HHS Public Access

Author manuscript

Drug Alcohol Depend. Author manuscript; available in PMC 2025 April 01.

Published in final edited form as:

Drug Alcohol Depend. 2024 April 01; 257: 111251. doi:10.1016/j.drugalcdep.2024.111251.

Unmet need for medication for opioid use disorder among persons who inject drugs in 23 U.S. cities

Senad Handanagic[*], **Dita Broz**,
Teresa Finlayson,
Dafna Kanny,
Cyprian Wejnert,
The NHBS Study Group[1]

Division of HIV Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention, CDC, USA

Abstract

Background: Persons who inject drugs (PWID) are at increased risk of HIV and hepatitis C virus (HCV) infections and premature mortality due to drug overdose. Medication for opioid use disorder (MOUD), such as methadone or buprenorphine, reduces injecting behaviors, HIV and HCV transmission, and mortality from opioid overdose. Using data from National HIV Behavioral Surveillance, we evaluated the unmet need for MOUD among PWID in 23 U.S. cities.

Methods: PWID were recruited by respondent-driven sampling, interviewed, and tested for HIV. This analysis includes PWID who were ≥18 years old and reported injecting drugs and opioid use in the past 12 months. We used Poisson regression to examine factors associated with self-reported unmet need for MOUD and reported adjusted prevalence ratios (aPR) with 95% confidence intervals.

Results: Of 10,879 PWID reporting using opioids, 68.8% were male, 48.2% were ≥45 years of age, 38.8% were non-Hispanic White, 49.6% experienced homelessness, and 28.0% reported

[*]Correspondence to: Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30329, USA. ndv9@cdc.gov (S. Handanagic).

[1]Development of NHBS protocols, implementation NHBS and ensuring the quality of the collected data at each National HIV Behavioral Surveillance site in the US.

Contributors

S.H. developed the idea for the study, conducted the analysis, and wrote the first draft of the manuscript. T.F. supported data analysis and provided edits and suggestions to the manuscript. D.B. D.K. and C.W. provided feedback on the study design, analysis, and manuscript. All authors have reviewed and approved the final manuscript.

CRediT authorship contribution statement

Dafna Kanny: Conceptualization, Methodology, Validation, Writing – review & editing. **Cyprian Wejnert:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Writing – review & editing. **Senad Handanagic:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Dita Broz:** Conceptualization, Methodology, Supervision. **Teresa Finlayson:** Conceptualization, Data curation, Formal analysis, Methodology, Supervision, Writing – review & editing.

Declaration of Competing Interest

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

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

an unmet need for MOUD in the past 12 months. PWID who were more likely to report unmet need for MOUD experienced homelessness (aPR 1.26; 95% CI: 1.19–1.34), were incarcerated in the past 12 months (aPR 1.15; 95% CI: 1.08–1.23), injected ≥once a day (aPR 1.42; 95% CI: 1.31–1.55), reported overdose (aPR 1.33; 95% CI: 1.24–1.42), and sharing of syringes (aPR 1.14; 95% CI: 1.06–1.23).

Conclusions: The expansion of MOUD provision for PWID is critical. Integrating syringe service programs and MOUD provision and linking PWID who experience overdose, incarceration or homelessness to treatment with MOUD could improve its utilization among PWID.

Keywords

Persons who inject drugs; Medication for opioid use disorder (MOUD); Opioid use disorder; HIV; Opioid overdose

1. Introduction

In 2021, more than 75% of the 107,699 drug overdose fatalities in the United States involved opioids, and approximately 8% of all new HIV infections were due to injecting drug use (Centers for Disease Control and Prevention, 2023; Spencer et al., 2022). Injecting opioids is associated with increased mortality from HIV, HCV, other blood-borne infections, and overdose death (Larney et al., 2019). Medications such as buprenorphine or methadone are a recommended approach for the treatment of mild to severe opioid use disorder, and if taken as prescribed, these medications are shown to reduce high-risk injecting behaviors, HIV and HCV transmission, and opioid overdose mortality (Gowing et al., 2011; Krawczyk et al., 2020; Larochelle et al., 2018; Platt et al., 2017a; Sordo et al., 2017).

In 2021, an estimated 2.5 million adults in the U.S. had opioid use disorder in the past 12 months, and only 22% of them received treatment for opioid use disorder (MOUD) (Jones et al., 2023). Even with the proven effectiveness and relatively good availability of MOUDs (Leshner and Mancher, 2019), persons seeking MOUD treatment in the U.S. face multiple barriers to care, such as provider (e.g., insufficient training of clinicians to provide MOUD that leads to an inadequate number of clinicians who can provide this service), institutional (e.g., lack of standardization of provision of MOUD across different facilities), regulatory (e.g., laws and regulations that currently limit access to treatment for opioid use disorder in some states) and financial barriers (e.g., absence of health insurance, high out-of-pocket costs, lack of facilities that accept the insurance plans held by patients, transportation costs, etc.)(Leshner and Mancher, 2019). In addition, the stigma surrounding treatment with MOUD is still common, and it can discourage people from seeking treatment and engaging with the healthcare system (Atkins et al., 2020; Stringer and Baker, 2018). Therefore, it is important to explore the reasons why a large number of PWID are not accessing MOUD and how to improve the access and utilization of this life-saving treatment.

Using data from National HIV Behavioral Surveillance (NHBS) (Kanny et al., 2022), we evaluated the self-reported unmet need for MOUD among PWID who reported using opioids in 23 cities in the United States. To our knowledge, this study is the first one in the U.S. to assess demographic characteristics and behaviors associated with an unmet need for

MOUD in a large sample (n=10,879) of PWID who reported using opioids that were not prescribed to them. Given that our previous analysis showed that PWID who were Black, Non-Hispanic, who were younger than 30 years, did not have health insurance, and injected more than one drug had lower utilization of MOUD (Handanagic et al., 2021), we explored if the unmet need for MOUD is also disproportionally distributed among different age groups, genders, race, and ethnicity, and if it is associated with other characteristics and behaviors.

This study provides critical evidence to build a more comprehensive understanding of the unmet need for MOUD among PWID, and these findings can inform national efforts to ensure more equitable access to MOUD in the U.S.

2. Material and methods

2.1. Data collection

From June to November of 2018, NHBS staff in 23 cities collected cross-sectional behavioral survey data and conducted HIV testing among PWID who were recruited by respondent-driven sampling (RDS) (Heckathorn, 2002; Kanny et al., 2022). A total of 11,437 participants who were 18 years or older, reported injecting drugs not prescribed to them in the past 12 months, and were able to respond to survey questions in English or Spanish, consented to and completed the survey. Out of them, 10,879 (95.1%) used opioids, including heroin or painkillers such as Oxycontin, Dilaudid, morphine, Percocet, or Demerol that were not prescribed to them in the past 12 months (Centers for Disease Control and Prevention, 2020). A total of 89.5% of participants reported injecting heroin in the past 12 months. In our questionnaire, we do not ask questions that would allow us to estimate if a person taking opioids not prescribed to them is eligible for MOUD treatment; however, given that almost 90% of all participants injected opioids in the past 12 months, we considered any participant reporting non-prescription opioid use to be a potential candidate for MOUD. Characteristics of this sample have been previously published (Centers for Disease Control and Prevention, 2020).

Eligible participants completed a standardized questionnaire administered face-to-face by trained interviewers. All participants were offered anonymous HIV testing; a nonreactive rapid test result was considered HIV-negative, and a reactive rapid test result was considered HIV-positive if supported by a second rapid test or supplemental laboratory-based testing. Incentives were offered for completing the interview, HIV testing, and recruitment. Participants were asked about behaviors in the previous 12 months, including receptive sharing of injection equipment and sexual behaviors, testing for HIV, participation in HIV behavioral interventions, receiving syringes from syringe service programs, MOUD use, and unmet need for MOUD.

