

CONCEPTS

Infectious Disease

Utilizing emergency departments for pre-exposure prophylaxis (PrEP)

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Funding and support: By *JACEP Open* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist.

Abstract

HIV incidence and prevalence rates in emergency departments (EDs) around the nation warrant strategies to protect and sustain the HIV negative status of persons who are at risk for HIV. The ED provides a rare opportunity to serve as a vehicle for connecting pre-exposure prophylaxis (PrEP)-eligible patients with clinical settings such as an ED that are knowledgeable and well informed about PrEP. PrEP has established efficacy at preventing HIV acquisition. The greatest challenge is access to PrEP and uptake thereof among vulnerable populations. We propose recommendations to improve the functionality of EDs as access points for PrEP referrals as an HIV prevention strategy to increase PrEP availability and uptake.

KEYWORDS

emergency department, emergency medicine, HIV prevention, HIV, pre-exposure prophylaxis, PrEP

1 | THE HIV EPIDEMIC IN THE UNITED STATES

The rate of new HIV diagnoses in the United States has been decreasing, from 12.6 per 100,000 in 2014 to 11.5 per 100,000 in 2018.¹ However, some populations remain disproportionately affected, including African Americans, men who have sex with men (MSM), and heterosexual women.^{1,2} The Updated 2018 HIV Surveillance Report from the Centers for Disease Control and Prevention (CDC) found that in 2018, there were 37,515 new HIV diagnoses in the United States.¹ Of these, 16,047 were African American, 24,669 were MSM, and 7110 were women.¹ The racial and sex epidemiology of HIV within an HIV screening program in the ED located in Harris County of Houston, Texas, the largest and most diverse county in the United States, revealed that African American females had the largest disparity between the population tested and those who tested positive for HIV.³

2 | ADDRESSING THE HIV EPIDEMIC IN THE UNITED STATES WITH PrEP

The National HIV/AIDS Strategy (NHAS) updated their call to reduce new HIV cases in the United States by 2020 with various goals (Figure 1) and indicators of progress.^{4,5} One of the NHAS indicators being developed proposes expanding access to pre-exposure prophylaxis (PrEP) via increasing PrEP prescriptions by 200% by 2020.^{5,6} Strategies to pursue and strengthen the trend toward ending the HIV epidemic should involve the use of antiretrovirals like PrEP to prevent HIV seroconversion. In 2019, the US Preventive Services Task Force (USPSTF) gave PrEP a grade A recommendation for people who are (1) HIV negative and (2) at high risk of becoming HIV positive.⁷ In 2012, the Food and Drug Administration (FDA) approved the use of a “daily oral fixed-dose combination of tenofovir disoproxil fumarate 300 mg

Supervising Editor: Steven G. Rothrock, MD

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NHAS 2020 Goals ^{5,6}
1. Reducing new HIV infections
2. Increasing access to care and improved health outcomes for people living with HIV
3. Reducing HIV-related disparities and health inequities
4. Achieving a more coordinated national response to the HIV epidemic

FIGURE 1 National HIV/AIDS strategy (NHAS) 2020 goals

and emtricitabine 200 mg” (TDF/FTC) for PrEP in all populations.^{7,8} Seven years later, the FDA approved the combination of emtricitabine 200 mg and tenofovir alafenamide 25 mg (TAF/FTC) as PrEP to prevent “HIV-1 infection from sex, excluding receptive vaginal sex.”^{9,10} Studies found daily tenofovir (TDF) to be effective as PrEP in people who inject drugs (PWID) and heterosexual adults.^{7,8,11–13} Longitudinal care is needed to maintain PrEP therapy, which requires frequent follow-up care (ie, quarterly) with additional testing and monitoring.⁸ PrEP is recommended during seasons of high-risk behavior. The length of high-risk seasons varies between individuals and is contingent upon their behaviors and perception of their own risk. Clinical practice guidelines by the CDC state that patients may discontinue PrEP if (1) they decide to stop using PrEP by choice, (2) their risk is lowered, (3) they are not adherent to daily use, or (4) they become HIV positive.⁸

The list price of TDF/FTC is \$2000 per month, on average; however, costs may vary widely for patients.¹⁴ The costs vary for patients with private insurance depending on their individual plans and deductibles but could cost > \$1000 out of pocket per year.¹⁴ In December 2019, the US Department of Health and Human Services (HHS) launched Ready, Set, PrEP, a national program making PrEP available at no cost to people without prescription drug insurance coverage.¹⁵ A generic form of TDF/FTC is poised to enter the market in September 2020, but its effect on costs are not yet known.^{14,16} Amongst all groups (insured, uninsured, and underinsured), the high price of PrEP may be a deterrent and barrier to initiation or continuation.

Mobilization of efforts to increase PrEP uptake is led by clinical trials aimed at engaging 4 vulnerable populations: MSM, African Americans, PWID, and heterosexual men and women at high risk of HIV seroconversion.¹⁷ Figure 2 contains the USPSTF recommendations on which populations are at high risk of HIV acquisition and should be considered for PrEP.^{7,18} Current findings demonstrate varying degrees of PrEP effectiveness aimed at preventing new HIV cases within these populations. Grant et al (2010) examined the use of TDF/FTC in conjunction with a “comprehensive package of prevention services” in MSM and found a “44% reduction in incidence of HIV” and a relative risk reduction of 92%.¹⁹ A reduction in high-risk behavior was also observed in this study, with a similar reduction observed in a trial of TDF/FTC in women.^{19,20} Both studies offered participants various HIV-prevention services, such as HIV counseling, condom counseling, and

sexually transmitted infection (STI) testing and treatment.^{19,20} Both studies found an increase of condom use among study participants. Peterson et al (2007) found an increase from 52% condom use at screening to 92% at enrollment and an average of 92% of condom use during follow-up visits after enrollment.²⁰ This is promising for use in the ED, which typically does not offer longitudinal care. Harnessing HIV- and risk-reduction counseling to patients in the ED may lower high-risk behaviors.^{11,19,20} Phase 3 clinical trials of TAF/FTC in high-risk MSM populations found that “TAF/FTC is noninferior to FTC/TDF for HIV prevention,” and similar to other PrEP studies, incident HIV seroconversions had low or undetectable measured drug levels.²¹ Clinical trials conducted in Bangkok, Thailand found that daily oral tenofovir coupled with HIV counseling and other risk-reduction measures reduced HIV transmission by 73.5% among PWID, which was highly dependent upon level of adherence.¹¹

