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ORIGINAL PAPER

Measuring Acceptability and Preferences for Implementation of Pre-Exposure Prophylaxis (PrEP) Using Conjoint Analysis: An Application to Primary HIV Prevention Among High Risk Drug Users

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Abstract Although people who use drugs (PWUD) are one of the key risk populations who could benefit from the use of pre-exposure prophylaxis (PrEP), to date, little attention has been given to incorporating PrEP into HIV prevention approaches targeting this underserved group. This study investigated the acceptability of PrEP based on a number of known PrEP attributes among high-risk PWUD in a drug treatment setting. A total of 400 HIV-negative PWUD, who reported drug- and/or sex-related risk behaviors were recruited from a methadone clinic to complete a stated preference (full-profile conjoint) survey. Participants ranked the eight hypothetical PrEP program scenarios with varied combinations of six attributes related to PrEP (cost, dosing, efficacy, side-effects, treatment setting, and frequency of HIV testing). SPSS *conjoint* procedure was used to estimate the relative importance of each attribute and preferences across eight possible PrEP delivery programs. PrEP acceptability ranged from 30.6 to 86.3% with a mean acceptability of 56.2% across the eight hypothetical PrEP program scenarios. The PrEP program scenario with the highest acceptability had the following attribute levels: insurance covered, daily dosing, 95% effective, no side-effects, treatment at HIV clinic, and HIV testing needed every 6 months. The cost associated with PrEP was the most important attribute (relative importance score: RIS = 38.8), followed by efficacy (RIS = 20.5) and side effects (RIS = 11.9); other attributes had no significant effect. Our findings reported a high acceptability of PrEP in response to different PrEP program scenarios with different attribute profiles. As the result of having this information, researchers and policymakers will be better equipped for evidence informed targeting and dissemination efforts to optimize PrEP uptake among this underserved population.

Keywords HIV prevention · Pre-exposure prophylaxis (PrEP) · Conjoint analysis · Patient preferences · Implementation science · People who use drugs (PWUD)

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Introduction

Oral pre-exposure prophylaxis (PrEP) represents a significant biomedical innovation to curtail the HIV epidemic [1]. Large-scale, prospective clinical trials have shown *daily* PrEP to be safe, well-tolerated, and efficacious for reducing HIV infection among those who are at substantial risk of acquiring HIV infection, such as men who have sex with men (MSM), people who inject drugs (PWID), sex workers, and transgender people [2–5]. Based on this evidence, the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have recommended PrEP for individuals at substantial risk for HIV infection

[6, 7], and the US National HIV/AIDS Strategy through 2020 priorities have expanded access to comprehensive PrEP services among those who are interested and may benefit [8]. Recently, *on demand* PrEP, the administration of two pills before sex and one pill daily until 24 and 48 h beyond the last condomless sexual event, has been shown to be efficacious (86% risk reduction) in preventing HIV infection among MSM [9, 10]. However, the level of PrEP in the body to prevent HIV is much lower when using *on demand* PrEP [11–13] and this strategy has not been approved by the US Food and Drug Administration.

Despite the efficacy of daily PrEP use, its uptake remains strikingly slow and inadequately scaled to meet the treatment needs of key risk populations [14, 15]. Engagement has been difficult among some high risk groups who could benefit from PrEP, including people who use drugs (PWUD) [16–19]. A variety of behavioral, clinical, service delivery, socio-cultural, and other structural challenges represent a significant challenge to PrEP implementation among this underserved population. New approaches are thus needed to understand these challenges and reduce gaps in the PrEP care continuum tailored toward PWUD.

Programs that are created based on stakeholders' preferences may improve implementation, including successful identification, engagement, and adherence of individuals at substantial risk for HIV infection in PrEP care [20]. Yet, few studies have assessed information about individuals' attitudes and preferences of various attributes (e.g., cost, side-effects, dose, dispensing venue, etc.) of PrEP programs. Where completed, studies have been limited mostly to MSM [21–23], and none focused on PWUD within a drug treatment setting (e.g., methadone maintenance program; MMP) where high risk individuals are mostly found. As demonstration projects emerge to promote PrEP rollout for PWUD, it is crucial to understand how high risk PWUD value various aspects of PrEP programs in order to optimize uptake.

