


PrEP Acceptance among Eligible Patients Attending the Largest PrEP Clinic in Jackson, Mississippi

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Abstract

Compared to other states in the United States, Mississippi has the lowest uptake of PrEP relative to the number of people newly diagnosed with HIV in the state. Open Arms Healthcare Center is the largest provider of PrEP in Mississippi, and has systematically documented PrEP eligibility, offers, and acceptance (ie, agreed to undergo a clinical PrEP evaluation) from 2017 to mid-2020. In encounter-based analyses, we examined factors associated with PrEP acceptance. Among 721 encounters where patients were eligible for PrEP, staff offered PrEP at 680 (94%) of encounters (526 unique individuals); individuals accepted a PrEP offer at 58% of encounters. Accepting a PrEP offer was lowest (15.8%) among transgender/non-binary individuals and highest (93.3%) among individuals who reported having sex partners living with HIV. This clinic's model worked to offer PrEP to a highly impacted population, though there is a need to enhance PrEP acceptance for key groups such as transgender/non-binary individuals.

Keywords

pre-exposure prophylaxis, HIV, health services, Mississippi

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Introduction

Despite evidence demonstrating the efficacy of oral pre-exposure prophylaxis (PrEP) for HIV prevention, uptake in the United States (US) has been slow, with only an estimated 23% of eligible persons using PrEP in 2019.¹ Low PrEP coverage is especially pronounced in the Southern US, a region where HIV incidence is the highest in the country, and among Black individuals, a population that continues to bear a disproportionately high burden of HIV.¹⁻⁵ In fact, in 2019 only an estimated 8% of Black individuals with a PrEP indication were prescribed PrEP, compared to 63% of white individuals.¹

There is a growing body of literature examining factors associated with PrEP acceptance and uptake. Acceptance and uptake have consistently been found to be associated with PrEP awareness, although this association differs based on the study population's gender identity.⁶⁻¹⁶ Factors such as age, race, number of sex partners, frequency of condom use,

relationship status, gender identity, having partners living with HIV or of unknown status, and history of STI have been consistently associated with PrEP acceptance and uptake, but the direction and magnitude of these associations varies widely across studies.^{6,8-13,15,17} There is still a key gap in our knowledge of factors associated with accepting a PrEP offer

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in a clinical setting, including a dearth of this type of information from the Southern US.

Mississippi has the sixth highest rate of HIV diagnosis in the US and is one of seven states identified by the US Ending the HIV Epidemic (EHE) initiative as being a geographic hotspot of HIV.^{4,18} Despite high rates of new HIV diagnosis, only one in five individuals with indications for PrEP use were prescribed PrEP in 2019,¹ and Mississippi has the lowest PrEP-to-Need Ratio in the US^{3,19} (ie, the lowest number of PrEP users per new HIV diagnosis). Yet we know little about factors associated with PrEP acceptance in clinical settings in Mississippi. This information can help guide PrEP providers to modify their approach to PrEP provision.

Open Arms Healthcare Center, located in Jackson, Mississippi, is the largest PrEP provider in the state. Open Arms systematically documents PrEP eligibility, offers, and acceptance among those seeking care in the clinic, providing a unique opportunity to examine PrEP acceptance and factors associated with acceptance among a population of patients who were eligible and offered PrEP by clinic staff. The objectives of this analysis were to determine acceptance of PrEP and factors associated with acceptance among patients attending Open Arms.

Methods

Study Design, Setting, and Population

This study was a cross-sectional study using data from Open Arms Healthcare Center, located in Jackson, Mississippi. Open Arms provides holistic healthcare (eg, sexual and reproductive healthcare, general medicine, behavioral health, social services, etc) to underserved, underinsured, and underrepresented populations, and aims to provide LGBT people of color culturally competent care in a safe environment. The clinic has offered PrEP to patients since October 2014.

