Assessing First Responders and People Who Use Drugs' Perceptions of Fentanyl and Drug Checking Services

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Abstract

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Background: The current wave of the opioid epidemic is primarily driven by the proliferation of fentanyl and its analogs. Fentanyl adulteration, the presence of fentanyl in addition to an expected substance, amplifies the dangers of an opioid overdose for people who use drugs (PWUD). Drug checking services (DCS) are a harm reduction strategy that allows PWUD to chemically analyze the contents of their substances for fentanyl adulteration to make informed decisions regarding their drug use and prevent fentanyl-involved overdoses. This study assessed PWUDs' perceptions of fentanyl and DCS and first responders' perceptions of fentanyl and safer use supplies (SUS), which include DCS.

Methods: The risk environment framework informed the qualitative study. First responders and PWUD, were recruited using a convenience sampling approach from first responder agencies and three community service locations in King County, Washington respectively. Semi-structured interviews were conducted with first responders (n=32) and PWUD (n=13) until data saturation. The qualitative data from the interviews were analyzed using a hybrid deductive and inductive thematic analysis approach by two investigators from the Research with Expert Advisors on Drug Use (READU) team, composed of people with lived and living experiences of drug use. Themes were generated, iteratively refined, and reviewed by the READU team.

Results: Thematic analysis revealed first responders' perceptions of the impacts of fentanyl adulteration on the volume and nature of first responders' responses to overdose events and the drug use landscape. PWUDs' views of fentanyl varied on a continuum, where some reported fentanyl as a drug of choice, a willingness to use fentanyl-adulterated substances, and others expressed their aversion to fentanyl. The saturation of the drug supply with fentanyl altered PWUDs' use, experiences with using substances, and overdose risk. First responders' perceptions of SUS were mixed with some first responders believing that their distribution of SUS would be feasible, provide safer options, and reduce PWUDs' overdose risk through harm reduction. Other first responders were concerned that it was beyond their scope of duty and that it would enable and perpetuate a cycle of harm. PWUDs' support for DCS was low with some PWUDs expressing the belief that DCS was useful as it provided information on the contents of their substances, addressed their safety concerns, and promoted safer use behaviors. In contrast, some participants believed that the results of DCS would not influence drug use behaviors or be useful as fentanyl adulteration was not a personal concern. Barriers to using DCS may be addressed by increasing access and improving the utility and usability of DCS.

Conclusions: Despite its benefits, DCS may only be feasible and useful for a subset of PWUD, specifically for PWUD who do not use fentanyl and are concerned with fentanyl adulteration. The results of the study provide timely information on the drug use landscape and offer recommendations for the implementation of DCS in King County, to increase harm reduction options for PWUD. Future research should further evaluate the implementation of interventions involving DCS and its efficacy in preventing overdoses and overdose deaths.

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1. INTRODUCTION

The opioid epidemic, fueled by an unprecedented growth of opioid overdoses and overdose deaths, persists as a significant public health challenge in the United States. National overdose deaths involving any opioid continue to rise with significant increases in 2021 and 2022.[1] The current wave of overdose deaths in the opioid epidemic is primarily driven by illicitly-manufactured synthetic opioids other than methadone, such as fentanyl and fentanyl analogs.[2,3] Since 2016, a disproportionate number of drug overdose deaths have involved synthetic opioids as opposed to heroin or prescription opioids.[1] Specifically, in King County, Washington, accidental drug overdose deaths reached a peak in 2020, following a 135% increase over the last 10 years, with cases positive for fentanyl growing rapidly.[4] The number of confirmed overdose deaths involving fentanyl increased by 128% from 2020 to 2021 and by 84.9% from 2021 to 2022.[5] Fentanyl has been involved in 70% of all confirmed overdose deaths to date in 2022, which is an increase from less than 10% before 2018.[6]

In 2022, decedents of opioid overdose who: identified as male; were aged 30 to 50; identified as American Indian/Alaska Native (AIAN) or non-Hispanic Black; and experienced unstable housing were all overrepresented in King County.[6] The age-adjusted rate of fatal overdose was approximately 5 times greater for AIAN individuals than non-Hispanic White individuals, while the rate of overdose was approximately 2 times greater among individuals who identified as male than individuals who identified as female.[6] The rapidly increasing trends in overdoses and growing health disparities have deleterious effects on the health and quality of life of people who use drugs (PWUD). As opioid overdose and overdose deaths in King County continue to rise along with illicit fentanyl in the drug supply, there is an urgent imperative to

prevent opioid overdose deaths by increasing access to care and harm reduction options for PWUD.[2]

1.1. The Role of Fentanyl in the Opioid Epidemic

Fentanyl, a synthetic opioid that is approximately 100 times more potent than morphine, was initially developed to serve as a safer clinical alternative and analgesic to morphine.[7,8] However, its high potency, relative inexpensiveness, fast onset, and short half-life raise concerns about its potential for misuse.[8,9] Illicitly manufactured fentanyl has most commonly been sold or disguised as heroin, known as "fentanyl-adulterated or substituted heroin" (i.e., FASH), due in part to heroin supply shortages and the lower dose-for-dose production costs of fentanyl.[9-11] The high potency of fentanyl—small amounts of fentanyl can produce the same pharmacological effects as a much larger amount of heroin—provides market incentives for suppliers looking to reduce production and distribution costs.[8,9] This supply-driven phenomenon where fentanyl is increasingly mixed, combined with, or used as an adulterant to produce desired or different effects, poses a danger to PWUD, especially PWUD who may not have tolerance for, or are naïve to, fentanyl use.[9,11,12]

The contamination or adulteration of PWUDs' substances with fentanyl is unbeknownst to many PWUD who may be inadvertently exposed to fentanyl.[12] The introduction of fentanyl into the drug supply, which may lead to the unintentional use of fentanyl, amplifies the structural risk environment and the dangers of an opioid overdose.[9,13] PWUD who may not have a tolerance for fentanyl may be at a heightened risk of experiencing an overdose from using substances containing small amounts of fentanyl.[12] The unpredictable amount and potency of fentanyl in PWUDs' substances may also lead to unexpected reactions with other substances, increasing PWUDs' risk of an overdose.[10] The compounding risks of overdose from different

opioids are particularly concerning since accidental drug overdoses in King County are currently at their highest.[6,10] Significant increases in fentanyl positivity detected in laboratory-developed tests, fentanyl-related deaths, and fentanyl use rates in Seattle, King County particularly during the COVID-19 pandemic, emphasize that fentanyl is now one of the main drivers for the ongoing opioid epidemic.[12]

PWUDs sometimes lack complete information on the contents of their substances which can make it more difficult to make informed decisions regarding their substance use.[9] In some cases, despite possessing knowledge of the presence of fentanyl in their substances, PWUDs are further constrained by the limited availability of fentanyl-free alternatives.[9] However, views on fentanyl use vary amongst PWUD with some preferring to avoid fentanyl completely, some expressing the willingness to use fentanyl-adulterated substances in the absence of alternatives, and others desiring to use fentanyl as a drug of choice.[9,10] In a prior study of PWUD in northeast Massachusetts and Nashua, New Hampshire, those reporting using fentanyl intentionally described how fentanyl is better able to satisfy their needs due to its greater intensity, rush, and the return of an opioid euphoric feeling that had disappeared due to increasing tolerance.[9,10] How PWUD in Washington feels about fentanyl and its role in the opioid epidemic, however, is currently underexamined.

The introduction of fentanyl and its analogs into the local drug supply has impacted first responders' (e.g., law enforcement officers, paramedics, firefighters, and emergency service providers, etc.) responses to and interactions with PWUD. The current standard of care and protocol for first responders and emergency medical services (EMS) personnel when responding to suspected overdose events, is to administer naloxone.[14-16] Naloxone is a potent and effective opioid antagonist that is FDA-approved for the emergency treatment of known or suspected

opioid overdose, where the individual is experiencing respiratory and/or central nervous system depression.[17,18] It can reverse the effects of many natural, semisynthetic, and synthetic opioids and can be administered intravenously, intramuscularly, subcutaneously, and intranasally.[17,18] A literature review on multiple naloxone administrations (MNA) for opioid overdose reversals found that the rates of MNA for studies based on EMS ranged from 9% to 53% with significant increases in annual MNA rates over time, due to the greater need for MNA to successfully reverse an overdose involving fentanyl.[19]

First responders are front-line responders to overdoses and key stakeholders in the opioid epidemic response. The opioid epidemic has negatively impacted first responders, particularly paramedics, who experience burnout and high emotional burden or stress.[20,21] Additionally, the spread of misinformation regarding the possibility of experiencing a fentanyl overdose in the field has perpetuated stigma and harm towards PWUD experiencing an overdose and has the potential to lead to delays in the delivery of effective care.[22] The propagation of this misinformation has also increased stressors for first responders who may experience negative somatic symptoms or psychological harms, which may potentially lead to a misdiagnosis or inappropriate treatment.[22] Given the impacts of fentanyl on first responders and overdose responses, there is a need to understand first responders' perceptions of fentanyl and address any misinformation. How first responders perceive the role of fentanyl in the opioid epidemic is currently unknown, and more information is needed on their perceptions of strategies to address this ongoing epidemic.

1.2. Drug Checking Services

Drug checking services (DCS) are a harm reduction strategy that holds great promise in preventing fentanyl-involved overdoses. Drug checking is a public health monitoring and

surveillance strategy that is used to identify dynamic trends in the unregulated illicit drug supply.[13,23] The surveillance of drug trends using drug checking allows for the detection of misrepresented or adulterated substances which may include samples that are high in dose or strength, have unexpected combinations of drugs, or include new psychoactive substances.[24] Drug checking may also inform public health responses by supporting public health officials in alerting the public of the toxicity of emerging illicit drugs in the market.[13,23] Most importantly, DCS serves as a harm reduction strategy that allows PWUD to chemically analyze the contents of their drug samples for adulteration, to make risk-aware and informed decisions regarding their drug use based on the chemical composition of their drugs.[25]

DCS and technologies may vary in costs, time required to administer, usability, and data reporting.[13] Examples of common drug checking methods include handheld infrared spectroscopy, Raman spectroscopy, ion mobility spectrometry, mass spectrometry, spot or color tests, and immunoassays (e.g., fentanyl test strips).[25] The different drug checking technologies may be further classified into methods that can only be accessed in laboratory settings and methods that can only be accessed in nonlaboratory or point-of-care settings.[24,25] Drug checking methods that can only be conducted in laboratories are generally costly and involve high-precision machinery that requires technical expertise to operate.[25]

Drug checking has historically been used to identify “party drugs” such as methylenedioxy-methamphetamine (MDMA) and cocaine, but has since been expanded to and adapted to identify synthetic opioid adulterants such as fentanyl.[23] Drug checking technologies allow for the rapid and accurate detection and quantification of fentanyl in illicit drug samples.[26,27] These valid, reliable, and evidence-based drug checking methods are effective in identifying unknown substances and their chemical contents.[25] Drug checking technologies

generally have a high sensitivity and specificity and may provide additional information when used in combination to address the limitations of other technologies.[25-27]

Emerging evidence on DCS, such as fentanyl test strips, suggests high utility as an opioid overdose prevention strategy that should be added to existing harm reduction strategies.[28,29] Positive test results from DCS, which indicate the presence of fentanyl in substances, can help to facilitate changes in drug use behavior including: the reduction of drug dose, disposal of drugs, using in the presence of others, using a tester, slowing the pace of use, or use of other harm reduction strategies that reduce the risk of an overdose.[28,30-32]

