

Preliminary Findings from Drug-Related Emergency Department Visits, 2021: Results from the Drug Abuse Warning Network

Acknowledgments

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1. Highlights

In 2021, the Drug Abuse Warning Network (DAWN) identified 141,529 (unweighted) drug-related emergency department (ED) visits from 52 participating hospitals. These data were analyzed to (1) generate nationally representative weighted estimates for the top five drugs in drug-related ED visits, (2) assess monthly trends and drugs involved in polysubstance ED visits in a subset of sentinel hospitals, and (3) identify drugs new to DAWN's Drug Reference Vocabulary (DRV) in 2021.

1.A Weighted National Estimates for the Top Five Drugs in Drug-Related ED Visits

KEY FINDINGS BY DRUGS

- › The top five drugs involved in drug-related ED visits in 2021 were alcohol (39.33% of all drug-related ED visits), opioids (14.07%), methamphetamine (11.02%), marijuana (10.78%), and cocaine (4.71%).
- › Fentanyl-related ED visits rose throughout 2021, peaking in quarter 4. Heroin-related ED visits rose from quarter 1 through quarter 3, and declined in quarter 4. All other top drugs peaked in quarter 2, and declined in quarters 3 and 4.

KEY FINDINGS BY AGE, SEX, RACE, ETHNICITY, AND CENSUS REGION

- › Patients aged 18 to 25 had the second highest percentage of ED visits related to marijuana (26.80%) and fentanyl (16.90%).
- › Males had a higher percentage of ED visits for all top five drugs as compared to females, however, the difference was much smaller (54.04% males vs. 45.94% females) for ED visits related to other opioid pain medications and their combinations.
- › Black or African American patients had the highest percentage of ED visits related to cocaine (44.19%), and the second highest percentage of ED visits related to marijuana (23.87%) and heroin (20.35%).
- › More than one-third of ED visits related to fentanyl were from the West census region alone (39.65%). The West and South census regions combined accounted for more than two-thirds of ED visits related to methamphetamine (71.02%). The West and South regions combined accounted for the majority of visits related to other opioid pain medications and their combinations (59.51%).

1.B Key Findings from Sentinel Hospitals, April 2021 – November 2021

- › Analysis of unweighted data from DAWN sentinel hospitals from April to November 2021 identified alcohol, methamphetamine, marijuana, cocaine, and heroin as the top five drugs involved in drug-related ED visits. Alcohol accounted for more than half of these drug-related ED visits.
- › Monthly trend analysis revealed decreasing trends of alcohol, methamphetamine, marijuana, and heroin-related ED visits, and increasing trends of fentanyl and unspecified narcotic analgesics.
- › The top six drugs involved in polysubstance ED visits (i.e., visits related to more than one drug) in sentinel hospitals were alcohol, methamphetamine, marijuana, cocaine, heroin, and fentanyl. While the majority of alcohol-related ED visits were due to alcohol alone, a significant percentage of methamphetamine-, marijuana-, cocaine-, heroin-, and fentanyl-related ED visits involved at least one other drug.

- › Alcohol was the most common additional drug involved in methamphetamine-, marijuana-, and cocaine-related polysubstance ED visits, while methamphetamine was the most common additional drug involved in heroin- and fentanyl-related polysubstance ED visits.

1.C Drugs New to DAWN's Drug Reference Vocabulary

- › In-depth analysis of 2021 data identified 38 substances related to ED visits that were new to DAWN's DRV. All of these substances were added to the DRV's existing drug categories. Of the 38 substances, roughly one-third were illicit drugs, and the other two-thirds were non-illicit substances.

2. Introduction and Background

Authorized by the 21st Century Cures Act in December 2016, DAWN is a nationwide public health surveillance system administered by the Substance Abuse and Mental Health Services Administration's (SAMHSA's) Center for Behavioral Health Statistics and Quality (CBHSQ). From 1992 through 2011 SAMHSA administered the former DAWN system, referred to as legacy DAWN, which collected data from ED visits resulting from substance use and overdoses. In 2018, SAMHSA re-established DAWN as a nationwide public health surveillance system that improves ED monitoring of substance use-related visits, including those related to opioids. DAWN captures data on ED visits related to recent substance use and misuse directly from the electronic health records (EHR) of participating hospitals. It helps SAMHSA and public health professionals, clinicians, and policymakers respond effectively to the opioid and substance misuse crisis in the United States.

The key objectives of DAWN are to:

- › Monitor demographic and geographic distribution, and identify trends of substance-related ED visits;
- › Provide an early warning system that identifies emerging and novel psychoactive substances and/or combinations of substances; and
- › Provide national estimates of substance-related ED visits to key stakeholders and the public.

3. Methods

3.A Design

DAWN is comprised of eligible hospitals selected from the 2016 American Hospital Association (AHA) file. All hospitals located in the United States and the District of Columbia that are non-federal, short-stay, general surgical and medical hospitals, with at least one 24-hour ED, and at least 100 annual ED visits, were eligible for selection (N = 4,310). DAWN uses a hybrid design of sentinel hospital-based surveillance and probability sample-based surveillance to better assess the epidemiology of substance use- and misuse-related ED visits.

Hospitals included in the sentinel-based surveillance were selected by SAMHSA from key urban areas with the goal of serving as an early warning system (Part A). Sentinel hospitals are expected to yield cases of concern, allowing for the collection and analysis of data quickly so a plan of action for addressing key and emerging problems can be developed. Sentinel hospitals were selected from counties that had the highest counts and rates for opioids, cocaine, and psychostimulant-related overdose deaths and ED visits.

Hospitals from the probability sample-based surveillance were selected using a stratified random sampling method and were divided into two categories: (1) a probability sample of hospitals in high-priority suburban and rural areas (Part B) to ensure the representation of suburban and rural hospitals, and (2) a probability sample of all the remaining hospitals (Part C). Part B hospitals were selected from suburban and rural counties with a high rate of drug-induced overdose deaths. Part C hospitals were selected from the remaining list of hospitals not included in Part B.

Table 1 provides an overview of the DAWN hospitals. Originally, DAWN was intended to be comprised of 50 hospitals (10 Part A, 8 Part B, and 32 Part C). The DAWN redesign in 2019 led to the retention of three hospitals, totaling 53 hospitals for DAWN. For weighting and estimation purposes, the three additional hospitals are included in Part A. See [Appendix A](#) for more information on the DAWN hospital selection design.

Table 3.A.1 Overview of the DAWN hospital selection

Part	Number	Description
Part A	13	Consists of 10 sentinel hospitals and 3 hospitals recruited prior to redesign
Part B	8	Sample of hospitals from suburban and rural counties with a high rate of drug-induced deaths
Part C	32	Sample of hospitals from all remaining hospitals not included in Part B

Participating DAWN hospitals complete a Data Access Agreement (DAA), Business Associate Agreement (BAA), and Institutional Review Board (IRB) approvals, as required. DAWN is committed by law and by practice to preserving patient privacy and safety by following the Health Insurance Portability and Accountability Act (HIPAA) (PL 104-191) and the HIPAA Privacy Rule (45 CFR Part 160 and Part 164 subparts A and E). The identity of DAWN participating hospitals is confidential.

3.B Data Abstraction, Drug Reference Vocabulary, and Quality Control

DAWN’s data abstraction effort involves the direct record review of all ED visit records from participating hospitals. Trained medical record abstractors review key areas of each patient’s ED visit record to assess whether the visit is related to recent drug use. If it is, they abstract key data items from the record into a web-based reporting system. DAWN abstracts demographic data, characteristics of the ED visit (time, date, etc.), and the drugs related to the visit. DAWN data elements do not include direct patient identifiers.

DAWN defines drug-related ED visits as drug use indicated as the reason for the ED visit, either as the direct cause (e.g., overdose) or as a contributing factor (e.g., injury, infection, organ damage). ED visits where the patient left the ED without being seen by a clinician or visits where the patient came to the ED but was directly admitted to the hospital are ineligible for review. See [Appendix A](#) for more information on data abstraction.

DAWN abstractors select the drug(s) related to the visit using a menu of drugs within the web-based reporting system. This menu is based on the contents of the DAWN DRV, which is a comprehensive drug vocabulary and classification system for all substances collected by DAWN. The DAWN DRV is derived from the Multum Lexicon®, 2020 Cerner Multum Inc., with modifications to meet DAWN’s unique requirements. The DRV includes codes for brand (trade) names, generic names, chemical names, metabolites, nonspecific drug terms, and street and slang terms for legal and illegal substances, including prescription and over-the-counter pharmaceuticals, alcohol, and select non-pharmaceuticals that are abused by inhalation.

Each drug in the DRV is assigned a drug ID. Brand names or street terms reported are classified to the drug ID of their more generic drug name. For example, smack, a street term for heroin, is linked to the drug ID for heroin. Drug IDs are used in the analysis of DAWN data either individually or in defined analytic groups. Drug IDs are assigned to individual drugs or drug combinations. When a drug-related visit is related to two or more drugs mixed together, this is defined as a

drug combination and is included on the DRV, for example, cocaine/marijuana is a mixture of cocaine and marijuana and has its own unique drug ID. This is different than when two drugs are related to a visit but taken separately. For this report, drug IDs were used to create a defined analytic group or the analysis was done at the drug ID level with no grouping.

DAWN uses a multi-step process to ensure data quality. Automated checks are embedded in the web-based abstraction system at initial entry to minimize errors, and machine learning (ML) algorithms are applied to each drug-related visit once it is submitted. Cases flagged by the ML model are subject to human review, which can be reviewed, edited, and resubmitted by a data manager. Quality control audits are performed on each abstractor's data bi-annually to identify training needs.

3.C Data Notes and Limitations

The recruitment of DAWN hospitals was ongoing in 2021. During 2021, 52 hospitals were actively participating and submitting data. Estimates presented in this report are subject to change as DAWN continues to collect data from additional hospitals. DAWN collects data on ED visits and not individuals. This means that a patient who has multiple drug-related ED visits will be counted as a separate drug-related ED visit each time.

The weighted estimates presented in this report are based on 52 hospitals, 13 selected for surveillance and 39 via a probability sample. Caution should be exercised when interpreting findings, as the precision offered by DAWN's small sample size is limited, and can lead to unreliable estimates. DAWN used relative standard error (RSE), calculated by dividing the standard error of the estimate with the estimate itself, as a measure of reliability. To avoid erroneous conclusions based on unreliable estimates, estimates with RSE > 50 percent are suppressed in this report. Estimates based on counts larger than zero and less than ten are suppressed to ensure patient confidentiality and minimize disclosure risk.

Definitions of the drugs and/or categories presented in the report are derived from the DAWN DRV and are provided in the respective sections and/or as footnotes.

3.D Characteristics of Unweighted Drug-Related ED Visits from DAWN Hospitals

Table 2 presents the demo-geographic distribution of drug-related ED visits from participating hospitals based on unweighted data. In 2021, 141,529 drug-related ED visits were identified from 52 hospitals. Drug-related ED visits from participating hospitals were predominantly among patients with the following characteristics: aged 26-44 (42.76%), male (65.65%), White (56.01%), Not Hispanic or Latino (78.40%), and from the West census region (30.61%).

Table 3.D.1 Demo-geographic distribution of DAWN cases (n = 141,529)

Subgroups	Count	Percent
Age Groups		
Under 18	4,953	3.50
18 to 25	16,691	11.79
26 to 44	60,523	42.76
45 to 64	45,111	31.87
65 and over	13,692	9.67
Missing	559	0.39
Age Groups (< 21 and 21+)		
Under 21	9,691	6.85
21 and over	131,279	92.76
Missing	559	0.40
Sex		
Male	92,920	65.65
Female	48,381	34.18
Other	119	0.08
Not documented	109	0.08
Race		
White	79,269	56.01
Black or African-American	33,430	23.62
Asian	3,077	2.17
American Indian/Alaska Native	4,073	2.88
Native Hawaiian/Pacific Islander	1,493	1.05
Other race	13,342	9.43
Multi-Racial*	2,735	1.93
Missing/Not documented	4,110	2.90
Ethnicity		
Not Hispanic or Latino	110,963	78.40
Hispanic or Latino	19,820	14.00
Unknown	10,746	7.59
Region		
Midwest	31,904	22.54
Northeast	23,338	16.49
South	24,768	17.50
West	43,324	30.61
No address/Institution	16,299	11.52
Missing	1,896	1.34

* ED visits with multiple-race categories are counted in the Multi-Racial category only.

3.E Weighting and Estimation

DAWN employed a multi-step weighting process to produce nationally representative estimates given DAWN's hybrid sentinel surveillance and probability sample design. The multi-step weighting process involved (1) calculating initial base weights for each sampling part/stratum, (2) adjusting the initial base weights for changes in the sample design and sampling frame, (3) adjusting for hospital non-response, and (4) post-stratification to adjust DAWN estimates of ED visit totals to AHA ED visits for the given stratum. For more details on weighting and estimation, see [Appendix A](#).