Women and participants ≥ 40 years old were found to have the highest efficacy rates, at 79% and 89% respectively, as well as high levels of adherence.¹¹ TDF/FTC coupled with “HIV-1 prevention services” reduced seroconversion by 90% in HIV-1-serodiscordant heterosexual couples.¹² The Partners PrEP study found a 66% reduction of seroconversion in women who used PrEP.^{13,22} A meta-analysis validated the effectiveness of PrEP with high adherence (70% of potential HIV cases averted) across various populations and methods of exposure.^{22,23} This meta-analysis demonstrated that PrEP was effective in preventing HIV infection across sexes, although individual studies consisting of only female participants has been variable.^{22,23} The FEM-PrEP and VOICE trial did not find significant difference in effectiveness of PrEP compared to placebo.^{8,24–26} Less than half (40%) of participants in the FEM-PrEP trial achieved target tenofovir (TFV) plasma levels and less than half of participants with measured plasma samples in the VOICE trial had detectable plasma TFV levels (oral TDF: 30%; oral TDF-FTC: 29%; TFV gel: 25%).^{8,24–26} The CDC’s effectiveness estimate of PrEP with “optimal or consistent use” to be $\approx 99\%$ in MSM and heterosexual adults and 74%–84% in PWID.²⁷ Effectiveness estimate is the estimated relative risk reduction. Optimal use is defined as taking PrEP daily and consistent use is defined as at least 4 pills per week.²⁷ PrEP uptake had no effect on HIV prevention when adherence was low and the highest efficacy rates were observed when there were detectable TDF/FTC levels; therefore, the efficacy of PrEP is contingent upon the patient’s adherence to the prescribed regimen. Furthermore, decision models found that the effectiveness and cost-effectiveness of PrEP are dependent not only on PrEP regimen adherence but also on “condom use, HIV prevalence, and degree of behavioral disinhibition—factors which vary widely between patients and populations.”²⁸ All of these factors affected the number needed to treat (NNT) observed in MSM populations. For a “patient fitting generic population profiles for MSM in the US,” the NNT to prevent 1 new HIV case was 64. However, the NNT was 30 in the scenario of the population-average profile with high adherence to PrEP.²⁸ Modeling of the cost-effectiveness of PrEP in different MSM populations varies, but the most consistent cost-effective strategy is targeting high-risk MSM for PrEP with cost-effectiveness ratios of < \$100,000 per quality-adjusted life years (QALY), with the exception of one model by Paltiel et al (2009), which found it to be

The USPSTF Recommendations on Populations at High Risk of HIV Acquisition ^{7,18}	
The following is from the USPSTF Final Recommendation Statement on the Prevention of HIV: PrEP	
Men who have sex with men	“Are sexually active and have one of the following: <ul style="list-style-type: none"> • A serodiscordant sex partner • Inconsistent condom use during receptive or insertive anal sex • A sexually transmitted infection (STI) with syphilis, gonorrhea, or chlamydia within the past 6 months”^{7,18}
Heterosexually active women and men	“Have one of the following: <ul style="list-style-type: none"> • A serodiscordant sex partner • Inconsistent condom use with a partner whose HIV status is unknown and who is at high risk • An STI with syphilis or gonorrhea within the past 6 months”^{7,18}
Persons who inject drugs	“Have one of the following: <ul style="list-style-type: none"> • Shared use of drug injection equipment • Risk of sexual acquisition of HIV”^{7,18}

FIGURE 2 Populations at high risk of HIV acquisition. PrEP, pre-exposure prophylaxis; USPSTF, US Preventive Services Task Force

\$298,000.^{28–32} For PrEP to be an effective and cost-effective therapy both on an individual and population level, further research on PrEP adherence and uptake is warranted.

Many of the studies on PrEP efficacy used varied HIV prevention strategies with PrEP, including HIV counseling, risk-reduction counseling, condoms, and testing with treatment of STIs.^{11,12,19,20} Grant et al (2010) and Peterson et al (2007) found a decrease in high-risk behavior and an increase in condom use after enrollment in various counseling services.^{19,20} It is important to note the use of HIV-prevention and risk-reduction strategies coupled with PrEP intervention. Diverse prevention measures should be implemented alongside a PrEP regimen.

3 | CURRENT TRENDS OF PrEP USE FOR HIV PREVENTION IN THE UNITED STATES

National estimates for adults with PrEP indications in 2015 exceeded 1 million people.^{4,33} Seventy-one percent of those were MSM and 22.5% were heterosexual adults, the majority being women.³³ Additionally, among those with PrEP indications, 43.7% were African American.^{4,33} Recent analysis confirms that MSM, at-risk African Americans, and heterosexual women are the subpopulations most vulnerable to HIV.^{1,2} MSM lead the nation in new diagnoses and account for 65% of new HIV diagnoses in the United States in 2018.^{1,33} These subpopulations would benefit most from PrEP above other sexual orientations or racial/ethnic groups; however, there is a discrepancy between the populations who need PrEP and those who receive PrEP. A recent evaluation project assessing PrEP utility based on a national pharmacy database identified 49,158 people who started PrEP.^{34,35} Of

those, 21% were women, 74% were Whites, 12% Latinos, and 10% African Americans.^{34,35} From 2014 to 2016, only 4.7% of PrEP users were female and only 11.2% of total people on PrEP were African American.³⁶ These data highlight suboptimal PrEP uptake levels among populations who would benefit from it most, thus warranting strategies to bridge PrEP access to at-risk populations within the current environment using EDs.

