



Harm Reduction and Adaptations Among PWUD in Rural Oregon During COVID-19

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Abstract

Coronavirus Disease 2019 (COVID-19) may influence HIV/HCV transmission risk behaviors in rural communities. We conducted semi-structured qualitative interviews with people who use drugs (PWUD) in five rural Oregon counties and asked about COVID-19 impact on substance use and harm reduction practices and their advice for improving public health responses. Participants (n = 36) reported using only methamphetamine (52.8%), only heroin (16.7%), or both (30.6%); 75% of participants reported recent injection. Three thematic categories emerged: SSP adaptations and accessibility, PWUD harm reduction practices, and policy suggestions. Participants noted the importance of SSPs to COVID-19 prevention and wellbeing, though some experienced increased barriers, leading to increased risky injection practices. Participants suggested need-based rather than one-for-one exchange, increasing syringe delivery services, encouraging secondary exchange by PWUD, and peers as trusted voices for information exchange. Rapid implementation of policy and practice changes are urgently required to improve SSP access, reinforce safer use, and prevent HIV/HCV and COVID-19 transmission.

Keywords COVID-19 · Harm reduction · Syringe services programs · Opioid use disorder · Rural

Introduction

Little is known about the interrelationship between substance use and the Coronavirus Disease 2019 pandemic (COVID-19) [1]. People who use drugs (PWUD) may be at increased risk of morbidity from both COVID-19 and substance use disorders (SUD) during the pandemic [2–8]. PWUD are more likely to have chronic diseases like chronic obstructive pulmonary disease, pulmonary hypertension, and heart failure that are known to increase the risk of

COVID-19 complications [9–13]. PWUD also experience social and economic vulnerabilities such as housing instability and lack of transportation [11], which are independently associated with an increased risk of contracting COVID-19 and worse outcomes in those infected [9, 11, 14]. Government guidance on physical distancing also presents unique risks to PWUD [2]. Injection best practices such as not injecting alone to prevent overdose are difficult to maintain while physical distancing [15]. The need to procure drugs to prevent withdrawal symptoms may reduce the likelihood of physical distancing among PWUD. COVID-19 and physical distancing may also affect existing structural barriers to accessing harm reduction services, including availability of supplies, transportation to services, and receipt of sufficient syringe and overdose prevention materials [16].

Syringe service programs (SSPs) decrease injection-related human immunodeficiency virus (HIV) and hepatitis C (HCV) transmission and decrease odds of syringe re-use behaviors [17–21]. The COVID-19 pandemic exacerbates the adverse public health consequences of the overdose and HIV/HCV syndemic by increasing overdose and viral transmission risk, further increasing the importance of harm reduction strategies for preventing injection-related

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infections and reducing HIV/HCV transmission and overdose [22–24]. Early reports documented SSP adaptations to the COVID-19 pandemic in urban centers, which included steps to maximize safety and increase syringe distribution, as well as SSP curtailed services and closures [25]. Little is known about the experiences of people accessing harm reduction services in rural areas.

Rural residents experience particular risks related to drug use, including earlier initiation, higher rates of injection use, and elevated harms such as overdose and HCV infection [26, 27]. These communities may also be at increased risk of COVID-19 morbidity, independent of substance use [28]. Rural residents may express greater distrust in government [29] as compared to urban residents, which may decrease receptivity to COVID-19 public health messaging. Distrust may be compounded in PWUD who have experienced stigma in interactions with health institutions and law enforcement [30]. Previous studies have explored sources of trusted information about drug use and found harm reduction practitioners and peers in the use community are primary sources of trusted information [31]. The objective of the current study was to explore how PWUD in rural communities experienced access to SSPs and may have adapted their drug use practices during the COVID-19 pandemic, to inform public policy related to harm reduction services.

Methods

The World Health Organization declared COVID-19 a pandemic on March 19, 2020 [32]. Beginning in April, 2020, we conducted rapid response semi-structured qualitative interviews in five rural Oregon counties with high rates of HCV and overdose (i.e., Coos, Curry, Douglas, Josephine, and rural Lane). Interviews were conducted via telephone with individuals aged ≥ 18 years who reported using drugs in the past 30 days, to assess their views on COVID-19, substance use and harm reduction practices, and to solicit their recommendations for improving the COVID-19 public health response in Oregon. All counties participate in the National Rural Opioids Initiative to address OUD, HCV, and HIV in rural America [33], which aims to improve HIV and HCV surveillance and risk reduction, and decrease overdoses among PWUD in rural communities. The study was approved by the Oregon Health and Sciences University Institutional Review Board and granted a federal Certificate of Confidentiality.