4. Weighted National Estimates of the Top Five Drugs in Drug-Related ED Visits, 2021

This section presents weighted national estimates of drug-related ED visits. The top five drugs in drug-related ED visits in 2021 were alcohol, opioids, methamphetamine, marijuana, and cocaine. The opioids category is further broken down into ED visits related to fentanyl, heroin, and other opioid pain medications. The top five drug-related ED visits include the drug used alone or in combination with other drugs as follows:

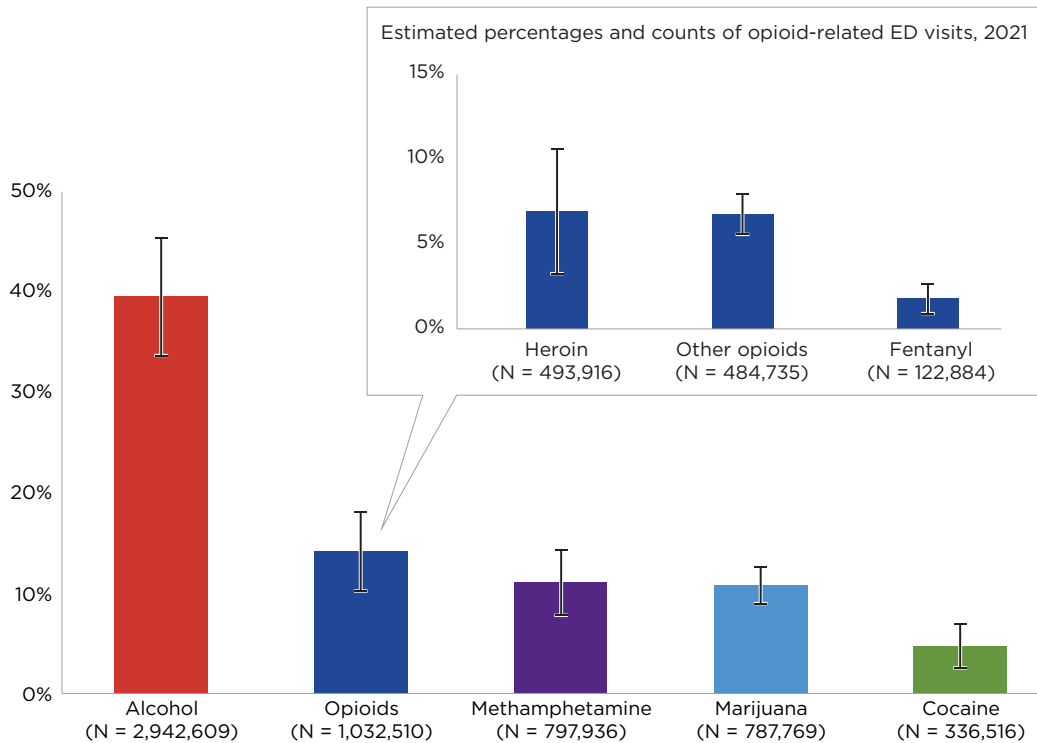
- › Alcohol-related ED visits involving alcohol alone or in combination with other drugs.
- › Opioid-related ED visits involving fentanyl, heroin, and other opioid pain medications taken alone or in combination with other opioids and/or other drugs.
- › Methamphetamine-related ED visits involving methamphetamine alone or in combination with other drugs.
- › Marijuana-related ED visits involving marijuana alone or in combination with other drugs.
- › Cocaine-related ED visits involving cocaine alone or in combination with other drugs.

Analytic grouping by drug ID was used for this analysis. See [Appendix B](#) for a list of drugs and drug combinations included.

Since a significant number of ED visits involve multiple substances, caution should be exercised while adding and/or comparing estimates across drugs, as ED visits related to more than one drug are counted more than once. For example, an ED visit related to both cocaine and marijuana are counted in both cocaine-related and marijuana-related ED visits.

In 2021, the majority of drug-related ED visits involved alcohol (39.33%), followed by opioids (14.07%), methamphetamine (11.02%), marijuana (10.78%), and cocaine (4.71%). Among the opioids, the majority of ED visits were from the heroin subcategory (6.94%) followed by other opioids and fentanyl.

Figure 4.1 Estimated percentages and counts of drug-related ED visits by the top five drugs (January 2021–December 2021)



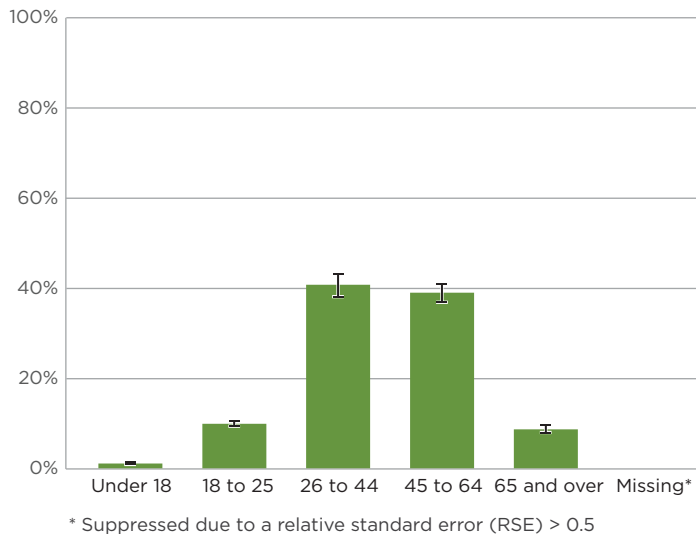
The top five drugs in all drug-related ED visits in 2021 were alcohol, opioids, methamphetamine, marijuana, and cocaine. Alcohol accounted for the majority of drug-related ED visits at 39.33 percent (2.9 million), followed by opioids at 14.07 percent (1.03 million). Opioids were further broken down into three categories—fentanyl, heroin, and other opioids. Among these opioid categories, heroin accounted for the highest percentage.

The following sections present subgroup analyses for each of the top five drugs: alcohol, opioids, methamphetamine, marijuana, and cocaine. Each section provides estimated percentages by age, sex, race, ethnicity, census region, in that order, and quarterly trends in 2021. For alcohol-related ED visits, an additional figure of estimated percentages for underage (under 21 years) vs. adult (21 years and older) is included. See [Appendix C](#) for accompanying tables.

4.A Estimated Percentages of Alcohol-Related ED Visits

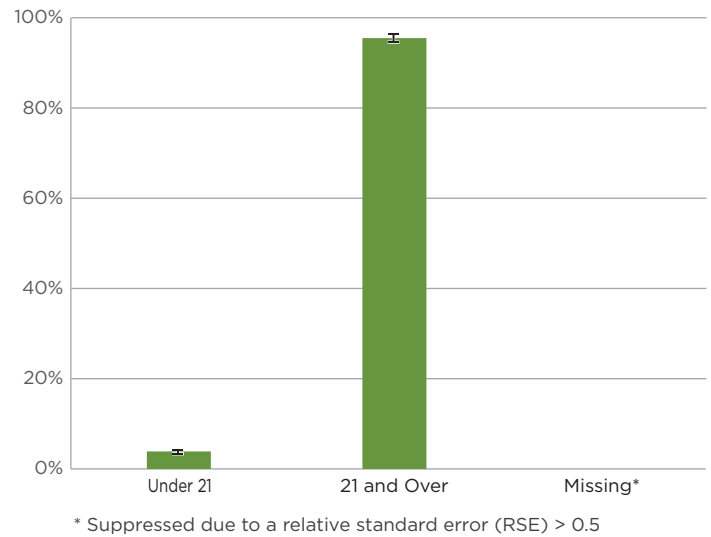
(Estimated weighted count = 2,942,609)

Figure 4.A.1 Alcohol-related ED Visits by Age Group



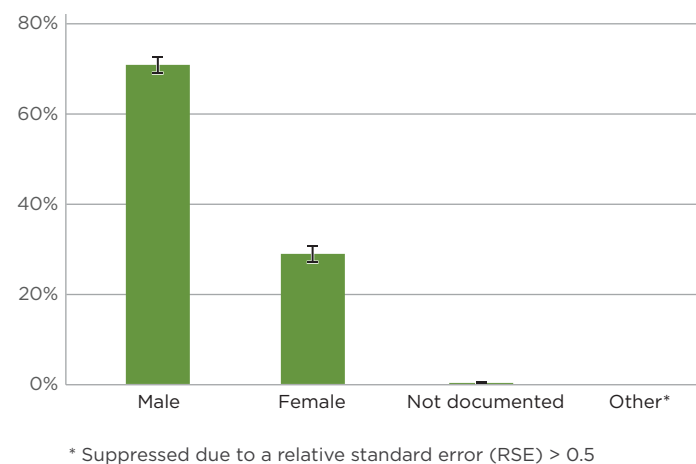
The percentage of alcohol-related ED visits was highest among patients ages 26 to 44 (40.63%) followed closely by patients ages 45 to 64 (38.92%).

Figure 4.A.2 Alcohol-related ED Visits by Age (< 21 and 21+)



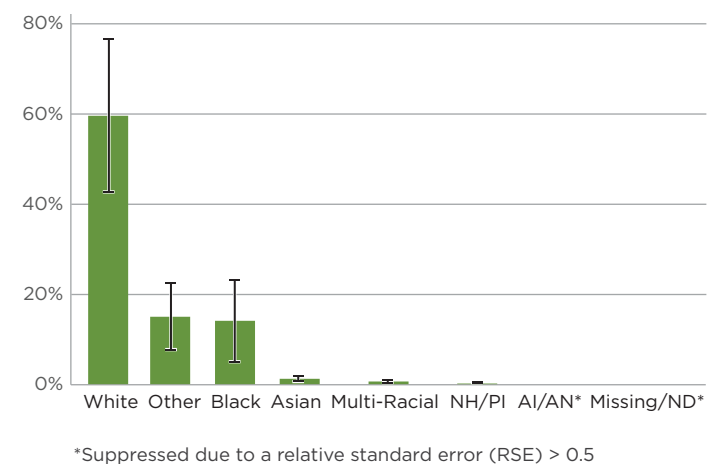
Patients ages 21 and over accounted for 95.58 percent of all alcohol-related ED visits.

Figure 4.A.3 Alcohol-related ED visits by sex



Male patients accounted for 71.01 percent of alcohol-related ED visits, while female patients accounted for 28.94 percent of these visits.

Figure 4.A.4 Alcohol-related ED visits by race



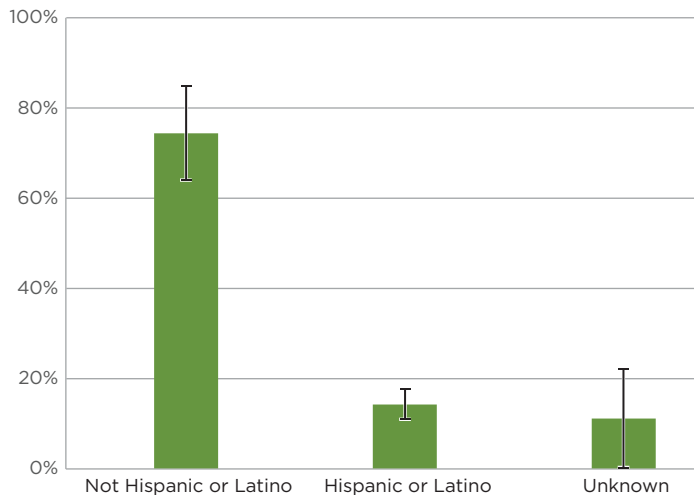
White patients accounted for the highest percentage of alcohol-related ED visits (59.76%), while Other patients accounted for the second highest percentage of these visits (15.09%).

Note: Other—The race documented in the medical record does not fit any other race category. Multi-Racial—Multiple races were selected. AI/AN—American Indian or Alaska Native. NH/PI—Native Hawaiian or Other Pacific Islander. Missing/ND—Race was missing or was not documented in the medical record.

Estimated Percentages of Alcohol-Related ED Visits (continued)

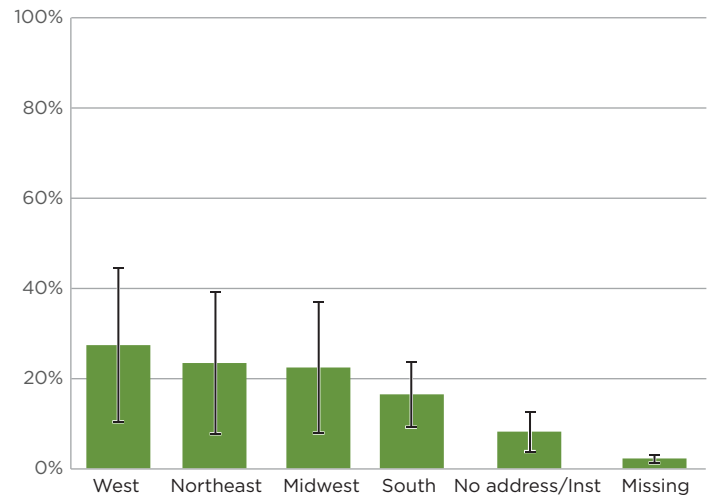
(Estimated weighted count = 2,942,609)

Figure 4.A.5 Alcohol-related ED Visits by Ethnicity



Not Hispanic or Latino patients accounted for 74.65 percent of alcohol-related ED visits, while Hispanic or Latino patients accounted for 14.26 percent of these visits.

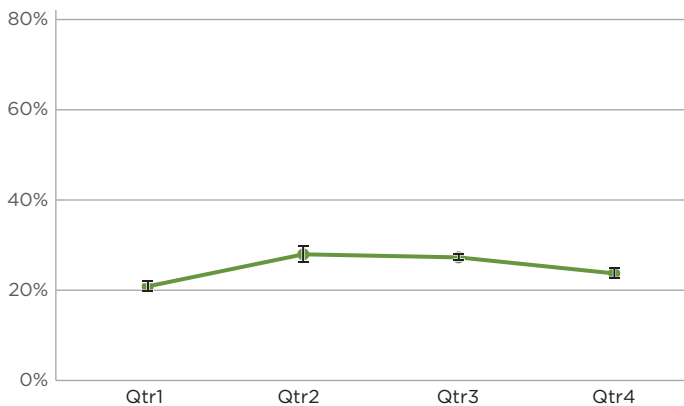
Figure 4.A.6 Alcohol-related ED Visits by Census Region



The regional percentage of alcohol-related ED visits was highest among patients residing in the West (27.45%), followed by patients residing in the Northeast (23.42%) and Midwest (22.40%).

Note: No address/Inst—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Figure 4.A.7 Alcohol-related ED visits by quarter



The percentage of alcohol-related ED visits rose from quarter 1 to quarter 2 before declining into quarters 3 and 4.