4 | RATIONALE FOR THE USE OF PrEP IN THE ED

The unique environment of the ED creates opportunities to both treat and serve patients along a spectrum ranging from immediate acute illness to longitudinal preventative measures. In 2017, ≈ 139 million ED visits occurred nationwide.³⁷ The ED is the only source of care for many, as 38% of ED patients report no access to primary care.³⁸ In addition, the Affordable Care Act's Medicaid expansion has increased the allowable number of ED visits and is projected to continue to rise.³⁹ Therefore, the ED has the potential to serve as a viable catalyst, bridging at-risk groups with access to PrEP. National 2016 estimates of ED visits by race/ethnicity illustrated that a quarter (25.6%) of patients who had ≥1 ED visit were African Americans, a population disproportionately affected by HIV.⁴⁰ Because of the ED's large patient volumes, long wait times, and ability to access underserved populations in the health care system, the ED is poised to serve a more active role in public health interventions via linkage to preventative and primary care services.⁴¹

A study conducted in an urban ED found that 96% of patients did not think they were at risk for HIV, and among those who reported

high-risk characteristics, only 1.5% considered themselves at high risk.⁴² They also found African Americans and women were less likely to consider themselves susceptible to HIV seroconversion.⁴² African American women and men, a subset of the ED population who experience an HIV positive conversion more often than other/race ethnicities, would benefit from enhanced access to and education about PrEP during an ED visit.

In response to the high HIV incidence rates in the United States, the CDC published revised guidelines in 2006 recommending opt-out HIV screening of patients aged 13 to 64 years.⁴³ These guidelines fueled a drastic change in the HIV testing approach by supporting widespread routine opt-out HIV screening in settings where the prevalence of undiagnosed infection was 0.1% or higher.⁴³ A meta-analysis conducted from 1984 to 2015 compared opt-out and opt-in HIV testing in EDs.⁴⁴ Findings illustrated that more testing was performed in the opt-out group (44%) versus the opt-in group (19%); yet, there was no difference in identifying HIV seroconversion.⁴⁴ Potential benefits of HIV testing in the ED identified by experts include “high volume and high HIV-prevalence,” the opportunity to test populations with limited or no access to health care, and ability to link patients to follow-up care.⁴⁵

EDs represent the most frequent site of contact for patients with missed opportunities for identifying a HIV positive status.⁴⁵⁻⁴⁷ Jenkins et al (2006) found that 34% of patients with newly diagnosed HIV had at least 1 clinical encounter within 3 years of diagnosis; 50% of these encounters were in the ED.⁴⁶ A study that examined the implementation of opt-out HIV screening in an urban academic ED found that it is possible to execute these types of screenings in a high-volume, fast-paced ED.⁴⁸ They provided brief HIV screening questionnaire via the electronic health record (EHR) conducted by triage nurses. Then, an “EHR-prompted ad hoc questionnaire” was administered in the treatment room.⁴⁸ If eligible, an automatic order was placed for HIV testing.⁴⁸ In addition to testing, their program offered counseling by the emergency physician and referred preliminarily positive patients to an HIV/AIDS clinic for follow-up.⁴⁸ Of the confirmed positive patients, 76% followed up with the HIV/AIDS clinic and attended an appointment.⁴⁸ This same model can be applied to referrals for PrEP and integrated in HIV opt-out screening in the ED.

5 | STRATEGIES TO INCORPORATE PrEP IN THE ED

The CDC estimates that \approx 1.2 million Americans are eligible for PrEP.⁴⁹ However, PrEP implementation in clinical settings has been slow.⁴⁹ Both STI clinics and the ED provide services to low-income and high-risk populations, representing opportunities for PrEP programs in the United States.⁴⁹ Future strategies to incorporate PrEP in the ED require a better understanding of current implementation methods within various clinical settings that could be adapted and expedited in the ED. ED-based interventions to improve PrEP uptake can increase risk awareness, PrEP knowledge and access to care for a cohort of patients that otherwise may remain unexposed to PrEP benefits.⁵⁰

In our local ED, Hill (2020) led a single-arm study with a tablet-computer-based intervention, “Increasing PrEP (iPrEP).”⁵¹ The study demonstrated feasibility and was associated with willingness to use PrEP among African American women who acknowledged both condomless sex and current substance use.⁵¹ The iPrEP study is currently being tested in a randomized clinical trial of a behavioral intervention compared to usual care.⁵¹ It addresses longitudinal care from the ED with a warm handoff to partnering local PrEP clinics from the ED, whereby enrolled participants can continue PrEP care over time.⁵¹

