

# PrEP Indications and PrEP Knowledge, Access, and Interest Among Individuals With HCV

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**Background.** Individuals with hepatitis C (HCV) represent a population that may benefit from pre-exposure prophylaxis (PrEP), given the overlapping risk factors and transmission networks of HCV and HIV. This analysis assesses the prevalence of PrEP indications among individuals with HCV mono-infection and PrEP awareness, interest, and access in this population.

**Methods.** GRAVITY was an observational study for the collection of epidemiologic data from individuals with HCV and/or HIV in Washington DC and Baltimore, with the present analysis limited to HCV-mono-infected patients. The prevalence of PrEP indications was determined using epidemiologic survey responses. Bivariate and multivariable analyses assessed for associations between PrEP indications and PrEP awareness, access, and interest.

**Results.** Among 314 HCV-mono-infected participants, 109 (35%) had an indication for PrEP. Forty-eight (44%) had a drug use indication alone, 40 (37%) had a sexual indication alone, and 21 (19%) had both drug use and sexual indications. Eighty-five (27%) participants had heard of PrEP, 32 (10%) had been offered PrEP by a provider, 114 (38%) were interested or maybe interested in PrEP, and 6 (2%) were currently taking PrEP. On bivariate analysis, PrEP awareness was significantly associated with study site ( $P < .0001$ ), race ( $P = .0003$ ), age ( $P < .0001$ ), and sexual PrEP indication ( $P = .04$ ). However, only study site remained significant ( $P = .0002$ ) on regression analysis.

**Conclusions.** Though indications for PrEP were prevalent among individuals with HCV in this cohort, most patients were unaware of PrEP, had never been offered PrEP, and were not using PrEP. These data support the need for improved PrEP implementation among people with HCV.

**Keywords.** pre-exposure prophylaxis; HCV; HIV; HIV prevention; PWID; hepatitis C; people who inject drugs; PrEP.

Pre-exposure prophylaxis (PrEP) is an effective but underutilized tool in public health efforts to limit HIV transmission. Daily oral tenofovir disoproxil fumarate–emtricitabine PrEP is associated with a 0.46 relative risk (RR) of HIV infection when compared with placebo, which is further reduced to 0.27 when analysis is limited to individuals with >70% adherence [1], and injectable cabotegravir holds promise to decrease risk even further [2]. However, utilization of PrEP remains low, and in 2018 only 18.1% of an estimated 1.2 million individuals with indications for PrEP received a prescription [3].

Given overlapping risk factors and transmission networks of hepatitis C (HCV) and HIV, particularly injection drug use

(IDU) and anal receptive sexual intercourse [4], individuals with HCV represent a population that may benefit from PrEP. In fact, 68% of new HIV infections in the United States in 2020 were secondary to male-to-male sexual contact, 7% were secondary to IDU, and 4% occurred in individuals reporting both risk factors [5].

Regional HCV prevalence could be an indicator of HIV risk among people who inject drugs (PWID) [6]. In recent years, there have been multiple documented outbreaks of HIV related to IDU in the United States across both rural and urban settings [7, 8]. Most individuals who contracted HIV in these outbreaks also had evidence of prior HCV infection [7], and genetic analysis of HCV strains in the Scott County outbreak identified HCV transmission networks among PWID that predated the county's HIV outbreak by years [9]. This is particularly concerning given the significant increase in incident HCV that has occurred in the setting of the opioid use disorder epidemic [10]. In 2019, 67% of individuals with new HCV infections reported IDU [11].

There is also evidence of sexual HCV transmission networks. Though sexual HCV transmission had been thought to primarily impact HIV-infected men who have sex with men (MSM), recent studies demonstrate sexual HCV acquisition among HIV-negative MSM [4]. Two phylogenetic analyses of European MSM cohorts

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demonstrated HCV clusters containing both HIV-positive and HIV-negative individuals that could not be fully explained by IDU, suggesting sexual transmission of HCV between HIV serogroups [12, 13]. The data on heterosexual HCV transmission is more varied, with evidence that risk of sexual HCV transmission is very low among monogamous heterosexual couples [14] but may be elevated among heterosexual individuals with multiple partners or those with sexually transmitted infections [15].

