ORIGINAL RESEARCH

Missed Opportunities for HIV Prevention in a Large County Safety Net Health System

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Introduction: **HIV pre-exposure prophylaxis (PrEP) is effective at reducing HIV transmission. However, PrEP uptake is low for racial and ethnic minorities and women, especially in the Southern US Health care clinicians should be prepared to identify all patients eligible for PrEP, provide counseling, and prescribe PrEP.**

Methods: **Retrospective analysis of persons newly diagnosed with HIV was conducted at a large public health system from January 2015 to June 2021. Interactions with the health system in the 5 years preceding HIV diagnosis were analyzed, and missed opportunities for HIV prevention interventions, including PrEP and condom use counseling, were identified.**

Results: **We identified 454 patients with a new HIV diagnosis with previous health system interactions. 166(36.6%) had at least 1 identifiable indication for PrEP: 42(9.3%) bacterial STI, 63(13.9%) inconsistent condom use, or 82(18%) injection drug use before HIV diagnosis. Only 7(1.5%) of patients were counseled on PrEP. Most patients (308; 67.8%) had no documented condom use history in the EHR before diagnosis, a surrogate marker for obtaining a sexual history. Patients who exclusively interacted with the emergency care setting did not receive PrEP education and were less likely to receive condom use counseling.**

Conclusion: **Missed opportunities to offer HIV prevention before diagnosis were common among patients newly diagnosed with HIV. Most patients did not have sexual history documented in the chart before their HIV diagnosis. Educational interventions are needed to ensure that clinicians are prepared to identify those eligible and discuss the benefits of PrEP. (J Am Board Fam Med 2024;37:261–269.)**

Keywords: **AIDS, HIV, Pre-Exposure Prophylaxis (PrEP), Sexually Transmitted Infections**

Introduction

There are over 30,000 new HIV infections in the United States yearly and over 1 million Americans living with HIV despite 40 years of scientific and public health progress.[1] Although there has been an 8% decrease in HIV diagnoses in the US between 2015 to 2019, the epidemic continues. The impact of the COVID-19 pandemic on HIV testing and diagnoses is unclear.[1] The Ending the HIV Epidemic (EHE) Initiative aims to reduce new HIV diagnoses 90% by 2030 by engaging stakeholders in impacted communities to improve early diagnosis, treatment, outbreak response, and increase uptake of biomedical prevention methods like pre-exposure prophylaxis (PrEP).[2] PrEP is highly effective at preventing HIV across a heterogenous population, including those of diverse sexual and gender identities and among persons who inject drugs

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(PWID).[3–5] Daily oral PrEP has been shown to reduce sexually acquired HIV up to 99%, and infections in PWID by over 70% when taken consistently.[6] Most recently, the first long-acting injectable PrEP option, cabotegravir, was found to have superior efficacy to daily oral PrEP at preventing sexually acquired HIV and provides a more desirable option for many patients.[7,8]

According to the Centers for Disease Control and Prevention (CDC) and the United States Preventive Services Task Force (USPSTF), sexually active adolescents and adults should receive information about PrEP and those identified as at increased likelihood of HIV should be offered PrEP.[9,10] Despite this recommendation, only 30% of eligible individuals in the US are prescribed PrEP.[11] Vast disparities in PrEP prescribing are seen, with 66% of the eligible white population prescribed PrEP compared with only 9% and 16% of the eligible black and Hispanic populations, respectively.[11] The underutilization of PrEP can be partially attributed to the fact that clinicians often do not perform comprehensive STI and HIV screening, conduct thorough sexual history assessments to identify eligible patients, or routinely offer preventative services.[12–14] Those with a recent bacterial STI (eg, gonorrhea or syphilis) are at increased likelihood of acquiring HIV and are eligible for PrEP, though HIV screening or PrEP prescribing does not often occur.[11,15,16]

The overlap of the HIV and STI epidemics is an important aspect of the public health response. Addressing increasing rates of STIs should be concurrently considered as part of HIV prevention strategies. The Southern US is disproportionately impacted by HIV and STIs, and the rates of syphilis and chlamydia, particularly in Texas, are significantly higher than the national average.[14] Dallas County was identified as 1 of 50 counties and jurisdictions in the U.S accounting for over half of new HIV diagnoses, making it a target area of the EHE initiative in 2019.[2] Health care systems with vulnerable populations should consider standardized STI and HIV cotesting to reduce transmission of undiagnosed STIs and HIV, increase treatment rates and PrEP uptake.[9,10,14]