Ridgway et al (2018) tested the use of the ED for PrEP referrals via an electronic risk score for identifying those at high risk of HIV acquisition that was integrated in the EHR.⁵² The following criteria was used by Ridgway et al to identify those at high risk: “(1) man who reported condomless sex with another man in the past 6 months, (2) man or woman who reported sex with a HIV-positive partner in the prior 6 months, (3) man or woman who reported sex with multiple partners in the past 30 days, regardless of partner’s gender, (4) bacterial STI in the past 6 months, or (5) injection drug use with needle sharing in the past 6 months.”⁵² These criteria, as well as other predictors, developed the risk score that was calculated automatically at triage. If ≥ 21 , an “automated electronic alert [was] generated in the form of both (1) a message sent to a pager held by an HIV prevention counselor, and (2) a best practice alert delivered to an HIV prevention electronic in-basket.”⁵² A risk score of ≥ 21 had a sensitivity of 50% and specificity of 80.6%.⁵² The authors’ plan on lowering the threshold score in future studies is to increase the sensitivity.⁵² The HIV prevention counselor would then meet with the patient if deemed eligible for HIV prevention services.⁵² Eligible patients were contacted by phone if they presented outside of business hours or were discharged before an initial meeting.⁵² These meetings with the counselor “included assessment of HIV knowledge, behavioral risk, self-perception of risk, education regarding PrEP, and referral for PrEP if appropriate.”⁵² If a patient was eligible and amenable to PrEP, an appointment for follow-up was scheduled and baseline labs were drawn.⁵² Most patients who completed the counseling (68.6%) were interested in PrEP.⁵² Nine patients scheduled a follow-up appointment, and 33% of those started PrEP.⁵² The schema outlined in Figure 3 builds on the design presented in Ridgway et al (2018) as a potential means for PrEP implementation in the ED. Figures 3 and 4 present a suggested pathway for integrating PrEP referrals in the ED. There are multiple ways screening for patients at high risk for HIV seroconversion could be integrated into the ED, such as a self-reported questionnaire given in the waiting room along with check-in documents, a form completed during triage, or a questionnaire administered by nursing staff. However, we propose the use of an automatic risk scoring system integrated in the EHR to detect patients at high risk, in a way that resembles the Ridgway et al (2018) study, in order to maximize the number of patients screened. A study analyzing opt-out HIV screening found 31.5% less HIV tests were performed when an HIV screening questionnaire was changed from a required ED triage EHR assessment form to an ad hoc questionnaire nurses administered at bedside.⁴⁸ Ridgway et al (2018) found patients were more likely to participate in HIV prevention counseling and a risk assessment

Steps for PrEP engagement during an ED visit
<p>Step 0: Identify and obtain resources required for PrEP and initiation.</p> <ul style="list-style-type: none"> a. The following resources may be beneficial, including but not limited to a person to screen potential patients, person to introduce PrEP referral to patient in the ED, social worker to liaison resources, community clinics for patient follow-up, and ability to schedule a follow-up appointment. b. Locate means to produce educational materials for patients, including posters, pamphlets, and various displays. c. It may be considered to have a packet, separate from the patient's discharge information, with information about HIV/AIDS, PrEP, and sexual health clinic information for follow-up.
<p>Step 1: Increase PrEP awareness, knowledge, and access via educational materials for patients.</p> <ul style="list-style-type: none"> a. Provide patients with access to literature on PrEP. Add pamphlets and posters in the waiting room and in patient rooms. The mean wait time in US EDs is 58.1 minutes, which could be used for PrEP education.⁵⁴
<p>Step 2: Integrate automatic risk scoring system into EHR to screen patients and identify potential candidates for PrEP initiation.</p> <ul style="list-style-type: none"> a. Like Ridgway et al. (2018), incorporate automatic messaging and tasks when patient meets threshold to be considered high-risk. b. Consider an automatic order for HIV testing. c. Couple screening results with HIV testing for providers to determine PrEP eligibility.
<p>Step 3: Counsel patients regardless of risk severity on HIV and STI prevention. Educate patients who are eligible for PrEP on HIV/AIDS and the effectiveness of PrEP to prevent seroconversion.</p> <ul style="list-style-type: none"> a. People who are responsible for education may include the physician, nursing staff, social worker, or a specific HIV and PrEP educator.
<p>Step 4: Give referral and clinic follow-up information to patients before discharge. If possible, schedule an appointment at clinic for follow-up.</p> <ul style="list-style-type: none"> a. Provide patients with a packet of information (separate from discharge information) for clinic follow-up, including clinic locations, phone numbers, hours of operation, and appointment information.

FIGURE 3 Steps for pre-exposure prophylaxis (PrEP) engagement during an emergency department visit, EHR, electronic health record

during an ED visit versus when they were contacted after discharge.⁵² In order to maximize participation, meeting with eligible patients during their stay if appropriate should be a high priority. Staffing the ED with an HIV prevention counselor at all times would be ideal; however, this may not be possible. Other options include physicians and nursing staff delivering HIV and PrEP counseling; however, this would require

training to deliver counseling and education in a culturally competent manner and cost-effectiveness would need to be evaluated.⁵³

Upon implementation, the efficacy of PrEP or lack thereof could be measured by the following outcomes: level of PrEP awareness in the community, rate of follow-up after ED discharge, and rate of PrEP initiation.⁴⁵ The 3 most commonly cited weakness of ED-based

