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## Health care providers' views on clinic infrastructure and practice models that may facilitate HIV pre-exposure prophylaxis (PrEP) prescribing: A qualitative meta-synthesis

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### Abstract

HIV pre-exposure prophylaxis (PrEP) is an effective biomedical HIV prevention tool. Increasing PrEP use among populations disproportionately affected by HIV is one of the key efforts in the United States (U.S.)' Ending the HIV Epidemic (EHE) initiative and the HIV National Strategic Plan for the U.S. Given that PrEP is only available through prescription, it is important to explore structural, organizational, or environmental factors that could facilitate or impede healthcare provider's PrEP prescribing behavior. The purpose of this systematic review (PROSPERO (CRD: 42019138889)) is to identify qualitative studies that addressed this topic and conduct meta-synthesis using the thematic synthesis method to identify major themes on the characteristics of clinic infrastructure or clinic models that providers consider as facilitators of PrEP prescribing in the U.S. Eighteen citations representing 15 studies were included in this review. Five overarching themes were identified: 1) Routinized HIV risk assessment; 2) Interdisciplinary/coordinated

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PrEP teams or services; 3) Clinic capacity to provide essential PrEP-related services; 4) Low out-of-pocket patient costs; and 5) Access to the priority populations. Some of these themes are consistent with the recommendations of CDC's PrEP clinical guidelines and the EHE initiative. More recent studies that include perspectives of diverse providers, timely analysis of these studies, and implementation research to assess strategies to address the current practice gaps are needed to further promote PrEP prescribing among providers in the U.S.

### Keywords

HIV pre-exposure prophylaxis (PrEP); healthcare providers; clinic infrastructure; practice models; prescribing; access to care; HIV/AIDS; environmental and systems change

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## INTRODUCTION

HIV pre-exposure prophylaxis (PrEP) is an effective biomedical HIV prevention tool; when taken consistently, it reduces the risk of HIV infection in persons at high risk by up to 99% (CDC [U.S. Centers for Disease Control and Prevention], 2020a). HIV PrEP uptake has significantly increased since the U.S. Food and Drug Administration (FDA) approved daily oral Truvada (emtricitabine/tenofovir) for PrEP use in 2012 (Sullivan et al., 2018). However, while growing, PrEP uptake in the U.S. is still low. CDC (CDC, 2021) estimates that only 22.9% of persons with PrEP indications in the U.S. had been prescribed PrEP in 2019. Increasing PrEP use is one of the key efforts in the United States' Ending the HIV Epidemic (EHE) initiative (Fauci et al., 2019; Giroir 2020) and the HIV National Strategic Plan for the U.S (U.S. Department of Health and Human Services, 2021).

Given that PrEP is only available through prescription, it is important to understand the behavior of healthcare providers and identify factors associated with PrEP prescription. A recent systematic review (Pleuhs et al., 2020) of 28 quantitative and qualitative studies of healthcare providers identified lack of PrEP knowledge among providers to be a major barrier. Other barriers identified in the review were the "purview paradox" in which neither HIV specialists nor primary care providers perceived themselves to be well suited to prescribe PrEP (Krakower et al., 2014), providers' personal values around prescribing PrEP, and concerns about patients' adherence, costs and effects on patients' behaviors. Other reviews that focused on cognitive aspects of providers (Pinto et al., 2018; Scholl, 2016; Turner et al., 2018) found similar barriers related to provider knowledge, attitudes, and beliefs about PrEP. While these individual factors are important to address, providers do not work in a vacuum. It is equally, if not more, important to explore structural, organizational, or environmental factors that could facilitate or impede provider's PrEP prescribing behavior. Some commentaries, based on reviews of earlier PrEP implementation work, have noted this point and offered organizational/structural responses that could facilitate PrEP delivery (Mayer et al., 2018; Krakower et al., 2016; Silapaswan et al., 2016). Yet no systematic reviews have been conducted to identify specific clinic infrastructure or practice models that providers consider as facilitators of PrEP prescribing.

Given that the implementation of PrEP is rapidly evolving in the U.S., it is crucial to include more recent investigations in a systematic review. Qualitative studies conducted through

individual interviews or focus groups offer rich, in-depth data from relatively small numbers of individuals, and for this review, provide nuanced exploration of providers' own PrEP prescribing experiences within clinic infrastructure or practice models that are facilitative of PrEP prescribing. In this review, we aimed to identify qualitative studies (including very recent ones) that addressed this topic and describe characteristics of these studies. We then conducted meta-synthesis to identify major themes on the characteristics of clinic infrastructure or practice models that providers in these studies consider as facilitators of PrEP prescribing in the U.S.

## METHODS

To report this review, we follow the American Psychological Association's Journal Article Reporting Standards recommendations for qualitative meta-syntheses (Levitt et al., 2018). This review was registered in PROSPERO (CRD: 42019138889, available from [https://www.crd.york.ac.uk/prospERO/display\\_record.php?ID=CRD42019138889](https://www.crd.york.ac.uk/prospERO/display_record.php?ID=CRD42019138889)).

### Database and search strategy

For identifying relevant citations, we searched the CDC's Prevention Research Synthesis (PRS) Project's cumulative HIV, AIDS, and sexually transmitted disease (STD) research database. Librarians with experience developing and conducting comprehensive systematic searches routinely update the PRS database through electronic searches (e.g., MEDLINE, EMBASE, PsycINFO) and manual checks (i.e., journals, reference lists, listservs) of the literature (DeLuca et al., 2008). Every citation added to the PRS database undergoes a base level of coding to classify the prevention focus and label key outcomes to facilitate retrieval for research. By the end of June 2020, the PRS database had amassed over 102,000 records (1988–2020). For this review, a librarian queried the PRS database for literature published from 2000 – 2020 using the PRS registry coding criteria, key words, and index terms specific to PrEP; last queried July 2020. See Appendix 1 for all PrEP searches.