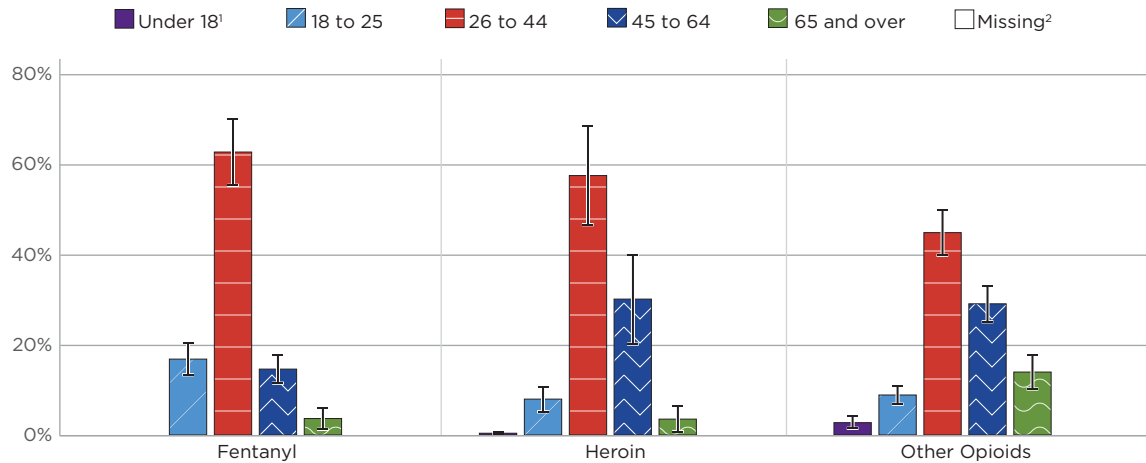
Key Takeaways from Alcohol-Related ED Visits

Alcohol-related ED visits in 2021 were more likely to be Not Hispanic or Latino, White, male, among those aged 26 to 64, and from the West census region. When comparing underage (under 21) vs. adult (21 and over) age groups, the majority of these patients were over 21 years of age (95.58%). The South census region had the lowest percentage of alcohol-related ED visits as compared to other census regions. Alcohol-related ED visits peaked in quarter 2 before declining in quarters 3 and 4. For the data table accompanying the figures in this section, see [Appendix Table C2](#).

4.B Estimated Percentages of Opioid-Related ED Visits

(Estimated weighted counts: Fentanyl = 122,884, Heroin = 493,916, Other Opioids = 484,735)

Figure 4.B.1 Fentanyl, Heroin, and Other Opioid-related ED Visits by Age Groups



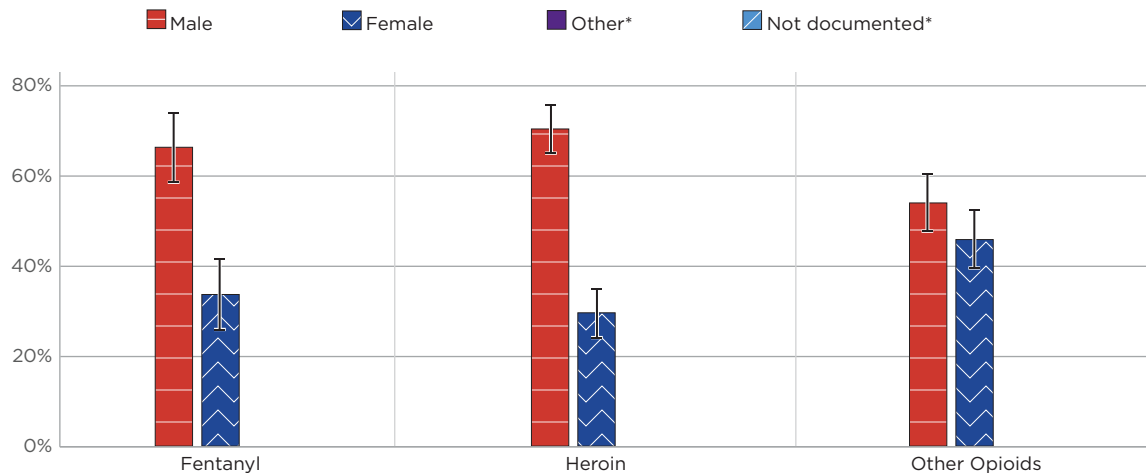
¹ The percent estimate for the Under 18 age group was suppressed for fentanyl due to a RSE > 0.5

² The percent estimates for the Missing age group were suppressed for each opioid category due to a RSE > 0.5

Note: For the data table accompanying this figure, see [Appendix Table C3](#).

The percentage of fentanyl, heroin, and other opioid-related ED visits was highest among patients ages 26 to 44. Patients ages 45 to 64 had the second highest percentage of heroin and other opioid-related ED visits, while patients ages 18 to 25 had the second highest percentage of fentanyl-related ED visits.

Figure 4.B.2 Fentanyl, Heroin, and Other Opioid-related ED Visits by Sex



* The percent estimates for Other and Not documented were based on less than 10 cases in every opioid category and therefore are suppressed

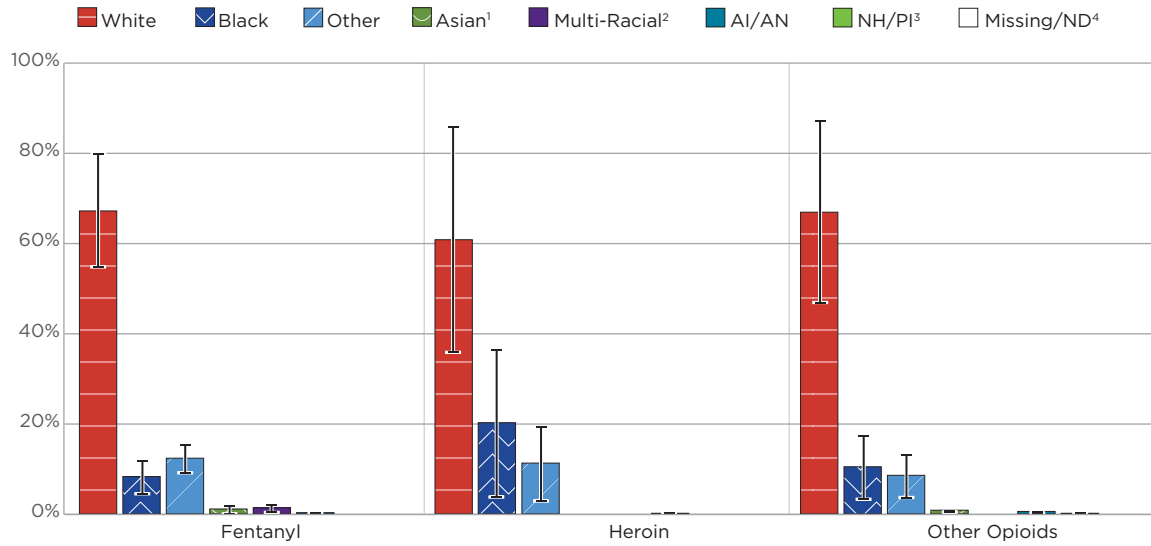
Note: For the data table accompanying this figure, see [Appendix Table C3](#).

Male patients accounted for the highest percentage of fentanyl, heroin, and other opioid-related ED visits, although the difference between males and females was smaller for other opioid-related ED visits.

Estimated Percentages of Opioid-Related ED Visits (continued)

(Estimated weighted counts: Fentanyl = 122,884, Heroin = 493,916, Other Opioids = 484,735)

Figure 4.B.3 Fentanyl, heroin, and other opioid-related ED visits by race



¹ The percent estimate for Asians was suppressed for heroin due to a relative standard error (RSE) > 0.5

² The percent estimate for Multi-Racial was suppressed for heroin and other opioids due to a relative standard error (RSE) > 0.5

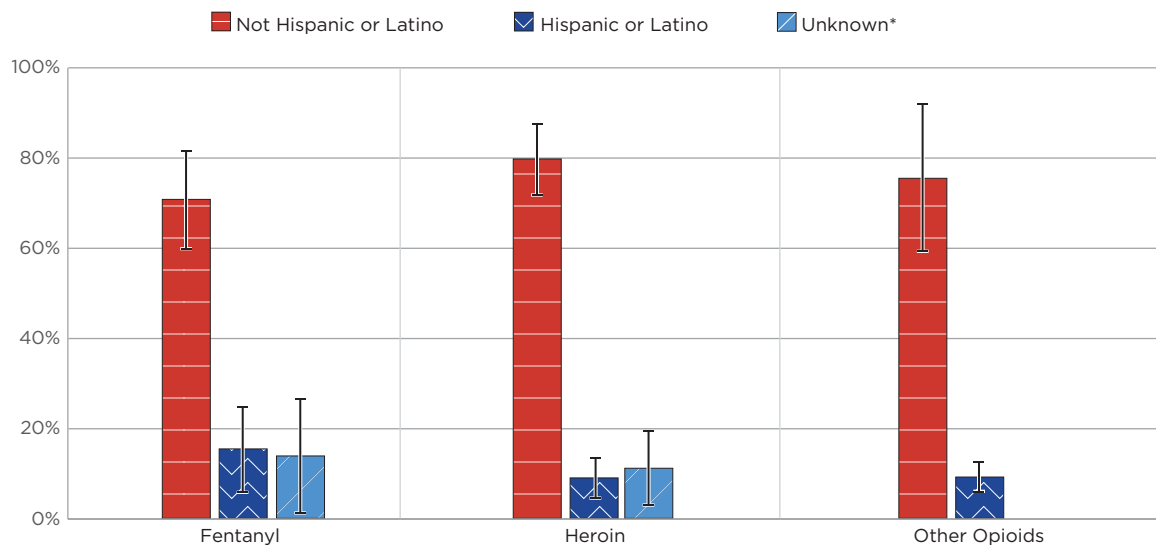
³ The percent estimate for NH/PI was suppressed for fentanyl and heroin due to a relative standard error (RSE) > 0.5

⁴ The percent estimates for Missing/ND were suppressed for every opioid category due to a relative standard error (RSE) > 0.5

Note: Other—The race documented in the medical record does not fit any other race category. Multi-Racial—Multiple races were selected. AI/AN—American Indian or Alaska Native. NH/PI—Native Hawaiian or Other Pacific Islander. Missing/ND—Race was missing or was not documented in the medical record. For the data table accompanying this figure, see [Appendix Table C3](#).

White patients accounted for the highest percentage of fentanyl, heroin, and other opioid-related ED visits, while Black patients accounted for the second highest percentage of heroin and other opioid-related ED visits.

Figure 4.B.4 Fentanyl, heroin, and other opioid-related ED visits by ethnicity



* The percent estimate for unknown ethnicity was suppressed for other opioids due to a relative standard error (RSE) > 0.5

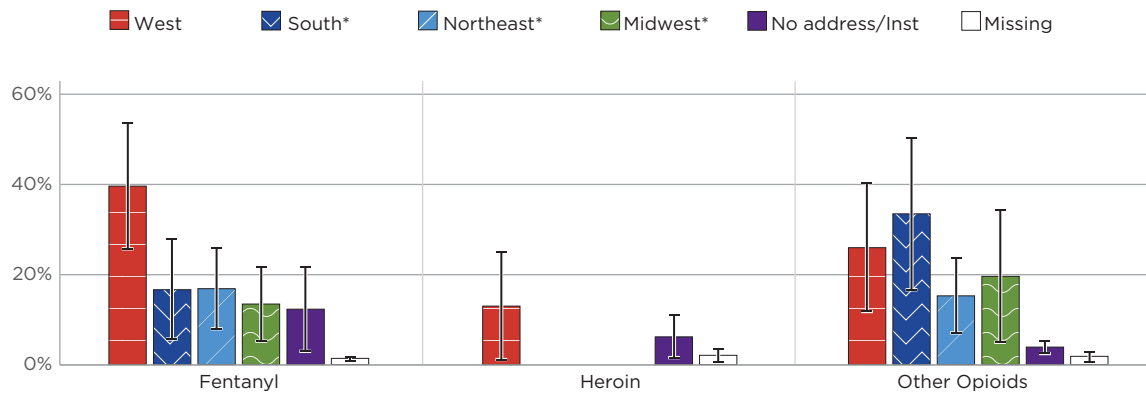
Note: For the data table accompanying this figure, see [Appendix Table C3](#).

Not Hispanic or Latino patients accounted for the highest percentage of fentanyl, heroin, and other opioid-related ED visits.

Estimated Percentages of Opioid-Related ED Visits (continued)

(Estimated weighted counts: Fentanyl = 122,884, Heroin = 493,916, Other Opioids = 484,735)

Figure 4.B.5 Fentanyl, heroin, and other opioid-related ED visits by census region

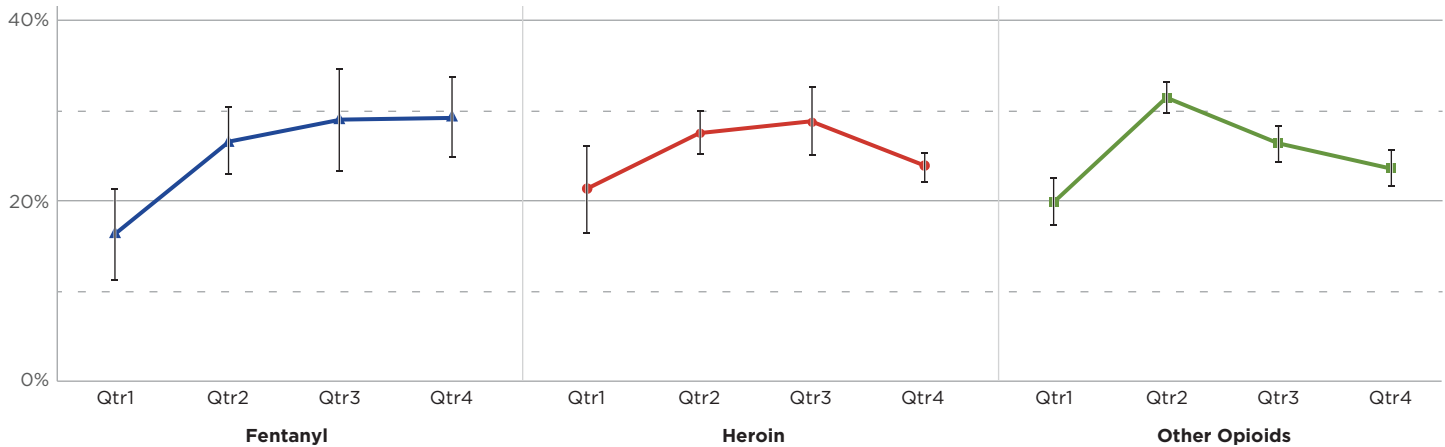


* The percent estimates for the South, Northeast, and Midwest regions were suppressed for heroin due to a relative standard error (RSE) > 0.5

Note: No address/Inst—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital). For the data table accompanying this figure, see [Appendix Table C3](#).