This study investigated both PrEP acceptability and preferences about the delivery of PrEP, using standardized stated preference methods (full-profile conjoint analysis) to assess how high risk PWUD value various attributes of hypothetical PrEP program [24, 25]. This approach enabled us to quantify the value that PWUD attach to each attribute and to perform simulations to determine which combination of features is likely to result in the greatest acceptability of a PrEP delivery program among this high risk group.

Methods

Data Collection

We conducted a cross-sectional study of high-risk PWUD at Connecticut's largest addiction treatment program (APT Foundation, New Haven, Connecticut), which provides opioid agonist treatments (methadone and buprenorphine) and clinical care to over 7000 opioid-dependent PWUD. Participants were recruited using flyers, peers, word-of-mouth, and direct referral from counselors. Eligibility screening was conducted by trained research assistants by phone or in a private room. After providing informed consent, interested individuals meeting inclusion criteria completed a survey using an audio computer-assisted self-interview (ACASI). All participants were reimbursed for their time. The study protocol was approved by the Institutional Review Board at the University of Connecticut and received board approval from the APT Foundation Inc.

Sample

Between June and July 2016, a convenience sample of 400 participants was recruited. The sample size calculation for the parent study was based on an outcome not related to the current analysis. Study participants were eligible if they: (i) were age 18 years or older, (ii) reported being HIV-uninfected, and (iii) reported drug- or sex-related HIV risk behaviors in the past 6 months. All patients receiving MMP at this program meet DSM-V criteria for chronic opioid use disorders.

Measures

Participant Characteristics

Demographic data included self-reported measures of age, gender, sexual orientation, ethnicity, marital status, educational status, employment status, and income. Participants' self-reported drug- and sex-related HIV risk behaviors during the past 30 days were also assessed using an adapted version of the HIV risk-taking behavior scale (HRBS) [26]. Being prescribed medication (excluding methadone) was assessed over the past 30 days and, for those who were, medication adherence was further assessed (range 0–100) using a self-report, validated three-item scale [27]. Participants were also asked about their awareness of PrEP and previous use of PrEP.

Conjoint Analysis

We used full-profile conjoint analysis approach to assess the acceptability of various hypothetical PrEP-related scenarios and to quantify the importance of key hypothetical and known PrEP attributes on acceptability. Briefly, conjoint analysis is a statistical technique often used to quantify consumer preferences for goods and services. It enables researchers to test what combination of program attributes is most critical in participants' decision-making

and which attributes are most preferred [24, 25]. It has been applied successfully to measure preferences in economics and market research [28–30] and recently has gained popularity in the health care studies [31–35].

Based on themes that emerged from our qualitative study [36], prior studies on PrEP acceptability [21–23] and input from PrEP experts, we composed six two-level PrEP program design attributes that included: **Cost** (*insurance covered* vs. *out-of-pocket*), **dosing** (*daily* vs. *on demand*), **efficacy** level at preventing HIV (*95* vs. *75%*), **side-effects** (*none* vs. *nausea/dizziness*), **treatment setting** (*HIV clinic* vs. *drug treatment clinic*), and **frequency of HIV testing** needed (*every 6* vs. *every 3 months*) (Table 2).

A full-factorial design for six attributes, each with two levels, yielded 64 ($26 = 64$) different PrEP program scenarios. Since asking participants to rate all 64 scenarios would be difficult and burdensome, we used a fractional factorial orthogonal design [37] to generate a subset of all of the possible combinations called an orthogonal array that allowed estimation of the part-worth utilities for all main effects. Part-worth utility is the value respondents attach to a specific level of a particular attribute. Relative importance reflects the influence of each attribute on a participant's decision-making. The 'Generate Orthogonal Design procedure' was used to generate an orthogonal array and is typically the starting point of a conjoint analysis. It is commonly used to reduce the number of profiles that have to be evaluated, while ensuring enough data are available for statistical analysis, resulting in a carefully controlled set of "profiles" for the respondent to consider [37]. This resulted in an orthogonal main effects design, thus yielding as much statistical information as possible for estimating unbiased, precise preference parameters, such as ensuring the absence of multicollinearity between attributes (i.e., attributes included in the model are not correlated), equal preference weights in calculating efficiency. The statistical procedure involved removing from the original set of 64, scenarios that were linearly related to one other. We reduced the number of scenarios from 64 to 8 while ensuring that all of the attribute/level combinations appeared with the same frequency.

