



Implementation Models for Linkage to HIV Prevention Services in California Emergency Departments

Pre-exposure prophylaxis (PrEP) is safe, well tolerated, and significantly reduces the risk of risk of acquiring HIV when taken as prescribed.¹⁻³ Improving PrEP uptake is a goal of the National HIV/AIDS Strategy and the Ending the HIV Epidemic initiative.⁴ Despite substantial progress in improving access to HIV prevention, the Centers for Disease Control (CDC) estimates that only 30% of people who could benefit from PrEP are prescribed it, a gap occurring against a backdrop of major inequities in PrEP use among racial, ethnic, gender, and economic lines.⁵⁻⁹

Strategies are needed to address these disparities in PrEP access, awareness, and use. Expanding HIV prevention services to reach populations at increased risk of acquiring HIV who might not otherwise have access to healthcare services should be promoted. Emergency departments (ED) are critical access points for many Californians, often serving as their sole point of entry with the healthcare system. Over the past 20 years, EDs have successfully implemented opt-out HIV screening programs leading to the identification, linkage, and treatment of individuals who might otherwise have remained undiagnosed.¹⁰⁻¹⁵ Until recently, HIV prevention counseling and delivery of prevention services, including PrEP, for ED patients screening HIV negative have not been prioritized. Consequently, best practices for implementing ED HIV prevention services (HPS) are emerging but not yet well defined.¹⁶⁻²³

In 2023 we had the opportunity to study seven California EDs that were implementing HIV prevention program linkage demonstration projects. The goal of the research described here was to describe and synthesize the various implementation strategies utilized by the seven EDs to integrate HPS, highlight the challenges and successes of these strategies, and provide actionable information on how future programs might consider implementing HIV prevention in the ED setting.

Methods

We conducted a mixed-methods, type 3 hybrid effectiveness-implementation study of seven California EDs implementing HPS linkage programs.²⁴ Each of the EDs received Gilead FOCUS funding to identify patients without HIV via their routine HIV screening infrastructure who were also eligible for linkage to comprehensive HPS and to provide linkage to such services between September 2021 and March 2023. The implementation research described here was approved by the UC Berkeley Committee for the Protection of Human Subjects.

The FOCUS program is a public health initiative that supports HIV and viral hepatitis screening, prevention, and linkage to a first appointment for care.²⁵ Comprehensive HIV prevention services were defined by FOCUS as “a combination of structural, biomedical, and behavioral prevention interventions that have demonstrated efficacy in helping to reduce the transmission of HIV infection”.²⁶ Participating sites independently developed their HIV prevention protocols and all had established HIV screening programs in place prior to the integration of HPS.

For the implementation research described in this report, a list of EDs funded by FOCUS to develop HPS programs in California was obtained from the regional FOCUS program officer. The seven recipients were contacted in March 2023 via email and asked to voluntarily participate in this study. All sites agreed to participate and provided basic ED demographic data and Gilead FOCUS indicator data using a structured form. Next, using an interview guide informed by the structured data we received, interviews were conducted between July – September 2023 with key personnel at each ED (including clinical champions, navigators/case managers, data managers). The guide asked respondents to describe their FOCUS program, review basic outcome data, discuss successes and challenges related to implementation, and share their perspectives on whether they would recommend continuing the program if funding were continued. Interviews were conducted over a videoconferencing platform and recorded. Interview recordings and transcripts were reviewed for gaps in our understanding, and we followed up with sites via email to gather additional data as needed.

We then reviewed quantitative and qualitative information to summarize each program, identify points of commonality across ED implementation strategies, define and categorize the programs into implementation models for the integration of HPS into ED settings, and qualitatively explored the success and challenges with each model.

Summary of Findings

- In 2023, we conducted a mixed-methods, effectiveness-implementation study of seven California emergency departments (ED) implementing HIV prevention services (HPS).
- The goal was to provide actionable information about implementing HPS in the ED and highlight the challenges and successes of various implementation strategies.
- Staffing capacity, existing screening programs, access to technology, and patient interest in PrEP were revealed as factors contributing to the success of HPS linkage programs in EDs.
- Based on common themes across the seven participating EDs, we identified three primary models for implementing HPS linkage in the ED: Behavioral Risk Assessment, STI Risk Assessment, and Automated Risk Assessment.
- Interacting with ED patients is an opportunity for HIV education, prevention, and counseling for patients who may otherwise lack information about PrEP. This is important even if people don't initiate PrEP after their ED encounter.
- Linkage to HIV prevention services from the ED is feasible and can increase access to PrEP for those at risk of acquiring HIV. However, the number of patients who are screened and meet the criteria for linkage to HPS often exceeds ED capacity for this service.
- As the California Department of Public Health expands screening recommendations to include HIV, syphilis, and hepatitis C within the ED, there is an opportunity to extend those recommendations to include prevention services as an adjunct to these screening programs.