Details on the clinic's PrEP program have been previously described.^{20,21} Per routine clinical protocol, all patients—including those who present to the clinic for reasons other than sexual healthcare—complete a health assessment that includes information on sexual behavior and sexual partners. The information is reviewed by clinic staff performing the patient's HIV test to determine whether or not the patient is eligible for PrEP. Clinic staff provide education about PrEP, and offer PrEP to individuals who are men who have sex with men (MSM) or transgender women; diagnosed with gonorrhea, chlamydia, or syphilis in the past year; report a partner who is living with HIV or of unknown HIV status; asking for PrEP; or transitioning from non-occupational post-exposure prophylaxis (nPEP). Once eligibility is determined by clinic staff, the PrEP navigator extends an offer to the patient to undergo a clinical evaluation to initiate PrEP (henceforth described as a "PrEP offer"). PrEP navigators also work with patients to address any barriers they may have to initiating PrEP (eg, assistance with completion of patient assistance paperwork). Prior to 2018, individuals who accepted a PrEP offer underwent a same-day clinical

evaluation with a clinical provider, including obtaining baseline labs. Individuals who were deemed clinically eligible to start PrEP were given a prescription after laboratory results were available. Starting in 2018, individuals were given a prescription for PrEP the same day as the clinical evaluation if the individuals did not show signs or symptoms of acute HIV, and if their rapid HIV test was negative. Individuals could start PrEP prior to receiving the results of other baseline laboratory-based tests (eg, creatinine).

In 2017, staff at Open Arms began systematically documenting PrEP eligibility criteria, PrEP offers, and PrEP acceptance (ie, accepted a PrEP offer, meaning the patient agreed to undergo an evaluation for PrEP) in an ancillary REDCap database,^{22,23} which was used until mid-2020. The REDCap database was implemented in the clinic to be able to more readily monitor the clinic's PrEP program for internal quality improvement without relying on data abstraction from the clinic's main electronic medical record. The REDCap database included demographic information, STI testing and diagnosis history, sexual behavior history, and whether or not someone was eligible for PrEP, offered PrEP, and accepted a PrEP offer.

For this analysis, the study population comprised individuals who were patients at Open Arms from January 2017 to October 2020 (the time period when the REDCap database was used) and who were determined to be eligible for PrEP by the clinic's criteria. This is an encounter-based dataset (ie, a dataset where each "row" of data represents a patient encounter/visit rather than an individual person. In encounter-based datasets, a single person may appear in the dataset multiple times if they had more than one visit during the study period).

Statistical Analysis

We describe the percentage of encounters where individuals accepted a PrEP offer, among encounters where individuals were eligible and offered PrEP. We examined associations between PrEP acceptance and select demographic (eg, age, race), clinical (eg, history of bacterial STI), and behavioral (eg, condom use) factors that we identified in the literature to be previously associated with PrEP acceptance or uptake. To explore whether acceptance of a PrEP offer differed by select factors, we used log binomial regression with robust standard errors to estimate unadjusted and adjusted prevalence ratios (PR) and 95% confidence intervals (CI). We included all factors of interest in the multivariate model.

In a person-based analysis, we describe the percentage of individuals who ever accepted a PrEP offer versus never accepted a PrEP offer. We compared the characteristics of patients who ever versus never accepted PrEP using chi-square tests and also reported the median number of times after the initial PrEP decline that someone later accepted a PrEP offer.

We used Stata version 17 (College Station, TX, USA) for all analyses. All tests were performed at a significance level of 0.05. This study was reviewed and approved by the University of Washington Institutional Review Board (IRB) and University

Table 1. Characteristics of Encounters Where Patient Was Eligible for Pre-Exposure Prophylaxis (PrEP) and Offered a Prescription (N = 680).

Characteristics	Eligible Encounters N = 680 N (%)
Age (years)	
<25	262 (38.5)
≥ 25	418 (61.5)
Race	
Black	493 (72.5)
White	159 (23.4)
Another race not listed*	28 (4.1)
Gender and Gender of Sex Partners	
Cisgender men	563 (82.8)
Cisgender men who have sex with men	431 (63.4)
Cisgender men who have sex with women	31 (4.6)
Cisgender men who have sex with women and men	100 (14.7)
Cisgender women	79 (11.6)
Cisgender women who have sex with men	61 (9.0)
Cisgender women who have sex with women	3 (0.4)
Cisgender women who have sex with women and men	15 (2.2)
Transgender/non-Binary individuals	38 (5.6)
Transgender/non-Binary individuals who have sex with men	31 (4.6)
Transgender/non-Binary individuals who have sex with women and men	7 (1.0)
Date of last HIV test	
Within the past 12 months	261 (38.4)
>12 months ago	62 (9.1)
Unknown	357 (52.5)
Has sex partner(s) living with HIV	
Yes	45 (6.6)
No	127 (18.7)
Unknown	508 (74.7)
STI diagnosis in prior 12 months**	
Yes	105 (15.4)
No	575 (84.6)
STI diagnosis at current visit†	
Syphilis	76 (11.2)
Gonorrhea	67 (9.9)
Chlamydia	86 (12.6)
No STI diagnosis of syphilis, gonorrhea, chlamydia	490 (72.1)
Condom use for receptive anal or vaginal sex	
Always	52 (7.7)
Not always	458 (67.4)
Not applicable	170 (25.0)
Condom use during receptive vaginal sex	
Always	15 (2.2)
Not always	157 (23.1)
Not applicable	508 (74.7)
Condom use during receptive anal sex	
Always	41 (6.0)
Not always	337 (49.6)
Not applicable	302 (44.4)