The West region accounted for the highest percentage of fentanyl and heroin-related ED visits, while the South region accounted for the highest percentage of other opioid-related ED visits.

Figure 4.B.6 Fentanyl, heroin, and other opioid-related ED visits by quarter



Note: For the data table accompanying this figure, see [Appendix Table C3](#).

Fentanyl-related ED visits rose throughout 2021, peaking in quarter 4. Heroin-related ED visits rose from quarter 1 through quarter 3, and declined in quarter 4. Other opioid-related ED visits peaked in quarter 2, and declined in quarters 3 and 4.

Estimated Percentages of Opioid-Related ED Visits *(continued)*

(Estimated weighted counts: Fentanyl = 122,884, Heroin = 493,916, Other Opioids = 484,735)

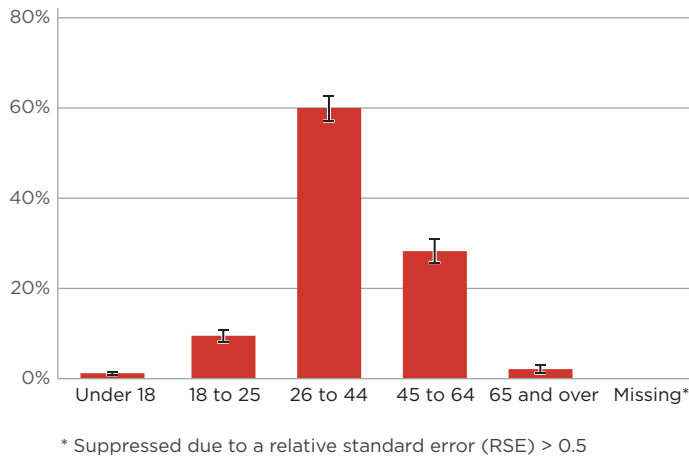
Key Takeaways from Opioid-Related ED Visits

Fentanyl, heroin, and other opioid-related ED visits in 2021 were more likely to be Not Hispanic or Latino, White, male, and among those aged 26 to 44. While males accounted for the majority of fentanyl, heroin, and other opioid-related ED visits, the difference between males and females was smaller for other opioid-related ED visits (54.04% and 45.94% respectively). Black or African American patients accounted for 20.35 percent of all heroin-related ED visits, but a smaller portion for fentanyl (8.39%) and other opioid-related ED visits (10.59%). Other opioid-related ED visits peaked in quarter 2, heroin-related ED visits peaked in quarter 3, and fentanyl-related ED visits peaked in quarter 4. For data tables accompanying the figures in this section, see [Appendix Table C3](#).

4.C Estimated Percentages of Methamphetamine-Related ED Visits

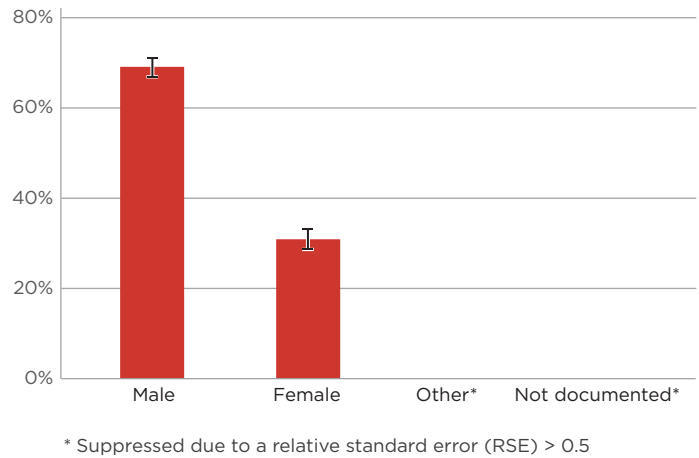
(Estimated weighted count = 797,936)

Figure 4.C.1 Methamphetamine-related ED visits by age group



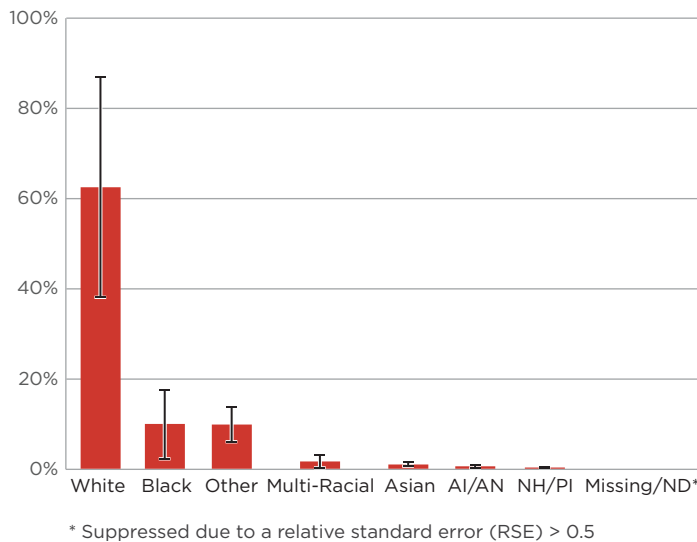
The percentage of methamphetamine-related ED visits was highest among patients ages 26 to 44 (59.58%) followed by patients ages 45 to 64 (28.05%).

Figure 4.C.2 Methamphetamine-related ED visits by sex



Male patients accounted for 69.10 percent of methamphetamine-related ED visits, while female patients accounted for 30.76 percent of these visits.

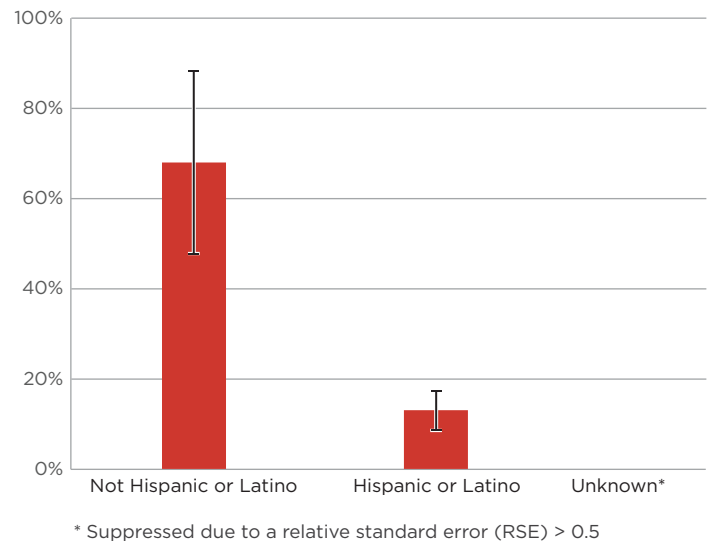
Figure 4.C.3 Methamphetamine-related ED visits by race



White patients accounted for the highest percentage of methamphetamine-related ED visits (62.45%), while Black patients accounted for the second highest percentage of these visits (9.95%).

Note: Other—The race documented in the medical record does not fit any other race category. Multi-Racial—Multiple races were selected. AI/AN—American Indian or Alaska Native. NH/PI—Native Hawaiian or Other Pacific Islander. Missing/ND—Race was missing or was not documented in the medical record.

Figure 4.C.4 Methamphetamine-related ED visits by ethnicity

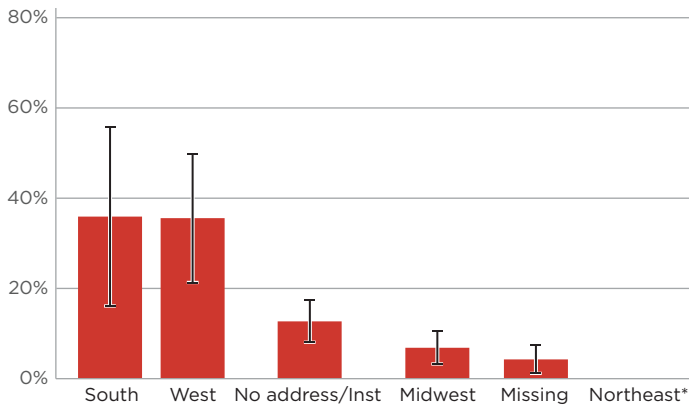


Not Hispanic or Latino patients accounted for 67.94 percent of methamphetamine-related ED visits, while Hispanic or Latino patients accounted for 12.92 percent of these visits.

Estimated Percentages of Methamphetamine-Related ED Visits *(continued)*

(Estimated weighted count = 797,936)

Figure 4.C.5 Methamphetamine-related ED visits by census region

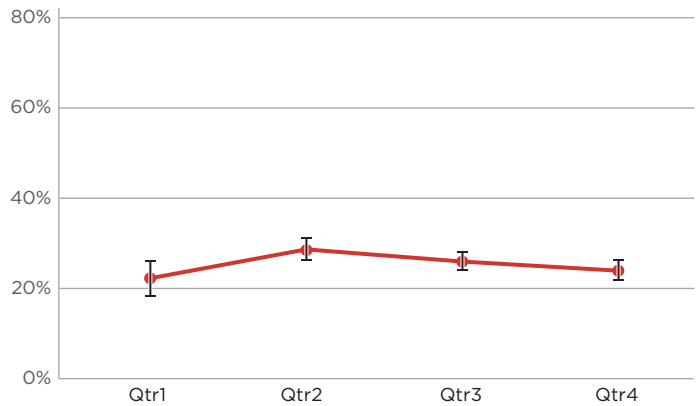


* Suppressed due to a relative standard error (RSE) > 0.5

The regional percentage of methamphetamine-related ED visits was highest among patients residing in the South (35.69%), followed closely by patients residing in the West (35.33%).

Note: No address/Inst—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Figure 4.C.6 Methamphetamine-related ED visits by quarter



The percentage of methamphetamine-related ED visits rose from quarter 1 to quarter 2 and then slightly declined in quarters 3 and 4.

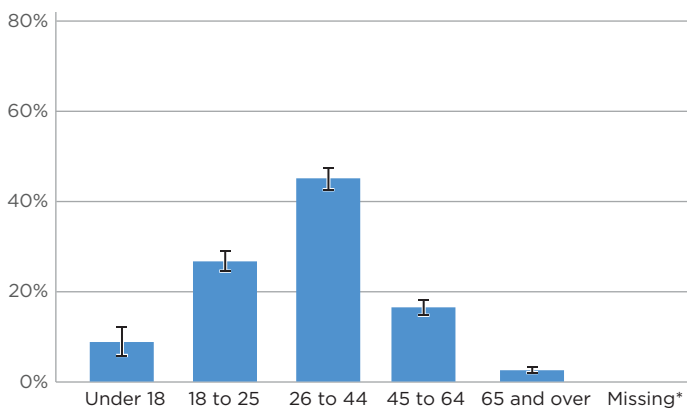
Key Takeaways from Methamphetamine-Related ED Visits

Methamphetamine-related ED visits in 2021 were more likely to be Not Hispanic or Latino, White, male, among those aged 26 to 44, and from the South census region. White patients accounted for the majority (62.45%) of all methamphetamine-related ED visits, followed by Black or African American patients (9.95%). The South and West census regions accounted for over 70 percent of methamphetamine-related ED visits. Methamphetamine-related ED visits peaked in quarter 2 before declining in quarters 3 and 4. For the data table accompanying the figures in this section, see [Appendix Table C4](#).

4.D Estimated Percentages of Marijuana-Related ED Visits

(Estimated weighted count = 787,769)

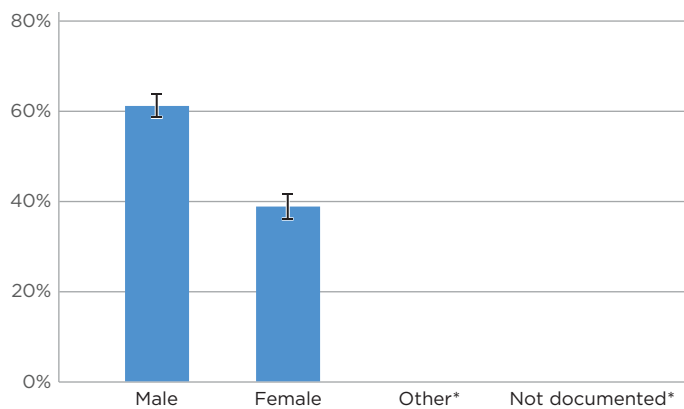
Figure 4.D.1 Marijuana-related ED Visits by Age Group



* Suppressed due to a relative standard error (RSE) > 0.5

The percentage of marijuana-related ED visits was highest among patients ages 26 to 44 (45.20%) followed by patients ages 18 to 25 (26.80%).

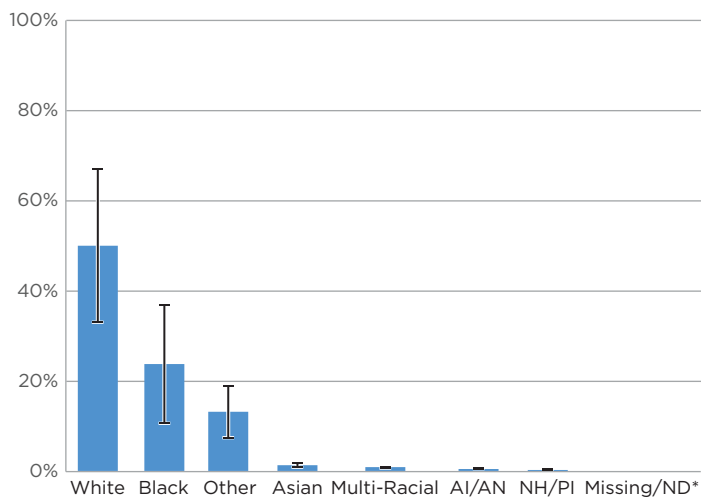
Figure 4.D.2 Marijuana-related ED Visits by Sex



* Suppressed due to a relative standard error (RSE) > 0.5

Male patients accounted for 61.20 percent of marijuana-related ED visits, while female patients accounted for 38.76 percent of these visits.