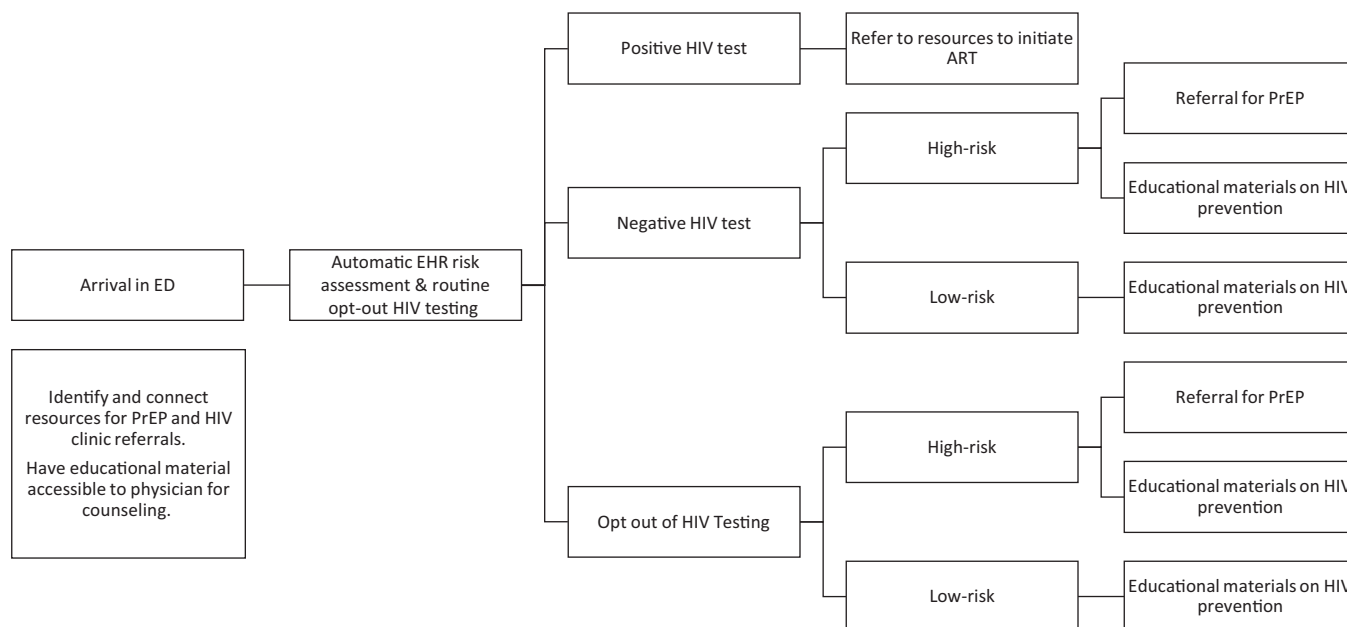


FIGURE 4 Pathway for pre-exposure prophylaxis (PrEP) engagement during an emergency department visit, ART, antiretroviral therapy; EHR, electronic health record

testing is additional burden to ED personnel and time (23.2%), lack of linkage to care (16.3%), and lack of privacy in the ED (13.0%).⁴⁵ Forty-four percent identified lack of resources as a possible threat.⁴⁵ The average amount to implement rapid HIV testing with counseling in STI clinics is \$16,100 and annual costs could be up to \$160,800.⁵⁴ These concerns over HIV testing could be extrapolated to providing PrEP in the ED, which would require HIV testing to identify HIV-negative patients who are eligible for PrEP. Additional barriers include, but are not limited to, community and physician awareness of PrEP, potential disruption of ED workflow, loss to follow-up, patient trust in their physician, culturally competent patient care, and stigma toward PrEP.^{53,55} Further research is warranted to quantify the magnitude of the barriers, as well as identify barriers unique to the ED.

Increasing accessibility of PrEP via the ED would require follow-up at a longitudinal clinic by the patient. However, patient follow-up after discharge from the ED is low and physicians are unable to predict which patients will follow-up.⁵⁶⁻⁵⁸ Follow-up from the ED for non-occupational post-exposure prophylaxis (nPEP) and completion of antiretroviral therapy is low, which may hold true for PrEP as well.⁵⁹ Ridgway et al (2018) found only 9 out of 35 patients scheduled an appointment for PrEP, and out of those 9 only 3 started PrEP.⁵² In order to mitigate potential lack of follow-up, we have added measures that have been found to maximize follow-up after discharge, such as emphasizing HIV counseling during the patient's ED visit and scheduling a follow-up appointment to occur before discharge, which has been found to improve rate of follow-up.^{52,57,60} By connecting patients with longitudinal care for PrEP services, patients may receive more comprehensive care and experience improved health outcomes. In addition, HIV-positive patients use the ED and its resources more frequently, therefore by increasing access and ease of access to PrEP, there will

be less HIV seroconversions.⁶¹ Downstream effects of less HIV seroconversions may be less use of the ED and its resources, as well as improved workflow.

Another possible limitation is the ability to provide effective HIV and PrEP counseling to patients. An ED-based study found that a majority of emergency physicians are aware of PrEP, but only 23.9% were knowledgeable of current guidelines and 23% of referral information. Of these emergency physicians, 43% were uncomfortable discussing PrEP with their patients and 53.7% showed concern for the lack of PrEP efficacy.⁶² These findings suggest that emergency physicians may benefit from educational interventions about PrEP in order to deliver informed referrals within the ED.^{62,63}

Additional barriers include patient trust in physicians and their ability to provide culturally competent care. Focus groups cited the following as barriers to PrEP: "inadequate knowledge about PrEP, concerns about side effects, disclosure of sexual orientation," perception of positive or negative treatment by physician, and their "sensitivity to homosexuality."⁵³ One of the 2 focus groups studied was composed primarily of African American MSM participants. Researchers found that this group had unique concerns toward PrEP, which included "medical mistrust and skepticism toward PrEP, intense stigma against homosexuality and HIV, and importance of PrEP education inclusive of heterosexuals to reach MSM who identify as straight."⁵³ All of these patient perceptions and concerns must be taken into account when identifying PrEP-eligible patients and delivering PrEP education and referrals. Although culturally competent care and patient trust in physicians are essential for any clinical environment, it is especially important in the ED where encounters are brief and not as longitudinal as other specialties. Time is another barrier to PrEP implementation in the ED, not only for developing patient rapport but also for PrEP education and

discussion with patients. Between 2010 and 2011, the median treatment time in the ED was \approx 90 minutes.⁶⁴ Personnel such as nurses, social workers, and HIV educators may also be harnessed to relieve the time constraint on physicians; however, this may further strain available monetary and personnel resources.

To address the barrier of PrEP administration, several organizations have developed education campaigns, including monographs that supply key PrEP information for physicians and potential consumers.⁶⁵ For instance, the Houston Health Department developed a PrEP toolkit that could seamlessly be integrated into the clinical care plan of ED physicians.⁶⁶ Approximately 50% of HIV tests in Houston are funded by the City of Houston's Department of Health and Human Services.⁶⁷ Among these, 90% followed a written linkage to care protocol for patients that tested positive for HIV in Harris County.⁶⁷ The Harris Health System's Thomas Street Health Center offers the HIV Prevention Program to under- or uninsured patients, which provides high-risk patients with HIV prevention counseling and PrEP.⁶⁸ Of the high-risk patients tested for HIV at this clinic and surveyed, 72.9% were interested in PrEP, 21.3% attended an HIV Prevention Program appointment, and ultimately 16.3% started PrEP.⁶⁸ Most participants (66.9%) believed they would acquire HIV in their lifetime. Yet, there remains a discrepancy between interest in PrEP and clinic follow-up.⁶⁸

