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Review

HIV preexposure prophylaxis and postexposure prophylaxis in women: a comprehensive guide for healthcare providers

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***Abstract*:** Great disparities and inequities in the delivery and acceptance of human immunodeficiency virus (HIV) prevention exist globally among women. Various barriers, such as societal stigma, low perceived risk, relationship dynamics, and lack of education on routes of HIV transmission can cause low utilization in HIV preexposure prophylaxis (PrEP) adoption and use. In addition, socioeconomic and structural factors, such as financial burden, lack of provider knowledge and willingness to prescribe, absence of insurance coverage, and limited access to healthcare services are additional barriers to PrEP use among cisgender women. The goal of this review is to highlight current and prospective PrEP options, attitudes, and views of PrEP use among cisgender women and healthcare providers, and the role of PrEP in special populations of cisgender women.

Keywords: female, female adolescents, HIV prevention, human immunodeficiency virus, PEP, postexposure prophylaxis, preexposure prophylaxis, PrEP, women

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Introduction

Women are at high risk for contracting human immunodeficiency virus (HIV). As of 2022, there were approximately 20.2 million women and girls living with HIV or acquired immunodeficiency syndrome (AIDS), which accounted for 53.5% of all individuals living with HIV worldwide. In 2023, globally, 4000 young women aged 15–24 years became infected with HIV every week.[1] This population of young women and girls comprised 44% of all new HIV infections globally in 2023.[2] Despite these numbers, there is a significant knowledge gap among providers regarding the use of preexposure prophylaxis (PrEP) and PEP in women. In addition, limited personal HIV risk perception and low PrEP awareness also act as significant barriers to PrEP uptake among women. As of 2018, 1.2 million people in the United States (U.S.) had indications for HIV PrEP.[3] However, in 2021, only 30% of those with indications received a PrEP prescription.[4] In addition, per the Centers for Disease Control and Prevention (CDC), PrEP coverage is three times higher for men (34%) than women (12%).[5] The US Ending the HIV Epidemic (EHE) initiative highlights PrEP as an integral component of HIV eradication. Specifically, the EHE initiative has set forth a goal for PrEP to be prescribed to at least 50% of people with PrEP indications by 2025.[4] Currently, available HIV prevention options include oral and injectable formulations (Table 1).[6–11] Table 2 lists approved HIV PrEP regimens by major global regulatory agencies. Of note, oral tenofovir alafenamide (TAF)/emtricitabine (FTC) is not approved as PrEP for individuals at risk for HIV through receptive vaginal sex.[6] In contrast, oral tenofovir disoproxil fumarate (TDF)/emtricitabine (FTC) is approved for HIV prevention for males and females at risk through both sex and injection drug use (IDU).[6] Injectable cabotegravir (CAB) is approved as PrEP for those with HIV risk through sex.[10]

To eradicate HIV and achieve the EHE initiative goal, providers must work to improve HIV PrEP and PEP awareness and utilization in underserved

Table 1. Approved HIV PrEP formulations.

Oral formulations.

Drug name	Counseling	Monitoring
Tenofovir disoproxil fumarate (TDF)/ emtricitabine (FTC)*[8]	• Indicated as PrEP for those at risk through sex or injection use.[6] • Adverse drug events (ADE) may include dizziness, depression, insomnia, headache, abdominal pain, abnormal dreams, insomnia, decreased bone mineral density, and decreased weight. • Serious ADEs may include hepatotoxicity, renal dysfunction, and lactic acidosis. • Do not use if CrCl < 50 mL/min. • For receptive vaginal sex and injection drug use, TDF/FTC reaches maximum protection at ~21 days of daily use. For receptive anal sex, TDF/FTC reaches maximum protection at ~7 days of daily use.[7]	• HIV-1 antigen/antibody test prior to PrEP initiation and every 3 months, alongside routine HIV RNA testing • Assess for signs/symptoms every 3 months • Sexually transmitted infection (STI) testing every 3 months • Hepatitis B Virus surface antigen (HBsAg) testing prior to PrEP initiation. • CrCl required at baseline and annually. • Obtain SCr at baseline and annually. Obtain every 6 months if >50 years old and/or CrCl < 90 at initiation. • Monitor lipid panel and BMI every 12 months
Tenofovir alafenamide (TAF)/emtricitabine (FTC)*[9]	• Indicated as PrEP for those at risk through sex. TAF/FTC is not for those assigned female at birth at risk for HIV through receptive vaginal sex.[6] • ADEs may include nausea, diarrhea, hyperlipidemia, and weight gain. • Serious ADEs may include lactic acidosis, and hepatotoxicity.	• Same as TDF/FTC

Injectable formulation.

