

MNDOSA Program

The Minnesota Department of Health (MDH) developed the **MiNnesota Drug Overdose and Substance Use Surveillance Activity (MNDOSA)** to understand substance misuse and drug overdose patterns in close to real-time. MNDOSA illuminates the types of substances being used in Minnesota, helps identify clusters of substance misuse/overdose, and can inform clinicians, community partners and the public about substance use trends to guide prevention efforts. Six participating sites in Northeast MN and the Metro area report patients treated in the emergency departments as a result of substance misuse. Demographic information and data on what substance(s) the patient may have taken, based on patient report and clinician observation of symptoms, is collected by MNDOSA. When sites see patients with severe or unusual symptoms of substance misuse (e.g., the patient was hospitalized, was part of an overdose cluster, or had symptoms not typically caused by the substance used) or where the patient died, MNDOSA collects further narrative information and data on linkage to care after discharge, if available. Participating sites can also send clinical samples for confirmatory toxicology testing to the MDH Public Health Laboratory to identify the substances involved. MNDOSA uses a high-resolution testing method that can identify nearly 1,000 substances. Findings from MNDOSA contextualize statewide trends on fatal and nonfatal drug overdose and offer insight into circumstances of substance misuse/drug overdose, as well as the substances involved.

Why This Report Is Needed

Fatal and nonfatal drug overdose rates in Minnesota have been steadily rising, and drug overdose is a common cause of death among people experiencing homelessness¹, accounting for 1 in 3 deaths among people experiencing homelessness in a recent Minnesota study². In 2019, at least 1 in 262 Minnesotans experienced homelessness, with Minnesotans of color disproportionately affected by homelessness³. While homelessness affects Minnesotans of all ages and backgrounds, Black and American Indian Minnesotans and youth under age 24 disproportionately experience the burdens of homelessness. Housing inequities are rooted in the colonization of lands stolen from Indigenous peoples and the subsequent genocide of Indigenous people and enslavement of African people. Many governmental policies and institutional practices codified the exploitation and segregation of Black and American Indian people, barring them from opportunities to gain education, own property, and establish wealth through intergenerational attainment of these opportunities. The impacts of explicit legislation mandating and enforcing segregation, such as the Jim Crows laws, racial covenants, and residential redlining are seen today in the health and well-being of non-white communities. These injustices continue to result in disparities today⁴⁻⁶.

Key Findings

- Of emergency department visits from November 2017 – October 2021 reported to the Minnesota Drug Overdose and Substance Use Surveillance Activity (MNDOSA) which

required hospitalization, were part of an overdose cluster, showed symptoms not typically caused by the substance used, or resulted in death, 29% (134) of patients were experiencing homelessness.

- The impact of structural inequities and systemic racism on health and housing is apparent in the overrepresentation in MNDOSA of American Indian/Alaska Native and Black patients experiencing homelessness⁷.
- Patients experiencing homelessness being treated for overdose or substance use often had other life experiences impacting their health.
 - 87% of patients experiencing homelessness had a history of at least one mental health disorder.
 - 25% of patients experiencing homelessness had a history of justice involvement.
- Substances were more often detected through toxicology testing than were reported by patients or clinician observations of symptoms.
 - 67% of patients experiencing homelessness believed they had used amphetamine or showed symptoms of amphetamine use, while 83% had amphetamine detected through toxicology.
 - 25% of patients experiencing homelessness believed they had used an opioid or showed symptoms of opioid use, while 48% had an opioid detected through toxicology testing.
- Among patients with substance use concerns, patients experiencing homelessness faced greater barriers to being healthy, compared to housed patients.
 - 90% of patients experiencing homelessness required hospitalization for their symptoms related to substance use and/or separate concerns such as untreated medical conditions.
 - 43% of patients experiencing homelessness had attempted and/or completed chemical dependency treatment in the past, compared to 24% of patients not experiencing homelessness. This suggests that there may not be appropriate treatment options available, and that there are barriers to finding housing after completing treatment.
 - One out of three patients experiencing homelessness (32%) was referred or directly transferred to chemical dependency treatment following hospitalization. However, one out of four patients experiencing homelessness declined further treatment (23% of unhoused patients compared to 17% of housed patients). Reasons for declining treatment could be related to homelessness and need further study.
- These data demonstrate the importance for affordable housing as a strategy for preventing overdose among people experiencing homelessness.