NHBS activities were approved by local institutional review boards (IRBs) in each participating city. Activities for NHBS were approved by the Centers for Disease Control and Prevention (NHBS was determined to be a routine disease surveillance activity)(Kanny et al., 2022) and by applicable local IRBs in each participating city.

2.2. Measures

Variables used in the analysis are listed and described in Table 1 and in the previous publication (Centers for Disease Control and Prevention, 2020). Participants were asked to report all types of drugs they used in the past 12 months. Our analysis included all participants who reported any injection or non-injection use of opioids in the 12 months before the interview. Opioids include heroin (taken alone or in combination with other drugs) and painkillers such as Oxycontin, Dilaudid, morphine, Percocet, or Demerol. Participants who used opioids in the past 12 months were asked if they have taken any of the following MOUD: methadone, buprenorphine, Suboxone, or Subutex, to treat drug use in the past 12 months. The participants who reported opioid use were asked if they tried to get MOUD to treat opioid use but were unable to in the past 12 months. Receptive sharing of syringes was defined as "using needles that someone else had already injected with."

2.3. Data analysis

We presented descriptive statistics of socio-demographic characteristics, behaviors and HIV status of PWID. Missing or unknown values were not larger than 1% for any variable, so we did not impute missing values in our analysis. We used log-linked Poisson regression with generalized estimating equations to examine the association between self-reported unmet need for MOUD and socio-demographic characteristics, injecting practices, and nonfatal opioid overdose. All regression models were adjusted for RDS survey design by including city of residence and peer network size in the models and by clustering the models on the recruitment chain by using the *repeated subject* option in SAS *GENMOD* function (Zou, 2004; Zou and Donner, 2013). Each model in bivariable analysis that showed significant association at $P<0.05$ was tested for potential confounding. The potential confounders we explored were age, gender, race/ethnicity, experiencing homelessness, having health insurance in the past 12 months, and using MOUD in the past 12 months. Covariates associated with the outcome and variable of interest at $P<0.1$ were considered as potential confounders and were included in the multivariable model. We created a separate model for each variable of interest and determined a specific set of confounders for each model. We used backward elimination to reduce each model to the most parsimonious versions. We obtained adjusted prevalence ratios (aPR) and 95% confidence intervals (CI). Data analysis was done in SAS 9.4.

3. Results

Among 10,879 PWID, 68.8% were male, 48.2% were 45 years of age or older (median age: 44 years), 38.8% were non-Hispanic White, 71.1% had high school or higher education, 85.3% were unemployed, and 35.9% were incarcerated in the past 12 months (Table 1). A large majority of PWID (75.0%) lived at or below the federal poverty level for 2018, 49.6% experienced homelessness at the time of the survey, 73.6% had health insurance, and 79.4% reported visiting a health care provider in the past 12 months.

The majority of PWID (56.0%) reported opioids as their most frequently used drug in the past 12 months. Third of all PWID (32.8%) reported sharing syringes in the past 12 months. Overdose in the past 12 months was reported by 28.0% of PWID, 53.5% reported taking

MOUD in the past 12 months, and 28.0% reported an unmet need for MOUD in the same period (city range: 18–36%; Fig. 1). The majority of PWID (55.0%) who did not report a previous HIV-positive test result reported being tested for HIV in the past 12 months. In total, 6.1% of PWID in the NHBS survey tested positive for HIV.

When adjusted for confounding, PWID who were more likely to report unmet need for MOUD were Hispanic/Latino (aPR=1.13, 95% CI:1.01–1.27) compared to non-Hispanic Black, living in one of the cities in the Northeast (aPR=1.29, 95% CI: 1.11–1.5) or Midwest (aPR=1.17, 95% CI: 1.01–1.36) compared to West, currently experiencing homelessness (aPR=1.26, 95% CI:1.19–1.34), and incarcerated in the past 12 months (aPR=1.15, 95% CI: 1.08–1.23) (Table 2).

PWID were more likely to report unmet need for MOUD if they visited a health care provider in the past 12 months (aPR=1.08, 95% CI:1.00–1.17) and if their usual place for getting health care was a hospital emergency room (aPR=1.32, 95% CI:1.21–1.44), a clinic or health center (aPR= 1.15, 95% CI:1.04–1.27), or if they did not have a usual place to get health care (aPR=1.28, 95% CI:1.07–1.53) compared to getting their health care from doctor's office or health maintenance organization.

PWID who injected more than once a day (aPR=1.42, 95% CI:1.31–1.55) compared to once a day or less, reported receptive sharing of syringes (aPR=1.14, 95% CI:1.06–1.23), and reported opioid overdose in the past 12 months (aPR= 1.33, 95% CI:1.24–1.42) were more likely to report unmet need for MOUD.

4. Discussion

This study aimed to evaluate the self-reported unmet need for MOUD among PWID who reported using opioids in 23 cities in the United States to help inform developing strategies to improve access and use of MOUD. Our analysis showed that more than one in four (28%) of PWID reported an unmet need for MOUD in the past 12 months. We observed a high variation of reported unmet needs for MOUD across 23 surveyed cities and different U.S. census regions. Some of the characteristics associated with unmet news for MOUD were a history of incarceration, homelessness, accessing health care providers, injecting frequency, and non-fatal opioid overdose.

More than one in four (28.0%) of PWID in our sample tried to get MOUD in the past 12 months, but they could not access it. Given that almost 90% of PWID in NHBS reported injecting some opioid in the past 12 months, which can indicate a more developed stage of opioid use disorder, this high percentage was not surprising. On the other hand, it was promising to know that more than one in four PWID are willing to start MOUD treatment if they had access to it. Regional variations in unmet need for MOUD could be due to the differences in the regulatory frameworks for the provision of MOUD in different U.S. regions or the lack of providers (Huhn et al., 2020). For example, the recent review of all regulations related to MOUD in all U.S. states reported a large difference in the number of regulations for MOUD in each region, with the highest number of regulations in the South and Northeast and the lowest in the West. This analysis showed that most of the regulations

across all regions are not in line with the evidence-based recommendations for the provision of MOUD and are not in line with SAMHSA's guidelines (Jackson et al., 2020).

4.1. Unmet need for MOUD and incarceration

More than 1 in 3 PWID reported being incarcerated in the past 12 months, and they were more likely to report an unmet need for MOUD compared to PWID who were not incarcerated. Meta-analysis showed that a history of incarceration is associated with an increased risk for HIV and HCV acquisition (Stone et al., 2018) and release from the correctional facility is associated with an increased risk for a fatal drug overdose, especially in the first four weeks after the release (Cooper et al., 2023). MOUD has been successfully provided in correctional settings in the U.S. and it is shown to reduce the risk of overdose deaths upon release (Gordon et al., 2014; Green et al., 2018; Rich et al., 2015), and risk for HIV and HCV among PWID (Stone et al., 2021, 2020). The provision of MOUD in correctional facilities increased engagement in MOUD after release from incarceration and decreased criminal activity and re-incarceration (Boksán et al., 2023; Malta et al., 2019). Adopting strategies for improving access to MOUD for PWID who are incarcerated or released from the correctional system has the potential to substantially reduce drug-related harms for PWID (Brinkley-Rubinstein et al., 2017).

4.2. Unmet need for MOUD and utilization of healthcare system

Almost 80% of PWID in this sample visited healthcare provider in the past 12 months, and PWID who visited their provider in the past 12 months were 8% more likely to report an unmet need for MOUD compared to those who did not. To explore the reasons for this unexpected result, we looked at the types of healthcare providers PWID used as their usual source of healthcare. The largest percentage of PWID reported the emergency department (37%) or clinic or health center (30%) to be their usual source of health care. Only 20% of PWID reported a doctor's office or health maintenance organization as their usual source of health care. This was not surprising given that a recent meta-analysis showed PWID were several times more likely to visit an emergency department or be admitted to a hospital compared to the general population (Lewer et al., 2019). Our analysis showed that PWIDs who receive usual health care in an emergency department or hospital or, if they did not have a usual place to get health care, were more likely to report unmet needs for MOUD.

