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High Prevalence of Indications for Pre-exposure Prophylaxis Among People Who Inject Drugs in Boston, Massachusetts

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Abstract

Introduction: In Massachusetts, recent outbreaks of HIV have been fueled by injection and sexual exposures among people who inject drugs (PWID). Understanding pre-exposure prophylaxis (PrEP) need, knowledge, and use among PWID will help inform and evaluate interventions.

Methods: In 2019, investigators analyzed 2018 National HIV Behavioral Surveillance data from PWID in Boston, Massachusetts, who met eligibility criteria. Proportions of PWID with U.S Preventive Services Task Force–based PrEP indication were estimated by types of HIV acquisition risk in the past year: injection exposure only, sexual exposure only, and overlapping injection and sexual exposures. Investigators then evaluated PrEP awareness, conversations with healthcare providers about PrEP, and self-reported PrEP use among those with and without PrEP indications.

Results: The prevalence of PrEP indication was 92% overall (389/423), with 290 (69%) indicated for injection exposures only, 3 (<1%) indicated for sexual exposures only, and 96 (23%) indicated for both injection and sexual exposures. Among those indicated for PrEP ($n=389$), 152 (39%) reported being aware of PrEP, 41 (11%) had discussed PrEP with a healthcare provider, and 8 (2%) had used PrEP in the past year. There were no statistically significant differences between PrEP-indicated and non-indicated PWID with respect to PrEP awareness, discussion with a healthcare provider, and PrEP use.

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Conclusions: Indication for PrEP was high but awareness was low, conversations about PrEP with healthcare providers were uncommon, and PrEP use was extremely low. These findings highlight important areas for clinical and community-based interventions to improve PrEP uptake among and delivery to PWID.

INTRODUCTION

Notable HIV outbreaks and clusters attributed to injection drug use have recently affected cities and towns across the U.S., including in Indiana, West Virginia, Pennsylvania, Washington, and Massachusetts.¹⁻⁵ The prevalence of injection drug use is increasing: As reflected in national data, substance use treatment admissions involving injection drug use increased 85% in 1 decade.⁶ In addition to rising prevalence of injection drug use, HIV risk among people who inject drugs (PWID) is increasing along with the surge of illicitly manufactured fentanyl in local opioid (including heroin) and stimulant drug markets.^{7,8} The consumption of fentanyl, which has a shorter half-life than other commonly injected opioids,^{9,10} has been associated with increased injection frequency and thus increased exposures to HIV via contaminated injection equipment.¹¹ The confluence of factors—increasing injection drug use in the population and rising levels of fentanyl and fentanyl-contaminated drugs that PWID are injecting—has already set back decades of public health progress in reducing injection-related HIV transmission.

Risk of HIV acquisition is experienced by PWID through injection and sexual exposures. In 2018, nationally 59% of PWID reported past-year receptive sharing of used syringes or other injection equipment, or using used syringes to divide drugs.¹² High proportions of PWID surveyed nationally have also reported condomless vaginal sex (67%) and the median number of opposite sexual partners was 2 (IQR=1–4).¹² Many PWID experience both injection and sexual exposures that put them at risk for HIV during the same period (e.g., past year).¹³ For example, qualitative research in this socially marginalized population has documented the frequent co-occurrence of injection and sexual exposures that increase risk for HIV acquisition, including common experiences of having non-monogamous injection and sexual partners and engaging in transactional sex to obtain drugs.¹⁴ Despite evidence that harm-reduction services such as syringe service programs and medications for opioid use disorder help reduce HIV transmission,^{15,16} geographic coverage of these services remains limited,^{17,18} and such medications are persistently underprescribed.^{19,20} Taken together, these studies suggests that PWID could benefit from antiretroviral pre-exposure prophylaxis (PrEP) as an additional efficacious HIV prevention tool.²¹