Despite the common risk factors leading to HIV and HCV acquisition, people with HCV have not been a target population in PrEP implementation, and there are limited data on PrEP uptake among this group. In 1 study of PWID receiving treatment for HCV, all patients were offered PrEP, but only 16% of patients initiated PrEP and only 28% were retained on PrEP after 48 weeks [16]. The study's low uptake was still higher than previous investigations of PrEP use among PWID, where utilization has ranged from 0% to 3% [17], despite high-quality evidence that PrEP can effectively reduce HIV incidence in PWID [18].

The current analysis aims to characterize PrEP eligibility and awareness among individuals with HCV. People with HCV represent an intersecting population with groups already targeted for PrEP implementation, including PWID and MSM. However, people with HCV are a distinct and likely particularly high-risk group, because HCV infection is a sensitive indicator of prior blood-to-blood contact. Understanding the HIV risk and PrEP engagement of people with HCV is necessary to better inform strategies for HIV prevention in this population.

## METHODS

### Study Design

The current analysis is part of the Geomapping Resistance and Viral Transmission in Risky Populations (GRAVITY) study. GRAVITY was an observational study for the collection of epidemiologic information and plasma samples from individuals with HCV and/or HIV to evaluate transmission networks and patterns of resistance. The study was conducted between March 2016 and November 2020 by the University of Maryland Baltimore.

### Recruitment

Five hundred eligible individuals were enrolled and completed the one-time study visit, which involved a blood draw and an epidemiologic survey. Participants were recruited through HIV and HCV testing at 6 partner sites in Washington DC and Baltimore. Most participants were recruited from a harm reduction organization that provides services to sex workers, PWID, and gender and sexual minorities. The organization also had a community HIV and HCV testing presence at parks, community centers, and shelters. Additionally, participants were recruited from 2 federally qualified health centers (FQHCs), 2 drug treatment centers, and a city health department clinic. Volunteers were eligible if they were 18 years or older, infected with HCV and/or HIV,

and able to provide informed consent. The current analysis is limited to HCV-monoinfected participants who responded to at least 1 survey question about PrEP awareness, past offers, or interest.

## Measures

### *Sociodemographic Data, Drug Use, and Sexual Behavior*

Participants completed an interview-administered epidemiologic survey, which included questions on demographic characteristics, health care access, and drug use and sexual behaviors. Participants who reported drug use in the past 12 months were surveyed on types of drugs used, routes of administration, and injection behaviors. Participants who reported sexual intercourse in the last 12 months were asked about transactional sex (sexual intercourse in exchange for drugs, money, or shelter), frequency of barrier protection during vaginal and anal sex, number of sexual partners, and specific partner categories.

### *PrEP Variables*

PrEP awareness, past offers, and interest were assessed. Awareness was assessed by asking participants if they had ever heard of PrEP or Truvada for PrEP (no/yes). Past offer was assessed by asking participants whether they had ever been offered PrEP or Truvada for PrEP by a provider (no/yes). Participants reported if they were currently taking PrEP (no/yes). Finally, the survey administrator provided all participants previously unaware of PrEP with a brief description of what PrEP is, and all participants not currently taking PrEP were asked, "Would you be interested in taking PrEP?" (no/yes/maybe).

### *PrEP Indications and HIV Risk Perception*

Patients were categorized as having drug use and/or sexual indication for PrEP. A drug use indication was defined as endorsing both IDU within 12 months and any sharing of needle or non-needle injecting equipment or backloading. A sexual indication for PrEP was defined as 1 of the following within 12 months: (1) >1 sexual partner and inconsistent condom use during anal or vaginal sex; (2) transactional sex, defined as sex in exchange for drugs, money, or shelter; and/or (3) an HIV-positive partner.

To assess HIV risk perception, participants answered, "Would you consider yourself high risk for contracting HIV?" (no/yes/unsure).

### Statistical Analysis

Chi-square tests were performed to assess for bivariate associations between PrEP indications, demographic characteristics, and PrEP awareness, offers, and interest. The Fisher exact test assessed for the associations between study site and PrEP variables. Two-sample *t* tests assessed for associations between age and PrEP variables.