These findings imply that while many PWIDs are interacting with healthcare systems, they are not being screened for opioid use disorder or offered treatment. Several studies showed that PWID can be effectively engaged to start buprenorphine treatment in emergency departments (Centers for Disease Control and Prevention, 2018; D'Onofrio et al., 2015; Goedel et al., 2019; Herring et al., 2019; Rhee et al., 2020) or in other health care facilities that are not specialized for addiction treatment (Sigmon et al., 2016).

4.3. Unmet need for MOUD among PWID experiencing homelessness

PWID who were experiencing homelessness were more likely to report unmet needs for MOUD. Persons who are experiencing homelessness encounter multiple barriers to access to health care services (Fazel et al., 2014), so it was not surprising to find that PWID experiencing homelessness were struggling to access MOUD. Persons experiencing

homelessness have higher rates of premature mortality than the general population, and this is due to increased risk from suicide, unintentional injuries, mental health disorders, substance misuse, and infectious diseases such as HCV, HIV, and Tuberculosis (Fazel et al., 2014). Injecting drugs and opioid use are causing or significantly contributing to many of these conditions. In addition, there are even greater challenges in providing MOUD to persons experiencing homelessness because they may prioritize basic daily needs, such as food, safety and shelter, over medical appointments and treatment, they have limited income and lack of social supports, transportation, or health coverage. Additionally, persons experiencing homelessness have high rates of comorbidities and cognitive impairments such as traumatic brain injury or mental illness and negative experiences with the healthcare system, which poses additional barriers to engaging in MOUD treatment (Warfield and DiPietro, 2016).

Injection drug use among persons experiencing homelessness was associated with several recent HIV outbreaks in the U.S. and internationally (Alpren et al., 2020; Des Jarlais et al., 2020; Golden et al., 2019; Lyss et al., 2020). Given that MOUD effectively reduces the need for injecting opioids and it reduces the risk for HIV and HCV infection (MacArthur et al., 2014), improving access to MOUD for PWID experiencing homelessness is one of the essential interventions for reducing the risk for future HIV and HCV outbreaks in this population (United States Interagency Council on Homelessness, 2017).

4.4. Unmet need for MOUD and injecting frequency and opioid overdose

PWID who reported injecting more than once a day and who reported sharing injecting equipment in the past 12 months were more likely to report unmet an need for MOUD. PWID who inject frequently and share injecting equipment need better access to sterile injecting equipment through syringe service programs or other sources to reduce the injecting behaviors that put them at higher risk for HIV and HCV infection (MacArthur et al., 2014). MOUD is effective in reducing the frequency of injecting and sharing of injecting equipment (MacArthur et al., 2014). Also, a systematic review showed that combined coverage with MOUD and SSP provided a higher reduction of the risk for HCV infection than either intervention alone (Platt et al., 2017b). When referrals and patient navigation for MOUD are offered at syringe service programs, clients who regularly use them are more likely to enter and remain in MOUD treatment and stop injecting drugs compared to PWID who don’t use syringe service programs (Hagan et al., 2000; Havens et al., 2009; Strathdee et al., 2006). Therefore, access to MOUD that is low-threshold, client-centered, and affordable and, if appropriate, integrated with a syringe service programs should be a priority (Centers for Disease Control and Prevention, 2018; Havens et al., 2009).

Our findings showed that PWID who reported overdose in the past 12 months were 33% more likely to report an unmet need for MOUD. One reason why we are seeing the higher unmet need for MOUD among PWID who reported overdose could be because we are capturing persons who were on MOUD recently and they abruptly stopped the treatment (53% of PWID in our sample reported being on MOUD in the past 12 months). A systematic review showed that while MOUD significantly reduces overall and opioid overdose-related

mortality, the time immediately after leaving treatment with methadone or buprenorphine are periods of particularly increased risk of overdose and death (Sordo et al., 2017).

We found that more than one in three PWID who experienced overdose were willing, but unable to get MOUD. Opioid overdose is responsible for almost a third of all causes of deaths among people using opioids (Larney et al., 2019) and is one of the leading causes of death among the U.S. population (The US Burden of Disease Collaborators, 2018; Woolf and Schoomaker, 2019). A 2019 study found that almost 46% of all U.S. counties and 71% of all rural counties lacked any publicly listed MOUD provider and that 22% of counties that had opioid overdose mortality above the national average had low rates or no MOUD provider (Haffajee et al., 2019). Another study found that Medicaid expansion in certain states was associated with reductions in total opioid overdose deaths (Kravitz-Wirtz et al., 2020), and authors hypothesized that this might be due in part through greater access to MOUD that was observed in states with Medicaid expansion (Saloner et al., 2018; Sharp et al., 2018). Therefore, making sure that PWID who experienced overdose are offered and enrolled in substance use treatment, including MOUD, could help reduce the risk for future overdose and overdose deaths among PWID. More generally, a major expansion of the provision of MOUD, in addition to the provision of naloxone, is needed to reduce the devastating effects of increasing rates of overdose deaths in the U.S. population.

4.5. Unmet need for MOUD and impact of COVID-19 pandemic

In 2020, the COVID-19 pandemic imposed an additional strain on the delivery of MOUD across the U.S., which resulted in a substantial reduction, and in many cases complete cancelations, of provision of treatment for opioid use disorder. In a report by SAMHSA from June 2020, 87% of sampled providers of MOUD reported challenges in maintaining pre-pandemic service levels, and 80% reported significant challenges in managing the impact of a pandemic to everyday operations (SAMHSA, 2020). Data from 2020 indicated a substantial increase in levels of non-fatal and fatal overdoses during the pandemic (Centers for Disease Control and Prevention, 2021; Haley and Saitz, 2020; Mason et al., 2021). Many syringe service programs needed to close or significantly reduce their services in response to the COVID-19 pandemic (Glick et al., 2020). Some positive changes for improving access to MOUD due to challenges imposed by COVID-19 pandemic already started (e.g., expanding the criteria for take-home methadone, using telemedicine for prescribing MOUD, home-based buprenorphine induction, allowing continued access to medications without in-person drug testing, removal of the federal requirement for practitioners to prescribe buprenorphine), and this positive examples should be used to sustain regulatory flexibility in the treatment of opioid use disorder, after the pandemic is over (SAMHSA, 2023; Stringer et al., 2021; Weimer et al., 2021).

4.6. Limitations

Our findings are subject to several limitations. First, because a method of obtaining standard probability samples of PWID does not exist, the representativeness of the NHBS sample cannot be determined. Although adjusted for respondent-driven sampling, biases related to participants' recruitment behavior or their willingness and ability to participate in the interview might have affected the representativenss of the sample. Second, NHBS is a

cross-sectional survey and, therefore, we cannot make conclusions about the temporality of the observed associations. Third, we report the association of unmet need for MOUD in the past 12 months with other behaviors in the same time frame. However, we cannot know if accessing health care providers or using MOUD in the past 12 months happened before or after the reported unmet need for MOUD. The questionnaire we used did not allow us to assess if participants had opioid use disorder. Given that about 90% of all participants reported injecting opioids in the past 12 months, we used any reported use of non-prescribed opioids as a proxy for participants being eligible to be evaluated for MOUD. This could underestimate the percentage of PWID with opioid use disorder who reported unmet need for MOUD. Fourth, in the behavioral questionnaire, we did not include direct questions about the reasons for the unmet need for MOUD, and therefore, we can only assume on what these reasons are. Fifth, PWID were interviewed in 23 cities with a high prevalence of HIV infection; findings from these cities might not be generalizable to all persons who inject drugs across the U.S., including those who reside in rural or nonmetropolitan areas. Finally, behavioral data are self-reported and collected through face-to-face interviews and are subject to social desirability bias or recall error.

