Recommendations for Poisoning Surveillance

REPORT FROM POISONING SURVEILLANCE WORKGROUP, 2026

CSTE

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ACRONYMS

Acronym	Description
AAD	Alcohol-attributable deaths
AAF	Alcohol-attributable fractions
APC	America's Poison Centers
ARDI	CDC Alcohol-Related Disease Impact Application
CDC	U.S. Centers for Disease Control and Prevention
CSTE	Council of State and Territorial Epidemiologists
DAWN	Drug Abuse Warning Network
DOSE	Nonfatal Drug Overdose Surveillance and Epidemiology System
ED	Emergency Department
EMS	Emergency Medical Services
ICD-10-CM and ICD-10	International Classification of Diseases, Tenth Revision, Clinical Modification
ISW7	National and State Poisoning Surveillance developed by the Safe States Injury Surveillance Workgroup on Poisoning
ME/C	Medical Examiner/Coroner
MCOD	Multiple Cause of Death
NCHS	National Center for Health Statistics
NEISS-AIP	National Electronic Injury Surveillance System-All Injury Program
NHAMCS	National Hospital Ambulatory Medical Care Survey
NPDS	America's Poison Centers National Poison Data System
NVDRS	National Violent Death Reporting System
PSW	Poisoning Surveillance Workgroup
SAMHSA	Substance Abuse and Mental Health Services Administration
SUDORS	State Unintentional Drug Overdose Reporting System
UCOD	Underlying Cause of Death
WHO	World Health Organization
WISQARS	Web-based Injury Statistics Query and Reporting System

Methodology for this report: The Poisoning Surveillance Workgroup (PSW) worked from March to January 2026 using monthly conference calls and small subgroup calls to develop this report.

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Foreword

The report "Consensus recommendations for national and state poisoning surveillance," authored by the Injury Surveillance Workgroup 7 (ISW7) and convened by the Safe States Alliance, has been the primary source of poisoning surveillance guidance for public health practitioners for over a decade. The ISW7 worked diligently to identify consensus recommendations between 2009 and 2012, a period that marked the second wave of the overdose epidemic. During that time, the United States (U.S.) was experiencing an increase in heroin-involved overdose deaths while also initiating earnest efforts to mitigate overdose deaths related to prescription opioids. While the ISW7's work largely emerged in the context of the overdose epidemic, it also provided a foundation for poisoning surveillance more broadly.

Since the publication of the ISW7 report in April 2012, the overdose landscape has continued to evolve, with a rise in deaths involving synthetic opioids and most recently, stimulants. Throughout the evolution of the overdose epidemic, the public health landscape has simultaneously been changing. Data modernization efforts have created new surveillance systems and advanced existing platforms; the International Classification of Diseases, 10th Revision (ICD-10) and the Clinical Modification (ICD-10-CM) diagnostic coding systems have become ubiquitous; and new data linkage approaches are possible. At the same time, other types of poisoning, such as environmental and chemical, have grown, garnering interest in revising the ISW7 report to address current public health needs.

The Poisoning Surveillance Workgroup (PSW) is pleased to present this report, an updated poisoning surveillance guide for public health practitioners. The PSW aimed to amend outdated details or gaps and enhance the previous guidance to align with current public health needs and strategies. It is important to note that the PSW decided to expand the scope of this guidance to include any poisoning, including those from environmental sources, and to focus on acute rather than chronic poisoning. Further, in this guidance, a poisoning is an outcome rather than an event. Defining poisoning as an outcome removes any restrictions on the characteristics or purpose of the substance to which a person is exposed. The first goal of the PSW was to identify best practices and innovative strategies in poisoning surveillance by

evaluating and integrating novel methodologies, including data linkage and approaches from Overdose Data to Action (OD2A), a cooperative agreement program through the Centers for Disease Control and Prevention (CDC) that provides funding to health departments to reduce drug overdoses and the impact of related harms. The second goal was to document and share lessons to support epidemiologists by compiling insights from workgroup discussions and stakeholder interviews into a comprehensive resource that provides practical guidance for epidemiologists.

The purpose of this guidance is to compile current best practices in poisoning surveillance to support public health practitioners. While the PSW comprised subject matter experts in the field, this resource is intended to be used as a guide for poisoning surveillance, not as the final consensus. For example, ICD codes and CDC indicators for poisoning already exist; however, this document can meaningfully explain the nuances of these indicators without the need to subscribe to one methodology. Poisoning is complex, and the ways in which we discuss it colloquially and epidemiologically both vary and overlap. Including both conceptual and operational definitions in this guidance is meant to acknowledge that we are not always aligned in how we talk about poisoning categories.

The PSW created two row–by-column matrices to operationalize the conceptual definitions of poisoning (drug, nondrug, and all poisons) for the two major U.S. coding systems: ICD-10-CM (morbidity) and ICD-10 (mortality). The matrices can be used to standardize state- and national-level surveillance, while allowing flexibility to develop and explore new or alternative approaches. By identifying matrix columns, rows, or cells that are useful to their surveillance efforts, users can create clear, code-based surveillance case definitions, enabling comparability and transparency across jurisdictions and time. These operational matrices are "pick and choose," allowing the reader to decide which codes they need to answer their surveillance questions.

We anticipate that as this guidance is used, tested, and honed, further revisions of poisoning surveillance recommendations will need to be developed, just as with the ISW7. The PSW hopes that this updated guidance will equip public health practitioners with the tools and clarity needed to improve poisoning surveillance, advance prevention, and enhance the health of the communities they serve.

Recommendations for Poisoning Surveillance

Executive Summary

In 2008, poisoning, primarily involving drugs, was the leading cause of injury death in the United States.[1] In 2024, the top five exposure case substance categories for America's Poison Centers were analgesics, household cleaning substances, antidepressants, cardiovascular drugs, and cosmetics/personal care products.[2] The Poisoning Surveillance Workgroup (PSW) structured this guidance to encompass all types of acute poisoning and to include the following:

List of Components in this Guidance

- Conceptual definitions of poisoning and drug for surveillance purposes
- ICD matrices
- Operational definitions for mortality and morbidity data
- Relevant data sources for poisoning surveillance in the U.S.
- New potential surveillance indicators
- Recommendations for improving poisoning surveillance at the local, state, and national levels

Key Products of the Updated Guidance

Conceptual Definitions

- **Drug:** A drug is any chemical compound that is used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes.

[1] Warner M, Chen LH, Makuc DM, Anderson RN, Miniño AM. Drug poisoning deaths in the United States, 1980–2008. NCHS data brief, no 81. Hyattsville, MD: National Center for Health Statistics. 2011.
[2] Michael C. Beuhler, Ryan Feldman, David D. Gummin, James B. Mowry, Laura J. Rivers, Kaitlyn Brown, Nathaniel P. T. Pham, Krys Johnson-O'Leary, Daniel A. Spyker & Alvin C. Bronstein (2025) 2024 Annual report of the National Poison Data System® (NPDS) from America's Poison Centers®: 42nd annual report, Clinical Toxicology, 63:12, 1029-1280, DOI: 10.1080/15563650.2025.2571299

- **Poisoning:** A poisoning is an exposure to any extrinsic substance by ingestion, inhalation, injection, or absorption through the skin or mucous membranes that causes at least one clinical effect.