Pilot interventions that provided DCS to PWUD found that those who used DCS reported an increased perception of overdose safety.[28,30] Furthermore, the use of harm reduction strategies, (i.e., reduction of drug dose) was associated with lower odds of opioid-related overdose.[28,30] A large majority of the participants in these interventions who endorsed using take-home DCS such as fentanyl test strips reported high self-efficacy in using them and intentions to use them again due to their perceived usefulness.[28,31-33] PWUDs have expressed positive perceptions of and interest in using DCS to prevent overdoses, with a majority of PWUDs expressing a willingness to use formal DCS and use DCS daily.[34,35]

Similarly, to DCS, safer use supplies (SUS) are a harm reduction strategy that promotes safer drug use behaviors, engagement with PWUD, and reduces overdose risk and the spread of infectious disease.[36] SUS, which may include supplies such as clean syringes, glass pipes, and mouthpieces, is a broader category of harm reduction supplies that includes take-home DCS (i.e., fentanyl test strips).[36] While first responders are not the primary intended implementers or providers of DCS, there is an opportunity for them to serve as potential distributors of SUS when they engage with PWUD in post-overdose emergency-response settings. DCS has the potential to

benefit PWUD, first responders, and other public health stakeholders by reducing the risk of overdose and overdose-related deaths due to fentanyl, particularly for PWUDs who are accessing the fentanyl-saturated drug supply.[11,37] However, currently, little is known about the potential for the integration of SUS, like fentanyl test strips, into first responder services and the implementation of DCS. How PWUD in Washington feels about DCS and the use of DCS to prevent fentanyl-involved overdoses is also unknown.

1.3. Study Purpose and Research Questions

As harm reduction supplies and programs continue to expand in King County, an opportunity exists to use DCS as a local harm reduction intervention to prevent fentanyl-involved overdoses. Though there is emerging evidence of PWUD expressing support for the implementation of DCS broadly, there is a dearth of evidence examining implementation strategies for DCS specifically in Washington State due to the novelty of this harm reduction strategy. Additionally, studies on DCS have generally focused solely on the perceptions of PWUD, who are the intended end-users of DCS. This study will contribute the perspectives of both PWUD and first responders, who are key stakeholders in the opioid epidemic, to the growing body of evidence regarding DCS.

Differences in the circulation of fentanyl and drug use behaviors, both of which vary across geographic regions and over time, limit the potential generalizability of the results from existing studies to the current implementation context in King County. To account for the dynamic and unpredictable nature of drug use patterns and the drug use landscape, this study will provide timely and recent information on fentanyl use and perceptions of DCS in King County. This research study also aims to solicit input on implementation suggestions for SUS and DCS to propose recommendations for the implementation of DCS in King County.

The insights provided by PWUD will be crucial in understanding the utility and acceptability of DCS and considerations for its implementation in King County. Harm reduction strategies that incorporate the perspectives of PWUD and allies will be better able to meet the needs of PWUD before they are implemented or accepted as evidence-based interventions.[38,39] DCS will have to be tailored and adapted to the needs within King County since the effectiveness of DCS in preventing overdoses differs based on the population of interest, context, and implementation.[34,40]

To support the successful uptake and implementation of DCS, buy-in from stakeholders such as first responders, particularly law enforcement, is necessary to address concerns regarding the legality of DCS, which may influence PWUDs' use of these services.[34] Policing and enforcement practices around DCS have historically served as a deterrent to PWUD from accessing DCS and may potentially discourage safer use behaviors and negatively impact health outcomes.[41-43] The involvement of these stakeholders has the potential to elicit support from first responders for DCS operations and to align first responder practices with harm reduction goals, to the extent possible, by encouraging institutional or policy changes.[41,44] The incorporation of different stakeholder perspectives will also provide important considerations to support the roll-out and scale-up of DCS.[34] As stakeholders who stand to benefit from the potential of DCS to reduce overdoses, first responders' experiences and expertise with overdose response are important to understanding the utility and acceptability of DCS in King County.

Therefore, in a sample of 32 first responders, mobile clinic staff, and EMS leaders, the present study addressed the following research questions: How do first responders, mobile clinic staff, and EMS leaders perceive fentanyl and its role in the opioid epidemic; What is the perceived value of first responders and mobile clinic staff distributing safer use supplies? In a

sample of 13 PWUDs, the present study also addressed the following research questions: How do PWUDs perceive fentanyl and its role in the opioid epidemic; How do PWUDs perceive and experience drug checking services? This study assessed the perspectives of first responders regarding fentanyl and SUS and the perspectives of PWUD on fentanyl and DCS. First responder perceptions of SUS were solicited to better understand facilitators, barriers, and readiness for potential first responder distribution of SUS in King County in post-overdose emergency-response settings.

1.4. Conceptual Model

The conceptual model of the study was adapted from the risk environment framework. The risk environment framework was developed to understand how social and structural factors influence an individual's risk for drug use and human immunodeficiency virus (HIV).[45] The framework proposes the concept of a "risk environment" to understand and reduce drug-related harm.[45] It posits that drug harms are a product of the social situations and environments in which the individual participates and interacts.[46] This shifts and extends the responsibility of drug harm and harm reduction from the individual to the social and political institutions that contribute to the production of that harm, to combat victim blaming.[45,46] Harm reduction interventions have the potential to create environments that enable safety but their success is influenced by the risk environments in which they operate.[45,47] Risk environments enable harm reduction by adopting a human rights approach and providing an understanding of how PWUD experience risk environments.[46]

The risk environment framework outlines four different types of environments—the physical, social, economic, and policy environments.[45,46] These environments interact with different levels of influence, which include macro and micro risk environments, and employ

mechanisms of susceptibility and vulnerability.[45,46] The micro-risk environment focuses on individual behaviors, decisions, and community norms and practices, while the macro-risk environment focuses on broad structural factors.[48] For the purposes of this study, the factors that contribute to each environment are further categorized by the fentanyl overdose ("risk") or DCS risk environment ("intervention.") Therefore, the risk environment framework provides an understanding of how the different environmental conditions and risk environments may shape harm reduction strategies, such as DCS, and their potential implementation and impact.[45] The risk environment framework was used to inform and guide the development of the conceptual model, the interview guides, the thematic analysis, and support the interpretation of the findings. A table describing the application of the risk environment framework to fentanyl overdose and DCS in King County can be seen in Appendix A.

2. METHODS

2.1. Population, Setting, and Recruitment

Parent Study: Changing Overdose Response with Emergency Services (CORES) Study

The present study will be drawing its data from the CORES study, which is the larger parent study. The CORES study conducted qualitative semi-structured interviews with first responders, EMS leadership, and PWUD who have experienced or witnessed an overdose response. The parent study aimed to assess first responders and PWUDs' experiences with overdose response and the barriers and facilitators to implementing evidence-based medical interventions in post-overdose emergency-response settings. Participants in the study, both PWUD and first responders in King County, were recruited using a convenience sampling

approach. Separate interview guides were developed and used for the first responder interviews and PWUD interviews.

The CORES study was led by the Research with Expert Advisors on Drug Use (READU) team, composed of people with lived and living experiences of drug use, who participated in every step of the research process (BG, CF, CW, GW, NH, DP, TF, JVD). The READU team is built on the principles of community engagement[49] that center the perspectives of people with lived and living experiences of drug use, who drive the research. Prior to the start of the CORES study, the READU team engaged in bi-directional training, where community co-researchers shared their experiences and work with the community while academically trained researchers provided an introduction to qualitative methods. The engagement of PWUD through participatory approaches is essential to ensure that harm reduction strategies are centered around and driven by PWUD.[38,39] The community-engaged research principles and the READU partnership model have been carried through to and throughout the present study.

Parent Study: Recruitment of First Responders, Mobile Clinic Staff, and EMS Leaders

Individuals who held leadership or administrative positions at various first responder agencies in King County assisted with the dissemination of study information to eligible paramedics, police, firefighters, and social workers based in the fire department. Recruitment flyers and study information were shared through email and first responders who were interested in participating in the study were asked to contact members of the research team for more information and eligibility screening. First responders were screened for inclusion criteria which required study participants to have at least one year of experience in their professional role, speak English, and be above 18 years of age. Participants who met the inclusion criteria were invited to participate in the study. The final first responder sample consisted of 32 individuals.

All the first responders were based in King County within geographic areas that included Seattle, Shoreline, Snoqualmie, Redmond, Bothell, Bellevue, and Kent. Participant demographic information on age, race and/or ethnicity, gender identity, professional role, educational attainment, and length of service were collected.

Parent Study: Recruitment of PWUD

PWUD were recruited from three different community services locations which included the People's Harm Reduction Alliance (PHRA) at the University District Exchange and Aurora Drop In as well as a mobile medical clinic in Kent, organized by Public Health - Seattle & King County (PHSKC). Similarly, recruitment flyers and information regarding the study were also shared with the participating community service locations. PWUDs who were interested in participating in the study were encouraged to contact the research team for more information on the study and screening for eligibility. PWUD were also screened for inclusion criteria which required study participants to speak English, be above 18 years of age, and have had a first responder encounter in the past 12 months to participate in the study. The final PWUD sample consisted of 13 individuals. Participant demographic information on age, race and/or ethnicity, gender identity, drug of choice, frequency of use, and length of time using drugs were collected.

2.2. Data Collection

Parent Study: Changing Overdose Response with Emergency Services (CORES) Study

The interviews for first responders and PWUD were conducted by two researchers from the READU team where an academically trained researcher was in most cases, accompanied by a community co-researcher (CW, GW, NH, DP, JVD). The interviews were conducted until data

saturation was achieved. Saturation is defined here as the degree to which no new data or themes are emerging, and the new data is a repetition of the previous data.[50] All interviews were audio-recorded and transcribed verbatim using a professional transcription service. The transcripts were de-identified and all identifying information about the participants was removed. The audio recordings were then destroyed to protect the privacy and confidentiality of the study participants.

Parent Study: Interviews with First Responders, Mobile Clinic Staff, and EMS Leaders

Semi-structured interviews for first responders were conducted between March 2022 and June 2022 using the online teleconferencing platform Zoom. The interviews lasted approximately 30 to 90 minutes. The interview guide for first responders included questions about perceptions of first responder distribution of SUS in post-overdose emergency-response settings, current or potential protocols for the distribution of SUS, and implementation considerations and suggestions for SUS, in addition to questions about other evidence-based interventions for PWUD (Appendix B). The interview guide for first responders, which was informed by the Consolidated Framework for Implementation Research (CFIR)[51] and the risk environment framework,[45] was revised iteratively after the initial interviews.

Parent Study: Interviews with PWUD

Semi-structured interviews for PWUD were conducted in person at private spaces provided by the participating community services locations between May 2022 and June 2022. The interviews lasted approximately 15 to 45 minutes. The interview guide for PWUD included questions about perceptions of fentanyl, personal fentanyl use, experiences with adulteration, experiences using fentanyl test strips or other DCS, perceptions of DCS, implementation

suggestions for DCS, and outcomes following the use of DCS, in addition to questions about interactions with first responders and other evidence-based interventions (Appendix B). The interview guide for PWUD, which was also informed by the CFIR[51] and the risk environment framework,[45] underwent multiple revisions after the initial interviews.