Drug name	Counseling	Monitoring
Cabotegravir (CAB)*[10,11]	• Indicated PrEP for those at risk through sex. • ADEs may include injection site reactions, diarrhea, pyrexia, fatigue, sleep disorders, nausea, headache, weight gain, abnormal dreams, and anxiety. • Serious ADEs may include hepatotoxicity and depression. • Missed scheduled injection by ⩾7 days: ○ > 12 years old or >35 kg, transition to oral cabotegravir 30 mg once daily. The first oral dose should be taken 2 months (±7 days) after the last cabotegravir injection. Restart cabotegravir injection on last day of oral cabotegravir or within 3 days. Oral cabotegravir may be taken for a duration of up to 2 months to replace 1 missed cabotegravir injection. If <1 month since missed target injection date, resume injections with every 2-month dosing schedule. If >1 month since missed target injection date, restart cabotegravir initiation injections (2 injections, 1 month apart), then continue with every 2-month dosing schedule.[11] • No available data on pregnancy or breastfeeding. • Due to concern for development of drug resistance, it is recommended to take oral PrEP for 1 year after discontinuing CAB if patient is still at risk for HIV.	• HIV-1 antigen/antibody test and HIV RNA at baseline within 7 days of starting, at 1 month, and then every 2 months. • LFTs every 3 months • STI screening every 6 months.

*For further information on current 2021 CDC HIV PrEP guidelines, please refer to https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf.
HIV, human immunodeficiency virus; PrEP, preexposure prophylaxis.

Table 2. Approval for HIV PrEP indication, by regulatory agency.

Regulatory agency	Approved HIV PrEP regimens
Food and Drug Administration (FDA), United States	TDF/FTC, TAF/FTC, CAB
Health Canada, Canada	TDF/FTC, TAF/FTC, CAB
Medicines and Healthcare products Regulatory Agency (MHRA), United Kingdom	TDF/FTC, TAF/FTC, CAB
European Medicines Agency (EMA), European Union	TDF/FTC, CAB
Brazil Health Regulatory Agency (Anvisa), Brazil	TDF/FTC, CAB

HIV, human immunodeficiency virus; PrEP, preexposure prophylaxis.

female populations. To accomplish this, providers must remain up to date on guidelines for PrEP and PEP and be aware of the various challenges that cisgender female populations face in remaining adherent to their PrEP and PEP regimens.

Methods

This review summarizes data relevant to the current challenges of providing PrEP and PEP to the adult and adolescent cisgender female population, how providers can navigate these challenges, and the future of PrEP as it relates to the cisgender female population. A comprehensive electronic search was conducted using PubMed and MEDLINE to identify relevant studies published from 04/01/2017 to 12/09/2023 for this review. The search terms used were, "(hiv OR human immunodeficiency virus) AND (preexposure prophylaxis OR prep) OR (post exposure prophylaxis OR pep) NOT (male)." Systematic reviews, meta-analyses, randomized controlled trials, and pharmacokinetic studies were specifically targeted. International studies were included with no limitation on country inclusion if findings were available in English. No abstracts or oral presentations were included. Articles on the use of PEP and/or PrEP in transgender women were excluded from the search. Search results were manually screened for relevance independently by the authors. ENTREQ guidelines were used to author this review article via a pre-planned search and inductive research approach.

Literature search and selection

A total of 738 search results were returned using the specified search criteria. Only 224 results were assessed as eligible for use in the development of this review article based on title, abstract, full-text review, and an inductive research approach. Results were then further screened and categorized manually by the authors based on their relevance and novelty.

New/future PrEP formulations for women

Globally, increased PrEP utilization in women is crucial to reduce HIV transmission. Novel PrEP formulations have the potential to increase women's sexual and reproductive autonomy on a vast scale. Providers should familiarize themselves with the array of PrEP formulations available for women and tailor formulations to accommodate patient preferences and acceptability, adherence, and barriers to access.