ICD-10-CM and ICD-10 Matrices

- The updated ICD-10 matrices group ICD codes for different agents or classes of agents (both drug and nondrug agents) and group ICD codes for different general categories of poisoning. These matrices are based on the conceptual definitions of poisoning and drug in this guidance.

Inventory of Data Sources

- The PSW identified twenty-one databases containing information on poisoning events in the U.S. The inventory in Appendix A provides a basic description of these databases.

Recommendations

- Recommendations for state- and local-level jurisdictions
- Recommendations for national-level surveillance

Overall, the intent of this guidance is that these tools and recommendations will strengthen the ability of agencies to conduct surveillance of a diverse range of poisoning events; improve the comparability of poisoning data across jurisdictions; enhance abilities to test and evaluate poison prevention interventions; and effectively reduce the national health burden of poisoning.

Introduction

In the past two decades, poisoning has emerged as an area of significant public health concern in the U.S. Poisoning affects individuals of all ages and encompasses events that represent a wide array of causes, intents, and substances. The causes of poisoning include overdoses due to drug or alcohol use, environmental toxin exposures, ingestion of household products, and many others. Poisoning may be unintentional (e.g., accidental drug overdose), intentional (e.g., suicide or suicide attempt), involve assault, or be undetermined in intent.

Challenges with poisoning surveillance hamper poisoning prevention and evaluation efforts. These challenges include a lack of formal standardized definitions for poisonings by specific agents or groups of agents, variable quality of toxicology information, and changes in the ICD classifications of poisonings over time. Historically, tracking of fatal and nonfatal poisonings in the population has often been limited to the use of ICD external cause-of-injury coded data and exposure data from the America's Poison Centers (APC, formerly the American Association of Poison Control Centers (AAPCC)). A conceptual definition of poisoning and a framework are needed that both:

1. Accommodate a broader range of circumstances and poison agents; and
2. Enable surveillance of subcategories of poisonings (e.g., opioid analgesics) that capture emerging poisoning problems in the population.

This report provides a new, broader conceptual definition of poisoning, an expanded framework for categorizing poisonings, and standardized operational definitions using ICD-10-CM and ICD-10 cause of death codes. The report herein focuses on **acute poisonings**, and includes guidance for drug, nondrug, alcohol, and environmental poisonings. The aim is to improve the available poisoning surveillance tools not only for injury prevention research and practice, but also for the monitoring and prevention of substance use disorders.

The Council of State and Territorial Epidemiologists (CSTE) convened the Poisoning Surveillance Workgroup (PSW) in 2025 to update the 2012 Consensus Recommendations for National and State Poisoning Surveillance developed by the Safe States Injury Surveillance Workgroup on Poisoning (ISW7).[3] The PSW included representation from state-level public health agencies, CDC, and America's Poison Centers. The group met regularly throughout 2025 to pursue the following:

1. Develop a consensus conceptual definition of all poisonings and drug poisonings for public health surveillance purposes.
2. Expand the framework within which poisonings can be subcategorized.
3. Develop operational definitions with ICD-10 cause of death and ICD-10-CM codes and new poisoning subcategories that reflect conceptual definitions in this guidance.
4. Develop an inventory of data sources relevant to poisoning surveillance in the U.S.
5. Provide recommendations on future work needed to improve poisoning surveillance at the local, state, and national levels.

[3] Injury Surveillance Workgroup 7. (2012, April). Consensus recommendations for national and state poisoning surveillance. The Safe States Alliance.

Tools described in this report are intended to be used by public health jurisdictions, healthcare practitioners, and researchers involved in the collection, analysis, and interpretation of poisoning surveillance data. Their use may improve cross-jurisdictional comparisons of data for a broader range of poisoning subcategories. This guidance is also intended to provide a standard but flexible approach to presenting poisoning surveillance data that will meet the needs of injury and substance use prevention practitioners, occupational and environmental health professionals, policymakers, drug enforcement, police and public safety officials, toxicologists, clinicians, educators, and researchers, and improve the overall effectiveness of prevention efforts.

Public Health Burden of Poisoning

Mortality

According to the CDC, unintentional poisoning is among the leading causes of death for unintentional injury.[4] In 2023, unintentional poisoning accounted for 34.5% of deaths among individuals ages 1 through 85+ years old. The CDC's Web-based Injury Statistics Query and Reporting System (WISQARS) created the Leading Causes of Death Visualization Tool to further highlight the distribution of unintentional poisoning deaths among individuals ages 25-64.[5] WISQARS uses the following definition for poisoning[6]:

> **Poisoning**: Ingestion, inhalation, absorption through the skin, or injection of so much of a drug, toxin (biologic or non-biologic), or other chemical that a harmful effect results, such as drug overdoses. This category does not include harmful effects from normal therapeutic drugs (i.e., unexpected adverse effects to a drug administered correctly to treat a condition) or bacterial illnesses.

The tables below summarize poisoning mortality data from two WISQARS data streams:

- Intentional and undetermined intent deaths from the National Violent Death Reporting System (NVDRS) (violent death data)
- Unintentional poisoning deaths from NCHS Fatal Injury Data

[4] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (n.d.). Animated ten leading causes of death for ages 1–44 [Interactive visualization]. Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved December 16, 2025, from https://wisqars.cdc.gov/animated-leading-causes/
[5] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (n.d.). Leading causes of death for all ages, 2023 [Interactive table]. Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved December 16, 2025, from WISQARS Leading Causes of Death Visualization Tool
[6] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (n.d.). About nonfatal injury data [Web page]. Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved December 16, 2025, from https://wisqars.cdc.gov/about/nonfatal-injury-data/

Table 1a. Poisoning deaths, includes all intents, ages, sexes, races, and ethnicities (2023)[7]

Age Group (Years)	Number of Deaths	Population	Crude Rate per 100,000 Population
0-4	272	18,511,160	1.5
5-9	31	20,152,757	0.2
10-14	126	20,834,564	0.6
15-19	1,674	22,075,480	7.6
20-24	4,520	21,811,172	20.7
25-29	8,485	22,018,360	38.5
30-34	13,030	23,524,156	55.4
35-39	14,086	22,506,644	2.6
40-44	13,903	21,884,049	63.5
45-49	11,244	19,817,010	56.7
50-54	11,252	20,676,771	54.4
55-59	11,647	20,606,257	56.5
60-64	9,844	21,248,154	46.3
65-69	5,685	19,150,728	29.7
70-74	2,141	15,534,556	13.8
75-79	819	11,387,417	7.2
80-84	399	6,980,680	5.7
85+	351	6,194,980	5.7
Total	109,522	334,914,895	32.7

Table 1b. Unintentional poisoning deaths, all sexes, races, and ethnicities (2023)[5]

The table below show, within each age group, how deaths from unintentional poisoning rank among deaths from all types of unintentional injuries (e.g., unintentional drowning, suffocation, motor vehicle traffic injury, fall).