Participants and Procedures

We recruited people who use drugs ($n = 36$) from April 21 to May 15, 2020 using flyer advertising at SSPs and a rural community service organization, snowball sampling, and through

Oregon HOPE peer support specialists contacting past and present clients. Eligibility criteria included: (1) injection drug use, use of methamphetamine or cocaine, or nonmedical use of opioids in the past 30 days, (2) age 18 or greater, and (3) living in the rural study areas in Oregon. Local SSPs and community organizations provided access to telephones for potential participants without telephones. Participants received a \$50 gift card.

Three research staff experienced in qualitative data collection with PWUD conducted semi-structured telephone interviews which lasted a mean of 51 min (range 24–80). Interview audiotapes were reviewed regularly to ensure interview quality and completeness. The interview team met daily during data collection to assess saturation through discussion of interview content. Interviews were audio-recorded, transcribed, and uploaded into NVivo software (version 12) for analysis [34].

Analysis

We reported participant characteristics using descriptive statistics. We used a semantic, inductive approach for our thematic analysis [35, 36]. Initial codes were created after familiarizing ourselves with the data, and using an iterative process to refine the codebook. Two team members (ES, MG) coded the remaining transcripts independently. Coders met at least twice weekly to assess consistency in coding, resolve discrepancies, and surface emergent themes. The full multidisciplinary team of co-investigators discussed emergent themes weekly.

Results

Of the 36 participants, most were female (55.6%) and non-Hispanic White (69.4%), and mean age was 40.1 years ($SD = 11.7$). Just over half (52.8%) used methamphetamine, 16.7% used heroin, and 30.6% used both drugs. Seventy-five percent of participants had injected drugs in the previous 30 days (Table 1). Three themes emerged related to harm reduction during COVID-19, including (1) SSP adaptations and accessibility during COVID-19, (2) harm reduction practices among PWUD during COVID-19, and (3) suggestions for SSPs and service organizations. For each of the main themes, we describe the common or unique sub-themes and provide illustrative quotations.

Theme 1: SSP Adaptations and Accessibility During COVID19

Several participants shared their experiences with SSPs during the COVID-19 pandemic and these experiences were grouped into three subthemes: Experiences of SSP

Table 1 Participant characteristics

Characteristic	N = 36
Gender	
Male	16 (44.4%)
Female	20 (55.6%)
Age in years, mean (SD)	40.1 (11.7)
Hispanic ethnicity	5 (13.9%)
Race	
African American	1 (2.8%)
American Indian/Alaska Native	2 (5.6%)
Asian or Pacific Islander	1 (2.8%)
White	28 (77.8%)
Multiracial	4 (11.1%) ^a
Heroin/methamphetamine use in past 30 days	
Heroin/opioids and methamphetamine	11 (30.6%)
Heroin/opioids (no methamphetamine)	6 (16.7%)
Methamphetamine (no heroin/opioids)	19 (52.8%)
Injection drug use in past 30 days	27 (75.0%)

^aThree of 4 were American Indian and another race

adaptations and safety; reliance on SSPs; and COVID-19 disruptions in SSP services.

Experiences of SSP Adaptations and Safety During COVID-19

Participants described precautions that SSPs were taking to reduce COVID-19 risk, including exchanging syringes outdoors, limiting the number of participants in a building, maintaining physical distancing, asking about potential exposure, requiring masks, and offering hand sanitizer. Participants reported that the SSP adaptations contributed to their feelings of safety and comfort about COVID-19 risk. For example:

...when I get there, there is nobody else there except the person that's standing like you know, way more than six feet back behind the table and then they just ask you what you need and want from there and then they put it on the table and you pick it up from the table so you are not even touching anything and they are wearing gloves and masks and stuff. So that's like way super safe. (Female, Opioids and Methamphetamine)

They were taking all precautions, they even had masks available and stuff and they stayed back behind the table and kept their distance and it was really nice. I think they probably did more safe practices with social distancing and risk—you know—limiting risk exposure—yeah, risk exposure. They did better than any place else I have been. Even you know, even going

to—anywhere, yeah. Like they did a really great job. (Female, Methamphetamine)