The U.S. Public Health Service recommended that PrEP be offered to at-risk PWID,²² and in 2019, U.S. Preventive Services Task Force (USPSTF) guidelines gave PrEP an “A” grade, indicating that offering PrEP to PWID would be of a substantial net benefit with high certainty.²³ Yet, PrEP uptake among PWID has been limited compared with that in other populations (e.g., men who have sex with men),^{24,25} representing an important disparity in PrEP implementation. There also remains a limited quantification of PrEP need among PWID, with existing studies involving small samples recruited through local harm-reduction venues.^{26,27} Though informative, these studies do not provide a thorough understanding of the distribution of multiple avenues of HIV acquisition (and thus multiple indicators of PrEP

need) in larger, more representative samples of PWID. To help inform research and programmatic efforts to improve PrEP delivery to PWID, the prevalence of PrEP indication was examined by type of risk (i.e., indication by injection exposures only, sexual exposures only, or both injection and sexual exposures) among PWID in the Greater Boston Area, where repeated clusters of HIV transmission among PWID have been identified.^{28,29}

METHODS

Study Sample

In 2019, data were analyzed from the 2018 PWID National HIV Behavioral Surveillance System (NHBS) survey in the Greater Boston Area.³⁰ NHBS is a repeated, cross-sectional survey with 3 populations at risk for HIV acquisition (men who have sex with men, PWID, high-risk heterosexuals) in 22 cities across the U.S. Participants in the PWID cycle were recruited using respondent driven sampling^{31,32} and were eligible if they were aged 18 years, reported injecting drugs in the past 12 months, lived in a 5-county sampling area in and around Boston, were able to complete the interview in English or Spanish, and had not previously participated in NHBS. Of 612 recruited PWID, 469 met NHBS eligibility criteria and were enrolled. For this analysis, all HIV-negative, cis-gender participants with complete data were included, resulting in a final analytic sample of 423 PWID.

Measures

Trained interviewers administered the NHBS questionnaire to recruited PWID. All participants were compensated \$25 for completing the survey, and were offered HIV testing for which they were compensated an additional \$25.³⁰

Measures included participant characteristics, health service and substance use behaviors, and PrEP knowledge and experiences. Participant characteristics included age, sex (male or female), sexual identity (lesbian or gay, bisexual, or heterosexual), race and ethnicity (non-Hispanic White, non-Hispanic Black/African American, Hispanic/Latinx, or other), marital status (currently married/cohabitating, divorced/separated/widowed, or single), educational attainment (less than high school, high school/GED, or more than high school), employment, income (\$0–\$9,999, \$10,000–\$14,999, \$15,000–\$24,999, or \$25,000), current homelessness, and past-year detention, jail, or prison for 24 hours and having 1 self-reported disability ([1] deaf or serious difficulty hearing; [2] blind or serious difficulty seeing; [3] a physical, mental, or emotional condition causing serious difficulty concentrating, remembering, or making decisions; [4] serious difficulty walking or climbing stairs; [5] difficulty dressing or bathing; and [6] a physical, mental, or emotional condition causing difficulty doing errands alone).

Healthcare utilization included current insurance status, ever being tested for hepatitis C virus or HIV, past-year receipt of safe injection supplies, syringe service program– or pharmacy-based access to sterile syringes, visiting a healthcare provider (past year), having a routine source of care (defined by *having a place that you usually go when you are sick or need advice about your health* and then describing that place as a clinic, healthcare center, doctor's office, or HMO), and past-year participation in a drug treatment program).

Substance use behaviors included past-month binge drinking, past-year non-injection use of any drugs not prescribed to the participant, past-year injection frequency, past-year injection of heroin (by itself) or any stimulants (by themselves, including methamphetamine, crack cocaine, and powder cocaine), past-year speedball injection (heroin and cocaine together), and past-year overdose from heroin or “painkillers.”

The PrEP variables included past-year PrEP knowledge defined by the question: *PRE-exposure prophylaxis, or PrEP, is an antiretroviral medicine, such as Truvada, taken for months or years by a person who is HIV-negative to reduce the risk of getting HIV. Before today, have you ever heard of PrEP?* Among those answering affirmatively that they had heard of PrEP before, past-year *discussion with a healthcare provider about taking PrEP* was assessed. PrEP use was assessed as: *In the past 12 months, have you taken PrEP to reduce the risk of getting HIV?* Based on these questions, a PrEP care continuum was created that includes PrEP indication (defined below), PrEP awareness, PrEP discussions with healthcare providers, and PrEP use.³³

Based on USPSTF guidelines for considering individuals for PrEP (Appendix Figure 1),²³ a categorical variable was created separating PrEP indication according to type of HIV acquisition risk: (1) not indicated for PrEP, (2) indicated for PrEP based on past-year injection exposure only (receptive sharing of drug injection equipment), (3) indicated for PrEP based on past-year sexual exposure only (inconsistent condom use during anal or vaginal sex with someone whose HIV status is positive, indeterminate, or unknown, or with someone who has ever injected drugs; having a sexually transmitted infection in the past year), and (4) indicated for PrEP based on both past-year injection and past-year sexual exposures (i.e., multiple types of HIV acquisition risk exposures).