Overview

Effective overdose prevention strategies rely on accurate characterization of populations and risk factors, along with tailored approaches that address each population’s challenges and resiliencies. The purpose of this report is to describe emergency department (ED) visits attributable to substance misuse and drug overdose in persons experiencing homelessness. Data come from five EDs in Northeast Minnesota¹ from November 2017 through October 2021, with results focused on demographic data, risk factors, substances involved, and follow-up treatment.

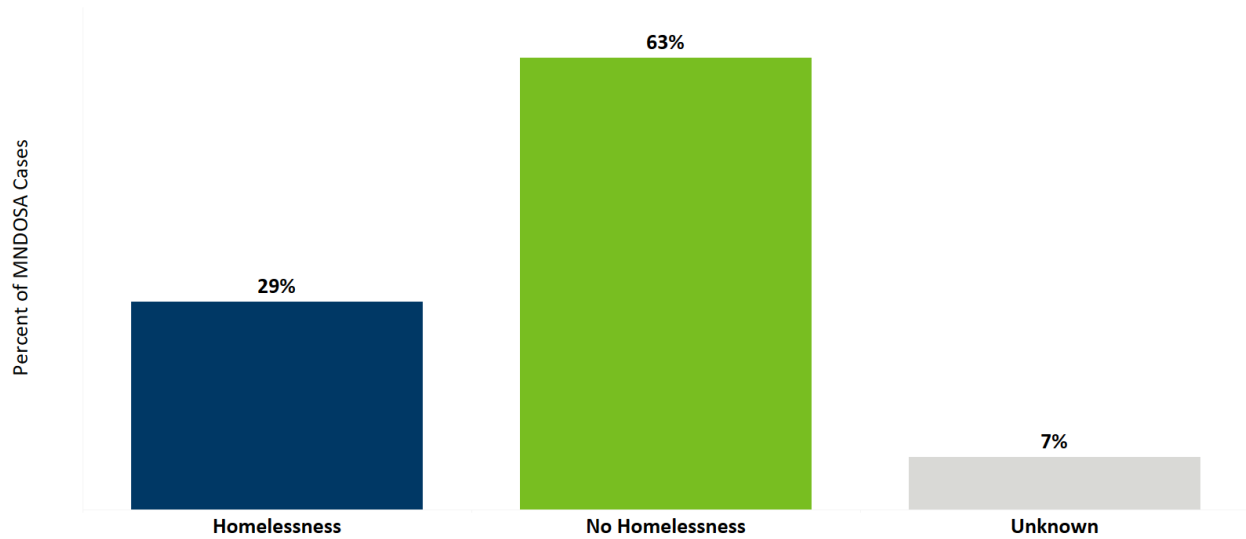
Demographics

Summary of Cases

From November 2017 through October 2021, there were 459 ED visits, representing 405 unique patients, reported through MNDOSA involving substance misuse that required hospitalization, had symptoms not typically caused by the substance taken, were part of an overdose cluster, or resulted in death. Among these cases, 134 (29%) represented patients experiencing homelessness (as noted by healthcare providers in ED records), 291 cases (63%) represented patients not experiencing homelessness, and 34 cases (7%) represented patients whose housing status was unknown at the time of the ED visit. The third group with unknown housing status was excluded from subsequent analyses. Among cases experiencing homelessness, 58% had specimens sent to MDH for toxicology testing; 67% of cases not experiencing homelessness had specimens sent for toxicology testing. Throughout this report, cases are referred to as ‘patients’.

¹ The five participating sites whose data contributed to this report are: Essentia Health – St. Mary’s Medical Center (Duluth), Essentia Health – Virginia, Essentia Health – Deer River, Essentia Health – Sandstone, and Essentia Health – Northern Pines (Aurora).