Other participants described receiving services outdoors, such as:

The process is a little different, you don't go inside anymore, you got to stay outside but other than that it's the same...they bring down an RV rather than it being a building now, they get up an RV and get little cones set out that you got to like stay at for distancing and then they get with you one by one. (Male, Opioids and Methamphetamine)

Despite SSP adaptations to reduce COVID-19 risk, some participants expressed discomfort with seeking SSP services in the context of COVID-19, primarily due to potential exposure to COVID-19. For example:

Probably the people who go through there, you know what I mean? Some of them don't take the precautions that are provided. (Female, Methamphetamine)

I would say this last time I probably waited a little bit longer to go back to the needle exchange compared to normal just because of what's been going on [COVID-19]. (Female, Opioids and Methamphetamine)

Some participants described ways that they have adapted their own syringe exchange practices to decrease their level of exposure from the SSP. For example, some participants described exchanging a larger quantity of syringes with each visit.

I just went and got a hundred when I went to the thing 'cause I had a bunch I hadn't exchanged in a long time... I didn't want to be going back and forth. (Female, Methamphetamine)

Other participants reported receiving increased quantity of syringes (needs-based rather than one-for-one) from SSP staff during COVID-19.

The last time I was there I met with my [peer support specialist] and instead of giving me only one box, he gave me two boxes and I am still using them...He actually offered more because of the virus... I actually thought it was good, and the less times you are around people, the less chance of you getting the virus. (Female, Methamphetamine)

More frequently, participants reported understanding that the SSPs were still distributing one-for-one exchange, meaning they believed they could not get more syringes than they brought in.

Though most participants felt more comfortable visiting their SSP because of the COVID-19 safety precaution practices, one participant noted that the move to an outdoor

syringe exchange decreased confidentiality of services and made them feel more reluctant to go.

Now it's just kind of out there in the open and so it makes me a little bit more reluctant to go but for me it's almost a necessity that I go every couple of weeks. (Female, Opioids and Methamphetamine)

Reliance on SSPs During COVID-19

Several participants expressed deep gratitude for ongoing availability of needle exchange services during the pandemic and cited SSPs as an important source of information related to substance use and COVID-19 mitigation strategies.

These guys are still here every week...at least they are keeping it open and keeping it rolling you know, thank God for them, you know? (Female, Methamphetamine)

There was also a general sense that people who worked at the SSPs were willing to support participants with whatever they were encountering in their lives. One participant noted,

I absolutely adore that place. Anything you need, if they can't provide it, they try to find out where you can get it, but usually they can pretty much take care of just about everything we need. (Female, Opioids)

This was a relief for those who were concerned SSPs may close like other services. "I was really worried that they weren't going to be open and I was really glad to find out that they were," one participant (Female, Methamphetamine) reported.

In addition to providing participants with harm reduction materials, SSPs served as a hub of information related to COVID-19. For example, one participant stated, "they educate people on how to be as clean as possible" (Male, Opioids). Others described receiving physical pamphlets and other sharable information sources. "There's pamphlets there and flyers about it and they are super on top of it as far as like social distancing and keeping everybody apart" (Male, Opioids and Methamphetamine).

COVID-19 Disruptions in SSP Services

Some participants reported that schedule changes reduced access to harm reduction services during COVID-19. One SSP site had a schedule reduction and some participants expressed uncertainty about SSP operating hours.

Uhm, [SSP is] open less days a week... and the hours I think are less now, too. Not exactly sure about that. (Female, Methamphetamine)

Sometimes it's difficult when you don't know the new schedule. (Female, Methamphetamine)

Lack of transportation accentuated the difficulties presented by reduction in the already limited hours of operation in rural SSPs.

Just trying to get there at the proper time they are open. I guess, I don't know, since I don't have a car, it's hard to get there on time, you know? (Female, Methamphetamine)

Two participants highlighted interruption of home delivery of syringes by peer support specialists as a barrier:

But before, [peer support specialist] would actually come down here and like deliver them through the needle exchange herself... [peer recovery support specialist] not being able to come down here, it's affected it quite a bit because people don't have access to needles as much. New ones, anyways. (Female, Methamphetamine)

I actually have a [peer support specialist] through [SSP] and anytime I need to exchange my box for new ones, I text him and I let him know and usually me and him will meet up and that's how we will do it, but since the virus we have to meet—I have to meet his boss and it's just, it takes a lot more time... it's more of a hassle than it used to be. (Female, Methamphetamine)

Overall, participants described continued use of the SSP to access syringes and other harm reduction materials during COVID-19. For most of these participants, the COVID-19 safety precautions taken by the SSP helped them feel comfortable continuing to access harm reduction services through the program. For others, the change of SSP services to outdoor environments resulted in reduced frequency of SSP attendance.