Results

Stakeholders in the participating ED programs were enthusiastic about HPS delivery in EDs and recognized its potential public health value in increasing awareness and uptake of PrEP. For example, one ED-based patient navigator shared, *"I feel like the work is definitely important. It's worth it because some people need the information but don't know where to look, and that [conversation] can change everything for them."* Additionally, some EDs chose to continue their HPS linkage programs even after the end of their funding period. An ED physician shared that they *"pitched [the program] to the CEO of*

[their] health system and were able to give them the numbers as far as screening to show that it was a self-sustainable program.”

Enabling Factors and Barriers to Implementation for ED HPS linkage

In interviews conducted with staff at the seven participating EDs, common themes emerged regarding the factors contributing to their implementation pilots' success. First, having existing navigator staff in place was a common factor mentioned that supported the programs. In most cases, chart reviews, risk assessments, the offer of HIV prevention education in the ED, and/or linkage to outpatient HPS were conducted by ED-based patient navigators. Second, all sites had existing opt-out HIV screening programs, which enabled them to identify patients who screened negative for HIV, serving as the foundation for their HPS efforts. Third, in some settings, having adequate technology infrastructure and support staff for that technology allowed ED staff to integrate new workflows and more easily prioritize patients by risk level. These sites relied heavily on electronic health record (EHR) systems and recurring data reports to gather information on eligible patients within the ED. Finally, patient interest in HIV prevention methods, including PrEP, and consent to be referred to HPS proved to be an important determinant of the pilots' impact. Many sites shared that it was not uncommon for patients to show a lack of interest in PrEP or referrals to HPS, in which case the navigators respected the patient's requests and did not offer further education or offers of linkage.

Emergency Department-Delivered HIV Prevention: Implementation Models

Based on the ED sites' experience and common themes across the implementation strategies, three primary HPS implementation models in the ED were identified: 1) Behavioral Risk Assessment, 2) Sexually Transmitted Infection (STI) Risk Assessment, and 3) Automated Risk Assessment (Figure 1).