Participants' preference to hypothetical PrEP program scenarios was assessed after providing a brief description of PrEP (Appendix). The attributes were described in lay language with examples to aid comprehension. Participants were then asked to rank the eight hypothetical PrEP program scenarios (Fig. 1) from 1 ("*most likely to use*") to 8 ("*least likely to use*"), which were presented concurrently, but none of the scenarios could share the same value. The scenarios were presented randomly to prevent order effect bias.

Statistical Analysis

All data analyses were performed using SPSS v.23 [38]. We computed descriptive statistics, including frequencies and percentages for categorical variables, and means and standard deviations for continuous variables. We used conjoint analysis to assess the acceptability of hypothetical PrEP scenarios and to quantify the impact of various PrEP attributes on acceptability. For the first conjoint analysis exercise, the acceptability of each of the eight hypothetical PrEP program scenarios was derived by averaging individual PrEP program acceptability ratings across respondents. Ratings from each PrEP program was transformed into a 0–100 scale, whereby "*highly likely would accept*" = 100 and "*highly unlikely would accept*" = 0. For the second conjoint analysis exercise, we used the "*conjoint*" procedure that utilizes the rankings of the different PrEP program scenarios for each participant to assess the impact of PrEP attributes. The conjoint procedure uses a set of linear regressions to generate utility scores for each attribute level. The utility score, called a part-worth, is an estimate of the overall preference of utility associated with each attribute level used to define the PrEP program. The utility score for each factor level is analogous to regression coefficients, and provide a quantitative measure of the preference for each factor level, with larger values corresponding to greater preference. The relative importance score for each PrEP attribute provides a measure of how important the attribute is to overall preference with greater score playing a more significant role than those with smaller score. We expressed the utility scores on a common scale in percentage terms. We then calculated the relative importance score by taking the range of utility scores for any attribute levels (highest minus lowest), dividing this by the sum of all the utility ranges, and multiplying by 100 [38, 39].

Results

Participant Characteristics

Among the 400 participants, the average age of the participants was 40.9 ± 11.1 years and 58.5% were male. Self-reported HIV risk behaviors were highly prevalent with 57.5% reporting recent drug injection (past 30 days) with two-thirds of these reporting sharing needles/works. Of those who were sexually active (82.0%), 39.9% reported having multiple sexual partners, yet 85.1% reported condomless sex with casual sexual partners. Most of the participants reported taking a prescribed medication in the past 30 days (77.0%) for which the mean medication adherence score was 73.3% ($SD = 15.4$). Only 18% of

