



# “It’s Helped Me a Lot, Just Like to Stay Alive”: a Qualitative Analysis of Outcomes of a Novel Hydromorphone Tablet Distribution Program in Vancouver, Canada

Andrew Ivsins · Jade Boyd · Samara Mayer · Alexandra Collins · Christy Sutherland · Thomas Kerr · Ryan McNeil

Accepted: 22 September 2020  
© The New York Academy of Medicine 2020

**Abstract** North America is experiencing an overdose crisis driven by fentanyl, related analogues, and fentanyl-adulterated drugs. In response, there have been increased calls for “safe supply” interventions based on the premise that providing a safer alternative (i.e., pharmaceutical drugs of known quality/quantity, non-adulterated, with user agency in consumption methods) to the street drug supply will limit people’s use of fentanyl-adulterated drugs and reduce overdose events. This study examined outcomes of a hydromorphone tablet distribution program intended to prevent overdose events among people who use drugs (PWUD) at high risk of fatal overdose. Semi-structured qualitative interviews were conducted with 42 people enrolled in the hydromorphone distribution program. Additionally, over 100 h of ethnographic observation were undertaken in and around the study site. Transcripts were coded using NVivo and based on categories extracted from the interview guides and those identified during initial interviews and

ethnographic fieldwork. Analysis focused on narratives around experiences with the program, focusing on program-related outcomes. Our analysis identified the following positive outcomes of being enrolled in the hydromorphone tablet distribution program: (1) reduced street drug use and overdose risk, (2) improvements to health and well-being, (3) improvements in co-management of pain, and (4) economic improvements. Our findings indicate that the hydromorphone distribution program not only is effective in responding to the current overdose crisis by reducing people’s use of illicit drugs but also addresses inequities stemming from the intersection of drug use and social inequality. Safe supply programs should be further implemented and evaluated in both urban and rural setting across North America as a strategy to reduce exposure to the toxic drug supply and fatal overdose.

A. Ivsins · J. Boyd · S. Mayer · C. Sutherland · T. Kerr · R. McNeil  
British Columbia Centre on Substance Use, 1045 Howe St Suite 400, Vancouver, British Columbia V6Z 2A9, Canada

A. Ivsins · J. Boyd · T. Kerr · R. McNeil  
Department of Medicine, University of British Columbia, 317 - 2194 Health Sciences Mall, Vancouver, British Columbia V6T 1Z3, Canada

A. Collins  
Brown University School of Public Health, 121 S Main St, Providence, RI 02903, USA

C. Sutherland  
PHS Community Services, 9 E Hastings St, Vancouver, British Columbia V6A 1M9, Canada

R. McNeil  
Program in Addiction Medicine, Yale School of Medicine, 333 Cedar St, New Haven, CT 06510, USA

R. McNeil (✉)  
General Internal Medicine, Yale School of Medicine, 333 Cedar St, New Haven, CT 06510, USA  
e-mail: ryan.mcneil@yale.edu

**Keywords** Overdose · Safe supply · Fentanyl · Qualitative research

## Background

North America is experiencing an unprecedented overdose crisis driven by fentanyl, related analogues, and fentanyl-adulterated drugs [1, 2]. This change in the illicit drug market poses a twofold challenge as fentanyl is both extremely potent (estimated 50–100 times stronger than morphine) and its distribution within illicit opioid markets varies considerably [3, 4]. People accessing drugs from the illicit market, therefore, seldom know the strength and purity of the drugs they are consuming, exposing people who use illicit drugs to considerable overdose risk [3, 5, 6]. This has resulted in a sharp increase in overdose mortality; more than 15,393 opioid-related overdose deaths have occurred in Canada since 2016, and over 94,000 in the United States (US) from 2017 to 2018 [1, 7]. The current toxic drug supply is now driving the vast majority of overdose fatalities, with 77% of opioid-related overdose deaths in Canada in 2019 attributed to fentanyl or fentanyl analogues, and 67% involving synthetic opioids other than methadone in the US in 2018 [1, 7].

Both the US and Canada have implemented measures to mitigate the overdose crisis, and while the response in Canada has been swifter and more robust, success in both countries has been limited and overdose mortality continues to steadily climb. Indeed, Canada, and Vancouver, British Columbia (BC), in particular, has often played a leading role in North America's response to substance use, often spearheading the design and implementation of public health measures to address drug use-related harms. Since the overdose crisis was declared a public health emergency in BC in 2016 [8], Canada has seen, for example, the expansion of drug-checking technologies, widespread naloxone distribution, national implementation of supervised consumption and overdose prevention sites, and expanded access to both oral and injectable opioid agonist treatments [9–14]. Similar measures have been enacted in the US, including expanded access to opioid use disorder (OUD) treatment by increasing buprenorphine prescribing limits for physicians (from 100-patient limit to 275-patient limit) [15] and scaling up naloxone availability [16]. However, their use and access remains constrained by social-structural barriers including

stigma around drug use and lack of knowledge regarding naloxone dispensing legislation and training among pharmacists [17–20]. Although no legally sanctioned supervised consumption sites currently operate in the US, several cities are currently seeking approvals [21–23]. While some face strong opposition [22, 24], a proposed site in Philadelphia has judicial and community support [21, 23]. Of note, in both Canada and the US, successful harm reduction initiatives, including current overdose response measures, have been galvanized by (often drug user-led) social activist and grassroots organizations—such as the Vancouver Area Network of Drug Users, the International Network of People who Use Drugs, and the People's Harm Reduction Alliance of Seattle, among others—and later sanctioned by provincial/state and federal regulatory bodies. The expansion of these interventions in Canada and the US represents an important step in addressing the overdose crisis and reducing overdose deaths; however, they are limited in their ability to directly intervene and prevent overdoses altogether by addressing the fentanyl-adulterated drug supply.