Long-acting injectables

Injectable formulations of PrEP offer numerous advantages over oral administration, including increased drug bioavailability and decreased administration frequency. In addition, long-acting injectables (LAIs) may help relieve the stigma and confidentiality concerns associated with daily pill use. Due to these benefits, there is a growing interest in LAI formulations by providers and patients alike.

Recently, the Food and Drug Administration (FDA) approved injectable long-acting cabotegravir (CAB) for HIV PrEP use in men and women. HIV Prevention Trials Network (HPTN) 084 was a phase III, randomized, double-blinded trial in Sub-Saharan Africa that demonstrated that CAB was superior to standard oral daily

tenofovir disoproxil fumarate plus emtricitabine (TDF/FTC) for HIV PrEP in women and was generally well tolerated with similar adverse events other than injection site reactions (ISR's).[12] A total of 3224 participants enrolled in the study (1614 in the CAB arm and 1610 in the TDF/FTC arm).[12] Participants were randomly assigned (1:1) to either active CAB with TDF/FTC placebo (CAB group) or active TDF/FTC with CAB placebo (TDF/FTC group).[12] The primary endpoints assessed incident HIV infection in the intention-to-treat population, as well as grade 2 or higher clinical and laboratory events associated with at least one dose of the study product.[12] Findings revealed only four incident HIV infections in the CAB group (HIV incidence = 0.2 cases per 100 person-years) compared to 36 incident HIV infections in the TDF/FTC group (HIV incidence = 1.85 cases per 100 person-years); [hazard ratio = 0.12; $p < 0.0001$].[12] Additionally, adverse event rates were similar across both groups except ISRs were more frequent in the CAB group than in the TDF/FTC group (38.0% in cabotegravir group vs 10.7% in TDF/FTC group).[12] These results indicate that long-acting CAB is an extremely effective and safe PrEP regimen for women. The reduced frequency of administration of LAI may be an effective and safe option for PrEP in patients with challenged adherence to oral formulations and/or who reside in rural communities with limited access to healthcare services.

Lenacapavir, a twice-yearly subcutaneous injectable first in-class HIV capsid inhibitor, currently FDA-approved for use in combination with other antiretrovirals in multi-drug resistant HIV-1 infection, is also being investigated as a twice-yearly PrEP option in the PURPOSE trials.[13] Phase III topline data from the PURPOSE 1 phase III trial indicated that lenacapavir demonstrated 100% efficacy for HIV prevention in young, cisgender women and adolescent girls aged 16–25 across 25 sites in South Africa and three sites in Uganda. The PURPOSE 3 Phase II trial is investigating lenacapavir for PrEP in cisgender adult women in the United States.[13]

Subdermal implants

Subdermal implants, which offer sustained-release antiretroviral drug delivery, are a further example of a new long-acting innovation. The Centre for the AIDS Programme of Research In South Africa (CAPRISA) 018 trial, is an ongoing phase I/II clinical trial evaluating the safety, acceptability, tolerance, and pharmacokinetics of a subdermal implant containing tenofovir alafenamide fumarate (TAF) for HIV prevention in women.[14] Long-acting PrEP options, such as the subdermal implant, have the potential to revolutionize HIV prevention by providing long-term drug delivery and enhancing adherence for women who carry a risk of poor adherence with oral or injectable options.

Vaginal rings/gels/films

In clinical trials, the Dapivirine Vaginal Ring (DVR) has demonstrated safety and efficacy as a PrEP modality for women, though it has yet to be established as a standard of care or approved in the United States. However, it is currently approved in other countries such as Kenya, Rwanda, South Africa, Uganda, and Zimbabwe for use as an alternative PrEP modality to oral and LAI formulations. Moreover, it has gained World Health Organization (WHO) approval. DVR is an intravaginal silicone ring that delivers the non-nucleoside reverse transcriptase inhibitor (NNRTI) Dapivirine for 28 days with negligible systemic absorption.[15] Notably, DVR has the benefit of being self-inserted and used discretely.[15] Clinical trials have shown that DVR reduced the acquisition of HIV-1 by 27–62% with no safety concerns or increased risk of HIV drug resistance.[15] In addition, the use of DVR among adolescent, lactating, and postmenopausal women was associated with minimal alterations in vaginal microbiota, however, further research is required to verify this finding.[16]