For analysis, some groups were consolidated or eliminated to allow for sufficient sample size. Only "male" and "female" were included in the analysis by gender. Age was treated as a

continuous variable. Housing was categorized as “stable” if participants reported that they “rent or own an apartment, house, or other stable housing”; all other responses were categorized as “unstable.”

Participants who responded to “Would you be interested in PrEP?” with “yes” or “maybe” were categorized as interested in bivariate and multivariable analysis. Participants who responded to “Would you consider yourself high risk for contracting HIV?” with “no” or “unsure” were both categorized as “no” in bivariate and multivariable analysis.

Descriptive statistics for race, housing status, PrEP interest, and HIV risk perception are reported according to original survey responses.

Logistic regression models were used for multivariable analysis. A sensitivity analysis was performed for the group of individuals categorized as having a PrEP indication and is included in the [Supplementary Data](#). Analyses were conducted using SAS, version 9.4, and JMP Pro 16.

## RESULTS

### Study Population

Three hundred fourteen HCV-monoinfected patients from 6 sites were included in the analysis. Two hundred sixty-four (84%) participants were recruited from a harm reduction center and community testing program, 27 (9%) were recruited from drug treatment programs, 14 (4%) were recruited from FQHCs, and 9 (3%) were recruited from a city health department clinic.

Most participants identified as cisgender male (207, 66%), heterosexual (246, 78%), and Black (275, 88%), with a median age (interquartile range) of 57 (52–62) years. One hundred ninety-one (61%) individuals had a high school degree or higher, and 180 (57%) reported having a source of money or income, with the government being the most common income source (146, 46%). More than half of participants were unstably housed (168, 54%), including 76 (24%) living outdoors or in shelters ([Table 1](#)).

### Medical Care Utilization

Most participants had medical insurance (295, 94%) and reported having a regular provider whom they saw for routine medical care (199, 63%). For those without a regular provider, the emergency department was the most common location of medical care utilization (71, 62%). Half of participants reported at least 1 barrier to medical care (157, 50%), with transportation being the most reported barrier (99, 32%) ([Table 1](#)).

### Drug Use and Sexual Behaviors

Three hundred six (97%) participants reported using drugs of any modality in their lifetime, not exclusive to injection drugs, with 265 (84%) reporting any drug use in the last 12 months.

Heroin was the most used substance (239, 76%), followed by crack cocaine (123, 39%). One hundred ninety-seven (63%) participants reported injecting drugs in the last 12 months. Among those who injected drugs in the preceding 12 months, 37 (19%) reported using a needle or syringe after someone else, 60 (30%) reported using non-needle injecting equipment after someone else, and 27 (14%) endorsed backloading.

One hundred ninety-two (61%) participants reported sex in the last 12 months. Most participants reported engaging in vaginal sex (185, 59%), and a minority engaged in anal intercourse (23, 7%). Sixty (31%) individuals reported >1 sexual partner, with 41 (68%) of these individuals reporting any vaginal sex without barrier protection and 8 (13%) reporting any anal sex without barrier protection. Twenty-nine (15%) individuals reported exchanging sex for drugs, money, or shelter, and 7 (4%) reported an HIV-positive partner in the last 12 months ([Table 2](#)).

### PrEP Indications

One hundred nine (35%) participants had an indication for PrEP. Of participants with a PrEP indication, 48 (44%) had a drug use indication alone, 40 (37%) had a sexual indication alone, and 21 (19%) had both drug use and sexual indications ([Table 2](#)).

### PrEP Awareness, Offers, Interest

In the total cohort, 85 (27%) participants had heard of PrEP, 32 (10%) had been offered PrEP by a provider, and 6 (2%) were currently taking PrEP. One hundred fourteen (37%) were interested or maybe interested in PrEP.

Among individuals with a PrEP indication, 41 (38%) were aware of PrEP, 13 (12%) had been offered PrEP, 3 (3%) were currently taking PrEP, and 47 (43%) were interested or maybe interested in PrEP.

### HIV Risk Perception

Forty-seven (15%) individuals considered themselves high risk for HIV, 264 (84%) did not consider themselves high risk, and 3 (1%) were unsure. Among individuals who considered themselves high risk for HIV, 10 (21%) had heard of PrEP, 5 (11%) had been offered PrEP, 3 (6%) were currently taking PrEP, and 31 (66%) were interested or maybe interested in PrEP.