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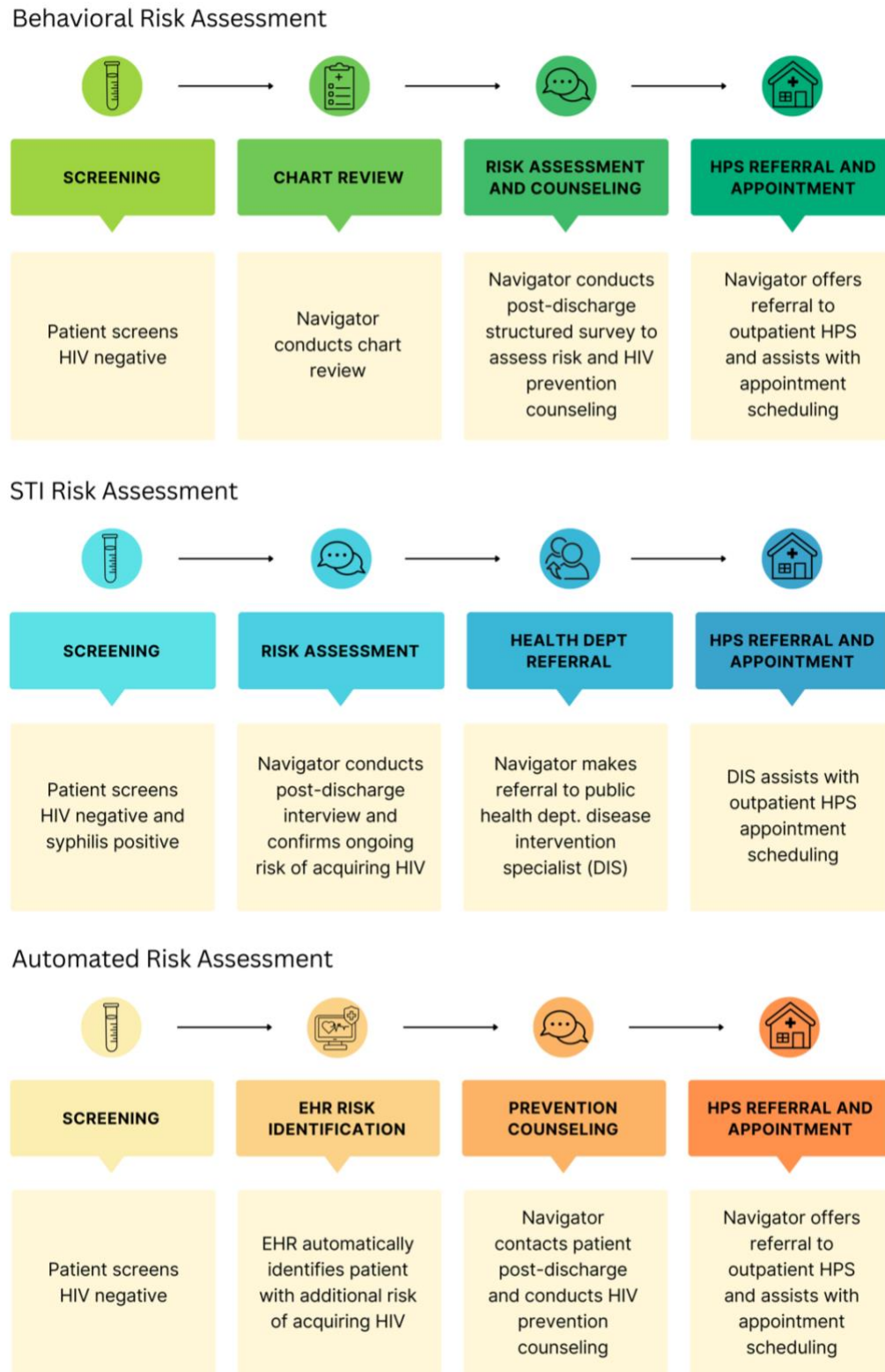
- Patient Navigator discussing use of the HIV Behavioral Risk Assessment model in the ED

Model 1: Behavioral Risk Assessment (3 sites). In this model, ED patients receiving a blood draw are screened for HIV as part of the existing opt-out HIV screening program. A patient navigator in the ED then performs chart reviews of patients screening HIV negative to identify those who may be eligible for an assessment to determine their risk for acquiring HIV infection. The navigator contacts eligible patients in person while they are still in the ED or after discharge via phone and conducts a structured or semi-structured HIV risk assessment survey to identify individuals who could benefit from HIV prevention counseling. Although the specific risk assessments differed by sites, the questions were based on CDC recommended

criteria to identify people at an increased risk for HIV acquisition.^{27,28} Patients identified to be at an increased risk are offered a referral to outpatient HPS. Once consent is obtained, the navigator assists patients in scheduling an appointment at an outpatient clinic that can provide comprehensive prevention services, including PrEP.

Model 2: STI Risk Assessment (3 sites). In this model, ED patients receiving a blood draw are screened for HIV and syphilis as part of the existing opt-out infectious disease screening program. A patient navigator in the ED conducts post-discharge interviews of patients screening HIV negative and syphilis positive to identify those who may be at an ongoing risk of acquiring HIV, using site-specific, non-structured

Figure 1. Emergency Department Delivered HIV Prevention Services (HPS): Implementation Models.



Abbreviations: DIS - Disease Intervention Specialists; EHR - Electronic Health Record; HPS - HIV Prevention Services; DIS - Disease Intervention Specialists

assessment of risk based on CDC guidance.^{27,28} Patients testing positive for syphilis determined to be at ongoing risk for acquiring HIV are referred by the navigator to a public health department disease intervention specialist (DIS) who assists patients with scheduling an appointment at an outpatient clinic that can provide comprehensive prevention services, including PrEP.

Model 3: Automated Risk Assessment (1 site). In this model, ED patients receiving a blood draw are screened for HIV as part of the existing opt-out HIV screening program. The EHR automatically identifies patients who screen HIV negative and whose medical record indicates additional risk factors for acquiring HIV in the past 12 months, such as a prior laboratory documented STI diagnosis or ICD-diagnostic code signifying a behavioral risk characteristic. A patient navigator in the ED receives this information via an electronic alert and contacts eligible patients via phone post discharge to offer HIV prevention counseling and a referral to outpatient HPS. Once consent for referral is obtained, the navigator assists patients in scheduling an appointment at an outpatient clinic that can provide comprehensive prevention services, including PrEP.