Inclusion criteria for this review were: (1) U.S.-based studies published in English; (2) focused on healthcare providers whose licenses may permit them to prescribe PrEP medication, including physicians (MDs and DOs), nurse practitioners (NPs), physician assistants (PAs) and pharmacists; and (3) reported barriers and facilitators of HIV PrEP prescription based on qualitative studies (i.e., in-depth interviews, focus groups). Commentaries, reviews, conference abstracts, and non-peer-reviewed publications were excluded.

### Screening, data abstraction, and assessment of study quality

A two-step approach was used to select studies for the review. First, a reviewer screened the citations by title and abstract to identify PrEP studies conducted in the U.S. that were published in English. Citations that were excluded by the first reviewer were verified by a second reviewer. Second, two reviewers independently reviewed the full text of the included citations to further screen for the eligibility of the studies. Disagreements were resolved through discussion. When two reviewers failed to resolve the disagreement, a third reviewer stepped in to resolve the discrepancy.

For eligible citations, two reviewers independently abstracted data on study characteristics (e.g., location, setting, inclusion criteria, data collection/analysis methods, sample size) and participant characteristics (e.g., age, race, gender, practice setting, professional status, specialty, experience working with patients with HIV, experience working with patients at risk for HIV). Disagreements were resolved through discussion.

Study quality was evaluated using the 10-item Critical Appraisal Skills Programme (CASP) qualitative checklist, (*CASP Qualitative Research Checklist. [online] 2017*). This checklist was used in previous meta-synthesis studies (Roland et al., 2020, 2019). Examples of questions included appropriateness of qualitative methodology, research design, recruitment strategy, data collection, and rigor of data analysis, and response options were “yes (1 point)” “can’t tell (0.5 points)” and “no (0 points).” Each study was independently rated by two reviewers and scored according to Butler et al. (Butler, Hall, & Copnell, 2016). The total scores were averaged across the reviewers, with 9+ indicating high quality, 7.5+ but <9 indicating moderate quality, and <7.5 indicating low quality.

### Analytical method

For the analysis of texts to identify barriers and facilitators of PrEP prescribing, we used thematic synthesis which involved coding of qualitative data and analysis of coded data through iterative process to regroup and identify overarching themes (Thomas & Harden, 2008). The lead author and a coauthor developed a codebook by randomly selecting four citations and independently coding secondary data (defined as authors’ interpretations of the primary data) (Roland et al., 2019; Roland et al., 2020; Zimmer 2006) in the result sections from these citations, and meeting to discuss the codes identified and resolving disagreements. Four coders (including the lead and co-author who developed the codebook) pilot tested these original codes to further refine the codebook, and a pair of coders subsequently coded secondary data from all citations using the refined codebook. Disagreements were resolved via discussion.

Next, the lead author reviewed coded data to select codes that capture clinic infrastructure and/or practice models as barriers or facilitators of PrEP prescribing. The lead author then reviewed all the texts linked to these codes, and via an iterative process, categorized them based on similarities and identified overarching themes related to specific characteristics of clinic infrastructure and practice models. A co-author independently followed the same procedures and the two authors met to discuss any discrepancies regarding the final themes emerging from this process. Finally, the overarching themes were worded as the facilitators (not barriers) of PrEP prescribing, and quotes (authors’ interpretations) that most articulately illustrate the major points of the themes were selected. NVivo 12™ (NVivo) was used for data management and analysis.

## RESULTS

### Characteristics of studies included in the meta-synthesis

Of 2712 unique citations identified through electronic and hand searches, 18 citations representing 15 studies were included in this review (Figure 1). Table 1 presents

characteristics of the included studies. Studies were published from 2012 to 2020. Date of data collection spanned from 2011 to 2019; five were conducted in 2017 or later. Most studies used in-depth interviews with sample size ranging from 6 to 39. Study locations were primarily large urban cities in the U.S. Northeast or West. Study settings varied including university/academic-based clinic (used most often), community health center, Veterans Affairs primary care clinic, hospital-based clinic, private practice, federally qualified health center, HIV clinic, and substance abuse treatment clinic. More than half of the studies had participants comprised primarily of physicians (MDs/DOs) and primary care providers. The study participants, when reported, were mostly over age 40. Most studies, when reported, had majority (56% – 92%) female and majority (50% – 93%) White participants. Providers' experience with PrEP ranged from none (having never prescribed) to 100% having prescribed. About half of the studies included providers who had patients with HIV or had patients who were men who have sex with men (MSM), transgender persons (TG), or other patients with characteristics that indicated increased risk for getting HIV including persons who inject drugs [PWID] and veterans who are homeless. Most citations were rated as having a moderate study quality (k=10) or higher (k=5).

### Themes emerging from the meta-synthesis

Through our analysis, we identified five overarching and interconnected themes regarding the clinic infrastructure and practice models that providers consider as facilitators of PrEP prescribing (Table 2).