Health care encounters offer opportunities for HIV prevention and PrEP initiation. Not using clinical encounters to discuss HIV prevention may be missed opportunities to initiate efforts that might prevent future HIV infection. In other research on missed opportunities, Lions et al. reported that among individuals who were eligible for PrEP, 90% had seen at least 1 physician in the past year.[17] Similarly, another recent study found only about 15% of PWID who visited a health care clinician in the past had a discussion with their clinician about PrEP, with sexual minority men most likely to have these conversations.[18] Aligned with local and national initiatives to decrease incident HIV, we aimed to identify missed opportunities for HIV prevention in patients who were newly diagnosed with HIV in our health system. Our goal was to better define target areas for interventions to improve uptake of HIV prevention interventions at a large safety net hospital in the Southern US.

Methods

We conducted a retrospective review of the electronic health record (EHR) for patients aged 16 years or older newly diagnosed with HIV from January 1, 2015 to June 30, 2021 at Parkland Health, a large public health system in Dallas County, TX. The purpose was to identify missed opportunities for HIV prevention in the 5 years preceding diagnosis. A missed opportunity was defined as an encounter for a patient with an indication for PrEP in which no preventative measure was documented. An indication for PrEP was defined as a bacterial STI (gonorrhea, chlamydia, or syphilis—self reported or within the EHR) within the 5 years before HIV diagnosis, injection drug use (IDU), reported condomless sex, or request for an STI test due to a known or possible exposure, regardless of the test result. Preventative measures included: PrEP offered, PrEP prescription written, or preventative counseling on PrEP or condom use.

Inclusion criteria included 1) Age 16 years or older and 2) confirmed newly diagnosed HIV from any Parkland Health facility from January 1, 2015 to June 30, 2021. Exclusion criteria included 1) being less than 16 years of age or 2) having an HIV diagnosis with an unknown diagnosis date.

Our primary outcome was the proportion of patients offered or prescribed PrEP before their incident HIV diagnosis when an identifiable indication for PrEP was present. Secondary outcomes included a composite of any HIV prevention intervention being offered in the 5 years before HIV diagnosis, including counseling on condom use or PrEP.

Patients with new HIV diagnoses were categorized into 2 groups: those who received any ambulatory care, and those who received emergency care

only. An ambulatory visit was defined as any outpatient clinic visit, and patients were categorized as ambulatory care received if they had 1 or more ambulatory visits within the 5 years before HIV diagnosis. Ambulatory care clinics included over 17 primary care clinics and all specialty clinics. The ambulatory care category also included patients who had received care in both the ambulatory and emergency care settings. Patients were categorized as receiving emergency care only if they had interacted exclusively with the ED, urgent care clinic, or inpatient settings.

Additional variables extracted from the EHR, Epic (Epic Systems Corporation, Verona, Wisconsin), included date of HIV diagnosis; age at diagnosis; sex assigned at birth; race/ethnicity; number of interactions with the health care system during the study period; prior PrEP usage (defined as a patient who has written documentation or prior PrEP usage in their record); previous STI and HIV screening and diagnoses (includes self-reported). We captured or confirmed the following variables through manual chart review in Epic: gender identity (transgender male, transgender female, cisgender male, or cisgender female); patient-reported condom use at the time of visit, relationship status, and confirmation of prior PrEP use reported by patient.

Statistical Analysis

We used descriptive statistics to describe the demographics, health conditions, STI screenings, PrEP indications, and prevention strategies for our overall patient sample. Analyses of the ambulatory care and emergency care only cohorts were conducted using the c^2 ($\chi 2$) test for categorical data. The continuous data were nonparametric and analyzed using a Kruskal Wallis test. Results were considered significant at a p-value <0.05. Multivariable logistic regression was used to calculate the adjusted odds ratios for receipt of different prevention interventions based on the following variables: Age <30, female sex, transgender identity, heterosexual orientation, ethnicity/race, not having PrEP on formulary at time of visit, and history of IDU. The gender identity, type sex of partner, and requested STI check after known exposure variables had some missing data and were imputed with the MICE package[19] before the regression analyses. All statistical analyses were performed with Python 3.7 (Python Software Foundation) and data imputation was done with R, version 4.0.3 (R Project for Statistical Computing).

