



Peer recovery coaching for comprehensive HIV, hepatitis C, and opioid use disorder management: The CHORUS pilot study

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ABSTRACT

Introduction: Amidst a surge in HIV and hepatitis C virus (HCV) infections in persons who use drugs, medications that effectively prevent HIV and treat opioid use disorder and HCV remain underutilized.

Methods: We developed a 6-month peer recovery coaching intervention (brief motivational interviewing followed by weekly virtual or in-person coaching) and collected data on uptake of medications for opioid use disorder (MOUD), HIV pre-exposure prophylaxis (PrEP), and HCV treatment. The primary outcomes were intervention acceptability and feasibility.

Results: At a Boston substance use disorder bridge clinic, we enrolled 31 HIV-negative patients who used opioids. Participants reported high intervention satisfaction at 6 months (95% “satisfied” or “very satisfied”). At study completion, 48% of the participants were on MOUD, 43% who met CDC guidelines were on PrEP, and 22% with HCV were engaged with treatment.

Conclusions: A peer recovery coaching intervention is feasible and acceptable, with positive preliminary findings regarding MOUD, PrEP and HCV treatment uptake.

List of abbreviations: HIV, human immunodeficiency virus; PrEP, pre-exposure prophylaxis.

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1. Introduction

Opioid use disorder (OUD), human immunodeficiency virus (HIV), and hepatitis C virus (HCV) form a syndemic (i.e. epidemics identified in the same population that together cause worse outcomes than if each occurred individually) (Perلمان and Jordan, 2018; Singer et al., 2017). This syndemic is driving a surge in deaths among persons who use drugs (PWUD) and other substances with the highest risk in persons who inject drugs (PWID) (Alpren et al., 2020; El-Bassel et al., 2012; CDC, 2021b; Neaigus et al., 2007; Zibbell et al., 2015). In addition, HIV acquisition is associated with smoked cocaine, especially in women, while HCV can be transmitted through smoking equipment in absence of injection (DeBeck et al., 2009; Scheinmann et al., 2007).

Evidence-based interventions are available to prevent opioid overdose, HIV, and HCV while treatments can also cure HCV (Afdhal et al., 2014, 2014; Choopanya et al., 2013; Foster et al., 2015; Larochelle et al., 2018; Sullivan et al., 2008). These evidence-based interventions include medications for opioid use disorder (MOUD), such as buprenorphine and methadone, which decrease opioid overdose and mortality (Larochelle et al., 2018). Methadone and buprenorphine are associated with lower HIV and HCV acquisition, and HIV risk behaviors respectively (Magidson et al., 2021; SAMHSA, 2021; Sullivan et al., 2008). Furthermore, a clinical trial demonstrated that daily oral HIV pre-exposure prophylaxis (PrEP) prevents HIV acquisition among PWID (Choopanya et al., 2013). Lastly, direct-acting antivirals for HCV are well-tolerated and can cure HCV infection, including among patients with ongoing substance use (Afdhal et al., 2014, 2014; Foster et al., 2015; Rosenthal et al., 2020). PrEP, MOUD and HCV treatment delivery to PWID has been inadequate (Barua et al., 2015; Bazzi et al., 2019; Mistler et al., 2021; Mojtabei et al., 2019; Younossi et al., 2016). The 2018 National HIV Behavioral Surveillance data from Boston indicated only 2% of people who inject drugs used PrEP in the last year, and a 2021 systematic review of the PrEP care cascade in PWID showed 0% - 3% uptake (Earlywine et al., 2021; Mistler et al., 2021). Further, a 2022 study showed only 23% of individuals with OUD received treatment (Krawczyk et al., 2022). Recent estimates demonstrated that only about 20% of people with HCV who injected drugs had reported receiving HCV-targeted therapy (Tsui et al., 2019). Reasons for low uptake include limited information available to eligible patients, stigma, care fragmentation, and competing priorities (Assoumou et al., 2021; Bazzi et al., 2018, 2019; Biancarelli et al., 2019; Chan et al., 2021; Childs et al., 2019). It is therefore critical to develop and implement interventions to increase uptake of these medications.