**Routinized/standardized screening/HIV risk assessment**—In 9 citations, providers stated that it would be important for clinics to support making screening/HIV risk assessment a routine/standardized clinical practice. Some providers advocated for practice models in which all healthcare providers complete HIV risk assessments (Przybyla et al., 2012) or routinely incorporate PrEP as a topic of discussion (Krakower et al., 2017). Benefits of such clinical practice for facilitating initial conversations with patient about PrEP were mentioned (St. Vil et al., 2019). Some endorsed “a routinized approach with respect to sexual history taking” (Calabrese et al., 2019) arguing that such an approach would prevent provider bias or prejudice from interfering with patient care.

Many talked about time constraints of providers and argued that access to easy to use screening tools that make HIV risk assessment more routine/standardized would be helpful. Some suggested that the screening may be done before a clinic visit for a better workflow (Gilkey et al., 2019; Phillips et al., 2020). Providers stressed the importance of having routine HIV assessment integrated into their clinic's protocol and suggested ways in which this can be done.

Two providers identified ways to use technology to facilitate this process. For example, a PrEP candidate screening tool could be integrated into the electronic health record system, and data could be entered by the medical assistant during the intake process in the same way that other screening tool data such as depression screening scores are entered. Providers would then be notified with an alert in the electronic health record when a patient is a candidate for PrEP. (Phillips et al., 2020)

This approach calls for a team of interdisciplinary staff, which was also one of the themes that emerged from our meta-synthesis.

**“Interdisciplinary PrEP team” or coordinated/co-located services**—In 7 citations, providers stated that PrEP prescribing could be facilitated by a workplace structure that would allow staff from various disciplines and/or specialties/service areas to collaborate effectively. Providers raised concerns about additional burden associated with implementing PrEP and talked about the need for on-site staff support.

This provider and others talked about the value of having support staff on site. These staff members could educate patients about PrEP, communicate with insurance companies, help patients complete paperwork, schedule and remind patients about appointments, and/or perform risk and adherence counseling, which alleviated provider burden. (Calabrese et al., 2016)

Some suggested that clinics build PrEP teams comprised of interdisciplinary staff (e.g., social workers, nurses, pharmacists, health educators, and/or patient navigators in addition to prescribing providers).

One provider identified that prescribing PrEP could be further facilitated by the use of a “PrEP Case Manager.” This case manager’s role would be to educate identified at-risk patients, confirm eligibility, discuss alternative prevention methods, provide standing-order laboratory tests, discuss the risks and benefits of PrEP and confirm the patient’s desire to initiate therapy. This would allow the provider to complete all eligibility information before the visit, and most patients would be able to leave the office with a prescription in hand. (Philips et al., 2020)

A couple of these PrEP providers recommended using patient navigators to help get PWID on patient assistance, and/or follow up with PWID to ensure they are adhering and planning to attend any follow-up appointments. (Hershow et al., 2019)

To overcome the issue of time, some clinics have systematically built in ways to have the conversation without cutting into the amount of time providers have with patients. Some participants have interdisciplinary PrEP teams, including a social worker, nurse, or health educator, which allows for more time to have the conversation. (St. Vil et al., 2019)

In addition to alleviating the prescribing providers’ burden, some talked about the value of interdisciplinary teams for alleviating the patient’s discomfort.

Patients may not feel comfortable talking to the doctor about risky sexual behavior or drug use, however, they may be more forthcoming with a nurse, health educator, or pharmacist on staff. (St. Vil et al., 2019)

Collaboration between primary care providers and HIV/infectious disease specialists also emerged as a facilitator of PrEP prescribing. In the “purview paradox,” providers ask whether primary care providers (who have access to HIV-negative patients who could benefit from PrEP) or HIV specialists (who have knowledge and experience in prescribing antiretroviral treatment (ART)) are better suited to prescribe PrEP (Krakower et al., 2014). Consensus among providers in these studies appears to be that primary care providers

and HIV specialists should collaborate to prescribe PrEP and that various models of collaboration can be considered.

One specialist had primary care providers refer patients to him for an initial in-depth consultation, which could last up to an hour. He felt more capable of accommodating such lengthy appointments and better prepared to answer detailed questions given his experience prescribing and familiarity with HIV medications from treating HIV+ patients for many years. After the initial consultation, patients were followed by their primary care providers. (Calabrese et al., 2016)

A few participants alluded to combined approaches in which primary care providers would partner with or have access to HIV specialists. (Hoffman et al., 2016)

Co-location/integration of PrEP and harm reduction services was also brought up by some providers for improving PrEP prescribing to PWID, as providers felt such an arrangement could promote retention in care among PWID (Hershow et al., 2019).

**Clinic capacity to provide essential services for PrEP prescribing**—In 14 citations, providers described capacity for a clinic to provide essential PrEP services as a facilitator for PrEP prescribing. In addition to the capacity to conduct routine screening/HIV risk assessment mentioned earlier, some argued for an on-site laboratory for timely PrEP initiation.

Many providers felt that having an on-site laboratory or using rapid HIV tests would facilitate the PrEP implementation process. Many providers said that some of their patients did not return for follow up visits to initiate PrEP because the required laboratory work was not completed on time. Some providers indicated that they would initiate PrEP while waiting for other laboratory results if rapid HIV tests were available in the health center. (Philips et al., 2020)

Providers stressed the importance of clinic capacity to be able to provide follow-up monitoring services per PrEP clinical guidelines.