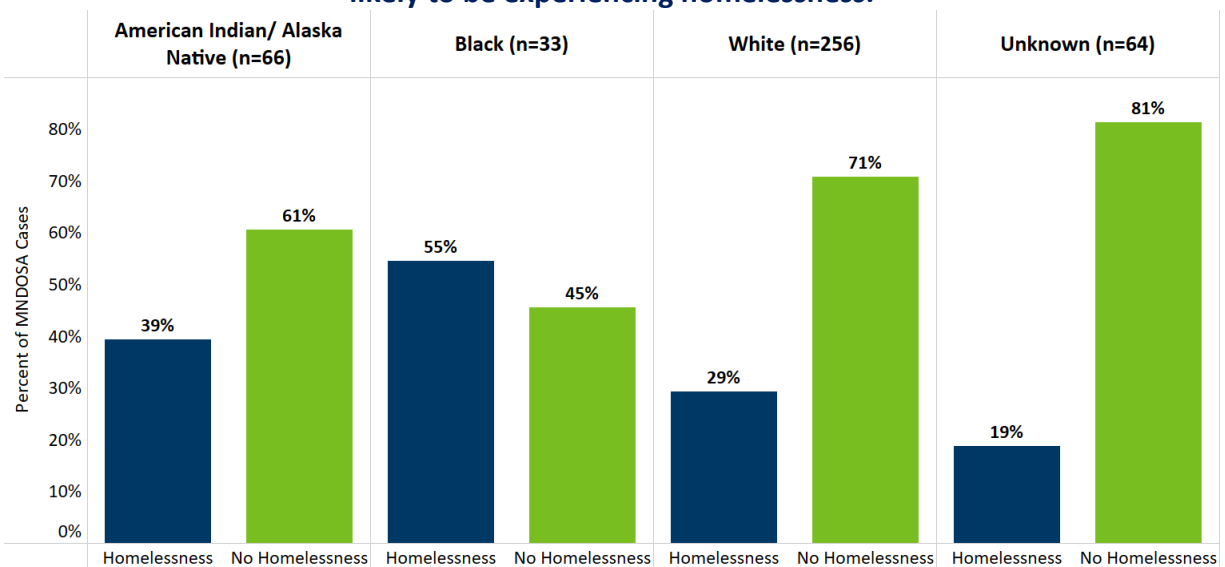
Chart 1. Approximately one third of MNDOSA cases represented persons experiencing homelessness.



Homelessness by Race

The population of MNDOSA patients were 60% white while 16% of patients were American Indian/Alaska Native and 8% of patients were Black; Asian and Pacific Islander patients and patients categorized as “other race” represented <5 cases and were excluded from Chart 1. American Indian and Black patients were more likely than white patients to be experiencing homelessness (Chart 2, 39% of American Indian patients and 55% of Black patients, compared to 29% of white patients, $p < 0.01$).

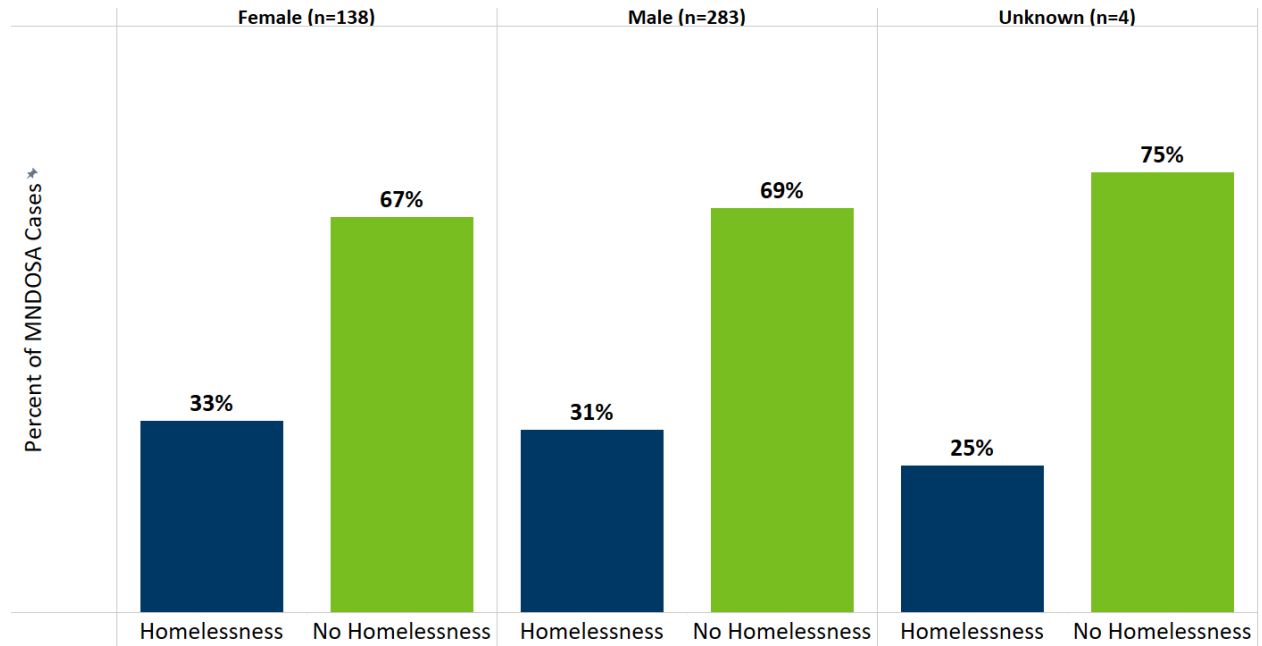
Chart 2. Compared to white patients, American Indian patients and Black patients were more likely to be experiencing homelessness.