5. Conclusion

More than one in four PWID in our sample reported that they tried to get access to MOUD in the previous year, but they were not able to. Provision of MOUD to persons who have opioid use disorder is a safe and effective intervention that reduces the risk for HIV and HCV infection, increases the adherence and effectiveness of antiretroviral therapy for PWID living with HIV, reduces the overall and overdose mortality, and decreases criminal activity and re-incarceration among PWID with opioid use disorder. Therefore, it is critical to further explore the reasons for the unmet need for MOUD and design strategic interventions to improve access to MOUD for many PWID who are willing to start the treatment. To ensure progress toward the federal Ending the HIV Epidemic initiative (https://www.cdc.gov/endhiv) is achieved, access to MOUD for PWID should be part of the comprehensive set of interventions that include the provision of sterile syringes without restrictions, HIV and viral hepatitis testing, access to health insurance and health services that provide treatment for HIV infection, viral hepatitis, substance use, including MOUD, and mental health disorders.

5.1. NHBS study group

Atlanta, GA: Pascale Wortley, Jeff Todd, David Melton; Baltimore, MD: Colin Flynn, Danielle German; Boston, MA: Monina Klevens, Rose Doherty, Conall O'Cleirigh; Chicago, IL: Antonio D. Jimenez, Thomas Clyde; Dallas, TX: Jonathon Poe, Margaret Vaaler, Jie Deng; Denver, CO: Alia Al-Tayyib, Daniel Shodell; Detroit, MI: Emily Higgins, Vivian Griffin, Corrine Sanger; Houston, TX: Salma Khuwaja, Zaida Lopez, Paige Padgett; Los Angeles, CA: Ekow Kwa Sey, Yingbo Ma, Hugo Santacruz; Memphis, TN: Meredith Brantley, Christopher Mathews, Jack Marr; Miami, FL: Emma Spencer, Willie Nixon, David Forrest; Nassau-Suffolk, NY: Bridget Anderson, Ashley Tate, Meaghan Abrego; New Orleans, LA: William T. Robinson, Narquis Barak, Jeremy M. Beckford; New York City, NY: Sarah Braunstein, Alexis Rivera, Sidney Carrillo Newark, NJ: Abdel R. Ibrahim,

Afework Wogayehu, Luis Moraga; Philadelphia, PA: Kathleen A. Brady, Jennifer Shinefeld, Chrysanthus Nnumolu,; Portland, OR: Timothy W. Menza, E. Roberto Orellana, Amisha Bhattari; San Diego, CA: Anna Flynn, Onika Chambers, Marisa Ramos; San Francisco, CA: Willi McFarland, Jessica Lin, Desmond Miller; San Juan, PR: Sandra Miranda De León, Yadira Rolón-Colón, María Pabón Martínez; Seattle, WA: Tom Jaenicke, Sara Glick; Virginia Beach, VA: Jennifer Kienzle, Brandie Smith, Toyah Reid; Washington, DC: Jenevieve Opoku, Irene Kuo; CDC: Monica Adams, Christine Agnew Brune, Amy Baugher, Dita Broz, Janet Burnett, Susan Cha, Johanna Chapin-Bardales, Paul Denning, Teresa Finlayson, Senad Handanagic, Terence Hickey, Dafna Kanny, Kathryn Lee, Rashunda Lewis, Elana Morris, Evelyn Olansky, Taylor Robbins, Catlainn Sionean, Amanda Smith, Anna Teplinskaya, Lindsay Trujillo, Cyprian Wejnert, Ari Whiteman, Mingjing Xia.

Acknowledgments

National HIV Behavioral Surveillance participants; CDC National HIV Behavioral Surveillance Team.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors do not have any conflict of interest to disclose.

References

Alpren C, Dawson EL, John B, Cranston K, Panneer N, Dawn Fukuda H, Roosevelt K, Monina Klevens R, Bryant J, Peters PJ, Lyss SB, Switzer WM, Burrage A, Murray A, Agnew-Brune C, Stiles T, McClung P, Campbell EM, Breen C, Randall LM, Dasgupta S, Onofrey S, Bixler D, Hampton K, Jaeger JL, Hsu KK, Adih W, Callis B, Goldman LR, Danner SP, Jia H, Tumpney M, Board A, Brown C, DeMaria A, Buchacz K, 2020. Opioid use fueling HIV transmission in an urban setting: An outbreak of HIV infection among people who inject drugs-Massachusetts, 2015–2018. Am. J. Public Health 110, 37–44. 10.2105/AJPH.2019.305366. [PubMed: 31725317]

Atkins J, Legreid Dopp A, Boone Temaner E, 2020. Combatting the stigma of addiction— the need for a comprehensive health system approach. NAM Perspect. Natl. Acad. Med 10.31478/202011D.

Boksán K, Dechant M, Weiss M, Hellwig A, Stemmler M, 2023. A meta-analysis on the effects of incarceration-based opioid substitution treatment. Med. Sci. Law 63, 53–60. 10.1177/00258024221118971. [PubMed: 35934979]

Brinkley-Rubinstein L, Cloud DH, Davis C, Zaller N, Delany-Brumsey A, Pope L, Martino S, Bouvier B, Rich J, 2017. Addressing excess risk of overdose among recently incarcerated people in the USA: harm reduction interventions in correctional settings. Int. J. Prison. Health 13, 25–31. 10.1108/IJPH-08-2016-0039. [PubMed: 28299971]

Centers for Disease Control and Prevention, 2018. Centers for Disease Control and Prevention, 2018. Evidence-based strategies for preventing opioid overdose: What's Working in the United States, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services..

Centers for Disease Control and Prevention, 2021. Health Alert Network (HAN) - Increase in Fatal Drug Overdoses Across the United States Driven by Synthetic Opioids Before and During the COVID-19 Pandemic. https://emergency.cdc.gov/han/2020/han00438.asp (accessed 3.24.21)..

Centers for Disease Control and Prevention, 2023. Estimated HIV incidence and prevalence in the United States 2017–2021. HIV Surveillance Supplemental Report 2023.

Centers for Disease Control and Prevention, 2020. HIV Infection, Risk, Prevention, and Testing Behaviors among Persons Who Inject Drugs-NHBS PWID 2018..

Cooper JA, Onyeka I, Cardwell C, Paterson E, Kirk R, O'Reilly D, Donnelly M, 2023. Record linkage studies of drug-related deaths among adults who were released from prison to the community: a scoping review. BMC Public Health 23, 826. 10.1186/s12889-023-15673-0. [PubMed: 37147595]

D'Onofrio G, O'Connor PG, Pantalon MV, Chawarski MC, Busch SH, Owens PH, Bernstein SL, Fiellin DA, 2015. Emergency department-initiated buprenorphine/naloxone treatment for opioid dependence: a randomized clinical trial. JAMA - J. Am. Med. Assoc 313, 1636–1644. 10.1001/jama.2015.3474.

Des Jarlais DC, Sypsa V, Feelemyer J, Abagiu AO, Arendt V, Broz D, Chemtob D, Seguin-Devaux C, Duwve JM, Fitzgerald M, Goldberg DJ, Hatzakis A, Jipa RE, Katchman E, Keenan E, Khan I, Konrad S, McAuley A, Skinner S, Wiessing L, 2020. HIV outbreaks among people who inject drugs in Europe, North America, and Israel. Lancet HIV. 10.1016/S2352-3018(20)30082-5.

Fazel S, Geddes JR, Kushel M, 2014. The health of homeless people in high-income countries: descriptive epidemiology, health consequences, and clinical and policy recommendations. Lancet. 384 (9953), 1529–1540. 10.1016/S0140-6736(14)61132-6. [PubMed: 25390578]

Glick SN, Prohaska SM, LaKosky PA, Juarez AM, Corcorran MA, Des Jarlais DC, 2020. The impact of COVID-19 on syringe services programs in the United States. AIDS Behav. 24, 2466–2468. 10.1007/s10461-020-02886-2. [PubMed: 32333209]

Goedel WC, Marshall BDL, Samuels EA, Brinkman MG, Dettor D, Langdon KJ, Mahoney LA, Merchant RC, Nizami T, O'Toole GA, Ramsey SE, Yedinak JL, Beaudoin FL, 2019. Randomised clinical trial of an emergency department-based peer recovery support intervention to increase treatment uptake and reduce recurrent overdose among individuals at high risk for opioid overdose: study protocol for the navigator trial. BMJ Open 9, e032052. 10.1136/bmjopen-2019-032052.