Figure 4.D.3 Marijuana-related ED visits by race

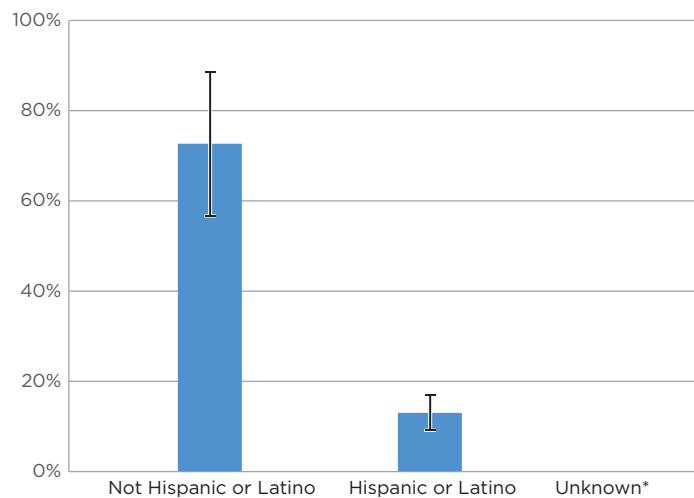


* Suppressed due to a relative standard error (RSE) > 0.5

White patients accounted for the highest percentage of marijuana-related ED visits (50.23%), while Black patients accounted for the second highest percentage of these visits (23.87%).

Note: Other—The race documented in the medical record does not fit any other race category. Multi-Racial—Multiple races were selected. AI/AN—American Indian or Alaska Native. NH/PI—Native Hawaiian or Other Pacific Islander. Missing/ND—Race was missing or was not documented in the medical record.

Figure 4.D.4 Marijuana-related ED visits by ethnicity



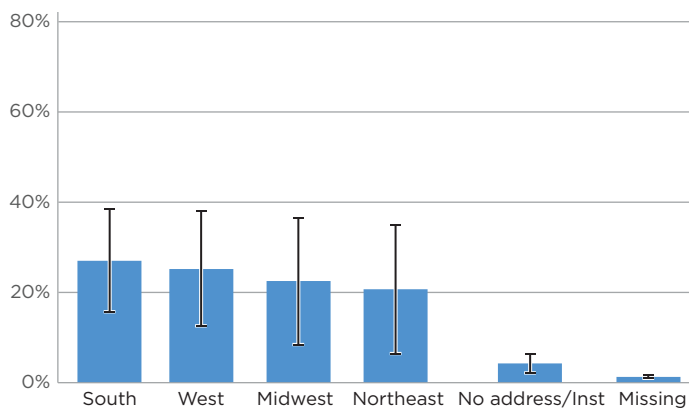
* Suppressed due to a relative standard error (RSE) > 0.5

Not Hispanic or Latino patients accounted for 72.65 percent of marijuana-related ED visits, while Hispanic or Latino patients accounted for 12.95 percent of these visits.

Estimated Percentages of Marijuana-Related ED Visits *(continued)*

(Estimated weighted count = 787,769)

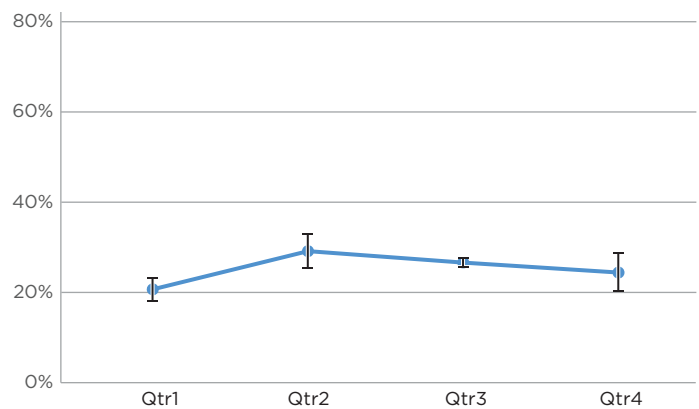
Figure 4.D.5 Marijuana-related ED visits by census region



The regional percentage of marijuana-related ED visits was highest among patients residing in the South (26.87%), followed by patients residing in the West (25.04%) and Midwest (22.30%).

Note: No address/Inst—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Figure 4.D.6 Marijuana-related ED visits by quarter



The percentage of marijuana-related ED visits rose from quarter 1 to quarter 2 before declining in quarters 3 and 4.

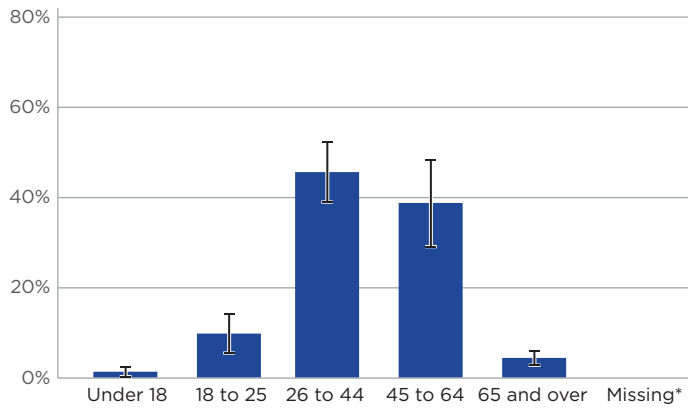
Key Takeaways from Marijuana-Related ED Visits

Marijuana-related ED visits in 2021 were more likely to be Not Hispanic or Latino, White, male, and among those aged 26 to 44. Patients aged 18-25 accounted for the second highest percentage of these ED visits. While marijuana-related ED visits were highest in the South census region, each census region accounted for at least 20 percent of these visits. Marijuana-related ED visits peaked in quarter 2 before declining in quarters 3 and 4. For the data table accompanying the figures in this section, see [Appendix Table C5](#).

4.E Estimated Percentages of Cocaine-Related ED Visits

(Estimated weighted count = 336,516)

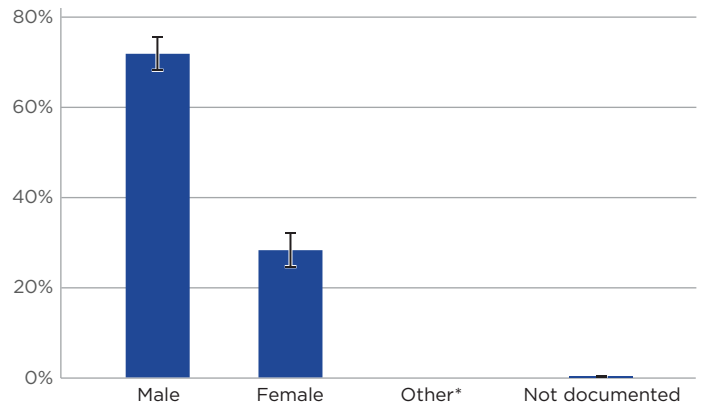
Figure 4.E.1 Cocaine-related ED Visits by Age Group



* Suppressed due to a relative standard error (RSE) > 0.5

The percentage of cocaine-related ED visits was highest among patients ages 26 to 44 (45.52%) followed by patients ages 45 to 64 (38.60%).

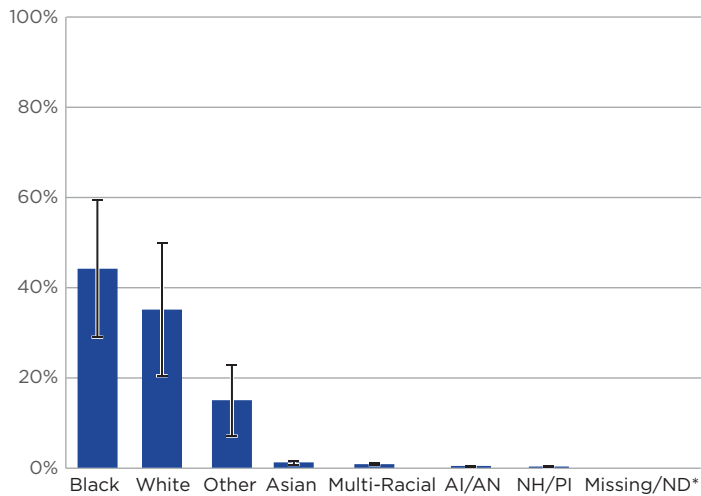
Figure 4.E.2 Cocaine-related ED Visits by Sex



* Suppressed due to a relative standard error (RSE) > 0.5

Male patients accounted for 71.71 percent of cocaine-related ED visits, while female patients accounted for 28.20 percent of these visits.

Figure 4.E.3 Cocaine-related ED visits by race

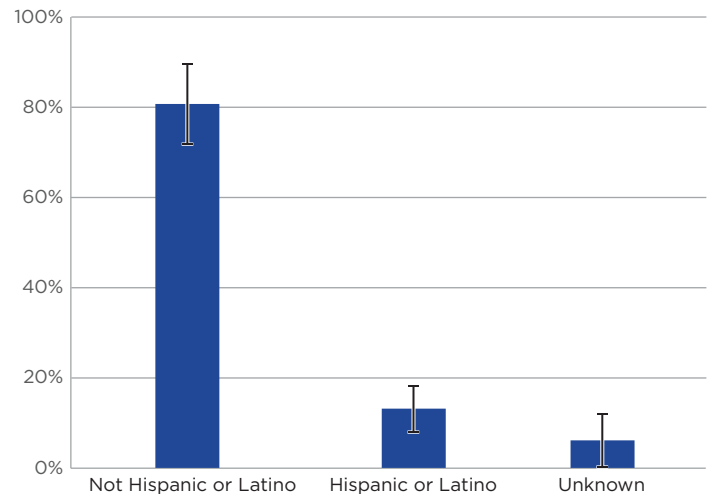


* Suppressed due to a relative standard error (RSE) > 0.5

Black patients accounted for the highest percentage of cocaine-related ED visits (44.19%), while White patients accounted for the second highest percentage of these visits (35.11%).

Note: Other—The race documented in the medical record does not fit any other race category. Multi-Racial—Multiple races were selected. AI/AN—American Indian or Alaska Native. NH/PI—Native Hawaiian or Other Pacific Islander. Missing/ND—Race was missing or was not documented in the medical record.

Figure 4.E.4 Cocaine-related ED visits by ethnicity

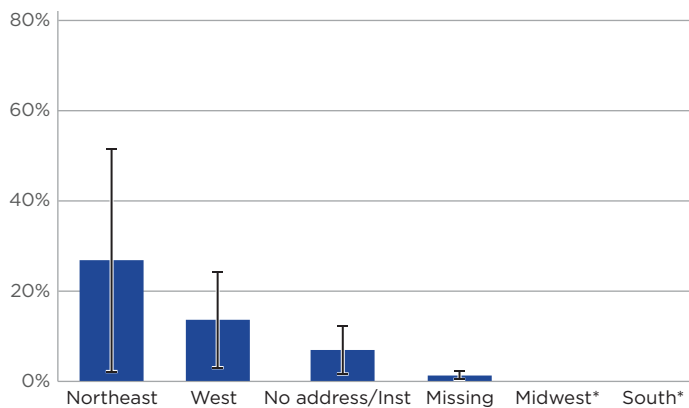


Not Hispanic or Latino patients accounted for 80.74 percent of cocaine-related ED visits, while Hispanic or Latino patients accounted for 13.10 percent of these visits.

Estimated Percentages of Cocaine-Related ED Visits (continued)

(Estimated weighted count = 336,516)

Figure 4.E.5 Cocaine-related ED visits by census region

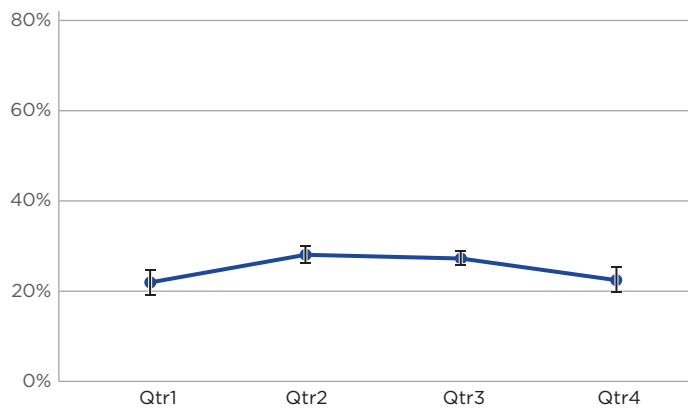


* Suppressed due to a relative standard error (RSE) > 0.5

The regional percentage of cocaine-related ED visits was highest among patients residing in the Northeast (26.84%), followed by patients residing in the West (13.61%).

Note: No address/Inst—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Figure 4.E.6 Cocaine-related ED visits by quarter



The percentage of cocaine-related ED visits rose from quarter 1 to quarter 2 and then declined in quarters 3 and 4.

Key Takeaways from Cocaine-Related ED Visits

Cocaine-related ED visits in 2021 were more likely to be Not Hispanic or Latino, Black or African American, male, and among those aged 26 to 44. Patients ages 45-64 accounted for the second highest percentage of these visits. Cocaine-related ED visits peaked in quarter 2 before declining in quarters 3 and 4. For the data table accompanying the figures in this section, see [Appendix Table C6](#).

5. Key Findings from Sentinel Hospitals, April 2021 – November 2021

This section presents unweighted data from eight sentinel hospitals that submitted complete data from April 2021 to November 2021. The top ten drugs involved in drug-related ED visits are shown in Table 3. This analysis was conducted using drug IDs from the DRV.

5.A Sentinel Hospitals: Top Ten Drugs in Drug-Related ED Visits

In sentinel hospitals from April to November 2021, alcohol-related ED visits accounted for more than half of all drug-related ED visits (range 49.91-52.48%), followed by methamphetamine (range 16.39-18.56%), and cocaine (range 8.16-9.34%). About 1.74 to 3.77 percent of drug-related ED visits involved drugs unknown to the patient. When examining the percentages of monthly drug-related ED visits from April to November 2021, ED visits involving alcohol, methamphetamine, marijuana, cocaine, and heroin decreased, whereas ED visits involving narcotic analgesic-NOS (not otherwise specified) and fentanyl increased.