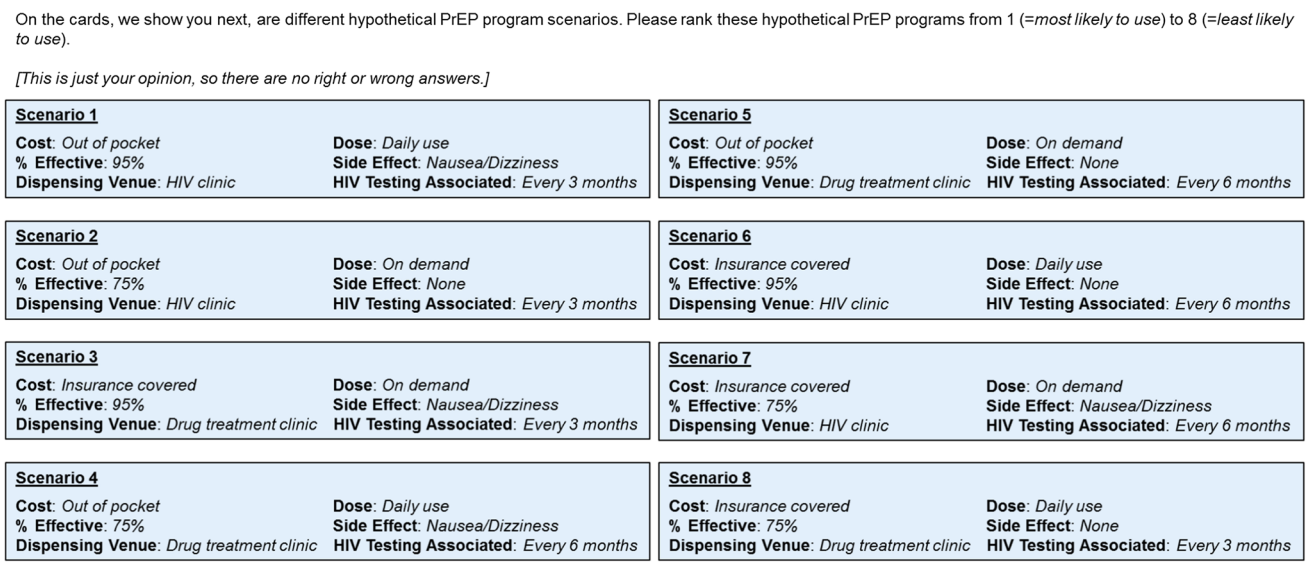

Fig. 1 Example of full-profile conjoint task (hypothetical PrEP program scenarios)

participants reported having heard about PrEP as a method to prevent HIV and only 1.8% had used PrEP previously (Table 1).

Full-Profile Conjoint Analysis

PrEP acceptability ranged from 30.6 to 86.3% with a mean acceptability of 56.2% across the eight hypothetical PrEP program scenarios (Table 2). The PrEP program scenario with the highest acceptability (scenario 1) had the following attributes: lower cost (insurance covered), daily dosing, 95% effective, no side effects, prescription at a HIV clinic, and HIV testing every 6 months.

When the eight PrEP attributes are examined individually, however, the marginal utility for each attribute differed from the optimal program on several key attributes when comparing the preferred versus the non-preferred attributes (Table 3). The cost associated with PrEP was the single most important attribute for participants. Participants reported higher acceptability if the cost of PrEP was covered by insurance (Marginal utility score: $MUS = 1.43$), compared to paying out-of-pocket ($MUS = -1.43$), yielding a net relative importance score (RIS) of 38.8. Efficacy of PrEP had the second-greatest impact on PrEP acceptability. Participants reported higher acceptability for PrEP when it was 95% effective ($MUS = 0.70$) compared with 75% effective ($MUS = -0.70$), yielding a RIS of 20.5. Side effects had the third-greatest impact on PrEP acceptability with an overall RIS of 11.9. There was a notable preference for PrEP with no side effects ($MUS = 0.29$) compared to PrEP with even minor side effects ($MUS = -0.29$). Dosing frequency ($RIS = 10.3$), treatment location ($RIS = 9.9$), and frequency of associated HIV testing ($RIS = 8.3$) had relatively low influence on PrEP acceptability. Compared to taking PrEP *on demand* ($MUS = -0.03$), participants preferred taking PrEP on a *daily* basis ($MUS = 0.03$). Receiving PrEP in drug treatment clinics ($MUS = 0.19$) rather than in HIV clinics ($MUS = -0.19$) was preferred. The preferred frequency of associated HIV testing was every 6 months ($MUS = 0.02$) as opposed to every 3 months (MUS $= -0.02$) (Table 3 and Fig. 2).

Discussion

This is the first study to assess PrEP acceptability in a sample of PWUD in a North American treatment program, as well as utilizing conjoint analysis to quantify key attributes associated with PrEP acceptability in this key population. Conjoint analysis allows clinicians and policy makers to identify and prioritize key attributes that would enhance utilization of an evidence-based HIV prevention strategy [24, 25]. While methadone has documented efficacy in reducing HIV transmission from needle sharing, it has no influence on sexual transmission [40, 41]. Key findings from this study of MMP patients, however, indicate a high prevalence of both injection- and sex-related HIV risk behaviors, thus making them ideal candidates for PrEP. Despite this need, there were remarkably low levels of PrEP awareness among these participants. This finding is in stark contrast to the high levels of PrEP awareness of U.S. MSM [42–45], suggesting the need for greater dissemination of clear and accurate information about PrEP in at-risk populations of PWUD to optimize the PrEP cascade. Additionally, PrEP-related information should be delivered