Age Group (Years)	Rank	Number of Deaths	Crude Rate per 100,000 Population	Percentage of Injury Deaths
<1	4	27	0.7	1.7%
1-4	5	69	0.5	4.1%
5-9	6	18**	<0.1**	2.0%**

[7] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (n.d.). National Violent Death Reporting System [Interactive database]. Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved December 16, 2025, from https://wisqars.cdc.gov/nvdrs/

Age Group (Years)	Rank	Number of Deaths	Crude Rate per 100,000 Population	Percentage of Injury Deaths
10-14	3	74	0.4	4.1%
15-24	2	5,462	12.4	20.7%
25-34	1	20,097	44.1	44.1%
35-44	1	26,286	59.2	52.1%
45-54	1	20,757	51.3	49.7%
55-64	1	19,701	47.1	44.4%
65+	3	7,803	13.2	9.0%
All Ages	1	100,304	29.9	33.3%

*** indicates unstable value (<20 deaths) -- indicates suppressed value; (between one to nine deaths or nonfatal injury counts based on <20 unweighted count, <1,200 weighted count, or coefficient of variation of the estimate >30%).*

Table 1c. Suicide and homicide poisoning deaths, all sexes, races, and ethnicities (2023) Error! Bookmark not defined.

The table below shows, within each age group, how deaths from suicide and homicide poisoning rank among deaths from all types of violence-related injuries (e.g., firearm, suffocation, cut/pierce).

Homicide Poisoning:

Age Group (Years)	Rank	Number of Deaths	Crude Rate per 100,000 Population	Percentage of Injury Deaths
<1	3	24	0.7	1.5%
1-4	3	50	0.3	2.9%
5-9	8	--	--	--
10-14	12	--	--	--
15-24	18	11**	<0.1**	<0.1%
25-34	19	22	<0.1	<0.1%
35-44	14	38	<0.1	<0.1%
45-54	16	31	<0.1	<0.1%
55-64	16	24	<0.1	<0.1%
65+	>20	12**	<0.1	<0.1%
All Ages	15	220	<0.1	0.1%

Suicide Poisoning:

Age Group (Years)	Rank	Number of Deaths	Crude Rate per 100,000 Population	Percentage of Injury Deaths
<1-9	N/A	0	0.0	N/A
10-14	4	36	0.2	2.0%
15-24	4	536	1.2	2.0%
25-34	4	819	1.8	1.8%
35-44	4	935	2.1	1.8%
45-54	4	1,128	2.8	2.7%
55-64	3	1,207	2.9	2.7%
65+	2	1,283	2.2	1.5%
All Ages	4	5,944	1.8	2.0%

*** indicates unstable value (<20 deaths) -- indicates suppressed value; (between one to nine deaths or nonfatal injury counts based on <20 unweighted count, <1,200 weighted count, or coefficient of variation of the estimate >30%).*

Hospitalizations

Nonfatal injury data in WISQARS are from the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP). In 2023, there were approximately 391,687 nonfatal, poisoning-related emergency department (ED) visits that *resulted in hospitalization*.[6]

Table 2. All Intents Poisoning Nonfatal ED Visits and Rates per 100,000 (2023, United States, All Ages, All Sexes, Disposition: Hospitalized)

Intent	Estimated Number	Age-adjusted Rate
Unintentional (includes undetermined)	291,596	85.0
Assault – Other	Suppressed value	Suppressed value
Legal intervention	Suppressed value	Suppressed value
Self-harm	99,602	30.8
Total	391,687	116.0

ED Visits

In 2022, 43.5 million ED visits were injury-related visits that included poisoning and adverse effects.[8] The National Hospital Ambulatory Medical Care Survey (NHAMCS) reported that 3.8% of ED visits (942,000 visits) in 2022 were coded as "Poisoning by, adverse effect of and underdosing of drugs, medicaments and biological substances" for primary diagnosis.[9]

Contacts with Poison Centers

In 2023, U.S. Poison Centers responded to over two million human exposures cases across 63 states and territories. Approximately 500,000 cases were reported from a healthcare facility. The top five substance exposures in 2023 included analgesics (11%), household cleaning substances (7%), antidepressants (6%), cosmetics/personal care products (5%), and cardiovascular drugs (5%).[10]

A 2024 study from the University of Virginia School of Medicine highlighted how poison centers throughout the U.S. are reporting "increasingly severe medical outcomes" among adults and children. Between 2007 and 2021, the number of poison center cases involving intentional exposures that resulted in death among adults increased by 233.9%.[11] These cases included suicide attempts, illegal drug use, and incorrect use of medications. Unintentional poisonings also increased, with 37% more cases resulting in serious health outcomes (i.e., disfigurement or disability) to people and 65% more cases resulting in death.[11] While these statistics are concerning, the study's authors expected such findings are due to a worsening mental health crisis, emerging psychoactive substances, and other risk factors that contribute to poisonings among adults and children.

Economic Costs of Poisoning

According to a 2021 report on the economic cost of injury, the cost of injury in the U.S. in 2019 was $4.2 trillion, which includes costs from healthcare, lost work productivity, lost quality of life, and lives lost.[12] A separate 2021 report estimated the cost of fatal opioid overdoses and opioid use disorder in the U.S. was $1.02 trillion in 2017 based on costs for healthcare, treatment, criminal justice activities, lost work productivity, lost quality of life, and lives lost.[13] WISQARS reported that in 2023, the total costs of drug and nondrug poisoning deaths in the U.S. were $1.1 trillion and $33.4 billion, respectively.

[8] Centers for Disease Control and Prevention, National Center for Health Statistics. (n.d.). FastStats: Emergency department visits [Web page]. Retrieved December 16, 2025, from https://www.cdc.gov/nchs/fastats/emergency-department.htm
[9] Centers for Disease Control and Prevention, National Center for Health Statistics. (2024). National Hospital Ambulatory Medical Care Survey: 2022 emergency department summary tables [Data tables]. Retrieved December 16, 2025, from https://www.cdc.gov/nchs/data/nhamcs/web_tables/2022_ed_web_tables.pdf
[10] American Association of Poison Control Centers. (n.d.). National Poison Data System (NPDS) [Web page]. Retrieved December 16, 2025, from https://poisoncenters.org/national-poison-data-system
[11] Farah, R., Cole, R. J., & Holstege, C. P. (2024). Increasing severity of medical outcomes and associated substances in cases reported to United States poison centers. *Clinical Toxicology*, *62*(4), 248–255. https://doi.org/10.1080/15563650.2024.2337897
[12] Peterson C, Miller GF, Barnett SB, Florence C. Economic Cost of Injury — United States, 2019. MMWR Morb Mortal Wkly Rep 2021;70:1655–1659. DOI: http://dx.doi.org/10.15585/mmwr.mm7048a1.
[13] Florence, C., Luo, F., & Rice, K. (2021). The economic burden of opioid use disorder and fatal opioid overdose in the United States, 2017. Drug and alcohol dependence, 218, 108350.

The tables below provide a more detailed description of costs related to poisoning deaths in 2023.[14] In these tables, the "value of statistical life" represents the economic value assigned to reducing the risk of death, based on willingness-to-pay studies.[15] "Medical costs" include direct healthcare expenses such as emergency services, hospital care, physician fees, and related treatment costs for a poisoning incident. Lastly, "combined costs" are the sums of medical costs and value of statistical life, representing the overall economic burden of poisoning deaths.