Golden MR, Lechtenberg R, Glick SN, Dombrowski J, Duchin J, Reuer JR, Dhanireddy S, Neme S, Buskin SE, 2019. Outbreak of Human Immunodeficiency Virus Infection Among Heterosexual Persons Who Are Living Homeless and Inject Drugs - Seattle, Washington, 2018. MMWR Morb Mortal Wkly Rep 68 (15), 344–349. 10.15585/mmwr.mm6815a2. [PubMed: 30998671]

Gordon MS, Kinlock TW, Schwartz RP, Fitzgerald TT, O'Grady KE, Vocci FJ, 2014. A randomized controlled trial of prison-initiated buprenorphine: prison outcomes and community treatment entry. Drug Alcohol Depend. 142, 33–40. 10.1016/j.drugalcdep.2014.05.011. [PubMed: 24962326]

Gowing L, Farrell MF, Bornemann R, Sullivan LE, Ali R, 2011. Oral substitution treatment of injecting opioid users for prevention of HIV infection. Cochrane Database Syst. Rev CD004145. 10.1002/14651858.cd004145.pub4. [PubMed: 21833948]

Green TC, Clarke J, Brinkley-Rubinstein L, Marshall BDL, Alexander-Scott N, Boss R, Rich JD, 2018. Postincarceration fatal overdoses after implementing medications for addiction treatment in a statewide correctional system. J AMA Psychiatry. 10.1001/jamapsychiatry.2017.4614.

Haffajee RL, Lin LA, Bohnert ASB, Goldstick JE, 2019. Characteristics of US Counties With High Opioid Overdose Mortality and Low Capacity to Deliver Medications for Opioid Use Disorder. JAMA Netw Open 2 (6) e196373–e196373. [PubMed: 31251376]

Hagan H, McGough JP, Thiede H, Hopkins S, Duchin J, Alexander ER, 2000. Reduced injection frequency and increased entry and retention in drug treatment associated with needle-exchange participation in Seattle drug injectors. J. Subst. Abus. Treat 19, 247–252. 10.1016/S0740-5472(00)00104-5.

Haley DF, Saitz R, 2020. The opioid epidemic during the COVID-19 pandemic. JAMA. 324 (16), 1615–1617. 10.1001/jama.2020.18543. [PubMed: 32945831]

Handanagic S, Finlayson T, Burnett JC, Broz D, Wejnert C, 2021. HIV Infection and HIV-Associated Behaviors Among Persons Who Inject Drugs - 23 Metropolitan Statistical Areas, United States, 2018. MMWR Morb Mortal Wkly Rep 70 (42), 1459–1465. 10.15585/mmwr.mm7042a1. [PubMed: 34673746]

Havens JR, Latkin CA, Pu M, Cornelius LJ, Bishai D, Huettner S, Rapp C, Ricketts EP, Lloyd JJ, Strathdee SA, 2009. Predictors of opiate agonist treatment retention among injection drug users referred from a needle exchange program. J. Subst. Abus. Treat 36, 306–312. 10.1016/j.jsat.2008.07.002.

Heckathorn DD, 2002. Respondent-driven sampling II: deriving valid population estimates from chain-referral samples of hidden populations. Soc. Probl 49, 11–34. 10.1525/sp.2002.49.1.11.

Herring AA, Schultz CW, Yang E, Greenwald MK, 2019. Rapid induction onto sublingual buprenorphine after opioid overdose and successful linkage to treatment for opioid use disorder. Am. J. Emerg. Med 37, 2259–2262. 10.1016/j.ajem.2019.05.053. [PubMed: 31239086]

Huhn AS, Hobelmann JG, Strickland JC, Oyler GA, Bergeria CL, Umbricht A, Dunn KE, 2020. Differences in Availability and Use of Medications for Opioid Use Disorder in Residential Treatment Settings in the United States. JAMA Netw Open 3 (2), e1920843–e1920843. [PubMed: 32031650]

Jackson JR, Harle CA, Silverman RD, Simon K, Menachemi N, 2020. Characterizing variability in state-level regulations governing opioid treatment programs. J. Subst. Abus. Treat 115, 108008 10.1016/j.jsat.2020.108008.

Jones CM, Han B, Baldwin GT, Einstein EB, Compton WM, 2023. Use of Medication for opioid use disorder among adults with past-year opioid use disorder in the US, 2021. JAMA Netw. Open 6, e2327488. 10.1001/jamanetworkopen.2023.27488. [PubMed: 37548979]

Kanny D, Broz D, Finlayson T, Lee K, Sionean C, Wejnert C, 2022. A Key Comprehensive System for Biobehavioral Surveillance of Populations Disproportionately Affected by HIV (National HIV Behavioral Surveillance): cross-sectional Survey Study. JMIR Public Heal. Surveill 8, e39053 10.2196/39053.

Kravitz-Wirtz N, Davis CS, Ponicki WR, Rivera-Aguirre A, Marshall BDL, Martins SS, Cerdá M, 2020. Association of medicaid expansion with opioid overdose mortality in the United States. JAMA Netw. Open 3, e1919066. 10.1001/jamanetworkopen.2019.19066. [PubMed: 31922561]

Krawczyk N, Mojtabai R, Stuart EA, Fingerhood M, Agus D, Lyons BC, Weiner JP, Saloner B, 2020. Opioid agonist treatment and fatal overdose risk in a state-wide US population receiving opioid use disorder services. Addiction 115, 1683–1694. 10.1111/add.14991. [PubMed: 32096302]

Larney S, Tran LT, Leung J, Santo T Jr., Santomauro D, Hickman M, Peacock A, Stockings E, Degenhardt, 2020. All-Cause and Cause-Specific Mortality Among People Using Extramedical Opioids: A Systematic Review and Meta-analysis. JAMA Psychiatry 77 (5), 493–502. [PubMed: 31876906]

Larochelle MR, Bernson D, Land T, Stopka TJ, Wang N, Xuan Z, Bagley SM, Liebschutz JM, Walley AY, 2018. Medication for opioid use disorder after nonfatal opioid overdose and association with mortality. Ann. Intern. Med 169, 137. 10.7326/M17-3107. [PubMed: 29913516]

Leshner AI, Mancher M (Eds.), 2019. Medications for Opioid Use Disorder Save Lives, Medications for Opioid Use Disorder Save Lives. National Academies Press, Washington, D.C.. 10.17226/25310

Lewer D, Freer J, King E, Larney S, Degenhardt L, Tweed EJ, Hope VD, Harris M, Millar T, Hayward A, Ciccarone D, Morley KI, 2019. Frequency of healthcare utilisation by adults who use illicit drugs: a systematic review and meta-analysis. Addiction, add.14892. 10.1111/add.14892.

Lyss SB, Buchacz K, Paul McClung R, Asher A, Oster AM, 2020. Responding to outbreaks of human immunodeficiency virus among persons who inject drugs-United States, 2016–2019: Perspectives on recent experience and lessons learned. J. Infect. Dis 10.1093/infdis/jiaa112.