PrEP providers often used particularly strong language, stating that they and other PrEP providers would feel uncomfortable distributing PrEP so easily, especially without assurance that they could conduct follow-up appointments and laboratory testing with PWID. (Hershow et al., 2019)

Providers whose patient populations included young MSM, substance using MSM, and MSM of color noted that these populations generally had difficulty keeping medical appointments and might require special care in any patient tracking protocol. (Arnold et al., 2012)

Providers felt that the need for follow-up monitoring would require some clinics to adopt “a more longitudinal model of care” (Arnold et al., 2012) and that could be “a departure from their usual protocol” (Hershow et al., 2019) particularly for STD or substance abuse treatment clinics or “drop-in sites” where regular follow-up is not a standard practice (Hoffman et al., 2016). Providers discussed ways in which follow-up monitoring could be integrated into their clinic’s workflow, noting the time constraints and burden that this additional aspect of PrEP care poses. As mentioned previously, some suggested hiring

of staff dedicated to this task (e.g., patient navigator) (Hershow et al., 2019). Others offered potential retention strategies or argued for structural/organizational enhancements like reminder systems in electronic medical records.

Some providers offered potential strategies to promote retention in care, including incentives for coming to the clinic (i.e., transport reimbursements, gift cards), free services, telehealth appointments, and integrating services into the syringe exchange. (Hershow et al., 2019)

Participants reported that structural/organizational factors that would facilitate PrEP included...improved availability of the drugs used for PrEP, and development of PrEP-specific visit templates and reminder systems in electronic medical records. (Mullins et al., 2016)

In addition to follow-up monitoring, providers also stressed the importance of the capacity to provide medication adherence counseling/support, preferably by dedicated staff, and considered not having this capacity a significant barrier to PrEP prescribing.

Maintaining close follow-up of patients on PrEP and providing adherence support were seen as challenges that primary care providers – and primary care practices – might have difficulty meeting...For example, after stating that the provision of PrEP should not be limited to HIV specialists, this adolescent specialist raised a concern around primary care providers' capacity for delivering adherence support. (Hoffman et al., 2016)

Some suggested PrEP clinics adopt the types of medication adherence support provided in HIV care clinics.

Providers noted that monitoring adherence would be a challenge. Current adherence monitoring practices for HIV positive patients, such as monitoring refills, interviewing and counseling about adherence, would need to be extended to those patients on PrEP. (Arnold et al., 2012)

Others more specifically proposed to develop a tool to screen for patients who are at risk of poor adherence and called for coordinated systems of adherence and social support to help such patients.

Participants in 2 groups proposed the need for a screening tool to identify patients at risk of poor adherence and gave several suggestions for possible indicators including history of adherence to appointments and other medications. The importance of a coordinated adherence and social support system for patients at risk for nonadherence due to complex social situations was also mentioned in several groups. (Doblecki-Lewis, et al., 2016)

**Low patient costs, insurance/patient assistance coverage**—In 11 citations, providers noted concerns about the cost and insurance coverage for PrEP medications/services (e.g., laboratory testing, follow-up visits). Some felt that provider training on PrEP coverage by various insurance plans and other resources (e.g., patient assistance programs) could help alleviate providers' cost-related concerns.



Although participants discussed the need to be knowledgeable on all of these topics, many highlighted the importance of understanding insurance coverage for PrEP. Due to the wide range of health insurance plans and programs available to patients, providers indicated that trainings should emphasize the extent to which insurance options covered the medication and the availability of resources to subsidize medication for eligible patients in need of financial assistance. (Bleasdale et al., 2020).

The complexity and difficulty in navigating health insurance or patient assistance programs to pay for PrEP medications or services was often mentioned.

However, navigating the requirements of these funding sources was often time-consuming and effortful for healthcare teams, and could be discouraging for patients. This barrier was the most commonly cited challenge to PrEP implementation. A few providers had not experienced problem in this realm, but most reported that they or their staff had dedicated significant amounts of time to phone conversations and paperwork in order to establish and maintain coverage. (Calabrese et al., 2016)

Some suggested the use of patient navigators or on-site support staff who could dedicate their time on insurance navigation (Calabrese et al., 2016; Hershow et al., 2019).

**Access to the Priority Populations**—In 6 citations, providers stated that clinic settings frequented by many HIV-negative persons who could benefit from PrEP are suited for PrEP delivery. The issue of access to the priority populations has often been brought up in the “purview paradox.” In one study, both HIV and primary care providers felt that primary care settings were an ideal place for PrEP provision because of its access to the priority populations (Hoffman et al., 2016).

Having access to the priority populations but not having the capacity to provide PrEP was noted in settings that serve substance using patients. Some suggested a “mixed model” in which identification of PrEP candidates and introduction to PrEP is done in one setting and prescription of PrEP is done in another (Hoffman et al., 2016). In addition to the clinics types that attract patients who could benefit from PrEP, providers also mentioned that access to PrEP candidates may be facilitated by the clinic being located in the communities where the priority populations reside (Przybyla et al., 2019).

## DISCUSSION

This meta-synthesis highlights the characteristics of clinic infrastructure or practice models that providers in the included qualitative studies consider as facilitators of PrEP prescribing. Five overarching themes were identified. Providers discussed the importance of routinizing/standardizing HIV risk assessment via access to easy to use screening tools, practice models where all healthcare providers complete HIV risk assessments or routinely incorporate PrEP as a topic of discussions with patients, and clinic systems where HIV risk assessment is integrated into clinical workflows. The notion of “routinizing or standardizing” is noteworthy here as it reflects providers’ desire to make PrEP prescribing a normative clinical

practice. Of the 9 citations in which this theme was identified, five reported data collected during earlier phases of PrEP implementation, indicating that this issue was identified at the beginning of PrEP implementation. Reviews conducted earlier (Mayer et al., 2018; Krakower et al., 2016; Silapaswan et al., 2016) raised similar points. However, four citations (Bleasdale et al., 2020; Philips et al., 2020; Przybyla et al., 2019, St, Vil et al., 2019) reported data from interviews conducted relatively recently, suggesting that this theme remains relevant among these providers.