Personal HIV risk perception did not vary significantly across indications for PrEP. Among individuals with any PrEP indication, 31 (28%) considered themselves high risk for HIV ([Figure 1](#)), compared with 20 (33%) of the individuals with a sexual indication and 19 (28%) of the individuals with a drug use indication ([Table 3](#)).

Among individuals with PrEP indications, women were twice as likely as men to self-identify as high risk for HIV (42% vs 19%;  $P = .01$ ). Engaging in transactional sex was also

**Table 1. Sociodemographic Characteristics (n = 314)**

Study Site, No. (%)	
1 (Harm reduction organization)	264 (84)
2 (Drug treatment facility)	8 (3)
3 (FQHC)	1 (0.3)
4 (Health department clinic)	9 (3)
5 (FQHC)	13 (4)
6 (Drug treatment facility)	19 (6)
Age, median (IQR), y	57 (52–62)
Race, No. (%)	
Alaska Native or Native American	1 (0.3)
Asian	3 (1)
Black or African American	275 (88)
>1 race	4 (1)
White or Caucasian	27 (9)
Other	4 (1)
Gender identity, No. (%)	
Female	105 (33)
Male	207 (66)
Transgender woman	1 (0.3)
Other	1 (0.3)
Sexual orientation, No. (%) <sup>a</sup>	
Heterosexual	246 (78)
Homosexual	5 (2)
Lesbian	4 (1)
Queer	1 (0.3)
Bisexual	5 (2)
Other	4 (1)
Income source, check all that apply, No. (%)	
None	133 (42)
Job	15 (5)
From the government	146 (46)
A pension	13 (4)
Working under the table	5 (2)
Other	8 (3)
Refused to answer	1 (0.3)
Educational attainment, No. (%)	
8th grade or less	25 (8)
College graduate	10 (3)
High school/GED	118 (38)
Master's or other advanced degrees	3 (1)
Some college/2-y degree	60 (19)
Some high school	91 (29)
Vocational/trade/technical school	7 (2)
Housing, No. (%)	
Rent or own an apartment, house, or other stable housing	146 (47)
Other	3 (1)
Outdoors	26 (8)
Shelters	50 (16)
Stay with friends or family	74 (24)
Transitional housing	15 (5)
At least annual visits with regular medical provider	199 (63)
Health care resources utilized if no regular provider (n = 115), check all that apply, No. (%)	
Primary care provider	21 (18)
Emergency department	71 (62)
Mobile clinic	2 (2)
Urgent care	7 (6)

**Table 1. Continued**

Study Site, No. (%)	
Homeless shelter clinic	3 (3)
Other	8 (7)
I do not receive medical care	18 (16)
Medical insurance, check all that apply, No. (%)	
None	19 (6)
Medicaid	170 (54)
Medicaid Managed Care Organization	96 (31)
Medicare	46 (15)
Private	15 (5)
Other	9 (3)
Unknown	2 (1)
Barriers to medical care, check all that apply, No. (%) <sup>b</sup>	
Transportation	99 (32)
Insurance/financial restrictions	42 (13)
Not enough time	13 (4)
Stigma/discomfort with providers	12 (4)
Legal concerns	2 (1)
Not interested in medical care	18 (6)
Other	24 (8)
I do not have any barriers	154 (49)
At least 1 barrier reported	157 (50)

Abbreviations: FQHC, federally qualified health center; IQR, interquartile range.

<sup>a</sup>Forty-nine missing.

<sup>b</sup>Three missing.

significantly associated with identifying as high risk for HIV (52% vs 25%;  $P = .01$ ) (Table 3).

#### Associations With PrEP Awareness, Offers, and Interest

On univariable analysis, higher PrEP awareness was significantly associated with study site ( $P < .0001$ ), younger age ( $P < .0001$ ), and having a sexual indication for PrEP ( $P = .04$ ). Participants at the community harm reduction and testing program had the lowest awareness (59, 22%) compared with patients at other categories of sites, including FQHCs (6, 43%), the city health department (4, 44%), and the combined drug treatment programs (16, 59%). The lowest awareness for an individual site was at one of the drug treatment centers (0, 0%). There was no association between reporting seeing a regular provider for routine medical care and PrEP awareness.