Statistical Analysis

One-way ANOVA *F*-tests were used to compare differences in continuous variables across PrEP indication categories and Fisher’s exact tests for binary and categorical variables where cell counts were small. All tests were 2-sided and considered significant at the $p < 0.05$ level. Stata, version 15.1 was used for all analyses.

RESULTS

Among 423 PWID, mean age was 41 (SD=11) years, 274 (65%) identified as male, 303 (72%) identified as heterosexual, 260 (61%) were non-Hispanic White, 262 (62%) were single, 202 (48%) had a high school education or GED, 375 (89%) were unemployed, 248 (59%) reported an income of \$0–\$9,999, 302 (71%) were currently homeless, and 163 (39%) reported being held in detention, jail, or prison for >24 hours in the past year (Table 1). Healthcare utilization was relatively high among this sample and almost all participants were insured (96%). Most 338 (80%) reported receiving safe injection supplies in the past year, most reported accessing sterile syringes through syringe service programs (81%), and 380 (90%) visited a healthcare provider in the past year.

The majority of participants (89%) reported non-injection drug use involving substances not prescribed to them, and past-year injection frequency was high, with 289 (68%) participants

injecting more than once a day. Nearly all participants (94%) reported injecting heroin in the past year, and more than half (56%) reported speedball injection (heroin and cocaine together) in this period. Any stimulant use (injection and non-injection) was high in this sample (88%) and methamphetamine injection was reported by 159 (38%) participants. A total of 151 (34%) reported binge drinking alcohol in the past month. Almost half of participants reported overdosing on heroin or painkillers in the past year (48%).

Based on USPSTF guidelines, 92% (389/423) of participants in the sample were indicated for PrEP (Table 1, Figure 1). A total of 386 (91%, 386/423) were indicated based on injection exposures, with 324 (77%) reporting using a needle after someone else had used it (past 12 months) as the most frequently reported injection exposure (Table 2). Ninety-nine PWID (23%) reported any sexual exposure leading to PrEP indication, of whom 85% (85/99) identified as heterosexual and 70% (70/99) reported inconsistent use of condoms with a partner whose HIV status is unknown and is at high risk for HIV acquisition (Table 2). PrEP indication based on sexual exposures only was reported by 3 (<1%) PWID. Overall, among the 389 PrEP-indicated PWID, 99% (386/389) were indicated for injection exposures and 25% (99/389) for sexual exposures.

A total of 290 HIV-negative PWID were indicated for PrEP based on injection exposure only (69%, 290/423) (Figure 1) compared with nearly a quarter of participants in both sexual and injection exposure category (i.e., multiple risk exposures PrEP indication; 23%, 96/423) (Figure 2). A significantly higher proportion of participants with multiple risk exposures were male (91%, 87/96) compared with 56% (162/290) of participants with injection-only exposure and 65% (22/34) of participants not indicated for PrEP ($p<0.001$). Those with multiple risk exposures had a higher proportion of participants recently incarcerated (49%, 47/96) compared with 37% (107/290) of participants with injection-only exposure and 26% (9/34) of non-indicated participants ($p=0.033$). Having 1 disability was reported by a higher proportion of participants in the multiple risk exposures category (89%, 85/96) compared with 80% (231/290) of participants indicated from injection exposure only and 71% (24/34) of those not indicated for PrEP ($p=0.013$).

Injection frequency did not statistically differ across categories of PrEP indication ($p<0.681$). Stimulant use (injection or non-injection) was reported by a higher proportion of participants in the multiple risk exposures category (94%, 90/96) compared with 88% (254/290) of participants indicated based on only injection exposure and 82% (28/34) of participants not indicated for PrEP ($p=0.013$). A higher proportion of participants in the multiple risk exposures category reported overdosing on heroin or painkillers in the past 12 months (55%, 53/96) compared with 48% (139/290) of those indicated based on injection exposure only and 24% (8/34) of participants not indicated for PrEP ($p=0.009$).