Table 5.A.1 Percentage of top ten drug-related visits to all drug-related ED visits by month

Drug name	Apr-21 (n=6,822)	May-21 (n=6,620)	Jun-21 (n=6,327)	Jul-21 (n=6,072)	Aug-21 (n=5,513)	Sep-21 (n=5,409)	Oct-21 (n=5,476)	Nov-21 (n=5,413)
Alcohol (N = 24,549)	52.48	52.24	49.91	51.76	51.10	51.99	51.75	50.75
Methamphetamine (N = 8,266)	18.56	16.87	17.70	17.21	17.56	17.58	16.65	16.39
Marijuana (N = 4,886)	11.92	9.47	9.36	9.80	9.70	10.22	10.99	10.51
Cocaine (N = 4,198)	9.34	8.16	8.42	8.93	8.83	9.11	9.26	8.48
Heroin (N = 2756)	7.04	5.82	6.34	5.90	5.73	5.58	4.69	4.75
Fentanyl (N = 2,469)	4.35	4.21	4.90	5.58	5.48	5.86	6.15	5.32
Narcotic analgesics-NOS ¹ (N = 1,566)	2.54	3.08	3.27	3.33	3.23	4.03	3.51	3.55
Drug unknown (N = 1,439)	1.74	2.95	2.96	3.18	3.36	3.33	3.21	3.77
Amphetamine (N = 632)	1.39	1.18	1.23	1.68	1.27	1.09	1.26	1.50
Alprazolam (N = 614)	1.23	1.40	1.63	0.99	1.38	1.44	0.91	1.29

n = number of total drug-related ED visits for the month

N = total number of drug-related ED visits for April 2021 – November 2021

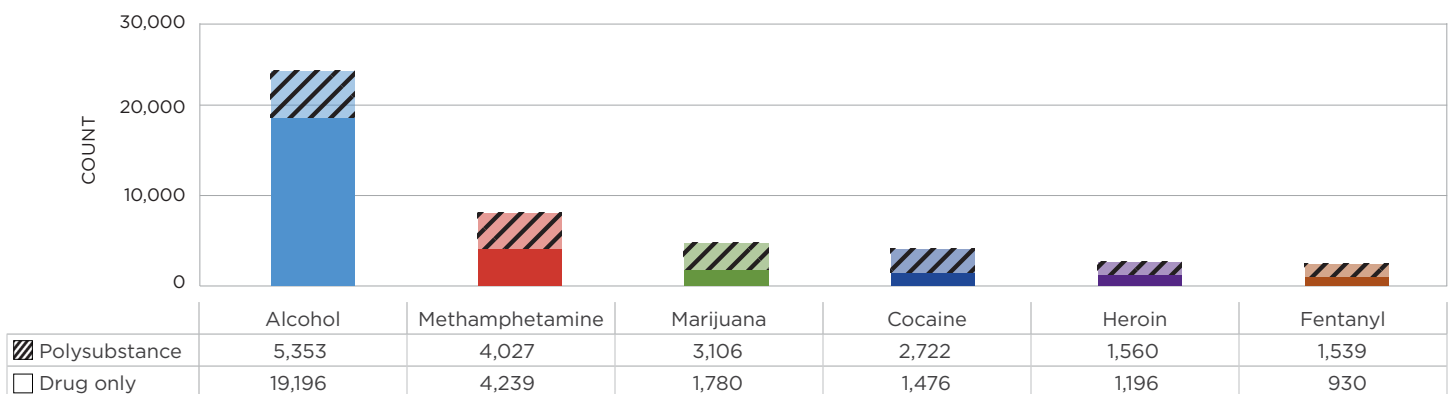
¹ NOS = not otherwise specified

Note: The above table presents unduplicated counts by drug ID. An ED visit that involves two brands linked to the same drug ID, for example Benzedrine and Obetrol, will be counted only once as Amphetamine.

5.B Sentinel Hospitals: Polysubstance ED Visits

DAWN defines polysubstance ED visits as visits related to more than one drug. For example, if cocaine and marijuana were both documented as related to an ED visit, it is considered a polysubstance visit. The top six drugs involved in polysubstance visits in sentinel hospitals from April to November 2021 were alcohol, methamphetamine, marijuana, cocaine, heroin, and fentanyl (Figure 5.B.1). While a majority of alcohol-related ED visits involved alcohol only, a significant proportion of methamphetamine-, marijuana-, cocaine-, heroin-, and fentanyl-related ED visits involved at least one other drug.

Figure 5.B.1 Polysubstance ED visits



Note: DAWN defines polysubstance ED visits as (1) ED visits involving more than one known and/or unknown drug irrespective of whether they are taken together or not, (2) ED visits involving unknown polydrugs, and (3) ED visits involving a combination of pharmaceutical substance with an illicit drug.

Polysubstance ED visits for the top six substances were analyzed further to identify the most common additional drug involved in those ED visits (Figures 5.B.2 – 5.B.7). Alcohol was the most common drug involved in methamphetamine- (35.36%), marijuana- (52.74%), and cocaine- (53.20%) related polysubstance ED visits, while methamphetamine was the most common drug involved in heroin- (48.65%) and fentanyl- (45.81%) related polysubstance ED visits. The N in the title of figures 5.B.2 through 5.B.7 represents the total number of polysubstance ED visits for each highlighted drug.

Figure 5.B.2 Top five drugs involved in **alcohol-related** polysubstance ED visits (N = 5,353)

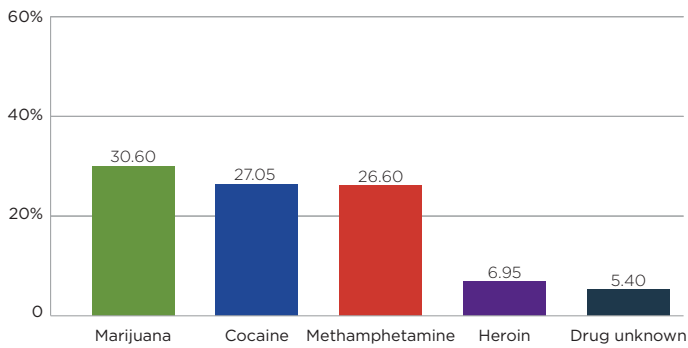


Figure 5.B.3 Top five drugs involved in **methamphetamine-related** polysubstance ED visits (N = 4,027)

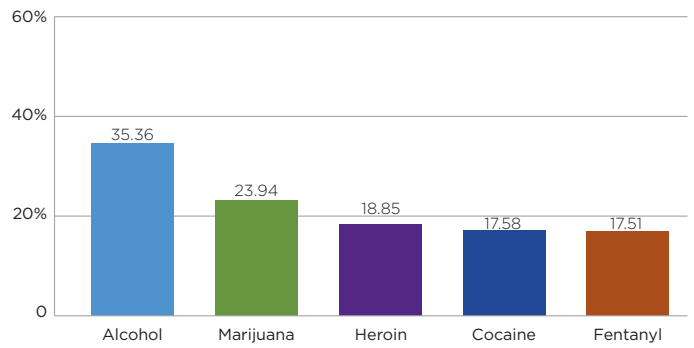


Figure 5.B.4 Top five drugs involved in **marijuana-related** polysubstance ED visits (N = 3,106)

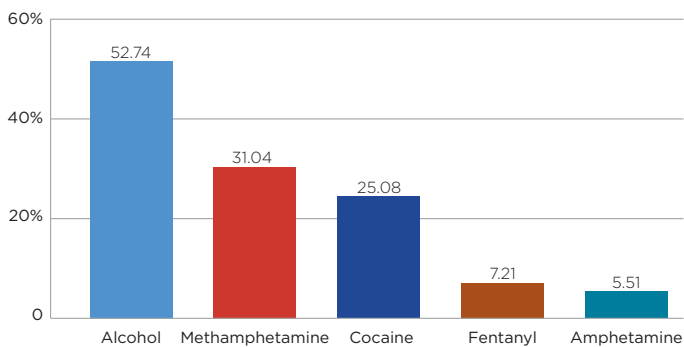


Figure 5.B.5 Top five drugs involved in **cocaine-related** polysubstance ED visits (N = 2,722)

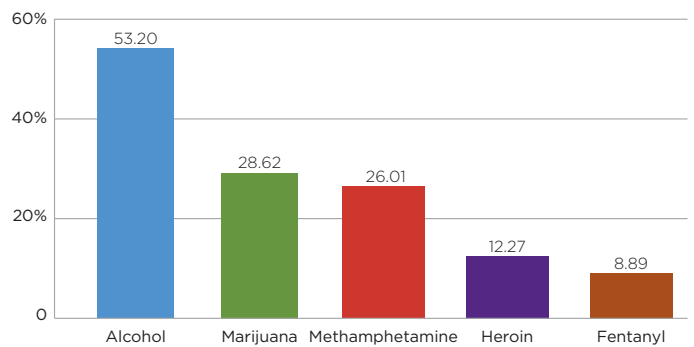


Figure 5.B.6 Top five drugs involved in **heroin-related** polysubstance ED visits (N = 1,560)

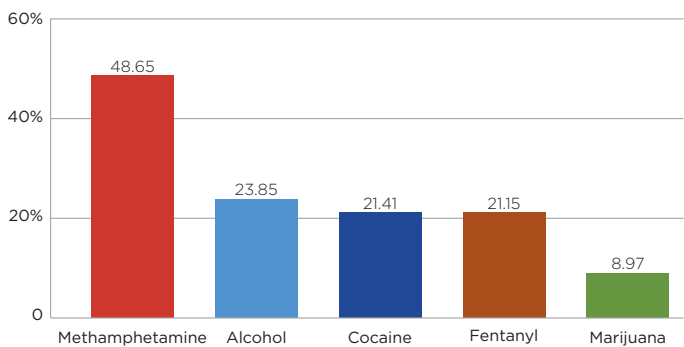
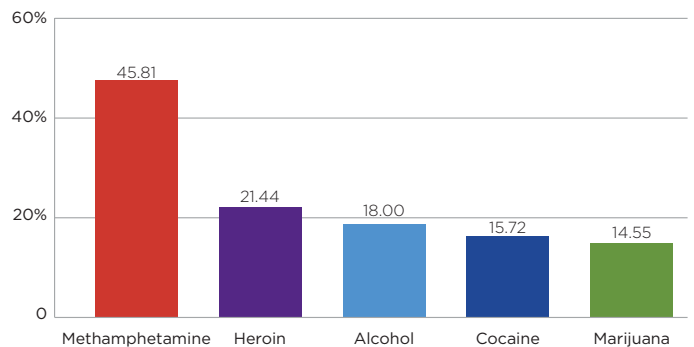


Figure 5.B.7 Top five drugs involved in **fentanyl-related** polysubstance ED visits (N = 1,539)



Note: Percentages presented in Figures 5.B.2–5.B.7 above are not mutually exclusive and may add up to more than 100 percent. ED visits involving more than one drug are counted once for each drug. For example, an alcohol-related polysubstance ED visit that involves both marijuana and cocaine will be counted in marijuana as well as cocaine.

6. Drugs New to DAWN Drug Reference Vocabulary, 2021

When a drug involved in an ED visit is not listed in the DAWN DRV, it is recorded verbatim from the ED record. These new drugs are reviewed regularly for inclusion and are added to the DAWN DRV upon SAMHSA approval. In 2021, there were 38 substances new to the DAWN DRV and, after research as to their make-up, all 38 were added to the DRV and assigned to existing categories.

Of the 38, 11 (28.94%) were illicit drugs, and 27 (71.05%) were non-illicit substances. The majority of the new illicit drugs were stimulants (n=5) followed by cannabinoids (n=3). The largest groups of non-illicit substances were herbal products (n=6), followed by CNS stimulants (n=3). Table 6.1 presents the complete list of 38 substances new to the DAWN DRV in 2021.

Table 6.1 Drugs new to the DAWN DRV, 2021

Category (number identified)	DAWN DRV category (number identified)	Drugs new to DAWN DRV in 2021
Illicit drugs (11)		
	Stimulants (5)	Bubble, MADAM-6, Meth Laced Cigar, Synthetic Amphetamine, Synthetic Cocaine
	Cannabinoids (3)	Candy Cane, Moon Rocks, Trees (marijuana)
	Cocaine (1)	Sniff
	MDMA (Ecstasy) (1)	Sassafras (MDMA)
	Miscellaneous hallucinogens (1)	Mushroom Bar
Non-Illicit substances (27)		
	Herbal products (6)	EZ Sleep, Harmala/Syrian Rue, Legal Lean, Lipo-Gel, Mugwort, Zarbees
	Antidepressants (2)	Tianaa, Za Za
	CNS stimulants (3)	Adrafinil, Cyclozodone, Phenethylamine
	Dermatological agents (2)	Boric Acid Suppository, Eczema Cream
	Erectile dysfunction agents (2)	Ant Male Enhancement, Royal Honey VIP
	Nutraceutical products (2)	Dherbs Full Body Cleanse, Triple Action Joint Health
	Oral nutritional supplements (2)	Animal Cuts, Arachidonic Acid
	Anticonvulsants (1)	CBD
	Antihistamines (1)	Cinnarizine
	CD20 monoclonal antibodies (1)	Ublituximab
	Immune globulins (1)	Brillia
	Miscellaneous antineoplastics (1)	Magrolimab
	Sex hormones (1)	Ingesta
	Smoking cessation agents (1)	ZYN Nicotine Pouches
	Vitamins (1)	Vitamin B5

Appendix A. Methods

DAWN Hospital Selection Design

The DAWN sample of 53 hospitals was created from a hybrid design that includes a group of ten hospitals identified for sentinel surveillance (Part A), three early sampled hospitals considered in Part A for weighting and estimation, a probability sample of eight hospitals from high priority rural and suburban counties (Part B), and a probability sample of 32 hospitals from all remaining counties (Part C). Hospitals in the probability sample-based surveillance were selected using a stratified random sampling method. The 2016 American Hospital Association (AHA) Survey database¹ was used to identify the universe of eligible hospitals. Two datasets were used to identify high priority counties: (1) the Centers for Disease Control and Prevention’s Wide-Ranging Online Database for Epidemiologic Research (CDC WONDER)² for the 2012-2016 county-level rates of opioid, cocaine, and stimulant-related mortality (Part A) or the highest rates of 5-year combined drug-related overdose deaths (Parts B and C) and (2) the Agency for Healthcare Research and Quality’s (AHRQ) Healthcare Cost Utilization Project (HCUP)³ for county-level counts and rates of morbidity (Part A). County-level urbanization was derived from the National Center for Health Statistics’ (NCHS) 2013 Urban-Rural Classification Scheme.⁴

PART A

Part A consists of ten sentinel hospitals. This is a set of large urban hospitals from high-priority sentinel areas, defined as counties with high counts and rates of opioid, cocaine, and stimulant-related mortality and high counts and rates of morbidity. Geographic distribution and characteristics of interest were also considered, for example, statewide legalization of marijuana or early incidence of novel psychoactive substances. Three early sampled hospitals were added to Part A during a sample redesign in 2019. They are not identified as sentinel hospitals, their data is not used in sentinel hospital analysis, but they are included in Part A of the sample design for weighted estimates.