Model Strengths and Limitations

Each of the three implementation models for ED-based HPS exhibited unique strengths, limitations, and settings under which they would be best suited (**Table 1**).

Model 1: Behavioral Risk Assessment. This implementation model relied on a combination of chart review and individualized risk assessments to identify patients who were at the highest risk of acquiring HIV. An ED-based patient navigator then provided HIV prevention education and linkage to outpatient HPS. One of the key strengths of this model is the expanded role of a traditional ED-based navigator to contribute to HIV prevention, whereby the navigator can tailor their conversation with the patient to best fit their needs and reported risk factors. This personal approach to HIV prevention also allows the hospital to address social determinants of health, such as making referrals to substance use treatment programs, helping with insurance enrollment, working with social services to provide temporary housing, and providing transportation assistance to attend appointments through contracts with ride-sharing services. Navigators can also share patient-specific risk and social determinants of health needs with outpatient HPS staff who can provide continued assistance in these areas. Furthermore, because navigators interact directly with many patients while they are still present in the ED, this model could be expanded to support the same-day provision of PrEP. With support from treating emergency physicians, protocols that use EHR PrEP order sets and eligibility checklists can be implemented to ensure the safe and correct initiation of ED-based PrEP for interested patients.

Limitations of this model include the requirement for routine opt-out HIV screening. Additionally, performing chart review and risk assessments for all ED patients who screen HIV negative is time-intensive and requires prioritization of those who exhibit the greatest perceived risk of acquiring HIV. These time and resource constraints mean the program may not reach everyone who could benefit from linkage to HPS. For example, one patient navigator shared, *“I would like to have another person on our team help with chart reviews because they are needed, it’s most important, but they do take a lot of time. You don’t want to rush through them and miss*



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- Patient Navigator in ED on implementing the Behavioral Risk Assessment model for HPS

something.” Finally, though ED-based navigators engaged in outreach should receive training on best practices for sensitive and confidential conversations about HIV risk, these conversations could be unintentionally stigmatizing.

Ideal Setting: The Behavioral Risk Assessment model would be best suited for EDs with existing HIV screening programs, those with ED-based patient navigators, and those who prefer a model with one-on-one, patient-centered conversations.



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- Patient Navigator in ED using the STI Risk Assessment model

Model 2: STI Risk Assessment. This model was implemented by EDs with comprehensive screening programs for syphilis (and sometimes hepatitis C) in addition to HIV. A strength of this model is the efficient use of existing testing infrastructure to identify a subset of patients who are at increased risk for acquiring HIV infection: those who test HIV negative but who are syphilis and/or hepatitis C positive. This population then serves as the foundation for navigator-led HIV prevention efforts and linkage activities. Another benefit of building a prevention program that engages patients with

syphilis and/or hepatitis C is that existing linkage pathways for the treatment of these infections can be leveraged for co-localized prevention services, including PrEP. When reflecting on their program which used the STI Risk Assessment model, an ED staff member shared, “Especially in [our] county, with the rates that we have for all the STIs, I think there is a huge opportunity for education for the people in this community.” An additional benefit of this model is that it could be expanded to focus on additional STI screening programs that do not incorporate linkage to the health department, such as chlamydia, gonorrhea, or trichomoniasis.

We also identified several limitations of the STI Risk Assessment Model. Most EDs in California, however, do not have integrated screening programs that provide comprehensive testing for syphilis and hepatitis C, in addition to HIV, thereby limiting the scalability of this approach at this time. Furthermore, although the model is efficient for identifying populations with objective risk for acquiring HIV, there are undoubtedly missed opportunities for HIV prevention among other patients without syphilis and/or hepatitis C. The population-level impact of this model is dependent on rates of syphilis and/or hepatitis C among people with risk of HIV; therefore, the model might be less impactful among populations with low rates of these infections. Lastly, sites implementing this model frequently relied on the local health department and DIS to provide services, which may not be available in some jurisdictions. Furthermore, the reliance on the local health department for HPS linkage and PrEP initiation means that there is less control over the outcome of the intervention and also less access to data on patient outcomes after linkage.