Homelessness by Sex

For this analysis, patient sex was reported as male, female, or unknown. Most patients included in this report were male (67%). Among female patients, 33% were experiencing homelessness; 31% of male patients were experiencing homelessness (Chart 3).

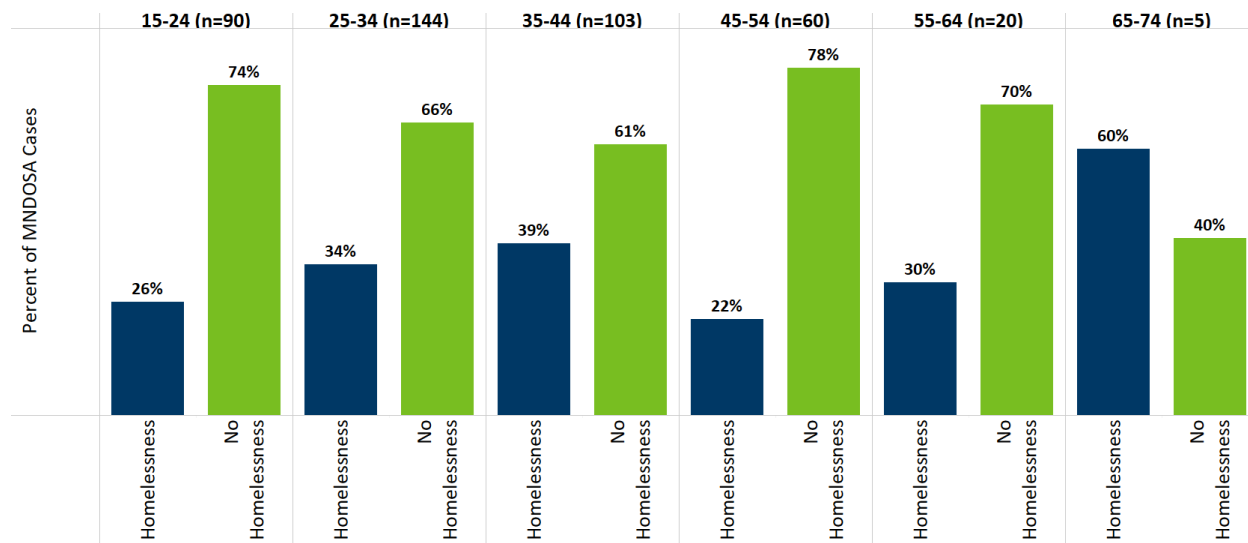
Chart 3. Male and female patients were equally likely to be experiencing homelessness.



Homelessness by Age

Patients experiencing homelessness were overrepresented among cases aged 65-74, compared to all patients, of which 29% were experiencing homelessness (Chart 4). Cases by race, sex, and homelessness, and age group, sex, and homelessness are included in Appendix III.

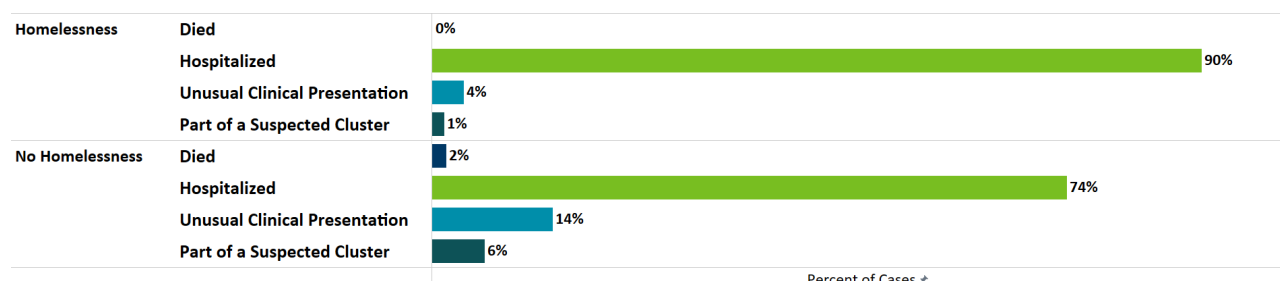
Chart 4. MNDOSA patients experiencing homelessness represent most cases aged 65-74.