Peer interventions have been shown to increase adoption of MOUD, PrEP, and HCV treatment and improve outcomes when evaluated separately. For example, studies have shown that HIV care can be successfully delivered alongside substance use care by including clinical, behavioral, and social services components within the intervention (Mayer et al., 2013). In addition, a randomized controlled trial showed that peer education was an effective approach to assist individuals with abstaining from heroin and/or cocaine use (J. Bernstein et al., 2005). Peer recovery coach (PRC) is a type of peer support where a coach with lived experience assists others on their own personal pathways to recovery. An observational study found that PRC engagement decreased acute care utilization and increased buprenorphine treatment and abstinence from opioids (Magidson et al., 2021). Due to growing interest in PRC models, some states offer formal training and certification. In Massachusetts, individuals seeking recovery coach certification must attend the Recovery Coach Academy program and complete a Certified Addiction Recovery Coach (CARC) examination (SAMHSA, 2017a.; The Massachusetts Board of Substance Abuse Counselor Certification, 2016). Nevertheless, little is known about using PRC to concurrently address OUD, HIV and HCV. We, therefore, developed and described a pilot intervention to test the acceptability and feasibility of PRC in addressing the syndemic of OUD, HIV and HCV.

2. Methods

2.1. Design

We conducted a longitudinal pilot study to examine the acceptability and feasibility of a PRC intervention focusing on the syndemic of OUD, HIV and HCV, and to develop procedures for testing this intervention's efficacy. The CHORUS intervention (Comprehensive HIV, Hepatitis C and Opioid use disorder Response to the Unaddressed Syndemic) aimed to improve MOUD and PrEP uptake and retention as well as initiation and completion of HCV treatment. The study was approved by the Institutional Review Board of Boston University Medical Campus and a Certificate of Confidentiality was obtained from the National Institutes of Health.

2.2. Site

We performed the study at Boston Medical Center's (BMC) Faster Paths clinic, a low-barrier bridge clinic for people with substance use disorders. BMC is the largest safety-net hospital in New England (Boston Medical Center, 2021) and the Faster Paths clinic offers same-day access to MOUD and HIV prevention services, including PrEP, with linkage to long-term care settings after stabilization (Harvey et al., 2021; Roy et al., 2021; Taylor et al., 2022). Faster Paths also provides on-site HCV treatment and referral to primary care or subspecialists such as gastroenterology for patients with co-infection.

2.3. Inclusion/exclusion criteria

We included patients who were aged 18 years or older, had a history of opioid use in the past 6 months, and agreed to sign a release form for medical records enabling the study team to review information on follow-up visits at BMC and at other clinics. Participants did not need to have a history of injection drug use in order to enroll. We included individuals who could speak English and excluded patients with HIV as they are not eligible for PrEP.

2.4. Recruitment

We recruited study participants from December 2020 – July 2021. Prior to recruitment days, the research assistant (RA) reviewed electronic medical records of patients scheduled in Faster Paths and alerted the clinical team to potentially eligible patients. During appointments, clinicians introduced the study to patients. If patients were interested in the study, clinicians informed the RA who then connected with potential participants in-person or by phone to administer a screening questionnaire. For patients meeting inclusion criteria, the RA provided a description of the study and its potential risks and benefits. Individuals were reminded that participation was voluntary. Those who wished to participate provided informed consent either in-person or through e-signature on RedCap, a data management platform which can securely store Health Insurance Portability and Accountability Act (HIPAA)-sensitive data.