Ideal Setting: The STI Risk Assessment model is best suited for settings that have a strong collaboration with a well-resourced local health department, strong local DIS systems, and robust syphilis and hepatitis C ED screening programs in place.

Model 3: Automated Risk Assessment. This model uses automated EHR alerts to identify possibly eligible patients who are at an increased risk of acquiring HIV. Like the Behavioral Risk Assessment model, an ED-based patient navigator provides HIV prevention education and linkage to outpatient HPS once the patient has been discharged. However, this model’s greatest strength is its efficiency, as the first time-consuming step of chart reviews and risk assessments is automated in the EHR. Additionally, this model

Table 1. Emergency Department Delivered HIV Prevention Services (HPS): Implementation Models Strengths and Limitations.

	Behavioral Risk Assessment	STI Risk Assessment	Automated Risk Assessment
Strengths	<ul style="list-style-type: none"> Expanded role of ED-based navigator One-on-one patient-centered approach Can address SDOH Navigator can advocate for PrEP initiation when scheduling HPS visit Can be expanded to support same-day PrEP provision 	<ul style="list-style-type: none"> Uses existing ED infrastructure, such as screening programs for syphilis and hepatitis C and partnerships with local public health departments Can be modified to focus on additional STI screenings, such as chlamydia, gonorrhea, or trichomoniasis 	<ul style="list-style-type: none"> Automation via EHR precludes time-consuming chart review and risk assessments Expanded role of ED-based navigator Navigator can advocate for PrEP initiation when scheduling HPS visit Potential to incorporate ML, AI, NLP, etc.
Limitations	<ul style="list-style-type: none"> Not all EDs have opt-out HIV screening programs Time-consuming and requires prioritizing and tailoring counseling and referrals by HIV risk Limited reach 	<ul style="list-style-type: none"> Limited availability of syphilis and hepatitis C screening programs in EDs Narrow eligibility criteria may limit impact and lead to missed opportunities for prevention Reliance on the health department reduces control over linkage and access to outcome data 	<ul style="list-style-type: none"> Requires internal political and technical support to make EHR modifications EHR modifications may take months to years Lack of face-to-face interaction between navigator and patient Strict coding requirements for EHR alerts may narrow reach
Ideal Settings	<ul style="list-style-type: none"> EDs with existing screening programs EDs with ED-based patient navigators Preference for one-on-one patient-centered approach 	<ul style="list-style-type: none"> EDs with a strong collaboration with a well-resourced health department Areas with strong local DIS systems EDs with existing, robust syphilis and/or hepatitis C screening programs 	<ul style="list-style-type: none"> EDs with a customizable EHR system EDs with internal political and technical support for EHR system modifications EDs without on-site navigators or other screening programs to leverage

Abbreviations: AI - Artificial Intelligence; DIS - Disease Intervention Specialists; ED - Emergency Department; EHR - Electronic Health Record; HPS - HIV Prevention Services; ML - Machine Learning; NLP - Natural language processing; PrEP - Pre-exposure Prophylaxis; SDOH - Social Determinants of Health; STI - Sexually Transmitted Infection

could conceivably increase in sophistication by incorporating artificial intelligence (AI), natural language processing (NLP), and other emerging technologies. Finally, like other models, the Automated Risk Assessment model's use of navigators to assist patients in scheduling an appointment for outpatient HPS allows navigators to communicate the patient's risk factors and advocate for PrEP referral to HPS staff.

A limitation of this implementation model is the need for political and technical support within the hospital to make modifications to the EHR system, which may take time (in this case, over a year).

Additionally, while the other implementation models can occur while the patient is still in the ED, this model does not identify people who could benefit from HPS until after discharge, which decreases opportunities for face-to-face interaction between the patient and the navigator. Lastly, though this model is likely to miss the least number of people who would benefit from linkage to HPS depending on the algorithm used, the strict coding requirements to implement the algorithm in the EHR alert system may still create missed opportunities to identify people who present with unique attributes but still experience HIV-related risk. An ED physician at the only site that implemented this model shared their thought process behind automating the chart review and risk assessment: “The thought was that by not automating the [process] like this, it would be difficult in terms of time and effort and cost to train everyone and go through the entire process. However, we would definitely capture more people [if we assessed risk on a case-by-case basis].”



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- Physician in ED using the Automated Risk Assessment model

Ideal Setting: The Automated Risk Assessment model is best suited for settings with a customizable EHR system, that have political and technical support for EHR system modifications, and those without on-site navigators or other screening programs to leverage.