Table 3. Drug and Nondrug Poisoning Deaths and Associated Costs (2023)[16]

Mechanism	Intent	Number of Deaths	Medical Costs Total	Medical Costs Average per Death	Value of Statistical Life Total	Value of Statistical Life Average per Death	Combined Costs Total	Combined Costs Average per Death
Drug Poisoning	Unintentional	97,231	$741.40 M	$7,625	$1.10 T	$11.27 M	$1.10 T	$11.28 M
Drug Poisoning	Homicide	213	$2.07 M	$9,724	$2.95 B	$13.84 M	$2.95 B	$13.85 M
Drug Poisoning	Suicide	4,660	$49.56 M	$10,635	$48.25 B	$10.35 M	$48.30 B	$10.36 M
Drug Poisoning	Undetermined	2,903	$20.17 M	$6,948	$33.10 B	$11.40 M	$33.12 B	$11.41 M
Nondrug Poisoning	Unintentional	3,073	$27.52 M	$8,954	$33.42 B	$10.87 M	$33.44 B	$10.88 M
Nondrug Poisoning	Homicide		$189,717	$27,102	$87.90 M	$12.56 M	$88.09 M	$12.58 M
Nondrug Poisoning	Suicide	1,284	$6.32 M	$4,922	$13.30 B	$10.36 M	$13.31 B	$10.37 M
Nondrug Poisoning	Undetermined	151	$1.76 M	$11,683	$1.64 B	$10.86 M	$1.64 B	$10.87 M

[14] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (n.d.). Cost of injury reports [Interactive database]. Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved December 16, 2025, from https://wisqars.cdc.gov/cost/

[15] Kearsley, A. "HHS Standard Values for Regulatory Analysis, 2024." Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. January 2024. https://aspe.hhs.gov/reports/standard-ria-values.

[16] Million (M), Billion (B), and Trillion (T)

Considerations for Using This Guidance

The conceptual and operational definitions in this guidance highlight nuance between how poisonings are defined and categorized for surveillance purposes. In many cases, there can be overlap in how different types of poisoning are defined to answer specific surveillance questions. The tables below summarize key considerations for different types of poisoning surveillance and visualize intersections between specific causes of poisoning and ICD code categories.

Table 4. Conceptual Considerations for Poisoning Surveillance

Surveillance Topic	Example sources of this poisoning	Route of administration or exposure	High-level considerations	How this surveillance informs public health jurisdictions' efforts
All poisonings	• Biological substances • Carbon monoxide • Chemicals • Contaminated water (Lead) • Ethanol (Ethyl Alcohol – beer, wine, liquor) • Gases • Inhalants • Nondrug poisoning can often result from nondrug substances being used outside of their primary intent. • Over-the-counter drugs • Pesticides • PFAS • Plants and animals • Prescription drugs • Recreational drugs • Supplements • Wildfire smoke	• Absorption • Consumption of contaminated food or water • Ingestion • Inhalation • Injection • Smoking • Snorting	• Poisoning can be caused by intentional (suicide or self-harm) or unintentional substance use. • Environmental poisoning can be out of an individual's control. It can be due to natural events (wildfires, harmful algal bloom) or human-made events (agricultural runoff, air pollution from factories, lead paint).	• All poisoning surveillance data are useful for general injury prevention surveillance work. • All poisoning surveillance data are not ideal for targeted prevention, but programs find it helpful to characterize overarching issues. • When assessing top causes of injury-related deaths, you may not want to get into the nuance of all types of poisoning but want to know where poisoning-related deaths rank with other injuries. When ranking causes of injury, you typically see "All Poisoning" as an item. • This is the broadest category for poisoning surveillance. • In general, what you choose to include and exclude in surveillance will depend on your target audience(s) for the data (e.g., working on suicide prevention and assessing suicide data involving prescription medication).

Surveillance Topic	Example sources of this poisoning	Route of administration or exposure	High-level considerations	How this surveillance informs public health jurisdictions' efforts
Drug overdose	• Over the counter drugs • Prescription drugs • Recreational drugs • Substances that may not be considered drugs but are consumed for the feelings they cause	• Absorption • Ingestion • Inhalation • Injection • Smoking • Snorting	• A drug overdose can be intentional (e.g., suicide or self-harm) or unintentional substances. • If your surveillance work is intended to inform prevention efforts for unintentional overdose, note that there is a subset of overdoses that aren't relevant to substance use disorder. • The ICD categorizes drugs in a way that may not be what you want to include. ICD says T36-T50 codes are for drugs, but there may be other codes of interest based on the intentions of your surveillance efforts. Some overdoses may receive codes outside of the expected ranges due to symptom presentation (e.g., stimulant overdoses that present as cardiovascular events). You may also want to exclude certain codes (e.g., codes for over-the-counter drugs). • Remember that the broadest version of this surveillance includes illicit, prescription, and over-the-counter drugs. Often, you'll want to limit ICD codes used in your drug overdose surveillance to get more granular with drug overdose surveillance (e.g., when you're thinking about naloxone distribution for opioid overdose).	• Drug overdose surveillance informs spike alerting for substances with potential for abuse. • Grant programs typically use drug overdose indicators to measure progress. • Drug overdose surveillance is also tied to DOSE indicators. • Drug overdose surveillance informs overdose prevention work among state and local jurisdictions.

Surveillance Topic	Example sources of this poisoning	Route of administration or exposure	High-level considerations	How this surveillance informs public health jurisdictions' efforts
Cannabis overdose/ poisoning	• Cannabis flowers • THC vapes • Edible products infused with THC (baked goods, snack foods, candies) • Beverages infused with THC • Tinctures • Topicals (lotions, salves, balms, transdermal patches) • Pills/capsules	• Ingestion - eating, drinking • Inhalation - smoking, vaping • Absorption	• Cannabis includes things labeled as containing THC (the psycho-active compound in cannabis, tetrahydrocannabinol), Delta8, Delta9, Delta10, marijuana, or intoxicating hemp. CBD products (cannabidiol, a non-psychoactive compound) also come from the cannabis plant. These products generally are not intoxicating, but too much CBD can result in negative side effects, particularly for children. • Consider whether your state legalized cannabis for medical and/or adult recreational use. The legal status of these products can determine how they are or are not regulated and is a critical component of understanding impacts on your jurisdiction and prevention activities. • When presenting stratifications by race/ethnicity, carefully consider the framing and context to ensure historically marginalized groups are not stigmatized.	• Routine surveillance of cannabis poisonings can be useful in jurisdictions that have legalized cannabis. • Jurisdictions considering legalizing may benefit from tracking cannabis poisonings pre-legalization for a baseline. • Cannabis poisoning surveillance often focuses on impacts to youth. These impacts may include older youth who are intentionally using cannabis and younger children who may be ingesting products left accessible by caregivers (these products often closely mimic foods that appeal to children).