In response to the ongoing overdose crisis, there have been increased calls for “safe supply” interventions. Safe supply is based on the premise that providing a safer alternative (i.e., pharmaceutical drugs of known quality/quantity, non-adulterated, with user agency in consumption methods) to the toxic illicit drug supply will limit people's use of fentanyl-adulterated drugs and reduce overdose events [25–27]. The safe supply concept extends the logic of using medications for the treatment of OUD—including injectable medications as done through the former North American Opiate Medication Initiative (NAOMI) and Study to Assess Longer-term Opioid Medication Effectiveness (SALOME) in Vancouver—by providing pharmaceutical-grade opioids as a public health intervention to people out-of-treatment as an alternative to illicit substance use. Alongside international randomized controlled trials and other studies [28–30], NAOMI and SALOME have helped to establish the effectiveness of both injectable diacetylmorphine and hydromorphone (i.e., Dilaudid™) in treating OUD [31, 32]. Injectable hydromorphone was recently approved by Health Canada for the treatment of OUD [33], and a number of physicians in the provinces of Ontario and BC have been prescribing hydromorphone tablets “off-label” to patients considered at high risk of overdose to reduce the patients' use of illicit drugs [34]. More recently, in response to the intersecting overdose crisis and COVID-19 pandemic, the

BC provincial government released risk mitigation prescribing guidelines, allowing physicians to prescribe opioids, stimulants, and benzodiazepines to reduce harms associated with social distancing measures among people at high overdose risk [35, 36]. This paper presents outcomes from a hydromorphone tablet distribution program in the Downtown Eastside neighborhood of Vancouver, Canada.

## Study Setting

In 2016, the province of BC declared the overdose crisis a public health emergency [8], with Vancouver’s Downtown Eastside neighborhood at the epicentre. The Downtown Eastside is a unique setting, characterized by a concentrated and visible drug market and street-based drug scene and high rates of poverty, homelessness, and housing instability [37–39]. To meet the needs of residents, the neighborhood houses numerous social and healthcare services for people living in poverty, including services specifically for people who use drugs (PWUD). Importantly, the neighborhood has a long-standing history of social activism and has been at forefront of innovative responses to drug use including Canada’s first federally sanctioned supervised injection site (Insite), opioid-assisted treatment trials (NAOMI and SALOME), and the current expansion and evolution of harm reduction interventions, including safe supply programs [40].

Despite the proliferation of harm reduction services, the Downtown Eastside neighborhood, and BC in general, has been one of the most severely impacted jurisdictions in Canada by overdose. There were 985 recorded overdose deaths in BC in 2019, with 85% attributed to fentanyl and related analogues [41]. Overdose fatalities in BC are again rising, with 909 through July 2020 and recent reports showing an increase in overdose events [41, 42], which highlights the need for additional overdose prevention measures (e.g., expansion of drug-checking technologies, naloxone distribution, supervised consumption and overdose prevention sites). However, socio-structural factors (e.g., stigma, community opposition, lack of community support) have limited the wider expansion of these overdose response interventions.

In January 2019, Vancouver’s first hydromorphone tablet distribution program began operating at the Molson Overdose Prevention Site (OPS) and Learning Lab (“the Molson”), located in the heart of the Downtown Eastside

neighborhood [43]. The hydromorphone distribution program is operated by the Portland Hotel Society (PHS) which provides housing, health, and social support services throughout the Downtown Eastside for structurally vulnerable individuals. Situated within the Molson OPS and staffed by a licensed practical nurse and social support worker, the hydromorphone distribution program runs within the operating hours of the OPS from 1:30 pm to 10:30 pm daily. Program participants receive up to five prescribed doses of hydromorphone daily, which are distributed by the nurse and must be consumed on site. At the time of writing, the program had 60 individuals receiving hydromorphone tablets (which can be taken orally, intranasally, or by injection) and 10 individuals receiving injectable hydromorphone (which can be injected or taken orally). Tablet enrollees can receive up to 16 mg (two 8 mg tablets) of hydromorphone each hour, for a maximum of five 16 mg doses daily (80 mg/day). Injectable formulation enrollees receive an equivalent amount. To prevent diversion, the hydromorphone tablets are crushed by the nurse before distribution. Oral and intranasal consumption is nurse-witnessed, while those injecting must use a table within the OPS and return used injecting supplies (cooker and syringe) to the nurse. A key feature of the Molson hydromorphone distribution program is integration with primary care, including an on-site physician 2 days a week and social worker 1 day per week, as well as provision of opioid agonist treatment.

In this paper, we present outcomes from a qualitative evaluation of the Molson hydromorphone tablet distribution program, intended to prevent overdose events among PWUD at high risk of fatal overdose.

## Methods

Ethnographic fieldwork was undertaken in and around the Molson between February 2019 and February 2020 and involved naturalistic observation and unstructured conversations with program staff and participants, as well as in-depth qualitative interviews with people enrolled in the program. Ethnographic methods are commonly used in qualitative drug and public health research, providing a richer understanding of social phenomena by elucidating the lived experience of study participants [44–46]. Over 100 h of ethnographic observation were conducted in and around the study site, including within the nursing station, OPS room, OPS waiting area, and the laneway abutting the Molson OPS to observe participant engagement with

the program and the Molson site. Observations focused on operational dynamics of this hydromorphone distribution program (e.g., hydromorphone distribution and consumption, patient-provider interactions). Observations and discussions were documented in fieldnotes following the completion of ethnographic observation sessions which lasted 2–3 h.