Conclusion

Our mixed-methods evaluation of HPS linkage programs implemented in seven California EDs identified three models for integrating HPS which can serve as a guide for future protocol development. Healthcare systems wishing to integrate HPS in their EDs can use these models as a framework, adapting them as necessary to meet their population needs, resources, and existing screening program infrastructure.

All three implementation models exhibited unique strengths and limitations, and no one model emerged as superior to the other. Integrating HPS into the ED workflow was not without its challenges, requiring dedicated staff, additional resources, and out-of-the-box development of novel policies and procedures. In all models, ED-based HIV screening programs served as the foundation for HPS delivery. Assessment of risk for acquiring HIV, an essential step for ED prevention programs, was approached uniquely at all sites and was a major protocol branch point, driving decisions for prevention service delivery, staffing needs, and linkage protocols. In addition to providing access to a population of patients without HIV for whom an assessment of prevention needs can be made, HPS programs leveraged the infrastructure already employed with HIV screening, such as existing linkage to care pathways, navigators, and experience working in parallel with ED staff to minimize the impact on ED workflows.

There are several observations from the three models worth highlighting. First, automating the EHR to identify objective risk laboratory data may require less in-ED staff time and does not rely on potentially stigmatizing questioning of patients, making this a highly recommended strategy wherever it is possible. Second, linking HPS efforts and PrEP to already existing screening programs and linkage pathways that prioritize the diagnosis and treatment of diseases that are associated with an increased risk of acquiring HIV infections (such as syphilis, STIs, and substance use disorders) has the potential to be highly

efficient, targeting prevention efforts towards populations that are most in need of these services. In addition, the capacity for ED-based HPS to close some of the earliest gaps in the prevention care cascade, particularly with regard to awareness of personal risk and PrEP knowledge, should be emphasized.²⁹ We heard from several sites across all three models that EDs create an opportunity to increase awareness of HPS and PrEP specifically, even if patients were not interested in referral for outpatient HPS.

The opportunity for California EDs to expand screening for communicable infectious diseases and integrate HPS is at hand. In March 2022, the California Department of Public Health (CDPH) issued recommendations for EDs statewide to integrate syndemic screening for HIV, syphilis, and hepatitis C into routine care.³⁰ Since that time, the CDPH has invested \$13 million to support 28 EDs in 14 counties to implement, expand, or sustain routine opt-out screening programs, and provide patient navigation linkage to treatment and prevention.³¹ Once these programs are in place, they can be leveraged as the foundation for linkage to HPS and other preventive services, a necessary next step in reaching the goals set forth in the California Office of AIDS *Ending the Epidemics* plan.³²

Research Limitations

This implementation science study has three main limitations. First, the three implementation models described in this report emerged from seven California EDs funded as Gilead FOCUS sites. This limited the reporting of key (quantitative) programmatic outcomes for several sites, including whether PrEP was provided or not. Other promising HPS models not used in our study have been implemented in other states.^{20,33} Second, a direct comparison of the effectiveness of the models is not possible due to a lack of data on appointment follow-up and subsequent PrEP initiation. Finally, as the purpose of the brief was to capture common practices across the seven ED sites, additional ancillary HIV prevention activities were not described, such as the scope and yield of patient referral by ED clinicians to prevention navigators.

Areas of Future Research

Although this report focuses on implementation models for linkage to HPS in the ED, it was evident that standardized outcome definitions and more consistent data collection of those outcomes, such as readiness for PrEP, PrEP initiation, adherence, and retention with outpatient PrEP, are needed. Once standardized outcomes are in place, ED HPS linkage implementation models can be directly compared based on the reported HIV prevention care cascades and thus, allow determination of feasibility, efficacy, and the identification of foci for program refinement and improvement.

Initiation of same-day PrEP and long-acting PrEP formulations are emerging implementation strategies that may lower barriers to the receipt of PrEP among populations most at need but the least likely to receive treatment.^{34,35} Experience with these strategies, however, remain largely unexplored in the ED setting and studies evaluating their feasibility and effectiveness are needed.