Table 1 Characteristics of the participants ($N = 400$)

Variable	Frequency	%
Age: mean (±SD)	40.9 (11.1)	
Gender		
Male	234	58.5
Female	166	41.5
Sexual orientation		
Heterosexual or straight	345	86.3
Homosexual, gay, or lesbian	16	4.0
Bisexual	39	9.7
Ethnicity		
White	253	63.2
African American	70	17.5
Hispanic or Latino	61	15.3
Other	16	4.0
Marital status		
Married	83	20.8
Divorced	111	27.8
Widowed	14	3.5
Single	192	48.0
High school graduate	293	73.3
Employed	69	17.3
Annual income		
<$10,000	312	78.0
$10,000–$19,999	57	14.2
≥$20,000	31	7.8
Injected drugs *(past 30 days)*	230	57.5
Shared needles/works *(past 30 days)*	*n = 230*	
No	80	34.8
Yes	150	65.2
Sexually active *(past 30 days)*	328	82.0
Number of sexual partners *(past 30 days)*	*n = 328*	
1	197	60.0
2–5	116	35.4
≥6	15	4.6
Always used condom with casual partner	*n = 328*	
No casual partner	64	19.5
No	215	65.6
Yes	49	14.9
Taking prescribed medication[a]	308	77.0
Medication adherence: Mean (SD)	73.3 (15.4)	
Heard about PrEP	72	18.0
Ever taken PrEP	7	1.8

SD standard deviation, *PrEP* pre-exposure prophylaxis

[a] Excludes methadone

in common drug treatment settings (e.g., MMP) where PWUD seek treatment and HIV testing. When presented with information about PrEP as a new and effective primary HIV prevention strategy, participants reported high acceptability in response to hypothetical PrEP program scenarios with various attribute profiles. Given these high levels of interest in PrEP use, PrEP demonstration projects focused on high risk PWUD are urgently needed.

Results from the conjoint analysis reveal variations in participants' attitudes and preferences of PrEP attributes that collectively or individually may help to strengthen the PrEP cascade [20]. PrEP acceptability exceeded 80% for two case scenarios (1 and 2). Two key attributes were central to both scenarios—low cost and high (95%) efficacy—with other attributes varying between the two scenarios. It is not surprising that low cost (PrEP covered by insurance) dominated the individual program attributes, especially given the high unemployment level and 78% of the sample earning markedly below the poverty level for Connecticut. This finding also aligns with that from previous studies which identified cost as one of the major barriers to PrEP acceptability among MSM, female sex workers, and male-to-female transgendered individuals [21, 46–49]. It is encouraging, however, that most private and public insurance plans in the U.S. cover the cost of PrEP, but this may be threatened if the Affordable Care Act is repealed, leaving over 20 million people without insurance.

Efficacy was the second most important attribute, with 95% efficacy, as expected, being the preferred alternative, corroborating findings in Peru, a middle-income setting where patients must pay for their own medications [21]. In addition, prior studies reported similar findings, where MSM were willing to use PrEP with higher efficacy in preventing HIV [50, 51]; no such studies exist for PWUD. Notable here is while PrEP efficacy exceeds 90% in patients with high adherence, efficacy falls markedly at lower adherence levels [2–5]. While numerous factors contribute to medication adherence [52], mean adherence for other medications in this sample was relatively low (Mean = 73.3). Prior research in this population suggests a high level of neurocognitive impairment (NCI) [53–56], which has been associated with risky behaviors, poor medication adherence, and treatment disengagement [54, 57–60]. Thus, NCI may undermine the effectiveness of PrEP, if prescribed to cognitively impaired individuals, since high levels of adherence to PrEP are correlated with its efficacy [2–5, 61, 62]. One consideration for scaling up PrEP in PWUD would be to test and introduce empirically-based strategies that simultaneously address NCI and medication adherence to ensure higher PrEP efficacy. Alternatively, many more PrEP medications are being developed and tested, including injectable, long-acting medications that can be administered once every 8-12 weeks [63, 64]. In the absence of such data about adherence to PrEP medication and concomitant NCI, it may be beneficial to implement a combination HIV