In-depth semi-structured interviews were conducted with 42 program participants (Table 1). Interview participants were recruited at the Molson OPS by the

**Table 1** Participant demographics

		<i>N</i> (total = 42)
Age: median (range)		44 (26–72)
Gender	Women	10
	Men	32
Ethnicity	Indigenous	8
	White	33
	Other	1
Housing	Apartment	10
	Single room accommodation	18
	Shelter	5
	Unhoused/outside	9
Income generation (past 30 days)	Full-time work	5
	Part-time work	6
	Drug selling	12
	Sex work	1
	Recycling/binning	17
	Panhandling	17
	Reselling goods	24
	Social assistance	39
Drug use (past 30 days)	Cocaine (powder)	10
	Crack	7
	Heroin	30
	Fentanyl	38
	Other opiates	27
	Crystal meth	32
	Marijuana	15
	“Goofballs” (heroin and meth combined)	33
Number of overdoses (past year before program enrollment)	0	22
	1	7
	2	5
	3 or more	8

interviewers during fieldwork. Initial baseline interviews were conducted with participants shortly after enrollment (average: 2–4 weeks), with follow-up interviews commencing 3–5 months after baseline ( $n = 21$ ) and again at 12 months ( $n = 6$ , with data collection suspended due to the COVID pandemic). Interviews were facilitated using an interview guide and covered topics such as current drug use patterns, experiences with overdose, drug treatment histories, program-related experiences, and program impacts on health and social harms, including overdose. Interviews were conducted at our Downtown Eastside storefront research office, private offices within the Molson OPS, and private clinic rooms rented by our team at a nearby PHS building. Interviews were recorded and lasted 45–60 min. Study participants provided written informed consent prior to commencing interviews. Participants received a \$30 CAD honorarium for their time. The study received ethical approval from the University of British Columbia and Providence Health Care Research Ethics Boards.

Interviews were transcribed verbatim and uploaded along with fieldnotes to NVivo 12, a qualitative analysis software program. An initial coding framework was developed by the study team after approximately 15 interviews had been conducted and was based on categories extracted from the interview guides (e.g., “program perceptions,” “program expectations,” “perceived outcomes”) and those identified during initial interviews and ethnographic fieldwork. The coding framework was revised over the course of the study as new themes and subthemes emerged. Thematic analysis was guided by participant narratives around experiences with the program, focusing on program-related outcomes, paying particular attention to the intersection with structural vulnerabilities [47, 48]. Initial study findings were presented to a Community Advisory Board comprising people enrolled in local injectable opioid agonist treatment (iOAT) and hydromorphone distribution programs to obtain feedback and enhance the validity of the interpretation and thematic description.

## Results

### Reduced Street Drug Use and Overdose Risk

For program participants, the availability of a safer, unadulterated supply of opioids decreased their need to

**Table 2** Participant quotations

Reduced street drug use and overdose risk

1. Now I’m on this Dilaudid program...it’s changing my drug use a lot, actually. Like I went from using [fentanyl] five to ten times a day to using once a day. So, in the last month, I’ve gone down to like just once a day, twice a day. And that’s - it’s good. (Participant 13, 47-year-old white man)
2. I’m using way less. I’m using way less of street drugs, meth and whatever, fentanyl, or yeah I’m using way less. Significantly less. Yeah, I’m still using but now down 75, 80 percent, easy, yeah. (Participant 28, 58-year-old white man)
3. You know, you are not using street drugs that have, god knows what in it. You know, fucking benzos [benzodiazepines] and this and that. [You] find all kinds of weird shit in there. (Participant 23, 48-year-old white man)

Improvements to health and well-being

4. I was remarking to a couple of people that two of the last three days I’ve actually managed to eat like entire meals, you know, and so even those little, little things are kind of gifts of the program really because you know if I did not have access to medications that day I would have been out hustling or boosting [stealing] or bullshitting for the dope. So you never get time to eat. (Participant 28, 58-year-old white man)
5. Well, I suppose I could say yes because I’m not using as many...using needles as many times as I was in the past throughout the day. (Participant 20, 43-year-old Indigenous man)

Improvements in co-management of pain

6. Well if you inject it you feel it like, you know, faster. And if you swallow of course it takes a long time to dissolve, so... but the pain is not as much. I can like walk more and do more stuff. (Participant 3, 66-year-old white man)
7. I was doing the injections but now I’m doing the oral, which is two pills I get of Dilaudid, and it helps me with pain...the last time I was in the hospital I got some oral Dilaudid, and I liked it. It helped a lot, so I was so looking forward to it. I thought I’d like the injections, but it turns out I do like the oral better. (Participant 34, 58-year-old white woman)

Economic improvements

8. Like say six months ago the 30 bucks I’m getting for doing this [interview], I would have spent that on drugs. Tonight, if I get 30 dollars, I’m going to go to McDonald’s and I’m going to go buy myself something...I’m not going to buy drugs with the money, I’ll tell you that. Six months ago I would have, though, right? That’s the first thing I would have been thinking...Now I know tonight I’m not going to be, because I’m going to go over to the window and get my drugs, and then I can go spend my money on me. (Participant 13, 47-year-old white man)
9. When I used to run out of money I would do crime, right. So that’s stopped. I’m not running out of money because this [hydromorphone] is free, right. That’s a big bonus for me. I do not have to decide between eating and doing dope, right. I can do my dope here and then go eat, right. It’s working fine. (Participant 39, 43-year-old South Asian man)

**Table 2** (continued)

10. Like I told you, this is the first time that I had money in years in my pocket. Like two weeks after [social assistance] cheque day, normally I’d be broke and I’d already be cuffing [trying to get for free] Dilaudid on the street. I’d hit somebody up and say hey, you know, I’m hurting, I’m sick and could you help me to cuff me a Dilaudid till payday and I’d be already in debt, owe people money. Because I’ve got good credit because I’m really good at paying my bills...So now I’ve got money that I can spend on food instead of having to waste it on that crap. (Participant 17, 49-year-old white man)

access the illicit drug market, significantly reducing their overdose risk. The program provided many participants a means to manage opioid withdrawal symptoms without having to rely on illicit opioids. Participants commonly reported using illicit opioids less frequently since enrolling in the program (Table 2, quotes 1 and 2).