Among those indicated for PrEP ($n=389$), 152 (39%) reported being aware of PrEP, 41 (11%) had discussed PrEP with a healthcare provider, and 8 (2%) had used PrEP in the past year (Figure 2). There were no statistically significant differences between PrEP-indicated and non-indicated participants along each step of the PrEP care continuum. Among the 389 PrEP-indicated participants, loss from this continuum occurred as follows. From PrEP indication to PrEP knowledge, 61% of participants were lost owing to a lack of awareness.

From PrEP awareness to PrEP discussions with healthcare providers, 73% were lost because of no PrEP discussions with healthcare providers. From PrEP discussions with healthcare providers to actual PrEP use, 80% were lost owing to never having started PrEP.

DISCUSSION

Based on USPSTF guidelines, 92% of PWID in the Boston NHBS had an indication for PrEP, but only 2% were using it. Increasing prevalence of injection drug use and related HIV outbreaks signal a critical opportunity for expanded access to PrEP and other essential HIV prevention services for PWID, and understanding PrEP need in this population can help inform programmatic and implementation efforts.

The vast majority of PWID in this sample were indicated for PrEP because they reported injection exposures that increase the risk of HIV transmission, reflecting an urgent need for prevention efforts as opioid and polysubstance use continue to drive HIV outbreaks.¹⁷ Despite the very high proportions of PWID in Boston who reported having health insurance, routine sources of medical care, past-year visits with healthcare providers, and access to harm-reduction services, most participants still reported engaging in past-year receptive syringe sharing, highlighting the need to expand access to PrEP and other HIV prevention services.³⁴ Moreover, fentanyl is increasingly present in illicit drug supplies in Massachusetts and is associated with increased injection frequency,^{11,35} underscoring the need for increased supply of syringes available to this population.³⁴

Although most PWID had PrEP indication due to injection exposure, nearly a quarter were also indicated because of sexual exposure that increases risk of HIV acquisition. This “multiple risk” subsample (i.e., PWID reporting both injection and sexual exposures indicating them for PrEP) had higher levels of stimulant use, including methamphetamine injection, than the rest of the sample. Stimulant use, particularly involving methamphetamine, has been associated with increased engagement in sexual exposures that increase HIV transmission among PWID^{36,37} as well as high levels of injection equipment sharing.³⁸ This is concerning as recent data reveal that stimulant-related deaths in Massachusetts increased >300% from 2000–2018,³⁹ and nationally, there was a >5-fold increase in the drug overdose death rate involving psychostimulants (including methamphetamine).⁴⁰ These trends have important implications for PrEP need among PWID in the Northeast and other regions of the country as well.

In addition to identifying the high prevalence of PrEP indication in this sample of PWID, aspects of the PrEP Care Continuum were examined.³³ Beginning with PrEP awareness, 39% of participants reported being aware of PrEP before the interview, which did not significantly differ between those with and without PrEP indication. This is a higher level than what has been found in other studies with PWID in metropolitan areas, in which awareness ranged from 12% to 31%.^{26,41,42} A recent study with PWID in 2 urban centers in the U.S. Northeast (including PWID in the Greater Boston Area) found that, although 36% of participants expressed awareness of PrEP, interviews revealed limited factual understanding of it and confusion with post-exposure prophylaxis.²⁴ Professional key informants attributed this low knowledge to PrEP programming failures, including

marketing focused on other populations (e.g., men who have sex with men) and healthcare providers' reluctance to prioritize discussing PrEP with PWID. Combined with low PrEP knowledge, limited HIV risk perceptions among PWID in this region could also limit PrEP uptake.^{3,24,25} Communicating about injection and sexual exposures that increase HIV risk could help motivate individuals to take up PrEP. At the same time, efforts to improve accurate knowledge of how PrEP works, the significance of adherence, and where to obtain it could also help increase PrEP uptake,²⁴ because although PrEP awareness may be improving over time,^{30,43} accurate knowledge is essential to optimizing its use over time.