Theme 2: Harm Reduction Practices Among PWUD During COVID-19

Several participants described their harm reduction practices during the COVID-19 pandemic, including syringe use practices, inhalation drug use practices, and communication of information and distribution of harm reduction resources.

Syringe Use Practices During COVID-19

Several participants reported reusing syringes less during COVID-19, either due to increased awareness of syringe access through SSPs or as a risk management effort to avoid the need for health system exposure during COVID-19. One participant noted:

Due to the fact that I have more access to the new needles or whatever more [frequently], I have been

like not reusing the same ones over again or whatever. I have been only using them once and then disposing of them and just using a new one every single time... 'cause before [COVID-19] I wasn't too concerned—I'd hustle up like five bucks here and there and the pharmacy sells like a bag of them for like five bucks so maybe like once a week or something like that I'd buy a bag or something every other week or I'd have to get one off of a friend or whatever I'd have to find somebody that had a clean one or whatever, and it was like I said, I'd have to be stuck with that same one or one or two for like throughout the week. Now I can use a new one every single time I inject. (Male, Opioids)

Some participants noted decisions to inject more safely were related to a desire to avoid complications of unsafe injection that may result in health system exposure during COVID-19:

Before COVID-19... I would just do however much I felt like doing at the time and now I kind of test the waters out a little bit first... I don't want to go to the hospital. I don't trust them. (Female, Methamphetamine)

A few participants accessed SSPs less due to COVID-19 concerns or access barriers and consequently were more likely to reuse syringes. One participant who had recently self-quarantined due to possible COVID-19 symptoms said,

The fact that I waited so long to go to the exchange, I did reuse needles like a few times which is not good. It's really painful and it's got bruises and scars in places from doing that. It's not a good thing. COVID I think, if I learned that the alliance was open and I was able to go in and exchange that was wonderful. It was such a great thing because yeah, it was—not really having the access I needed before that. (Female, Methamphetamine)

COVID-19 Risk Mitigation for Inhalational Drug Use

Many participants whose method of use was inhalation reported decreasing pipe sharing or using sanitizing measures to mitigate viral transmission risk. Several reported “wiping [the pipe] off” or “cleaning it more.” Others reported decreasing or completely ceasing pipe sharing.

[Don't] touch my pipe. That's my life. I don't want to lose the way I do it [methamphetamines] if I am going to still do it and if someone could potentially be sick, I don't want to take that risk. (Male, Methamphetamine)

Participants reported taking these measures both for self-protection and the protection of others they used with.

Communication and Distribution of Harm Reduction Materials

Many participants described a caring community network comprised of PWUD who looked out for each other, exchanged information, and distributed harm reduction materials to each other. One participant described how messages provided by SSP staff on both safer use and COVID-19 self-protection measures were amplified by word-of-mouth communication in the community.

Then the needle exchange contacts a lot of this community using—the drug community, so even if one person does have needles, odds are they know someone that does shoot up so the person shooting up gets the information they will probably pass it on to the other people that they know, so I would think it would be one of the better ways... I mean I guess [COVID-19 information is] all over the radio, it's all over the TV, it's all over the phone. I don't have any of them, so I just have to find out word of mouth and the [service organization].” (Male, Methamphetamine)

The same participant noted the potential for drug dealers to disseminate information, while also highlighting the challenges inherent to that recommendation:

Will all the drug dealers please step forward to pick up your allotment of [COVID-19] flyers, this is a confidential thing but would you turn this big allotment of flyers out to people? (Male, Methamphetamine)

Several participants reported continuing or expanding their existing practices of distributing injection supplies and naloxone to their peers (secondary distribution). One participant noted distributing syringes and naloxone to:

[close] friends... a group of twenty. Whoever calls me that needs them because I get hooked up with a thousand 'cause I only get about five hundred every two weeks for myself and I give the other five hundred away and they also give me extra Narcan, whatever to give people in case somebody OD's so everybody is safe. (Male, Opioids and Methamphetamine)

Others noted providing syringes to people who were avoiding SSPs out of COVID-19-related concerns; for example:

Last time I think we took like four hundred in but they weren't all ours, so we got some for other people... They don't want to go out because of the virus... I offered 'cause they are doing social distancing so I just figured I would help them out. (Female, Methamphetamine)

Well, I help other people exchange theirs because they are too scared to go themselves. (Female, Methamphetamine)

Participants described similar practices of looking out for others in their use community, both to prevent substance use complications and to limit their peers' risk of contracting COVID-19.