Black race was significantly associated with lower PrEP awareness ( $P = .0003$ ) on univariable analysis, with 64 (23%) Black participants being aware of PrEP, compared with 15 (56%) White participants and 6 (50%) participants categorized as other. However, in the multivariable analysis, only study site remained significantly associated with PrEP awareness ( $P = .0002$ ) (Table 4).

On multivariable analysis, past offer of PrEP by a provider was also associated with study site ( $P = .007$ ), and PrEP interest was associated with study site, age, and self-perception of HIV risk ( $P = .01$ ,  $P = .03$ , and  $P < .0001$ , respectively).

**Table 2. Sexual Behavior, Drug Use, and PrEP Variables (n = 314)**

Any Lifetime Drug Use (Excluding Marijuana)	306 (97)
Drug use in the last 12 mo (excluding marijuana)	265 (84)
All drugs used without a prescription in the last 12 mo (check all that apply)	
K2/synthetic marijuana	14 (4)
Crack cocaine	123 (39)
Powder cocaine	56 (18)
Heroin	239 (76)
Meth	12 (4)
Club drugs (GHB, ecstasy, special K)	7 (2)
Downers (Ativan, valium, xanax)	13 (4)
Pain killers (oxycodone, vicodin, percocet)	16 (5)
Hallucinogens (LSD, mushrooms)	10 (3)
Injection drug use in last 12 mo	197 (63)
Enrolled in syringe exchange <sup>a,b</sup>	168 (85)
New needle or syringe with every injection <sup>b</sup>	115 (58)
Frequency of using a needle/syringe after someone else had already used it in the last 12 mo <sup>p</sup>	
Every time	9 (5)
Never	160 (81)
Often	2 (1)
Rarely	21 (11)
Sometimes	5 (3)
Frequency of using non-needle injection equipment after someone else had already used it in the last 12 mo <sup>b</sup>	
Every time	10 (5)
Never	137 (70)
Often	11 (6)
Rarely	24 (12)
Sometimes	15 (8)
Endorses backloading in the last 12 mo <sup>b</sup>	27 (14)
Sexual intercourse in the last 12 mo	192 (61)
No. of sexual partners in last 12 mo <sup>c,d</sup>	
3–5	20 (10)
6–10	8 (4)
>10	7 (4)
1	99 (52)
2	25 (13)
Transactional sex in last 12 mo	29 (15)
Frequency of barrier protection during vaginal sex in last 12 mo <sup>d,e</sup>	
About half the time	18 (9)
Always	47 (24)
Most of the time	27 (14)
Never	80 (42)
Rarely	13 (7)
I don't engage in this type of sex	6 (3)
Frequency of barrier protection during anal sex in last 12 mo <sup>d</sup>	
About half the time	1 (0.5)
Always	3 (2)
Most of the time	3 (2)
Never	12 (6)
Rarely	4 (2)
I don't engage in this type of sex	169 (88)
Sexual partners in last 12 mo (check all that apply) <sup>d</sup>	
MSM	7 (4)
PWID	35 (18)
Person with HIV	7 (4)
Person who exchanges sex	10 (5)

**Table 2. Continued**

Any Lifetime Drug Use (Excluding Marijuana)	306 (97)
Person who has been incarcerated	41 (21)
None of the above	129 (67)
PrEP indication	109 (35)
Type of indication <sup>f</sup>	
Sexual only	40 (37)
Drug use only	48 (44)
Dual	21 (19)
Do you consider yourself high risk for contracting HIV?	
No	264 (84)
Yes	47 (15)
Unsure	3 (1)
Have you ever heard of PrEP or Truvada for PrEP?	
No	229 (73)
Yes	85 (27)
Have you ever been offered PrEP or Truvada for PrEP by a provider?	
No	282 (90)
Yes	32 (10)
Are you currently on Truvada for PrEP?	
No	308 (98)
Yes	6 (2)
Would you be interested in taking PrEP? <sup>g</sup>	
No	190 (63)
Yes	85 (28)
Maybe	29 (10)

Abbreviations: IDU, injection drug use; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; PWID, people who inject drugs.