*Another race includes American Indian/Alaskan Native (N = 2), Asian (N = 1), Native Hawaiian or Other Pacific Islander (N = 1), More than One Race (N = 10), and unknown/not reported (N = 15).

**STI diagnoses include chlamydia (genital, rectal, and/or pharyngeal), gonorrhea (genital, rectal, and/or pharyngeal), and syphilis.

†Diagnosis of syphilis, gonorrhea, and chlamydia are not mutually exclusive (ie, individuals can be diagnosed with more than one STI at a given visit).

of Mississippi Medical Center IRB. Because this was a medical records review, patients did not provide written informed consent.

Results

Between January 2017 and October 2020, there were 721 encounters where patients were eligible for PrEP; staff offered PrEP at 680 (94%) of these encounters. These 680 encounters include 526 unique individuals, and comprise the analytic datasets used for analysis.

Descriptive characteristics of encounters at which patients were offered PrEP are shown in Table 1. Most encounters were with patients ages 25 and older (61.5%), patients who identified as Black (72.5%), and cisgender MSM (63.4%). Approximately 6.6% of encounters were with patients who reported having sex partners living with HIV.

Individuals accepted a PrEP offer at 395 (58%) of 680 encounters (Table 2). Encounters with individuals who were transgender or non-binary had the lowest prevalence of accepting the PrEP offer (16%); the highest prevalence of accepting the PrEP offer (93%) was during encounters where individuals reported having a sex partner who was living with HIV (Table 2). Bivariate analyses indicated that encounters with transgender/non-binary individuals were significantly less likely to accept a PrEP offer compared to those with cisgender MSM (PR = 0.3; 95% CI = 0.1, 0.5). Encounters with individuals who did not know their last date of HIV test (PR = 1.3; 95% CI = 1.1, 1.6) and encounters where individuals reported always (vs not always) using condoms for receptive vaginal or anal sex (PR = 1.3; 95% CI = 1.1, 1.6) were more likely to accept the PrEP offer. Encounters with individuals who reported having sex partners living with HIV or of unknown HIV status were more likely to accept the PrEP offer compared to those who did not report having these partners; this was the only factor that remained significantly associated with accepting a PrEP offer in adjusted analysis (aPR = 1.9, 95% CI = 1.2, 2.8). There were no significant differences in accepting a PrEP offer by race or age.

There were 526 unique individuals who were offered PrEP; 346 (65.8%) ever accepted a PrEP offer and 180 (34.2%) never accepted a PrEP offer (Table 3). Among these 180 individuals who never accepted a PrEP offer, 86% were offered PrEP once, 10% were offered twice, and 4% were offered PrEP three or more times. There were no significant differences in ever versus never accepting a PrEP offer by age or race. Transgender/non-binary individuals were the least likely to ever accept a PrEP offer (16.7% ever accepted) and cisgender MSM were the most likely to ever accept a PrEP offer (73.1% ever accepted). Of the 346 individuals who ever accepted a PrEP offer, 329 (95.1%) accepted at the first offer and 17 (4.9%) initially declined a PrEP offer and later accepted; 14 (82%) of 17 accepted a PrEP offer the second time they were offered. Notably, 28 (8.1%) of the 329 who accepted PrEP at first offer declined a subsequent PrEP offer that was made after a gap in their PrEP coverage (a median of 6 months after initiating PrEP).