Results

454 patients with a new HIV diagnosis were identified. Participant characteristics are listed in Table 1. Most patients 284 (62.6%) were assigned male at birth (AMAB), and there were 13 (2.9%) transgender individuals. Non-Hispanic black was the most common racial/ethnic group 251 (55.3%), followed by Hispanic 147 (32.4%) and non-Hispanic white 52 (11.5%). Most 270 (59.5%) identified as heterosexual only, followed by 155 (34.1%) documented as having same sex partners. Patients had a mean of 11.4 (S.D. = ±15.8) total health care visits before their diagnosis, with a higher overall number of ambulatory visits than emergency care visits (7.8 ± 14.0 vs 3.2 ± 5.4, $p = <0.01$).

There were no significant differences in type of health care interaction among racial or ethnic groups, gender identity, type of sex partner, STI screen completed, or year of HIV diagnosis. Those assigned female at birth (AFAB) were more likely to have attended at least 1 ambulatory visit (144 (84.7%)) than to interact with the emergency care setting only (26 (15.3%)), and most patients who only interacted with the emergency care setting were male versus female (74.3% vs 25.7%, $P = .008$). Those that attended ambulatory care visits were older than those who interacted only with the emergency care setting (39.3 years ±12.8 vs 36.1 year ±13.0, $P = .014$) (Table 1).

Table 2 highlights the identified indications for PrEP in the study sample. In total, 166(36.6%) of patients had at least 1 indication for PrEP before HIV diagnosis; 62(13.7%) had at least 1 bacterial STI in the 5 years preceding HIV diagnosis, 63 (13.9%) reported condomless sex, and 82(18.1%) reported IDU. Patients seeking ambulatory care were significantly more likely to have 1 or more PrEP indication identified (139(39.4%)) compared with patients receiving emergency care only (27 (26.7%)). Only 176 of the 454 patients received an HIV test before their diagnosis. Patients who engaged in ambulatory visits were significantly more likely to have a documented history of condomless sex compared with those who interacted with emergency care only (57(16.1%) vs 6(5.9%), $P = .013$). However, most patients (348(76.7%)) had no condom use history documented in the chart, with a slightly larger proportion (88(87.1%)) missing documentation in those receiving emergency care only compared with 260(73.7%) receiving ambulatory care. There were significantly higher rates of

Table 1. Demographic Characteristics of Patients Diagnosed with HIV Who Had Prior Health System Interactions by Site of Healthcare Interaction

Demographic Characteristics	Total Sample (n = 454) N (%) or Mean (SD)	Ambulatory Care Received* (n = 353) N (%) or Mean (SD)	Emergency-Care Only† (n = 101) N (%) or Mean (SD)	P-Value
Age at diagnosis	38.6 (12.9)	39.3 (12.8)	36.1 (13.0)	0.014
< 30, n (%)	130 (28.6)	91 (25.8)	39 (38.6)	0.017
≥ 30, n (%)	324 (71.4)	262 (74.2)	62 (61.4)	
Number of healthcare visits				
Total healthcare visits	11.4 (15.8)	13.3 (16.8)	4.7 (8.6)	<0.01
ED visits	3.2 (5.4)	2.9 (4.6)	4.2 (7.5)	<0.01
Inpatient admissions	0.5 (1.0)	0.6 (1.1)	0.3 (0.68)	<0.01
Ambulatory visits	7.8 (14.0)	10 (15.1)	–	N/A
Ethnicity/Race				0.544
Hispanic	147 (32.4)	111 (31.4)	36 (35.6)	
Non-Hispanic – Black	251 (55.3)	199 (56.4)	52 (51.5)	
Non-Hispanic – White	52 (11.5)	39 (11.0)	13 (12.9)	
– Other/Unknown	4 (0.9)	4 (1.1)	0 (0)	
Sex assigned at birth				0.008
Female	170 (37.4)	144 (40.8)	26 (25.7)	
Male	284 (62.6)	209 (59.2)	75 (74.3)	
Gender Identity				0.49
Cisgender	309 (68.1)	246 (69.7)	63 (62.4)	
Transgender	13 (2.9)	10 (2.8)	3 (3.0)	
Nonbinary	1 (0.2)	1 (0.3)	0 (0)	
Unknown	131 (28.9)	96 (27.2)	35 (34.7)	
Sexual Relationships		0.28		
Heterosexual only	270 (59.5)	216 (61.2)	54 (53.5)	
Same sex partners‡	155 (34.1)	117 (33.1)	38 (37.6)	
Unknown	29 (6.4)	20 (5.7)	9 (8.9)	
STI screen completed§§	23 (5.1)	21 (5.9)	2 (2.0)	0.178
Year of HIV diagnosis				0.609
2015	36 (7.9)	32 (9.1)	4 (3.96)	
2016	33 (7.3)	25 (7.1)	8 (7.9)	
2017	75 (16.5)	58 (16.4)	17 (16.8)	
2018	86 (18.9)	67 (19.0)	19 (18.8)	
2019	96 (21.1)	77 (21.8)	19 (18.8)	
2020	76 (16.7)	55 (15.6)	21 (20.8)	
2021‖	52 (11.5)	39 (11.0)	13 (12.9)	
Encounter after PrEP added to pharmacy formulary	224 (49.3)	171 (48.4)	53 (52.5)	0.547