Providers also suggested a workplace structure in which staff from various disciplines and/or specialties/service areas collaborate effectively, proposing interdisciplinary PrEP teams that distribute tasks to help clinical providers manage their time constraints. Cross-specialty (primary care providers and HIV care providers) and cross-agency (PrEP providers and harm reduction providers) collaborations were also suggested and various models of such collaboration (e.g., service co-location) were mentioned. This theme was identified in 7 citations; three of them (Hershow et al., 2018; Philips et al., 2020; St Vil et al., 2019) were from interviews conducted relatively recently, suggesting that this theme is still relevant. Integration of PrEP care into prevention and clinical care services for other diseases (e.g., Hepatitis B and C) has been recommended in the CDC's PrEP clinical guidelines (CDC 2018). CDC's PrEP Care System (<https://www.cdc.gov/hiv/effective-interventions/prevent/prep/index.html#PrEP-Care-System>) suggests a variety of ways in which different health care entities can collaborate to provide PrEP services. Activities promoted under the EHE initiative also include structural/organizational-level strategies like service co-location, integration of HIV, STI, and hepatitis screening, and PrEP navigation to facilitate PrEP prescribing and persistent use (e.g., CDC 2020b; CDC 2020c; HRSA [Health Resources & Services Administration] 2021).

Providers believed that clinics' capacity to deliver on-site laboratory testing and essential services such as follow-up monitoring and adherence counseling would facilitate PrEP prescribing. They discussed ways in which some of these additional services could be integrated into their clinic's workflow without further burdening them (e.g., hiring support staff such as patient navigators, implementing retention strategies such as financial incentives and telehealth, and building reminder systems in electronic medical records). This theme was the most salient among the five; 14 citations referenced to this theme, and more than one-third of them (Bleasdale et al., 2020; Gregg et al., 2020; Hershow et al., 2020; Philips et al., 2020; Przybyla et al., 2019) were from interviews conducted relatively recently, again suggesting the theme is still relevant.

Addressing PrEP cost and insurance coverage was a theme referenced in 11 citations; this theme was particularly salient in citations reporting data collected during earlier phases of PrEP implementation (Arnold et al., 2012; Calabrese et al., 2016; Doublecki-Lewis et al., 2016; Krakower et al., 2014; Mullins et al., 2016; Spector et al., 2015) and was also brought up in earlier reviews (Mayer et al., 2018; Pleuhs et al., 2020; Silapaswan et al., 2016). These earlier citations talked about the complexity of "navigating the requirements" of insurance or pharmaceutical companies' patient assistance programs (Calabrese et al., 2016), for example, and suggested using on-site support staff dedicated to insurance navigation. Navigation services is a key strategy of CDC's PrEP Care System for PrEP

candidates to get information about insurance options or to access medication assistance programs. In interviews as recent as in 2018–2019 (Bleasdale et al., 2020; Philips et al., 2020), providers stated that they needed to understand insurance coverage and resources available for patients who need financial assistance, and that more training was needed on this topic. However, in December 2019, the U.S. Department of Health and Human Services launched *Ready, Set, PrEP*, a nationwide program, as part of the EHE efforts, to make PrEP medications available at no cost to those without prescription drug coverage (<https://www.hiv.gov/federal-response/ending-the-hiv-epidemic/prep-program>). In addition, beginning in January 2021, patients can receive first-dollar coverage (i.e., no deductible) if they have public or private insurance plans with preventive service requirements or coverage through Medicaid Expansion (U.S. Department of Health and Human Services, 2021). As more programs that address PrEP costs are widely implemented, providers' perceptions about this prescribing barrier may change.

Lastly, providers stated that prescribing PrEP would be facilitated in clinics with access to a large number of patients who could benefit from PrEP, and those located in a community where priority populations concentrate. Providers noted that some clinics have access to a priority population but lack the capacity to deliver PrEP (e.g., substance use treatment clinics) and suggested a “mixed model” wherein different types of clinics divide the labor to provide screening/introduction of PrEP in one clinic and prescribe PrEP and follow-up with patients in another. Such a model, however, may still suffer from a drop-off in the number of patients arriving at the PrEP delivery site. The theme of patient access was referenced least frequently (6 out of 18). Two of the six citations (Philips et al., 2020; Przybyla et al., 2020) were from interviews conducted relatively recently, hinting that this view may be still relevant.

Characteristics of the qualitative studies included in this meta-synthesis point to several research gaps for understanding providers' views on clinic infrastructure or practice models that may facilitate PrEP prescribing. First, only 18 out of 2712 citations screened reported relevant qualitative data, and fewer than one-third of these were conducted in 2017 or later. More recent data on the views of providers would be beneficial given the rapidly evolving PrEP implementation in the U.S. University/academic settings were the most often used and very few studies were conducted in the South or the Midwest US or in small cities/rural areas. Community health centers/federally qualified health centers, family planning, STD, and methadone clinics are the settings that could be given priority in future research; the National HIV Strategic Plan for the U.S. recommends making PrEP services more commonly available in some of these settings (U.S. Health and Human Services, 2021). Providers interviewed were primarily physicians (MDs/DOs), many in primary care, who were majority White, suggesting a need to interview providers that are more diverse in profession (e.g., NPs and PAs) and race/ethnicity.