While most of the current illicit opioid supply contains fentanyl and related analogues (including carfentanil), other drugs such as benzodiazepines have been found in the street drug supply and increase overdose risk. Participants discussed how the program was therefore beneficial in addressing the uncertainty of the illicit supply (Table 2, quote 3). Most participants still accessed the illicit drug market, for example in the morning to avoid withdrawal symptoms, or outside program operating hours. During ethnographic observation in the Molson OPS waiting area, participants commonly discussed not knowing what was in illicit drugs and shared information about adulterated drugs (e.g., levamisole, benzodiazepines) or excessively potent fentanyl being sold in the neighborhood.

Improvements to Health and Well-being

During ethnographic observation, program participants frequently accessed the program physician and nurses to address health concerns, such as wound care and pain treatment. This is an important feature of the program given that many PWUD experience underlying and chronic health issues that go unmanaged due to the lack of adequate healthcare access and the general mistrust of the healthcare system. Nursing staff were also commonly observed scheduling and reminding participants about medical appointments and liaising with other medical services on their behalf (e.g., arranging transportation to other medical services).

When discussing positive aspects of program enrollment, some participants described general improvements to their health and well-being (e.g., improved nutrition and sleep) because they no longer had to spend their time and resources trying to access illegal drugs and/or managing opioid withdrawal through the illicit drug market. Some participants also attributed these improvements to reduced stress as a result of having regular access to hydromorphone, as this alleviated concerns about needing to acquire money for drugs or experiencing opioid withdrawal and associated drug-related risks (e.g., injecting in unsafe environments, rushed injections with drugs of unknown potency). Within the broader context of extreme poverty and housing vulnerability in the Downtown Eastside, these improvements in sleep and nutrition were emphasized by participants (Table 2, quote 4).

A number of participants spoke about wanting to stop injecting—something possible within a hydromorphone program that gave them an option to take hydromorphone tablets orally, intranasally, or by injection. One participant explained, “I’m injecting less, so I’m putting less holes in my arms. So that’s...one positive, then” (participant 13, 47-year-old white man). Participants commonly emphasized health improvements resulting from less frequent injecting (Table 2, quote 5).

#### Improvements in Co-management of Pain

While pain management is not a stated objective of the program, participants who experienced chronic pain emphasized hydromorphone’s role in managing their pain. These participants reported that they were unable to obtain medication to manage pain from physicians and had to resort to self-managing pain with illicit opioids—something they acknowledged was increasingly hazardous due to fentanyl and other adulterants. As one participant explained, “If I’m in pain, I’ll buy off anybody and get ripped off a hundred times over” (participant 38, 45-year-old white man). Having access to a consistent supply of hydromorphone became an important feature of the program, improving overall quality of life and functioning (Table 2, quote 6).

Some participants also reported that taking the hydromorphone orally was more effective than injecting in alleviating their chronic pain and facilitating their pain management, which motivated their access to the program (Table 2, quote 7).

#### Economic Improvements

Participants discussed the positive impact the program had on their economic situation, explaining that consistent access to hydromorphone meant they were not spending all of their money on street-purchased drugs, allowing them to use their money for other things. Participants described how this allowed them to use their money to meet basic needs (e.g., purchasing food), purchase a cell phone in order to keep in touch with family, or save money to visit children living in other provinces (Table 2, quote 8).

Participants recounted regular engagement in stigmatized and criminalized forms of income generation (e.g., informal recycling, shoplifting, sex work) to acquire money to purchase (often small amounts) of drugs prior to enrollment in the program—something they described as exhausting and time consuming. Participants reported that their enrollment in the hydromorphone program meant that their need to engage in this type of daily “hustle” was reduced (Table 2, quote 9).

Furthermore, many participants had previously become entangled in constant cycles of debt with drug dealers related to illicit drug purchases. Subsequently, monthly income received from social assistance often went directly to paying off drug debt—something that put participants at risk of violence or withdrawal when unable to pay. Participant described how the program had provided them the opportunity to get out of that debt cycle (Table 2, quote 10).

#### Discussion

In summary, our findings indicate that the Molson hydromorphone distribution program not only is effective in responding to the current overdose crisis by reducing people’s use of illicit drugs, and thereby overdose risk, but also addresses inequities stemming from the intersection of drug use and social inequality. That participants reported using less fentanyl since enrolling in the program (with very few reporting an overdose event since enrolling, and none within the OPS) suggests that safer supply programs are both feasible and effective in disrupting people’s need to access drugs from a toxic illicit drug supply. Additionally, participants described experiencing improvements to health and well-being, including access to healthcare, reduced drug injection, improvements in pain management, and

improvements in economic security since program enrollment. While study participants were not able to entirely cease their illicit fentanyl use due to operational constraints (for example, needing to manage withdrawal with illicit opioids when the program was closed, or for whom the prescribed dose is not strong enough), our study suggests that safer supply programs likely have significant potential to reduce overdose events and overdose mortality rates.

Our finding that having access to hydromorphone reduced participants’ use of illicit opioids is consistent with other studies demonstrating a reduction of illicit drug use when provided with a suitable alternative (e.g., diacetylmorphine, hydromorphone) [32, 49–52]. Indeed, studies on heroin assisted treatment in both Canada and Europe have found that diacetylmorphine is more effective than oral methadone for reducing illicit opioid use for many individuals [31, 49, 51, 52], indicating the need to expand opioid substitution models. Further, our study builds on research demonstrating a reduction in illegal activities (e.g., property crime, illegal means of income generation) among people receiving injectable opioid-assisted treatment [53–55]. This is especially important considering the association between socio-environmental factors, such as poverty, lack of adequate housing, and overdose risk [56–59], and underscores the potential role of safer supply interventions to address issues at the intersection of drug use and structural vulnerability.