*Ambulatory Care Received included patients who had at least 1 ambulatory visit and could include patients who also engaged with the emergency care setting.
†Emergency Care Only included patients who only interacted with the Emergency Department, Urgent Care Clinic, and/or Inpatient Settings.
‡Same sex partners included patients that have both male and female partners and those who exclusively had same sex partners.
§Defined as having all 3 of the following STI tests: Gonorrhea, Chlamydia, and Syphilis test.
‖Ending 6/30/2021.
Abbreviation: SD, standard deviation.

bacterial STIs in the 5 years before HIV diagnosis for those who received ambulatory care services versus emergency care only (56(15.9%) vs 6(5.9%), respectively, $P = .017$).

Only 7(1.5%) patients had documented counseling on PrEP in any practice setting. Only 11% of patients had a documented discussion with a clinician about any safer sex practices, including condom use

Table 2. Patients with Indications for HIV PrEP Identified Before HIV Diagnosis by Site of Healthcare Interaction, n = 454

Indication for HIV PrEP*	Total Patients, n (%), n = 454	Ambulatory Care Received, n (%), n = 353	Emergency-Care Only, n (%), n = 101	P-Value
One or more PrEP Indication	166 (36.6)	139 (39.4)	27 (26.7)	0.027
IV Drug Use	82 (18.1)	65 (18.7)	17 (17.3)	0.878
Bacterial STI in last 5 years (one or more)	62 (13.7)	56 (15.9)	6 (5.9)	0.017
Type of Bacterial STI				
Gonorrhea	25 (5.5)	21 (5.9)	4 (4.0)	0.599
Chlamydia	21 (4.6)	20 (5.7)	1 (1.0)	0.088
Syphilis	10 (2.2)	10 (2.8)	0 (0)	0.185
Self-reported STI[†]	21 (4.6)	20 (5.7)	1 (1.0)	0.088
Patient requested STI screen[‡]	8 (1.8)	7 (2.0)	1 (1.0)	0.81
Condomless Sex				0.013
Yes	63 (13.9)	57 (16.1)	6 (5.9)	
No	43 (9.5)	36 (10.2)	7 (6.9)	
Unknown	348 (76.7)	260 (73.7)	88 (87.1)	

*Indications for HIV PrEP are those identified from documentation in the EHR for 5 years before the date of HIV diagnosis.
[†]Results not available in the EHR.
[‡‡]Patient requested STI screening before HIV diagnosis due to a known or suspected exposure.
Abbreviations: HIV, human immunodeficiency virus; STI, sexually transmitted infections.

and/or PrEP. All 7 patients who were counseled on PrEP were also counseled on condom use, but only 3 out of the 47 patients who were counseled on condoms also received counseling on PrEP. No patients were counseled on or offered PrEP in the emergency care setting.