2.5. Procedures and study assessments

After obtaining consent, participants completed an RA-administered baseline assessment collecting demographics, information on substance use, and sexual and social histories. We defined unstably housed individuals as persons living on the street, an overnight shelter or other non-permanent housing (Eastwood and Birnbaum, 2007; Frederick et al., 2014; Rebholz et al., 2009). Participants then completed a 20-minute PRC-delivered motivational interviewing session either in-person or via telehealth. PRC training sessions were developed by members of the

study team and followed a protocol-based approach to improve substance use care (see Section 2.7). (E. Bernstein et al., 1997; J. Bernstein et al., 2005; Lee et al., 2020). Smartphones were provided to all participants for ease of communication and to increase retention in the study. The smartphones did not include any special tools other than a videoconferencing application. RAs completed 3- and 6-month follow up questionnaires with participants assessing satisfaction with the intervention through telephone calls, HIPAA-compliant video calls, or in-person meetings. Satisfaction surveys gathered information on the intervention content and length, as well as the frequency of check-ins. Surveys also focused on the perceived utility of PRC assistance with navigation of the healthcare system and satisfaction with obtaining other resources related to social determinants of health such as housing and employment. We also asked participants about the perceived impact of study phones on engagement and retention in the study. During interviews, RAs obtained information on initiation and retention on MOUD, PrEP and HCV treatment. To supplement information collected through surveys, RAs reviewed medical records at baseline, 3 months, 6 months and beyond to collect information about participants' initiation and retention on MOUD, PrEP, or HCV treatment. Chart reviews took place from December 2020, when the first participant was recruited, to February 2022, a few months after the last enrolled participant reached 6 months in the program. RAs recorded information on HIV and HCV testing as well as testing for sexually transmitted infections. Participants received a \$20 gift card for baseline and each follow-up assessment visit.

2.6. Training

We hired a coach with 4 years of experience as a PRC for persons with substance use disorders. The PRC had prior experience with local support services to address social determinants of health. The study principal investigator (SAA) conducted motivational interviewing trainings for the PRC. Sessions included an overview of the theoretical framework, assessments, and the intervention. The PRC also received information on substance use treatment and HIV prevention as well as an overview of HIV and HCV medical management.

2.7. Intervention

CHORUS was organized into two phases over a 6-month period: (1) initiation phase at enrollment, and (2) maintenance phase. As part of the initiation phase, the PRC performed a 20-minute motivational interviewing session with participants. The session followed the Brief Negotiation Interview framework, which was developed as a strategy to assist patients in recognizing and changing behaviors associated with significant health risks (E. Bernstein et al., 1997; J. Bernstein et al., 2005). The baseline session focused on substance use and HIV prevention. During the motivational interview, the PRC obtained information on each participant's substance use history, readiness to change, and interest in and experience with MOUD. The PRC explored perceived HIV and HCV risk and worked with participants to develop and implement strengths-based self-directed recovery wellness plans. The session briefly focused on indications and benefits of PrEP and HCV treatment. Subsequent sessions during the intervention delved into HIV prevention alongside OUD treatment.

At baseline and during the intervention, participants were assessed for PrEP eligibility following Centers for Disease Control and Prevention (CDC) guidance (CDC, 2021a). Participants who inject drugs were eligible for PrEP if they had shared injection equipment in the prior six months (CDC, 2021a). All participants were eligible for PrEP if they had past-six-month sexual risk for HIV acquisition, including bacterial sexually transmitted infection and incomplete condom use with partners of unknown HIV status (CDC, 2017).

During the maintenance phase, the PRC connected with participants at least once per week. Interactions occurred in-person, by telephone calls, text messages or videoconferencing. The PRC assisted participants

Table 1

Baseline characteristics for all participants enrolled in a peer recovery coaching intervention at a low-barrier access clinic for people with substance use disorders ($n=31$).

Characteristics	Overall	
Race/Ethnicity (n,%)		
White	17	(55)
Black or African American	3	(10)
American Indian or Alaska Native	2	(6)
Native Hawaiian/Pacific Islander	1	(3)
Latino	8	(26)
Gender		
Male	21	(68)
Female	10	(32)
Sexual orientation		
Heterosexual	30	(97)
LGBTQIA+	1	(3)
Educational attainment		
Some elementary school	1	(3)
Some high school	5	(16)
Completed high school or GED	15	(48)
Some college	9	(29)
Completed college	1	(3)
Housing status, past 6 months		
House or apartment	16	(52)
On the street	7	(23)
Overnight shelter	1	(3)
Residential treatment facility	3	(10)
Group housing	1	(3)
Jail or prison	1	(3)
Other ¹	2	(6)
Employment		
Employed full-time (30+ hours per week)	2	(6)
Employed part-time (<30 h per week)	2	(6)
Unemployed	25	(81)
Disabled	2	(6)

Abbreviations: GED, General Educational Development test; LGBTQIA+: lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual, and more.