Vaginal gels are another PrEP modality for women currently under investigation. Several randomized clinical trials utilizing vaginal gels have been conducted with varied results. FACTS-001 was a phase III, randomized, double-blind, placebo-controlled trial utilizing 1% TDF gel in several sites in Africa.[17] This trial failed to demonstrate that TDF 1% vaginal gel prevented HIV-1 acquisition in women better than placebo. However, the modality showed high acceptability among study participants. Additionally, Griffithsin (GRFT), a non-antiretroviral lectin vaginal gel is also currently undergoing phase II investigation.[18] Griffithsin, a protein isolated from red algae, acts by binding to the HIV viral gp120 glycoprotein to block viral entry. Study

findings have revealed only minor adverse events. Moreover, given that GRFT is not an antiretroviral, it is thought to be less likely to lead to drug-resistant HIV variants. Thus, HIV testing prior to and during use may not be required.[18] It also has activity against other sexually transmitted infections (STIs), such as herpes simplex virus type-2 and human papillomavirus. Finally, the use of vaginal films containing Bictegravir nanomicelles and anionic pullulan is also under investigation for PrEP. This modality offers a dual mechanistic approach for HIV prevention. Anionic pullulan, a rapidly soluble film and novel carbohydrate-based anti-HIV agent, is combined with Bictegravir, a commonly used HIV integrase strand transfer inhibitor.[19] Initial studies show rapid disintegration of the combined drug film in simulated vaginal and seminal fluid.[19] Vaginal films may hold several advantages over vaginal creams and gels due to their flexibility, portability, and accurate dosing.[19] Efavirenz nanomicelles are also under investigation for PrEP in women.[20] Efavirenz, a NNRTI, is a weakly basic lipophilic molecule with poor aqueous solubility, necessitating the use of a surfactant or co-solvent.[20] However, these surfactants or co-solvents typically cause vaginal irritation and inflammation limiting effective use. To circumvent this challenge, researchers are attempting to produce a surfactant-free formulation of efavirenz vaginal film in a rapidly soluble form. While these technological advancements are promising, none are yet FDA approved, and many are in early phase trials.

Women's attitudes/views/barriers to PrEP

PrEP is a highly effective HIV prevention strategy, but its adoption and accessibility among women are hampered by significant and complex barriers. Some of these barriers may include societal stigma, low perceived risk, relationship dynamics, and lack of awareness regarding HIV transmission.[21] Socioeconomic and structural factors, such as financial constraints, lack of provider knowledge and willingness to prescribe, absence of insurance coverage, limited access to healthcare services, and high medication costs, are also known to be major barriers to PrEP use among cisgender women.[22,23] Preferences for certain formulations also play a role in PrEP utilization as this can positively or negatively impact a patient's adherence.[24] Women's acceptance and adherence to PrEP may be enhanced by the availability of multiple options to provide them choice of formulation to best suit their personal lifestyles.[24] Finally, relationship dynamics and social stigma are also prominent obstacles to PrEP adoption among women. Concern about partner disclosure and fear of potential conflicts can significantly impact women's access to and utilization of HIV PrEP.[24] A 2022 qualitative study of highly educated women (84.8% of participants were enrolled in post-secondary education) in Durban, South Africa, found that many women viewed use of PrEP as a sign of promiscuity and feared judgment from their communities.[25] Similarly, a 2017 survey study of 597 female Planned Parenthood attendees in the United States also reported that HIV-related stigma was a significant barrier to PrEP uptake.[26] Participants felt that taking PrEP would lead to stereotypical labeling such as being "promiscuous" (37%), "HIV-positive" (32%), "bad" (14%), or "gay" (11%).[26] This fear of societal disapproval was associated with less inclination to discuss PrEP with their healthcare providers.[26]

A survey study in Louisiana, USA, conducted in a general obstetrics and gynecology setting revealed little interest in PrEP in 144 female participants, largely citing a low perception of personal risk and concerns about medication adverse effects.[27] At baseline, 37.5% of participants indicated interest in PrEP. Following an education session on PrEP requirements and side effects, only 2.8% ($n=2$) of participants remained interested.[27] Incorporating non-risk-based PrEP education into routine OB/GYN and primary care visits may help to reduce stigma.