Theme 3: Suggestions for SSPs and Service Organizations

Participants provided suggestions for ways SSPs and other organizations could better support PWUD during a pandemic. Participants suggested increasing naloxone distribution; expanding SSP days, hours, and locations; and providing needs-based syringe distribution.

I don't know maybe have an extra day or something where they are open... So people can plan on different days on not have to be so pressed to get there on time and stuff and not be—yeah. (Female, Opioids and Methamphetamine)

I think it'd be more about one to one—more not one for one but give out more in this moment would be a bit better considering less visits, less people having to go back in and less frequently. (Male, Methamphetamine)

Participants also suggested that SSPs provide or increase access to mobile syringe delivery services during COVID-19:

They need more availability as far as having people that can do mobile exchanges because it is an awesome service they provide... (Female, Methamphetamine)
If they could set up a program possibly for people who don't have a car or who don't have access to come to exchange and be like a delivery program like they have in some other cities. (Female, Opioids)

Maybe there could be, well like with me you guys dropped [syringes] off and [if] it was in the back of the truck or the mailbox or just a drop box thing would be nice. (Female, Opioids and Methamphetamine)

A participant suggested encouraging secondary exchange networks:

Do things like I am doing. Have people that are already in the community disperse them. (Female, Methamphetamine)

Some participants encouraged finding ways to support each other and offered that organizations could provide classes that support mutual aid among local PWUD.

People that need to help each other, they need to come together in a time of crisis. (Male, Methamphetamine)
I think they need to have classes on this kind of stuff. I think they should have like a community, a place like a community center where people that are on drugs or people that need help that are ignorant about all this stuff can go learn and take like a two day like you would for like—Heimlich or save somebody's life. (Male, Methamphetamine)

Discussion

Our rapid qualitative assessment of the effect of COVID-19 on drug use and harm reduction practices in rural Oregon suggests complex and heterogeneous responses to the social and structural milieu of the pandemic. This may reflect differences in culture and geographic realities within our sample, which was spread throughout a broad expanse of rural Oregon spanning multiple communities in both inland and coastal regions. Interviews were also conducted over 3 weeks during a rapidly evolving pandemic with daily or weekly updated guidance from state and national public health institutions, complicating analysis in aggregate as a unified sample. Nonetheless, these data suggest several important messages for public health policy and support of PWUD in rural areas during the COVID-19 pandemic that might mitigate the impact of COVID-19 and HIV/HCV transmission risk during the pandemic.

Our data suggest that during the COVID-19 pandemic, many rural PWUD who typically engaged with SSPs continued to feel safe returning for services. Still, some reported limiting trips to the SSP in a way that led to less safe use practices, such as reusing injecting equipment, thus increasing the potential risk of HIV, HCV, and serious bacterial infections. Often, participants expressed a sense of deep gratitude for their SSP and efforts made to keep services available during the pandemic. Some reported that increased quantities (needs-based distribution) or new access to SSPs led to less needle reuse, emphasizing the importance of SSP flexibility and availability during the pandemic. SSPs' role in educating clients about COVID-19 and safer use as well as modeling effective physical distancing practices suggests that these services are crucial to maintain and expand as the COVID-19 pandemic continues to disproportionately impact vulnerable populations, including PWUD [9, 10]. This may be especially important as many participants continued to struggle to access limited harm reduction services in rural communities.

Pre-existing, significant barriers to accessing syringe services programs were, for some, amplified by the COVID-19 pandemic. Known transportation challenges and large distances between services, changes in hours of operation,

limited telephonic and virtual communication capacity, and SSP availability in rural communities posed even larger barriers during this time. The COVID-19 pandemic also led to discontinuation of previously available services that addressed some of these barriers specific to rural syringe access, such as home peer outreach and mobile syringe exchange. While discontinuation of these services may have been a reasonable early response, as the pandemic continues programs will need to reconsider outreach services to balance risk posed by COVID-19 infection with increasing overdose and HIV/HCV transmission [3–8, 22]. We also found that, as experienced by the participants, state guidelines allowing for needs-based syringe distribution were not uniformly realized during the study period, further limiting harm reduction engagement in the context of a rapidly changing pandemic. This highlights the challenges and importance of rapid communication and implementation of evolving public health guidelines through trusted messengers during a state of emergency.