PART B

Part B is a systematic random sample of eight rural and suburban hospitals located in high-priority counties. The top rural and suburban counties rates of 5-year combined drug-related overdose deaths were ranked highest to lowest for sampling. Hospitals in Part B were stratified by 1 stratum with 4 levels: U.S. census regions Northeast, South, Midwest, and West. Two hospitals were selected per stratum.

PART C

Part C is a systematic random sample of 32 hospitals from counties not included in Part B. The hospitals in Part C were stratified by 3 strata with 16 levels total: U.S. census regions (4 levels) and their counties drug-induced 5-year combined death rate (2 levels) and emergency department annual visit counts (2 levels) were ranked highest to lowest for sampling. Two hospitals were selected per stratum.

¹ <https://www.ahadata.com/aha-annual-survey-database-asdb/>

² <https://wonder.cdc.gov/mcd-icd10.html>

³ <https://www.hcup-us.ahrq.gov/overview.jsp>

⁴ https://www.cdc.gov/nchs/data/series/sr_02/sro2_166.pdf. Six-level urbanization categories from NCHS were collapsed to generate three urbanization categories (urban, suburban, and rural) in DAWN.

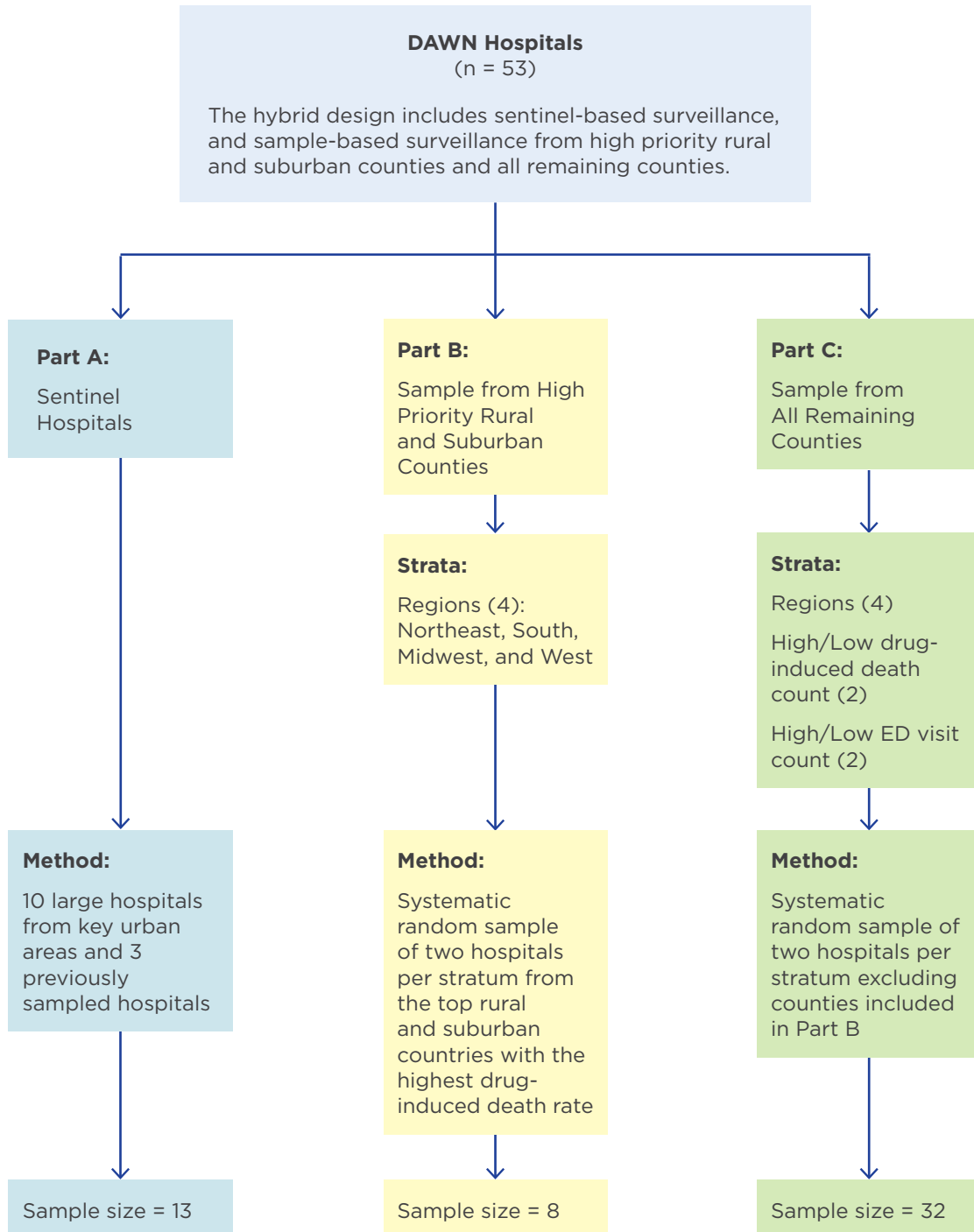
Table A1 provides an overview of the DAWN hospitals by Part and Strata, and levels within each strata.

Table A1 Overview of the DAWN sample

DAWN sample	Strata (H) and Levels (L)	Brief description	Number of hospitals (n)
Part A	N/A	Consists of ten sentinel hospitals and three hospitals recruited prior to redesign.	13
Part B	Census region (H): Northeast, South, Midwest, and West (L = 4)	Systematic random sample of two hospitals per stratum from suburban and rural counties with a high rate of drug-induced deaths.	8
Part C	<ul style="list-style-type: none"> • Census region (L = 4) • High vs. Low Drug-Induced Death Counts for Hospital County (L = 2) • High vs. Low AHA ED Visit Counts (L = 2) 	Systematic random sample of two hospitals per stratum excluding hospitals included in Part B.	32

Figure A1 provides an overview of the DAWN hospital selection design.

Figure A1 DAWN hospital selection design



Data Abstraction

DAWN medical record abstractors are trained on how to thoroughly review ED records, identify drug-related visits following the DAWN criteria, and abstract DAWN data elements. A drug-related visit is defined as an ED visit related to or induced by recent drug use.

Data elements are abstracted from an ED visit if the patient was treated in the ED for a condition that was induced by or related to recent use of a drug. ED visits when the patient left the ED without being seen by a clinician, or visits when the patient came to the ED but was directly admitted to the hospital, are ineligible for review.

Data elements abstracted for DAWN include patient visit characteristics (date/time of visit), patient demographics (age, sex, race, ethnicity, county of residence), drugs involved, ED diagnoses, patient disposition, and a brief narrative describing how the drug was involved in the visit.

Data Quality Review

Prior to the weighting and estimation effort, a quality review was conducted on the preliminary 2021 data. Checks were run on date of visit, and data presence in 2021, by year, quarter, and month. Analytic tests are used to identify out-of-control points by month in ED visits, records reviewed, and count of drug-related visits. Out-of-control points from the analysis were identified and investigated by survey operations to confirm or resolve identified issues.

Since DAWN reviews every ED visit from participating hospitals, there was no sampling error within a hospital. Missing data was minimal, which reduced the potential for bias beyond measurement error and/or data quality.

Weighting and Estimation

Given DAWN's hybrid sentinel surveillance and probability sample design, DAWN employed a multi-step weighting process to produce nationally representative estimates. The multi-step weighting process involved (1) calculating initial base weights for each sampling part/stratum, (2) adjusting the initial base weights for changes in the sample design and sampling frame, (3) adjusting for hospital non-response, and (4) post-stratification to adjust DAWN estimates of ED visit totals to AHA ED visits for the given stratum.

STEP 1:

Initial base weights for each stratum were generated using the inverse of the selection probability. Since part A hospitals were chosen by SAMHSA with certainty, their initial base weight was set to 1. For Part B and Part C, base weights for sampled hospitals in each stratum was set to $N_H/2$, where N_H is the number of hospitals in the sampling frame in the given explicit stratum (H). Table A2 below provides N_H and base weights for each stratum for Parts B and C.

Table A2 Initial base weights for Part B and Part C hospitals

Part	Stratum	Number of hospitals on the sampling frame (N_H)	Initial base weight
B	Midwest	19	9.5
B	Northeast	27	13.5
B	South	20	10
B	West	26	13
C	MHH	292	146
C	MHL	70	35
C	MLH	499	249.5
C	MLL	433	216.5
C	NHH	183	91.5
C	NHL	44	22
C	NLH	190	95
C	NLL	87	43.5
C	SHH	492	246
C	SHL	54	27
C	SLH	654	327
C	SLL	408	204
C	WHH	226	113
C	WHL	83	41.5
C	WLH	290	145
C	WLL	215	107.5

STEP 2:

Initial base weights were adjusted to reflect changes to DAWN sample design and sampling frame, and address duplicate records from the sampling frame. Changes to DAWN sample design (i.e., DAWN sample redesign) resulted in moving three initially sampled hospitals to Part A. Hospitals with duplicate records and those with less than 100 annual visits were removed from the sampling frame. As a result, the base weights of the Part B and Part C hospitals were adjusted by a factor of N_H^*/N_H , where N_H^* is the updated count of hospitals in a given stratum (H) after removing Part A hospitals, duplicates, and hospitals with less than 100 ED visits. No adjustment was required to the Part A hospitals, i.e., beyond the affect they had on the base weights for other hospitals in Parts B and C. Table A3 provides updated N_H and adjusted base weights for each stratum for Parts B and C.

Table A3 Adjusted base weights for Part B and Part C hospitals⁵

Part	Stratum	Updated count of hospitals (N _H [*])	Adjusted base weight
B	Midwest	19	9.5
B	Northeast	27	13.5
B	South	20	10
B	West	25	12.5
C	MHH	290	145
C	MHL	70	35
C	MLH	499	249.5
C	MLL	432	216
C	NHH	183	91.5
C	NHL	44	22
C	NLH	190	95
C	NLL	87	43.5
C	SHH	488	244
C	SHL	54	27
C	SLH	647	323.5
C	SLL	407	203.5
C	WHH	221	110.5
C	WHL	83	41.5
C	WLH	290	145
C	WLL	212	106

STEP 3:

The adjusted base weights were used and further adjusted to generate quarterly nonresponse-adjusted weights. Depending on data availability by hospital in a given quarter, DAWN employed two types of nonresponse adjustment. For hospitals with at least one month of completed data in the quarter, quarterly weights were adjusted by the ratio of the number of days in the quarter to the number of non-missing days in the quarter. For hospitals with no data in the quarter, the weights of other hospitals in the same or similar stratum, after collapsing, were adjusted to represent both the responding and nonresponding hospitals in that collapsed stratum.

STEP 4:

The next step in the weighting process was to calibrate (poststratify) the estimated number of annual ED visits from the responding DAWN 2021 hospitals to the total number of ED visits in DAWN-eligible hospitals from the 2020 AHA Annual Survey Database for Parts B and C. The poststratification adjustment was done within collapsed strata created in Step 3. Within a poststratification stratum, the adjustment factor is equal to the ratio of the AHA ED visit total to the weighted DAWN estimate of ED visits.

STEP 5:

The final step required creation of the final weight variable for generating 2021 DAWN estimates, calculated as:

*Final Weight = Initial Base Weight * Base Weight Adjustment Factor * Nonresponse Adjustment Factor * Poststratification Factor.*

⁵ There were 4,288 records total = 4,312 from Table A2, less: (A) The 13 hospitals moved to Part A, (B) the nine duplicate hospitals, and (C) the two hospitals in the two strata where the sample was not reselected to reflect the change in the target population definition to exclude hospitals with less than 100 EDVs. Note that the seven hospitals in stratum C-SHL are already excluded from the 4,312 records in Table A2.