Table 2 Acceptability (mean) of hypothetical pre-exposure prophylaxis (PrEP) scenarios with different attributes in order of decreasing acceptability among participants ($N = 400$)

PrEP scenarios	PrEP Acceptability mean	PrEP attributes					
		Cost	Dose	Efficacy	Side effects	Treatment location	HIV testing needed
1	86.28	Insurance covered	Daily use	95%	None	HIV clinic	Every 6 months
2	82.09	Insurance covered	On demand	95%	Nausea/dizziness	Drug treatment clinic	Every 3 months
3	70.75	Insurance covered	Daily use	75%	None	Drug treatment clinic	Every 3 months
4	57.25	Insurance covered	On demand	75%	Nausea/dizziness	HIV clinic	Every 6 months
5	51.44	Out of pocket	On demand	95%	None	Drug treatment clinic	Every 6 months
6	39.84	Out of pocket	Daily use	95%	Nausea/dizziness	HIV clinic	Every 3 months
7	31.63	Out of pocket	On demand	75%	None	HIV clinic	Every 3 months
8	30.56	Out of pocket	Daily use	75%	Nausea/dizziness	Drug treatment clinic	Every 6 months

Table 3 Relative importance and marginal utilities of PrEP attribute levels among participants ($N = 400$)

Attributes	Attribute levels	Relative importance score (%)
Cost	Insurance covered	38.8
	Out of pocket	
Efficacy	95%	20.5
	75%	
Side-effects	None	11.9
	Nausea/dizziness	
Dosing	Daily use	10.3
	On demand	
Treatment location	Drug treatment clinic	9.9
	HIV clinic	
HIV testing needed	Every 6 months	8.3
	Every 3 months	

PrEP pre-exposure prophylaxis, *RIS* relative importance score

prevention package that includes evidence-based HIV risk reduction and PrEP adherence skills, routinely testing for HIV and STIs, and monitoring/supporting PrEP adherence over time.

Experiencing side effects like nausea and dizziness had the third greatest impact on PrEP acceptability in the conjoint analysis. Not surprisingly, participants were concerned about potential side effects from PrEP, opting for scenarios without them. Previous studies have shown that potential side effects from PrEP medications as being one of the major barriers to uptake [21, 49, 51, 65], yet numerous studies suggest that currently approved PrEP medications have few to no side effects [2–5, 61]. Strategies like informed or shared decision-making can be useful to help guide patients to incorporate their preferences alongside evidence-based information in their decisions about initiating a medication like PrEP [66, 67]. To date, such decision aids are unavailable to at-risk individuals and pre-PrEP counseling could provide clients with skills, strategies, and support for minimizing adverse effects associated with taking PrEP [68]. Low-threshold PrEP programs, however, may not have the luxury of extensive counseling sessions, favoring brief, evidence-based decision aids.

Participants preferred to receive treatment at an addiction treatment (i.e., MMP) rather than a HIV clinic. Though not explored here, this finding may either represent a convenience factor for patients who might prefer integrated or co-located services [69], or alternatively, they perceive high levels of HIV stigma by attending such sites, even though they do not have HIV. For patients who prefer this attribute, there may be multiple advantages, including either combining supervised of methadone and PrEP medication, which has been successfully done for other diseases [70–74], or when not feasible, to take advantage of the regular interaction with clinical staff supervising methadone administration to inquire about adherence and provide brief counseling when needed. Although HIV and TB services have been successfully integrated into addiction treatment settings [75, 76], further research is needed

