, 85% of the participants were aware of PrEP. HIV providers have higher mean PrEP knowledge scores (2.8 vs. 2.2., p=0.001). While their research helped learn

about provider attitudes and acceptability of PrEP as an HIV prevention strategy, the study populations were comprised of healthcare providers (HCPs) who were either familiar with PrEP or involved in HIV prevention. Concerns about the use of PrEP included the possibility of medication resistance if HIV infection develops, expense, side effects, a lack of understanding about PrEP efficacy, and the possibility of risk compensation or an increase in risk-related behaviors when PrEP reduces HIV risk perception among those who take it. They also noted that a lack of knowledge about PrEP, limited experience prescribing it, and PCPs' varying willingness to prescribe it are barriers to PrEP prescription in primary care.

Carter et al. (2019) used an online survey that examined the knowledge, attitudes, prescribing behaviors, and comfort level with PrEP among 81 HCPs in the Philadelphia Department of Public Health. 75% (*n*=61) reported they felt confident prescribing PrEP, and 77% (*n*=62) said they had ever done so. HIV care providers were significantly more informed about the laboratory tests required for prescribing PrEP than PCPs, and they were far more likely to have prescribed PrEP to more than ten patients. HCPs in women's health and pediatrics reported they were hesitant to prescribe PrEP to their patients.

Using a web-based survey, Hakre et al. (2016) investigated the knowledge, attitudes, and beliefs about PrEP among the 403 active-duty PCPs and ID providers in the United States Air Force (USAF). Their findings revealed that HCPs had a poor understanding of PrEP (total 59%: ID 5%, non-ID 62%) and had never prescribed PrEP or Post-Exposure Prophylaxis (PEP) (overall 72%, ID 0%, non-ID 76%). Overall, 26% of participants reported that they had prescribed antiretroviral therapy to prevent HIV infection. Only 9% of providers (75% ID, 5% non-ID) said they had ever prescribed PrEP. Only 35% (95% ID, 34% non-ID) reported a patient had ever inquired about PrEP. Ninety four percent of providers (100% ID, 93% non-ID) were

comfortable about sexual history taking. HCPs who have ever prescribed PrEP were more likely to have a high level of PrEP knowledge.

Henny et al. (2017) conducted an online survey to examine HIV providers' knowledge, behaviors, attitudes, and practices (K-BAP) in high HIV incidence areas of the Southeast US, including Atlanta, Georgia; Baltimore, Maryland; Baton Rouge, Louisiana; Miami, Florida and the District of Columbia. According to the study, only one-third of PCPs (36.3%) self-reported HIV-related training. They also discovered that PCPs who had received PrEP training were more likely to adopt PrEP in their practice. PCPs who had HIV-related training were more likely to practice in Miami (PR = 1.85, 95% CI 1.52, 2.25) than in Atlanta. PCPs with HIV-related training were more likely to recommend PrEP to their patients.

A semi-structured qualitative interview with PCPs in Boston, Massachusetts, was conducted by Krakower et al. (2017). Thirty-one PCPs from a community health clinic specializing in LGBTQ patients (LGBTQ specialist, n=12) and an academic medical center (generalist, n=19) took part in the study. They investigated how PCPs make PrEP prescription decisions for MSM and their own experience with PrEP. Generalists have less experience prescribing PrEP than LGBTQ specialists, according to their findings. PrEP has been prescribed by 10 of 12 LGBTQ specialists versus two of 19 generalists. Their interview showed that the approach regarding the prescription of PrEP is a collaborative decision-making process with patients. Compared to LGBTQ specialists, they also discovered that generalists have limited knowledge of PrEP and are less discuss and prescribe PrEP to their patients.

Moore et al. (2020) used an electronic survey to examine Tennessee PCPs' PrEP knowledge, attitudes, and prescribing practices. There were 99 responses to the study. Their findings showed that 43% of participants had prescribed PrEP in the previous 12 months.

Prescribers were more likely than non-prescribers to be trained in internal medicine (IM) or ID (56% versus 25%, p =0.01). Most responders (65%) felt compelled to prescribe PrEP and thought all PCPs should (63%). Prescribers showed higher median PrEP knowledge ratings (7.3 vs. 5.6, p =.01), a more significant proportion of patient PrEP inquiries that are self-reported (95% vs. 21%, p =.01), and a larger proportion of self-reported good or exceptional at conducting sexual history (83% vs. 58%, p =.01) and taking a sexual history with ease (92% vs. 63%, p =.01) than non-prescribers. The most significant impediments to PrEP prescription, according to both prescribers and non-prescribers, are the expense of PrEP (26% and 51%, respectively) and the necessity for administrative support (26% and 49%, respectively).

Pleuhs et al. (2020) did a systematic review to identify barriers to PrEP adoption in the practices of HCPs. Based on the analyzed studies, there are six key concerns: 1) a lack of understanding of PrEP, 2) a debate between HIV clinicians and non-HIV providers about who should prescribe PrEP, 3) financial concerns, 4) concerns about behavior and health repercussions, 5) interpersonal stigma, and 6) issues with patient adherence to PrEP

Synthesis of Literature Review

The selected eight studies used different study designs and methodologies. Six of these studies conducted online surveys for observational research (Blacktock et al., 2016; Blumenthal et al., 2015; Carter et al., 2019; Hakre et al., 2016; Henny et al., 2017; Moore et al., 2020), and one conducted a semi-structured qualitative interview (Krakower et al., 2017), and one did a systematic review (Pleuhs et al., 2020). Prescribing clinicians such as physicians, physician assistants (PAs), and nurse practitioners (NPs) who work either at general primary care or LGBTQ clinics were included in all studies. The investigations were conducted in various settings in the United States, ranging from single to multi-center locations. Most of the studies

were carried out in large metropolitan regions such as New York, San Diego, Los Angeles, Philadelphia, Boston, Atlanta, Baltimore, Baton Rouge, Miami, and the District of Columbia; the findings may not be applicable outside of these locations. Even though these studies were conducted in large cities, the gap in PrEP prescriptions between PCPs and HIV providers has significant implications for nationwide PrEP adoption. Understanding how to convince PCPs to adopt and use PrEP in their clinical practices could lead to more equitable PrEP access, especially in rural areas where HIV providers are few.

The survey and interview data were self-reported, which is vulnerable to bias like any self-reported metrics. Current literature suggests that most PCPs had heard about PrEP in the past. Still, most do not prescribe it due to a multitude of factors, one of which is a lack of in-depth knowledge of PrEP, which implies that better understanding is linked to a higher willingness to prescribe PrEP (Blumental et al., 2015; Hakre et al., 2016, Moore et al., 2020; Pleuhs et al., 2020). Compared to HIV providers, PCPs have less experience prescribing PrEP (Krawkower et al., 2017; Moore et al., 2020). Providers who prescribe PrEP are also familiar with the laboratory tests required for PrEP (Carter et al., 2019). PCPs who had received HIV-related training were more likely to discuss and prescribe PrEP to their patients than those who did not benefit from the training (Henny et al., 2019; Moore et al., 2020). Overall, most of these studies found that clinicians are comfortable gathering sexual histories and willing to prescribe PrEP to their patients if they have undergone HIV-related training. Concerns regarding increased risk behavior, cost, safety, drug toxicities, patient adherence challenges, interpersonal stigma, and administrative assistance, in addition to a lack of awareness, were identified as important hurdles to PrEP prescription (Blackstock et al.; 2016, Moore et al., 2020; Pleuhs et al., 2020).

Roles of DNP Leadership, Interdisciplinary Practice, and Ethical Implications

Identifying leadership practices is essential to ensure the success of the project. Brene Brown (2018) has described four skillsets for courageous leadership: rumbling with vulnerability, living your principles, braving the trust, and learning to rise. One of the leadership strategies that was utilized in the project's implementation is embracing vulnerability. Assessing patients at risk for HIV acquisition necessitates being vulnerable and open to challenging conversations, such as performing a comprehensive sexual history and risk assessment among patients. Patients often are uncomfortable disclosing their deepest secrets and sensitive details with their PCPs, such as sexual activities and practices. It is not always easy for patients and PCPs to have open and honest discussions about sexual behaviors and practices.

Stigma among patients and providers is a barrier to PrEP adoption. Patients who use PrEP are characterized as promiscuous and stigmatized (Dubov et al., 2018). Social stigma also occurs, and it is a severe impediment to PrEP use among individuals who might benefit significantly from it. PrEP users are further stigmatized because taking PrEP allows for the same socially undesirable pattern of activity that would generally result in HIV acquisition while also preventing PrEP takers from infection. PrEP-related stigma at the provider level may exacerbate these societal stigmas experienced by PrEP users. Some PCPs believe PrEP users desire to participate in a risky activity that puts them at risk for HIV; nevertheless, PrEP eliminates that risk (Dubov et al., 2018). According to Blackstock et al. (2017), PCPs' concerns about PrEP users engaging in more risky sexual behavior as their HIV susceptibility is lowered, a phenomenon known as risk compensation, may cause PCPs to be hesitant to prescribe PrEP to their at-risk patients. Having an open mind, supporting a patient's sexual behaviors, and encouraging patients to take charge of their sexual health may improve health outcomes. PCPs

who listen to their patients and understand their motives for taking PrEP will be better able to harness those motivations to improve PrEP care and delivery.