This meta-synthesis found five overarching themes as structural, organizational, or environmental facilitators of PrEP prescribing. Given that PrEP is only available through prescription, practical views of healthcare providers are important considerations. Stakeholders of PrEP implementation might consider these five elements as essential components of their PrEP programming and develop a milieu that can make it easier for

providers to prescribe PrEP. Future research may examine how many of these facilitators have been addressed in the field and whether the implementation of these facilitators actually makes a difference in increasing the number of clinics providing PrEP. Also, this meta-synthesis attempted to answer the very basic question of which clinic infrastructure or practice models would facilitate PrEP prescribing. Given the significant racial/ethnic and gender disparities in PrEP uptake (CDC, 2021) more research is needed to understand, for example, which clinic infrastructure or practice models would help address such disparities. Lastly, COVID-19 has upended HIV prevention efforts (Beima-Sofie et al., 2020; Glick et al., 2020; Qiao et al., 2020). There may be ways in which structural/organizational changes of clinics could help address both COVID-19 and HIV simultaneously (e.g., telemedicine for PrEP), and providers' perspectives are urgently needed.

This meta-synthesis has the following limitations. First, although most of the qualitative studies included in this meta-synthesis were rated as having moderate to high quality, all the studies used small convenience samples of providers, thus the review findings are not generalizable. As noted previously, perspectives of providers that are diverse in terms of location, setting, profession, and race/ethnicity need to be considered to understand how best to promote broader PrEP implementation. Because qualitative studies and systematic reviews are inherently time consuming and therefore are subject to time lags, the review findings may not necessarily capture what is currently happening in the field, e.g., pharmacy-delivered PrEP. Finally, coding of qualitative data may be subject to bias, although a method/process (e.g., using two coders, use of a standard codebook and data abstraction form) was in place to achieve rigor and minimize bias.

## CONCLUSION

This meta-synthesis reviewed 18 citations published through June 2020 to identify the characteristics of clinic infrastructure or practice models that providers consider as facilitators of PrEP prescribing. Five such facilitators were identified: 1) Routinized HIV risk assessment; 2) Interdisciplinary/coordinated PrEP team or services; 3) Clinic capacity to provide essential PrEP-related services; 4) Low out-of-pocket patient costs; and 5) Access to the priority populations. More recent studies that include perspectives of diverse providers, timely analysis of these studies, and implementation research to assess strategies to address the current practice gaps are needed to further promote PrEP prescribing among health care providers in the U.S.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

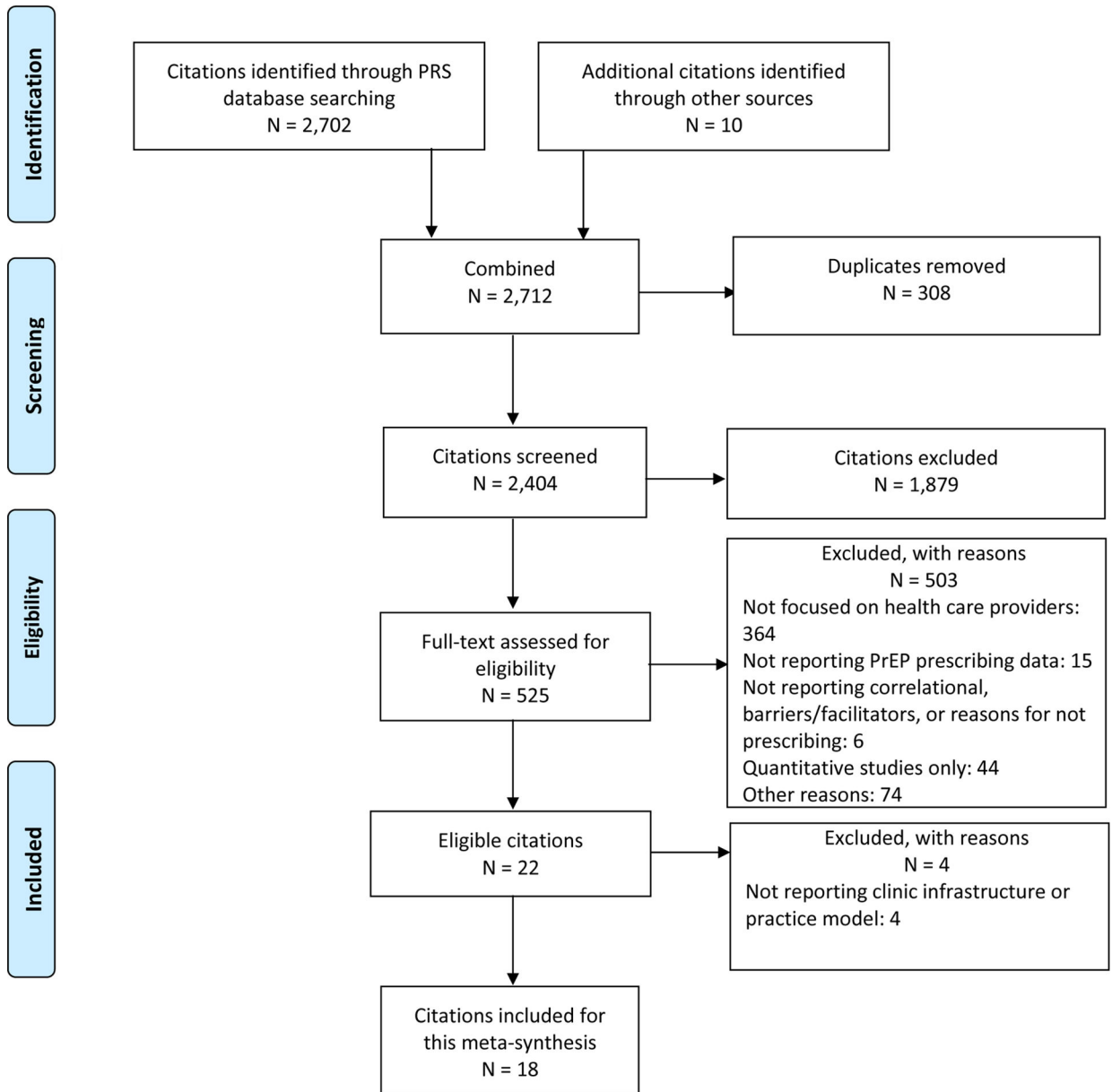
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**Figure 1.** PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2009 Flow Diagram