MacArthur GJ, van Velzen E, Palmateer N, Kimber J, Pharris A, Hope V, Taylor A, Roy K, Aspinall E, Goldberg D, Rhodes T, Hedrich D, Salminen M, Hickman M, Hutchinson SJ, 2014. Interventions to prevent HIV and Hepatitis C in people who inject drugs: a review of reviews to assess evidence of effectiveness. Int. J. Drug Policy 25, 34–52. 10.1016/j.drugpo.2013.07.001. [PubMed: 23973009]

Malta M, Varatharajan T, Russell C, Pang M, Bonato S, Fischer B, 2019. Opioid-related treatment, interventions, and outcomes among incarcerated persons: a systematic review. PLoS Med. 16, e1003002 10.1371/journal.pmed.1003002. [PubMed: 31891578]

Mason M, Welch SB, Arunkumar P, Post LA, Feinglass JM, 2021. Notes from the field: opioid overdose deaths before, during, and after an 11-week COVID-19 stay-at-home order — cook county, Illinois, January 1, 2018–October 6, 2020. MMWR Morb Mortal Wkly Rep 70, 362–363. 10.15585/mmwr.mm7010a3. [PubMed: 33705372]

Platt L, Minozzi S, Reed J, Vickerman P, Hagan H, French C, Jordan A, Degenhardt L, Hope V, Hutchinson S, Maher L, Palmateer N, Taylor A, Bruneau J, Hickman M, 2018. Needle and syringe programmes and opioid substitution therapy for preventing HCV transmission among people who inject drugs: findings from a Cochrane Review and meta-analysis. Addiction 113 (3), 545–563. [PubMed: 28891267]

Platt L, Minozzi S, Reed J, Vickerman P, Hagan H, French C, Jordan A, Degenhardt L, Hope V, Hutchinson S, Maher L, Palmateer N, Taylor A, Bruneau J, Hickman M, 2017b. Needle syringe

programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs. Cochrane Database Syst. Rev. 2017 10.1002/14651858.CD012021.pub2.

Rhee TG, D'Onofrio G, Fiellin DA, 2020. Trends in the Use of Buprenorphine in US Emergency Departments, 2002–2017. JAMA Netw. Open 3, e2021209. 10.1001/jamanetworkopen.2020.21209. [PubMed: 33079195]

Rich JD, McKenzie M, Larney S, Wong JB, Tran L, Clarke J, Noska A, Reddy M, Zaller N, 2015. Methadone continuation versus forced withdrawal on incarceration in a combined US prison and jail: a randomised, open-label trial. Lancet 386, 350–359. 10.1016/S0140-6736(14)62338-2. [PubMed: 26028120]

Saloner B, Levin J, Chang HY, Jones C, Alexander GC, 2018. Changes in Buprenorphine-naloxone and opioid pain reliever prescriptions after the affordable care act medicaid expansion. JAMA Netw. Open 1, e181588. 10.1001/jamanetworkopen.2018.1588. [PubMed: 30646116]

SAMHSA, 2023. Waiver Elimination (MAT Act) [WWW Document]. URL https://www.samhsa.gov/medications-substance-use-disorders/waiver-elimination-mat-act (accessed 8.23.23).

SAMHSA, 2020. Opioid Treatment Programs Reported Challenges Encountered During the COVID-19 Pandemic and Actions Taken To Address Them..

Sharp A, Jones A, Sherwood J, Kutsa O, Honermann B, Millett G, 2018. Impact of Medicaid Expansion on Access to Opioid Analgesic Medications and Medication-Assisted Treatment. Am J Public Health 108 (5), 642–648. 10.2105/AJPH.2018.304338. [PubMed: 29565661]

Sigmon SC, Ochalek TA, Meyer AC, Hruska B, Heil SH, Badger GJ, Rose G, Brooklyn JR, Schwartz RP, Moore BA, Higgins ST, 2016. Interim buprenorphine vs. waiting list for opioid dependence. New Engl. J. Med 375, 2504–2505. 10.1056/nejmc1610047. [PubMed: 28002704]

Sordo L, Barrio G, Bravo MJ, Indave BI, Degenhardt L, Wiessing L, Ferri M, Pastor-Barriuso R, 2017. Mortality risk during and after opioid substitution treatment: systematic review and meta-analysis of cohort studies. BMJ j1550. 10.1136/bmj.j1550.

Spencer MR, Miniño AM, Warner M, 2001. Drug Overdose Deaths in the United States, 2001–2021. NCHS Data Brief, no 457.Hyattsville, MD: National Center for Health Statistics. 2022. doi: 10.15620/cdc:122556..

Stone J, Degenhardt L, Grebely J, Larney S, Altice FL, Smyrnov P, Rahimi-Movaghar A, Alavi M, Young AM, Havens JR, Miller WC, Hickman M, Vickerman P, 2021. Modelling the intervention effect of opioid agonist treatment on multiple mortality outcomes in people who inject drugs: a three-setting analysis. Lancet Psychiatry 8 (4), 301–309. 10.1016/S2215-0366(20)30538-1. [PubMed: 33640039]

Stone J, Fraser H, Lim AG, Walker JG, Ward Z, MacGregor L, Trickey A, Abbott S, Strathdee SA, Abramovitz D, Maher L, Iversen J, Bruneau J, Zang G, Garfein RS, Yen YF, Azim T, Mehta SH, Milloy MJ, Hellard ME, Sacks-Davis R, Dietze PM, Aitken C, Aladashvili M, Tsertsvadze T, Mravčík V, Alary M, Roy E, Smyrnov P, Sazonova Y, Young AM, Havens JR, Hope VD, Desai M, Heinsbroek E, Hutchinson SJ, Palmateer NE, McAuley A, Platt L, Martin NK, Altice FL, Hickman M, Vickerman P, et al. , 2018. Incarceration history and risk of HIV and hepatitis C virus acquisition among people who inject drugs: a systematic review and meta-analysis. Lancet Infect. Dis 18, 1397–1409. 10.1016/S1473-3099(18)30469-9. [PubMed: 30385157]

Stone J, Fraser H, Young AM, Havens JR, Vickerman P, 2020. Modeling the role of incarceration in HCV transmission and prevention amongst people who inject drugs in rural Kentucky. Int. J. Drug Policy, 102707. 10.1016/j.drugpo.2020.102707. [PubMed: 32151496]

Strathdee SA, Ricketts EP, Huettner S, Cornelius L, Bishai D, Havens JR, Beilenson P, Rapp C, Lloyd JJ, Latkin CA, 2006. Facilitating entry into drug treatment among injection drug users referred from a needle exchange program: Results from a community-based behavioral intervention trial. Drug Alcohol Depend. 83, 225–232. 10.1016/j.drugalcdep.2005.11.015. [PubMed: 16364566]

Stringer KL, Baker EH, 2018. Stigma as a barrier to substance abuse treatment among those with unmet need: an analysis of parenthood and marital status. J. Fam Issues 39, 3–27. 10.1177/0192513x15581659.

Stringer KL, Langdon KJ, McKenzie M, Brockmann B, Marotta P, 2021. Leveraging COVID-19 to sustain regulatory flexibility in the treatment of opioid use disorder. J. Subst. Abus. Treat 123, 108263 10.1016/j.jsat.2020.108263.

The US Burden of Disease Collaborators, 2018. The State of US Health, 1990–2016. JAMA 319, 1444. 10.1001/jama.2018.0158. [PubMed: 29634829]

United States Interagency Council on Homelessness, 2017. Strategies to Address the Intersection of the Opioid Crisis and Homelessness.

Warfield M, DiPietro B, 2016. Medication-assisted treatment: Buprenorphine in the HCH community.

Weimer MB, Wakeman SE, Saitz R, 2021. Removing one barrier to opioid use disorder treatment. JAMA. 10.1001/jama.2021.0958.

Woolf SH, Schoomaker H, 2019. Life Expectancy and Mortality Rates in the United States, 1959–2017. JAMA - J. Am. Med. Assoc 10.1001/jama.2019.16932.