That a number of study participants used the program to self-manage pain points to the need to better understand and address chronic pain management among PWUD. Although chronic pain is common among PWUD [60–62], it remains inadequately treated due to the intersection of poverty, stigma, discrimination, and regulatory pressures, often necessitating self-management through illicit drug use [63–68]. Our study showed that inadequate pain management was common among people accessing the program and how an unintended but important benefit of the program was addressing inequities in pain treatment among PWUD produced by the healthcare system. Although this emerged as a key outcome, there remains a need to rethink and improve current pain management strategies and prescribing policies, especially considering the role that restrictions on prescription opioids has played in driving the overdose crisis in North America [69, 70]. Finding ways to co-deliver complementary programming to enhance pain management, including novel

cannabis distribution programs [71], as part of safer supply programs might further address these needs. Further, the integration of primary care with the program in particular was important for participants who may otherwise not engage with the healthcare system but felt comfortable speaking with on-site nursing staff, physicians, and the social worker. Participants’ comfort engaging with healthcare providers within the Molson OPS draws attention to the importance of providing spaces in which PWUD feel safe and not exposed to experiences of structural vulnerability (e.g., stigma, violence, arrest).

Our findings provide evidence of the need for, and feasibility of, safer supply programs to reduce the use of illicit drugs by directly intervening to provide an alternative to the toxic illicit drug market. Safer opioid distribution represents a novel public health intervention with potential to directly address the overdose crisis. The recent expansion of such programs in BC, including recent provincial guidelines on risk mitigation pandemic prescribing during the COVID-19 pandemic which allow physicians to prescribe opioids, stimulants, and benzodiazepines to individuals at high overdose risk (and includes options for take-home doses and deliveries) [35, 36], indicates that wide-scale implementation in rural, suburban, and urban setting may be possible. However, restricting available opioids to hydromorphone, combined with a lack of broad support from the medical community, constitutes a limitation that is constraining the effective implementation of the risk mitigation prescribing guidelines. To fully optimize the potential public health impact of safer supply distribution, multiple program models should be implemented, and a range of safer opioids made available, to meet the diverse needs of PWUD [72, 73]. However, given the currently limited evidence of the effectiveness of opioid distribution and safe supply programs, the implementation of these programs should be accompanied by rigorous evaluation. Further research is also needed to determine the feasibility and effectiveness of various safe supply distribution models, including scale-up of existing injectable hydromorphone and diacetylmorphine programs, heroin compassion clubs in which individuals can purchase pharmaceutical grade opiates without risk of criminal sanctions [74], and the “off-label” prescription of hydromorphone and other opioids, including those nested within existing harm reduction services, and stand-alone locations (e.g., through automated dispensing machines and dedicated distribution locations).

Although the current overdose crisis in North America is largely driven by illicitly-manufactured fentanyl and fentanyl-adulterated drugs, drug-related harms such as overdose continue to be shaped by social-structural forces, such as poverty, racism, and criminalization of drugs and the people that use them [13, 75, 76]. Our findings thus demonstrate how hydromorphone distribution programs can be understood not simply as a source of medical-grade opioids, but also as safer environment interventions (SEI) responsive to structural vulnerabilities of PWUD (e.g., poverty, criminalization) [77, 78]. Attending to structural inequities is critical to the success of SEIs given how closely intertwined experiences of structural vulnerability are with drug use and related harms. Study participants discussed the program as addressing a variety of social and health issues, highlighting the essential role of SEIs in improving access to social, material, and health resources.

Our study has several limitations. First, our sample involved only a subset of individuals enrolled in the hydromorphone distribution program and thus may not be reflective of other program participants. Second, our study focused on a single hydromorphone distribution program in Vancouver, and therefore, the study findings may not be applicable to other similar programs, or programs offering other opioids (e.g., diacetylmorphine). Further, our study was located in Vancouver's Downtown Eastside neighborhood, a community characterized by high levels of poverty, homelessness, and drug use, and our findings, including certain contextual considerations, may not be generalizable to other settings.

Our study demonstrates that hydromorphone distribution programs have significant potential to address the overdose crisis by reducing people's use of illicit fentanyl. A number of additional outcomes for program participants were identified including improvement to health and well-being, reduced drug injection, pain management, and improvements to economic circumstances. Our findings further demonstrate that providing PWUD with a reliable and safe source of drugs has the potential to reduce harm related to social and health inequity. Based on these findings, we suggest that similar safe supply programs should be further implemented and evaluated across urban, suburban, and rural settings across North America as a strategy to reduce exposure to the toxic drug supply and by consequence fatal overdose.

**Acknowledgments** We thank the study participants for their contributions to this research, without whom this study would not be possible. We also thank past peer research assistants for their research and administrative assistance. We further acknowledge that this work took place on the unceded territories of the xwmaθkwəyam (Musqueam), Skwxwú7mesh (Squamish), and sel̓íl̓witulh (Tsleil-waututh) nations. This work was supported by the US National Institutes of Health under award number R01DA044181. AI is funded by a Mitacs Elevate Fellowship. SM is supported by a Canadian Institutes of Health Research (CIHR) Doctoral Award. AC was supported by a Vanier Canada Graduate Scholarship. RM was supported by a CIHR New Investigator Award and Michael Smith Foundation for Health Research Scholar Award.

**Compliance with Ethical Standards** The study received ethical approval from the University of British Columbia and Providence Health Care Research Ethics Boards.

**Disclaimer** The funding sources were not involved in the study design, analysis, or writing of this report, or the decision to submit the paper for publication.