**Table 1.** Characteristics of Studies Included in the Qualitative Synthesis (18 citations representing 15 studies)

Lead Author, Publication Year	Data Collection Date, Method, Sample Size	Location, Setting	Provider Type, Specialty	Demographic Characteristics	Experience with PrEP	Experience with HIV-positive patients	Experience with patients who are MSM <sup>1</sup> or TG <sup>2</sup>	Experience with other patients at risk for HIV	CASP <sup>10</sup> (study quality) score
Arnold, 2012	2011; In-depth interview; n=22	San Francisco, Oakland, Los Angeles CA (Urban); Setting unknown	At least 50% MD <sup>3</sup> ; 32% primary care, 18% HIV specialist, 27% community/STD clinic-based provider	Majority (68%) male	Not reported	18% HIV specialists	Primary care physicians seeing high number of MSM and TG women in their practices	Not reported	8.75
Bleasdale, 2020 <sup>4</sup>	2017–2018; In-depth interview; n=20	Erie and Niagara Counties in New York State (Mostly urban); 25% community health center, 20% academic health center	40% MD, 5% DO <sup>5</sup> , 35% NP <sup>6</sup> , 20% PA <sup>7</sup> ; Majority primary care	Mean age=42.4; Majority (85%) female; Majority (80%) White	0% had prescribed PrEP	Not reported	Almost all had clinical experience with MSM & majority had clinical experience with TG	Almost all had clinical experience with PWID <sup>8</sup> and 50% had clinical experience with people who exchanged sex	9.00
Calabrese, 2019 Calabrese, 2016	2014–2015; In-depth interview; n=18	Majority Northeast; 50% university/academic-based clinic	Almost 100% MD; Majority HIV/ID specialist	Majority (61%) age 40+; Majority (72%) male; Majority (61%) non-White	100% had prescribed PrEP	100% had HIV-positive patients	100% had MSM and TG patients	100% had PWID patients	9.75 (Calabrese 2019) 9.25 (Calabrese 2016)
Doblecki-Lewis, 2016	2014; Focus group; n=22 (of which 6 were medical providers)	Southeastern Florida; 100% community health center	27% medical provider (MD or NP); None were ID specialists	Majority (55%) Black (not reported for medical providers)	50% of medical providers had prescribed PrEP	100% had HIV-positive patients	50% of the 4 health centers were LGBT <sup>10</sup> focused	50% of the 4 health centers served predominantly Black patients	7.75
Gilkey, 2019 Krakower, 2017	2013–2014; In-depth interview; n=31	Boston MA (Urban); Majority university/academic-based clinic	Majority MD; 100% primary care, majority generalist	Median age=39; Majority (55%) male; Majority (77%) White	Not reported	100% had HIV-positive patients	39% were LGBT specialist	Not reported	8.25 (Gilkey 2019) 8.75 (Krakower 2017)
Gregg, 2020	2018–2019; In-depth interview & focus group; n=23	Los Angeles CA (Urban); 100% VA primary care clinic	Provider type not reported; 100% primary care	Not reported	22% stated they were comfortable talking about PrEP with patients at baseline <sup>11</sup>	Not reported	Not reported	100% worked at a primary care clinic for homeless veterans	4.75

Lead Author, Publication Year	Data Collection Date, Method, Sample Size	Location, Setting	Provider Type, Specialty	Demographic Characteristics	Experience with PrEP	Experience with HIV-positive patients	Experience with patients who are MSM <sup>1</sup> or TG <sup>2</sup>	Experience with other patients at risk for HIV	CASP <sup>10</sup> (study quality) score
Hershow, 2019	2018; In-depth interview; n=20 (of which 10 were medical providers)	Triad/Triangle region of North Carolina (Urban, rural, medium metropolitan); Setting not reported	MD, mid-level providers, registered nurse (no breakdown provided); Specialty not reported	Not reported	100% had prescribed PrEP	Not reported	Some providers said most of their PrEP patients were MSM	Not reported	8.25
Hoffman, 2016	2012–2013; In-depth interview; n=30	New York City NY (Urban); Majority university/academic-based clinic	Majority MD; Majority primary care	Not reported	23% had prior experience prescribing PrEP	Majority had HIV-positive patient	Not reported	Not reported	8.50
Krakower 2014	2012; Focus group; n=39	Boston MA (Urban); Majority hospital-based clinic	Majority MD; Majority ID	Majority (56%) female; Majority (66%) White	Not reported	Almost all had HIV-positive patients	One focus group was at a community health center that specialized LGBT	Not reported	9.00
Mullins 2019	2014–2016; In-depth interview; n=38	Location not reported (Urban); (Majority urban/suburban); 47% private practice, 45% university/academic-based clinic	100% MD; 100% primary care serving youth	Mean age=44.6; Majority (71%) female; Majority (84%) White	37% familiar with PrEP	Majority ever had HIV-positive patients	Not reported	Not reported	8.75
Mullins 2016	Date of data collection not reported; In-depth interview; n=15	Location not reported (Urban); Setting not reported	Almost 100% MD; 100% caring for HIV-positive or at risk youth	Mean age=47.1; Majority (60%) female; Majority (93%) White	40% had ever prescribed PrEP	100% had HIV-positive patients	Not reported	Not reported	8.75
Philips 2020	2019; Focus group; n=12 (of which 7 participated in focus group <sup>72</sup> )	Sacramento CA (Urban, rural, suburban); 100% federally qualified health center	Majority MD/DO (not reported for focus group participants); 100% primary care	Mean age=49 (not reported for focus group participants); Majority (92%) female (not reported for focus group participants); Majority (58%) White (not reported for focus group participants)	Majority prescribing PrEP	Not reported	Not reported	Not reported	6.25
Przybyla 2019 St. Vil 2019	2017–2018; In-depth interview; n=28	Erie and Niagara Counties in New York State (Mostly urban);	Majority NP; Majority primary care	Mean age=40.4; Majority (79%) female; Majority (54%) White	100% had prescribed PrEP	Not reported	Not reported	Not reported	7.75 (Przybyla 2019)