A systematic review of 39 studies evaluated factors affecting PrEP implementation among women in the United States.[28] Findings highlighted that only about 1/3 of female study participants had heard of HIV PrEP; however, the majority of these women were interested in trying PrEP and PrEP education for women was positively associate with increased intention to use PrEP.[28] An additional study conducted in Washington, D.C. in 387 women at high risk of HIV acquisition found similar results.[29] Burns et al. found that for cisgender women already prescribed oral PrEP ($N=20$), factors negatively associated with PrEP continuation included concerns about adverse effects, difficulties with adherence, and a lack of consistent healthcare provider follow-up. The most common reasons for PrEP discontinuation were side effects,

negative emotional experiences during PrEP use, and negative interactions with healthcare providers.[30] Future research should target anticipatory guidance regarding PrEP side effects. Improvement of provider-patient interactions, and improved healthcare service delivery.

Special populations

Pregnant and postpartum women

HIV infection is particularly concerning for pregnant and postpartum women. In fact, a study assessing HIV incidence during pregnancy found that pregnant women have a higher risk for HIV acquisition compared to nonpregnant women. Moreover, not only does a new HIV infection during pregnancy or the postpartum period pose negative health consequences for the woman but there is also a further risk for vertical transmission during childbirth and breastfeeding.[31] Thus, PrEP-specific considerations and obstacles must be considered by providers for pregnant and postpartum women. Several studies have highlighted the safety and efficacy of oral TDF/FTC PrEP during pregnancy and the postpartum period.[32] The CAP016 trial confirmed the safety and noninferiority of daily oral PrEP during pregnancy in terms of pregnancy and neonatal safety outcomes.[33] Currently, long-acting cabotegravir does not have enough efficacy and safety data to support its use in pregnant or postpartum populations.

A 2019 study assessed PrEP guidelines during periconception, pregnancy, and breastfeeding in all countries that had clinical guidance in place.[34] Among the countries and international bodies examined (WHO, South Africa, Kenya, Uganda, Lesotho, Zimbabwe, Botswana, Nigeria, Swaziland, Malawi, United States, United Kingdom, France, Australia, New Zealand, and Canada), almost all countries recommended PrEP use during pregnancy. Only South Africa noted PrEP as contraindicated during pregnancy due to a gap in complete safety data in this population.[34] However, on a global scale, there are many countries lacking PrEP guidance during pregnancy.[34] Thus, the study emphasized the need for further research in this area by highlighting the significant benefits of PrEP for eligible and at-risk expectant and breastfeeding women.[34] Despite the lack of guidelines, attitudes toward PrEP in women who are pregnant or postpartum are generally positive. In 2022, a survey study of women in Washington, D.C. compared 201 pregnant women and 1103 nonpregnant women and highlighted safety, efficacy, and social network and medical provider support as integral factors to improve PrEP uptake during pregnancy. In addition, the belief that PrEP can protect their baby from HIV transmission was also associated with PrEP uptake during pregnancy. There were no significant differences between the attitudes of the pregnant and nonpregnant women.[35] These findings illustrate that strategies such as integrating PrEP education into family planning and OB/GYN care can increase PrEP utilization in women.[36]

Overall, HIV PrEP reduces HIV transmission among expectant and postpartum women and is proven to be safe and effective. Availability of LAI PrEP may also improve PrEP utilization in pregnant and postpartum women. A recent 2023 study explored the acceptability of long-acting PrEP options in South African and Kenyan women who had prior experience with daily oral PrEP formulations.[37] Notably, LAI was preferred to oral PrEP by 75% of participants.[37] Oral PrEP, however, was preferred to long-acting vaginal rings by 87% of participants.[37] Further research into the safety and efficacy of long-acting injectables in pregnant and postpartum women can better inform the future implementation of PrEP regimens.