PrEP implementation in primary care is a team effort that necessitates a transformational and daring leader. A transformational leader, according to Bernard Bass, the father of transformational leadership, encourages, inspires, and motivates his peers to innovate and create change. In addition, the transformational leader fosters a culture that encourages team members to shift their focus from self-interest to the greater good (Bass, 1999). This change can pertain to the adoption and implementation of PrEP in primary care for at-risk patients' common good. The relevance of interprofessional collaboration in improving patient and population health outcomes is highlighted in Essential VI of the Doctor of Nursing Practice (Chism, 2019).

Interprofessional collaboration was required for the project's successful implementation and adoption. Authenticity, cooperation, and open communication among team members are crucial to the transformative leader (Bass, 1999). IPC among PCPs (physicians, PAs, NPs), HIV specialists, nurses, pharmacists, social workers, and laboratory personnel is required to adopt PrEP in primary care. The administrator must be on board with the initiative and support it. PCPs should be open to adapting and incorporating PrEP into their clinical practices. The interdisciplinary team members must have a strong IPC relationship to implement the project properly. DNP-prepared NPs and leaders must be innovative and creative to end the HIV epidemic. A true leader's vision and political will must address the social inequities and challenges to PrEP access. In a physician-driven and led health care system, courage will be required to execute a PrEP educational intervention among PCPs.

CHAPTER FOUR: METHODS

Sample and Setting

Internal medicine (IM) and family medicine (FM) PCPs at KP LAMC and other KP Southern California locations such as Downtown Los Angeles, East Los Angeles, Glendale, North Hollywood, Pasadena, and Romaine medical offices were recruited and sent an email notification regarding the planned PrEP educational intervention (PrEP-EI) one to two months before implementing the project. The advertisement of the proposed PrEP-EI was shared via email with the approval of the Southern California Permanente Medical Group (SCPMG) Department of Physician Education. Another reminder was sent two weeks before the actual implementation dates. A final reminder was sent to those who signed up for the educational program three days before implementation.

Inclusion/Exclusion Criteria

All PCPs in IM and FM who were full-time or part-time were eligible and invited to attend the PrEP-EI. ID and other healthcare providers who work in an HIV clinic and prescribe PrEP were excluded from the invitation as these providers have had HIV-related training.

Project Considerations

Participation in the PrEP-EI was voluntary. As a quality improvement (QI) project, there was no risk of harm to the participants in the PrEP-EI. No actual patients or patient information were involved in the PrEP-EI. An approval from the Institutional Review Board of KP LAMC was not needed. All demographic data and pre-and post-test responses were securely collected and kept confidential.

Project Design

The PrEP-EI was a virtual QI project aimed at increasing PCPs' knowledge of prescribing PrEP. The project relied on a pre-and post-test design. A quasi-experiment was conducted using five PrEP knowledge-based pre-and post-test questions that assess the participant's knowledge level of PrEP. All participants who attended the PrEP-EI were included and were non-randomized.

Educational Intervention

After the pre-test and demographic data were collected, the PrEP-EI was subsequently provided. The PrEP-EI was a one-hour continuing medical education (CME) conducted virtually via Microsoft® Teams. It was conducted in two sessions on two different dates due to the different monthly lunch meeting schedules of IM and FM. The first session was held on Thursday, February 24, 2022, from 12:30 to 01:30 PM. Twenty-seven attending IM physicians at KP LAMC responded to the invitation to join the PrEP-EI's first session. The second session was conducted on Tuesday, March 22, 2022, from 01:00 to 02:00 PM and was attended by eight FM residents. The PrEP-EI lasted for 60 minutes, with 40 minutes allotted for the PrEP educational presentation, 10 minutes for case studies, questions, and answers, and 10 minutes for teaching PCPs on PrEP billing and coding. There were five educational objectives: (1) identify the patients/populations at risk for HIV acquisition; (2) recite the evidence of the need for PrEP services; (3) identify the components of PrEP education; (4) identify the recommended PrEP regimen including dosing, safety, and clinical eligibility; and (5) identify and implement PrEP clinical guidelines in practice. The PrEP-EI was recorded for those PCPs who were not present during the educational lunch CME. The SCPMG Department of Physician Education awarded participants a one-unit CME upon completing the pre- and post-test evaluations. Participants

were also provided with a link to a PrEP quick clinical guide handout created by the student that can be saved or printed for use in their clinical practice.

Data Collection

Participants were given a link to voluntary answer pre-test and demographic questions before the start of the PrEP-EI. Five PrEP knowledge-based questions were generated from the 2021 CDC's PrEP clinical guideline and were used pre-and post-tests (Appendix C and D). Other data collected from participants included their demographics such as age, gender, ethnicity, type of provider (physician, physician assistant [PA], nurse practitioner [NP]), specialty (IM, FM), and the number of years in practice (Appendix B). The knowledge-based questions were multiple choice and were designed to test the basic PrEP clinical knowledge standardized through CDC's PrEP website. Knowledge related to these questions was discussed and reinforced in the PrEP-EI. After the PrEP-EI, participants were provided a link to the post-test. The pre-test, demographic questions, and post-test were implemented using Microsoft® Forms. This software tool enabled the data to be collected rapidly and securely.

Data Analysis

The collected data was downloaded and stored in Microsoft® Excel spreadsheets. The information was grouped using relevant data codes, and the total scores for each construct were calculated using Excel's mathematical formulas. After organizing all valid data, the Excel spreadsheet's working datasheet was exported to IBM® Statistical Package for the Social Sciences (SPSS). The data was analyzed using SPSS version 27 to obtain descriptive statistics such as means, percentages, and standard deviations. A paired sample *t*-Test was used to assess changes in PrEP knowledge before and after the PrEP-EI. A *p*-value of <0.05 was used to determine the significance of the difference in the pre-and post-test evaluation of PrEP

knowledge among PCPs. This would indicate increased PrEP knowledge among PCPs before and after the PrEP-EI. The primary research question analyzed in this project was whether a PrEP-EI will increase PrEP knowledge among PCPs. The null hypothesis was that the PrEP-EI has no impact on PCP's PrEP knowledge scores. Rejecting the null hypothesis would imply an increase in PrEP knowledge scores among PCPs after the PrEP-EI.

CHAPTER FIVE: RESULTS

Participant Demographics

A total of 35 participants attended the PrEP-EI and completed the pre-and post-tests. Participants' age ranged from 28 to over 65 years, with a mean age of 40 years (Figure 1), 51% were male, and 49% were female (Figure 2). Fifty-one percent were Asian, 29% were white, 11 % were Hispanic, 3% were African American, and 6% were of mixed ethnicity (Figure 3). All participants were physicians (Medical Doctor and Doctor of Osteopathic Medicine). None of the participants were PAs or NPs. When asked to identify their primary area of medicine, 77% chose IM, and 23% were FM (Figure 4). Twenty-seven participants were attending IM physicians, and eight were FM medical residents in training. When asked about their years in the practice, 40% of participants had been in practice for less than five years, 31% had been in practice between six to 15 years, and 29% had been in practice for over 15 years (Figure 5).