Our findings also suggest the role rural SSPs may have in mitigating the impact of the COVID-19 pandemic on PWUD. Participants described SSPs modeling best practices in physical distancing, as well as providing COVID-19 protective supplies (e.g. masks, hand sanitizer) and information about the spread of the disease. Participants described supporting each other by sharing information and increased secondary distribution of injection equipment and naloxone to their use community, which they linked to protecting other people in their use network, limiting potential COVID-19 exposure for peers and SSP staff, in addition to self-protection. This demonstrates the altruism and capacity of people who use drugs to care for their communities and suggests a crucial role for engaging PWUD in public health messaging. Our results support the development of policies that enhance SSPs' ability to encourage secondary distribution of safe supplies and implementation of paired education around COVID-19 prevention (e.g. maintaining physical distancing during supply distribution that occurs outside of the controlled environment of an SSP) and decreasing infectious disease transmission risk (e.g. HIV, HCV infection).

Engagement with rural harm reduction services was also impeded by difficulties in accessing information for those who were not engaging on a regular basis with in-person services. Although information flow about harm reduction services and COVID-19 were not pre-specified study domains, study findings suggest a tendency for trusted information to be attained through word-of-mouth and informal means. This has been reported elsewhere [31], but achieves increased salience in the era of physical distancing. Participants frequently reported significantly shrinking social interaction in an effort to institute physical distancing measures. Efficacy and speed of direct interpersonal information sharing was likely affected by physical distancing among

participants. Physical distancing can affect transmission of both viruses and ideas in similar ways, as described in social contagion theory [37–39], possibly indicating a need for targeted efforts for direct communication and engagement of social networks during the pandemic. Trusted voices will be required for successful COVID-19 exposure contact tracing and future vaccine distribution among rural PWUD.

Our study has certain limitations. During the interview period, Oregon had reported fewer cases of COVID-19 per capita than most regions of the United States [40]. This may affect the applicability of our findings to regions with higher COVID-19 prevalence. It should also be noted that 44% of our sample was recruited through an SSP or peer support specialist, which might disproportionately augment the implied importance of harm reduction services. It is also possible that the necessity of telephone instead of in-person interviews affected the richness of data obtained from a population with pre-existing mistrust of the medical establishment. Future research should explore the impact of COVID-19 on PWUD in diverse recruitment sites, both in urban settings and other locales with higher COVID-19 incidence. Finally, Oregon's state guidelines for SSPs during COVID-19 were released shortly before interview enrollment and may have introduced secular trends that could have altered our participants' experiences [24]. Despite this, participants identified many recommendations for improving harm reduction activities during COVID-19 that could inform implementation of guidelines in Oregon and other states.

Conclusion

Our work provides new insights into rural PWUD's experiences of harm reduction services during the COVID-19 pandemic and offers direct insights into how the exchange of key health knowledge among PWUD may be altered as a result of physical distancing. These findings help inform urgent policy considerations to address the emerging syndemic of substance use and COVID-19. Harm reduction centers, and specifically SSPs, should be viewed as essential services and expanded as emergency measures to address the increased risk of substance use, HIV/HCV transmission, and COVID-19 complications. Directions for future research include assessments of the effect of COVID-19 on exchange of crucial health information during COVID-19 among PWUD to better understand how to approach syndemic-related interventions such as contact tracing, vaccine distribution, and prevention of SUDs complications. Our findings also suggest that educational interventions may be amplified through the trusted voices of harm reduction workers, as well as word-of-mouth and social media interventions.

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Data Transparency Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

Code Availability Not applicable.

Compliance with Ethical Standards

Conflict of interest Andrew Seaman has received investigator-initiated research funding from Gilead Sciences and Merck & Co Pharmaceuticals unrelated to the content of this research. All other authors report no financial conflicts of interest. Dr. Korthis serves as principal investigator for NIH-funded studies that accept donated study medications from Alkermes (extended-release naltrexone) and Indivior (buprenorphine).