Lead Author, Publication Year	Data Collection Date, Method, Sample Size	Location, Setting	Provider Type, Specialty	Demographic Characteristics	Experience with PrEP	Experience with HIV-positive patients	Experience with patients who are MSM <sup>1</sup> or TG <sup>2</sup>	Experience with other patients at risk for HIV	CASP <sup>10</sup> (study quality) score
Saberri 2018	2016; In-depth interview; n=6	32% community health center, 21% physician practice group) San Francisco CA (Urban); 100% HIV clinic	Almost 100% MD; 100% HIV specialist	Majority (67%) female; Majority (50%) White	Majority prescribing PrEP	100% had HIV-positive patients	Not reported	Not reported	8.50 (St. Vit 2019)
Spector 2015	Date of data collection not reported; in-depth interview; n=36 (of which 8 were medical providers)	New York City NY (Urban); 100% substance abuse treatment clinic	22% medical providers (1 NP, 1 PA, 5 MDs); None primary care - all provided psychiatric or care related directly to substance use	Not reported	Not reported	Not reported	Not reported	100% had substance using patients	7.00
									9.50

<sup>1</sup>MSM = men who have sex with men

<sup>2</sup>TG = transgender

<sup>3</sup>MD = Doctor of Medicine

<sup>4</sup>This citation is based on the same study as Przybyla et al., 2019 and St. Vit et al., 2019. However, this citation was focused on providers who had not prescribed PrEP.

<sup>5</sup>DO = Doctor of Osteopathic Medicine

<sup>6</sup>NP = Nurse Practitioner

<sup>7</sup>PA = Physician Assistant

<sup>8</sup>PWID = persons who inject drug

<sup>9</sup>ID = Infectious Disease

<sup>10</sup>CAPS Critical Appraisal Skills Programme; CASP scores range from 0–10: 9+ indicates the article is of high quality, 7.5+–<9 indicates moderate quality, and scores <7.5 indicate low quality.

<sup>11</sup>LGBT = Lesbian, Gay, Bisexual, Transgender

<sup>12</sup>This was a pilot study of an intervention aimed at improving access to PrEP in a primary care clinic for homeless veterans. At the end of the intervention, at least 50% of providers in the clinic had initiated PrEP with a new patient.

<sup>13</sup>The focus group was conducted at 3 months after an educational intervention designed to increase provider knowledge of and provision of PrEP.

**Table 2.**

Emerging themes regarding clinic infrastructure and tools that could facilitate PrEP prescribing among providers

Theme	Citation
Routinized/standardized screening/HIV risk assessment (k=9)	Bleasdale et al., 2020 Gilkey et al., 2019 Philips et al., 2020 Przybyla et al., 2019 St. Vil et al., 2019 Calabrese et al., 2019 Krakower et al., 2017 Calabrese et al., 2016 Arnold et al., 2012
Interdisciplinary PrEP team or coordinated/co-located services (k=7)	Philips et al., 2020 Hershow et al., 2019 St. Vil et al., 2019 Calabrese et al., 2016 Doblecki-Lewis et al., 2016 Hoffman et al., 2016 Arnold et al., 2012
Clinic capacity to provide essential services for PrEP prescribing (k=14)	Bleasdale et al., 2020 Gregg et al., 2020 Philips et al., 2020 Hershow et al., 2019 Mullins et al., 2019 Przybyla et al., 2019 Saber et al., 2018 Calabrese et al., 2016 Doblecki-Lewis et al., 2016 Hoffman et al., 2016 Mullins et al., 2016 Spector et al., 2015 Krakower 2014 Arnold et al., 2012
Low patient cost, insurance/patient assistance coverage k=11	Bleasdale et al., 2020 Philips et al., 2020 Hershow et al., 2019 Mullins et al., 2019 Saber et al., 2018 Calabrese et al., 2016 Doblecki-Lewis et al., 2016 Mullins et al., 2016 Krakower et al., 2014 Spector et al., 2015 Arnold et al., 2012
Access to HIV-negative persons at high risk for HIV acquisition (k=6)	Philips et al., 2020 Mullins et al., 2019 Przybyla et al., 2019 Calabrese et al., 2016 Hoffman et al., 2016 Mullins et al., 2016