Moving along the PrEP Care Continuum, dramatic declines in the proportions of PWID reporting discussions about PrEP with healthcare providers (11% of those indicated for PrEP) and actually using PrEP were observed (only 2% of those indicated for PrEP). There were no significant differences along the PrEP care continuum between PWID with and without indications for PrEP, suggesting that PrEP uptake outcomes are no better for those that may actually benefit the most. As previous research has identified low willingness of providers to prescribe PrEP to PWID,⁴⁴ studies should explore reasons for this and identify intervention targets at the provider and clinical systems levels. Additional interventions will be needed to address the extremely low PrEP use among PWID, including those that target individual-level factors (e.g., low PrEP motivation), interpersonal challenges (e.g., stigma), and clinical and structural-level barriers (e.g., complex PrEP protocol, decentralized care, and transportation difficulties).^{24,25,45}

Limitations

This study is not without limitations. First, respondent-driven sampling helps obtain representative samples of PWID at risk of HIV⁴⁶ but NHBS does not provide weights for single-site analyses; therefore, results may not be generalizable to the greater Boston PWID population. Additionally, findings may not generalize to less-insured populations or more rural and underserved communities that have also been adversely affected by injection drug use.⁴⁷ Third, detecting statistically significant differences between non-indicated and indicated PWID may have been limited by small numbers. Fourth, although the use of illicitly manufactured fentanyl is rising in Massachusetts³⁵ and could be an important factor to consider in research on PrEP with PWID, NHBS did not assess fentanyl use. Fifth, levels of PrEP indication were assessed rather than clinical eligibility, which would require additional patient evaluation. Finally, PrEP indication categories describe varying degrees of HIV risk that were not captured in these analyses (e.g., numbers and types of sexual and injection partners).

CONCLUSIONS

In this sample of PWID in Boston in 2018, PrEP indication according to USPSTF guidelines was extremely high but discussions with providers were uncommon, and actual PrEP use was very low. Taken together, these findings reveal a high unmet need for PrEP among PWID in this area and underscore the need for PrEP uptake interventions tailored for PWID. With increasing HIV outbreaks fueled by opioid use and injection involving fentanyl,^{17,35} polysubstance use including stimulants, prevalent sexual exposures that increase the risk for

HIV transmission, and suboptimal healthcare utilization among PWID with access to care, efforts to improve PrEP provision to this socially marginalized population should be a public health priority.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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JJE, ARB, and RMK designed the study. JJE conducted the literature review and wrote the first draft of the manuscript. JJE and RMK undertook data management and JJE conducted statistical analyses with input from ARB, KBB, and RMK. JJE and RMK had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors reviewed, contributed revisions, and approved of the final manuscript.

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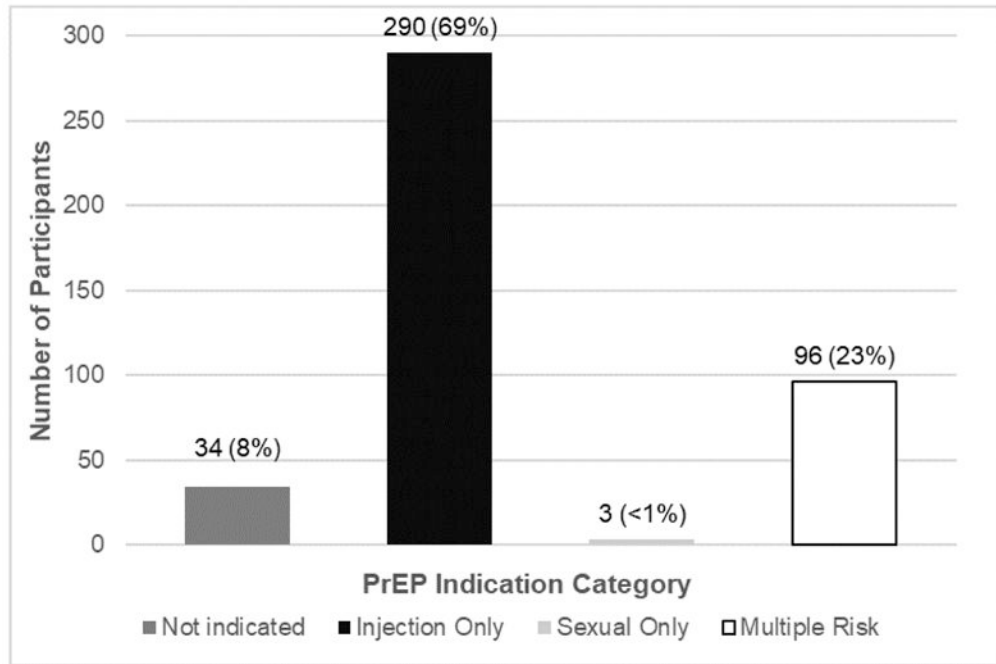


Figure 1. PrEP indication among 423 PWID by route of HIV acquisition in Greater Boston Area, Massachusetts, NHBS. PrEP, preexposure prophylaxis; PWID, people who inject drugs; NHBS, National HIV Behavioral Surveillance.