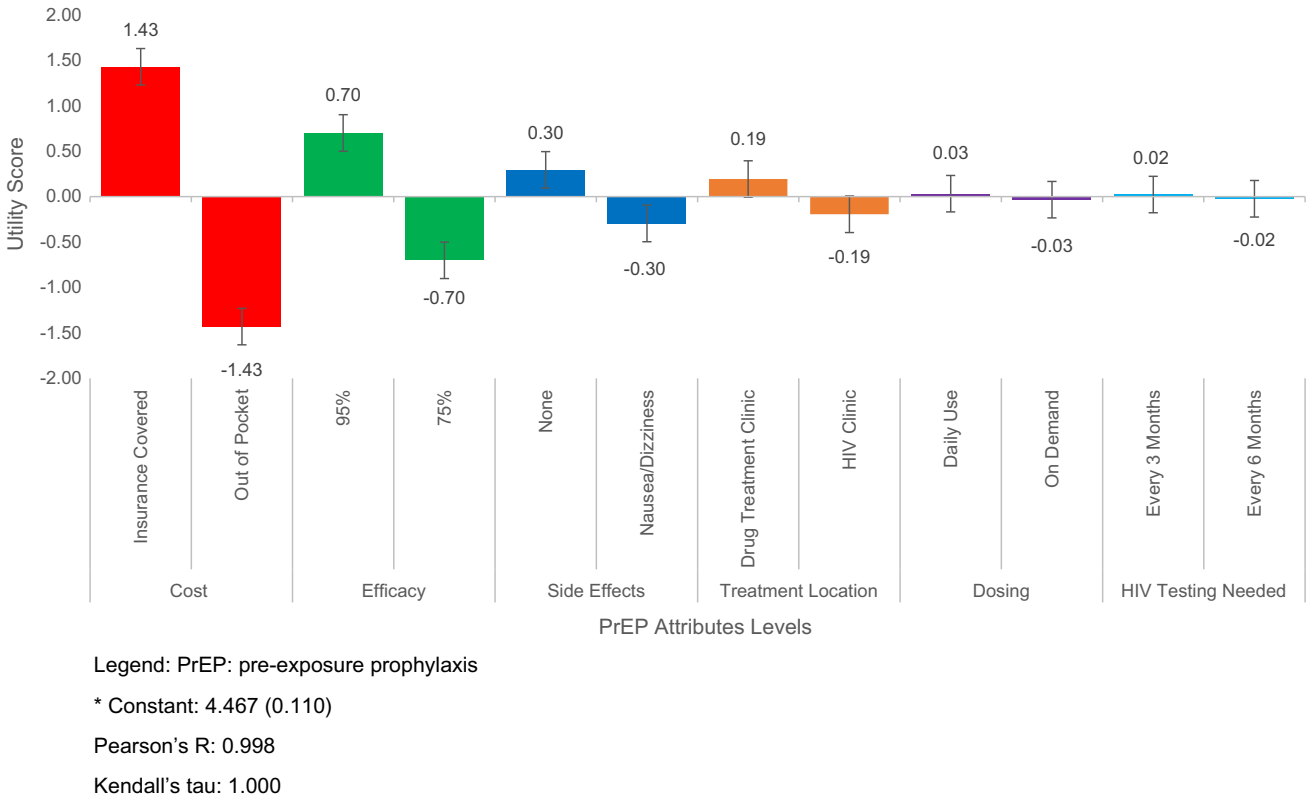

Fig. 2 Marginal utilities of pre-exposure prophylaxis (PrEP) attributes' levels among participants ($N = 400$). *PrEP* pre-exposure prophylaxis, *Constant: 4.467 (0.110), Pearson's R: 0.998, Kendall's tau: 1.000

to ascertain the feasibility of integrating PrEP into such settings.

Consistent with national recommendations, participants in this study preferred PrEP to be taken on a daily basis, regardless of event-level risk-taking that would support PrEP taken *on-demand* only as needed. *On-demand* PrEP has only been documented to be effective in reducing HIV transmission only in MSM. Daily PrEP, however, is efficacious among all key populations [2–5, 61]. This findings align well with their interest in receiving PrEP at addiction treatment settings, like MMPs, where there is the potential for integration of services and daily supervision. Though integrating HIV testing at addiction treatment settings is an evidence-based practice [77], many real-world treatment settings do not integrate such practices, preferring to refer offsite for either logistical or staffing reasons [78]. Last, our sample generally preferred minimal testing and low levels of interaction with their healthcare provider. The desired frequency of HIV testing while on PrEP was every 6 months in this sample, similar to previous studies [22, 23], but inconsistent with national guidelines that recommend side-effect monitoring and testing for HIV and sexually transmitted infections every 3 months [6, 7]. Where guidelines are discordant with patient preferences, however, uptake or retention may be suboptimal, especially in PWUD who are presently uninformed about PrEP. In tailoring programs for this population, coming up with self-testing with brief follow-up calls or texting strategies may address their concerns about more frequently recommended monitoring.