MNDOSA Case Characteristics

Among all patients with symptoms of substance misuse that required hospitalization, had symptoms not typical for the substance used, were part of an overdose cluster or resulted in death, 29% were experiencing homelessness and 63% were not experiencing homelessness. Most patients were hospitalized (this includes hospitalization for symptoms of substance misuse and/or for other concerns such as untreated medical conditions (Chart 5)). Compared to housed patients, patients experiencing homelessness were more likely to be hospitalized for any reason (90% of patients experiencing homelessness compared to 74% of patients not experiencing homelessness).

Chart 5. Most MNDOSA visits identified as severe or unusual involved patients who were hospitalized.



Substances Reported and Detected through Toxicology

This section describes reported and detected substances for patients who had toxicology testing performed (n=299) and excludes patients who met criteria for toxicology testing but did not have clinical specimens collected during the ED visit, or whose collected specimens were entirely used for clinical purposes (n=160).

NOTE: The substance categories in this report may overlap and are not mutually exclusive. In some cases, multiple substances are reported and/or detected, and for other cases, no common drugs are reported to be involved.

Substances Reported

Substances which patients reported using, or which clinicians believe they used based on the patient's symptoms, are part of case reports that sites send to MDH. Reported substances are rarely confirmed because toxicology testing is not usually necessary for clinical care.

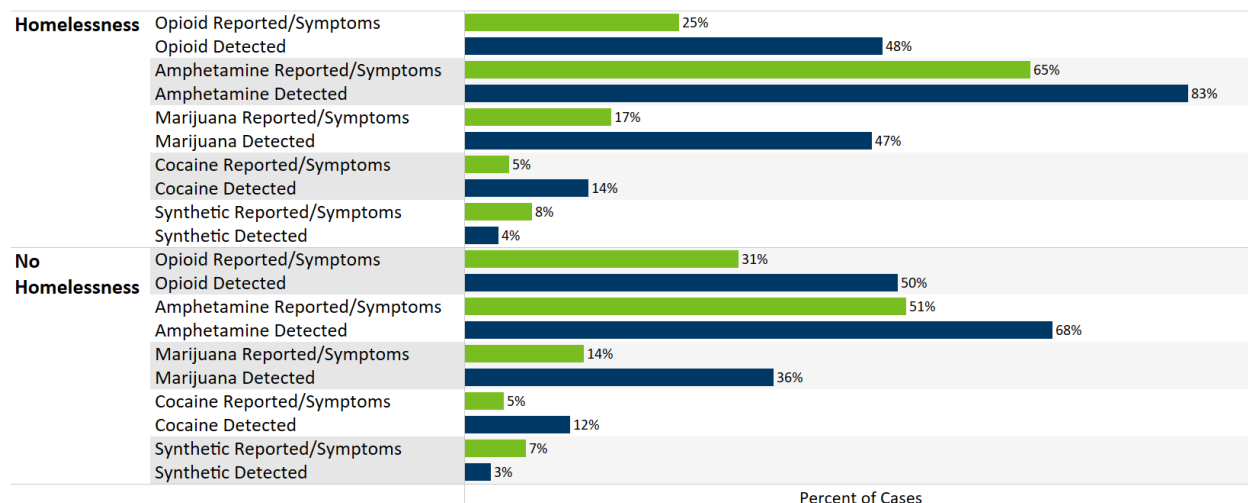
Among persons experiencing homelessness, 25% had reported opioid involvement and 65% had reported amphetamine involvement (Chart 6). Twenty percent did not report use of or symptoms suggesting the use of common illicit drugs, based on clinicians' observation and interpretation; this was partially due to incomplete case report forms. Patients experiencing homelessness were more likely to have believed they had used amphetamines or have symptoms consistent with amphetamine use (51% in patients not experiencing homelessness), but were less likely to have believed they had used opioids or have symptoms consistent with opioid use (31% in patients not experiencing homelessness).

Substances Detected through Toxicology

High resolution toxicology testing detects a wide variety of substances a person has been exposed to around the time of their ED visit and can provide more accuracy about substances related to their clinical presentation. Toxicology provides a snapshot of exposures, but cannot determine which substances resulted in certain symptoms, when substances were used, or whether substances were used together or sequentially. The method in which a substance was used, the time from when a patient used a substance to when a biological sample is collected, and the type of substance used, all impact whether a substance will be detected through toxicology testing.