Zou G, 2004. A modified poisson regression approach to prospective studies with binary data. Am. J. Epidemiol 159, 702–706. 10.1093/aje/kwh090. [PubMed: 15033648]

Zou GY, Donner A, 2013. Extension of the modified Poisson regression model to prospective studies with correlated binary data. Stat. Methods Med. Res 22, 661–670. 10.1177/0962280211427759. [PubMed: 22072596]

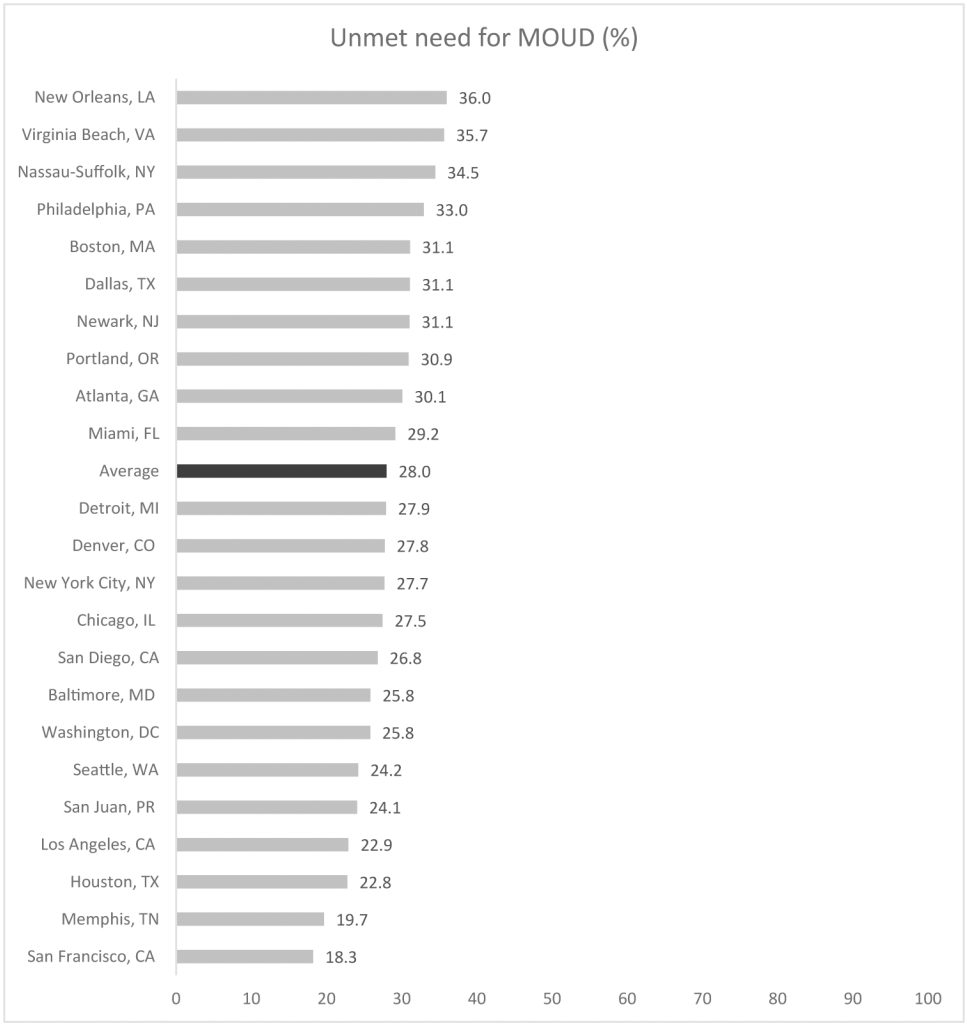

Fig. 1.

Unmet need for medications for opioid use disorder (MOUD) (%) among persons who inject drugs by city - National HIV Behavioral Surveillance, 23 cities, United States, 2018. *MOUD – includes methadone, buprenorphine, Suboxone, or Subutex.

Table 1

Socio-demographic characteristics, behaviors, and HIV status of persons who inject drugs - National HIV Behavioral Surveillance, 23 cities, United States, 2018.

Characteristic	No.	%
Overall	10,879	100
Age		
18–24	394	3.6
25–34	2582	23.7
35–44	2656	24.4
≥45	5247	48.2
Gender		
Male	7485	68.8
Female	3300	30.3
Transgender	88	0.8
Race/ethnicity		
Non-Hispanic Black	3634	33.4
Hispanic/Latino[a]	2297	21.1
Non-Hispanic White	4219	38.8
Other[b]	720	6.6
U.S. Census region [c]		
West	2626	24.1
Northeast	2228	20.5
South + Territories	4971	45.7
Midwest	1054	9.7
Education (highest level completed)		
Less than high school	3139	28.9
High school	4499	41.4
Some college or higher	3238	29.7
Employment status		
Unemployed	9274	85.3
Employed (full or part-time)	1605	14.7
Incarcerated, past 12 m [d]		
No	6965	64.0
Yes	3907	35.9
Federal Poverty level-2018 [e]		
Above federal poverty level	2645	24.3
At or below federal poverty level	8164	75.0
Homelessness [f]		
Not homeless	5480	50.4
Currently homeless	5398	49.6
Current health insurance		

Characteristic	No.	%
No	2806	25.8
Yes	8011	73.6
Visited HCP, past 12 months		
No	2243	20.6
Yes	8632	79.4
Usual place to get health care (among those who visited HCP, past 12 months)		
Doctor's office or HMO	1743	20.2
Clinic or health center	2629	30.5
Hospital emergency room	3188	36.9
Some other place	268	3.1
No usual place to get health care	748	8.7
Drugs injected most commonly		
Opioids	6096	56.0
Stimulants	566	5.2
Multiple drugs	4191	38.5
Injecting frequency		
Once a day or less	2285	21.0
More than once a day	8584	78.9
Receptive sharing of syringes, past 12 months		
No	7306	67.2
Yes	3569	32.8
Received syringe from SSP, past 12 months		
No	5068	46.6
Yes	5802	53.3
Overdosed on opioids, past 12 months [g]		
No	7821	71.9
Yes	3051	28.0
Used MOUD [h]**, past 12 months**		
No	5062	46.5
Yes	5815	53.5
Tried to get access to MOUD to treat drug use but were unable to		
No	7834	72.0
Yes	3045	28.0
HIV testing, past 12 months [i]		
No	4630	45.0
Yes	5659	55.0
NHBS HIV testing results		
Neg	10,211	93.9
Pos	668	6.1

Numbers and totals may not add up to 100% due to missing data and rounding. Missing or unknown values were not larger than 1% for any variable. Abbreviations: HCP – health care provider; HMO – health maintenance organization; MOUD – medication for opioid use disorder; SSP – syringe service program; HIV - human immunodeficiency virus; NHBS – National HIV Behavior Surveillance

[a]Participants reported 1 or more race categories (American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or other Pacific Islander, and white). Hispanic or Latino ethnicity was asked separately; participants reporting Hispanic or Latino ethnicity were considered Hispanic or Latino, regardless of reported race. Participants reporting multiple races (but not Hispanic or Latino ethnicity) were classified as multiple races. Hispanic/Latinos can be of any race.

[b]Includes American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

[c]**Northeast** region includes the metropolitan statistical areas of Boston, Massachusetts; Nassau-Suffolk, New York; New York, New York; Newark, New Jersey; and Philadelphia, Pennsylvania. **South + Territories** region includes Atlanta, Georgia; Baltimore, Maryland; Dallas, Texas; Houston, Texas; Memphis, Tennessee; Miami, Florida; New Orleans, Louisiana; Virginia Beach, Virginia; Washington, District of Columbia; and San Juan, Puerto Rico. **Midwest** region includes Chicago, Illinois and Detroit, Michigan. **West** region includes Denver, Colorado; Los Angeles, California; Portland, Oregon; San Diego, California; San Francisco, California; and Seattle, Washington.

[d]Having been held in a detention center, jail, or prison, for more than 24 hours in the 12 months before interview

[e]Participants were asked about their combined monthly or yearly household income (in US$) from all sources for the calendar year before the interview. Poverty was determined by using the U.S. Department of Health and Human Services poverty guidelines for 2018. These

[f]Living on the street, in a shelter, in a single-room occupancy hotel (SRO), or in a car at the moment of the interview

[g]Nonfatal opioid overdose was defined as having passed out, turned blue, or stopped breathing from using heroin or painkillers in the 12 months before interview. Opioids include heroin and painkillers such as Oxycontin, Dilaudid, morphine, Percocet, or Demerol

[h]MOUD - includes methadone, buprenorphine, Suboxone, or Subutex

[i]Data include all participants who did not report a previous HIV-positive test result and participants who received their first HIV-positive test result less than 12 months before the interview

Table 2

Socio-demographic characteristics and behaviors associated with unmet need for medication for opioid use disorder (MOUD) among persons who inject drugs - National HIV Behavioral Surveillance, 23 cities, United States, 2018.