Table 2. Characteristics of Encounters Where Patients Accepted Versus Did Not Accept a PrEP Offer (N = 680).

Characteristics	N	Accepted PrEP Offer	Did not accept PrEP	PR (95% CI)	Adjusted PR (95% CI)
		N = 395	offer N = 285		
		N (row %)	N (row %)		
Overall	680	395 (58.0%)	285 (42.0%)		
Age (years)					
<25	262	152 (58.0)	110 (42.0)	Reference	Reference
≥25	418	243 (58.1)	175 (41.9)	1.0 (0.9, 1.1)	1.1 (0.8, 1.4)
Race					
Black	493	290 (58.8)	203 (41.2)	Reference	Reference
White	159	88 (55.4)	71 (44.7)	0.9 (0.8, 1.1)	1.0 (0.8, 1.3)
Other	28	17 (60.7)	11 (39.3)	1.0 (0.8, 1.4)	1.0 (0.6, 1.6)
Gender and Gender of Sex Partners					
Cisgender MSM	431	270 (62.7)	161 (37.4)	Reference	Reference
Cisgender MSW	31	20 (64.5)	11 (35.5)	1.0 (0.8, 1.4)	1.0 (0.6, 2.1)
Cisgender MSMW	100	54 (54.0)	46 (46.0)	0.9 (0.7, 1.1)	1.1 (0.8, 1.5)
Cisgender women	79	45 (57.0)	34 (43.0)	0.9 (0.7, 1.1)	1.4 (0.9, 2.1)
Transgender/nonbinary individuals	38	6 (15.8)	32 (84.2)	0.3 (0.1, 0.5)	0.4 (0.6, 2.4)
Date of last HIV test					
Within past 12 months	261	134 (51.3)	127 (48.7)	Reference	Reference
>12 months ago	62	32 (51.6)	30 (48.4)	1.0 (0.8, 1.3)	1.2 (0.8, 1.8)
Unknown	357	229 (64.2)	128 (35.9)	1.3 (1.1, 1.4)	1.2 (0.9, 1.5)
Has sex partner(s) living with HIV					
Yes	45	42 (93.3)	3 (6.7)	2.1 (1.7, 2.6)	1.9 (1.2, 2.8)
No	127	57 (44.9)	70 (55.1)	Reference	Reference
Unknown	508	296 (58.3)	212 (41.7)	1.3 (1.1, 1.6)	1.3 (0.9, 1.9)
STI diagnosis in prior 12 months					
Yes	105	52 (49.5)	53 (50.5)	0.8 (0.7, 1.0)	1.0 (0.6, 1.6)
No	575	343 (59.7)	232 (40.4)	Reference	Reference
Condom use for receptive anal or vaginal sex					
Always	52	37 (71.2)	15 (28.9)	1.3 (1.1, 1.6)	1.2 (0.7, 2.3)
Not always	458	251 (54.8)	207 (45.2)	Reference	Reference
Not applicable	170	107 (63.0)	63 (37.1)	1.2 (1.0, 1.3)	1.3 (0.8, 2.1)

CI, confidence interval; MSM, men who have sex exclusively with men; MSMW, men who have sex with men and women; MSW, men who have sex exclusively with women; PR, prevalence ratio.

Discussion

In this analysis of clinic data from the largest PrEP provider in Jackson, Mississippi, we found that clinic staff offered PrEP at a vast majority of eligible encounters (94%) and that patients accepted a PrEP offer at 58% of visits at which they were eligible. In our person-based analysis, we found that about 66% of patients eligible for PrEP ever accepted a PrEP offer and that vast majority (95%) of those patients accepted the PrEP offer the first time they were asked. Accepting a PrEP offer was lowest for patients who identified as transgender and highest for patients who had a partner living with HIV. These findings highlight a successful model of PrEP implementation in a clinic setting located in a state with disproportionately high rates of new HIV diagnosis.