Overall, the most frequently detected substances in MNDOSA samples were amphetamines and opioids, both in unhoused and housed patients (Chart 6). Patients experiencing homelessness had more amphetamine detection (83% of persons experiencing homelessness compared to 68% of persons not experiencing homelessness). This group also had more marijuana detection (47% of persons experiencing homelessness compared to 36% of persons not experiencing homelessness). Of note, while patients experiencing homelessness have opioid detection as frequently as patients not experiencing homelessness (48% of persons experiencing homelessness and 50% of persons not experiencing homelessness), patients experiencing homelessness are less likely to report or present symptoms of opioid exposure.

Chart 6. The most frequently reported and detected substance in MNDOSA cases, including cases with homelessness, is amphetamine.



Opportunities for Intervention

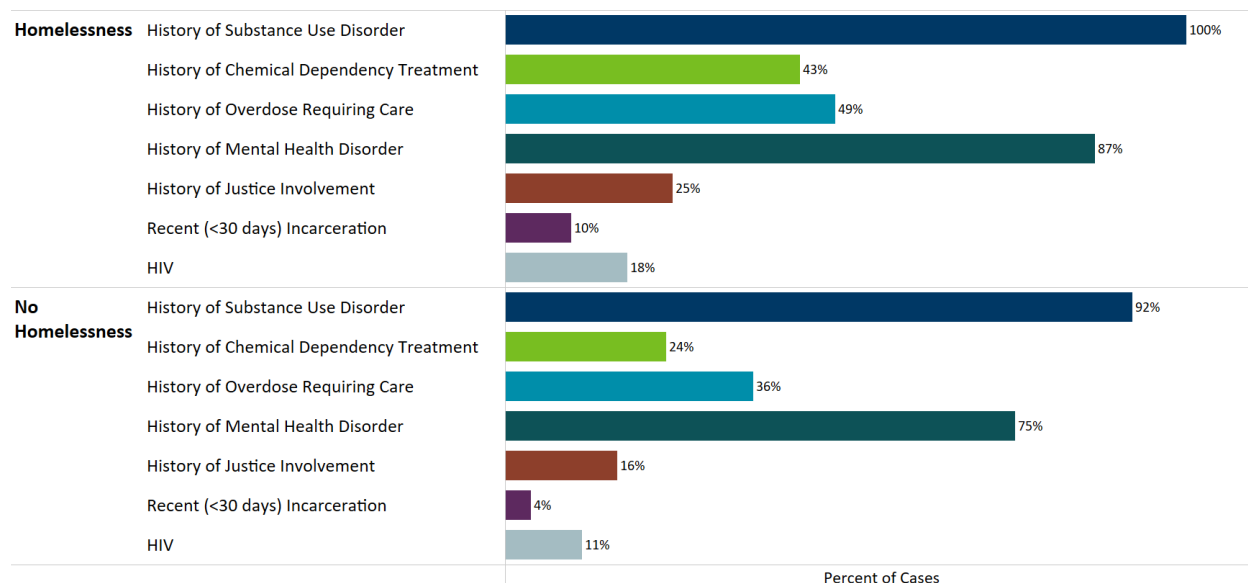
MNDOSA collects indicators of substance misuse concerns that are present at the time of the ED visit, like prior history of diagnosed substance use disorder and markers of substance misuse (e.g. prior overdose or prior chemical dependency treatment). Beyond these indicators, MNDOSA collects factors (presence of mental health disorder(s), recent release from an institution, living with HIV) which impact a person’s ability to access housing, economic stability, and appropriate medical treatment, and subsequently put an individual at greater risk of fatal drug overdose⁸⁻⁹. These factors represent individual life experiences, but they also reflect systemic gaps in access to treatment for certain groups. For example, individuals involved with the justice system, with co-occurring substance use and mental health concerns, and those with conditions like HIV that expose them to stigma within the healthcare system, encounter challenges in accessing care because of their life experiences.

Importantly, these factors also represent opportunities for intervention. For example, if a patient is diagnosed with a substance use disorder or mental health disorder, the healthcare provider diagnosing the patient can connect the patient to further supportive treatment or resources which would decrease their risk of subsequent overdose as well as other adverse health outcomes.