Figure 1: *Age of Participants*

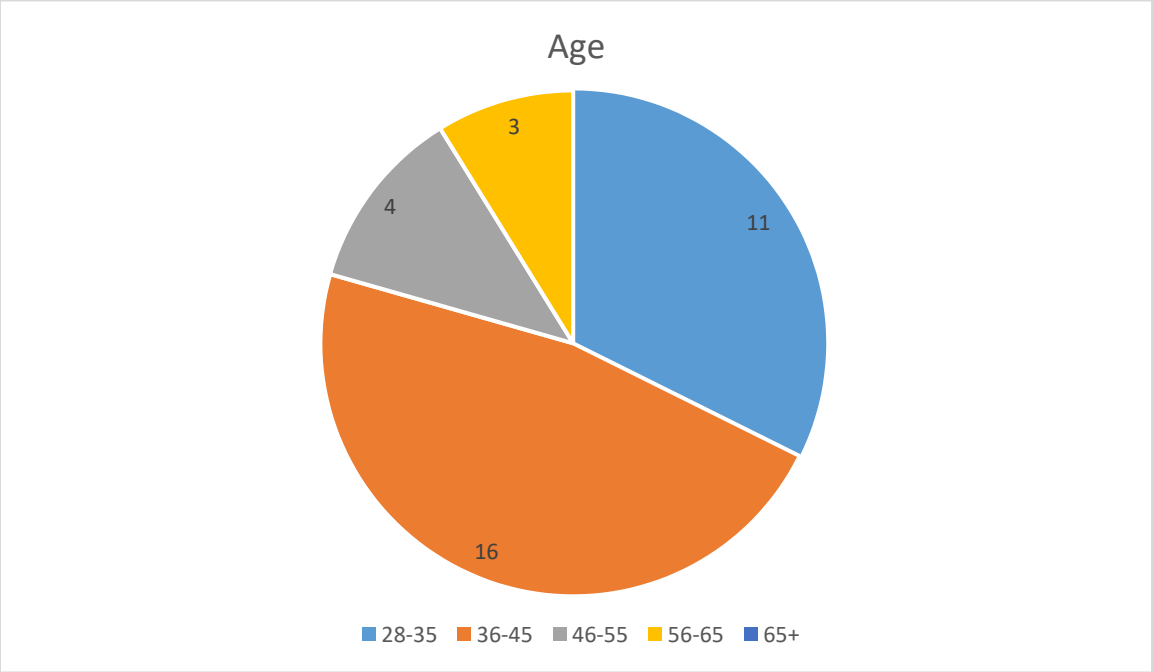


Figure 2: *Gender of Participants*

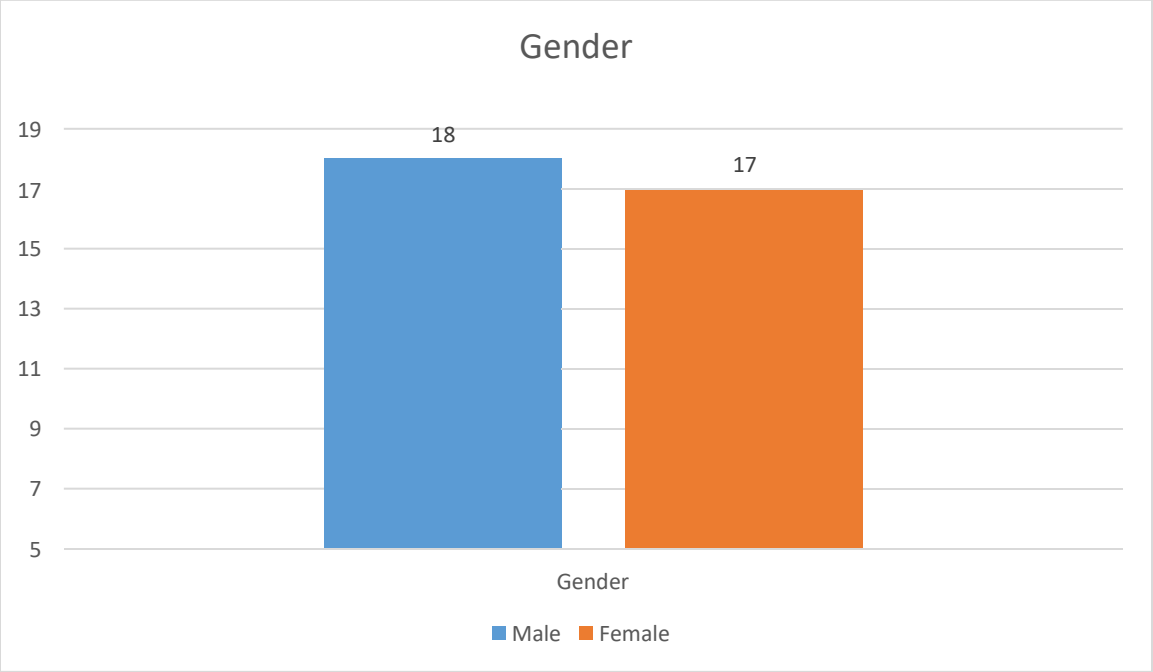


Figure 3: *Ethnicity of Participants*

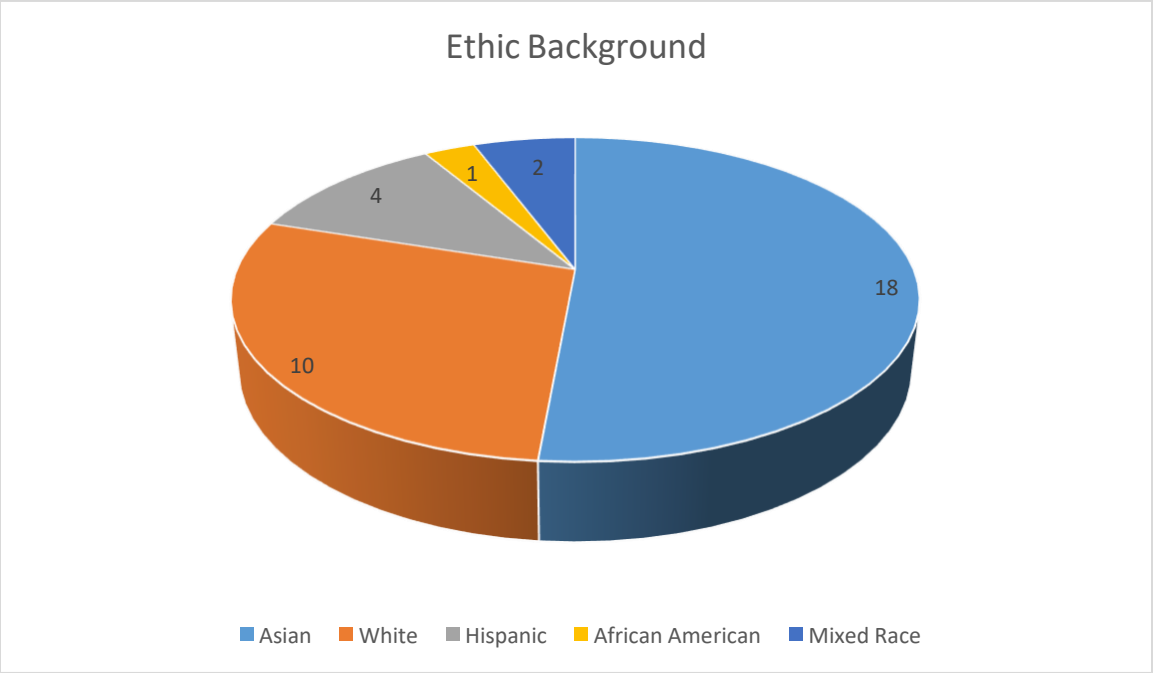


Figure 4: *Specialty of Participants*

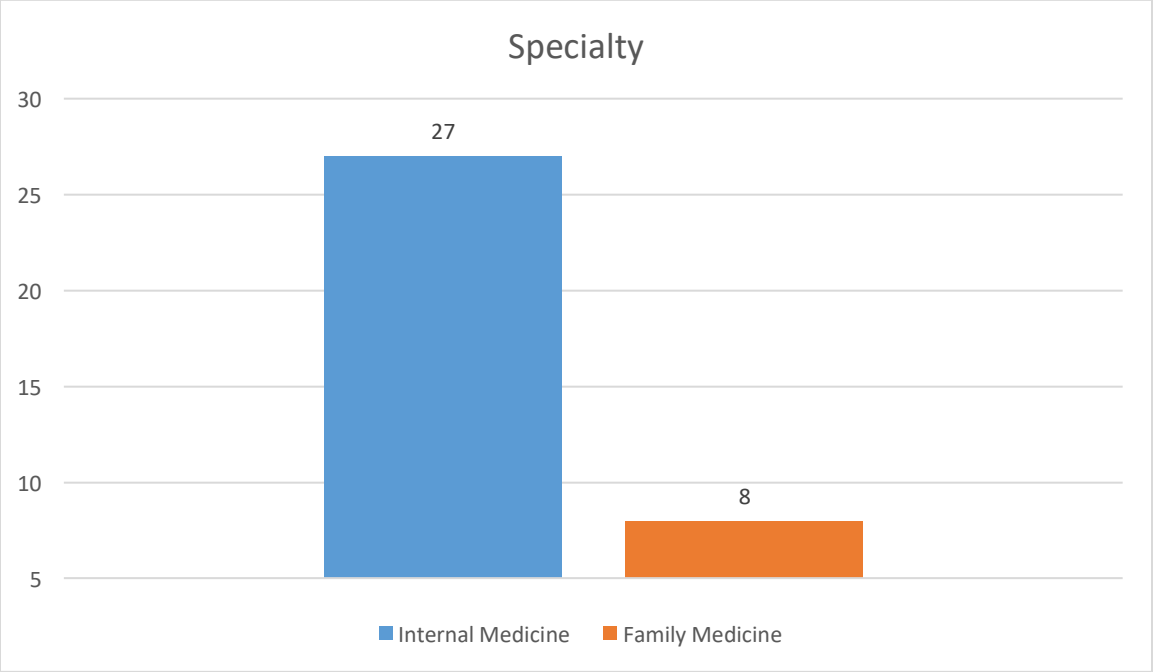
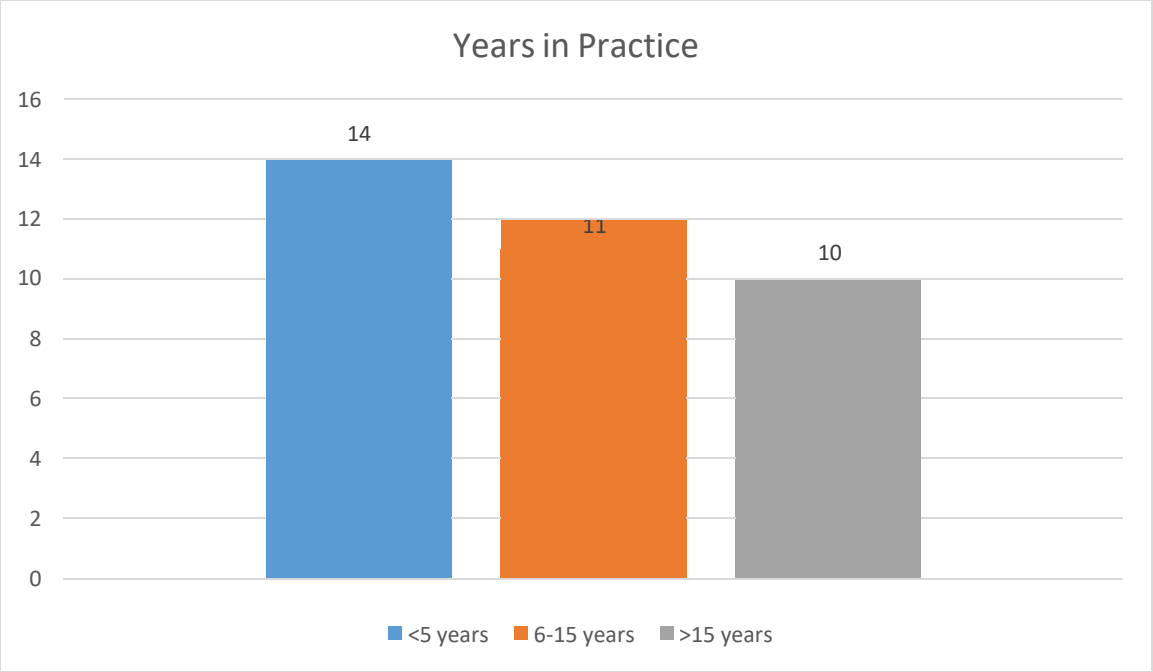