Intimate partner violence

Women who experience intimate partner violence (IPV) are a highly vulnerable population and are at an increased risk of contracting HIV infection. Numerous studies have demonstrated a significant correlation between IPV and reduced PrEP use in women. Specifically, this population tends to struggle with medical mistrust, and this contributes to poor access to PrEP services.[38] A 2022 study by Sharpless et al.[38] highlights the significant impact of medical mistrust on PrEP utilization in women and underscores the urgent need to address this barrier by facilitating trust between providers and IPV-affected women. Findings showed that psychological IPV was associated with increased embarrassment over discussing PrEP with a healthcare provider ($p=0.009$).[38] IPV-affected women also struggle with PrEP adherence due to fear of disclosure of PrEP use to partners.[38] The HPTN 082 trial ($N=409$) found that IPV was associated with reduced oral PrEP adherence among younger African women.[39] Adolescent girls

and young women less than 21 years old who reported IPV were less than half as likely to show high adherence to their PrEP regimens. On the contrary, women over 21 years of age who reported IPV were more than twice as likely to show high adherence to their PrEP regimen.[39] A 2023 systematic literature review identified fear of disclosure, absence of provider knowledge, and limited healthcare access, as key barriers to PrEP access in women experiencing IPV.[40]

Women in custody

Women in custody are at high risk for HIV acquisition and experience an HIV prevalence rate nine times higher than that of women in the general population.[41] During incarceration, however, may be an ideal time to initiate PrEP due to likely improved access and adherence during custody. A 2022 survey study regarding PrEP attitudes among women in the criminal justice system emphasized the importance of policy and practice modifications to increase PrEP use in correctional facilities.[42] The study found that women in custody ($n=48$) were more likely to take PrEP, if offered, than non-institutionalized women in the criminal justice system ($n=125$). The study recommended incorporating comprehensive sexual health education, routine HIV screening, and PrEP provision into the healthcare services offered to individuals in custody and post-release.[42] Common barriers to PrEP uptake in this population are poor literacy and understanding of HIV transmission and risk factors, coupled with structural factors. In 2018, Rutledge et al. investigated the perception of HIV risk and eligibility for PrEP among women in the criminal justice system. The study found that women in custody underestimated their risk of contracting HIV, resulting in a low perception of need for PrEP. Thirty-three percent of study participants ($N=41/125$) met eligibility criteria for PrEP but only 25% of those eligible ($n=10/41$) were aware of PrEP and only one participant was currently taking it ($n=1/41$).[43] In addition, only 16.7% ($n=7/42$) of those who were PrEP eligible perceived they were at risk for contracting HIV in the next 12 months.[43] This finding illustrates the need for education programs to increase HIV risk and PrEP awareness among incarcerated women.

A 2023 study in southeastern USA investigated the influence of social relationships on PrEP attitudes among women with incarceration experience. Study findings highlighted the importance of social support networks in shaping PrEP perspectives and decision-making processes.[44] Incorporating peer counseling and enhanced support systems into PrEP services may assist to address PrEP concerns and misperceptions, thereby improving awareness and access for women in custody.

Female sex workers

Due to their high risk of contracting STIs and HIV, Female sex worker (FSW) are excellent candidates for PrEP to prevent HIV acquisition. However, this population encounters numerous complex access barriers. Multiple studies have identified a lack of awareness and knowledge about PrEP as the most significant barrier to HIV PrEP uptake in this population.[45,46] Inadequate access to healthcare services, PrEP-prescribing providers, stigma, and economic constraints also hinder PrEP utilization.[47,48] However, integration of sexual health and PrEP education and services into existing healthcare settings and sex worker-led initiatives have demonstrated promise for enhancing access, sexual health, and PrEP adherence.[45,48] In the event of poor PrEP adherence, educating FSWs on the continued use of contraception during PrEP breaks represents one recommendation that healthcare providers can make to promote improved sexual health practices in this population.[49] Moreover, misinformation can lead to increased stigmatization and confusion in this population. Thus, trained peer navigators and community outreach workers may be utilized to help combat stigma and assist FSWs in initiating and adhering to PrEP.[50]

Women who inject drugs

Due to the risk of contracting HIV through IDU, HIV PrEP is crucial for Women Who Inject Drugs (WWID). Truvada is currently the only medication approved for PrEP use in this population. A 2020 study investigated factors associated with initiation of PrEP in WWID ($N=39$). Trust in their healthcare provider or peer support network emerged as a central factor in their decision to initiate PrEP.[51]

A 2020 global systematic review of the gaps in the PrEP care continuum for cisgender women who use drugs and/or sell sex emphasized barriers at various stages, such as awareness, acceptability, uptake, and adherence in care.[52] In their 2021 study, Felsher et al. investigated adherence issues

in WWID participating in a PrEP demonstration project in Philadelphia, USA. The study underscored the intricate connection between substance abuse, mental health, and PrEP adherence.[53] The ability of WWID to prioritize and consistently adhere to PrEP was hindered by competing priorities, such as the daily struggles associated with substance use disorders, unstable housing, and financial hardships.[53] Thus, social work collaboration and case management services may help to address these barriers to PrEP utilization in this population.