Most MNDOSA patients have a history of substance use disorder, including all patients experiencing homelessness (Chart 7). Almost half (49%) of patients experiencing homelessness have a history of an overdose requiring medical attention, compared to 41% of all patients. Importantly, 87% of patients experiencing homelessness also have a history of at least one mental health disorder, representing a point of intervention. Among all MNDOSA patients, about 1 out of 5 had ever been involved in the justice system, and 6% had been recently incarcerated. Among patients experiencing homelessness, 1 out of 4 had justice system involvement (p=0.06) and almost 10% had been recently incarcerated (Chart 7, p=0.03). Among

patients experiencing homelessness, 18% had a diagnosis of HIV, compared to 11% in patients not experiencing homelessness (Chart 7, p=0.09).

Chart 7. MNDOSA patients experiencing homelessness have more opportunities for intervention, like substance use disorders, prior overdose, mental health disorders, justice involvement, and HIV, compared to patients not experiencing homelessness.



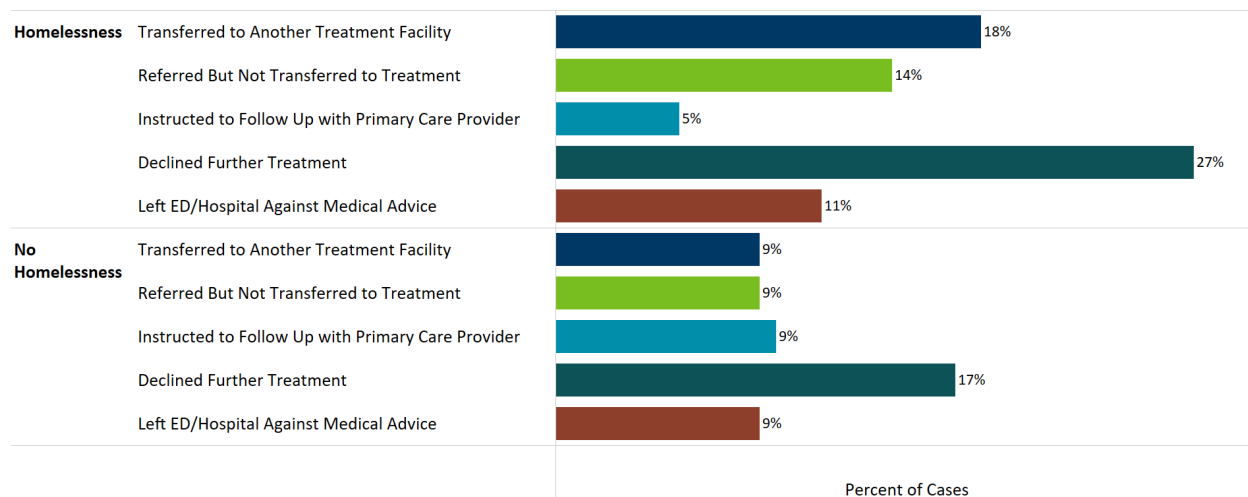
Linkage to Treatment at Hospital Discharge

Each MNDOSA event is a possible point of intervention for persons at risk of overdose, when the patient can be referred, transferred or otherwise connected to treatment options.

Overall, 22% of MNDOSA patients were referred or directly transferred to subsequent treatment, while 20% declined further treatment (Chart 8). Among patients experiencing homelessness, both referral and decline of treatment were more common: 1 out of 3 cases were referred or directly transferred to further treatment (p<0.01) while 1 out of 4 cases declined further treatment (p=0.02). Some patients, regardless of housing status, decline further treatment; patients experiencing homelessness may decline further treatment for reasons directly related to the experience of homelessness. People experiencing homelessness may face additional barriers to treatment such as stigma associated with treatment, strict sobriety requirements of facilities, lack of culturally responsive treatment options or providers, and reluctance to being separated from their existing community supports¹⁰.

These findings should be interpreted with caution, as the data depend on the level of detail available in patients’ health records (in some cases, patients have detailed and thorough records and in other cases, less detail is available). Additionally, each case is unique and requires individual consideration by healthcare providers. The factors that affect whether a patient is offered various treatment options, and whether they engage in the available options, need further study in this population.

Chart 8. One out of three cases with homelessness were referred or transferred to further treatment, while one out of four declined further treatment.



Important Considerations

This study used data from emergency department records limited to the encounter reported to MNDOSA. Patients noted to be “homeless” or living in emergency shelter in these records were included. Patients who were unstably housed (such as couch surfing, temporarily doubling up) were not included. This definition of homelessness could mean that some patients experiencing homelessness were not documented as such, and results should be interpreted with this consideration. Additionally, patients experiencing homelessness might have had more available information on medical history, risk factors, and treatment, necessitating caution when interpreting the results. These considerations highlight the need for healthcare providers to capture social history by using public health diagnosis codes.ⁱⁱ Use of these codes will more accurately characterize the impact of social determinants, such as housing status, on health. The MNDOSA program asks participating facilities to proactively report cases to MDH, and asks clinicians to identify cases which show unusual signs of substance misuse or are part of an overdose cluster; this introduces variability and the likelihood of missed cases in reporting to MDH.