<sup>a</sup>Four missing.

<sup>b</sup>Among those who reported IDU in the last 12 months (n = 197).

<sup>c</sup>Thirty-three missing.

<sup>d</sup>Among those who reported sexual intercourse in the last 12 months (n = 192).

<sup>e</sup>One missing.

<sup>f</sup>Among those with any PrEP indication (n = 109).

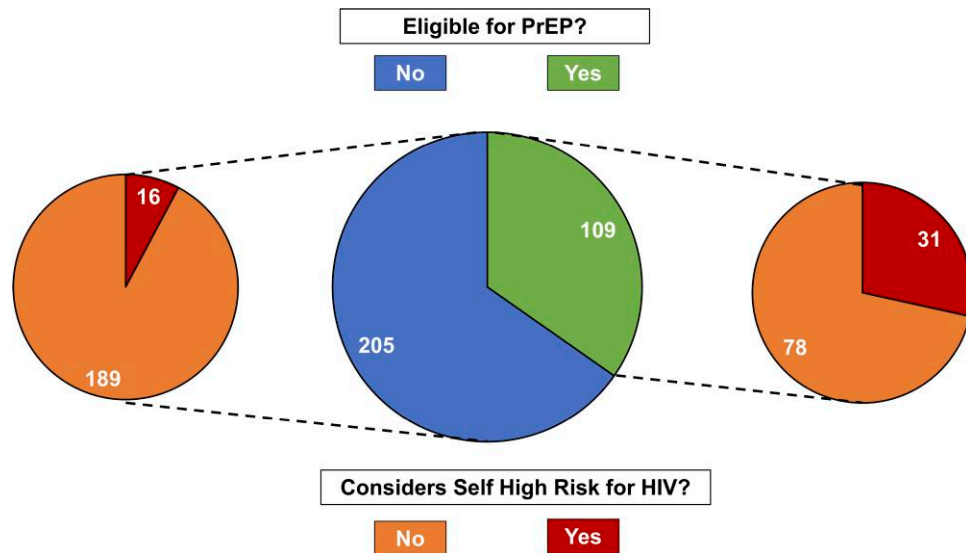
<sup>g</sup>Ten missing.

## DISCUSSION

In this study of people with HCV mono-infection recruited from 6 sites in Washington DC and Baltimore, indications for PrEP were prevalent, but we found low rates of PrEP awareness and prior offers to prescribe PrEP.

The low PrEP awareness among individuals with HCV in our sample is aligned with previous scholarship examining PrEP awareness among PWID and heterosexual adults. Though awareness in our cohort was greater than the 13% reported in a 2012 survey of PWID in Washington DC [19], it is not much improved from the 24% reported in a 2016 survey of PWID in Baltimore [20]. Awareness in our sample is also comparable to a 2019 survey of heterosexually active adults in high-prevalence US cities, where only 32% of respondents were aware of PrEP [21].

Consistent with previous research demonstrating incongruence between self-reported HIV risk behaviors and personal HIV risk perception [22–24], only 28% of respondents with



**Figure 1.** PrEP eligibility and HIV risk perception. Abbreviation: PrEP, pre-exposure prophylaxis.

**Table 3. Bivariate Correlation of HIV Risk Perception With PrEP Characteristics Among Individuals With PrEP Indications (n = 109)**

	Considers Self High Risk for HIV		P Value
	Yes, No. (%)	No, No. (%)	
<b>Race</b>			
Black	24 (31)	54 (69)	.57
Other	1 (14)	6 (86)	
White	6 (25)	18 (75)	
<b>Gender</b>			
Female	18 (42)	25 (58)	.01
Male	12 (19)	52 (81)	
<b>Transactional sex</b>			
No	14 (25)	43 (75)	.01
Yes	15 (52)	14 (48)	
<b>Drug PrEP indication</b>			
No	12 (30)	28 (70)	.78
Yes	19 (28)	50 (72)	
<b>Sexual PrEP indication</b>			
No	11 (23)	37 (77)	.25
Yes	20 (33)	41 (67)	

Abbreviation: PrEP, pre-exposure prophylaxis.