Figure 5: ***Years in Practice***



PrEP Knowledge

The pre-and post-tests were corrected and scored with one correct corresponding to one point, then divided by five (total number of questions) and multiplied by 100. The percentage of correct answers was documented (Table 1). Participants' computed mean pre-test score was 60%, and the mean post-test score was 90.86% (Figure 6). One-sided paired *t*-Tests were used in comparing the pre-and post-test evaluation of PrEP knowledge among participants. The analyses resulted in a significant difference (t (34) = 4.487, p <0.001 between the pre-test scores (M= 3.0, SD = 1.66) and post-test scores (M = 4.54, SD = 2.034), indicating an increase in PrEP knowledge among PCP participants (Table 2). The null hypothesis was that PrEP-EI has no impact on PCP's PrEP knowledge scores. The analysis shows sufficient evidence to claim that the pre-and post-test results were not equal, therefore rejecting the null hypothesis.

Table 1: *Pre-test and post-test scores*

Participant	Pre-test (%)	Post-test (%)
1	100	80
2	80	100
3	100	100
4	80	80
5	80	80
6	100	80
7	80	80
8	100	60
9	40	100
10	100	100
11	40	100
12	80	80
13	0	100
14	0	100
15	20	100
16	0	100
17	40	80
18	60	100
19	40	100
20	80	80
21	40	80
22	40	100
23	20	100
24	40	100
25	40	100
26	20	100
27	40	80
28	100	100
29	100	60
30	80	80
31	100	100
32	40	100
33	80	100
34	40	100
35	100	80

Figure 6: *Mean Scores for PrEP Knowledge Level*

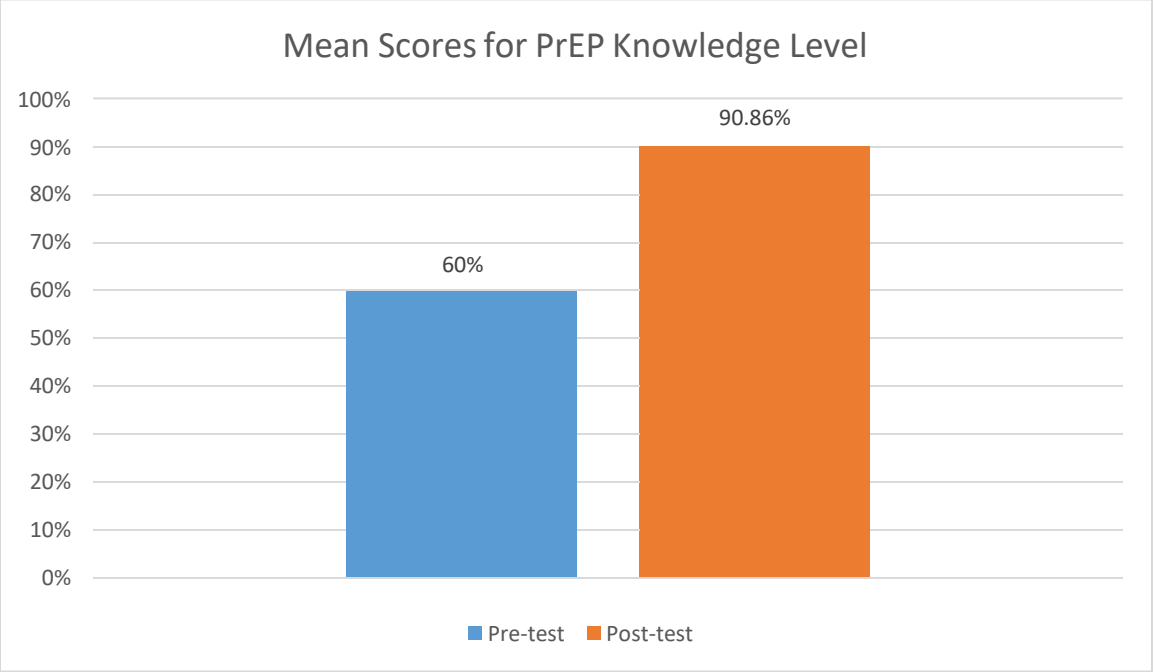


Table 2: *Paired t-Tests for Pre-and Post-tests Results*

Pre-test			Post-test						95% CI	
M	SD	N	M	SD	N	*t*	df	*p*	Lower	Upper
3.0000	1.66274	35	4.5429	2.03416	35	4.487	34	<.001	2.24162	0.84410

Baseline and Future PrEP Prescription

The number of PrEP medications (Truvada® and Descovy® and the generic version of Truvada®- emtricitabine and tenofovir disoproxil fumarate) prescription at the pharmacy was documented at baseline before PrEP-EI. Based on the quarterly HIV dashboard of the KP Southern California region, from 2021 4th quarter data, the total number of PrEP patients was 1065, based on the prescription data of PrEP from KP LAMC pharmacies. Most of these PrEP prescriptions were prescribed by ID and HIV clinic providers, not PCPs. The PrEP prescription from the ID or HIV clinic providers will be excluded from future analysis. It will be reevaluated to check if there's an increase in PrEP prescriptions from PCPs once an updated report for the 2022 1st quarter is provided during the next KP Regional HIV Committee meeting scheduled this coming summer.

CHAPTER SIX: DISCUSSION

Multiple research studies revealed deficits in knowledge and comfort in prescribing PrEP among PCPs. Prior studies have looked into various educational efforts that promote PrEP adoption among PCPS without experience in HIV. This DNP project sought to provide PCPs with a better understanding of PrEP so that they can prescribe it to at-risk patients in their clinical practice. Although the pre-and post-test questions used in the survey were different, the quality and level of difficulty and the context of both tests were the same. Both tests measured PCPs' PrEP knowledge level based on the recent CDC's PrEP clinical practice guideline. The PrEP-EI was successful in increasing their knowledge and understanding of PrEP

The survey results gave demographic information about PCPs as well as helpful baseline scores. The average age of PCPs was 40 years, and most of them have been in practice for five years or less. While many PCPs have heard about PrEP when asked verbally before the PrEP-EI,

most PCPs do not prescribe it to their patients and refer their at-risk patients to ID providers. PrEP was approved by the FDA in 2012 and has been around for HIV prevention for a decade, but these younger PCPs lacked knowledge about PrEP's prescribing practices.

In the post-test that immediately followed the PrEP-EI, PCPs displayed increased knowledge scores from the baseline. Increased correct knowledge of PrEP was linked to a higher likelihood of prescribing it (Blumenthal et al., 2015). The PCPs' knowledge score was impressive, even though the virtual PrEP-EI was just an hour-long CME. The PrEP-EI evidence-based presentation with case studies, question and answer, and time for PrEP billing and coding training may have had a role in generating positive knowledge gain results.

Clinical Implications

The PrEP-EI findings supported the value of increasing PCPs' knowledge through virtual CME training. Based on the most recent CDC's PrEP clinical practice guideline (CDC: U.S. Public Health Service, 2021), the PrEP-EI had a significant influence on the PCPs and the health system, and the population it serves. Establishing PCPs' competence and knowledge of PrEP's safety, side effects, laboratory tests, costs, health repercussions, and adherence are critical to facilitating PCPs' adoption of PrEP in primary care practice. PCPs' thorough understanding of PrEP is imperative to providing high-quality care for patients that may be at risk for HIV. PCPs increased ability to prescribe PrEP to their patients' benefits all populations, especially those at risk of HIV infection. Providing PCPs with the information they need to feel confident about prescribing PrEP should result in better patient outcomes and lower HIV infection rates.