¹ Hotel, Halfway House.

with accessing care related to MOUD, PrEP, and HCV treatment, and connected participants to social services available in the community such as housing, job opportunities, and peer support meetings. Given delays related to the coronavirus disease 2019 (COVID-19) pandemic and staffing issues, we extended the intervention for 2 participants by approximately 2 months so we could collect necessary data, such as satisfaction surveys.

2.8. Data analysis

We used descriptive statistics to characterize participants. All analyses were performed using Excel (Microsoft, Redmond, WA).

3. Results

3.1. Participant characteristics

Thirty-three screened individuals met eligibility requirements, and 31 (94%) enrolled in the study. Among 31 participants, 21 (68%) were male, with a mean [SD] age of 39 [9] years (Table 1). Fourteen (48%) participants were unstably housed. Twenty-one (68%) participants did not have cell phones when they enrolled in the intervention.

3.2. Baseline self-reported risk behaviors

Twenty-two (71%) participants reported using fentanyl in the past 6 months (Table 2). Thirteen participants injected drugs in the past 6 months, and of those, the most commonly injected drugs were fentanyl (77%) and heroin (77%). In terms of sexual history, 20 (65%) partici-

Table 2

Baseline risk factors and behaviors for all participants enrolled in a peer recovery coaching intervention at a low-barrier access clinic for people with substance use disorders (n=31).

Characteristics	Overall	
No penetrative sex in past 6 months	11	(35)
Condom use, past 6 months (vaginal or anal penetrative sex)		
Always	5	(16)
Usually	2	(6)
Sometimes	2	(6)
Rarely	1	(3)
Never	10	(32)
Tested for a STI or infections (other than HIV-infection), past year		
Yes	21	(68)
No	10	(32)
Diagnosed with STI, past year		
None	20	(65)
Herpes/Genital warts	1	(3)
Drug used to get 'high/buzzed on', past 6 months (categories are not mutually exclusive)		
Crack	15	(48)
Alcohol	19	(61)
Heroin	21	(68)
Cocaine	19	(61)
Fentanyl	22	(71)
Nonprescribed buprenorphine	2	(6)
Prescribed buprenorphine	4	(13)
Downers or sedatives (Valium, Xanax)	9	(29)
Crystal methamphetamine	10	(32)
Prescribed methadone	3	(10)
Nonprescribed methadone	4	(13)
Other opioids like prescription painkillers (Oxycontin)	8	(26)
Other drugs NOT prescribed to participants	4	(13)
Frequency of drug injection, past 6 months		
4 or more times a day	4	(13)
2 to 3 times a day	1	(3)
2 to 6 days a week	2	(6)
1 to 3 days month	1	(3)
Less than once a month	4	(13)
Not injected in past month	1	(3)
Not injected in past 6 months	7	(23)
Never injected in lifetime	11	(35)
Drug injected to get 'high/buzzed on', past 6 months (categories are not mutually exclusive)		
Crack	6	(19)
Heroin	10	(32)
Cocaine	8	(26)
Buprenorphine	1	(3)
Crystal methamphetamine	5	(16)
Methadone	2	(6)
Fentanyl	10	(32)
Other drugs NOT prescribed to participants	1	(3)
None/Not Applicable	18	(58)

pants reported having vaginal or anal sex in the past 6 months. Of those, 15 (75%) reported condomless sex.

3.3. Laboratory results and medication data

At baseline, twenty-six (84%) participants had results for HIV testing available in the electronic medical record (EMR), and all were negative (Table 3). Of those with HIV testing results available at any point during the intervention, 20/28 (71%) were tested within 3 months of enrollment (either prior to or post enrollment). The maximum time since last HIV testing was 35 months. One participant was on PrEP at baseline and 14 (45%) participants were eligible for PrEP at baseline (CDC, 2021a).