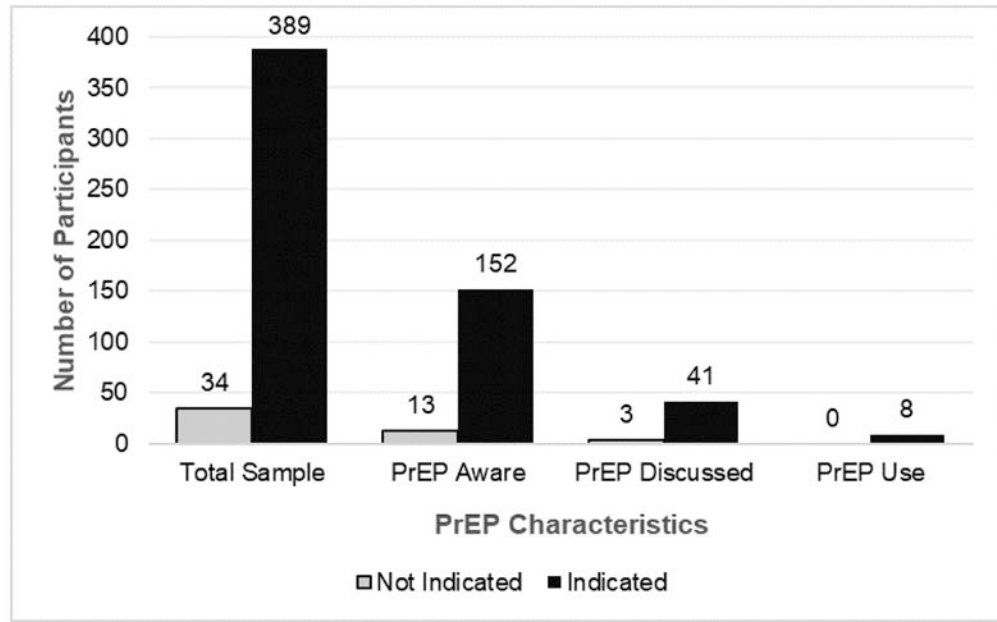


Figure 2. PrEP care continuum among 423 PWID by indication status in Greater Boston Area, Massachusetts, NHBS 2018. PrEP, preexposure prophylaxis; PWID, people who inject drugs; NHBS, National HIV Behavioral Surveillance.

Table 1.

Sample Characteristics and Differences Across PrEP Indication Categories Among 423 People Who Inject Drugs in the Greater Boston Area, Massachusetts, NHBS 2018