Sub Study: Assessing First Responders and PWUDs' Perceptions of Fentanyl and DCS

Interview questions pertaining to the present study were developed by BG in collaboration with the principal investigator of the parent study, JVD. The interview questions for the sub-study were incorporated into the interview guides for the parent study. As a sub-study of the larger parent study, the analysis of the present study will focus specifically on data from the first responder (n=32) and PWUD (n=13) sample pertaining to DCS, SUS, and fentanyl. The larger parent study, including all interview questions asked for the present study, was reviewed by the University of Washington's Institutional Review Board, Human Subjects Division (HSD) and deemed exempt.

2.3. Data Analysis

Sub Study Analysis: First Responders, Mobile Clinic Staff, and EMS Leaders Dataset

The qualitative data from the interviews with first responders and PWUD were analyzed using the six phases of thematic analysis.[52] First, two researchers from the READU team reviewed each transcript for accuracy and noted initial impressions, observations, and insights during the data familiarization phase (BG, CF, CW, GW, NH, TF, JVD). The preliminary codebooks, for both the first responders and PWUD interviews, were developed iteratively through a hybrid deductive-inductive thematic approach.[52] An initial set of codes in the

preliminary codebooks were derived deductively from the literature, conceptual frameworks, interview guides, and research questions. Additionally, codes were also derived inductively from concepts that emerged directly from the qualitative data. The READU team then grouped their initial observations and insights from the transcripts to create additional codes and grouped those codes conceptually with the deductively generated codes to create a preliminary codebook.

Researchers from the READU team engaged in line-by-line group coding, using a qualitative and mixed methods data management software (Dedoose; SocioCultural Research Consultants, LLC, Manhattan Beach, CA), of a rich transcript from each dataset. The preliminary codebooks were applied to the rich transcripts and any disagreements in code applications were identified and reconciled. The codebooks were revised during the first round of coding as new codes and detailed descriptions of the codes were added, while others were modified, deleted, or regrouped. The finalized codebooks were then applied by the READU team to the datasets through a round of primary coding and a round of secondary coding. After primary coding was completed, all transcripts were reviewed by another researcher through a round of secondary coding to reconcile any differences, reach a consensus, and establish inter-coder reliability.

BG then collated and organized the extracts of the codes relevant to the present study and examined the collected data to generate initial themes from the data. The initial themes were reviewed and checked with the coded extracts and the datasets.[52] The themes were further analyzed and refined to narrow their scope and focus and to generate informative names.[52] Lastly, the extracts and the themes were integrated, linked back to the research questions and existing literature, and presented back to the READU team for review and feedback.[52]

Sub-Study Analysis: PWUD Dataset

Similarly, BG developed the preliminary codebook for the PWUD interviews with researchers from the READU team by first gaining familiarity with the transcripts and noting initial impressions, which were used to inform the development of the initial codes. Codebook development and line-by-line coding followed the same process described above for the first responders' dataset, with the READU team collaborating in the coding process. As with the other process, BG led the collation of extracts and the analysis of themes and presented the preliminary themes back to the READU team for review.

3. RESULTS

3.1. Participant Demographics

The final first responder sample consisted of 32 participants while the final PWUD sample consisted of 13 participants. First responder participants were 6.5% trans, non-binary, or gender non-conforming, 13% racially and ethnically diverse, most were above the age of 36 (range 20-65) with at least some college education, and most had been in their current role for more than 10 years and (Table 1). Less than half of the interviews were conducted with mobile integrated health (MIH) (n=9) or mobile clinic staff (n=4), while the majority of interviewees were engaged in acute emergency response or management (n=18). PWUD participants were 7.7% trans, non-binary, or gender non-conforming, 62% racially and ethnically diverse, most were under the age of 45 (range 26-55), most reported using substances daily, and most reported fentanyl as their drug of choice (Table 2).

Table 1. First responder demographic information (n=32)

Characteristics	n (%*)
Age (years)	
20-25	2 (6.3%)
26-35	5 (15.6%)
36-45	11 (34.4%)
46-55	6 (18.8%)
56-65	8 (25%)
Gender	
Male	20 (62.5%)
Female	10 (31.3%)
Trans, non-binary, or gender non-conforming	2 (6.3%)
Race and/or ethnicity	
White	28 (87.5%)
Asian or Pacific Islander	2 (6.3%)
Hispanic	1 (3.1%)
Mixed race	1 (3.1%)
Professional role	
Basic life support providers (i.e., firefighter/emergency medical technicians)	8 (25%)
Advanced life support providers (i.e., paramedics)	6 (18.8%)
Police officers	5 (15.6%)
Nurses and advanced registered nurse practitioners	3 (9.4%)
Community paramedicine behavioral health providers or social workers	5 (15.6%)
EMS leadership or management	5 (15.6%)
Length of service (years)	
< 1	2 (6.3%)
1-4	8 (25%)
5-9	3 (9.4%)
10-19	8 (25%)
> 20	11 (34.4%)
Highest level of educational attainment	
Associate degree/technical certification	8 (25%)
Bachelor's degree	8 (25%)
Master's degree	10 (31.3%)
Doctoral degree	2 (6.3%)
Unspecified	4 (12.5%)

*Percentages may not sum up to 100% due to rounding to one decimal place.

Table 2. PWUD demographic information (n=13)

Characteristics	n (%*)
Age (years)	
26-35	6
36-45	4
46-55	1
Unspecified	2
Gender	
Male	8
Female	2
Trans, non-binary, or gender non-conforming	1
Unspecified	2
Race and/or ethnicity	
White	4
American Indian or Alaska Native	1

Hispanic	2
Mixed race	3
Unspecified	3
Drug of choice	
Fentanyl	4
Non-fentanyl opioids	2
Methamphetamine	2
Cocaine	1
Marijuana	3
Multiple or polysubstance use	1
Frequency of use	
Daily	10
Multiple days a week	1
Multiple times a month	1
Unspecified	1
Length of use (years)	
< 1	1
3-4	1
5-9	4
10-14	3
> 15	1
Unspecified	3

*Percentages may not sum up to 100% due to rounding to one decimal place.

3.2. Perceptions of Fentanyl

First Responder Dataset

1. The introduction of fentanyl changed the drug supply and the drug use landscape

Thematic analysis revealed that first responders perceived the drug supply to be saturated with fentanyl and fentanyl-adulterated substances. First responders felt that fentanyl adulteration increased both first responders and PWUDs' uncertainty about the contents of substances, especially in the context of overdose events. The saturation and increased presence of fentanyl described by first responders was something they inferred based on their observations of dynamic drug use patterns. First responders believed that there was a growing preference for fentanyl as a drug of choice amongst PWUD and noted a noticeable shift in the drug use landscape from injecting heroin or other non-fentanyl substances to smoking fentanyl pills,

powder, and the use of fentanyl-adulterated substances. A nurse described the increase in fentanyl adulteration in the local drug supply and the changes in the drug use landscape:

> *"It's just because fentanyl is just... It seems like being cut into a lot more substances. I feel like even a year ago, somebody would say like, "Oh, I just use meth, I don't need that." But now more and more people are experiencing overdose from using meth because Fentanyl's been cut in there." – (ID#10)*

Another nurse discussed the polarizing preferences for fentanyl amongst PWUD:

> *"So the drug using community itself vary with the fentanyls now kind of everywhere. There seems to be a delineation between folks who are using fentanyl and those that are not. Those that are using it think it's wonderful and a lot of people come to us, hey, I'm not injecting anymore. I'm smoking blues instead. And we're like, that's kinda great but kinda awful. And then there's the folks that are not touching the blues at all and have a pretty negative perspective on the folks that are using it. So it's been an interesting delineation or still using opioids but just different approaches." – (ID#15)*

2. The introduction of fentanyl amplified the overdose risk environment

First responders believed that the introduction of fentanyl into the drug supply contributed significantly to the volume of EMS responses to overdoses and overdose deaths. Drawing from personal experiences responding to fentanyl-involved overdose events, first responders felt that fentanyl increased PWUDs' overdose risk and uncertainty about their substances. They felt that the increase in fentanyl-involved overdoses and overdose deaths, visible in the surveillance data, was a compelling call to action to address the opioid epidemic. A firefighter described parallels between the trends in the drug supply and overdose trends in the community:

> *"It seems to go in waves, and I'm not sure, it seems like the supply of what's coming in, maybe something, some new pills hit the streets, and we had one day where there were multiple overdoses within the jail, so it was like somehow they got in there and multiple people are ODing over the course of one day. But it seems like a shipment of something comes in and it'll go on a wave where you'll run into a lot of overdoses and then it'll kinda die off for a little bit" – (ID#23)*

3. **Fentanyl changes first responder responses to overdose events**

In addition to the increase in the volume of responses to overdose events, first responders also described changes in their responses and interactions with PWUD, in part due to the greater perceived visibility of PWUD using substances in public spaces. The perceived preference for using substances in public spaces, as opposed to in private settings, was attributed to the switch to smoking fentanyl powder or pills. A few first responders described having more frequent interactions with PWUD in public settings and during responses to fentanyl-related calls. A police officer discussed increased responses and interactions with PWUD in public settings:

> *"It's pretty daily. So we get a lot of people that smoke Fentanyl or other drugs on Metro buses, so that's pretty much about daily we get calls about people that are using drugs on the bus, and then throughout our patrol, we encounter people just riding our bikes in the downtown core Seattle that are either overdosing on drugs or shooting up or what have you." – (ID#31)*

Additionally, first responders discussed the greater need for MNA to reverse an overdose involving fentanyl when compared to overdose events involving less potent opioids. The need for MNA to reverse an overdose was often an indication of a fentanyl-involved overdose. Although they acknowledged the efficacy of naloxone in reducing opioid overdoses, they expressed concerns regarding its efficacy in reversing a fentanyl-involved overdose and noted its limitations, as described by a paramedic:

> *"We're seeing so much more fentanyl and it's like... Narcan, Naloxone, it's not gonna make that big of a difference in some of these instances because of the dosage and the strength." – (ID#25)*

PWUD Dataset

4. **Polarizing preferences for fentanyl**

Thematic analysis revealed PWUDs' sharply contrasting views of and preferences for fentanyl where people who use fentanyl (PWUF) intentionally reported fentanyl as their drug of

choice while other PWUDs expressed aversion to fentanyl and fentanyl-adulterated substances. A smaller subset of PWUD who did not report fentanyl as a drug of choice shared a willingness to use fentanyl-adulterated substances. PWUF held positive perceptions of fentanyl and were not concerned with fentanyl adulteration as they believed that fentanyl was present in all substances or were specifically seeking out fentanyl to use. They expressed a preference for smoking fentanyl pills or powder as opposed to injecting it. Conversely, PWUD who do not use fentanyl held negative perceptions of fentanyl due to its potency, a greater perceived overdose risk, or past adverse reactions or unpleasant experiences. One person described their aversion to fentanyl:

> *"If I get drugs from an unknown source, or if for some reason something doesn't... Sometimes it's if the high feels different, I test it...That fentanyl stuff is Ugh...Horrible stuff." – (ID#6)*

Another person described the increasing preference for fentanyl as a drug of choice that was evident in the drug use landscape:

> *"I mean, like I saw Seattle had a whole bunch of rigs everywhere. There was needles everywhere at one point and then they cleaned up all the rigs. Now there's foil everywhere. So, the power of a blue pill man. That's very right." – (ID#1)*

5. The saturation of the drug supply with fentanyl

Similarly, to first responders, PWUD felt that the drug supply was saturated with fentanyl and fentanyl-adulterated substances. PWUD felt that it was increasingly common for other substances, including non-opioid substances, to be mixed or contaminated with fentanyl. They believed that fentanyl was widely circulating as an adulterant in the drug supply and expected fentanyl to be present in most substances, including their substances. This assumption regarding the ubiquity of fentanyl in the drug supply was of particular concern to PWUD who do not use fentanyl. They held the belief that there was a high probability that they had used fentanyl-

adulterated substances unknowingly and unintentionally, given the prevalence of fentanyl adulteration. When asked about their intentional use of fentanyl, one person answered:

> *"Never, not to my knowledge...I'm pretty sure I may have, but not intentionally." – (ID#7)*

Another person described substances adulterated with large amounts of fentanyl:

> *"I don't know, probably not. I mean, truthfully [...] these days people put so much in the drug, that could be the only thing that's in... Is the actual opiate in drugs." – (ID#10)*

6. Suspicions of fentanyl adulteration and a greater perceived overdose risk

Fentanyl adulteration changed the drug use landscape, especially for PWUD who do not enjoy using fentanyl-adulterated substances. PWUD who do not use fentanyl discussed having to engage in harm reduction strategies or take extra precautions to prevent an overdose from fentanyl adulteration. Generally, PWUD expressed a greater uncertainty regarding the safety and contents of their substances due to the lack of complete information on their purity, specifically if their substances are truly what they expected and if fentanyl is present as an adulterant. PWUD described their suspicions of fentanyl adulteration, which may only be confirmed after PWUD use or experience an overdose from using their substances. Suspicions of fentanyl adulteration arose when PWUD felt physiological effects that were contrary to what they would have expected if they were to be using their expected substances. PWUD described indications of fentanyl adulteration which include different euphoric effects, uncomfortable physical reactions or sensations, or different chemical drug reactions when preparing substances for use. Experiencing an overdose after the use of their substances or witnessing peers, who used substances from the same supply, experience an overdose were also other indicators of fentanyl adulteration, as one person described:

> *"Because like I'm saying, 90% of our crystal has got that crap in it, and there's no way to know until you smoke it or slammed it and then you're on the ground." – (ID#13)*

PWUD also believed that the use of fentanyl or fentanyl-adulterated substances was associated with a greater overdose risk due to the high potency of fentanyl, and this concern was especially prominent amongst PWUD who do not use fentanyl. PWUD discussed the strong effects of fentanyl and drew from personal experiences with overdose or witnessing or hearing about peers' experiences with overdose from using fentanyl-adulterated substances. They also shared difficulties with identifying fentanyl adulteration prior to using their substances and expressed concerns about how it may not be possible to confirm fentanyl adulteration until an overdose occurs. A participant discussed the strong effects of fentanyl and overdose risk, saying:

> *"I expect it to be there. I expect it to be 'cause it's in everything right now. The fentanyl just, man... The effect of fentanyl is no joke man. I don't know what to do, you might pass out. I don't know. What can you to. It'd be too late, you can't do anything. If it's in it, you're gonna go... You're gonna drop. Make sure you got your Narcan." – (ID#1)*

7. Source of drugs as an indicator of safety

Some PWUDs also believed that the source of their drugs was an accurate indicator of safety and fentanyl-free substances while others expressed distrust of all drug sources. Some PWUDs expressed trust in drug suppliers with whom they have established trusting relationships and have demonstrated consistent quality with their products. They discussed frequent use of the same sources that they are familiar with and perceived a low overdose risk associated with using them. Inversely, other PWUDs expressed distrust of unknown drug sources or suppliers, who may intentionally sell fentanyl-adulterated substances or products of poorer quality, and an unwillingness to purchase from unfamiliar sources. One person expressed their distrust of unfamiliar drug suppliers:

> *"Why, I don't because sometimes there's shady characters out there. But for the most part, I try not to buy off people that I really don't know." – (ID#9)*

Another person expressed their trust in the source of their drugs:

> *"Just because, basically I trust the source that I get my stuff from. It's been consistently okay, and I don't have the... Like I don't need to shoot all the time or whatever. It's kind of a... I kinda use it as a prolonging, conservative really, least way to conserve." – (ID#12)*

3.3. Perceptions of SUS

First Responder Dataset

There was mixed support for the distribution of SUS where the first responders interviewed expressed a full range of support, opposition to, and concern for their involvement and their agency's involvement. The negative perceptions were a relatively stronger theme in this dataset. In most cases, participants distinguished specific SUS that they would prefer to distribute, with fentanyl test strips being the most common. Each theme below outlines the dichotomy between positive and negative first responder perceptions of SUS and reasons for their support for or opposition to first responder distribution of SUS.

8. Efficacy of SUS as harm reduction tools

First responders had diverging perceptions regarding the efficacy of SUS in reducing PWUDs' overdose risk and other harms. Some first responders believed that first responders' distribution of SUS would provide safer options for PWUD and promote their health and well-being, through the prevention of injuries and overdoses. They believed that SUS had the potential to promote safer use behaviors and reduce PWUDs' overdose risk by allowing PWUDs to make informed decisions about their drug use and health based on complete information. Additionally, these first responders felt that the broad distribution of SUS could be leveraged as a tool to address the opioid epidemic. A paramedic described the potential efficacy of SUS in encouraging PWUDs' engagement in harm reduction strategies:

> *"But maybe it would help them decide maybe, now I won't take my normal amount that I usually take. And maybe I'll reduce it down a little bit." – (ID#22)*

Other first responders were concerned that the distribution of SUS would enable substance use and potentially lead to or exacerbate substance use disorders. These first responders were reluctant to endorse substance use and believed that the distribution of SUS would perpetuate a cycle of harm and lead to more overdoses and overdose deaths. They expressed concerns about community perceptions of SUS distribution and how their involvement in its distribution could contribute directly to overdoses, which they would have to respond to. First responders drew from direct experiences with witnessing or responding to overdoses, which they felt made it difficult to justify the distribution of SUS to PWUD, whom they cared about. They discussed concerns that SUS may potentially deter PWUD from engaging with treatment and other services as these first responders believed that complete abstinence from using substances was most effective in preventing overdoses. This perspective was endorsed by some of the firefighters, police, and interviewees in EMS leadership or managerial positions.

Some first responders also felt that SUS distribution did not align with their goals of addressing the root causes of the opioid epidemic and was incongruent and in tension with first responders' call of duty to help PWUD and to improve their lives. First responders' philosophy, morals, and personal beliefs, especially as they pertained to harm reduction, also shaped this view. A police officer shared their opinion on how the distribution of SUS may potentially enable substance use and lead to an overdose:

> *"And so I understand the logic behind it. But also as a society, I think it's hard to tell somebody that you care about them and want to wanna keep them safe while giving them the same tools that they use to kill themselves slowly but surely." – (ID#32)*

Some first responders also believed that SUS had low utility for PWUD and low efficacy in promoting safer use behaviors. Specifically, some first responders felt that SUS may only be

useful for PWUD who do not use fentanyl and are concerned about fentanyl adulteration. They felt that the time, resource, and effort burdens were potential deterrents for PWUD to use SUS and to engage in safer use behaviors. These first responders also expressed the belief that the results from DCS would not influence PWUDs' drug use, especially PWUD with substance use disorders. First responders felt that SUS would present limited benefits to the community and may be ineffective in reducing overdose risk and other harms, as discussed by a police officer:

> *"I don't know how many of these people would actually take the time to take a little chunk of their pill off, dissolve it in some water and test it versus I'm very desperate to get high and they will just flat out smoke it right away, or they will just swallow the pill itself." – (ID#30)*

9. Feasibility and acceptability of first responder distribution of SUS

In terms of implementation, some first responders believed that SUS distribution was a feasible and acceptable short intervention, given the scope of their roles and duties. These first responders discussed that it would be easy and appropriate for them to distribute SUS and expressed interest in participating in its distribution. They anticipated few implementation barriers and believed that it would not require additional training and could be easily integrated into the current workflow. This group of first responders felt that it would be helpful and desirable to increase access to take-home SUS for PWUD. A nurse discussed the prospects of distributing SUS:

> *"I mean, it's pretty straightforward. I think like assembling kits can become at times consuming but other than that, like it's yeah, pretty straightforward as long as you're able to order all of the supplies and keep them stocked and make the kits. Yeah, and I don't think it requires a ton of training. I think it's mostly just offering it to people and, making it available." – (ID#14)*

However, another group of first responders felt that it was beyond their scope of duty and conflicted with their role, which was to respond to acute emergencies and provide immediate medical attention under the rapid service delivery model. First responders discussed concerns of

role conflict and mission creep as they felt that the distribution of SUS was incompatible with their workflow and mission to save lives and help members of the community. This group of first responders also anticipated low buy-in and push-back from their colleagues, the public, and leadership. They felt that the perceived lack of support was an implementation barrier that had the potential to influence the success and effectiveness of the intervention. A firefighter discussed concerns regarding their agency's capacity to distribute SUS:

> *"Honestly, because of where I work, no. For the reason of maybe full capacity, I don't wanna say stigma, but once you get away from life safety, emergent. Like, "Oh, we wanna talk about the choices. Well then let's sit around and talk about choices. Do you have Jesus in your heart?", right? And you're like, "Oh, I don't wanna have that conversation. That's unprofessional." Well, we've gotten away from life safety now, right? We've gotten away from emergencies, and now we're talking about maintaining." – (ID#26)*

10. Distribution of SUS facilitates engagement with PWUD

Lastly, some first responders believed that SUS distribution had the potential to improve engagement and facilitate relationship-building with PWUD. These first responders felt that their connections and existing interactions with PWUD in community settings provided a prime opportunity to distribute SUS, by meeting PWUD where they are. They expressed a desire to leverage existing interactions by using them as starting point for conversation and education to encourage the adoption of harm reduction strategies and serve as a point of entry for more prolonged care. First responders felt that the distribution of SUS had the potential to support them in providing compassionate care, that is free of judgment, and build trusting connections with PWUD, as described by a firefighter:

> *"We would get more buy-in from that person. They would immediately believe like, "Oh my gosh, this person actually isn't judging me and think I'm a horrible human being, they actually wanna talk," and that actually could potentially open that person up to, maybe it's suboxone or maybe it's some sort of treatment or point them in the right direction, 'cause it would immediately change the patient-provider relationship to a... I think you would gain trust from a lot of people that you would normally not have that connection with." – (ID#12)*

3.4. Perceptions of DCS

PWUD Dataset

There was mixed support for the distribution of DCS where PWUD expressed both interest and disinterest in using DCS. Generally, people who did not use fentanyl expressed an interest in using DCS while PWUF expressed a disinterest in using DCS, as fentanyl adulteration was not a personal concern. The negative perceptions of DCS were a relatively stronger theme in this dataset. Similarly, each theme presents the dichotomy between positive and negative PWUDs' perceptions of DCS and reasons for their interest or disinterest in using DCS.