Most published data about PrEP use in the US reflects ever or current use of PrEP (ie, the percentage of individuals in a given setting or geographic region who report ever using PrEP or who report current PrEP use). In our study, we examined the step immediately preceding use or uptake; that is, we examined the percentage of individuals who accepted an offer

to undergo a clinical evaluation for PrEP, among those who were eligible for PrEP and offered PrEP. In that regard, our findings are somewhat difficult to contextualize in other published estimates of studies in the US, which have largely measured PrEP uptake. However, some US studies have explicitly measured PrEP initiation or acceptance of a PrEP offer among individuals eligible for PrEP (as we did here); those studies have yielded a range of estimates of PrEP uptake, from 19% to 79%.^{24–28} The three studies most comparable to ours were clinic or community-based organization evaluations. Using electronic medical record (EMR) data from a large network of federally qualified health centers in New York City, Caponi and colleagues²⁴ found that 19% of patients were prescribed PrEP among those who were identified in their EMR as being eligible for PrEP (ie, had clinical indicators in the EMR of being at high risk of HIV but were HIV-negative). In a health department clinic in Atlanta, Rolle and colleagues²⁵ noted that 60% of patients who were determined to be eligible for PrEP by clinic criteria attended their PrEP initiation visit. And in a PrEP demonstration project in Tennessee, Brantley and colleagues²⁶ found that

Table 3. Characteristics of Individuals Who Ever Versus Never Accepted a PrEP Offer (N = 526).

Characteristic	N	Ever	Never	P-value*
		Accepted N = 346	Accepted N = 180	
Overall	526	346 (65.8)	180 (34.2)	
Age at first visit				0.66
<25	209	135 (64.6)	74 (35.4)	
>=25	316	210 (66.5)	106 (33.5)	
Race				0.66
Black	369	247 (66.9)	122 (33.1)	
White	130	82 (63.1)	48 (36.9)	
Other	26	16 (61.5)	10 (38.5)	
Gender and Gender of Sex Partners				<0.05
Cisgender MSM	309	226 (73.1)	83 (26.9)	
Cisgender MSW	31	20 (64.5)	11 (35.5)	
Cisgender MSMW	79	51 (64.6)	28 (35.4)	
Cisgender women	76	43 (56.6)	33 (43.4)	
Transgender/ non-binary individuals	30	5 (16.7)	25 (83.3)	

MSM, men who have sex exclusively with men; MSMW, men who have sex with men and women; MSW, men who have sex exclusively with women.

*From chi-square test.

clients accepted a PrEP offer at 50% of eligible encounters. Thus, our observation that 66% of individuals ever accepted a PrEP offer is at the high end of these estimates. It is worth noting that we did not explicitly capture whether or not a client underwent the clinical evaluation and was given a PrEP prescription, as some of these other studies did. But given that for most of the study period (in 2018 and later), it was the clinic's protocol for individuals to undergo a same-day PrEP evaluation, we believe that the majority of those who accepted a PrEP offer did indeed have a clinical evaluation and were likely provided with a PrEP prescription, though we cannot assert that with certainty.

This high level of PrEP acceptance we observed is particularly remarkable given that Mississippi has lowest number of PrEP users per new HIV diagnosis in the US at 1:3 (ie, for every one person newly diagnosed with HIV in Mississippi, there were only an estimated 3 people using PrEP). For comparison, in New York State this ratio is 1:17.³ Our findings suggest that at least in our setting—which is the largest PrEP provider in the state—once individuals are identified as eligible for PrEP and are educated about PrEP, overall acceptance is high. Therefore, other components of the PrEP care continuum, such as awareness of PrEP and persistence on PrEP, may be driving the low prevalence of PrEP use in Mississippi. Indeed, a number of clinic-based PrEP programs in the US including in Mississippi have observed low persistence on PrEP, noting that 30–50% of individuals discontinue PrEP within the first 12 months of initiation.^{20,25,29–34} Additionally, it is important to recognize that over 50% of individuals newly diagnosed with HIV in Mississippi reside

in rural communities,³⁵ and [CLINIC] is just one provider that is located in an urban area. Thus, continued efforts to increase PrEP awareness and education alongside interventions to improve PrEP persistence and implement same-day PrEP in settings outside large urban areas are needed to increase more widespread PrEP use Mississippi and elsewhere in the US.