Characteristics	Overall (n=423) n (%)	Not indicated (N=34) n (%)	Injection only (N=290) n (%)	Sexual only (n=3) n (%)	Multiple risk (n=96) n (%)	p-value
Participant characteristics						
Age, years, mean (SD)	41 (11)	41 (10)	41 (11)	43 (7)	42 (11)	0.777
Sex						<0.001
Male	274 (65)	22 (65)	162 (56)	3 (100)	87 (91)	
Female	149 (35)	12 (35)	128 (44)	0 (0)	9 (9)	
Sexual identity						0.505
LGB	120 (28)	6 (18)	85 (13)	1 (33)	28 (29)	
Heterosexual	303 (72)	28 (82)	205 (71)	2 (67)	68(71)	
Race and Ethnicity						0.412
Non-Hispanic, White	260 (61)	17 (50)	182 (63)	3 (100)	58 (60)	
Non-Hispanic, Black/African American	46 (11)	7 (21)	27 (9)	0 (0)	12 (13)	
Hispanic/Latino	80 (19)	5 (15)	59 (20)	0 (0)	16 (17)	
Other	37 (9)	5 (15)	22 (8)	0 (0)	10 (10)	
Marital status						0.091
Currently married/Co-habiting	42 (10)	1 (3)	33 (11)	0 (0)	8 (8)	
Divorced/Separated/Widowed	119 (28)	7 (21)	79 (27)	3 (100)	30 (31)	
Single	262 (62)	26 (76)	178 (61)	0 (0)	58 (60)	
Education attainment						0.138
Less than high school	110 (26)	9 (26)	69 (24)	2 (67)	30 (31)	
High school/GED	202 (48)	16 (47)	137 (47)	0 (0)	49 (51)	
More than high school	111 (26)	9 (26)	84 (29)	1 (33)	17 (18)	
Employment						0.354
Employed	48 (11)	4 (12)	35 (12)	1 (33)	8 (8)	
Unemployed	375 (89)	30 (88)	255 (88)	2 (67)	88 (92)	
Homelessness						0.549
Currently homeless	302 (71)	22 (65)	205 (71)	2 (67)	73 (76)	
Not currently homeless	121 (29)	12 (35)	85 (29)	1 (33)	23 (24)	
Held in detention, jail, or prison for >24 hours ^a						0.033
Yes	163 (39)	9 (26)	107 (37)	0 (0)	47 (49)	
No	260 (61)	25 (74)	183 (63)	3 (100)	49 (51)	
Insurance status						0.724
Insured	404 (96)	32 (94)	276 (95)	3 (100)	93 (97)	
Uninsured	19 (4)	2 (6)	14 (5)	0 (0)	3 (3)	
Income						0.897
\$0–\$9,999	248 (59)	20 (59)	168 (58)	3 (100)	57 (59)	
\$10,000–\$14,999	84 (20)	4 (12)	59 (20)	0 (0)	21 (22)	
\$15,000–\$24,999	34 (8)	4 (12)	24 (8)	0 (0)	6 (6)	

Characteristics	Overall (n=423) n (%)	Not indicated (N=34) n (%)	Injection only (N=290) n (%)	Sexual only (n=3) n (%)	Multiple risk (n=96) n (%)	p-value
\$25,000	57 (13)	6 (18)	39 (13)	0 (0)	12 (13)	
One or more disability						0.013
Yes	341 (81)	24 (71)	231 (80)	1 (33)	85 (89)	
No	82 (19)	10 (29)	59 (20)	2 (67)	11 (11)	
Health services						
Received safe injection supplies ^a						0.242
Yes	338 (80)	23 (68)	232 (80)	3 (100)	80 (83)	
No	85 (20)	11 (32)	58 (20)	0 (0)	16 (17)	
Goes to syringe exchange for needles ^a						0.905
Yes	344 (81)	28 (82)	233 (80)	3 (100)	80 (83)	
No	79 (19)	6 (18)	57 (20)	0 (0)	16 (17)	
Goes to syringe exchange or pharmacy for needles ^a						0.878
Yes	388 (92)	32 (94)	264 (91)	3 (100)	89 (93)	
No	35 (8)	2 (6)	26 (9)	0 (0)	7 (7)	
Visiting a healthcare provider ^a						0.926
Yes	380 (90)	30 (88)	261 (90)	3 (100)	86 (90)	
No	43 (10)	4 (12)	29 (10)	0 (0)	10 (10)	
Drug treatment ^a						0.948
Yes	260 (61)	21 (62)	180 (62)	2 (66)	57 (59)	
No	163 (39)	13 (38)	110 (38)	1 (33)	39 (41)	
Have a usual source of care						0.517
Yes	266 (63)	25 (74)	182 (63)	2 (67)	57 (59)	
No	157 (37)	9 (26)	108 (37)	1 (33)	39 (41)	
HCV testing/diagnosis						0.040
Never tested	30 (7)	0 (0)	21 (7)	0 (0)	9 (9)	
Tested, not diagnosed	97 (23)	11 (32)	63 (22)	3 (100)	20 (21)	
Tested, diagnosed	296 (70)	23 (68)	206 (71)	0 (0)	67 (70)	
HIV testing/diagnosis						0.487
Never tested	30 (7)	2 (6)	18 (6)	0 (0)	10 (10)	
Tested, not diagnosed	393 (93)	32 (94)	272 (94)	3 (100)	86 (90)	
Substance use and behaviors						
Binge drink ^b						0.106
Yes	151 (34)	8 (24)	99 (34)	2 (67)	42 (44)	
No	170 (40)	17 (50)	124 (43)	1 (33)	28 (29)	
Don't know/Refused	102 (24)	9 (26)	67 (23)	0 (0)	26 (27)	
Non-injection drug use ^a						0.236
Yes	378 (89)	29 (85)	263 (91)	2 (67)	84 (88)	
No	45 (11)	5 (15)	27 (9)	1 (33)	12 (13)	