## References

1. Government of Canada. National report: apparent opioid-related deaths in Canada - Data Blog - Public Health Infobase | Public Health Agency of Canada [Internet]. 2019 [cited 2019 Jun 26]. Available from: <https://health-infobase.canada.ca/datalab/national-surveillance-opioid-mortality.html>
2. Jones CM, Einstein EB, Compton WM. Changes in synthetic opioid involvement in drug overdose deaths in the United States, 2010-2016. *JAMA*. 2018 May 1;319(17):1819–21.
3. Ciccarone D, Ondocsin J, Mars SG. Heroin uncertainties: exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin'. *Int J Drug Policy*. 2017;46:146–55.
4. Suzuki J, El-Haddad S. A review: fentanyl and non-pharmaceutical fentanyls. *Drug Alcohol Depend*. 2017;171:107–16.
5. Carroll JJ, Marshall BDL, Rich JD, Green TC. Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: a mixed methods study. *Int J Drug Policy*. 2017;46:136–45.
6. Mayer S, Boyd J, Collins A, Kennedy MC, Fairbairn N, McNeil R. Characterizing fentanyl-related overdoses and implications for overdose response: findings from a rapid ethnographic study in Vancouver, Canada. *Drug Alcohol Depend*. 2018;193:69–74.
7. Wilson N, Kariisa M, Seth P, Smith H, Davis N. Drug and opioid-involved overdose deaths — United States, 2017–2018. *MMWR Morb Mortal Wkly Rep* [Internet]. 2020 [cited 2020 May 6];69. Available from: <https://www.cdc.gov/mmwr/volumes/69/wr/mm6911a4.htm>
8. Government of British Columbia. Provincial health officer declares public health emergency [Internet]. 2016. Available

from: <https://news.gov.bc.ca/releases/2016HLTH0026-000568>. Accessed 9 Jul 2019

9. Fairbairn N, Coffin PO, Walley AY. Naloxone for heroin, prescription opioid, and illicitly made fentanyl overdoses: challenges and innovations responding to a dynamic epidemic. *Int J Drug Policy*. 2017;46:172–9.
10. Fairbairn N, Ross J, Trew M, Meador K, Turnbull J, MacDonald S, et al. Injectable opioid agonist treatment for opioid use disorder: a national clinical guideline. *CMAJ*. 2019;191(38):E1049–56.
11. Government of Canada. Supervised consumption sites: guidance for application form [Internet]. aem. 2017 [cited 2020 May 6]. Available from: <https://www.canada.ca/en/health-canada/services/substance-use/supervised-consumption-sites/status-application.html#scs-app>
12. Karamouzian M, Dohoo C, Forsting S, McNeil R, Kerr T, Lysyshyn M. Evaluation of a fentanyl drug checking service for clients of a supervised injection facility, Vancouver, Canada. *Harm Reduct J*. 2018;15(1):46.
13. Strike C, Watson TM. Losing the uphill battle? Emergent harm reduction interventions and barriers during the opioid overdose crisis in Canada. *Int J Drug Policy*. 2019;71:178–82.
14. Wallace B, Pagan F, Pauly B (Bernie). The implementation of overdose prevention sites as a novel and nimble response during an illegal drug overdose public health emergency. *Int J Drug Policy*. 2019;66:64–72.
15. Mojtabai R, Mauro C, Wall MM, Barry CL, Olfson M. The affordable care act and opioid agonist therapy for opioid use disorder. *Psychiatr Serv*. 2019;appi.ps.201900025.
16. Freeman PR, Hankosky ER, Lofwall MR, Talbert JC. The changing landscape of naloxone availability in the United States, 2011–2017. *Drug Alcohol Depend*. 2018;191:361–4.
17. Bakhireva LN, Bautista A, Cano S, Shrestha S, Bachyrycz AM, Cruz TH. Barriers and facilitators to dispensing of intranasal naloxone by pharmacists. *Subst Abuse*. 2018;39(3):331–41.
18. Huhn AS, Dunn KE. Why aren’t physicians prescribing more buprenorphine? *J Subst Abus Treat*. 2017;78:1–7.
19. Puzantian T, Gasper JJ. Provision of naloxone without a prescription by California pharmacists 2 years after legislation implementation. *JAMA*. 2018;320(18):1933–4.
20. Thakur T, Frey M, Chewning B. Pharmacist roles, training, and perceived barriers in naloxone dispensing: a systematic review. *J Am Pharm Assoc*. 2020;60(1):178–94.
21. Levenson E, del Valle L. Judge clears path for Philadelphia nonprofit to open safe-injection site to combat overdoses [Internet]. CNN. 2020. Available from: <https://www.cnn.com/2020/02/26/us/philadelphia-supervised-injection-site/index.html>. Accessed 7 Feb 2020
22. Allyn B. Cities planning supervised drug injection sites fear justice department reaction [Internet]. NPR.org. 2018. Available from: <https://www.npr.org/sections/health-shots/2018/07/12/628136694/harm-reduction-movement-hits-obstacles>. Accessed 23 Mar 2020
23. Roth AM, Kral AH, Mitchell A, Mukherjee R, Davidson P, Lankenau SE. Overdose prevention site acceptability among residents and businesses surrounding a proposed site in Philadelphia, USA. *J Urban Health Bull N Y Acad Med*. 2019;96(3):341–52.
24. Lewis C. NYC Plan for safe injection sites faces resistance from Cuomo, Trump [Internet]. Gothamist. 2019. Available from: <https://gothamist.com/news/nyc-plan-for-safe-injection-sites-faces-resistance-from-cuomo-trump>. Accessed 17 Sept 2020
25. Canadian Association of People Who Use Drugs. Safe supply concept document [Internet]. 2019. Available from: <http://capud.ca/images/files/CAPUD%20safe%20supply%20Feb%202020%202019.pdf>. Accessed 10 Sept 2019
26. Fleming T, Barker A, Ivsins A, Vakharia S, McNeil R. Stimulant safe supply: a potential opportunity to respond to the overdose epidemic. *Harm Reduct J*. 2020;17(1):6.
27. Ivsins A, Boyd J, Beletsky L, McNeil R. Tackling the overdose crisis: the role of safe supply. *Int J Drug Policy*. 2020;1:102769.
28. van den Brink W, Hendriks VM, Blanken P, Koeter MWJ, van Zwieten BJ, van Ree JM. Medical prescription of heroin to treatment resistant heroin addicts: two randomised controlled trials. *BMJ*. 2003;327(7410):310.
29. Haasen C, Verthein U, Degkwitz P, Berger J, Krausz M, Naber D. Heroin-assisted treatment for opioid dependence: randomised controlled trial. *Br J Psychiatry*. 2007;191(1):55–62.
30. March JC, Oviedo-Joekes E, Perea-Milla E, Carrasco F. Controlled trial of prescribed heroin in the treatment of opioid addiction. *J Subst Abus Treat*. 2006;31(2):203–11.
31. Oviedo-Joekes E, Brissette S, Marsh DC, Lauzon P, Guh D, Anis A, et al. Diacetylmorphine versus methadone for the treatment of opioid addiction. *N Engl J Med*. 2009;361(8):777–86.
32. Oviedo-Joekes E, Guh D, Brissette S, Marchand K, MacDonald S, Lock K, et al. Hydromorphone compared with diacetylmorphine for long-term opioid dependence: a randomized clinical trial. *JAMA Psychiatry*. 2016;73(5):447–55.
33. Government of Canada H. Government of Canada approves new treatment options for opioid use disorder and supports research, treatment and harm reduction projects in Ontario [Internet]. gcnews. 2019. Available from: <https://www.canada.ca/en/health-canada/news/2019/05/government-of-canada-approves-new-treatment-options-for-opioid-use-disorder-and-supports-research-treatment-and-harm-reduction-projects-in-ontario.html>. Accessed 12 Jul 2019
34. Browne R. More doctors are prescribing opioids to prevent their patients from dying of overdoses [Internet]. Global News. 2019. Available from: <https://globalnews.ca/news/5412946/safe-supply-opioid-overdose/>. Accessed 7 Nov 2019
35. Uguen-Csenge E. B.C. releases plan to provide safe supply of drugs during COVID-19 pandemic | CBC News [Internet]. CBC. 2020. Available from: <https://www.cbc.ca/news/canada/british-columbia/safe-supply-drug-plan-covid-1.5511973>. Accessed 12 Apr 2020
36. British Columbia Centre on Substance Use. Risk mitigation in the context of dual public health emergencies [Internet]. 2020. Available from: <https://www.bccsu.ca/wp-content/uploads/2020/04/Risk-Mitigation-in-the-Context-of-Dual-Public-Health-Emergencies-v1.5.pdf>. Accessed 12 Apr 2020
37. Carnegie Community Action Project. Displaced: rents and the rate of change in the Downtown Eastside [Internet].