MNDOSA collects data from participating in Minnesota to identify issues related to substance use and overdose that need further investigation. This analysis looks at a small number of cases and is not representative of statewide trends or overall substance misuse. However, its findings show the profound health impacts of homelessness on patients with substance misuse concerns. These findings illustrate the value of data that describe both health and social

ⁱⁱ A sub-analysis of this study found that from January 2020- December 2021, 42.3% of MNDOSA cases noted as experiencing homelessness did not have a diagnosis code related to housing instability from the related hospital records.

determinants. They also generate questions about why patients engage in or decline treatment options. Improved public health data collection and future analyses of linkage to treatment and gaps in engaging in treatment can answer these questions. Further studies that expand on these findings could identify successful connections to treatment services, and inform the distribution of drug overdose and substance misuse prevention efforts and resources.

Conclusions

Homelessness is common among persons presenting to the ED as a result of substance misuse. Persons experiencing homelessness are more likely to have multiple areas for intervention, such as diagnosed mental health disorders and past incarceration. Expanded toxicology testing highlighted that people experiencing homelessness are at risk of exposure to substances they may not realize they are using. When compared to others, they are more likely to have amphetamine exposure. While persons experiencing homelessness are more likely to be referred or transferred to subsequent treatment, they are also more likely to decline treatment. The reasons MNDOSA patients declined treatment are unclear, but existing treatment options may have strict sobriety requirements, may not be culturally responsive, or may necessitate leaving community supports behind¹⁰, and this may influence the decision to engage in or decline treatment. Further investment in data collection systems and analysis is needed to address treatment gaps in this population.

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Appendix

Appendix I: MNDOSA Case Definition

The case definition for inclusion in the MNDOSA program is: any patient presenting to the emergency department where the principal diagnosis is attributable to substance misuse.

Appendix II: Report Definitions

Homelessness: Any documentation in the patient's ED visit records indicating the patient was "homeless," living in a temporary shelter, or living with others due to lack of housing.

Unusual clinical presentation: Per ED clinician(s) and/or ED staff, the patient exhibited symptoms or features that would not be considered typical, given the suspected substances involved in the patient's ED visit.

Transferred to another treatment facility: Upon discharge, the case was directly transferred to another inpatient medical, psychiatric, or chemical dependency treatment facility.

Referred but not transferred to treatment: Upon discharge, the patient had agreed to be referred to chemical dependency treatment, but was not transferred directly to another facility.

Declined further treatment: During the course of their ED visit and/or hospitalization, the patient was offered some type of chemical dependency treatment, and declined this treatment.

Appendix III: Supplemental Tables

Chart 1. Cases by race, sex, and homelessness status.

	Homelessness	Homelessness	No Homelessness	No Homelessness	Unknown
<i>Race</i>	<i>Female % (n)</i>	<i>Male % (n)</i>	<i>Female % (n)</i>	<i>Male % (n)</i>	<i>Male % (n)</i>
<i>American Indian/ Alaska Native</i>	3.7% (17)	2.0% (9)	3.1% (14)	5.7% (26)	
<i>Black</i>		3.9% (18)		2.2% (10)	
<i>White</i>	5.0% (23)	11.3% (52)	12.0% (55)	27.5% (126)	3.1% (14)
<i>Unknown</i>		2.0% (9)	3.9% (18)	6.8% (31)	

Chart 2. Cases by sex, age, and homelessness status.

	Homelessness	Homelessness	No Homelessness	No Homelessness	Unknown
<i>Age Group</i>	<i>Female % (n)</i>	<i>Male % (n)</i>	<i>Female % (n)</i>	<i>Male % (n)</i>	<i>Male % (n)</i>
<i>15-24</i>	2.2% (10)	2.8% (13)	4.1% (19)	10.2% (47)	
<i>25-34</i>	3.9% (18)	6.8% (31)	5.7% (26)	14.8% (68)	1.5% (7)
<i>35-44</i>	2.4% (11)	6.1% (28)	5.4% (25)	8.3% (38)	2.4% (11)
<i>45-54</i>		2.2% (10)	3.9% (18)	6.3% (29)	
<i>55-64</i>				2.4% (11)	

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