Characteristics	Overall (n=423) n (%)	Not indicated (N=34) n (%)	Injection only (N=290) n (%)	Sexual only (n=3) n (%)	Multiple risk (n=96) n (%)	p-value
Injection frequency ^a						0.681
More than once a day	289 (68)	26 (76)	189 (65)	2 (67)	72 (75)	
Once a day	49 (12)	3 (9)	36 (12)	1 (33)	9 (9)	
More than once a week	45 (11)	2 (6)	34 (12)	0 (0)	9 (9)	
Once a week or less	40 (9)	3 (9)	31 (11)	0 (0)	6 (6)	
Injection of heroin ^a						0.329
Yes	396 (94)	32 (94)	272 (94)	2 (67)	90 (94)	
No	27 (6)	2 (6)	18 (6)	1 (33)	6 (6)	
Stimulant use ^a						0.013
Yes	373 (88)	28 (82)	254 (88)	1 (33)	90 (94)	
No	50 (12)	6 (18)	36 (12)	2 (67)	6 (6)	
Inject speedball ^a						0.108
Yes	235 (56)	18 (53)	153 (53)	1 (33)	63 (66)	
No	188 (44)	16 (47)	137 (47)	2 (67)	33 (34)	
Inject methamphetamine ^a						0.061
Yes	159 (38)	11 (32)	100 (34)	1 (33)	47 (49)	
No	264 (62)	23 (68)	190 (66)	2 (67)	49 (51)	
Overdosed ^a						0.009
Yes	201 (48)	8 (24)	139 (48)	1 (33)	53 (55)	
No	222 (52)	26 (76)	151 (52)	2 (67)	43 (35)	

Note: Boldface indicates statistical significance ($p < 0.05$).

^aIn the past 12 months.

^bIn the past 30 days.

PrEP, preexposure prophylaxis; NHBS, National HIV Behavioral Surveillance; LGB, lesbian, gay, or bisexual; HCV, hepatitis C virus

Table 2.

Distribution of Injection and Sexual Exposures for PrEP Indication Among 423 People Who Inject Drugs in the Greater Boston Area, Massachusetts, NHBS 2018

Route of HIV acquisition risk	n (%)
Injection exposures	386 (91)
Used a needle after someone else injected with it ^a	324 (77)
Used the same cooker, cotton, or rinse water that someone else had already used ^a	304 (72)
Used drugs that had been divided with a syringe that someone else had already used ^a	207 (49)
Sexual exposures	99 (23)
Men who have sex with men (with one or more of risk exposure below)	15 (4)
A serodiscordant sex partner (i.e., in a sexual relationship with a partner living with HIV) ^a	0 (0)
Inconsistent use of condoms during receptive or insertive anal sex ^a	12 (3)
A sexually transmitted infection (STI) with syphilis, gonorrhea, or chlamydia ^a	5 (1)
Heterosexually active women and men (with one or more risk exposure below)	85 (20)
A serodiscordant sex partner (i.e., in a sexual relationship with a partner living with HIV) ^a	1 (<1)
Inconsistent use of condoms during sex with a partner whose HIV status is unknown ^a and who is at high risk (e.g., a person who injects drugs ^b or a man who has sex with men and women) ^a	70 (17)
An STI with syphilis, gonorrhea, or chlamydia ^a	15 (4)
Individuals who engage in transactional sex and have 1 of the following characteristics	50 (12)
A serodiscordant sex partner (i.e., in a sexual relationship with a partner living with HIV) ^a	0 (0)
Inconsistent use of condoms during sex with a partner whose HIV status is unknown ^a and who is at high risk (e.g., a person who injects drugs ^b or a man who has sex with men and women ^a) OR Inconsistent use of condoms during receptive or insertive anal sex (if MSM) ^a	44 (10)
An STI with syphilis or gonorrhea ^a	8 (2)

^aIn the past 12 months.

^bEver reported (based on participant knowledge of partner's behavior).

PrEP, preexposure prophylaxis; NHBS, National HIV Behavioral Surveillance; MSM, men who have sex with men.