Successful PrEP implementation in the ED is contingent upon the ability of interdisciplinary teams, including emergency physicians, nurses, social workers, and public health practitioners, to address barriers that prevent individuals from accessing PrEP. Collaboration between community-based organizations and hospital systems who both serve vulnerable populations are needed to identify and engage with high-risk individuals who would benefit from PrEP, and link them to PrEP services.⁶⁹ One way to do this is to use the ED for identification and linkage of care. Additional marketing strategies leveraging social media platforms, posters/brochures, outreach, and a PrEP-specific hotline are needed to increase consumer awareness of PrEP.⁶⁹ Hospital-based patient navigators require training on PrEP in order to help patients access and adhere to PrEP regimens through provision of support and information. PrEP knowledge and care needs to be integrated within the ED's standard of care for all individuals to produce sustainable change in our nation's plan to end the HIV epidemic.

ACKNOWLEDGMENTS

The University of Texas Health Science Center at Houston McGovern Medical School and Tufts University School of Medicine.

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REFERENCES

- Centers for Disease Control and Prevention. HIV Surveillance Report 2018 (Updated). <https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published 2020. Accessed September 14, 2020.
- Centers for Disease Control and Prevention. HIV in the United States: At a Glance. <https://www.cdc.gov/hiv/statistics/overview/ataglance.html>. Published 2020. Accessed September 14, 2020.
- Hill M, Cardenas-Turanzas M, Prater S, Campbell J, McNeese M. Racial and sex disparities in HIV screening outcomes within emergency departments of Harris County, Texas. *JACEP Open*. 2020:1-8.
- Smith D, Van Handel M, Wolitski R, et al. Vital signs: estimated percentages and numbers of adults with indications for preexposure prophylaxis to prevent HIV acquisition—United States, 2015. *Morb Mortal Wkly Rep*. 2015;64(46):1291-1295.
- The National HIV/AIDS Strategy. The National HIV/AIDS Strategy for the United States: Updated to 2020: Overview. <https://www.hiv.gov/federal-response/national-hiv-aids-strategy/overview>. Published 2017. Accessed September 14, 2020.
- The Office of National AIDS Policy. The National HIV/AIDS Strategy for the United States: Updated to 2020. <https://files.hiv.gov/s3fs-public/nhas-update.pdf>. Published 2015. Accessed September 14, 2020.
- Owens DK, Davidson KW, Krist AH, et al. Preexposure prophylaxis for the prevention of HIV infection: US preventive services task force recommendation statement. *JAMA*. 2019;321(22):2203-2213.
- Centers for Disease Control and Prevention. Preexposure prophylaxis for the prevention of HIV infection in the United States - 2017 update: a clinical practice guideline. <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf>. Published 2018. Accessed September 14, 2020.
- Shaw M. In debate over PrEP, researchers raise questions about benefit vs value. *Am J Managed Care*. <https://www.ajmc.com/newsroom/in-debate-over-prep-researchers-raise-questions-about-benefit-vs-value->. Published 2020. Accessed April 7, 2020.
- U.S. Food and Drug Administration. FDA Approves second drug to prevent HIV infection as part of ongoing efforts to end the HIV epidemic. FDA News Release. <https://www.fda.gov/news-events/press-announcements/fda-approves-second-drug-prevent-hiv-infection-part-ongoing-efforts-end-hiv-epidemic>. Published 2019. Accessed April 7, 2020.
- Choopanya K, Martin M, Suntharasamai P, et al. Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial. *Lancet*. 2013;381:2083-2090.
- Baeten JM, Donnell D, Ndase P, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med*. 2012;367(5):399-410.
- Murnane PM, Celum C, Mugo N, et al. Efficacy of pre-exposure prophylaxis for HIV-1 prevention among high risk heterosexuals: subgroup analysis from the Partners PrEP Study. *AIDS*. 2013;27(13).
- Kay ES, Pinto RM. Is insurance a barrier to HIV preexposure prophylaxis? clarifying the issue. *Am J Public Health*. 2020;110(1):61-64.
- U.S. Department of Health and Human Services. Ready, Set, PrEP Expands Access to Medication to Prevent HIV. <https://www.hhs.gov/about/news/2019/12/03/ready-set-prep-expands-access-to-medication-to-prevent-hiv.html>. Published 2019. Accessed May 12, 2020.
- Rosenberg J. Reactions are mixed as gilead announces PrEP donations, early launch of generic. *Am J Managed Care*. <https://www.ajmc.com/newsroom/reactions-are-mixed-as-gilead-announces-prep-donations-early-launch-of-generic>. Published 2019. Accessed April 7, 2020.
- Centers for Disease Control and Prevention. PrEP Clinical Trials. <https://www.cdc.gov/hiv/research/biomedicalresearch/prep/>. Published 2019. Accessed September 21, 2020.
- U.S. Preventive Services Task Force. Prevention of Human Immunodeficiency Virus (HIV) Infection: Preexposure Prophylaxis. <https://www.uspreventiveservicestaskforce.org/uspstf/document/RecommendationStatementFinal/prevention-of-human-immunodeficiency-virus-hiv-infection-pre-exposure-prophylaxis#bootstrap-panel-3>. Published 2019. Accessed September 22, 2020.