Twenty-seven out of 31 (87%) participants had results for HCV testing available in the electronic medical record (EMR) at baseline. 9/31 (29%) participants had detectable HCV RNA indicative of chronic HCV infection.

Table 3

Laboratory data and treatment history of participants enrolled in a peer recovery coaching intervention at a low-barrier access clinic for people with substance use disorders (n=31).

Infection Screening	Overall	
HCV antibody test on file in EMR	27	(87)
Reactive	15	(48)
Nonreactive	11	(35)
Weakly reactive	1	(3)
HCV RNA on file in EMR	16	(52)
Positive	9	(29)
Negative	7	(23)
HCV genotype testing on file in EMR	11	(35)
Genotype 1	5	(16)
Genotype 3	3	(10)
Unknown	3	(10)
HIV test on file in EMR	26	(84)
Negative	26	(84)

Abbreviations: EMR, electronic medical records; HCV, Hepatitis C Virus; RNA, Ribonucleic Acid, HIV, Human Immunodeficiency Virus.

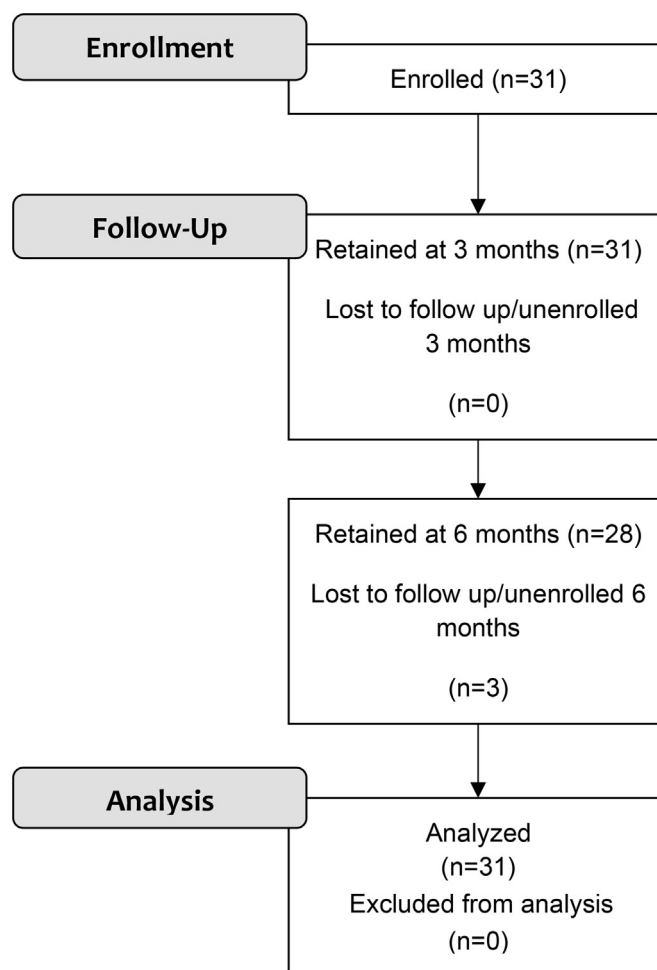


Fig. 1. Study flow.

3.4. Feasibility measures

Of the 33 individuals screened, two were excluded (one did not complete the baseline assessment and another did not complete the motivational interview) (Fig. 1). Twenty-eight (90%) participants were retained at 6 months with 2 lost to follow up, and 1 unenrolled by self-request. Twenty (65%) of 31 participants completed the 6-month satisfaction survey. Satisfaction with the intervention was high, with 19/20

Table 4
Satisfaction with the peer recovery coaching intervention at 6 months after enrollment.