	Unmet need for MOUD								
	n=3045	Row %	PR[b]	95% CI		p-value	aPR[c]	95% CI	
Age									
18–24	120	30.5	1.14	0.94	1.39				
25–34	768	29.7	1.11	1.02	1.19				
35–44	753	28.4	1.05	0.97	1.13				
≥45	1404	26.8	Ref.			0.0802			
Gender									
Male	2072	27.7	Ref.			0.5768			
Female	949	28.8	1.03	0.96	1.11				
Transgender	21	23.9	0.89	0.62	1.29				
Race/ethnicity									
Non-Hispanic Black	1005	27.7	Ref.			0.0037	Ref.		
Hispanic/Latino[d]	692	30.1	1.22	1.08	1.37		1.13	1.01	1.27
Non-Hispanic White	1151	27.3	1.00	0.91	1.10		0.92	0.84	1.01
Other[e]	195	27.1	1.02	0.90	1.16		0.97	0.86	1.10
U.S. Census region [f]									
West	663	25.2	Ref.			0.151	Ref.		
Northeast	692	31.1	1.34	1.11	1.63		1.29	1.11	1.50
South + Territories	1398	28.1	1.04	0.90	1.20		1.07	0.93	1.24
Midwest	292	27.7	1.10	0.94	1.29		1.17	1.01	1.36
Education									
Less than high school	896	28.5	Ref.			0.2056			
High school	1226	27.3	0.95	0.88	1.03				
Some college or higher	922	28.5	1.01	0.91	1.11				
Employment status									
Unemployed	2613	28.2	Ref.			0.1475			
Employed (full or part-time)	432	26.9	1.07	0.97	1.18				

	Unmet need for MOUD								
	n=3045	Row %	PR[b]	95% CI		p-value	aPR[c]	95% CI	
Incarcerated [g], past 12 m									
No	1804	25.9	Ref.			<.0001	Ref.		
Yes	1237	31.7	1.23	1.15	1.31		1.15	1.08	1.23
Federal Poverty level-2018 [h]									
Above federal poverty level	754	28.5	Ref.			0.8368			
At or below federal poverty level	2270	27.8	0.99	0.91	1.07				
Homelessness [i]									
Not currently homeless	1417	25.9	Ref.			<.0001	Ref.		
Currently homeless	1627	30.1	1.20	1.13	1.28		1.26	1.19	1.34
Current health insurance									
No	817	29.1	Ref.			0.1593			
Yes	2213	27.6	0.93	0.85	1.03				
Visited HCP, past 12 months									
No	538	24	Ref.			0.0002	Ref.		
Yes	2506	29	1.21	1.11	1.32		1.08	1.00	1.17
Usual place to get health care (among those who visited HCP, past 12 months)									
Doctor's office or HMO	423	24.3	Ref.			<.0001	Ref.		
Clinic or health center	717	27.3	1.18	1.07	1.30		1.15	1.04	1.27
Hospital emergency room	1022	32.1	1.34	1.22	1.47		1.32	1.21	1.44
Some other place	84	31.3	1.30	1.09	1.55		1.31	1.13	1.51
No usual place to get health care	246	32.9	1.36	1.18	1.57		1.28	1.07	1.53
Drugs injected most commonly									
Opioids	1704	28	Ref.			<.0001	Ref.		
Stimulants	75	13.3	0.49	0.37	0.65		0.59	0.45	0.77
Multiple drugs	1259	30	1.10	1.02	1.19		1.07	0.99	1.16
Injecting frequency									
Once a day or less	452	19.8	Ref.			<.0001	Ref.		
More than once a day	2592	30.2	1.50	1.37	1.64		1.42	1.31	1.55
Receptive syringe sharing									
No	1915	26.2	Ref.			<.0001	Ref.		

	Unmet need for MOUD								
	n=3045 Row %		PR[b]	95% CI		p-value	aPR[c]	95% CI	
Yes	1130	31.7	1.19	1.11	1.28		1.14	1.06	1.23
Received syringe from SSP, past 12 months									
No	1381	27.2	Ref.			0.0061	Ref.		
Yes	1662	28.6	1.12	1.03	1.21		1.05	0.97	1.14
Overdosed on opioids [j], past 12 months									
No	1950	24.9	Ref.			<.0001	Ref.		
Yes	1093	35.8	1.42	1.33	1.52		1.33	1.24	1.42
HIV testing, past 12 months [k]									
No	1233	26.6	Ref.			0.002	Ref.		
Yes	1661	29.4	1.11	1.05	1.18		1.02	0.96	1.08
NHBS HIV testing status									
Neg	2879	28.2	Ref.			0.1487			
Pos	166	24.9	0.90	0.79	1.04				

Abbreviations: CI - confidence interval; PR - prevalence ratio; aPR – adjusted prevalence ratio; Ref. - reference category; HCP – health care provider; MOUD – medication for opioid use disorder includes methadone, buprenorphine, Suboxone, or Subutex; SSP – syringe service program; HIV - human immunodeficiency virus.

[a]Numbers may not sum to total N due to missing values.

[b]Separate Poisson regression models with generalized estimating equations run for each characteristic of interest; each model was adjusted for respondent-driven sampling (RDS) design by including included social network size and metropolitan statistical areas, and it was clustered on a recruitment chain.

[c]Separate Poisson regression models with generalized estimating equations run for each characteristic of interest; each model was adjusted for RDS design and tested for confounding. The potential confounders we explored were age group, gender, race/ethnicity, current homelessness, having health insurance in the past 12 months, and using MOUD in the past 12 months. We created a separate model for each variable of interest and determined a specific set of confounders for each model. We used backward elimination to reduce each model to the most parsimonious versions. Missing values were lower than 1% for any variable and did not make more than 10% of values in any of the regression models.

[d]Participants reported 1 or more race categories (American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or other Pacific Islander, and white). Hispanic or Latino ethnicity was asked separately; participants reporting Hispanic or Latino ethnicity were considered Hispanic or Latino, regardless of reported race. Participants reporting multiple races (but not Hispanic or Latino ethnicity) were classified as multiple races. Hispanic/Latinos can be of any race.

[e]Includes American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

[f]**Northeast** region includes the metropolitan statistical areas of Boston, Massachusetts; Nassau-Suffolk, New York; New York, New York; Newark, New Jersey; and Philadelphia, Pennsylvania. **South** + **Territories** region includes Atlanta, Georgia; Baltimore, Maryland; Dallas, Texas; Houston, Texas; Memphis, Tennessee; Miami, Florida; New Orleans, Louisiana; Virginia Beach, Virginia; Washington, District of Columbia; and San Juan, Puerto Rico. **Midwest** region includes Chicago, Illinois and Detroit, Michigan. **West** region includes Denver, Colorado; Los Angeles, California; Portland, Oregon; San Diego, California; San Francisco, California; and Seattle, Washington.

[g] Having been held in a detention center, jail, or prison, for more than 24 hours in the 12 months before interview

[h] Participants were asked about their combined monthly or yearly household income (in US$) from all sources for the calendar year before the interview. Poverty was determined by using the U.S. Department of Health and Human Services poverty guidelines for 2018.

[i] Living on the street, in a shelter, in a single-room occupancy hotel (SRO), or in a car at the moment of the interview

[j] Nonfatal opioid overdose was defined as having passed out, turned blue, or stopped breathing from using heroin or painkillers in the 12 months before interview. Opioids include heroin and painkillers such as Oxycontin, Dilaudid, morphine, Percocet, or Demerol.

[k] Data include all participants who did not report a previous HIV-positive test result and participants who received their first HIV-positive test result less than 12 months before the interview