Surveillance Topic	Example sources of this poisoning	Route of administration or exposure	High-level considerations	How this surveillance informs public health jurisdictions' efforts
Nondrug poisoning	• Biological substances • Carbon monoxide • Chemicals • Contaminated water (Lead) • Gases • Inhalants • Ethanol (Ethyl Alcohol – beer, wine, liquor) • Nondrug poisoning can often result from nondrug substances being used outside of their primary intent. • Pesticides • PFAS • Plants and animals • Supplements • Wildfire smoke	• Absorption • Consumption of contaminated food or water • Ingestion • Inhalation	• Nondrug poisoning can be caused by intentional or unintentional substance use. • Reflect on what sources of poisoning are included in your nondrug surveillance (e.g., lead poisoning). • There is high crossover between sources of nondrug poisoning and environmental poisoning. • ICD categorizes alcohol as a nondrug.	• Some programs may choose to exclude self-harm suicide events from nondrug poisoning surveillance. If you choose to include it, be aware of that and note that prevention may look different depending on intent. • Nondrug poisoning surveillance can inform prevention for young children. • Prevention is specific to the type of substance, so be aware of what you're including. In some cases, for nondrug poisoning surveillance, requests can be more specific (e.g., inform carbon monoxide poisoning prevention by fire departments).
Alcohol poisoning	• Ethanol (Ethyl Alcohol – beer, wine, liquor)	• Ingestion	• Alcohol poisoning is one of the alcohol-attributable types of death (see here for more information - https://nccd.cdc.gov/DPH_ARDI/default/default.aspx). • Alcohol poisoning can be intentional (a suicide or self-harm event) or unintentional. • NVDRS data includes alcohol. • Remember, alcohol is a legal substance for people aged 21 years and older. Contextualize this as you're telling your surveillance story about illicit, prescription, and age-restricted substances. • When you're doing surveillance, understand the legal landscape. Consider impacts of state and local laws on alcohol poisoning events (e.g., Good Samaritan Law).	• Alcohol poisoning can focus on use among youth. • Alcohol poisoning surveillance data can be used to contextualize polysubstance use (e.g., alcohol and benzodiazepines) and alcohol's role in other injuries, and to compare alcohol-related deaths to deaths from other substances. Alcohol poisoning surveillance data adds to the broader picture of substance use and mental health issues.

Surveillance Topic	Example sources of this poisoning	Route of administration or exposure	High-level considerations	How this surveillance informs public health jurisdictions' efforts
Environmental poisoning	• Biological substances • Carbon monoxide • Chemicals • Contaminated water (e.g., lead, TTHM) • Gases • Pesticides • PFAS • Plants and animals • Wildfire smoke	• Consumption of contaminated food or water • Ingestion • Inhalation	• Environmental poisoning can be out of an individual's control. • It can be due to natural events (wildfires, harmful algal blooms) or human-made events (agricultural runoff, air pollution from factories, lead paint). • Surveillance of health impacts from wildfire smoke and carbon monoxide can occur after natural events. • Distinguishing between occupational and environmental exposures is more complex and nuanced. Exposures to sources of environmental poisoning can also be related to occupational health.	• The area of environmental poisoning may be addressed by epidemiologists in distinct areas of a department (e.g., PFAS by environmental epidemiology; carbon monoxide by injury epidemiology; pesticides by occupational epidemiology)

Table 5. Sources of Drug Poisoning (i.e. Substances) and Related ICD Categories

The "Operational Definitions of Poisoning and Drug" section in this guidance describes the methodology for applying the following ICD categories to poisoning surveillance. Table 5 illustrates the overlap between ICD categories and different types of drug and nondrug poisoning seen in Table 4. Refer to Appendices B and C for full matrices of ICD-10-CM and ICD-10 codes for these categories.

Substance	*ICD Category:* **Drug poisoning**	*ICD Category:* **Drugs with potential for abuse**	*ICD Category:* **Cannabis**
Systemic Antibiotics, Anti-infectives, Antiparasitics	X		
Hormones & Synthetic substitutes	X		
Nonopioid analgesics, Antipyretics, and Antirheumatics	X		
▪ 4-Aminophenol derivatives (incl. acetaminophen)	X		
Opioids	X	X	
▪ Heroin	X	X	
▪ Methadone	X	X	
▪ Synthetic narcotics	X	X	
▪ Fentanyl or Fentanyl analogs	X	X	
Cocaine	X	X	
Psychostimulants	X	X	
▪ Amphetamines	X	X	
▪ Ecstasy	X	X	
▪ Methamphetamine	X	X	
Cannabis	X	X	X
Other Psychodysleptics	X		
Antidepressants	X		
Other Psychotropic Drugs	X	X	X

Substance	*ICD Category:* **Drug poisoning**	*ICD Category:* **Drugs with potential for abuse**	*ICD Category:* **Cannabis**
Anesthetics and therapeutic gases	X		
Antiepileptic, sedative- hypnotic and antiparkinsonism drugs	X		
▪ Barbiturates	X		
▪ Benzodiazepines	X	X	
Drugs primarily affective the autonomic nervous system	X		
Primarily systemic and hematological agents	X		
▪ Anticoagulants	X		
Drugs primarily affecting the Cardiovascular, Gastrointestinal, Smooth & skeletal muscle, & Respiratory systems	X		
Topical agents, ophthalmological, otorhinolaryngological and dental drugs	X		
Other drugs, medicaments, and biological substances	X		
Unspecified drugs, medicaments, and biological substances	X		

Sources of Nondrug Poisoning

** These are also sources of environmental poisoning*

- Alcohol
  - Ethanol
- Tobacco & Nicotine
- Carbon monoxide*
- Organic solvents & their vapors
- Halogenated hydrocarbons & their vapors
- Other gases, fumes, & vapors
- Noxious substances eaten as food
- Envenomation
- Envenomation from Plants*
- Envenomation from Animals
- Other specified nondrugs
- Unspecified nondrugs

Conceptual Definitions of Poisoning and Drug

Currently, poisoning surveillance faces serious challenges due in part to varying definitions of poisoning and limitations in the classification of poisons. The goal of this guidance is to create a more comprehensive framework for poisoning surveillance that is inclusive of major existing poisoning definitions and operational definitions. The starting point for this effort was revising conceptual definitions for "poisoning" and "drug" from the ISW7.

Poisoning

The consensus definition of poisoning for this guidance is the following:

> **Poisoning:** A poisoning is an exposure to any extrinsic substance by ingestion, inhalation, injection, or absorption through the skin or mucous membranes that causes at least one clinical effect.

This definition specifically includes:

- Acute exposures;
- Adverse effects of drugs; and
- Exposures to venoms and poisonous plants.

This definition specifically excludes:

- Chronic effects of exposures;
- Bacterial foodborne intoxications (e.g., staphylococcal food poisoning and botulism);
- Food and waterborne infections (e.g., hepatitis A, cryptosporidiosis, and salmonella);
- Infections resulting from the injection of drugs; and
- Exposure to radiation and radioactive substances.

Both a "poison" and a "poisoning" are difficult concepts to define. No universally accepted definitions of poisoning exist, as noted by the 2004 Institute of Medicine report, "Forging a Poison Prevention and Control System."[17] The definition proposed in this guidance is the consensus definition designed for public health surveillance. Public health agencies may find that other definitions might be more useful or preferred for their specific surveillance activities and other fields of specialization.

[17] Board on Health Promotion, Disease Prevention, & Committee on Poison Prevention. (2004). *Forging a poison prevention and control system*. National Academies Press.

EXAMPLES OF EVENTS THAT COULD LEAD TO NONDRUG POISONING

- An individual is exposed to wildfire smoke.
- An individual dies in their sleep from a carbon monoxide leak from an appliance in their home.
- A child eats a wild mushroom.

Defining "poisonous" as an inherent characteristic of a substance is not helpful given that any substance can be toxic if consumed in a high enough dose. A quotation from Paracelsus is frequently cited to support this fact: "All things are poison and not without poison; only the dose makes a thing not a poison."[18] Therefore, a poison is best defined not by what it is, but by what it has done in certain circumstances. From this perspective, a poisoning is an **outcome** rather than an event. Defining poisoning as an outcome also removes any restrictions on the characteristics or purpose of the substance to which a person is exposed. Thus, a poisoning can result from:

- Solids, liquids, or gases;
- Natural or synthetic substances;
- Substances intended to improve health, such as pharmaceuticals; and
- Substances designed to disrupt biological processes, such as pesticides.