2018. Available from: [http://www.carnegieaction.org/wp-content/uploads/2019/06/FINAL-190611\\_CCAP-SRO-Hotel-Report-2018-1.pdf](http://www.carnegieaction.org/wp-content/uploads/2019/06/FINAL-190611_CCAP-SRO-Hotel-Report-2018-1.pdf). Accessed 7 May 2020

38. City of Vancouver. Vancouver homeless count 2019 [Internet]. 2019. Available from: <https://vancouver.ca/files/cov/vancouver-homeless-count-2019-final-report.pdf>. Accessed 9 May 2020

39. Linden IA, Mar MY, Werker GR, Jang K, Krausz M. Research on a vulnerable neighborhood—the Vancouver downtown eastside from 2001 to 2011. *J Urban Health*. 2012;90(3):559–73.

40. Boyd S, Osborne B, MacPherson D. *Raise shit!: social action saving lives*: Fernwood, Nova Scotia; 2009

41. British Columbia Coroners Service. Illicit drug overdose deaths in BC January 1, 2010–July 31, 2020 [internet]. 2020. Available from: <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/decorers-service/statistical/illicit-drug.pdf>. Accessed 16 sep 2020

42. British Columbia Centre for Disease Control. Overdose response indicator report [Internet]. 2020. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Overdose/Overdose%20Response%20Indicator%20Report.pdf>. Accessed 23 Jan 2020

43. Olding M, Ivsins A, Mayer S, Betsos A, Boyd J, Sutherland C, et al. *The Molson: a low-barrier and comprehensive community-based harm reduction site in Vancouver, Canada*. 2020

44. Collins AB, Boyd J, Czechaczek S, Hayashi K, McNeil R. (Re)shaping the self: an ethnographic study of the embodied and spatial practices of women who use drugs. *Health Place*. 2020;63:102327.

45. Maher L. Don't leave us this way: ethnography and injecting drug use in the age of AIDS. *Int J Drug Policy*. 2002;13(4):311–25.

46. McNeil R, Kerr T, Lampkin H, Small W. "We need somewhere to smoke crack": an ethnographic study of an unsanctioned safer smoking room in Vancouver, Canada. *Int J Drug Policy*. 2015;26(7):645–52.

47. Bourgois P, Holmes SM, Sue K, Quesada J. Structural vulnerability: operationalizing the concept to address health disparities in clinical care. *Acad Med*. 2017;92(3):299–307.

48. Quesada J, Hart LK, Bourgois P. Structural vulnerability and health: Latino migrant laborers in the United States. *Med Anthropol*. 2011;30(4):339–62.

49. Ali S, Tahir B, Jabeen S, Malik M. Methadone treatment of opiate addiction: a systematic review of comparative studies. *Innov Clin Neurosci*. 2017;14(7–8):8–19.

50. Metrebian N, Groshkova T, Hellier J, Charles V, Martin A, Forzisi L, et al. Drug use, health and social outcomes of hard-to-treat heroin addicts receiving supervised injectable opiate treatment: secondary outcomes from the Randomized Injectable Opioid Treatment Trial (RIOTT). *Addiction*. 2015;110(3):479–90.

51. Smart R, Evidence on the effectiveness of heroin-assisted treatment. CA: Santa Monica: RAND Corporation; 2018.

52. Strang J, Groshkova T, Uchtenhagen A, van den Brink W, Haasen C, Schechter MT, et al. Heroin on trial: systematic review and meta-analysis of randomised trials of diamorphine-prescribing as treatment for refractory heroin addiction. *Br J Psychiatry*. 2015;207(1):5–14.