	Overall	
Recruitment and Retention		
Recruitment into the trial	31/33	(94)
Retention at 6 months	28/31	(90)
6-month Satisfaction		
Satisfaction working with PRC (n=20)		
Very satisfied	13	(65)
Satisfied	6	(30)
Neither satisfied nor dissatisfied	0	(0)
Dissatisfied	0	(0)
Very dissatisfied	1	(5)
Intervention was helpful (n=20)		
Strongly agree	16	(80)
Agree	3	(15)
Neither/NA	1	(5)
Disagree	0	(0)
Strongly disagree	0	(0)
PRC provided navigation to SU programs/resources (n=20)		
Strongly agree	15	(75)
Agree	4	(20)
Neither/NA	0	(0)
Disagree	0	(0)
Strongly disagree	1	(5)
PRC provided access to HIV prevention and PrEP (n=20)		
Strongly agree	12	(60)
Agree	7	(35)
Neither/NA	1	(5)
Disagree	0	(0)
Strongly disagree	0	(0)
Helpfulness of Phone (n=14)*		
Very helpful	12	(86)
Helpful	2	(14)
Neither/NA	0	(0)
Unhelpful	0	(0)
Very unhelpful	0	(0)
Lived-Experience of PRC Had Positive Impact (n=20)		
Strongly agree	15	(75)
Agree	4	(20)
Neither/NA	1	(5)
Disagree	0	(0)
Strongly disagree	0	(0)
Would recommend intervention to others with SUD (n=20)		
Strongly agree	16	(80)
Agree	4	(20)
Neither/NA	0	(0)
Disagree	0	(0)
Strongly disagree	0	(0)

* Certain questions were added after satisfaction surveys had been collected for some participants. Abbreviations: PRC: Peer recovery coach; SU, Substance Use, HIV, Human Immunodeficiency Virus; PrEP, Pre-Exposure Prophylaxis, SUD; Substance Use Disorder.

(95%) participants indicating they were either “satisfied” or “very satisfied” with working with a PRC (Table 4). All 20 (100%) participants who completed the 6-month survey would recommend CHORUS to other individuals with SUD.

3.5. MOUD initiation and retention

Twenty-two (71%) participants were on MOUD at the time of enrollment. Six (19%) participants were started on MOUD on the day of enrollment. The median number of days [IQR] on MOUD prior to enrollment in the study was 25 days [6.5–36.5]. Of the 28 participants who initiated on MOUD either prior to or on the day of enrollment, 27 (96%) were on buprenorphine, and one (4%) was on methadone.

At 6 months after enrollment, 15 of 31 (48%) participants were on MOUD, with 13 (87%) participants on buprenorphine, and 2 (13%) participants on methadone. Of the 15 participants on MOUD at 6 months, 1 (7%) was started on MOUD on the day of their enrollment, and 14

(93%) were on MOUD at the time of enrollment and remained through the end of the intervention.

3.6. PrEP initiation and retention

One patient was on PrEP at the time of enrollment. At 6 months, 6 of 14 (43%) eligible (at baseline) participants were on PrEP. Five patients were started on PrEP during the intervention period. The one patient on PrEP at the time of enrollment remained on PrEP throughout the intervention. The median number of days [IQR] after enrollment when participants were initiated on PrEP was 114 [25.75–201]. Of note, 2 of the 6 participants on PrEP were initiated after 6 months. As noted in section 1.2.8, the intervention was extended for some participants to address staffing changes during the COVID-19 pandemic and to allow collection of necessary outcome data. These two participants continued to work with the PRC for 2 months beyond 6 months after enrollment.

3.7. HCV treatment initiation and retention

None of the participants were engaged in HCV treatment at the time of enrollment. At 6 months, two participants were receiving or had completed HCV treatment. This result corresponds to 2 of the 9 (22%) participants with HCV viremia at baseline.

3.8. Peer recovery coach-participant communication and phone use during the intervention

The PRC and participants engaged in a median [IQR] of 12.5 [22.5] contacts throughout the intervention with a total of 491 recorded contacts. The most used forms of communication were telephone calls (54%) and text messages (28%). Other methods included in-person visits (14%) and videoconferencing (2%). The topic most frequently discussed with the PRC was OUD (49%), followed by HCV (15%), community resources (14%), HIV and HIV prevention (11%), and other SUD (7%). Of 67 contacts focused on resources, the most discussed topics were housing/shelter (59%), employment (13%), clothing (4%), identification documents (3%), department of children and family-related issues (1%), and food insecurity (1%).