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References

1. Grant RM, Lama JR, Anderson PL, et al. Preexposure Chemoprophylaxis for HIV Prevention in Men Who Have Sex with Men. *N Engl J Med*. 2010;363(27):2587-2599. doi:10.1056/nejmoa1011205
2. 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. doi:10.1056/nejmoa1108524
3. 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(9883):2083-2090. doi:10.1016/s0140-6736(13)61127-7
4. The White House. 2021. National HIV/AIDS Strategy for the United States 2022–2025. Washington, DC. <https://files.hiv.gov/s3fs-public/NHAS-2022-2025.pdf>
5. CDC. PrEP for HIV Prevention in the U.S. <https://www.cdc.gov/nchhstp/newsroom/factsheets/hiv/PrEP-for-hiv-prevention-in-the-US-factsheet.html>
6. Baugher AR, Trujillo L, Kanny D, et al. Racial, Ethnic, and Gender Disparities in Awareness of Preexposure Prophylaxis Among HIV-Negative Heterosexually Active Adults at Increased Risk for HIV Infection — 23 Urban Areas, United States, 2019. *Morb Mortal Wkly Rep*. 2021;70(47):1635-1639. doi:10.15585/mmwr.mm7047a3
7. Siegler AJ, Mouhanna F, Giler RM, et al. The prevalence of pre-exposure prophylaxis use and the pre-exposure prophylaxis-to-need ratio in the fourth quarter of 2017, United States. *Ann Epidemiology*. 2018;28(12):841-849. doi:10.1016/j.annepidem.2018.06.005
8. Huang Y lin A, Zhu W, Smith DK, Harris N, Hoover KW. HIV Preexposure Prophylaxis, by Race and Ethnicity — United States, 2014–2016. *Morb Mortal Wkly Rep*. 2018;67(41):1147-1150. doi:10.15585/mmwr.mm6741a3
9. Shull JA, Attys JM, Amutah-Onukagha NN, Hill MJ. Utilizing emergency departments for pre-exposure prophylaxis (PrEP). *J Am Coll Emerg Physicians Open*. 2020;1(6):1427-1435. doi:10.1002/emp2.12295
10. Henriquez-Camacho C, Villafuerte-Gutierrez P, Pérez-Molina J, Losa J, Gotuzzo E, Cheyne N. Opt-out screening strategy for HIV infection among patients attending emergency departments: systematic review and meta-analysis. *HIV Med*. 2017;18(6):419-429. doi:10.1111/hiv.12474
11. Hsieh YH, Kelen GD, Laeyendecker O, Kraus CK, Quinn TC, Rothman RE. HIV Care Continuum for HIV-Infected Emergency Department Patients in an Inner-City Academic Emergency Department. *Ann Emerg Med*. 2015;66(1):69-78. doi:10.1016/j.annemergmed.2015.01.001
12. White DAE, Scribner AN, Vahidnia F, et al. HIV Screening in an Urban Emergency Department: Comparison of Screening Using an Opt-In Versus an Opt-Out Approach. *Ann Emerg Med*. 2011;58(1):S89-S95. doi:10.1016/j.annemergmed.2011.03.032
13. Haukoos JS, Lyons MS, Rothman RE, et al. Comparison of HIV Screening Strategies in the Emergency Department. *JAMA Netw Open*. 2021;4(7):e2117763. doi:10.1001/jamanetworkopen.2021.17763
14. White DAE, Todorovic T, Petti ML, Ellis KH, Anderson ES. A Comparative Effectiveness Study of Two Nontargeted HIV and Hepatitis C Virus Screening Algorithms in an Urban Emergency Department. *Ann Emerg Med*. 2018;72(4):438-448. doi:10.1016/j.annemergmed.2018.05.005
15. Grant C, O'Connell S, Lillis D, et al. Opt-out screening for HIV, hepatitis B and hepatitis C: observational study of screening acceptance, yield and treatment outcomes. *Emerg Med J*. 2019;37(2):emermed-2019-208637. doi:10.1136/emermed-2019-208637
16. Gormley MA, Nagy TR, Moschella P, Lu Z, Rodriguez J, Roth P. HIV Pre-Exposure Prophylaxis in the Emergency Department: A Systematic Review. *Ann Emerg Med*. 2023;81(4):468-481. doi:10.1016/j.annemergmed.2022.07.015