53. Demaret I, Quertemont E, Litran G, Magoga C, Deblire C, Dubois N, et al. Efficacy of heroin-assisted treatment in Belgium: a randomised controlled trial. *Eur Addict Res*. 2015;21(4):179–87.

54. Oviedo-Joekes E, Marchand K, Lock K, Chettiar J, Marsh DC, Brissette S, et al. A chance to stop and breathe: participants' experiences in the North American Opiate Medication Initiative clinical trial. *Addict Sci Clin Pract*. 2014;9(1):21.

55. Palis H, Marchand K, Guh D, Brissette S, Lock K, MacDonald S, et al. Men's and women's response to treatment and perceptions of outcomes in a randomized controlled trial of injectable opioid assisted treatment for severe opioid use disorder. *Subst Abuse Treat Prev Policy*. 2017;12(1):25.

56. Hembree C, Galea S, Ahern J, Tracy M, Markham Piper T, Miller J, et al. The urban built environment and overdose mortality in New York City neighborhoods. *Health Place*. 2005;11(2):147–56.

57. Jenkins LM, Banta-Green CJ, Maynard C, Kingston S, Hanrahan M, Merrill JO, et al. Risk factors for nonfatal overdose at Seattle-area syringe exchanges. *J Urban Health*. 2011;88(1):118–28.

58. Pear VA, Ponicki WR, Gaidus A, Keyes KM, Martins SS, Fink DS, et al. Urban-rural variation in the socioeconomic determinants of opioid overdose. *Drug Alcohol Depend*. 2019;195:66–73.

59. Visconti AJ, Santos G-M, Lemos NP, Burke C, Coffin PO. Opioid overdose deaths in the city and county of San Francisco: prevalence, distribution, and disparities. *J Urban Health*. 2015;92(4):758–72.

60. Dahlman D, Kral AH, Wenger L, Hakansson A, Novak SP. Physical pain is common and associated with nonmedical prescription opioid use among people who inject drugs. *Subst Abuse Treat Prev Policy*. 2017;12(1):1–11.

61. Neighbor ML, Dance TR, Hawk M, Kohn MA. Heightened pain perception in illicit substance-using patients in the ED: implications for management. *Am J Emerg Med*. 2011;29(1):50–6.

62. Voon P, Hayashi K, Milloy M-J, Nguyen P, Wood E, Montaner J, et al. Pain among high-risk patients on methadone maintenance treatment. *J Pain*. 2015;16(9):887–94.

63. Berg KM, Arnsten JH, Sacajiu G, Karasz A. Providers' experiences treating chronic pain among opioid-dependent drug users. *J Gen Intern Med*. 2009;24(4):482–8.

64. Craig KD, Holmes C, Hudspith M, Moor G, Moosa-Mitha M, Varcoe C, et al. Pain in persons who are marginalized by social conditions. *PAIN*. 2020 Feb;161(2):261–5.

65. Ivsins A, Yake K. Looking beyond harm: meaning and purpose of substance use in the lives of marginalized people who use drugs. *Drugs Educ Prev Policy*. 2018;0(0):1–10.

66. McNeil R, Small W, Wood E, Kerr T. Hospitals as a 'risk environment': an ethno-epidemiological study of voluntary and involuntary discharge from hospital against medical advice among people who inject drugs. *Soc Sci Med*. 2014;105:59–66.

67. Merrill JO, Rhodes LA, Deyo RA, Marlatt GA, Bradley KA. Mutual mistrust in the medical care of drug users. *J Gen Intern Med*. 2002;17(5):327–33.

68. Voon P, Callon C, Nguyen P, Dobrer S, Montaner J, Wood E, et al. Self-management of pain among people who inject drugs in Vancouver. *Pain Manag*. London:Future Medicine Ltd; 2014. 4(1):27–35.

69. Beletsky L, Davis CS. Today’s fentanyl crisis: prohibition’s Iron law, revisited. *Int J Drug Policy*. 2017;46:156–9.

70. Voon P, Kerr T. “Nonmedical” prescription opioid use in North America: a call for priority action. *Subst Abuse Treat Prev Policy*. 2013;8(1):39.

71. Valleriani J, Haines-Saah R, Capler R, Bluthenthal R, Socias ME, Milloy M, et al. The emergence of innovative cannabis distribution projects in the downtown eastside of Vancouver, Canada. *Int J Drug Policy*. 2020;79:102737.

72. Marchand K, Foreman J, MacDonald S, Harrison S, Schechter MT, Oviedo-Joekes E. Building healthcare provider relationships for patient-centered care: a qualitative study of the experiences of people receiving injectable opioid agonist treatment. *Subst Abuse Treat Prev Policy*. 2020;15(1):1–9.

73. Nordt C, Vogel M, Dey M, Moldovanyi A, Beck T, Berthel T, et al. One size does not fit all—evolution of opioid agonist treatments in a naturalistic setting over 23 years. *Addiction*. 2019;114(1):103–11.

74. British Columbia Centre on Substance Use. Heroin compassion clubs: a cooperative model to reduce opioid overdose deaths & disrupt organized crime’s role in fentanyl, money laundering & housing unaffordability. British Columbia Centre on Substance Use; 2019.

75. Dasgupta N, Beletsky L, Ciccarone D. Opioid crisis: no easy fix to its social and economic determinants. *Am J Public Health*. 2017;108(2):182–6.

76. Rhodes T. Risk environments and drug harms: a social science for harm reduction approach. *Int J Drug Policy*. 2009;20(3):193–201.

77. McNeil R, Small W. ‘Safer environment interventions’: a qualitative synthesis of the experiences and perceptions of people who inject drugs. *Soc Sci Med*. 2014;106:151–8.

78. Rhodes T, Kimber J, Small W, Fitzgerald J, Kerr T, Hickman M, et al. Public injecting and the need for ‘safer environment interventions’ in the reduction of drug-related harm. *Addiction*. 2006;101(10):1384–93.

**Publisher’s Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.