Ethical Approval The questionnaire, methodology, and study protocol for this study were approved by the Institutional Review Board of Oregon Health and Sciences University (IRB#:STUDY00020911).

Consent to Participate Verbal informed consent was obtained from all individual participants included in the study.

Consent to Publish The authors affirm that human research participants provided informed consent for publication of quotes and summarized interview responses in the academic literature.

References

- Raker EJ, Zacher M, Lowe SR. Lessons from Hurricane Katrina for predicting the indirect health consequences of the COVID-19 pandemic. *Proc Natl Acad Sci USA*. 2020;117(23):12595–7.
- Volkow N, NIDA. 2020. <https://www.drugabuse.gov/about-nida/noras-blog/2020/04/covid-19-potential-implications-individual-s-substance-use-disorders>.
- Wang QQ, Kaelber DC, Xu R, Volkow ND. COVID-19 risk and outcomes in patients with substance use disorders: analyses from electronic health records in the United States. *Mol Psychiatry*. 2020;14:1–10.
- Ochalek TA, Cumpston KL, Wills BK, Gal TS, Moeller FG. Nonfatal opioid overdoses at an urban emergency department during the COVID-19 pandemic. *JAMA*. 2020;324(16):1673–4.
- Slavova S, Rock P, Bush HM, Quesinberry D, Walsh SL. Signal of increased opioid overdose during COVID-19 from emergency medical services data. *Drug Alcohol Depend*. 2020;214:108176.
- Wainwright J, Mikre M, Whitley P, Dawson E, Huskey A, Lukowiak A, et al. Analysis of drug test results before and after the US declaration of a national emergency concerning the COVID-19 outbreak. *JAMA*. 2020;34(15):1674–6.
- Glober N, Mohler G, Huynh P, Arkins T, O'Donnell D, Carter J, et al. Impact of COVID-19 Pandemic on drug overdoses in Indianapolis. *J Urban Health*. 2020;97(6):802–7.
- Rodda LN, West KL, LeSaint KT. Opioid overdose-related emergency department visits and accidental deaths during the COVID-19 pandemic. *J Urban Health*. 2020;97(6):808–13.
- Farhoudian A, Baldacchino A, Clark N, Gerra G, Ekhtiari H, Dom G, et al. COVID-19 and substance use disorders as brain diseases: recommendations to a comprehensive health-care response. An International Society of Addiction Medicine (ISAM) Practice and Policy Interest Group Position Paper. *Basic Clin Neurosci J*. 2020;11(2):133–50.
- Marsden J, Darke S, Hall W, Hickman M, Holmes J, Humphreys K, et al. Mitigating and learning from the impact of COVID-19 infection on addictive disorders. *Addiction*. 2020;115(6):1007–10.
- Slaunwhite AK, Gan WQ, Xavier C, Zhao B, Buxton JA, Desai R. Overdose and risk factors for coronavirus disease 2019. *Drug Alcohol Depend*. 2020;212:108047.
- Akhtar WZ, Mundt MP, Koepke R, Krechel S, Fiore MC, Seal DW, et al. Prevalence of tobacco use among rural-dwelling individuals who inject drugs. *JAMA Netw Open*. 2020;3(3):e200493.
- Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *JAMA*. 2020;323(20):2052–9.
- Karaye IM, Horney JA. The impact of social vulnerability on COVID-19 in the U.S.: an analysis of spatially varying relationships. *Am J Prev Med*. 2020;59(3):317–25.
- Hunter A, Weekly ADA. Overdose resurgence amid pandemic fuels debate over treatment access measures. 2020;32(24):5–6.
- Dunlop A, Lokuge B, Masters D, Sequeira M, Saul P, Dunlop G, et al. Challenges in maintaining treatment services for people who use drugs during the COVID-19 pandemic. *Harm Reduct J*. 2020;17(1):26.
- Des Jarlais DC, Nugent A, Solberg A, Feelemyer J, Mermin J, Holtzman D. Syringe service programs for persons who inject drugs in urban, suburban, and rural areas—United States, 2013. *Morb Mortal Wkly Rep*. 2015;64(48):1337–41.
- Bluthenthal RN, Anderson R, Flynn NM, Kral AH. Higher syringe coverage is associated with lower odds of HIV risk and does not increase unsafe syringe disposal among syringe exchange program clients. *Drug Alcohol Depend*. 2007;89(2–3):214–22.
- Fernandes RM, Cary M, Duarte G, Jesus G, Alarcao J, Torre C, et al. Effectiveness of needle and syringe programmes in people who inject drugs—an overview of systematic reviews. *BMC Public Health*. 2017;17(1):309.
- Bramson H, Des Jarlais DC, Arasteh K, Nugent A, Guardino V, Feelemyer J, et al. State laws, syringe exchange, and HIV among persons who inject drugs in the United States: history and effectiveness. *J Public Health Policy*. 2015;36(2):212–30.
- Platt L, Minozzi S, Reed J, Vickerman P, Hagan H, French C, et al. Needle syringe programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs. *Cochrane Database Syst Rev*. 2017;9:012021.
- Bonn M, Palayew A, Bartlett S, Brothers TD, Touesnard N, Tyn-dall M. Addressing the syndemic of HIV, hepatitis C, overdose, and COVID-19 among people who use drugs: the potential roles