11. Feasibility and utility of DCS for PWUD

PWUD had contrasting views of the feasibility and utility of DCS, which were important considerations in their decision to use DCS. Some PWUDs expressed favorable views of DCS and interest in using them as they felt that DCS was a helpful and useful service to have available for overdose prevention. PWUD were curious about the contents of their substances and interested in analyzing them for adulterants such as fentanyl or other specific substances. Some PWUDs cited uncertainty and suspicions of fentanyl adulteration as strong motivators to use DCS, especially when they were using substances obtained from unfamiliar drug sources. DCS was perceived to provide information on the safety of PWUDs' substances and confirmation on whether the substances they intended to use were expected substances. A few PWUF discussed the use of DCS to test for fentanyl in their substances as they were actively seeking out fentanyl in the drug supply.

PWUD also felt that the results from DCS provided reassurance and certainty regarding their substances and addressed concerns about their personal safety and overdose risk due to

fentanyl adulteration. They believed that DCS allowed for informed decision-making by providing complete information and encouraging PWUD to take the necessary precautions to prevent an overdose. This view was endorsed by PWUD who do not use fentanyl who also discussed the use of DCS in combination with other harm reduction strategies or in their place. PWUD also discussed sharing DCS, specifically fentanyl test strips, with their peers out of concern for their safety or at their request. One person discussed the interest in fentanyl and testing substances for fentanyl adulteration:

> *"Well, people are very intrigued with how much Fentanyl is in everything. So a lot of people want to know, is there Fentanyl in all the drugs? So yeah. People are very curious now in this time and day right now, so yeah. And there's Fentanyl in everything, in Meth, Crack, in every drug, you'd be surprised. There's fentanyl in it. It's weird. It is..." – (ID#1)*

In contrast, other PWUDs believed that DCS would not be feasible and that the results from DCS would not be relevant or useful as fentanyl adulteration was not a personal concern. PWUD cited time, resource, and effort burdens to using DCS and a perceived lack of control as a consumer. PWUD also expressed concerns that other PWUDs may not be willing to use DCS, out of convenience, when trying to use their substances. These perceptions also arose due to a low perceived risk of overdose or a high degree of existing use of harm reduction strategies. PWUF were also not curious about the contents of their substances or interested in analyzing them as they had a personal preference for fentanyl as a drug of choice, held the assumption that fentanyl is present in all substances, and trusted their substances and drug source. Some PWUD also discussed the lack of accuracy and low efficacy of DCS, especially fentanyl test strips. They felt that fentanyl test strips had the tendency to produce inaccurate (i.e., false positives) or inconclusive results and were also ineffective as they only indicated the presence or absence of fentanyl, rather than the amount of fentanyl, as described by a person:

> *"'Cause all it's gonna tell you is if it has fentanyl in it or not, that doesn't... There's people that are addicted to fentanyl, just because it says it has fentanyl it doesn't prevent me a fentanyl user if I'm overdosing on fentanyl, because one pill might be... Not have that much fentanyl in it, but the other one might have a lot of it. It might help if it tells you the percentage of fentanyl, that way I would know, Hey, make... Take a smaller hit or I don't know." – (ID#11)*

12. Impact of results from DCS on drug use behaviors

Some PWUD expressed that a positive result for fentanyl adulteration would encourage PWUD to take extra precautions by prompting them to use a smaller amount, forgo using their substances, or dispose of their drugs to prevent an overdose. Some PWUDs expressed comfort and ease in informing the source of their drugs about fentanyl adulteration to return fentanyl-adulterated substances, obtain a refund, or exchange them for substances that do not contain fentanyl. Other PWUD would notify their peers about the fentanyl-adulterated substances, sell fentanyl-adulterated substances to PWUF, or change the source of their drugs due to wariness. These were views that were specifically endorsed by PWUD who do not use fentanyl and who were concerned with fentanyl adulteration.

> *"I would let the person I got it from know and see maybe if I could exchange it or sell to somebody who wanted it, so I could get something that didn't have it in it...I wouldn't do it 'cause I'm very sensitive." – (ID#12)*

Another group of participants believed that the results from DCS would not influence PWUDs' behaviors or prevent an overdose as PWUDs may choose not to engage in safer use behaviors. PWUF believed that the results from DCS would not change their own drug use behaviors or their peers' behaviors as PWUD may still choose to use fentanyl-adulterated substances despite the results from DCS. They also expressed either a strong preference for fentanyl as a drug of choice or a willingness to use fentanyl-adulterated substances, with some PWUD expecting the presence of fentanyl in all substances. PWUF also believed that the results from DCS were not informative and anticipated that other PWUD would not be willing to use

DCS when using their substances. When asked about the precautions they might take to prevent an overdose, a person who uses fentanyl shared:

> ***"****Yeah, probably. If it was something that I wasn't looking for, yeah, I'd probably be a little more precaution on what I use but since it's something I'm looking for then..." – (ID#9)*

13. Lack of connections to DCS as a barrier to access

PWUD who were aware of where to find DCS and who had access to DCS through peers or personal connections perceived low barriers to accessing DCS. They felt that DCS were easy to access, widely distributed, well supplied, and well promoted within the community. PWUD discussed accessing DCS through community service organizations and mobile medical outreach programs in the community, that offer DCS in addition to other harm reduction supplies. They held positive perceptions of community service organizations, with some PWUDs expressing a preference for accessing DCS at these organizations or at clinics, where the staff had the necessary training and expertise to use laboratory-based DCS. Despite this trust in community service organizations, most PWUDs expressed a preference for take-home DCS, such as fentanyl test strips, so that they would be able to use their substances and test them in private settings. They expressed feasibility concerns about testing their substances at community service organizations and held the belief that other PWUD would also prefer to use DCS in private, as described by one person:

> *"I don't think nobody wants to pull their drugs out at an organization. Hey, "Can you kindly check it before I smoke it at, here at your guy's place." I think everybody want to take it home." – (ID#7)*

However, other PWUDs felt that there were high barriers to accessing DCS, especially if they did not have knowledge of where to find DCS or had no connections to peers who had access to DCS, especially at community service organizations. Some PWUDs expressed an

interest in using DCS but had limited access to DCS or were only able to access them infrequently as they were difficult to find. Most PWUDs felt that access to DCS should be easy and that they should be promoted and expanded by increasing their saliency in the community. PWUD generally referred to take-home DCS, such as fentanyl test strips, with a few PWUD discussing the difficulties of accessing laboratory-based DCS. Lack of knowledge on how to use DCS appropriately, fear of legal repercussions, and not having enough substances to test were also cited as deterrents to using DCS. When referring to the high barriers to access to DCS, one person stated:

> *"You don't see it much...Give it out like they do fentanyl strips, or have like a store or whatever, where we can go buy this stuff." – (ID#4)*

14. Increasing access and utility to improve DCS

PWUD offered suggestions for increasing the access to and availability of DCS to address high barriers to access to DCS. There was general support for the distribution of take-home DCS, such as fentanyl test strips, through vending machines or drop boxes located in different locations and settings such as community service organizations, encampments, hotel shelters, stores, and more. PWUD believed that fentanyl test strips should be offered at high-density settings and easy-to-access locations. They advocated for increased engagement with and promotion of fentanyl test strips by leveraging and improving the services provided by existing community service organizations and mobile medical outreach programs. PWUD discussed the potential of increasing funding for laboratory-based DCS and potentially promoting the use of DCS to drug suppliers, who may be interested in using DCS. Lastly, PWUD felt that the utility, usability, and capabilities of DCS could be improved by expanding the use of DCS to test for substances other than fentanyl and analyzing the amount or percentage of fentanyl composition in substances, as opposed to the sole detection of the presence or absence of fentanyl. One person

also felt that the instructions for fentanyl test strips could be improved by providing pictures or diagrams and providing additional information on how to apply the results from DCS, as they discussed:

> *"Language. How... Excuse me. The directions are how to apply it, or what you would need to do in case someone... If it does test positive for that, where do you draw the line? There is no line. That's the tricky part...Maybe pictures, picture diagram." – (ID#2)*

Another person discussed expanding access to fentanyl test strips to other locations:

> *"You guys already have it here in the camp place. Maybe you should start at the hotel shelters. There should be in one of those the drop box... The drop machine. There should be one of those located at each one of the hotel shelters, I think." – (ID#11)*

4. DISCUSSION

First responders and PWUD both discussed the growing preference for fentanyl as a drug of choice, the saturation of the drug supply with fentanyl and fentanyl-adulterated substances, and the shift in the drug use landscape from injecting non-fentanyl substances to smoking fentanyl pills or powder. Fentanyl adulteration was perceived to have increased both first responders and PWUDs' uncertainty of the contents of substances, PWUDs' overdose risk, and first responders' responses to overdoses due to its high potency. Some first responders and PWUD felt that DCS had the potential to reduce overdose risk and promote the safety and health of PWUD through harm reduction. They felt that access to DCS could be improved by leveraging existing programs and outreach or engagement opportunities for the distribution of take-home DCS or SUS. First responders and PWUD both had some similar reservations regarding the efficacy and utility of DCS for PWUD, as they felt that DCS may have the highest utility for PWUD who do not use fentanyl and are concerned about fentanyl adulteration. First responders and PWUD expressed concerns that PWUD may be deterred by the time, resource, and effort burdens associated with using DCS and decide to use fentanyl-adulterated substances

or choose not to engage in safer use behaviors despite receiving a positive result for fentanyl adulteration.

Although first responders acknowledged the role of fentanyl adulteration in the opioid epidemic, a subset of first responders expressed the belief that most PWUD were using fentanyl intentionally and that fentanyl was the dominant drug of choice amongst PWUD. This view is contrary to the preferences expressed by PWUD who do not intentionally use fentanyl and are concerned about fentanyl adulteration. PWUD also expressed a preference for using their substances and DCS in private settings as opposed to public spaces, which differs from some first responders' perceptions of the increasing visibility of substance use in public spaces. In contrast to PWUDs' support for harm reduction principles and perceptions of DCS as an overdose prevention tool, some first responders were concerned that the distribution of SUS would enable substance use and contribute to overdoses and overdose deaths. Despite the skepticism expressed by first responders and some PWUD regarding PWUDs' willingness to use DCS and the efficacy of DCS in overdose prevention, a few of the PWUDs in the sample expressed an interest in using DCS and using the results from DCS to inform their drug use. PWUD also cited other reasons, in addition to reasons of convenience that were identified by first responders, for their disinterest in using DCS which included the existing use of harm reduction strategies, trust in the source of their drugs, low perceived feasibility, low perceived efficacy, and fentanyl adulteration not being a personal concern.

4.1. Risk Environment Factors

The results of the study are contextualized in the risk environment framework and the themes were numbered and assigned to the most relevant domain to form a revised conceptual model (Table 3). This conceptualization of the results provides insights into the specific level

and type of risk environments that interventions could potentially address. The themes that emerged from the data focused specifically on the physical, social, and policy risk environments. The economic risk environment was excluded from the conceptual model due to the lack of relevant themes and the greater alignment of themes with other risk environments. Participants in the study did not engage in discussion about the costs of purchasing fentanyl or the limited funding and resources that are available for the provision of DCS and harm reduction supplies. There were also fewer dominant themes in the macro-social environment as there were no discussions on the drug use culture which may include the stigmatization or marginalization of PWUD, health inequities, or abstinence-based approaches compared to harm reduction approaches in substance use. The dominant themes in the physical and social environments indicate an opportunity to address the former by promoting DCS and harm reduction for overdose prevention, and the latter by influencing social norms and relationships between PWUD and their suppliers.