Educational Implications

PCPs are lifelong learners who will seek out ongoing training and education throughout their careers. As a result of the COVID-19 epidemic, virtual education has become widely

available and accepted for meeting the professional needs and development of PCPs. Quality virtual educational training that is engaging and interactive will be more effective in attracting learners and promoting a pleasant learning experience. The PrEP-EI interactive design with case scenarios, questions, and answers positively impacted PCPs. The PrEP-EI serves as a small step in the process of widespread implementation of PrEP in primary care. More comprehensive education and training are required to gain momentum, including training those with HIV care experience to become PrEP "clinical champions." Including the PrEP-EI in the medical, nursing, pharmacy, and other healthcare professions curricula would help students better understand the importance of HIV prevention. Having such education and training before joining the healthcare workforce could prepare providers to adopt the CDC's guidelines on PrEP implementation. Overall, the PrEP-EI provided a cost-free yet robust method to educate PCPs about PrEP.

Implications for Healthcare Leadership

Healthcare executives and clinical leaders must examine evidence-based practice regularly and communicate research findings that support new practice guidelines. The educational team should provide training sessions and resources for any more recent guideline changes. The role of PrEP management in primary care should be legitimized through clinical expectations and workflow development. Setting the expectation that PrEP should be a standard element of preventative care should lead to more frequent discussions about PrEP, more effective PrEP use, and more equitable PrEP access, all of which could help lower HIV incidence (Calabrese et al., 2017). PrEP implementation in primary care is a team effort that necessitates interprofessional collaboration and support of the healthcare administration. The healthcare system administration must be on board with the initiative and support it. PrEP will be sustainable in the healthcare system when supported by the leadership, when PrEP becomes seen

by PCPs as feasible with good clinical outcomes and when patients come to expect and demand PrEP from the PCPs.

Implications for Safety and Quality

Recent healthcare trends emphasize providing safe patient care that results in verifiable improvements in patient outcomes. Educational training that can improve PCPs' ability to provide safer patient care should be given recognition. Following the PrEP-EI, PCPs' PrEP knowledge scores improved, suggesting that PCPs may be able to impact better outcomes for patients at risk for HIV. As PCPs' ability to identify patients who are candidates for PrEP improves, PCPs will be knowledgeable about how to safely prophylactically treat patients to prevent them from being infected with HIV. Patients recognized as at-risk and fit the PrEP criteria will receive safe, high-quality care. The measurable outcome for healthcare organization will support the national strategy to reduce new HIV infections by 75% in 2025 and by 90% by 2030 (HIV.gov, 2021).

Limitations

Despite PrEP-EI's effectiveness in improving the PCP's knowledge level on PrEP, it has several limitations. Although the PrEP-EI was advertised ahead of time and other KP Southern California region PCPs were invited to join, only 35 PCPs participated in the training. It only included a convenience sample of a single group of participants, all physicians from the same location, no comparator or controlled group, and participants were not randomized. Although the initial results are promising, a larger sample size is needed to ensure the effectiveness of the PrEP-EI. The project's scope was to conduct a post-assessment immediately after the PrEP-EI; future interventions should focus on long-term follow-up and effects of PrEP-EI on PCPs' PrEP knowledge and their implementation of PrEP in clinical practice. The PrEP-EI was designed to

meet the educational needs not only of physicians but also other healthcare providers such as PAs, NPs, nurses, and pharmacists. These healthcare providers are highly encouraged to attend future PrEP-EI sessions. Another constraint is the project's generalizability, as it was implemented only in one primary care setting in Los Angeles. The hope is that other PCPs from other Southern California KP locations will be able to join in the future PrEP-EI sessions. Additionally, retrospective analysis and evaluation of actual PrEP medication prescriptions from PCPS were not completed because the pharmacy will not release the quarterly HIV dashboard report until this summer. The retroactive analysis of PrEP prescriptions would provide more insight into the PrEP-EI impact of PrEP uptake among PCPs.

Sustainability

The two sessions of PrEP-EI were recorded and available from the Department of Physician Education at the organization. It should be available to PCPs who could not attend either of the sessions. It should also be available for any healthcare providers interested in learning about PrEP. It should be disseminated and offered to incoming nursing and medical students and residents, and attending physicians new to the organization. Future virtual or in-person PrEP-EI should be replicated and should include participants from other regions of California or the nation, as these PCPs may also benefit from PrEP-EI, especially in remote areas with limited access to ID experts or HIV clinics.

CONCLUSION

Despite the proven safety and efficacy of PrEP in preventing HIV infection, the uptake of PrEP in primary care remains low. PCPs remain hesitant to adopt and implement PrEP in their clinical practice. It was clear from the literature that PCP’s uptake of PrEP requires more than just medication awareness. Several researchers have investigated the challenges of implementing

PrEP in primary care, and the issue of low PrEP uptake is complex and multifaceted (Blackstock et al., 2016; Petrol et al., 2016). Lack of experience prescribing PrEP, concern regarding PrEP's safety, the disagreement over whether it should be provided by primary care or ID, the practicalities of implementation, and ingrained cognitive biases are among the challenges cited (Blackstock et al., 2016; Calabrese et al., 2017; Krakower et al., 2014).

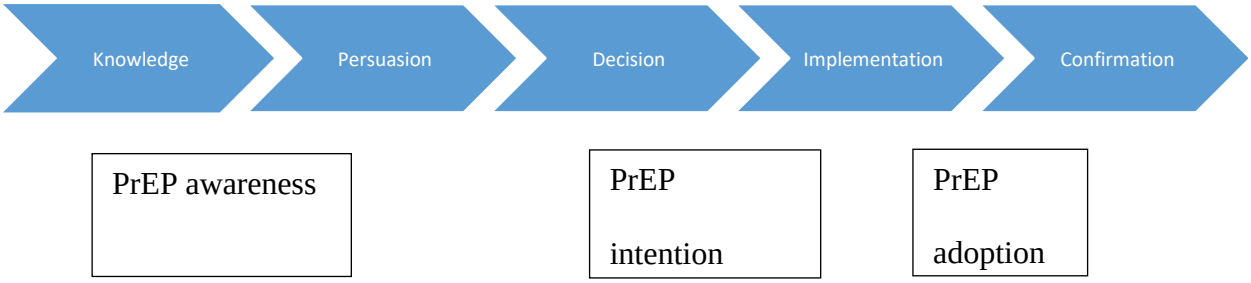
The PrEP-EI was designed to increase knowledge of PrEP among PCPs. This QI project successfully demonstrated improved post-test scores among PCPs, indicating improved PrEP knowledge. PCPs are more likely to adopt and implement PrEP in their clinical practice when trained with the necessary knowledge and skills. All PCPs should receive training to equip them with an in-depth understanding of PrEP to prescribe it to their at-risk patients rather than referring them to ID providers. PCPs who prescribe PrEP will help optimize HIV prevention efforts by reaching out to more at-risk patients. If patients can readily get PrEP from their PCPs, they will be more likely to stay HIV negative and healthy, resulting in a better quality of life.

APPENDICES

Appendix A. Diffusion of Innovation Theory

Diffusion of Innovations Theory

Diffusion: a process in which an innovation is communicated through certain channels over time among members of a social system



What individual-level factors facilitate progression across stages?

Appendix B. Demographics Data

1. What is your age?
    a) 23-55
    b) 36-45
    c) 46-55
    d) 56-65
    e) 65+
2. Gender
    a) Male
    b) Female
    c) Non-binary
    d) I prefer not to say
3. Ethnic Background
    a) White
    b) African American
    c) Hispanic
    d) Asian
    e) Mixed/Others
4. Specialty
    a) Internal Medicine
    b) Family Medicine
5. Years in Practice

a) <5 years

b) 6-5 years

c) >15 years

Appendix C. Pre-test Questions

1. Pre-Exposure Prophylaxis medication, if taken daily, could reduce HIV infection through sexual exposure by up to:

a) 40%

b) 60%

c) 35%

d) **99%***

2. A 33-year-old cisgender male presented to the clinic to discuss PrEP. He engages in both insertive and receptive anal sex. If he starts today, how long will it take before he becomes fully protected anally?

a) **7 days***

b) 14 days

c) 21 days

d) 28 days

3. A 21-year-old man who has sex with a man would like to start taking PrEP. Which test screening test should be included?

a) chlamydia, gonorrhea and trichomonas

b) chlamydia and gonorrhea

c) **chlamydia, gonorrhea and syphilis***

d) chlamydia, gonorrhea, syphilis, and trichomonas

4. A 25-cisgender female sex worker presents to the clinic and is interested in starting on PrEP. Which medication is appropriate for her?

a) BIC + TAF/FTC (Biktarvy)

b) **TDF/FTC (Truvada)***

c) TAF/FTC (Descovy)

d) RAL (Raltegravir) + Truvada (TDF/FTC)