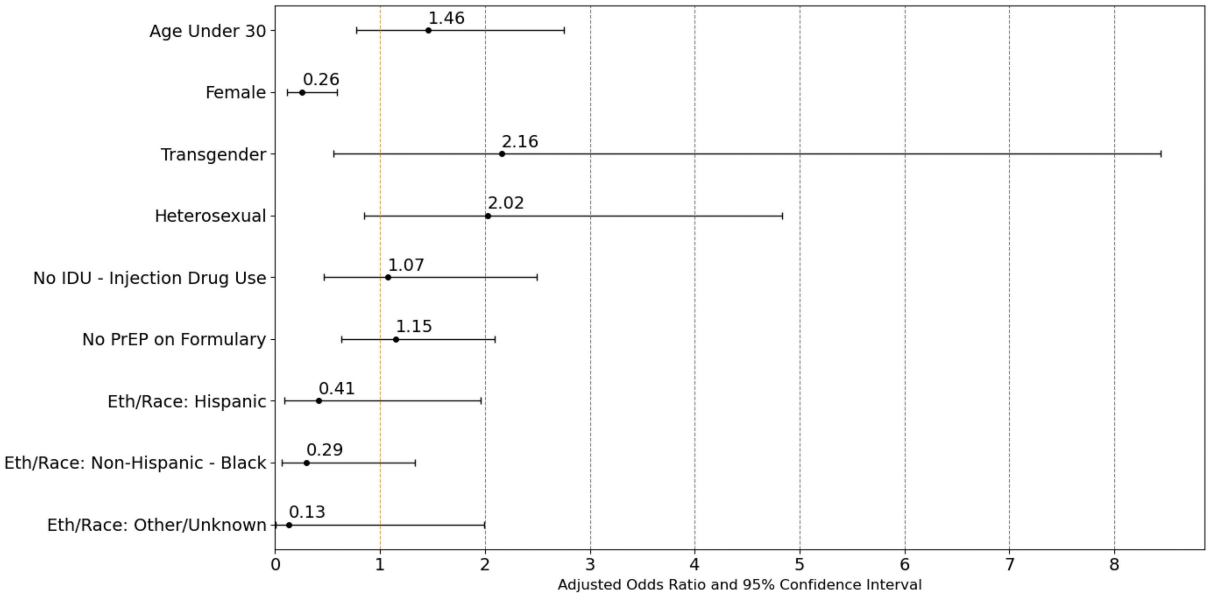
Patients with 1 or more ambulatory visits were more likely to be counseled on any safer sex practices than those who exclusively interacted with the emergency care setting (47(13.3%) vs 3(3.0%), respectively, $P = .006$). Logistic regression showed overall, those AFAB were less likely to have a missed opportunity for counseling on PrEP or condom use. In other words, those AFAB had a higher odds of being offered preventative measures or counseling on PrEP and condoms (aOR 0.26, CI [0.11-0.59]), while other characteristics including age <30, gender identity, sex of partners, IDU, eth/race, and availability of PrEP on the institution's pharmacy formulary did not have statistically significant impacts on being offered preventative measures or counseling (Figure 1).

Discussion

In this retrospective analysis of patients with incident HIV diagnoses at a large health system in Texas, multiple missed opportunities to discuss PrEP and STI prevention before HIV diagnosis were identified. While only 36.7% had an identifiable indication for PrEP before their diagnosis, most patients did not have documentation of condom use history in the chart, which could be used as a surrogate marker for obtaining sexual history. It is possible a significant number of patients had an indication for PrEP, but the necessary questions were not asked or documented to elicit this information. Even those who had a documented indication for PrEP had low rates of counseling on the benefits PrEP – with only 7 of the 166 patients overall and none who sought emergency care receiving PrEP education. The CDC and USPSTF recommend all sexually active adolescents and adults receive information on PrEP, though our findings demonstrate low rates of PrEP counseling overall, even for those with sexual risk behaviors identified.[9,10] Documented condom use, a recommended component of sexual history taking,[20] was mostly absent, and when discussions on condom use occurred, few also included discussions on PrEP. These findings highlight the need for improvement and standardization of sexual history collection and documentation by health care clinicians to hopefully better identify patients with increased likelihood of acquiring HIV and to standardize PrEP prescribing to all eligible patients.

The EHE initiative aims to reduce new HIV diagnoses in the US 90% by 2030 by improving early

Figure 1. Adjusted Odds Ratio of missed opportunity for counseling on PrEP or Condom Use or PrEP prescribing based on Characteristics. *Abbreviation:* PrEP, pre-exposure prophylaxis.