- for decriminalization and safe supply. *J Stud Alcohol Drugs*. 2020;81(5):556–60.
23. OHA sees 70% increase in Oregon opioid deaths during April, May [press release]. Oregon Health Authority. 2020.
 24. Guidance about COVID-19 risk for harm reduction and syringe service programs [press release]. Public Health Acute and Communicable Disease Prevention. 2020.
 25. Glick SN, Prohaska SM, LaKosky PA, Juarez AM, Corcorran MA, Des Jarlais DC. The impact of COVID-19 on syringe services programs in the United States. *AIDS Behav*. 2020;24(9):2466–8.
 26. Dombrowski K, Crawford D, Bilal K, Kimberly T. Current rural drug use in the US Midwest. *J Drug Abuse*. 2016;2(3):2–14.
 27. Grant KM, Kelley SS, Agrawal S, Meza JL, Meyer JR, Romberger DJ. Methamphetamine use in rural Midwesterners. *Am J Addict*. 2007;16(2):79–84.
 28. Moy E, Garcia MC, Bastian B, Rossen LM, Ingram DD, Faul M, Massetti GM, Thomas CC, Hong Y, Yoon PW, Iademarco MF. Leading causes of death in Nonmetropolitan and Metropolitan areas—United States, 1999–2014. *MMWR Surveill Summ*. 2017;66(SS-1):1–8.
 29. Whetten K, Leserman J, Whetten R, Ostermann J, Thielman N, Swartz M, et al. Exploring lack of trust in care providers and the government as a barrier to health service use. *Am J Public Health*. 2006;96(4):716–21.
 30. Room R. Stigma, social inequality and alcohol and drug use. *Drug Alcohol Rev*. 2005;24(2):143–55.
 31. Soukup-Baljak Y, Greer AM, Amlani A, Sampson O, Buxton JA. Drug quality assessment practices and communication of drug alerts among people who use drugs. *Int J Drug Policy*. 2015;26(12):1251–7.
 32. WHO Director-General’s opening remarks at the media briefing on COVID-19—11 March 2020 [press release]. World Health Organization 2020.
 33. NIDA. 2020. <https://www.drugabuse.gov/news-events/news-releases/2017/08/grants-awarded-to-address-opioid-crisis-in-rural-regions>.
 34. International Q. NVivo Qualitative Data Analysis Software. <https://qsrinternational.com/nvivo/nvivo-products/>. 1999.
 35. Miles M, Huberman A, Saldana J. *Qualitative data analysis: a methods sourcebook*. Thousand Oaks: Sage Publishing; 2014.
 36. Guest G, MacQueen K, Namey E. *Applied thematic analysis*. Thousand Oaks, CA: Sage Publications, Incorporated; 2011.
 37. Bartal A, Pliskin N, Tsur O. Local/global contagion of viral/non-viral information: analysis of contagion spread in online social networks. *PLoS One*. 2020;15(4):e0230811.
 38. Hodas NO, Lerman K. The simple rules of social contagion. *Sci Rep*. 2014;4:4343.
 39. Monsted B, Sapiezynski P, Ferrara E, Lehmann S. Evidence of complex contagion of information in social media: an experiment using Twitter bots. *PLoS One*. 2017;12(9):184148.
 40. United States COVID-19 Cases and Deaths by State. 2020. <https://www.cdc.gov/covid-data-tracker/index.html#cases>.

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