5. How frequently should PrEP patients be followed for medication adherence, side effects, and laboratory tests?

a) Every 6 months

b) Yearly

c) **Every 3 months***

d) Every month

***Correct answer to the question**

Appendix D. Post-test Questions

1. Which statement is true about PrEP and hormone replacement therapy?
    a) PrEP lower the concentration of estrogen in the body, her estradiol dosing may need to be increased
    b) Estradiol lowers the concentration of TDF/FTC, the dose of PrEP (TDF/FTC) should be doubled
    c) **There is no known drug interaction between TDF/FTC and cross-sex hormonal treatment**
    d) Intake of PrEP along with hormone therapy is contraindicated

2. Why is it so important to do baseline testing for HBV infection for a patient starting on PrEP medications TDF/FTC or TAF/FTC?
    a) Tenofovir can cause hepatoxicity
    b) Emtricitabine has significant hepatotoxicity
    c) HBV drug resistance is likely to occur with the use of PrEP medications
    d) **HBV patients may develop hepatitis flare after stopping these medications**

3. Which of the following is a contraindication for starting PrEP with TDF/FTC?
    a) History of methamphetamine use in the past 12 months
    b) Concurrent intake of proton pump inhibitor
    c) Chronic HCV infection
    d) **eGFR of less than 60 ml/min**

4. A 21-year-old man who has sex with men has recently started PrEP and asks how often he will come back to the laboratory for HIV testing.

a) Every 4 weeks

b) Every 6 weeks

c) Every 6 months

d) **Every 12 weeks**

A) A 45-year-old transgender female has been on PrEP for 3 years but has not been sexually active for the past 6 months due to the COVID-19 pandemic. She would like to stop the intake of PrEP. How long does a patient have to wait become she can stop PrEP?

a) 1 day after the last sexual encounter

b) 1 week after the last sexual encounter

c) 2-3 weeks after the last sexual encounter

d) 4 weeks after the last sexual encounter

***Correct answer to the question**

Appendix E. PrEP Educational Intervention Timeline

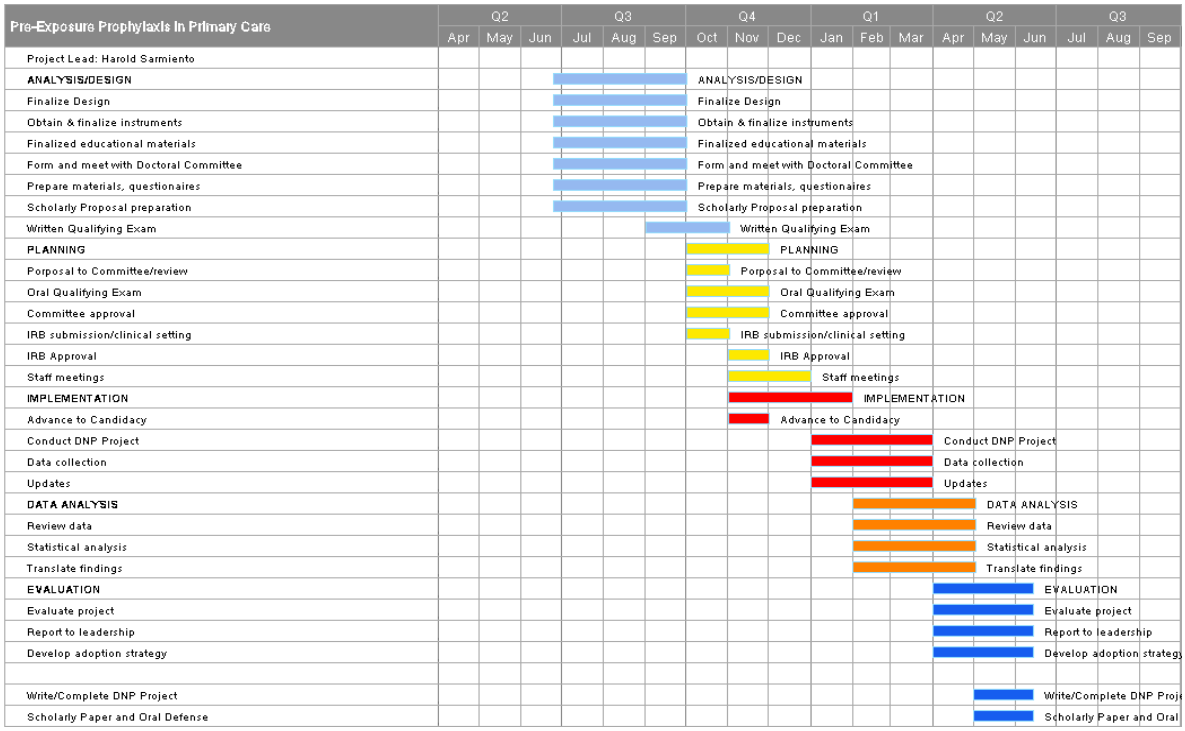


TABLE OF EVIDENCE

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**
Blackstock, O., Moore, B., Berkenblit, G., Calabrese, S., Cunningham, C., Fiellin, D., Patel, V., Phillips, K., Tetrault, J., Shah, M., & Edelman, E. (2016). A cross-sectional online survey of HIV pre-exposure prophylaxis adoption among primary care physicians. *Journal of General Internal Medicine, 32(*1), 62-70. http://dx.doi.org /10.1007/s11606-016-3903-z	To determine whether primary care physicians are aware of and adopt PrEP and the factors that influence their adoption.	266 PCP members of the Society of General Internal Medicine took part in the study.	PCP completed PrEP Survey. Provider sociodemographic, clinical, functional features, self-rated knowledge, attitudes, and beliefs about PrEP and its implementation were all included in a 57-item survey conducted in English. Measures - O*utcome of Interest.* If they have prescribed or referred a patient for PrEP, the participants were asked. - *Independent Variables* -Characteristics of providers and	-266 completed surveys out of 2093 SGIM members who were invited to participate, yielding an 8.6% response rate -146 (92.5%) of the 266 participants had heard of PrEP before. 34.9 percent of those surveyed said they use PrEP in their practice -Participant characteristics - mean age was 40.9 (SD 9.6) -73% white -62% female -91% heterosexual -79% attending physician -41% of time in direct patient care Clinic location -50% Northeast -85% urban areas	-Only one-third of PCPs had ever prescribed or referred a patient for PrEP, although most were aware of the drug. -Concerns among providers about increased risk behavior, safety, and potential toxicities of PrEP continue to be a roadblock to PrEP adoption -Providers were not specifically asked about the risk factors associated with their patients. -Sampling frame might be used not just to SGIM members but also other PCPs in academic and non-academic settings.

			healthcare practices were gathered -A five-point Likert scale was used to assess self-reported PrEP knowledge - S*tatistical Analysis* The characteristics of adopters and non-adopters were compared using Chi-square tests and MANOVA. Statistical analyses were performed using SPSS version 21 software.	-68% academic medical centers -75% provided outpatient care to HIV patient -34.9% had prescribed or referred patient for PrEP -15.4% had only prescribed PrEP -14.6% had only referred PrEP -4.9% had done both Adjusted analysis showed: Attending physician (vs. trainee, OR = 2.16, 95% CI 1.04–4.50) and caring for more than 50 HIV-positive patients (vs. 0, OR = 7.63, 95% CI 2.33–24.98) were linked with greater odds of PrEP use Only providing care to more than 50 HIV-positive clinic patients (vs. 0) was significantly linked with PrEP adoption in a multivariable model considering only current role (attending vs. trainee) and number of HIV-positive clinic	-Response rate is low (8.6 %); 266 of the 2093 members of the SGIM - Academic PCPs may be more up to date on medical developments than those who work in non-academic clinical settings. -Furthermore, despite the fact that study used both HIV-specific and general primary prevention messaging for recruitment, PCPs who were aware of or interested in PrEP, or HIV prevention and treatment in general, may have been more inclined to participate in the study, affecting the sample's representativeness

				patients (aOR = 6.82, 95% CI 2.06–22.52). Adopters were also more likely to have outstanding, very good, or decent self-rated PrEP knowledge (15.1%, 33.7%, 30.2% vs. 2.5%, 18.1%, 23.8%, respectively; $p = 0.001$) and believe PrEP to be highly safe (35.1% vs. 10.7%; $p = 0.002$) Adopters were also less likely than non-adopters to believe PrEP could considerably increase risk behaviors (12.8% vs. 28.8%, $p = 0.02$).	