In the special case of **pharmaceuticals**, unwanted clinical effects from taking a drug as directed have been previously defined by others as adverse drug reactions or effects, instead of a poisoning. Even though the primary purpose of a pharmaceutical is beneficial, any undesirable effects still meet this guidance's definition of poisoning.

Infection – the invasion and multiplication of microorganisms in body tissues – is not a poisoning. If the clinical effect depends on the actions of microorganisms after invasion, then the event is not considered a poisoning by this guidance or by most previous attempts at defining a poisoning. Therefore, many gastrointestinal infections are not poisonings by this definition, even though they are commonly referred to as "food poisoning" in the vernacular. Additionally, exposures to preformed toxins or noxious food agents (e.g., staphylococcal food "poisoning") do not meet this consensus definition.

As defined here, a poisoning is the result of exposure to any extrinsic substance (external to the person). Therefore, a **physiologic event** is not considered a poisoning (e.g., clinical effects of excess production of thyroid hormone).

[18] Chen, L., Giesy, J. P., & Xie, P. (2018). The dose makes the poison. *Science of The Total Environment*, *621*, 649-653.

Also, a premise of the definition of a poisoning is that an individual is exposed to a "substance" or physical agent, rather than to a form of energy. Therefore, the effects of **external irradiation** – infrared (thermal burns), ultraviolet (sunburn) or ionizing (X-ray burn) – are not included in this guidance's definition of a poisoning. Exposure to **mechanical energy**, such as what occurs when struck by or cut by external objects, is also not included in this definition. **Bites and stings without envenomation** are considered exposures to mechanical energy and are therefore not considered poisonings by this guidance. These distinctions are consistent with the most widely accepted classification of diseases and injury, the ICD, which places the results of exposure to radiation or mechanical energy in non-poisoning rubrics. This distinction, however, is not made in other settings, such as Poison Centers, which consider the effects of all sources of radiation, internal or external, within their scope.

Finally, the definition of poisoning for this guidance only includes **clinical effects for acute poisoning cases**. Numerous examples exist of chronic poisoning (e.g., the effects of occupational exposures to lead or mercury, or the cumulative damage to the liver from certain drugs such as acetaminophen). This guidance recognizes, however, that connecting exposure and effect in individual poisoning cases becomes increasingly difficult with longer latency periods, especially when the exposure was one of many possible triggers for certain physiological events (e.g., a genetic predisposition for a disease).

Drug

Poisoning surveillance that involves drugs also requires a conceptual definition of a "drug." While other jurisdictions may use different conceptual definitions, the consensus definition of a drug for this guidance is as follows:

> **Drug:** A drug is any chemical compound that is used by or administered to humans as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes.

This definition specifically includes:

- Street drugs such as fentanyl, cocaine, and hallucinogens;
- Prescription drugs;
- Over-the-counter drugs;
- Biological substances such as vaccinations;
- Veterinary drugs; and
- Dietary supplements.

This definition specifically excludes:

- Alcohol;
- Beverage ethanol;
- Tobacco;

- Nicotine-based products such as e-cigarettes and liquid nicotine; and
- Chemicals that are deliberately inhaled for the feeling they cause but are chiefly used for other purposes (e.g., organic solvents and halogen derivatives of aliphatic and aromatic hydrocarbons).

Drugs can either be used **(1) chiefly for medicinal purposes or (2) for the feeling they cause**. Drugs that are used for medicinal purposes are relatively easy to define by their therapeutic purposes. Street drugs, like fentanyl, are primarily employed for the feeling they cause and have limited alternative uses.

EXAMPLES OF EVENTS THAT COULD LEAD TO DRUG POISONING/DRUG OVERDOSE

- An adult unintentionally consumes an additional dose of prescribed medication.
- An adult mixes their medication with alcohol (either intentionally or inadvertently).
- A young child consumes a parent's prescription or recreational drug.
- An adult uses cocaine recreationally, but the cocaine is laced with fentanyl.
- An adult uses cocaine and fentanyl in combination for recreational use ("speedball").

Chemicals that are produced for non-medicinal purposes but are employed for the feeling they cause (e.g., organic solvents and glue) are more difficult to define as drugs. These chemicals were not defined as drugs in this guidance, even though they might be used for the feeling they cause. This distinction is similar to that made by ICD coding systems.

This guidance does not include **alcohol and tobacco** in the conceptual definition of a drug, although alcohol and tobacco are included as potential poisons in the broader poisoning definition. It might be argued that these substances should be included in the conceptual definition of drug because they are often consumed for the feeling they cause and have psychoactive properties like other non-medicinal drugs. In fact, the Substance Abuse and Mental Health Services Administration (SAMHSA) incorporates "alcohol and other drugs" within its framework of substance use disorders. However, the PSW decided that this guidance should be consistent with major coding schemes for morbidity and mortality in the U.S., where alcohol and tobacco are classified separately from drugs.

For example, they are not included in the category of "drug-induced death" employed by the National Center for Health Statistics (NCHS). Alcohol is also not classified as a drug in the World Health Organization's (WHO) ICD-10, where drug poisoning external cause codes (X40-X44) precede a separate code for alcohol (X45). Similarly, in the ICD-10-CM, the alcohol poisoning code is included in the "Substances chiefly nonmedicinal as to source" category rather than in the "Drugs, medicaments, and biological substances" category. For specific surveillance purposes, additional substances could be grouped with defined "drugs" as needed or preferred.

Operational Definitions of Poisoning and Drug

Purpose

The PSW created two row–by-column matrices to operationalize the conceptual definitions of poisoning (drug, nondrug, and all poisons) for the two major U.S. coding systems: ICD-10-CM (morbidity) and ICD-10 (mortality).

The matrices can be used to standardize state- and national-level surveillance, while allowing flexibility to develop and explore new or alternative approaches. By identifying matrix columns, rows, or cells that are useful to their surveillance efforts, users can create clear, code-based surveillance case definitions, enabling comparability and transparency across jurisdictions and time. The matrices are organized as follows:

- **Rows** represent 'drug' or 'nondrug' sources of poisonings, broken into subcategories that follow the first three characters of the ICD code and balance public health importance, utility for surveillance, and feasibility given the limitations of each coding system.
- **Columns** represent code type (i.e., intent):
    - Unintentional
    - Self-harm
    - Assault (includes terrorism)
    - Undetermined intent
    - Legal intervention/operations of war
    - Adverse effects
- **Marginal totals** are provided in the 'all drug,' 'all nondrug,' and 'all poisoning' rows and the 'all code types' column.

These matrices intentionally include a larger spectrum of events than is typically used in injury surveillance (i.e., adverse effects of drugs).[19]

Using the matrices requires a basic understanding of the ICD coding system. If unfamiliar with the ICD coding system, seek guidance from an epidemiologist, statistician, or data analyst who is familiar

[19] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2024). 2022 injury indicator instructions [PDF]. Retrieved December 16, 2025, from https://www.cdc.gov/injury-core-sipp/media/pdfs/2024/06/2022-Injury-Indicator-Instructions.pdf

with the ICD and appropriate analytic methods. When using the matrices, jurisdictions may encounter challenges related to the following:

- Underlying data quality
- Aspects of the ICD classification system
- The extent to which one can locate specific groups of codes within the matrix structure is dependent upon their existence in the ICD-10-CM or ICD-10 coding schema, respectively.