17. Jackson KJ, Chittle P, McCoy SI, White DAE. A Systematic Review of HIV Pre-exposure Prophylaxis (PrEP) Implementation in U.S. Emergency Departments: Patient Screening, Prescribing, and Linkage to Care. *J Community Heal.* Published online 2023:1-15. doi:10.1007/s10900-023-01320-7
18. Faryar KA, Ancona RM, Braun RS, Brown JL, Sickles RK, Lyons MS. Estimated proportion of an urban academic emergency department patient population eligible for HIV preexposure prophylaxis. *Am J Emerg Med.* 2021;48:198-202. doi:10.1016/j.ajem.2021.04.087
19. Zhao Z, Jones J, Arrington-Sanders R, et al. Emergency Department–Based Human Immunodeficiency Virus Preexposure Prophylaxis Referral Program—Using Emergency Departments as a Portal for Preexposure Prophylaxis Services. *Sex Transm Dis.* 2021;48(8):e102-e104. doi:10.1097/olq.0000000000001351
20. Ridgway JP, Almirol EA, 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. doi:10.1089/apc.2018.0011
21. Mahal J, Deccy S, Seu R. Linking emergency department patients at risk for human immunodeficiency virus to pre-exposure prophylaxis. *Am J Emerg Med.* 2022;54:87-90. doi:10.1016/j.ajem.2022.01.038
22. Kulie P, Castel AD, Zheng Z, et al. Targeted Screening for HIV Pre-Exposure Prophylaxis Eligibility in Two Emergency Departments in Washington, DC. *AIDS Patient Care STDs.* 2020;34(12):516-522. doi:10.1089/apc.2020.0228
23. Haukoos JS, White DAE, Rowan SE, et al. HIV Risk and Pre-Exposure Prophylaxis Eligibility Among Emergency Department Patients. *AIDS Patient Care STDs.* 2021;35(6):211-219. doi:10.1089/apc.2021.0012
24. Curran GM, Bauer M, Mittman B, Pyne JM, Stetler C. Effectiveness-implementation Hybrid Designs. *Méd Care.* 2012;50(3):217-226. doi:10.1097/mlr.0b013e3182408812
25. Gilead Sciences, Inc. The Importance of HIV Testing. Gilead Sciences Policy Position: The Importance of Testing. Accessed November 30, 2023. https://www.gilead.com/~media/Files/pdfs/other/The_Importance_of_HIV_Testing_9_12_14.pdf
26. Gilead Sciences, Inc. Integrating Linkage to Comprehensive Prevention Services into an HIV Routine Screening Infrastructure.
27. Centers for Disease Control and Prevention: US Public Health Service: 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 March 2018.
28. CDC. Centers for Disease Control and Prevention: US Public Health Service: Preexposure prophylaxis for the prevention of HIV infection in the United States—2021 Update: a clinical practice guideline. <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf>
29. Nunn AS, Brinkley-Rubinstein L, Oldenburg CE, et al. Defining the HIV pre-exposure prophylaxis care continuum. *Aids.* 2017;31(5):731-734. doi:10.1097/qad.0000000000001385
30. Jacobson K, Ramos M. California Department of Public Health. Published March 28, 2022. Accessed January 3, 2023. <https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/DCL-Opt-Out-ED-HIV-HCV-and-Syphilis-Screening.pdf>
31. Bridge. ED Syphilis/HIV/HCV Screening. Bridge to Treatment. Accessed March 26, 2024. <https://bridgetotreatment.org/public-health-screening/>
32. California Department of Public Health. Ending the Epidemics: Addressing Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), and Sexually Transmitted Infections (STIs) in California - Integrated Statewide Strategic Plan Overview 2022-2026. Published online 2021. https://www.cdph.ca.gov/Programs/CID/DOA/CDPH%20Document%20Library/CDPH_StratPlan2021_FINAL_ADA.pdf

33. Stanford KA, Almirol E, Eller D, Hazra A, Schneider J. Routine, Opt-Out, Emergency Department Syphilis Testing Increases HIV Preexposure Prophylaxis Uptake. *Sex Transm Dis.* 2023;50(5):292-297. doi:10.1097/olq.0000000000001774
34. Dashler G, Rudolph D, Cho MH, et al. A Novel, Emergency Department Based Human Immunodeficiency Virus Preexposure Prophylaxis Program. *Academic Emergency Medicine SAEM23 Abstracts.* Published online 2023. doi:10.1111/acem.14718
35. Rogers BG, Chan PA, Suttan-Coats C, et al. Perspectives on long-acting formulations of pre-exposure prophylaxis (PrEP) among men who have sex with men who are non-adherent to daily oral PrEP in the United States. *BMC Public Heal.* 2023;23(1):1643. doi:10.1186/s12889-023-16382-4