Our data further indicated that participants were willing to make trade-offs in exchange for having the PrEP program they prefer. For example, participants were willing to attend a HIV clinic or accept PrEP with lower efficacy to avoid side effects (i.e., nausea, dizziness) associated with PrEP. In other instances, participants were willing to pay out-of-pocket in exchange for a 20% increase in PrEP efficacy from 75 to 95%. Much has been learned from PrEP demonstration programs targeting MSM [79–82], and many such lessons might be applied to PWUD, but nonetheless, the PrEP cascade will be optimized, including satisfaction, if patient preferences are incorporated into treatment decision-making process.

Though these findings provide the first glimpse of patient interest in and preference for attributes associated with PrEP programs in PWUD, a few limitations must be acknowledged. First, although a brief explanation about PrEP and its attributes was provided, we do not know the extent to which participants understood every PrEP attribute (e.g., efficacy, cost, side-effects, dispensing venue,

adherence, etc.) while ranking the PrEP program scenarios. Second, the participants in this study were high-risk PWUD enrolled in MMP; thus, our findings may not be generalizable to other risk groups. Third, our use of self-report measures may have resulted in participant underreporting or inconsistent reporting (e.g., HIV status) of socially undesirable behaviors, but similar to findings here, patients reported high levels of HIV risk, suggesting social desirability responses being minimal. This concern is further mitigated by our use of CASI, which reduces underreporting by allowing participants to answer sensitive questions privately and anonymously. Fourth, PrEP characteristics modelled in our analysis did not include factors such as perception of HIV risk, trust in health care providers, stigma and discrimination, or satisfaction with current HIV prevention methods, which could also impact PrEP acceptability. Last, and importantly, patient preferences and intentions may not fully be aligned with their practices, suggesting the need to link PrEP initiation after stating their preferences. Further research is thus warranted to assess the impact of these issues on PrEP acceptability among our sample. Notwithstanding these limitations, this first study suggests that PrEP characteristics, especially low cost and high efficacy, and to a lesser extent side effects, greatly influence acceptability of future PrEP deliver among PWUD, and supports further development of PrEP programs and implementation strategies for scaling them to need in order to optimize evidence-based HIV prevention efforts that target high risk PWUD.

Conclusions

PrEP represents an important biomedical innovation in evidence-based primary HIV prevention among key risk populations. Although PWUD are one of the key risk populations who could benefit from the use of PrEP [6, 7, 83], to date, very little, if any, attention has been given to incorporating PrEP into HIV prevention approaches targeting this underserved group. This study investigated the acceptability of PrEP based on a number of known PrEP attributes among high-risk PWUD in an addiction treatment setting. Key findings include low knowledge about PrEP, but when informed, high levels of PrEP acceptability if PrEP delivery programs for PWUD are optimally organized. Consequently, researchers and policy-makers will be better equipped for scale-up of PrEP among PWUD.

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Compliance with Ethical Standards

Conflicts of interest The authors have no conflicts of interest to disclose.

Ethical Approval The study protocol was approved by the Investigational Review Board (IRB) at the University of Connecticut and received board approval from APT Foundation Inc. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Appendix

Brief description of pre-exposure prophylaxis (PrEP) provided to the participants.

"There is a new way to prevent HIV infection for people who may be exposed to the virus. It is called Pre-Exposure Prophylaxis or PrEP. It involves an HIV-negative person taking a pill daily, on an ongoing basis (starting before an exposure and continuing after for as long as the person is at risk) to reduce their risk of HIV infection. Research suggests that PrEP is generally safe and is highly effective (over 90%) in preventing HIV infection if taken every day. It is much less effective if not taken every day and does not protect against other sexually transmitted infections. Taking PrEP would require a visit to a doctor every 3 months in order to be tested for HIV, STIs and side effects."

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