PrEP indications considered themselves high risk for HIV. Among individuals with PrEP indications, women were twice as likely as men to consider themselves high risk, likely reflecting public health messaging that has traditionally portrayed women as a vulnerable group and heterosexual men as a low-risk group [25]. Considering oneself high risk for HIV was associated with higher interest in PrEP, though 26% of those who considered themselves high risk were not interested. More qualitative data are needed to explore the reasons for lack of interest in PrEP uptake among people who perceive themselves to

be high risk and how interest may change with options for different PrEP modalities such as injectable PrEP.

Both PrEP awareness and past offers of PrEP by providers were significantly associated with study site, suggesting high variability in PrEP access by location of health care utilization. Though PrEP awareness was not associated with reporting a regular clinician, there was significantly lower PrEP awareness among participants recruited by the harm reduction organization (22%) relative to those recruited at FQHCs, pooled drug treatment centers, or the health department clinic (44%–60%). Harm reduction organizations are well poised to engage individuals not currently connected to traditional health care systems in HIV prevention. The low PrEP awareness observed among participants from the harm reduction organization suggests an opportunity to better integrate PrEP education, counseling, and prescribing into the harm reduction landscape.

In addition to the variability in PrEP awareness observed between different categories of sites, there was also variability within categories. Among the 2 drug treatment programs, awareness was 0% at 1 center and 84% at the other. The site with higher awareness was a methadone program associated with an academic medical center, while the site with lower awareness was an abstinence-focused drug treatment program. This finding suggests that some drug treatment centers could also benefit from increased integration of PrEP education and access.

Our study also demonstrated an alarming racial disparity in PrEP awareness, with Black participants being less than half as likely to have heard of PrEP compared with participants of other races. However, on regression analysis, race was no longer significantly associated with PrEP awareness, and only study

**Table 4. Multivariable Analysis of Demographic Categories and PrEP Characteristics (n = 314)**

	PrEP Awareness		PrEP Offers		PrEP Interest	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Site</b>						
2 vs 1	...	...	...	...	0.02	0.002–0.22
4 vs 1	2.15	0.50–9.21	1.07	0.11–10.39	0.27	0.03–2.42
5 vs 1	3.04	0.92–10.07	0.68	0.07–6.21	1.31	0.38–4.59
6 vs 1	16.3	4.3–60.9	7.69	2.38–24.83	1.83	0.60–5.53
<b>Race</b>						
Black vs White	0.93	0.29–2.98	1.34	0.27–6.62	4.43	1.27–15.44
Other vs White	1.44	0.29–7.07	6.61	0.94–46.81	3.04	0.53–17.52
<b>Age</b>						
Age	0.97	0.94–1.00	1.00	0.95–1.04	0.97	0.94–0.997
<b>Gender (female vs male)</b>						
Gender (female vs male)	0.74	0.40–1.37	1.13	0.49–2.61	1.17	0.68–2.03
<b>Drug use PrEP indication</b>						
Drug use PrEP indication	1.73	0.86–3.47	1.51	0.59–3.90	1.43	0.73–2.81
<b>Sexual PrEP indication</b>						
Sexual PrEP indication	1.37	0.64–2.92	0.70	0.23–2.16	1.39	0.67–2.88
<b>Considers self high risk for HIV</b>						
Considers self high risk for HIV	0.52	0.20–1.36	0.87	0.25–3.00	12.3	4.4–34.5

Abbreviations: OR, odds ratio; PrEP, pre-exposure prophylaxis.

site remained significant. This suggests that the racial disparity in PrEP awareness was driven at least in part by location of health care utilization, with a higher percentage of Black participants accessing care at the harm reduction organization. Direction of PrEP to the places where Black individuals access care, including harm reduction organizations, will be essential to achieving racial equity in PrEP education and access. However, equity in PrEP access will also require intentional prioritization and investment from traditional health care organizations in the engagement and provision of quality care for Black patients.