19. Grant R, Lama J, Anderson P, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. 2010;363(27):2587-2599.
20. Peterson L, Taylor D, Roddy R, et al. Tenofovir disoproxil fumarate for prevention of HIV infection in women: A phase 2, double-blind, randomized, placebo-controlled trial. *PLoS Clin Trials*. 2007;2(5):e27.
21. Hare C, Coll J, Ruane P, et al. The Phase 3 DISCOVER Study: Daily F/TAF or F/TDF for HIV Preexposure Prophylaxis. In: *Conference on Retroviruses and Opportunistic Infections*. Seattle, Washington: International Antiviral Society; 2019.
22. Bailey JL, Molino ST, Vega AD, Badowski M. A review of HIV pre-exposure prophylaxis: the female perspective. *Infect Dis Ther*. 2017;6:363-382.
23. Fonner VA, Dalglish SL, Kennedy CE, et al. Effectiveness and safety of oral HIV preexposure prophylaxis for all populations. *AIDS*. 2016;30(12):1973-1983.
24. Mensch B, Brown E, Liu K, et al. Reporting of Adherence in the VOICE trial: did disclosure of product nonuse increase at the termination visit? *AIDS Behav*. 2016;20(11):2654-2661.
25. Marrazzo JM, Ramjee G, Richardson BA, et al. Tenofovir-based preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. 2015;372(6):509-518.
26. Van Damme L, Corneli A, Ahmed K, et al. Preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. 2012;367(5):411-422.
27. Centers for Disease Control and Prevention. Effectiveness of Prevention Strategies to Reduce the Risk of Acquiring or Transmitting HIV. <https://www.cdc.gov/hiv/risk/estimates/preventionstrategies.html>. Published 2019. Accessed September 21, 2020.
28. Chen A, Dowdy DW. Clinical effectiveness and cost-effectiveness of HIV pre-exposure prophylaxis in men who have sex with men: Risk calculators for real-world decision-making. *PLoS One*. 2014;9(10):e108742.
29. Schackman BR, Eggman AA. Cost-effectiveness of pre-exposure prophylaxis for HIV: a review. *Curr Opin HIV AIDS*. 2012;7(6):587-592.
30. Juusola J, Brandeau M, Owens D, Bendavid E. The cost-effectiveness of preexposure prophylaxis for HIV prevention in men who have sex with men in the United States. *Ann Intern Med*. 2012;156(8):541-550.
31. Desai K, Sansom SL, Ackers ML, et al. Modeling the impact of HIV chemoprophylaxis strategies among men who have sex with men in the United States: HIV infections prevented and cost-effectiveness. *AIDS*. 2008;22(14):1829-1839.
32. Paltiel AD, Freedberg KA, Scott CA, et al. HIV Pre-exposure Prophylaxis (PrEP) in the United States: impact on lifetime infection risk, clinical outcomes, and cost-effectiveness. *Clin Infect Dis*. 2009;48(6):806-815.
33. Smith D, Van Handel M, Grey J. Estimates of adults with indications for HIV pre-exposure prophylaxis by jurisdiction, transmission risk group, and race/ethnicity, United States, 2015. *Ann Epidemiol*. 2018;28(12):850-857.
34. Coffey S. PrEP Uptake by Sex, Race, and Age. HIV InSite. <http://hivinsite.ucsf.edu/insite?page=hmq-1609-06>. Published 2016. Accessed September 21, 2020.
35. Bush S, Magnuson D, Rawlings MK, Hawkins T, McCallister S, Mera GR. Racial Characteristics of FTC/TDF for Pre-exposure Prophylaxis (PrEP) Users in the US. In: 2016 *ASM Microbe*. Boston, MA: National AIDS Treatment Advocacy Project. Accessed September 21, 2020.
36. Huang Y, Zhu W, Smith D, Harris N, Hoover K. HIV preexposure prophylaxis, by race and ethnicity - United States, 2014-2016. *Morb Mortal Wkly Rep*. 2018;67(41):1147-1150.
37. Rui P, Kang K. National Hospital Ambulatory Medical Care Survey: 2017 emergency department summary tables. National Center for Health Statistics. https://www.cdc.gov/nchs/data/nhamcs/web-tables/2017_ed_web_tables-508.pdf. Accessed September 21, 2020.
38. Uscher-Pines L, Pines J, Kellermann A, Gillen E, Mehrotra A. Deciding to visit the emergency department for non-urgent conditions: a systematic review of the literature. *Am J Manag Care*. 2013;19(1):47-59.
39. Nikpay S, Freedman S, Levy H, Buchmueller T. Effect of the affordable care act medicaid expansion on emergency department visits: evidence from state-level emergency department databases. *Ann Emerg Med*. 2017;70(2):215-225.e6.
40. Centers for Disease Control and Prevention, National Center for Health Statistics Office of Analysis and Epidemiology. Emergency department visits within the past 12 months among adults aged 18 and over by selected characteristics: United States, selected years 1997-2016. National Health Interview Survey, family core and sample adult questionnaires. <https://www.cdc.gov/nchs/data/abus/2017/074.pdf>. Published 2018. Accessed September 21, 2020.
41. Hatcher J, Rayens M, Schoenberg N. Mammography promotion in the emergency department: a pilot study. *Public Health Nurs*. 2010;27(6):520-527.
42. Ridgway J, Almirol E, Schmitt J, et al. Exploring gender differences in PrEP interest among individuals testing HIV negative in an urban emergency department. *AIDS Educ Prev*. 2018;30(5):382-392.
43. Haukoos JS, Hopkins E, Conroy AA, Silverman M. Routine opt-out rapid HIV screening in emergency department patients. *JAMA*. 2010;304(3):284-292.
44. Henriquez-Camacho C, Villafuerte-Gutierrez P, Pérez-Molina J, Losa J, Gotuzzo E, Cheyne N. Opt-out Scening strategy for HIV infection among patients attending emergency departments: systematic review and meta-analysis. *HIV Med*. 2017;18(6):419-429.
45. Kecojevic A, Lindsell CJ, Lyons MS, et al. Public health and clinical impact of increasing emergency department-based HIV testing: Perspectives from the 2007 conference of the national emergency department HIV testing consortium. *Ann Emerg Med*. 2011;58(1):S151-S159.e1.
46. Jenkins TC, Gardner EM, Thrun MW, Cohn DL, Burman WJ. Risk-based Human Immunodeficiency Virus (HIV) testing fails to detect the majority of HIV-infected persons in medical care settings. *Sex Transm Dis*. 2006;33(5):329-333.
47. Duffus W, Kettinger L, Stephens T, et al. Missed opportunities for earlier diagnosis of HIV infection—South Carolina, 1997–2005. *Morb Mortal Wkly Rep*. 2006;55(47):1269-1272. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5547a2.htm>. Accessed September 21, 2020.
48. Galbraith J, Willig J, Rodgers J, et al. Evolution and escalation of an emergency department routine, opt-out HIV screening and linkage-to-care program. *Public Health Rep*. 2016;131(1):96-106.
49. Chan P, Glynn T, Oldenburg C, et al. Implementation of preexposure prophylaxis for human immunodeficiency virus prevention among men who have sex with men at a New England sexually transmitted diseases clinic. *Sex Transm Dis*. 2017;43(11):717-723.
50. Ojikutu B, Bogart L, Higgins-Biddle M, et al. Facilitators and barriers to Pre-Exposure Prophylaxis (PrEP) use among black individuals in the United States: results from the National Survey on HIV in the Black Community (NSHBC). *AIDS Behav*. 2018;22:3576-3587.
51. Hill M, Flash C, Heads A, Cardenas-Turanzas M, Grimes R. PrEP education and awareness building through an intervention for African-Americans reporting both condomless sex and substance use during an emergency department visit. *J AIDS Clin Res STDs*. 2020;7(1):1-7.
52. Ridgway J, Almirol E, Bender A, et al. Which patients in the emergency department should receive preexposure prophylaxis? implementation of a predictive analytics approach. *AIDS Patient Care STDs*. 2018;32(5):202-207.
53. Cahill S, Taylor W, Elsesser S, Mena L, Hickson D, Mayer K. Stigma, medical mistrust, and perceived racism may affect PrEP awareness and uptake in black compared to white gay and bisexual men in Jackson, Mississippi and Boston, Massachusetts. *AIDS Care*. 2017;29(11):1351-1358.