Poisoning Morbidity Matrix for ICD-10-CM Coded Data

Background on Morbidity Coding

ICD-coded ED and hospitalization administrative claims data reported through state-level hospital discharge data systems are among the primary sources of poisoning morbidity data.

The transition from the ICD 9th Revision, Clinical Modification (ICD-9-CM) to ICD-10-CM on October 1, 2015 marked a major change in medical claims coding for all healthcare entities covered by the Health Insurance Portability and Accountability Act (HIPAA).[20,21] This impacted poisoning surveillance in the following ways:

- The number of injury and poisoning diagnosis codes increased from 2,600 in ICD-9-CM to 43,000 in ICD-10-CM, greatly improving code specificity and thereby expanding surveillance capabilities.
- ICD-10-CM simplified the coding process for poisonings by incorporating both substance type and intent (unintentional, intentional self-harm, assault, undetermined intent, adverse effects) into a single code category (T codes). In ICD-9-CM, poisonings were coded with a diagnosis code indicating the substance involved (960-989 codes) and/or a separate non-billable external cause of injury code (E-codes) indicating intentionality.
- ICD-10-CM introduced new concepts of underdosing and encounter type.
- Coding of undetermined intent and unintentional poisonings changed in ICD-10-CM. Under ICD-9-CM coders were instructed to default to undetermined intent, and the guidance under ICD-10-CM is to default to unintentional, unless the medical record explicitly indicates that the intent is undetermined.

Though these were positive changes for poisoning surveillance, the extensive revisions preclude a simple one-to-one crosswalk between the ICD-9-CM and ICD-10-CM coding systems, and literature has shown that the coding change introduced systematic differences in measurement of drug

[20] Yang, H., Pasalic, E., Rock, P., Davis, J. W., Nechuta, S., & Zhang, Y. (2021). Interrupted time series analysis to evaluate the performance of drug overdose morbidity indicators shows discontinuities across the ICD-9-CM to ICD-10-CM transition. *Injury prevention*, *27*(Suppl 1), i35-i41.
[21] Vivolo-Kantor, A., Pasalic, E., Liu, S., Martinez, P. D., & Gladden, R. M. (2021). Defining indicators for drug overdose emergency department visits and hospitalisations in ICD-10-CM coded discharge data. *Injury prevention*, *27* (Suppl 1), i56-i61.

overdoses before and after October 1, 2015. Therefore, the poisoning morbidity matrix presented in this document focuses on ICD-10-CM coded morbidity data.[22]

About the ICD-10-CM Morbidity Matrix

The matrix for ICD-10-CM Coded Morbidity Data in **Appendix B** provides a framework for categorizing codes as part of the conceptual definition of poisoning. The morbidity matrix is designed as a row-by-column spreadsheet. Rows are organized hierarchically (from broad categories to more detailed subcategories). An asterisk (*) beside a category or subcategory indicates that the rows beneath it are not exhaustive of all possible codes. Additional considerations for the ICD-10-CM morbidity matrix are listed below.

Drug Poisoning

- Includes T36-T50 with 7th character of A (initial encounter, active treatment)
- Intent information is captured in:
    - 5th character of: T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9
    - 6th character of all other T36-T50 codes
- Intent values:
    - 1 = Unintentional
    - 2 = Self-harm
    - 3 = Assault
    - 4 = Undetermined
    - 5 = Adverse effects
- There are no codes for legal intervention/war drug poisonings

Nondrug Poisoning

- Includes T51-T65, and certain Y codes with 7th character of A (initial encounter, active treatment)
- Intent information is captured in:
    - 5th character of: T51.9, T52.9, T53.9, T54.9, T56.9, T57.9, T58.0, T58.1, T58.9, T59.9, T60.9, T61.0, T61.1, T61.9, T62.9, T63.9, T64.0, T64.8, and T65.9
    - 6th character of all other T51-T65 codes
- Intent values:
    - 1 = Unintentional
    - 2 = Self-harm
    - 3 = Assault
    - 4 = Undetermined

[22] *The poisoning morbidity matrix for ICD-9-CM coded data is provided in ISW7. Those using hospital discharge data for analysis of poisoning surveillance trends spanning October 1, 2015, should be aware that data may not reflect actual changes in morbidity, and should provide a visual indication of this on any trend line graphs.*

- There are no codes for adverse effects under nondrug poisonings
- Legal intervention/war codes: Y35.2, Y36.7, Y37.7
- Terrorism codes: Y38.6, Y38.7 (grouped under assault)

For ICD-10-CM coded data, it is generally recommended to search all available fields for the presence of poisoning codes that are part of your case definition.[21]

Morbidity matrix overlap with existing surveillance definitions

CDC State Injury Indicators Nonfatal Nondrug Poisoning[19]

This indicator specifically excludes:

- T54.1, T52.3, T54.3, T54.90 - Toxic effects of other corrosive organic compounds, corrosive acids and acid-like substances, corrosive alkalis and alkali-like substances, unspecified corrosive substance
- T63 - Toxic effect of contact with venomous animals and plants
- T65.82 - Toxic effect of harmful algae and algae toxins
- T65.84 – Toxic effects of xylazine
- Y38.6 - Terrorism due to biological weapons

CDC Nonfatal Drug Overdose Surveillance and Epidemiology (DOSE) indicators[23]

This indicator includes T36-T50 with intent character 1 or 4 & 7th character of A (ONLY Unintentional & Undetermined intent). Adverse effects are NOT included.

Approach to using the ICD-10-CM morbidity matrix

1. Choose operational case definition

First, select appropriate cells from the poisoning matrix to construct a list of ICD-10-CM codes in your surveillance case definition.

2. Choose a search method

Determine what ICD-10-CM coded fields are available in your hospital discharge data. Typically, there is a primary/principal/first-listed diagnosis field, and some number of additional/secondary diagnosis fields. Some systems have separate fields for external cause of injury codes, which should be included along with diagnosis fields in your list of available fields. Select the search method that is appropriate for your surveillance goals:

[23] Centers for Disease Control and Prevention. Drug Overdose Surveillance and Epidemiology Discharge Surveillance (DOSE-DIS) System: Nonfatal Overdose Emergency Department and Inpatient Hospitalization Discharge Data. Atlanta, GA: US Department of Health and Human Services, CDC; December 30, 2025. Access at: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-discharge-data.html

a. Any Mention

For ICD-10-CM coded data, it is generally recommended to search all available fields for the presence of poisoning codes that are part of your case definition.[18] For hospitalizations data, consider searching within an injury subset (there must be an injury diagnosis as the primary diagnosis). For ED visits, there are no restrictions on the subset.

- This allows capture of cases where the poisoning code is not in the primary or first listed diagnosis field. For example, a case with a secondary diagnosis of opioid overdose and a primary diagnosis of respiratory failure or a mental health condition. Research based on medical record review has demonstrated the high positive predictive value of T codes in secondary diagnosis fields.[24]
- This also captures all substances involved in a multi-substance poisoning.

b. Principal/primary or first-listed diagnosis field

Another approach is to search only the principal/primary or first-listed diagnosis field for the presence of ICD-10-CM codes that are part of your case definition.