Adolescent girls and young women

Rates of HIV in AGYW remain a major concern, particularly in Sub-Saharan Africa. In fact, in sub-Saharan Africa in 2021, 63% of new HIV infections were in AGYW.[54] Though PrEP has emerged as a highly effective HIV prevention strategy, there is notably low utilization by young women for various reasons. Research shows that PrEP has lowered incidence in Sub-Saharan African women, though uptake was significantly hampered by stigma and misperceptions regarding HIV transmission.[55,56] Several interventions have been proposed to address the HIV prevention barriers encountered by AGYW in low-income and middle-income countries including comprehensive strategies that address social, structural, and individual factors. Examples of successful strategies included a social marketing campaign, a decision support tool, SMS reminders, peer-group support, and conditional economic incentives.[57] Moreover, a study in Zimbabwe recommended improving PrEP access by involving community healthcare providers and integrating PrEP services into existing reproductive health programs.[58] In South Africa, mobile clinics were found to be an effective model for providing PrEP services to AGYW.[59] In addition, qualitative research conducted in Uganda emphasized the importance of peer support and counseling services to address misconceptions and improve PrEP adherence.[60]

Gender norms and societal expectations, for example, "good girl" conceptions, also frequently impede PrEP utilization in AGYW.[61] To overcome these obstacles, comprehensive strategies addressing social and cultural factors, promoting gender equality, and empowering young women to make informed decisions regarding their reproductive health are necessary.

The role of the provider

PrEP is a highly safe and effective prevention strategy for at-risk individuals. However, its utilization among women remains suboptimal. Providers, particularly gynecologists, obstetricians, primary care providers, family medicine providers, pharmacists, and women's healthcare providers, play a crucial role in addressing this disparity and expanding women's access to PrEP. A 2020 study investigated the impact of PrEP counseling by providers on PrEP knowledge and attitudes in women seeking family planning care. The study found that the participants who received guided counseling reported higher knowledge and acceptability regarding HIV PrEP ($p = 0.031$) than participants who did not receive guided counseling.[62] In order to provide effective PrEP counseling, providers must familiarize themselves with the most recent clinical guidelines and recommendations for PrEP provision to women. A study by Zhang et al.[63] demonstrated that open and nonjudgmental discussions about sexual health and HIV prevention are necessary for patients to make informed decisions about PrEP.

To further increase access, PrEP services should be incorporated into routine healthcare care settings. Obstetrician-gynecologists and general gynecologists can play a key role in providing PrEP to women during routine visits.[64] Routine screenings for STIs offer the chance to identify women at increased risk for HIV acquisition and to initiate discussions about PrEP. Emergency room and urgent care providers who care for individuals who were sexually assaulted should also integrate discussions about PrEP into their standard of practice.

Providers can also assist to promote PrEP utilization by deconstructing myths and disseminating accurate information regarding efficacy and safety, as well as addressing concerns regarding adverse effects and adherence. This may also help to reduce stigma and fear associated with PrEP use.

Provider attitudes toward PrEP in women

While PrEP is widely available, it can be difficult for women to find a healthcare provider who will prescribe PrEP. Provider attitudes and experiences in offering PrEP services to women are varied. Numerous studies have examined the attitudes and experiences of providers regarding

the provision of PrEP to women. A population-based study conducted in Kenya and Uganda reported that providers had favorable attitudes toward PrEP implementation. However, concerns about potential adverse effects, adherence requirements, and the stigma associated with PrEP use were cited as obstacles to its provision. Some providers in the study feared offering PrEP and then being blamed for failures such as HIV seroconversion or patient misconceptions that PrEP use increases immortality.[65] Women experiencing IPV also present unique challenges in PrEP provision. One study investigating provider perspectives on safety planning in women experiencing IPV found that providers had a positive perception of PrEP for this population but believed the women may be at increased risk of violence if their PrEP use was discovered.[66]

Strategies to promote HIV PrEP for women

To address gender disparities in HIV prevention, it is vital to encourage PrEP utilization in women. Several sites worldwide have begun developing novel strategies to increase PrEP uptake in women.