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**
Blumenthal, J., Jain, S., Krakower, D., Sun, X., Young, J. Mayer, K., Haubrich, R. & the CCTG 598 Team. (2015).	To understand the healthcare provider's knowledge, interests, and potential barriers to prescribing PrEP.	Participants: 233 HIV and non-HIV HCPs in NY, SD, and LA. -Attendees at an International AIDS Society-USA Meeting in NYC,	-Participants completed a 35-question iPad-based self-assessment of their PrEP knowledge and experience.	-*Knowledge of PrEP* - Prior to the trial, 85% of participants were aware about PrEP -Overall score was 2.5	-This indicates that HIV providers knew a lot more about PrEP and were far more likely to prescribe it than non-HIV providers

Knowledge is power! Increased provider knowledge scores regarding pre-exposure prophylaxis (PrEP) are associated with higher rates of prep prescription and future intent to prescribe prep. *AIDS Behavior*, *19* (8), 802–810. https://doi.org/10		AIDS Grand Rounds at UCSD and Scripps Mercy Hospital, UCSD IM and FM residents, and HIV providers in LA who belong to SoCal research team *Participant Demographics and Characteristics* -Mean age was 40 y/o -60% of women -70% from Southern CA -27% from tri-state of New York, New Jersey, and Connecticut -59% white -19% Asian -7% black -70% non-Hispanic -52% of HIV providers -60% of physicians -13% of NPs -6% nurses, social workers, and medical students	-*Study Measures* specific knowledge-based questions and attitudes concerning use of PrEP were assessed utilizing modified instruction developed by Fenway Institute -*PrEP Knowledge Score* -answering five questions about PrEP yielded a knowledge score. To ensure that the score was internally consistent, the Kuder and Richarson Formula (KR-20) was used -*Statistical Analysis* The knowledge scores of HIV and non-HIV providers were compared using a two-sample *t*-test -Multivariate linear regression model was used to investigate characteristics such	-In univariate analysis, HIV providers had substantially higher mean PrEP knowledge scores (2.8 versus 2.2; p=0.001), were older (mean 2.8 versus 2.3; p=0.004), were white (2.7 versus 2.2; p=0.026), and practiced in the New York region (3.0 versus 2.3; p=0.001) - Those who had previously prescribed post-exposure prophylaxis (PEP) (3.1 versus 2.2, p<.001), those who asked about sex practices (2.8 for those who asked all of their patients versus 2.0 for some versus 2.2 for few; p=0.004), and those who felt comfortable determining if someone was a right candidate for PrEP (2.8 for those who felt very comfortable vs 2.5 for somewhat uncomfortable vs 2.0 for very uncomfortable; p=000.5). - The alpha score for the KR-20 for internal	-More PrEP awareness was linked to future intentions to prescribe PrEP, with more than 60% of participants saying they would prescribe PrEP in the future. *Limitations* -Use of convenience sampling for those who attend specific conferences in specific areas of the U.S., which has an impact on its generalizability - Study results that rely on this assessment should be regarded hypothesis-generating concerning the association between knowledge and PrEP experience and goals, but not definite because it has not been rigorously validated

		-34% internal medicine -21% HIV -15% infectious disease -13% FM -62% work in academic settings -20% community settings -5% private practice *Participant Demographics and Characteristics* -Mean age was 40 -60% of women -70% from Southern CA -27% from tri-state of New York, New Jersey, and Connecticut -59% white -19% Asian -7% black -70% non-Hispanic -52% of HIV providers -60% of physicians -13% of nurse practitioners	as age, religion, practice setting, and HIV provider status that were linked to greater knowledge scores -Univariate correlations of prior PrEP prescribing and future willingness to prescribe PrEP with HIV provider status and other covariates that were deemed to be potentially important determinants based on external clinical judgment were assessed using Fisher's exact tests	consistency of PrEP knowledge was 0.22 *Prior PrEP Prescription* -Out of 201 available providers, 21% had previously prescribed PrEP *Future PrEP Prescription* -64% among 201 potential providers said they were likely or very likely to prescribe PrEP. *Who Should Provide PrEP* Participants were asked which sort of provider/clinic should provide PrEP; responses were: -35% HIV provider clinic -31% non-HIV provider clinic -21% public health dept. -10% STD clinics *Normative beliefs about PrEP* -There is no difference in global attitudes of PrEP among HIV and non-HIV providers	

		-6% nurses, social workers, and medical students -34% internal medicine -21% HIV -15% infectious disease -13% family medicine -62% work in academic settings -20% community settings -5% private practice			

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**
Carter, M. R., Aaron, E., Nassau, T., & Brady, K. A. (2019). Knowledge, attitudes, and PrEP Prescribing Practices of Health Care Providers in Philadelphia, PA.	To examine the knowledge, attitudes, prescribing behaviors, and level of comfort with PrEP among Philadelphia health care providers.	Participants: Philadelphia healthcare providers (MDs, NPs, PAs) in HIV/ID, family med, internal med, women's health, and pediatrics/adolescent clinics -Philadelphia Department of Public	-The Philadelphia Department of Public Health AIDS Activities Coordinating Office sent out online surveys to providers between Sept and Dec 2017 -Self-reported replies of the participants were	-Survey response rate was 9% -81 eligible participants -48% family/internal medicine -31% HIV/ID specialist -8 NPs/PAs -53% (*n*=43) female -63% (*n*=51) <50 y/o -60% (*n*=49) practicing for > 10 years	-Majority of HCPs in the Philadelphia area who responded to the study stated they have previously provided PrEP to their patients -HIV care providers were significantly more comfortable and informed about prescription PrEP than

Journal of Primary Care & Community Health, *10*, 21501327198785 26. https://doi.org/10. 1177/215013271 9878526		Health granted IRB permission	examined using a Likert scale -Difference in sample demographics between providers who were and were not comfortable administering PrEP was described using $\chi^2 2$ tests. - χ^2 test was used to determine the differences between HIV and non-HIV providers along the PrEP continuum -In all statistical tests, SAS 9.4 was employed	75% (*n*=61) felt comfortable providing PrEP and 77% (*n*=62) had ever prescribe PrEP -HIV care providers were significantly more knowledgeable about the necessary laboratory testing for prescribing PrEP (*p* =.003) and more likely to have prescribed PrEP to more than ten patients (*p*=.006) than PCPs -Providers of women's health and pediatrics reported they were less confident about prescribing PrEP to their patients (*p* =.0003).	clinicians in primary care, women's health, and/or adolescent/pediatric medicine. - The poll was conducted using a convenience sample, which is inherently biased because clinicians who handle HIV patients and have prior awareness of PrEP may be more motivated to answer to a PrEP survey. -Future Department of Health educational trainings should focus on primary and preventive care providers, as well as HCPs who have never administered PrEP or encounter a small number of HIV patients

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**

Hakre, S., Blaylock, J. M., Dawson, P., Beckett, C., Garges, E. C., Michael, N. L., Danaher, P. J., Scott, P. T., & Okulicz, J. F. (2016). Knowledge, attitudes, and beliefs about HIV pre-exposure prophylaxis among US Air Force health care providers. *Medicine*, *95*(32), e4511. https://doi.org/10.1097/MD.0000000000004511	To determine PrEP knowledge, attitudes, and beliefs in order to inform future implementation of PrEP as a complement to current HIV prevention measures in the United States Air Force (USAF).	Participants: Active-duty PCPs (Physicians, PAs & NPs) and ID physicians from the Air Force Personnel Center (Randolph Air Force Base, TX). Sample size 403 providers -Median Age – 35 -59% - male -74% - white -58% -family medicine -64% physicians -42% located in Southern US -5 median years in practice	-Web-based need assessment survey was conducted in Dec 2015 -Participants were questioned about their demographics, overall medical practice, and PrEP experience, as well as their attitudes and understanding about PrEP -The association between demographic and medical practice characteristics and knowledge scores was investigated using univariate analysis and univariate logistic regression. -Multivariate logistic regression was used to investigate traits that were independently connected to high knowledge scores after controlling for other relevant variables (p= 0.25).	-Poor PrEP knowledge rating (overall 59%: ID 5%, non-ID 62%) -Never prescribed PrEP or PEP before (overall 72%: ID 0% , non-ID 76%) -Overall, 26% said they had prescribed antiretroviral treatment to prevent HIV infection, - 21% said it was for occupational PEP -Only 9% of providers (75% of ID, 5% of non-ID) said they had ever prescribed PrEP -Only 38% of respondents (ID 95%, non-ID 34%) said they had ever been asked about PrEP by a patient - 94% of providers reported they felt at ease talking about sexual risk behaviors especially MSM (ID 100%, non-ID 93%) -Univariate analysis, years of practice, the	-This is based on the findings of the first HIV PrEP need assessment survey, which was conducted just within the Department of Defense. - Majority of PCPs said they had never prescribed PrEP to prevent HIV infection, felt the military should offer PrEP, and that their patient population was at risk of HIV - Survey was conducted at USAF, limiting its generalizability - Although PrEP uptake in the USAF may be low, and ID providers currently appear to be able to handle demand for PrEP access, it is expected that the need for PrEP in the USAF will follow the U.S. population's low but increasing use of the drug.