Physical Risk Environment

First responders and PWUDs' perceptions regarding the proliferation of fentanyl and the saturation of the local drug supply with fentanyl-adulterated substances at the macro level are consistent with drug trends in Washington State.[53,54] Fentanyl and its analogs constitute a large percentage of crime lab cases with cases testing positive for each or both doubling in the fourth quarter of 2022 when compared to the average quarter in the prior three years.[53] Seizures of counterfeit fentanyl pills also increased by 264% from 2020 to 2021, particularly in Eastern and Western Washington, due to their geographic prominence in the route of distribution.[53,54] Given the circulation of fentanyl as an adulterant in the national drug supply and the unknown purity and content of substances, many PWUDs have expressed uncertainty and suspicions regarding

fentanyl exposure.[31,35,56,57] As contextualized at the micro level, PWUD have also expressed awareness and concerns of a higher perceived overdose risk and other adverse physiological reactions when using fentanyl.[10,58,59] First responders' perceptions of the impacts of fentanyl adulteration also align with epidemiologic trends, that show rapid growth in fentanyl-involved overdose deaths and non-fatal overdoses treated by EMS in King County, and the need for MNA for overdoses involving fentanyl.[4,5,60,61]

Social Risk Environment

At the micro level, PWUDs' shifting preferences for fentanyl echo previous research which found an increasing preference for fentanyl among PWUDs and a clear distinction between PWUF and PWUD who do not use fentanyl.[9,10,62,63] However in the present study, there was a small subset of PWUD who use fentanyl intentionally, specifically, PWUD who were willing to use fentanyl-adulterated substances, who do not have a preference for fentanyl as a drug of choice and were not personally concerned about fentanyl adulteration. PWUDs who use fentanyl-adulterated substances may use them due to feasibility concerns and the lack of fentanyl-free alternatives. PWUD in other studies have also expressed trust in their suppliers and distrust in unknown sources based on the length of time of the relationship, the consistency of the drug supply, and communication with their suppliers.[10,64]

The potential barriers and facilitators to using DCS that were raised in this study are consistent with the literature. PWUD identified motivations for use which included concerns about the contents of drugs, adverse health consequences or overdose risk, previous experiences of negative physiological effects, and distrust of the source.[31,40,64] Conversely, barriers to using DCS included disinterest in the contents of their substances, trust in their source, accessibility of DCS, and limited or inaccurate results.[40,64,65] If PWUD received a positive test result for fentanyl

adulteration, some shared that they would abstain from using their substances, dispose of them, confront suppliers, or cease purchases from that supplier.[35,59] Although most of the literature has found a high level of acceptability and self-reported behavior change among PWUD who used DCS, many of the PWUD in this study expressed that they would not engage in harm reduction strategies if they received a positive test result for fentanyl adulteration.[31,35,40] PWUDs' disinterest in using DCS, when it appeared in this study, was due largely to their existing engagement in harm reduction strategies and the perceptions of the ubiquity of fentanyl. At the macro level, first responders' concerns regarding the efficacy of DCS as a harm reduction tool can be ascribed to stigma toward substance use and PWUD.[66-68] While most first responders in the study expressed skepticism of harm reduction, as consistent with the literature, a subset of first responders felt that the distribution of SUS had the potential to promote the health of PWUD.[66-69] There was tension in this group, similar to what has been reported in other studies, between wanting to prevent overdoses and not wanting to enable substance use.[21,68]

Policy Risk Environment

Existing literature has also cited structural barriers that PWUDs face such as the low availability of DCS, physical barriers to accessing DCS, and knowledge of where to access DCS.[65,70,71] Evidence suggests that community service organizations such as syringe service programs, serve a small proportion of PWUD in the community and that PWUD who are not frequent clients may have limited contact with these services.[28,72] In this study, the lack of existing connections with peers who have access to DCS and community service organizations served as a barrier to access for PWUD. To reduce these barriers to access, PWUD suggested increasing the availability of DCS at a range of public locations with most PWUD expressing a preference for using fentanyl test strips in private settings.[35,69,73] The results from this study also

align with a pilot study of law enforcement and community distribution of fentanyl test strips, where law enforcement officers discussed the high feasibility of distributing fentanyl test strips with community partners and its utility in supporting engagement with PWUD.[69] First responders' ambivalence in supporting harm reduction interventions, due to a desire to make a bigger impact and to address upstream root causes, is also echoed in the literature.[21,68]

Table 3. Conceptual understanding and visualization of the themes*

	Levels of Environmental Influence	
Types of Environments	**Micro Environment**	**Macro Environment**
Physical Environment *Risk*	2. The introduction of fentanyl amplified the overdose risk environment 3. Fentanyl changes first responder responses to overdose events 6. Suspicions of fentanyl adulteration and a greater perceived overdose risk	1. The introduction of fentanyl changed the drug supply and the drug use landscape 5. The saturation of the drug supply with fentanyl
Social Environment *Risk* *Intervention*	4. Polarizing preferences for fentanyl 7. Source of drugs as an indicator of safety 11. Feasibility and utility of DCS for PWUD 12. Impact of results from DCS on drug use behaviors	 8. Efficacy of SUS as harm reduction tools
Policy Environment *Intervention*	13. Lack of connections to DCS as a barrier to access 14. Increasing access and utility to improve DCS	9. Feasibility and acceptability of first responder distribution of SUS 10. Distribution of SUS facilitates engagement with PWUD

*Themes were assigned to the domain that they aligned with the most. There was significant overlap of the themes across the domains.

4.2. Recommendations

Currently, PHSKC is considering the implementation of a public health intervention, involving the expansion of DCS which will involve the large-scale distribution of fentanyl test strips (as of November 2022). The final study results were presented back to the READU team, who provided assistance with the generation of recommendations and the contextualization of the study findings and their implications in King County. This research offers the foundation for the following recommendations for the future implementation of DCS, to promote the uptake of DCS in King County:

1) Despite its benefits, DCS may only be useful for a subset of PWUD, specifically for PWUD who do not use fentanyl and are concerned with fentanyl adulteration. Thus, interventions involving DCS should clearly distinguish between PWUF and PWUD who do not use fentanyl, and tailor relevant harm reduction strategies to each population.
2) DCS should be widely promoted specifically amongst PWUD who do not use fentanyl and who may be interested in other methods or indicators for identifying fentanyl adulteration, avoiding it, and mitigating the effects of using fentanyl-adulterated substances with other harm reduction strategies. DCS should also be promoted or marketed to people who do not use opioids and other PWUDs. To increase the perceived utility of DCS, interventions should emphasize the unpredictable and increasing potency of fentanyl and how DCS can be used to test for substances other than fentanyl.
3) Education is necessary to combat misinformation regarding fentanyl among PWUD and first responders. The risks associated with using fentanyl or fentanyl-adulterated substances should be clearly communicated to PWUD, with a particular focus on addressing the lower perceived overdose risk associated with smoking fentanyl. First responders' perceived risk of experiencing an overdose due to occupational exposure to fentanyl should also be addressed in addition to the stigmatization of PWUD.
4) When considering barriers to access and availability, fentanyl test strips may offer the most utility and feasibility for PWUD. They should be distributed and offered in different community settings, especially at salient and easily accessible locations.

5) DCS should be promoted in conjunction with other SUS or strategies, as part of a broader harm reduction toolkit to reduce PWUDs' overdose risk. Some examples of harm reduction strategies may include using in the presence of others, using a tester, or slowing the pace of use.[28,30-32]
6) Peer-led interventions and engagement with PWUD have the potential to promote knowledge and uptake of DCS in the community.[37,73] Trusted social networks within the PWUD community could provide tangible support and access to DCS for PWUD.[59,69] These interventions should focus on PWUDs' curiosity about the contents of their substances, safety concerns about their overdose risk, and meaningful and useful application of the results from DCS. Existing interventions and community service organizations should be uplifted and strengthened through the provision of additional funding and resources to support peer work.
7) DCS may have particular utility for people who sell drugs, who may potentially want additional knowledge of the contents of the substances they are selling, due to the potential for the adulteration of substances higher up in the distribution chains (i.e., the wholesale level).[9,10,64]
8) Emphasizing to first responders that DCS reduces harm and overdose, improves interactions with PWUD, and promotes public safety, may help to mobilize support for the widespread implementation of DCS in King County. There is a need to advocate for the adoption and integration of harm reduction principles in first responder agencies and practices, to ensure its alignment with interventions involving DCS.

9) If DCS such as fentanyl test strips were to be distributed by first responders (or co-responder teams) in post-overdose emergency-response settings, its implementation must account for existing roles and capacities to reduce logistical barriers to facilitate adoption.

4.3. Implications and Future Directions

Thus far, most research has focused exclusively on PWUDs' perceptions of DCS, of who are the intended end-users of DCS. This study contributes the perspectives of first responders, who are important stakeholders who have the potential to influence the implementation of DCS. These results also contribute to the growing body of evidence supporting the utility of DCS as a harm reduction intervention to prevent overdoses and overdose deaths. As harm reduction interventions continue to expand across the country, these results may be applicable to other geographic areas or contexts. The results of the study may also be extrapolated to other emerging harm reduction supplies, such as xylazine test strips, that may be used to address the emergence of new analogs or adulterants in the evolving drug supply.

Further research on improving the utility of DCS and advancing innovation for DCS technology and services is warranted. Future research should explore PWUDs' motivations and facilitators for protective behavior change based on the results from DCS, especially with PWUDs who do not use fentanyl or who are concerned about fentanyl adulteration. The feasibility and acceptability of the recommended strategies for stakeholder engagement in this study, to increase the buy-in and uptake of DCS, should also be explored. Finally, research should further evaluate the implementation of interventions involving DCS and its efficacy in preventing overdoses and overdose deaths, given the recent legislative changes surrounding the criminalization of drug possession (i.e., Senate Bill 5536) in Washington State.[74]

4.4. Strengths and Limitations

This study assessed first responders' perceptions of fentanyl and SUS and PWUDs' perceptions of fentanyl and DCS. There are several limitations to this study. The results of the study may have limited generalizability to other drug use and service landscapes across the country, due to the location specificity. Additionally, the convenience sampling approach may have introduced bias and further limited generalizability to other first responder and PWUD populations. PWUF were overrepresented in the PWUD sample, which may have accounted for the relatively stronger negative perceptions of DCS, due to its low perceived utility and relevance. The PWUD sample, who were recruited from community service organizations that supplied DCS, may also have different socio-demographic characteristics, drug use behaviors, and overdose risks. First responders were not explicitly interviewed on their perceptions of fentanyl but rather, the themes that emerged on the perceptions of fentanyl were derived from unprompted discussions of fentanyl, which may have limited the elicitation of specific themes regarding first responder perceptions of fentanyl. Although the diversity of professional roles for the first responder sample was a strength of the study, it limits our ability to discern specific themes that were unique among subsets of first responders. Due to the different information needs of first responders and PWUD, the study assessed perceptions of SUS in first responders, rather than DCS, which may have influenced the alignment of results with the PWUD dataset.