Out of the 32 phones provided to participants, 22 (69%) were disconnected due to unenrollment or phone loss. Three (9%) phones were disconnected because the participant was unenrolled or lost to follow up, and 19 (59%) phones were disconnected because they were reported by participants as lost or stolen. Out of the 19 participants who lost their phones or had them stolen, the majority (58%) were unstably housed. The 22 phones were disconnected at a mean [SD] of 15 [9.5] weeks after enrollment, but one was disconnected as early as two days into the intervention, while others were not disconnected until the end of the 6-month intervention. Two of 19 (11%) lost or stolen phones were replaced.

4. Discussion

We show that during the COVID pandemic the CHORUS intervention recruited individuals at-high risk for overdose death, HIV and HCV, and offered a comprehensive approach to address OUD and its infectious complications (CDC 2020; CDC, 2022). Our findings are especially timely given increases in overdose deaths during the COVID-19 pandemic and increasing HIV incidence among PWID in recent years (Baker et al., 2019; CDC, 2022). Furthermore, the CHORUS intervention was feasible and acceptable as evidenced by responses to the satisfaction surveys. In addition, we recorded encouraging preliminary findings related to MOUD and PrEP with nearly half of participants on MOUD and over 40% of eligible individuals on PrEP.

The relationship between the PRC and participants was likely critical to study findings. PRC and participants were able to develop a relationship during the 6-month intervention and the PRC's lived-experience

with substance use likely facilitated this process. In terms of PrEP initiation, the PRC provided both information and encouragement to follow-up with their clinicians to see if they were appropriate candidates for PrEP. The PRC also accompanied participants to clinical appointments and to pharmacies to pick up PrEP prescriptions. We believe this wraparound approach helped participants initiate this medication. Nevertheless, future iterations of CHORUS might necessitate an adjustment to the weekly frequency of contacts between the PRC and participants to scale the intervention, and reach more people at-risk. As participants make progress, interactions could be modified from weekly to biweekly and then monthly, as appropriate.

As part of the intervention, we provided study phones to all participants, many of whom did not have phones at baseline. Although many devices were lost or stolen during the intervention, participants reported that study phones were helpful to facilitate contact with the PRC. In addition, phones became very helpful during the COVID-19 pandemic to maintain access to substance use-related programs (Bergman and Kelly, 2021). The majority of participants who lost their phones were unstably housed, and property-theft is a well described barrier to care for people experiencing homelessness (Keene et al., 2018; McInnes et al., 2013). Even if participants lost their study phones, the research team worked to maintain engagement through various means such as meeting participants in-person when individuals came to the medical campus for clinic appointments or when they accessed local community-based organizations and resources. We offered to replace lost phones if participants continued to interact with the recovery coach and showed interest in remaining in the study.

Previous studies have focused on a siloed approach to OUD and its complications. For example, many studies used peer support to address substance use and have shown improvement in outcomes (Armitage et al., 2010; J. Bernstein et al., 2005; Boisvert et al., 2008; Min et al., 2007; Rowe et al., 2007; SAMHSA, 2017a, 2017b), and others have specifically used PRCs to address substance use with mixed results (Bassuk et al., 2016; Byrne et al., 2020; Magidson et al., 2021). Other studies have described the use of peers to improve HIV and HCV-related outcomes (Mayer et al., 2013; Stagg et al., 2019). Our intervention is novel, as it utilizes PRC to concurrently address OUD, HIV risk, and HCV.