diagnosis, access to rapid initiation of antiretroviral therapy, responding promptly to outbreaks, and increasing uptake of PrEP among eligible populations.[2] One of the targets necessary to meet this objective is to increase PrEP uptake to 50% of eligible individuals prescribed and maintained on PrEP, though the unmet needs for PrEP are greatest among black and Hispanic populations.[2,11] Our study population of incident HIV diagnoses was mainly AMAB and predominantly black or Hispanic, mirroring the national and regional demographic trends for incident HIV.[1,21] We did not see a significant difference in PrEP counseling before HIV diagnosis across racial and ethnic groups, though this analysis was limited by low overall rates of documented counseling on PrEP and safer sex practices in the overall population. Interestingly those AFAB were more likely to have received counseling on PrEP and/or condom use for reasons that are not entirely clear and is unexpected given the inequity in PrEP uptake in the AFAB population.[11] One possible explanation would be an increased emphasis on age-based screening for bacterial STIs in young women by the USPSTF who assigns a grade level B recommendation for chlamydia and gonorrhea screening in young AFAB or older AFAB at risk, which may prompt a discussion on safer sex practices.[22] In contrast, the USPSTF assigns a grade level I, indicating insufficient evidence to recommend STI screening in AMAB.[22] A focus on improving PrEP uptake in females is imperative, as only 12% of eligible AFAB in the US are prescribed PrEP.[11] Further research is needed to better characterize the barriers to improving AFAB PrEP uptake.

Despite the CDC's recommendation for individuals with increased likelihood of acquiring HIV between the ages of 13 – 64 be screened yearly for HIV, most patients in this sample did not receive regular HIV screening before their HIV diagnosis.[23] Only about 1-third of patients had a prior documented HIV test in their EHR. Traynor et al. found patients who were screened for HIV were more likely to have a discussion on PrEP with their health care clinician.[24] With a minority of patients in this sample having an HIV test before their diagnosis, our study suggests the need for clinician education on the importance of routine HIV screening and identification of risk factors that could lead to HIV acquisition. It is important to examine clinician barriers to having conversations with patients about sex and IDU, which may be difficult and time intensive.

Documented PrEP and condom education was underutilized across clinical sites. Though those seeking care in the ambulatory setting were more

likely to be counseled on safer sex practices and HIV prevention than in the emergency care setting. Compounding this, our study found zero patients received counseling on PrEP, despite more than a quarter (26.7%) of those accessing emergency care services having 1 or more indication for PrEP. It is possible the urgency of other medical concerns took precedent over discussions on PrEP, but this fails to fully explain the emergency are encounters in which an indication for PrEP was identified during the visit. A quarter of people in the US do not have a primary care clinician according to Healthy People 2030 with many individuals only seeking care for emergency needs in emergency care setting.[26] Like other studies examining PrEP eligibility among patients seeking emergency care in an urban emergency department, our study found relatively high rates of PrEP eligibility among patients seeking care in our emergency care setting in Dallas, Texas. These prior studies demonstrated low baseline knowledge of PrEP and high rates of interest in PrEP after counseling,[27,28] suggesting PrEP uptake may be improved by increasing discussion of PrEP in the emergency care setting. Future opportunities to examine how to identify and engage PrEP-eligible people seeking emergency care are important, especially since for some individuals, the emergency setting is the only health care setting with which they engage.

Although we found higher rates of risk reduction conversations in the ambulatory setting, uptake of PrEP in the primary care settings has been slow. In addition, patients who were counseled on PrEP in the ambulatory setting may have already been prescribed PrEP before the encounter, which would imply and even lower impact of interventions overall. Many barriers remain to improve sexual history taking, identification of eligible patients, and PrEP prescribing among primary care clinicians.[12,18,25] This study demonstrates higher rates of identifying STIs and PrEP indications in those patients who obtain ambulatory care compared with those seeking emergency care only, highlighting the potential benefit of future research improving PrEP uptake in the primary care. With extremely low rates of documented sexual history taking and sexual health counseling in our sample, increased educational interventions for health care clinicians and expanded staffing in both the primary care and emergency care settings will be essential to successfully improve counseling and PrEP uptake among patients accessing the health care system.

There are several limitations to this study. The retrospective observational design relies on clinician documentation in the EHR, limiting the ability to determine whether counseling was provided. Inconsistencies in location of documentation of sexual history and counseling in the EHR may have contributed to an underestimation of baseline condom use and counseling outcomes. Subjects may have had higher numbers of baseline STIs diagnosed at outside institutions before their HIV diagnosis not captured in our EHR. In addition, available prevention interventions changed over the course of the study period with oral PrEP initial approval by the FDA in 2012 which may have impacted uptake of prevention for patients diagnosed earlier in the study, though availability of PrEP on our institutional formulary was included in analysis.

Conclusion

Despite PrEP's effectiveness, uptake remains low, leaving individuals at risk for infection. Health care setting efforts to improve HIV prevention must focus first on improving sexual history taking and identification of indications for PrEP with an emphasis on improving clinician knowledge and acceptability of PrEP as a best practice.

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