Interventions such as the following have been shown to improve access and utilization:

- Incorporation of PrEP services into routine reproductive health care, ED and urgent care, and primary care.
- Community-based approaches to the provision of PrEP services to help destigmatize PrEP use. For example, the successful incorporation of PrEP into community-based HIV prevention initiatives for female sex workers in Kolkata, India, suggests that community engagement and peer support play an essential role in promoting PrEP adherence.[67]
- Incorporation of technology, such as electronic health records (EHRs) and electronic patient messages, to facilitate awareness, adherence monitoring, and improve PrEP delivery. EHR prompts can serve as reminders to providers to offer PrEP to all individuals.[68,69]
- Utilization of telehealth services and mobile applications for PrEP services to help eliminate geographical barriers and improve access, particularly for women in custody and post-release, AGYW, women living in rural and remote areas, and sex workers.
- Incorporation of PrEP training into healthcare provider education to improve provider awareness, knowledge, and confidence in prescribing PrEP.

The importance of HIV postexposure prophylaxis for women

HIV PEP is recommended for the prevention of HIV transmission after both potential occupational and nonoccupational exposures. PEP is highly effective in preventing HIV transmission if administered within 72 h of HIV exposure and for a full 28-day course. A study of PEP initiation for victims of sexual assault in urban emergency departments revealed that delayed presentation, lack of knowledge about PEP, and fear of stigmatization were significant barriers to PEP utilization in this population. In addition, educational level, employment, health insurance, vaginal injuries, and tongue/mouth assaults of presenting patients also affected the utilization of PEP regimens.[70] PEP recommendations should be included in sexual assault care guidelines to ensure prompt initiation and enhance patient outcomes. Individuals who receive PEP after a sexual assault may also benefit from long-term HIV prevention strategies, such as PrEP.[71] A study conducted in Brazil investigated women's PEP use after sexual activity. Predictors of loss to follow-up included younger age and inadequate social support. Understanding the factors influencing PEP utilization, and patient risk profiles is important for healthcare providers and may enhance patient care.[72]

Conclusion

Overall, PrEP has shown great efficacy in preventing HIV transmission among cisgender women. Nonetheless, numerous obstacles, such as stigma, low awareness, and cultural gender norms, impede its adoption and continued adherence among this population. To address these obstacles, interventions involving healthcare provider education, community engagement, and peer support are necessary. AGYW must also be empowered by providers to protect themselves from HIV. Integration of PrEP services into existing reproductive health programs and routine care, providing comprehensive education, partnering with community organizations, utilizing peer educators, and confronting societal stigma are examples of successful interventions. Integration of digital

formats, comprehensive safety planning, and strategies tailored to specific special populations, such as adolescent girls and women experiencing IPV, can also increase PrEP access and utilization.

Current HIV PrEP and PEP practices among women reveal not only the progress made but also the path forward. By remaining up to date with current PrEP/PEP guidelines, treatment options, and screening for risk factors associated with HIV acquisition, healthcare providers can better identify cisgender women eligible for PrEP/PEP services.

Declarations

Ethics approval and consent to participate

Not applicable. This article is based on previously conducted studies and does not involve any new studies of human or animal subjects performed by any of the authors.

Consent for publication

Not applicable.

Author contributions

Niam Vora: Conceptualization; Investigation; Methodology; Resources; Writing – original draft; Writing – review & editing.

Melissa E. Badowski: Conceptualization; Methodology; Resources; Supervision; Writing – original draft; Writing – review & editing.

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Competing interests

Niam Vora and Melissa Badowski all declare there are no disclosures related to personal, financial, commercial, or academic conflicts of interests.

Availability of data and materials

Data sharing is not applicable to this article as no data sets were generated or analyzed during the current study.

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Supplemental material

Supplemental material for this article is available online.

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