The current study capitalizes on the strengths of a low-barrier substance use disorder bridge clinic with same-day infrastructure for MOUD and PrEP delivery. We built upon prior work demonstrating that low-threshold services are readily accessed by PWID, and that same-day prescriptions, intensive outreach, and navigation are important facilitators of PrEP delivery to PWID (Bazzi et al., 2023; Mistler et al., 2021; Roth et al., 2021). For example, a PrEP program at a community health center for people experiencing homelessness that provided directly observed therapy and flexible navigation tailored to the client's need achieved a PrEP retention rate of 44% after 6 months (Biello et al., 2021). In the bridge clinic setting, our finding that 43% of PrEP-eligible patients were on PrEP compares favorably to prior clinic work showing 66% of eligible patients were offered and 14% prescribed PrEP, suggesting important synergy between PRC and the low-barrier clinical settings model (Braun et al., 2022). The impact of the PRC intervention may be less robust in settings without resources designed to meet the clinical needs of PWID.

Available data on the influence of peer interventions on MOUD retention is limited. A 2021 observational study showed that PRC contact was associated with buprenorphine retention (OR = 1.89; 95% CI: 1.49–2.39; $p < 0.001$) and abstinence from opioids (OR = 1.32; 95% CI: 1.02–1.70; $p < 0.001$) (Magidson et al., 2021). Although our pilot study does not have a comparison group, the 6-month MOUD retention rate of nearly 50% is comparable to that of office-based addiction treatment programs which generally care for patients facing fewer structural barriers (e.g., lower rates of homelessness) compared to bridge clinics. A cohort study in primary care clinics reported a buprenorphine retention rate of 59% at 24 weeks, and another office based opioid treatment

analysis found that 45% of patients continued treatment for at least a year (Stein et al., 2005; Weinstein et al., 2017).

HCV treatment initiation in our sample was more limited. Prior studies have shown in a sample of individuals who inject drugs, 20% of patients with HCV reported receiving treatment for the condition, and 7% completed therapy (Tsui, et al., 2019). This may be due to the additional steps required to initiate HCV treatment (e.g., liver fibrosis staging, prior authorization for HCV medications) compared to PrEP or to the relative prioritization of HCV treatment alongside other acute care needs. However, a recent pilot study found that same-day HCV treatment initiation led to improved outcomes in PWID (Charuchandra, 2021). Streamlining HCV treatment initiation-related steps in future iterations of the CHORUS intervention and integrating this care with other clinical priorities (e.g., by incorporating liver staging labs into intake order sets) might improve treatment rates.

4.1. Limitations

The current study includes a single site, and the small sample size limits generalizability. The study did not include a comparison group to assess the efficacy of the intervention; however, results provide a foundation for testing CHORUS' efficacy to improve retention on MOUD, PrEP and HCV treatment through future experimental designs. Additionally, because many patients in our sample were recruited during follow-up (as opposed to initial) visits, many were already on MOUD at the time of enrollment; this may limit generalizability to patients initiating care who are not yet on MOUD and may also have blunted observed rates of MOUD initiation. Additionally, satisfaction survey findings were only based on those who completed the 6-month survey, and those who were most satisfied may have been most likely to complete the 6-month assessments. Future studies should focus on improving retention especially among patients initiating MOUD during the intervention and on the optimal use of phones to support participants.

4.2. Conclusion

Overall, CHORUS pilot findings show that during the overdose epidemic that has been exacerbated by the COVID-19 pandemic, a comprehensive PRC intervention could potentially complement efforts of clinical settings seeking to engage and retain patients on MOUD and PrEP. While the approach to HCV treatment warrants modification in future intervention iterations, the current study provides a blueprint for an integrated, PRC-based approach to OUD and its infectious complications. Future studies should focus on evaluating CHORUS' efficacy and optimizing its implementation in other real-world clinical settings.

Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Anna K. Martin: Formal analysis, Investigation, Writing – original draft, Writing – review & editing. **Tyshaun Perryman:** Writing – review & editing. **Judith A. Bernstein:** Methodology, Writing – review & editing. **Jessica L. Taylor:** Writing – review & editing. **Ricardo Cruz:** Writing – review & editing. **Jordana Muroff:** Writing – review & editing. **Jeffrey H. Samet:** Writing – review & editing. **Sabrina A. Assoumou:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Funding acquisition, Resources, Supervision.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dadr.2023.100156.

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