Despite these limitations, this is the first study to our knowledge to have assessed and integrated both first responders and PWUDs' perceptions of fentanyl and DCS to inform recommendations for the wide-scale implementation of DCS. The comparison of first responders and PWUDs' perceptions of fentanyl and DCS provided a holistic understanding of the drug use landscape and overdose risk environment with implications for the implementation of DCS in

King County. The study was able to capture nuances across and within datasets based on the wide range of perspectives and experiences that first responders and PWUD brought. The variety of first responders in the sample and the inclusion of co-responders provided a breadth of perspectives and responses that contributed to the richness of the data. Finally, this research took a community-engaged approach that involved and centered the experiences and perspectives of people with lived and living experiences of drug use.

5. CONCLUSION

This study builds on the growing body of evidence on the acceptability and utility of DCS in the context of the drug use landscape and fentanyl overdose risk environment. The results of the study provide insights into the implementation of DCS in King County to increase harm reduction options for PWUD. Some first responders and PWUD expressed support for DCS as a harm reduction tool and an overdose prevention strategy as it allows PWUD to make informed decisions about their drug use and promotes engagement in safer use behaviors. Many of the first responders and PWUDs expressed reservations regarding the efficacy and utility of DCS as they felt that DCS had low feasibility, low utility for PWUDs who were not concerned with fentanyl adulteration, and low efficacy in influencing drug use behaviors and in preventing overdoses. As fentanyl continues to saturate the local drug supply along with the introduction of more potent adulterants, DCS should be promoted as an evidence-based harm reduction intervention. Although DCS holds promise as an overdose prevention strategy, barriers to accessing and using DCS should be addressed before its implementation. Ultimately, the implementation of DCS should incorporate the perspectives and center the needs of PWUD.

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APPENDICES

Appendix A

Conceptual Model of the Fentanyl Overdose Risk Environment

	Levels of Environmental Influence	
Types of Environments	**Micro Environment**	**Macro Environment**
Physical Environment *Risk*	● Lack of safe consumption sites for PWUD to use drugs safely ● Lack of safety when PWUD use substances in public or private spaces ● Limited access to evidence-based medical interventions and consistent healthcare	● Unregulated drug supply in King County, sporadic circulation of fentanyl ● Adulteration of substances ● Drug trafficking and distribution routes facilitated by Washington State's location ● Geographical dispersal and mobility of PWUD
Intervention	● Limited access to harm reduction supplies, such as DCS	
Social Environment *Risk*	● Negative community attitudes towards and perceptions of substance use and harm reduction ● Discriminatory policing practices ● Limited access to high-quality community health and welfare services ● Relationships between suppliers and PWUD	● Stigmatization and marginalization of PWUD ● Growing health inequities and disparities disproportionately impact people with marginalized identities ● Cultural norms and values that discourage substance use and promote abstinence
Intervention	● Peer and social norms regarding substance use and DCS	
Economic Environment *Risk*	● High cost of living and healthcare ● Low employment and income ● Lower costs to purchase fentanyl compared to other substances	● Comparatively lower costs to produce and transport fentanyl or fentanyl-adulterated substances ● Limited funding and support for community health and welfare services ● Discriminatory hiring and employment practices ● Growing economic or income inequality in Washington State and King County
Intervention	● Lack of insurance coverage for health care or harm reduction supplies, such as DCS	● Limited funding for public health and health services spending, especially for harm reduction supplies
Policy Environment *Risk*		● Criminalization of substance use ● Inconsistent policies on drug trafficking and production ● Inconsistent enforcement, policing, and education on the Blake decision ● Limited engagement with PWUD

Intervention	● Low access to and availability of harm reduction supplies, such as DCS ● Limited distribution of DCS such as fentanyl test strips	● Regressive policies on healthcare, welfare, and other sectors of influence ● Inconsistent policies and lack of support for harm reduction

Appendix B

Interview Guide for Mobile Medical Clinic Staff

PERSON 1 - Preamble
Thank you for your willingness to do this interview today and contributing to this study. My name is NAME, and I am a Co-researcher with the University of Washington.

PERSON 2 – *And my name is NAME, and I am also a co-researcher with the University of Washington.*

PERSON 1- *The purpose of this study is to learn about first responders' experiences of responding to the needs of people who use drugs and their perceptions of other services that may be helpful. We will be discussing such topics as: serving people who use drugs and services like take-home naloxone, HIV testing and treatment, among others.*

As we go through the interview, I will be reading questions from a script. Please note that as we go through the questions, I will be asking you to elaborate on many of your answers. This is to ensure we are answering all the questions thoroughly. Please also keep in mind that there are no wrong answers. It is important that you answer as honestly as you can. We rely on your information to help improve emergency services and their ability to meet the needs of people who use drugs. If you have any questions or there is something you don't understand, please stop us and ask for clarification.

We realize that some of the topics covered in this interview are sensitive. If you do not want to answer a question or discuss a topic, just let us know and we will move on.

If you experience any technical issues or are disconnected for any reason, please do your best to reconnect to this zoom link. If this is unsuccessful, feel free to email us and we will troubleshoot with you.

A quick reminder that these interviews will be audio-recorded and transcribed, which means they will be typed out. Your name or other identifying information will be removed from the transcript. All the information you provide will be kept confidential and the audio files will be stored securely. We never include any information that could identify an individual in any publications or reports.

This interview will last approximately 1 hour. If you need a break, let us know and we can stop for a short rest before we finish the interview.

You should have been provided a copy of the consent form when we scheduled this interview. Do you consent to be interviewed? Do you have any questions before we begin? When you are ready, I will start the audio-recorder.
*[**Proceed to Topic Guide**]*

PERSON 2 - Let's start with some questions about your role and the services you provide to people who use drugs.

Role as a first responder and encounters with people who use drugs	
Question	**Probes**
What agency do you work for?	● What is your position at that agency?
Can you walk me through a recent interaction you had at work with a person who uses drugs?	● How did this interaction go? ● Did you feel as though you were able to meet the needs of the person you responded to?
Was this typical of your interactions with people who use drugs?	● **[If answers NO]** what does a "typical" encounter with a person who use drugs look like? ● **[If answers YES]** Have you noticed any themes or patterns in your interactions with people who use drugs?
What would a successful interaction look like between your agency and a person who uses drugs?	● What kinds of support or services would you like to offer people who use drugs?

[Ask partner if he/she has any other questions about their interactions with people who use drugs. Pass the baton to your partner.]

PERSON 1 –
Recent policy changes in Washington State may present an opportunity for first responders to deliver additional evidence-based interventions to people who use drugs during an emergency response. The next set of questions will be about medical services provided by first responders elsewhere in the country.

Medical services for people who use drugs	
Question	**Probes**
Do you have a role in addressing the opioid epidemic?	● How would you describe that role?

Naloxone is an overdose-reversal medication that Washingtonians can receive without a prescription. Many EMS systems, including the Tacoma Fire Department, have instituted successful programs where providers leave behind naloxone kits at the scene when they suspect opioids may be used. Do you think it would be helpful for first responders to provide a naloxone kit to people who use drugs or bystanders on the scene? Why or why not?	• Does your agency currently provide leave-behind-naloxone? • **[IF YES]** what does your agency's leave-behind-naloxone protocol look like? • **[IF NO]** what would the leave-behind-naloxone protocol look like at your agency? • What are the barriers to implementing a program like this? • Do you have any reservations about distributing naloxone to people who use drugs? • Would you need additional training to implement a leave-behind-naloxone program?
Buprenorphine or Suboxone is an evidence-based medication that treats opioid use disorder. Research shows that it increases engagement in addiction treatment and reduces overdose deaths. Paramedics in Contra Costa County, California, and Camden, New Jersey, are currently providing this medication in the field to patients in opioid withdrawal. Do you think it would be helpful for first responders to provide access to buprenorphine or Suboxone? Why or why not?	• Does your agency facilitate in-person or telehealth visits in the field with a clinician who could prescribe buprenorphine or Suboxone? • **[IF YES]** what does your agency's buprenorphine or Suboxone protocol look like? • **[IF NO]** What do you think about facilitating a telehealth visit in the field with a clinician who could prescribe buprenorphine or Suboxone? • What are the barriers to implementing a program like this? • Do you have any reservations about providing access to buprenorphine or Suboxone in the field? • Would you need additional training?
HIV and hepatitis C are unfortunately still prevalent among those who use drugs in our community. However, early treatment can improve the lives of people living with HIV and cure hepatitis C, preventing complications like cirrhosis and cancer. Outreach teams in King County are currently using rapid, point-of-care diagnostic tests for HIV and hepatitis C. Do you think it would be helpful for first responders to provide access to	• Does your agency currently provide HIV and hepatitis C testing? • **[IF YES]** what does your agency's HIV and hepatitis C testing protocol look like? • **[IF NO]** what would an HIV and hepatitis C testing protocol look like at your agency? • What are the barriers to implementing a program like this? • Do you have any reservations about providing access to HIV and hepatitis C testing to people who use drugs? • Would you need additional training?

HIV and hepatitis C testing? Why or why not?	
Many community organizations in King County are currently distributing safer use supplies, such as syringes, pipes, and fentanyl test strips. Access to safer use supplies decreases risky behaviors and the spread of infectious diseases. Do you think it would be helpful for first responders to provide access to safer use supplies? Why or why not?	● Does your agency currently provide safer use kits? ● **[IF YES]** what does your agency's safer use kit protocol look like? ● **[IF NO]** what would a safer use kit protocol look like at your agency? ● What are the barriers to implementing a program like this? ● Do you have any reservations about providing access to safer use supplies? ● Would you need additional training?
Of the interventions we've discussed so far (leave behind naloxone kits, buprenorphine or Suboxone, HIV, and hepatitis C testing, and safer use kits), what would be appropriate and feasible for first responders to implement?	● Which interventions would be appropriate and feasible for a mobile health team like your agency to do? ● Are there other interventions that you would like to implement in partnership with first responder agencies? ● **[IF YES]** What would this protocol look like? What are the barriers to implementing a program like this?
Are there other services that first responders should offer to people who use drugs?	● What else might we have forgotten about?

*[**Ask partner if he/she has any other questions about medical services. Pass the baton to your partner.**]*

PERSON 2 - Our final set of interview questions is about harm reduction services such as supervised consumption sites.

Perceptions of supervised consumption sites	
Questions	**Probes**

Supervised consumption sites are a facility where people can use drugs bought outside the premises under the supervision of medical professionals like a nurse or perhaps other staff with EMT training. The primary public health objective of these sites are to prevent fatal overdose, and there is evidence to support their effectiveness. It is likely that Seattle will develop a supervised consumption site in the future. If this were the case, what sorts of services do you believe should be offered at a program like this?	● Can you see a program like this filling any gaps in the existing array of services available to people who use drugs? If so, how? ● Do you think services should be co-located within the same building? ● If a program like this were to exist, where should the local supervised consumption site be located? ● What should its hours of operation be?
If a program like this existed, how do you feel your day-to-day work with people who use drugs could change?	● What sorts of challenges would you anticipate responding to calls at a supervised consumption site? ● **[SKIP IF NO CHALLENGES]** How could these concerns be mitigated? ● Would you anticipate any benefits of a program like this being available?
How can staff at a supervised consumption site be best prepared to respond to overdose?	● How can supervised consumption site staff partner with first responders?
Those are our main interview questions for today. Is there anything we missed? Anything else you'd like to share?	

PERSON 1 - Finally, we would like to ask you some quick questions about your identity so that we can understand the representativeness of our interviews.