It is important to consider the study population when interpreting our results. Our population was primarily recruited from a harm reduction organization and drug treatment centers, with a minority recruited from FQHCs and a city health department clinic. While recruitment from these sites enabled us to include a population less engaged in the health care system, it also means that our sample likely has higher rates of active IDU than the general population of individuals with HCV mono-infection. Recruitment from the harm reduction organization also meant that we had very high rates of engagement in syringe exchange among PWID in our cohort (85%). Receptive sharing of injection equipment was still prevalent in our population despite this high level of syringe exchange engagement, highlighting the need for multipronged HIV prevention for PWID that includes access to prep alongside other harm reduction services. Finally, it is notable that our study population was older and may not reflect the same populations previously seen in HCV outbreaks preceding HIV outbreaks [7, 8].

A limitation of our analysis is that PrEP indication definitions were constrained by the available survey data. Our survey evaluated sexual and drug use behavior over the prior 12 months, and we did not collect data on whether participants knew their partners were HIV negative or HIV undetectable,

or whether participants had contracted any bacterial sexually transmitted infections (STIs) within the last 6 months. This limited our ability to assess indications according to Centers for Disease Control and Prevention guidelines [26]. It is possible that individuals having condomless sex with multiple known HIV-negative partners were miscategorized as having a sexual PrEP indication. Conversely, participants with PrEP indications based on prior history of STI may have been under-recognized, and missing data on the number of sexual partners for some participants could have led to further under-recognition of sexual indications. These findings may not be generalizable to other populations with different cultural perceptions of HIV risk, as this study's population represents the epidemic in Baltimore and DC. Finally, all surveys were administered by members of the study team, which could have led to under-reporting of risk behaviors and over-reporting of PrEP interest. For patients previously unaware of PrEP, the impact of social desirability bias on reporting of PrEP interest was likely amplified by the survey administrator asking about PrEP interest immediately following a brief explanation of PrEP.

Our study builds on existing literature demonstrating that people with HCV represent an important population for HIV prevention. HCV infection is a sensitive indicator that an individual has at one point had blood-to-blood contact. Therefore, a positive HCV test could serve as a “biomarker” for increased HIV risk, prompting a clinical evaluation about PrEP, so the medical provider and patient engage in shared decision-making about PrEP based on individual risk. While HIV risk can be elicited by provider interview, not all patients feel comfortable discussing this personal and often stigmatized information with providers [27, 28]. The US Preventative Services Task Force recommends a one-time HCV test for all adults [29], and this widespread screening may represent an opportunity to identify patients who could benefit from PrEP.

A previous investigation conducted by our group, the ANCHOR study, illustrated that HCV treatment provided at a harm reduction center could be leveraged to engage PWID in opioid agonist therapy and PrEP [16, 30]. The results of the current analysis suggest that HCV testing is another step in the HCV care cascade that could be leveraged and integrated into harm reduction services to increase access to PrEP for vulnerable populations. Additional interventions outside traditional health care settings, like peer-driven PrEP education and pharmacy-based PrEP, also warrant further exploration [31].

Unfortunately, progress in PrEP implementation for people with HCV will be limited if individuals with HCV are not included in the testing and implementation of new PrEP technologies. Daily adherence was a challenge for patients on PrEP through the ANCHOR study [16], suggesting that long-acting PrEP formulations could play an important role in optimal PrEP implementation among PWID with HCV. However, people with HCV antibodies and PWID have been systematically excluded from landmark PrEP clinical trials, including HPTN 083 and HPTN 084, the 2 major studies investigating long-acting injectable PrEP [2, 32, 33]. Equitable PrEP implementation will require both investigations into novel strategies to engage individuals with HCV in care and inclusion in landmark clinical trials.

Individuals with HCV are an undertargeted population in HIV prevention efforts. As rates of HCV are rising and often predate outbreaks of HIV, we must identify approaches to identify those at risk for HIV and intervene before outbreaks occur. Leverage of the HCV care cascade for PrEP implementation may represent a novel strategy for HIV prevention in people with HCV.

### Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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**Author contributions.** K.H., E.R., and S.Ka. established the study design and drafted the manuscript. D.S. contributed to manuscript

conceptualization and editing. J.S. and K.H. conducted the statistical analysis. R.S., R.E., O.O., E.E., A.C., A.D., B.G., D.S., and P.B. contributed to study implementation. H.M. and S.Ko. supervised and advised throughout the performance of the study.

**Patient consent.** This study protocol was approved by the Institute of Human Virology at the University of Maryland's Institutional Review Board, and written consent was obtained from all study participants.

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