54. Eggman A, Feaster D, Leff J, et al. The cost of implementing rapid HIV testing in sexually transmitted diseases clinics in the United States. *Sex Transm Dis*. 2014;41(9):545-550.
55. Underhill K, Operario D, Skeer MR, Mimiaga MJ, Mayer KH. Packaging PrEP to prevent HIV: an integrated framework to plan for pre-exposure prophylaxis implementation in clinical practice. *J Acquir Immune Defic Syndr*. 2010;55(1):8-13.
56. Naderi S, Barnett B, Hoffman RS, et al. Factors associated with failure to follow-up at a medical clinic after an ED visit. *Am J Emerg Med*. 2012;30:347-351.
57. Kyriacou D, Handel D, Stein A, Nelson R. Brief report: factors affecting outpatient follow-up compliance of emergency department patients. *J Gen Intern Med*. 2005;20:938-942.
58. Cornell S, Valerio M, Krause T, Cornell J, Revere L, Taylor B. Low adherence to post emergency department follow-up among hypertensive patients with medical insurance. *J Emerg Med*. 2020:1-8.
59. Bogoch I, Scully E, Zachary K, et al. Patient attrition between the emergency department and clinic among individuals presenting for HIV nonoccupational postexposure prophylaxis. *Clin Infect Dis*. 2014;58(11):1618-1624.
60. O'Brien G, Stein M, Fagan M, Shapiro M, Nasta A. Enhanced emergency department referral improves primary care access. *Am J Manag Care*. 1999;5(10):1265-1269.
61. Mohareb A, Rothman R, Hsieh Y. Emergency department (ED) utilization by HIV-infected ED patients in the United States in 2009 and 2010—A national estimation. *HIV Med*. 2013;14:605-613.
62. Tortelli B, Char D, Crane J, et al. Comfort discussing HIV pre-exposure prophylaxis with patients among physicians in an Urban emergency department. *J Acquir Immune Defic Syndr*. 2019;80(2):e49-e52.
63. Mimiaga M, White J, Krakower D, Biello K, Mayer K. Suboptimal awareness and comprehension of published pre-exposure prophylaxis efficacy results among physicians in Massachusetts. *AIDS Care*. 2014;26(6):684-693.
64. McCaig L, Albert M. Median Emergency Department (ED) wait and treatment times, by triage level—National Hospital ambulatory medical care survey, United States, 2010–2011. *Morb Mortal Wkly Rep*. 2014;63(19):421-426. <https://www.cdc.gov/mmwr/pdf/wk/mm6319.pdf>. Accessed September 21, 2020.
65. Mayer K, Hosek S, Cohen S, et al. Antiretroviral pre-exposure prophylaxis implementation in the United States: a work in progress. *J Int AIDS Soc*. 2015;18(Suppl 3):19980.
66. Houston Health Department. PrEP Provider Toolkit. http://houstontx.gov/health/HIV-STD/PrEP/documents/PrEP_Toolkit_Combined_All_8-2017.pdf. Published 2017. Accessed September 21, 2020.
67. Giordano T, Hallmark C, Davila J, et al. Assessing HIV testing and linkage to care activities and providing academic support to public health authorities in Houston, TX. *J Acquir Immune Defic Syndr*. 2013;64(1):S7-13.
68. Flash C, Adegboyega O, Yu X, et al. Correlates of linkage to HIV Pre-exposure Prophylaxis (PrEP) among HIV testing clients. *J Acquir Immune Defic Syndr*. 2018;77(4):365-372.
69. Parisi D, Warren B, Leung SYJ, et al. A multicomponent approach to evaluating a Pre-exposure Prophylaxis (PrEP) implementation program in five agencies in New York. *J Assoc Nurses AIDS Care*. 2018;29(1):10-19.

How to cite this article: Shull JA, Attys JM, Amutah-Onukagha NN, Hill MJ. Utilizing emergency departments for pre-exposure prophylaxis (PrEP). *JACEP Open*. 2020;1:1427–1435. <https://doi.org/10.1002/emp2.12295>