			- The internal consistency of the 10 questions used to assess knowledge was examined using Cronbach's standardized alpha coefficient (0.70) -For data administration and analysis, SAS Cary, NC's Statistical Analysis Software version 9.4 was used.	number of HIV-positive patients treated in the past 12 months, previous antiretroviral prescriptions for HIV prevention, frequency of PrEP prescriptions in the preceding 12 months, and ever being questioned about PrEP by a patient were all connected to PrEP knowledge (*p* and then is it <0.05) -Multivariate analysis, clinicians who have ever prescribed antiretrovirals to prevent HIV (AOR: 2.37, 95% CI: 1.27–4.42) were more likely to have a good PrEP knowledge	

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Henny, K. D., Duke, C. C, Geter, A., Gaul, Z., Frazier, C., Peterson, J.,	To look at the characteristics and practices associated with HIV-related	PCPs in six high-HIV-incidence areas (MSA) of the U.S. took part in the study.	-Baseline assessment of Knowledge, Behaviors, Attitudes, and Practices of HIV-related care	- Provider characteristics were: -49.7% ≥ 50 years of age, -59.4% female -60.2% white	-Only 1/3 of PCPs in the selected MSA areas reported HIV-related training, according to this study

Buchacz, K., & Sutton, M. Y. (2019). HIV-related training and correlates of knowledge, HIV screening, and prescribing of nPEP and PrEP among primary care providers in the Southeast United States, 2017. *AIDS Behavior, (11)*, 2926-2935. doi: 10.1007/s10461-019-02545-1 PMID: 31172333	training experience. Specific Objectives: -To determine the extent of previous HIV-related training -To investigate whether and how self-reported HIV-related training correspond with provider characteristics, HIV screening practices, knowledge and prescription of PrEP.	MSA selection criteria included: - (1) located in the Southeast of the US. -(2) having a sizable African-American population (>20% of persons aged 18 to 54); -(3) having a high HIV infection rate (HIV incidence >25 per 100,0000 and prevalence >300 per 100,000).	among providers in the Southeast (K-BAP) were obtained for analysis -820 representative sample of providers was obtained from the IQVIA ® provider database -Participants were given a 56-item baseline survey that assessed their HIV prevention and care knowledge, attitudes, screening, and clinical practices -To examine bivariate relationships, Rao-Scott χ^2 tests were utilized as a statistical analysis	Weighted sample -75.6% physicians -20.7% NPs -3.6% PAs -47.6% sample practiced in the Washington, DC and Baltimore, Maryland MSAs -36.3% of PCPs self-reported HIV-related training Bivariate analyses showed: - PCPs with HIV-related training were more likely to practice in Miami (PR = 1.85, 95% CI 1.52, 2.25) than Atlanta (PR = 1.54, 95% CI 1.25, 1.92), offer HIV screening annually or more frequently (PR = 1.54, 95% CI 1.25, 1.92), and provide condoms to patients at their practice facility (PR = 1.79, 95% CI 1.20, 2.63) - PCPs with HIV-related training were more likely to be more familiar with	-This backs up other reports that there is a lack of provider competency to handle the community's HIV-related concerns Limitations: -Only 29.6% of people responded, low adjusted response rate -Self-reports were used to assess HIV-related training. It's possible to under- or over-report - Miami had fewer participants and lower response rates than the other MSAs. When evaluating and comparing data, extreme vigilance is required

				nPEP (PR = 2.08, 95% CI 1.67, 2.56), ever have a patient request nPEP (PR = 1.52, 95% CI 1.20, 1.92), and more likely to ever prescribe nPEP to at least one person - PCPs who had received HIV-related training were more likely to be familiar with PrEP (PR = 2.63, 95% CI 2.13, 3.23), to have had a patient request PrEP (PR = 1.49, 95%CI 1.22, 1.82), and to prescribe PrEP (PR = 2.00, 95%CI 1.59, 2.56).	

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**
Krakower, D. S., Ware, N. C., , , Maloney, K. M., Wilson, I. B., Wong, J .B., Mayer, K. H., (2017). Differing experiences with pre-exposure	-To acquire a better understanding of ways of addressing the gap in PrEP adoption into primary care practice - To learn more about LGBT experts' and	31 PCPs from a community health facility in Boston that specializes in LGBT patients ("LGBT specialist"; n=12) and an academic medical center in Boston ("generalist"; n=19)	-From September 2013 to August 2014, PCPs were interviewed for 60 minutes in semi-structured qualitative interviews. Knowledge, attitudes, prescribing experiences, and PrEP decision-	Participant characteristics: -Median age:39 -45% female -77% white -1/4 homosexual or queer -61% generalist -39% LGBT specialists -27 Physicians -2 N.P.s -2 P.A.s	-This study's findings are similar with previous studies that found generalists have inadequate PrEP knowledge and expertise -Although this study was conducted in Boston, the disparity in

prophylaxis in Boston among lesbian, gay, bisexual, and transgender specialists and generalists in primary care: Implications for scale-up. *AIDS Patient Care STDS*. 2017 Jul;31(7): 297-304. doi: 10.1089/apc. 2017.0031. Epub 2017 June 2. PMID: 28574774;	generalists' experiences, as well as potential measures to increasing PrEP uptake in primary care		making were all discussed -Data was analyzed using inductive approaches influenced by grounded theory methodology. -To categorize and organize concepts into a codebook, Atlas.ti software was used -Beth Israel Deaconess Medical Center and Fenway Health gained IRB permission for the study protocols	-Generalists had less experience prescribing PrEP than LGBT specialists -10/12 LGBT specialist have prescribed PrEP -2/19 generalist have prescribed PrEP -Both LGBT specialists and generalists acknowledged a shared decision-making technique when deciding whether or not to prescribe PrEP -Both providers have identified areas of doubt and problem with a choice about prescribing PrEP such as: 1) low-risk habits and asking about PrEP, 2) are at high risk for HIV and have poor adherence, and 3) do not follow the recommended monitoring while on PrEP -LGBT specialists' pessimism about PrEP quickly turned to optimism, prompting	PrEP implementation between LGBT specialists and generalists has important implications for nationwide PrEP implementation -Understanding how to get generalists to use PrEP in their practices could lead to more equitable PrEP access, particularly in rural areas where patients have limited access to HIV specialists

				them to prescribe PrEP more frequently.	

Author, Year, Title	**Purpose**	**Sample & Setting**	**Methods** **Design** **Interventions** **Measure**	**Results**	**Discussion, Interpretation, Limitations**
Moore, E., Kelly, S. G., Alexander, L., Luther, P., Cooper, R., Rebeiro, P. F., Zuckerman, A. D., Hargreaves, M., Bourgi, K., Schlundt, D., Bonnet, K., & Pettit, A. C. (2020). Tennessee healthcare provider practices, attitudes, and knowledge around HIV pre-Exposure prophylaxis. *Journal of Primary Care & Community Health, 11*, 215013272098	To analyze Tennessee (TN) primary care provider's PrEP knowledge, attitudes, and prescribing practices.	Participants: TN PCPs – physicians, NPs, PAs and pharmacists in Internal Med (IM), Medicine-Pediatrics, Family Med, ID and Ob-gyn. Exclusion criteria: If PCP hasn't prescribed PrEP in the last year or is not able to do so	-PCPs at TN medical centers and members of professional society listservs received an electronic survey through email -Research Electronic Data Capture (REDCap) was used to collect and managed survey -Fisher's exact tests were employed in comparing categorical factors across PrEP prescribing patterns, both in terms of global tests of provider characteristics and pairwise 2-by-2 tests comparing mutually exclusive categories within individual characteristics	-Of 147 survey responses, 99 were included and 43 (43%) had prescribed PrEP in the past 12 months -Compared to non-prescribers, a higher number of PrEP prescribers were trained in IM or ID (56% vs 25%, p =.01), and a lower proportion of PrEP prescribers were NPs or Ob-gyns (12% vs 34%, p =.02 and 2% vs 18%, p =.02) -Majority of PrEP prescribers (n = 18) were found in the Nashville/Davidson County, TN Department of Health -Majority of respondents (65%) felt obligated to	-It's possible that this finding reflects a long-term trend of increased PrEP prescription -Across several responder groups, prescribers had higher knowledge scores than non-prescribers, similar to earlier studies that suggested a lack of knowledge as a barrier to PrEP prescription. -Patients' requests for PrEP may play a crucial influence in PrEP prescription, according to the findings -Limitation: One study limitation is selection bias. Because Tennessee lacks an easily accessible

4416. https://doi.org/ 10.1177/215013 2720984416			-To compare knowledge scores across provider characteristics, Kruskal-Wallis tests were utilized -To compare knowledge scores across 2 mutually exclusive categories within individual characteristics among PrEP prescribing practices, Wilcoxon rank-sum tests were performed -The knowledge tool's internal consistency was measured using Cronbach's alpha. -Stata 15.1 was used to analyze the data.	prescribe PrEP and believed that all PCP should do so (63%) -Prescribers had higher median PrEP knowledge scores (7.3 vs 5.6, *p* <.01), a higher proportion of self-reported patient PrEP inquiries (95% vs 21%, *p* <.01), and a higher proportion of self-reported good or excellent ability to conduct sexual history (83% vs 58%, *p* =.01) and comfort taking a sexual history (92% vs 63%, *p* <.01) than non-prescribers -Cost of PrEP (26% and 51%) and the requirement for administrative support (26% and 49%) were recognized as the most significant barriers to PrEP prescription by both prescribers and non-prescribers -Non-prescribers reported that PrEP online trainings (57%), educational events (53%), and competent providers in their practice	database of provider contact information, surveys were distributed through numerous channels. Reporting a reliable response rate was difficult as it was also difficult to determine who accesses the survey link -Physicians were the most common respondent (70%), followed by those who worked primarily in an academic medical center (44%) and those who worked mainly in Davidson County (37%), which does not represent all Tennessee PCPs and limits the generalizability of the findings.

				(49%) may help them prescribe more PrEP and that they particularly sought training in PrEP contraindications (69%) and adverse effects (57%)	

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