Appendix B. Definitions of the Top Five Drugs in Drug-Related ED Visits

Table B1 Top five drug definitions

Top five drugs	Drugs included
Alcohol-related ED visits	alcohol (ethanol) and alcohol/food products
Opioids: heroin-related ED visits	heroin, fentanyl/heroin, cocaine/heroin, heroin/methamphetamine, heroin/methylenedioxymethamphetamine, heroin/marijuana, alprazolam/heroin, amphetamine/heroin, cyanide/heroin/strychnine, heroin/benzodiazepine, heroin/desomorphine
Opioids: fentanyl-related ED visits	fentanyl, fentanyl/heroin, fentanyl/percocet, fentanyl/methamphetamine, cocaine/fentanyl, fentanyl/marijuana, fentanyl/oxycodone, alprazolam/fentanyl, carfentanil, acetaminophen/fentanyl, fentanyl/benzodiazepine, fentanyl/methadone
Opioids: other opioid-related ED visits	narcotic analgesics-NOS, acetaminophen-oxycodone, oxycodone, methadone, buprenorphine-naloxone, acetaminophen-hydrocodone, tramadol, morphine, hydrocodone, buprenorphine, hydromorphone, acetaminophen-codeine, codeine, oxymorphone, opium, codeine combination-NOS, marijuana/opioid, cocaine/opioids, methamphetamine/opioids, cocaine/marijuana/opioid, desomorphine, hydrocodone-ibuprofen, acetaminophen-oxycodone/alprazolam, heroin/desomorphine, acetaminophen-oxycodone/marijuana, acetaminophen/butalbital/caffeine/codeine, morphine/nicotine, pentazocine, propoxyphene, acetaminophen-tramadol, butorphanol, tapentadol
Methamphetamine-related ED visits	methamphetamine, fentanyl/methamphetamine, marijuana/methamphetamine, heroin/methamphetamine, methamphetamine/opioids, cocaine/methamphetamine, heroin/methylenedioxymethamphetamine, cocaine/methylenedioxymethamphetamine, methamphetamine/methylenedioxymethamphetamine, cocaine/marijuana/methamphetamine
Marijuana-related ED visits	marijuana, marijuana/methamphetamine, fentanyl/marijuana, cocaine/marijuana, marijuana/opioid, marijuana/phencyclidine, cocaine/marijuana/opioid, heroin/marijuana, marijuana/synthetic cannabinoid, amphetamine/marijuana, marijuana/lysergic acid diethylamide, cocaine/marijuana/methamphetamine, acetaminophen-oxycodone/marijuana
Cocaine-related ED visits	cocaine, cocaine/heroin, cocaine/fentanyl, cocaine/marijuana, cocaine/opioids, cocaine/methamphetamine, cocaine/marijuana/opioid, amphetamine/cocaine, cocaine/methylenedioxymethamphetamine, cocaine/marijuana/methamphetamine

Appendix C. Data Tables, Top Five Drugs in Drug-Related ED Visits, 2021

Table C1 Estimated percentages and counts of drug-related ED visits by top five drugs, 2021

Top five drugs*	Percent (estimated counts)	95% CI
Alcohol	39.33% (N = 2,942,609)	33.40 - 45.27
Opioids ¹	14.07% (N = 1,032,510)	10.05 - 18.09
Fentanyl	1.76% (N = 122,884)	0.83 - 2.69
Heroin	6.94% (N = 493,916)	3.20 - 10.67
Other opioids	6.77% (N = 484,735)	5.51 - 8.03
Methamphetamine	11.02% (N = 797,936)	7.69 - 14.36
Marijuana	10.78% (N = 787,769)	8.84 - 12.71
Cocaine	4.71% (N = 336,516)	2.41 - 7.01

* A significant number of ED visits involve multiple substances, therefore, caution should be exercised while adding and/or comparing estimates across drugs, as ED visits related to more than one drug are counted more than once. For example, an ED visit related to both cocaine and marijuana are counted in both cocaine-related and marijuana-related ED visits.

¹ The opioids category was further broken down to Fentanyl, Heroin, and Other Opioids. However, since patients taking opioids that fall under different opioid categories (e.g. Fentanyl and Other Opioids) are counted in each category, the total ED visits for Fentanyl, Heroin, and Other Opioids exceeds the Opioids ED visits.

Table C2 Estimated subgroup percentages of alcohol-related ED visits (N = 2,942,609)

Subgroups	Percent	95% CI
Age groups		
Under 18	1.18	0.77 - 1.59
18 to 25	9.99	9.17 - 10.80
26 to 44	40.63	37.93 - 43.33
45 to 64	38.92	36.71 - 41.12
65 and over	8.77	7.86 - 9.68
Missing	*	*
Age groups (< 21 and 21+)		
Under 21	3.90	3.23 - 4.57
21 and over	95.58	94.51 - 96.65
Missing	*	*
Sex		
Male	71.01	68.94 - 73.09
Female	28.94	26.82 - 31.05
Other	*	*
Not documented	0.01	0.00 - 0.01
Race		
White	59.76	42.60 - 76.92
Black or African American	14.12	4.90 - 23.33
Asian	1.29	0.58 - 2.00
American Indian/Alaska Native	*	*
Native Hawaiian/Pacific Islander	0.24	0.19 - 0.29
Other race ¹	15.09	7.50 - 22.67
Multi-Racial ²	0.71	0.25 - 1.17
Missing/Not documented	*	*
Ethnicity		
Not Hispanic or Latino	74.65	63.92 - 85.38
Hispanic or Latino	14.26	10.71 - 17.81
Unknown	11.09	0.00 - 22.28
Region		
Northeast	23.42	7.52 - 39.31
Midwest	22.40	7.68 - 37.13
South	16.39	9.02 - 23.75
West	27.45	10.17 - 44.74
No address/Institution ³	8.15	3.49 - 12.82
Missing	2.18	1.09 - 3.27
Quarter		
Quarter 1	20.82	19.55 - 22.10
Quarter 2	28.02	26.21 - 29.82
Quarter 3	27.35	26.45 - 28.26
Quarter 4	23.81	22.40 - 25.22

* Estimates with relative standard error (RSE) > 0.5 are suppressed.

¹ Other race—The race documented in the medical record does not fit any other race category.

² ED visits with multiple-race categories are counted in the Multi-Racial category only.

³ No address/Institution—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Table C3 Estimated subgroup percentages of fentanyl, heroin, and other opioid-related ED visits

Subgroups	Fentanyl-related ED visits (N = 122,884)		Heroin-related ED visits (N = 493,916)		Other opioid-related ED visits (N = 484,735)	
	Percent	95% CI	Percent	95% CI	Percent	95% CI
Age groups						
Under 18	*	*	0.39	0.08 – 0.70	2.84	1.37 – 4.31
18 to 25	16.90	13.16 – 20.64	7.95	5.01 – 10.89	8.95	6.74 – 11.17
26 to 44	62.76	55.18 – 70.33	57.56	46.44 – 68.68	44.84	39.66 – 50.01
45 to 64	14.65	11.34 – 17.97	30.10	20.04 – 40.15	29.07	24.97 – 33.17
65 and over	3.67	1.07 – 6.26	3.56	0.52 – 6.59	14.05	10.07 – 18.04
Missing	*	*	*	*	*	*
Sex						
Male	66.35	58.43 – 74.27	70.47	64.87 – 76.07	54.04	47.51 – 60.57
Female	33.64	25.72 – 41.56	29.52	23.90 – 35.13	45.94	39.39 – 52.48
Other	—	—	—	—	—	—
Not documented	—	—	—	—	—	—
Race						
White	67.74	55.00 – 80.48	61.26	36.00 – 86.53	67.37	47.00 – 87.74
Black or African American	8.39	4.54 – 12.24	20.35	3.83 – 36.86	10.59	3.36 – 17.82
Asian	1.13	0.05 – 2.20	*	*	0.85	0.51 – 1.19
American Indian/Alaska Native	0.34	0.24 – 0.45	0.23	0.00 – 0.46	0.59	0.27 – 0.92
Native Hawaiian/ Pacific Islander	*	*	*	*	0.11	0.05 – 0.17
Other race ¹	12.44	9.16 – 15.73	11.34	2.92 – 19.76	8.65	3.78 – 13.51
Multi-Racial ²	1.39	0.41 – 2.36	*	*	*	*
Missing/Not documented	*	*	*	*	*	*
Ethnicity						
Not Hispanic or Latino	70.83	59.82 – 81.85	79.82	71.67 – 87.97	75.64	59.14 – 92.13
Hispanic or Latino	15.34	5.68 – 25.00	8.99	4.41 – 13.56	9.25	5.83 – 12.67
Unknown	13.83	0.99 – 26.67	11.19	2.76 – 19.63	*	*
Region						
Northeast	16.79	7.76 – 25.82	*	*	15.27	6.77 – 23.78
Midwest	13.44	5.06 – 21.82	*	*	19.57	4.66 – 34.48
South	16.69	5.51 – 27.87	*	*	33.48	16.41 – 50.55
West	39.65	25.50 – 53.80	13.00	0.78 – 25.22	26.03	11.47 – 40.59
No address/Institution ³	12.22	2.70 – 21.74	6.22	1.25 – 11.19	3.89	2.33 – 5.45
Missing	1.22	0.72 – 1.71	1.97	0.38 – 3.55	1.75	0.47 – 3.02
Quarter						
Quarter 1	15.99	10.87 – 21.11	20.93	16.09 – 25.77	19.56	16.95 – 22.18
Quarter 2	26.34	22.55 – 30.12	27.25	24.83 – 29.66	31.09	29.28 – 32.9
Quarter 3	28.71	22.98 – 34.45	28.45	24.65 – 32.26	26.00	23.89 – 28.12
Quarter 4	28.96	24.40 – 33.51	23.37	21.71 – 25.03	23.34	21.28 – 25.40

* Estimates with relative standard error (RSE) > 0.5 are suppressed.

— Estimates based on less than 10 cases were suppressed to ensure patient confidentiality.

¹ Other race—The race documented in the medical record does not fit any other race category.

² ED visits with multiple-race categories are counted in the Multi-Racial category only.

³ No address/Institution—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Table C4 Estimated subgroup percentages of methamphetamine-related ED visits (N = 797,936)

Subgroups	Percent	95% CI
Age groups		
Under 18	1.04	0.53 - 1.56
18 to 25	9.25	7.74 - 10.77
26 to 44	59.58	56.63 - 62.52
45 to 64	28.05	25.29 - 30.80
65 and over	2.00	0.94 - 3.05
Missing	*	*
Sex		
Male	69.10	66.78 - 71.42
Female	30.76	28.41 - 33.11
Other	*	*
Not documented	*	*
Race		
White	62.45	37.88 - 87.02
Black or African American	9.95	2.08 - 17.82
Asian	1.03	0.40 - 1.67
American Indian/Alaska Native	0.54	0.12 - 0.96
Native Hawaiian/Pacific Islander	0.29	0.16 - 0.42
Other race ¹	9.84	5.86 - 13.81
Multi-Racial ²	1.66	0.09 - 3.23
Missing/Not documented	*	*
Ethnicity		
Not Hispanic or Latino	67.94	47.51 - 88.36
Hispanic or Latino	12.92	8.31 - 17.52
Unknown	*	*
Region		
Northeast	*	*
Midwest	6.63	2.76 - 10.51
South	35.68	15.74 - 55.62
West	35.33	20.94 - 49.72
No address/Institution ³	12.45	7.61 - 17.29
Missing	4.02	0.78 - 7.27
Quarter		
Quarter 1	21.98	17.93 - 26.04
Quarter 2	28.45	25.75 - 31.15
Quarter 3	25.81	23.64 - 27.98
Quarter 4	23.75	21.40 - 26.10

* Estimates with relative standard error (RSE) > 0.5 are suppressed.

¹ Other race—The race documented in the medical record does not fit any other race category.

² ED visits with multiple-race categories are counted in the Multi-Racial category only.

³ No address/Institution—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Table C5 Estimated subgroup percentages of marijuana-related ED visits (N = 787,769)

Subgroups	Percent	95% CI
Age groups		
Under 18	8.86	5.60 - 12.12
18 to 25	26.80	24.37 - 29.24
26 to 44	45.20	42.65 - 47.75
45 to 64	16.42	14.53 - 18.31
65 and over	2.52	1.69 - 3.34
Missing	*	*
Sex		
Male	61.20	58.35 - 64.05
Female	38.76	35.88 - 41.63
Other	*	*
Not documented	*	*
Race		
White	50.23	33.06 - 67.40
Black or African American	23.87	10.43 - 37.32
Asian	1.22	0.65 - 1.80
American Indian/Alaska Native	0.44	0.06 - 0.82
Native Hawaiian/Pacific Islander	0.24	0.15 - 0.34
Other race ¹	13.20	7.27 - 19.13
Multi-Racial ²	0.73	0.42 - 1.04
Missing/Not documented	*	*
Ethnicity		
Not Hispanic or Latino	72.65	56.46 - 88.83
Hispanic or Latino	12.95	8.88 - 17.02
Unknown	*	*
Region		
Northeast	20.48	6.08 - 34.87
Midwest	22.30	8.14 - 36.46
South	26.87	15.32 - 38.42
West	25.04	12.24 - 37.83
No address/Institution ³	4.16	1.81 - 6.51
Missing	1.15	0.64 - 1.67
Quarter		
Quarter 1	20.41	17.66 - 23.16
Quarter 2	28.95	24.94 - 32.96
Quarter 3	26.41	25.18 - 27.64
Quarter 4	24.23	19.80 - 28.65

* Estimates with relative standard error (RSE) > 0.5 are suppressed.

¹ Other race—The race documented in the medical record does not fit any other race category.

² ED visits with multiple-race categories are counted in the Multi-Racial category only.

³ No address/Institution—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

Table C6 Estimated subgroup percentages of cocaine-related ED visits (N = 336,516)

Subgroups	Percent	95% CI
Age groups		
Under 18	1.23	0.04 - 2.42
18 to 25	9.74	5.20 - 14.27
26 to 44	45.52	38.63 - 52.41
45 to 64	38.60	28.84 - 48.36
65 and over	4.28	2.56 - 5.99
Missing	*	*
Sex		
Male	71.71	67.84 - 75.58
Female	28.20	24.27 - 32.13
Other	*	*
Not documented	0.01	0.00 - 0.02
Race		
White	35.11	20.21 - 50.00
Black or African American	44.19	28.72 - 59.67
Asian	1.09	0.48 - 1.70
American Indian/Alaska Native	0.31	0.00 - 0.62
Native Hawaiian/Pacific Islander	0.17	0.10 - 0.24
Other race ¹	14.88	6.77 - 22.99
Multi-Racial ²	0.76	0.34 - 1.19
Missing/Not documented	*	*
Ethnicity		
Not Hispanic or Latino	80.74	71.69 - 89.79
Hispanic or Latino	13.10	7.90 - 18.29
Unknown	6.16	0.10 - 12.23
Region		
Northeast	26.84	1.93 - 51.75
Midwest	*	*
South	*	*
West	13.61	2.80 - 24.41
No address/Institution ³	6.87	1.41 - 12.33
Missing	1.21	0.09 - 2.32
Quarter		
Quarter 1	22.03	19.13 - 24.93
Quarter 2	28.13	26.06 - 30.19
Quarter 3	27.29	25.63 - 28.95
Quarter 4	22.55	19.63 - 25.48

* Estimates with relative standard error (RSE) > 0.5 are suppressed.

¹ Other race—The race documented in the medical record does not fit any other race category.

² ED visits with multiple-race categories are counted in the Multi-Racial category only.

³ No address/Institution—Patient had no fixed address or currently resides in an institution (e.g., shelter, jail, hospital).

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