Demographic Questions

1. What is your gender identity? _____
2. What term would you use to describe your race and/or ethnicity?_____
3. What is your age?_____
4. What is your highest level of educational attainment? _____

First Responder Question

5. How long have you been in your role? (# of years)
6. What substance use disorder training have you received as a first responder or member of a mobile clinic? (list)

Those are all of our questions for you. Do you have any questions for us?

Thank you so much for your time and input, it has been very valuable for us to hear your perspectives. We will be in touch toward the end of the month to send you your gift card by email and we will be in touch later in the year to share the results of our study with you.

Interview Guide for PWUD

PERSON 1 – Hi I'm ___, a co-researcher at the University of Washington [and anything else you'd like to share]

PERSON 2 – Hi I'm ___, a co-researcher at the University of Washington [and anything else you'd like to share]

PERSON 1

Preamble
Thank you for your willingness to do this interview today.

The purpose of this study is to learn about people's experiences of overdose and encounters with emergency services, like paramedic, fire, EMTs on an ambulance, and other medical services. We will be discussing such topics as: your access to services, your substance use, your experience with calling 9-1-1 or encountering first responders.

As we go through the interview, keep in mind that there are no wrong answers. It is important that you answer as honestly as you can. If you have any questions or there is something you don't understand, please stop me and ask. We realize that some of the topics covered in this interview are sensitive. If you do not want to answer a question or discuss a topic, just let me know and we will move on.

These interviews will be audio-recorded and transcribed, which means they will be typed out. Your name or other identifying information will be removed from the transcript. All the information you provide will be kept confidential and the audio files will be stored securely. We never include information that could identify an individual in any publications or reports.

A reminder that you will be compensated for the time you spend participating in this project. Once we have finished the interview and have stopped recording, one of the interviewers will provide you with the information to access a $50 gift card. You can stop participating at any time and still get a gift card. You can also change your mind about participating after the interview is over and let us know, and we will delete your information from our study.

This interview will last approximately 1 hour. If you need a break, let me know and we can stop for a short rest before we finish the interview. Do you have any questions before we begin? When you are ready, I will start the audio-recorder.

PERSON 2

Perceptions of and experiences with drug checking

Question	**Probes**
Can you tell me what sorts of drugs you use most frequently?	● How long have you been using drugs? ● **ASK FOR SURE:** How often do you use drugs? (e.g., every day, multiple times per day, every week)\ ● **(If they don't mention fentanyl, ask):** As far as you know, have you ever used fentanyl? Do you use fentanyl now?
Now we have some questions about drug checking supplies and services. Drug checking services provide people who use drugs with a way to chemically analyze the contents of drugs that they intend to take. There are different ways to do this, some are more simple, like fentanyl test strips, and others involve machines and larger pieces of equipment. All types of drug checking can help to identify what is in the drugs you are using.	
Have you ever suspected that your drugs were laced or contaminated with other substances? Why or why not?	● Have you ever suspected that your drugs were laced or contaminated with fentanyl? Why or why not? ● Do you trust the source of your drugs? Why or why not?
Have you ever used fentanyl test strips to test your drugs?	● IF YES, can you tell me what your experience with fentanyl test strips has been like? ● IF YES, how often do you use fentanyl test strips? ● IF YES, how do you decide when to use fentanyl test strips? ● IF NO, is there anything that would make you consider using fentanyl test strips to test your drugs? ● IF NO, why haven't you used fentanyl test strips before?
Have you ever used other drug checking technologies or services to test your drugs?	● IF NO, would you be interested in using other drug checking services? Why or why not? ● IF YES, do you currently use other drug checking services? Why or why not? ● IF YES, what type of drug checking services do you use? Where do you get them from? ● IF YES, how often do you use drug checking services? What have your experiences with these services been like? ● IF YES, how do you decide when to use drug checking services?

Are drug checking services helpful in preventing overdose, in your opinion? Why or why not?	● What are some barriers to using drug checking services, in your opinion? ● How could drug checking services be made easier to access, in your opinion? ● Where do you think drug checking services should be located ? ● If you were going to use drug checking services, would you prefer to use take-home drug checking supplies, which can be used in private places on your own, or would you prefer to test your drugs at an organization? Why?
What would you do if you found fentanyl in your drugs when you didn't expect it to be there?	● Would you take any extra precautions to prevent an overdose? Why or why not? What precautions would you take? ● [IF USED FENTANYL TEST STRIPS/DRUG CHECKING] how have the results of drug checking/fentanyl test strips changed the way you've used your drugs in the past? ● [IF USED FENTANYL TEST STRIPS] Have you ever shared fentanyl test strips with other people who use drugs? Why or why not?

PERSON 1

Now we have some questions about the services you've accessed from first responders

First Responder Encounters	
Question	**Probes**
Can you tell me about your most recent interaction with a first responder (fire fighter, police, or paramedic)?	● What led to that situation with the first responder? ● What have your interactions been like with first responders during an overdose, either for yourself or when you've been a bystander? ● How satisfied did you feel with the outcome of that interaction? ● Did you receive any referrals to other supports or services from the first responder you interacted with? ● **[If they don't already mention it]** How long ago was that interaction?
What would a good interaction look like between a first responder and someone experiencing an overdose?	● How should a first responder approach the people at an overdose response call? ● What would be most helpful for you when you are met by someone who is responding to an overdose or another drug-related emergency? ● Would there be any other supports or services that would be helpful to receive when a first responder responds to an overdose or other drug-related call?

Have you ever had interactions with mobile integrated health team or a co-responder team consisting of a first responder paired with a mental health professional like a nurse or social worker? What was that interaction like?	● What do you think about receiving services from teams like these, as opposed to traditional first responders? ● Are there services for substance use that you think should definitely be available through mobile clinic or co-responder programs rather than first responders? Why?

PERSON 2

Now let's talk about your experiences with other services related to opioids, like take home naloxone and buprenorphine

Experiences with opioid-related services	
Question	**Probes**
Have you ever gotten naloxone, also known as Narcan, to take home with you or carry on you?	**[If never received]**, ● Can you tell me why you haven't accessed naloxone? ● Did you have any issues or challenges with getting naloxone when you've wanted to get some? What kinds of issues? ● Is take-home naloxone easy to access, in your opinion? What makes it easy/hard to access? ● If naloxone was offered to you for free by a first responder, to take home or carry with you, would you take it? Why or why not? **[If received],** ● Do you have it right now? If so, where did you get the naloxone from? ● Is take-home naloxone easy to access, in your opinion? What makes it easy/hard to access? ● If naloxone was offered to you for free by a first responder, to take home or carry with you, would you take it? Why or why not?
How do you feel about first responders handing out naloxone to patients or bystanders when they respond to an overdose? Is this something you or people you know would want?	● How should first responders offer these kits to people? What about their approach would make you more or less likely to want to take a naloxone kit? ● What should be included in these kits? ● Do you think these services should be offered by first responders? What might be some problems with first responders offering this service? ● Do you have a preference for what kinds of first responders or mobile clinic staff you'd get naloxone from? Why? ● How does (or would) having naloxone with you affect your likelihood of calling 9-1-1 in an overdose event?
Buprenorphine, also known as Suboxone, is a medication used to treat opioid use	**[If never accessed]:** ● Can you tell me why you haven't received this medication before? ● How easy is buprenorphine easy to access, in your opinion?

disorder. Can you tell me about any experiences you may have had receiving buprenorphine?	• How do other people you know (who use drugs) feel about buprenorphine? • If the option to start buprenorphine treatment was available and free alongside first responder services, would you have wanted to start it that way? Why or why not? **[If have accessed]:** • Do you currently have buprenorphine? • Where did you get the buprenorphine/Suboxone from? • Did you have any issues or challenges with obtaining buprenorphine or Suboxone? What kinds of issues? • How easy is buprenorphine easy to access, in your opinion? • How do other people you know (who use drugs) feel about buprenorphine? • If the option to start buprenorphine treatment was available and free alongside first responder services, would you have wanted to start it that way? Why or why not?
Between different kinds of first responders and mobile clinic staff, who would you prefer to receive buprenorphine from?	• What do you think would be good about receiving buprenorphine from first responders like firefighters or paramedics? • What about from mobile clinics? • What sorts of challenges would you expect to encounter receiving a medication this way? • What would you think about participating in a telemedicine visit with a provider who could prescribe buprenorphine, facilitated by a first responder or mobile clinic staff member?

PERSON 1

Now I'd like to ask you about your opinions and experiences with other services like HIV and Hepatitis C testing. There is interest from the county to expand testing. Testing can be conducted in about 20 minutes, and then a referral could happen after.

Experiences with other medical services	
Question	**Probes**
Can you tell me what you know about testing for HIV and Hepatitis C?	• Have you ever wanted to be tested for HIV or Hep C but haven't been able to? If so, what stopped you from getting tested? • What do you think some of the barriers are to accessing testing for HIV or Hep C? • Can you tell me anything else about why you think people who use drugs may not want to get tested?
If HIV or Hep C **testing** was available and free in first responder services would you use it? Why or why not?	• Do you think other people would use these testing services from first responders? • Between different kinds of first responders and mobile clinic staff, who would you prefer to receive testing from? • If first responders or mobile clinic staff are engaging with people out in the community, what do you think they can do

	that would help people feel more comfortable and willing to get tested?
If you needed **treatment** for Hep C and linkage to Hep C treatment were free and available alongside first responder services, would you use it? Why or why not?	● Have you ever accessed treatment for HCV? If yes, how did you start that treatment process? If not, why not? ● What sorts of challenges would you expect people would encounter receiving treatment this way?
Do you think it would be helpful for first responders to provide access to safer use supplies, like syringes, pipes, or fentanyl testing strips? Why or why not?	● What sorts of challenges would you expect to encounter receiving safer use supplies like this? ● Is there anything I didn't mention that you think should be included with safer use supplies?

PERSON 2

We are almost done with the questions in the interview, we will now ask some final questions about the types of services you wish you could access alongside first responder encounters.

Other needs and preferences	
Question	**Probes**
First responder services have gone through some changes recently. Have you noticed any ways that your experience interacting with first responders has changed over time?	● What kinds of differences have you noticed (if any)? ● When did you start to notice these changes?
Are there any other services (other than the ones we asked you about) that you think would be important to have offered by first responder to better serve people who use drugs?	● Are there different things that are more important to you than the services we mentioned today? ● Are there other services that you have trouble accessing?

Finally, we would like to ask you some questions about your identity so that we can understand how representative our interviews are of people who use drugs.

Demographic Questions

1. What is your gender identity? _____
2. What term would you use to describe your race?_____
3. What is your age?_____

Resources in case people ask:

Drug Checking Resources in Seattle/King County:

Check with local Syringe Service program, community clinics

- People's Harm Reduction Alliance (https://nasen.org/sep/peoples-harm-reduction-alliance) offers fentanyl test strips/education
- Free fentanyl test strips available at Uncle Ike's Bottle Shop located in Capitol Hill (https://ikes.com/uncle-ikes-focuses-on-harm-reduction-with-free-fentanyl-test-strips/)
- Seattle Test It offers free and anonymous drug checking services, including fentanyl test strips, that are held regularly or by an appointment basis (https://seattletestit.org/testing/)
    - The Dance Safe shop also sells fentanyl test strips and other drug checking technologies (https://dancesafe.org/shop/)