Although we believe our findings demonstrate a successful model of PrEP implementation, it is notable that in our study there were 42% of encounters where patients were eligible for PrEP but declined a PrEP offer and that one-third of patients never accepted a PrEP offer. Several studies have identified a lack of PrEP awareness as a key barrier to uptake,^{6,8–10,12–15} but here patients were already engaging with the healthcare system, received standardized education about PrEP, and were offered PrEP. This highlights other critical barriers to PrEP uptake. A large body of research has attempted to characterize these barriers at all socioecological levels. Individual-level barriers (eg, perceived risk of HIV infection, concerns of PrEP side effects), interpersonal-level barriers (eg, PrEP use implies cheating to monogamous partners), and healthcare-level barriers (eg, proximity to facilities, medical mistreatment) all contribute to low uptake.^{6–12,15–17,27,36–41} Additionally, structural racism and perceived and enacted PrEP-related stigma associated with HIV, homophobia, and transphobia are barriers at all socioecological levels.³⁹ Notably in our study, accepting a PrEP offer was lowest (17%) among transgender/non-binary individuals. Transgender/non-binary populations may have unique barriers to PrEP uptake such as concerns of side effects and interactions with hormone replacement therapy (HRT) for gender-affirming care, stigma, and prioritization of social support programs over medical care.^{9,13,42–44} Improving PrEP acceptance and uptake necessitates approaches that address these critical hurdles such as gender-affirming care, effective patient-provider communication, programs to reduce PrEP related stigma, improving access to low-barrier care, and improving marketing strategies for non-MSM PrEP users.^{9–11,16,35–37}

In our encounter-based analysis, the only factors other than gender that were significantly associated with PrEP acceptance were condom use and having a partner living with HIV, with the latter being the only factor significantly associated with PrEP acceptance in adjusted analyses. Given that over 90% of individuals with partners living with HIV accepted the PrEP offer, we hypothesize that these individuals specifically sought care at the clinic in order to start PrEP. Supporting this, previous evaluations of [CLINIC] data have found that people with a partner living with HIV have high persistence on PrEP at 12 months after initiation.²⁰ Notably, both person and encounter-based analyses found no significant difference in PrEP acceptance by race and age. This was reassuring, given that [CLINIC] made substantial efforts to promote PrEP acceptance among young, Black MSM in particular and specifically hired clinic staff that reflected the community they served.

There are several limitations that may influence the results of the study. First, these data are from a single clinical site in

Jackson, Mississippi, and results may not be able to be extrapolated broadly, though these data do come from the largest PrEP provider in Mississippi. Second, because this analysis leveraged data collected in an ancillary clinical database and not the primary electronic health record, we were not able to examine other factors' association with PrEP acceptance that were not included in the ancillary database. For example, our analysis did not include urban/rural residence information, insurance status, ethnicity, reason for visit, or substance use history. Third, we do not know reasons why people did not accept the PrEP offer (eg, did not perceive a need for PrEP, did not want to return to the clinic for quarterly visits, etc). However, this study still provides important insights into this step of the "PrEP continuum." Finally, our data only describe acceptance of a PrEP offer, and we do not have insights into how many individuals who accepted an offer for a PrEP evaluation ultimately picked up their prescription and persisted on PrEP. However, a key strength of our study is that the clinic systematically documented PrEP eligibility criteria, PrEP offers, and acceptance of the offer, allowing us to gain a comprehensive look at PrEP acceptance.

In summary, we found that overall PrEP uptake was high in this clinical setting in the Deep South. These data are critically important to allow our clinic and others to understand gaps in PrEP provision. Here we found that our clinic offered PrEP to the vast majority (94%) of PrEP patients and that most accepted a PrEP offer, though transgender/non-binary patients had relatively low acceptance. These findings highlight the important of standardized and systematic processes for PrEP education and offers as well as documentation of these services so that the data can be used to improve clinic services and highlight potential areas of intervention.

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Author Contributions

M.H. and C.M.K. conceptualized the study design and analysis with input from L.W. and J.D. J.G., A.B., and L.M. were involved in the design and execution of data collection. M.H. wrote the first draft of the manuscript. All others critically reviewed the manuscript and agreed on the final submitted version.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: C.M.K. has received donations of specimen collection kits and reagents for research outside the submitted work. L.M. received grants from ViiV Healthcare, Gilead Sciences, Merck, Hologic, Janssen, Lupin, Evofem, Click Diagnostics, Binx Health, ThaiMed and received honoraria for from ViiV Healthcare, Gilead Science, Merck and Roche.

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