- For inpatient hospitalizations, the principal/primary diagnosis is the condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care.
- For ED visits, there may or may not be clinical significance associated with which code is placed in the first-listed position. This varies by jurisdiction.

This is a more conservative method of case selection and may underestimate the true prevalence of poisonings requiring medical care within an ED or hospital.

3. Analysis considerations

- It is good practice to always report the number of diagnosis fields and/or external cause code fields collected in your hospital discharge data, as well as the search method you used.
- If using the "any mention" approach, avoid double counting when a single hospital discharge record contains more than one of the ICD-10-CM codes in your surveillance case definition. In other words, count a record once if it contains any code in your case definition.
- Using the "any mention" approach can create problems when making comparisons across jurisdictions that collect different numbers of diagnosis fields and/or external cause code fields. In general, more cases will be identified as the number of fields increases. Therefore, the number of fields to be searched should be the same across jurisdictions and over time.

[24] Slavova S, Quesinberry D, Costich JF, et al. ICD-10- CM- Based definitions for emergency department opioid poisoning surveillance: electronic health record case confirmation study. Public Health Rep 2020;135:262–9.

Poisoning Mortality Matrix for ICD-10 Coded Data

Background on Mortality Coding

ICD-10 mortality data began with deaths occurring in 1999. Prior to that, mortality data were coded using ICD-9. Because of substantial changes in coding structure and definitions between ICD-9 and ICD-10, caution must be exercised when comparing mortality data across this transition.

In ICD-10 coded mortality data, each death is assigned a single underlying cause of death (UCOD) code. This represents the disease or injury event judged to have initiated the chain of events leading directly to death. Each death may also be assigned additional multiple cause of death (MCOD) codes. These codes address all other conditions mentioned on the death certificate that contributed to the death, whether as comorbid diseases, contributing chronic conditions, or the nature of specific injuries or poisons that were involved in the death.

For poisoning surveillance, this distinction is especially important. The **UCOD code identifies poisoning as the primary cause of death** and, where applicable, indicates the manner of death (e.g., unintentional, intentional self-harm, assault, undetermined intent). The UCOD code provides broad categories of substances (e.g., 'narcotics and psychodysleptics') while detailed information about the specific agent(s) involved is generally only available in MCOD codes (e.g., heroin, cannabis, cocaine). Due to the ICD-10 coding system, MCOD codes cannot appear in the UCOD field. For example, a death caused by an unintentional heroin overdose should contain both X42 'unintentional poisoning by narcotics', and T40.1 'poisoning by heroin'; but only X42 is allowed to be the UCOD code. In addition, the MCOD fields may identify multiple substances that contributed to the death. If a benzodiazepine also contributed to the example given above, there will be at least three ICD-10 codes: X42 as the UCOD, and two MCOD codes (T40.1 and T42.4).

Of note, UCOD and MCOD codes are dependent upon the completeness and comprehensiveness of literal text information on the death certificate, which is filled in locally by medical examiners, coroners, or others with authority to certify deaths (e.g., physicians in some instances). In some cases, true poisoning deaths might receive codes that are outside of the expected ranges, and some deaths that are not actually due to poisoning might receive codes that are in the poisoning ranges; therefore, case-finding that uses UCOD and MCOD codes (such as that outlined in the ICD-10 Mortality Matrix) could benefit from text-searching and manual review for poisoning-related terms. One example of deaths that might be true poisonings and not receive poisoning-related codes is stimulant overdose deaths, which often present as cardiovascular events (e.g., myocardial infarction) but that are precipitated by acute overdoses; often, other parts of the death certificate (e.g., "How Injury Occurred," "Other Significant Conditions") contain poisoning/overdose-related text (e.g., "methamphetamine intoxication"). An example of a death that might receive a poisoning-related code despite not being a true poisoning/overdose is a death resulting from injuries sustained during a motor vehicle crash in which the decedent was intoxicated but did not overdose. Some guidance for incorporating text-based searches is below in the "Analysis Approach" section of "Approach to using the ICD-10 mortality matrix."

About the ICD-10 Mortality Matrix

The Poisoning Matrix for ICD-10 Coded Mortality Data in **Appendix C** provides a framework for categorizing ICD-10 codes included in the conceptual definition of poisoning. The mortality matrix is designed as a row-by-column spreadsheet. Rows are organized hierarchically (from broad categories to more detailed subcategories). An asterisk (*) beside a category or subcategory indicates that the rows beneath it are not exhaustive of all possible codes. Columns are organized by underlying and multiple causes of death.

Underlying Cause of Death

- Drug Poisoning
    - Unintentional: X40-X44
    - Suicide: X60-X64
    - Homicide: X85
    - Undetermined intent: Y10-Y14
    - Adverse effects: Y40-Y59
    - There are no codes for legal intervention/war drug poisonings
- Nondrug Poisoning
    - Unintentional: X45-X49, X20-X29
    - Suicide: X65-X69
    - Homicide: X86-X90
    - Terrorism: U01.6, U01.7
    - Undetermined intent: Y15-Y19
    - There are no codes for adverse effects under nondrug poisonings
    - Legal/War: Y35.2, Y36.7, Y37.7

Multiple Cause of Death

ICD-10 codes in the range T36-T65, which describe specific drugs and toxic substances, cannot appear in UCOD fields but may appear in the MCOD fields to provide additional detail. Unlike ICD-10-CM, these codes do not capture intent or encounter type.

MCOD codes should only be considered when the UCOD field has a poisoning code from a relevant matrix cell. In some cases, a T36-T65 code might appear as a contributing factor for a death not classified as a poisoning (e.g., drug intoxication contributing to a motor vehicle crash). This would not be considered a poisoning death.

Drug Poisoning

- T36-T50

Nondrug Poisoning

- T51-T65

Mortality matrix overlap with existing surveillance definitions

CDC Fatal Drug Overdose: State Unintentional Drug Overdose Reporting System (SUDORS)

- SUDORS collects data on unintentional and undetermined intent drug overdose deaths: (X40–X44, Y10-14)
- Excludes adverse effects

CDC State Injury Indicators Fatal Nondrug Poisoning

- X45–X49: Accidental poisoning by nondrugs
- X65–X69: Intentional self-poisoning by nondrugs
- X86–X90: Assault by nondrug poisoning
- Y15–Y19: Poisoning by and exposure to nondrugs, undetermined intent
- Y35.2: Legal intervention involving gas
- U01.6, U01.7: Terrorism involving biological or chemical weapons

NCHS Drug Induced Causes of Death Indicator

- X40-X44: Unintentional
- X60-X64: Suicide
- X85: Homicide
- Y10-Y14: Undetermined intent

Approach to using the ICD-10 mortality matrix

The way the ICD-10 mortality matrix is applied depends on whether you have access to only UCOD data or both UCOD and MCOD data.

1. Choose operational case definition

Select appropriate cells from the poisoning matrix to construct a list of ICD-10 codes in your surveillance case definition.

- **UCOD data only:** Build a single case definition from UCOD columns only.
- **UCOD and MCOD data:** Build a two-part case definition.
    - **Part 1:** UCOD case definition to create your subset of poisoning deaths.
        - Choose only from UCOD matrix columns.
        - Choose from a row broad enough to include all poisoning deaths where your substance of interest might appear. The UCOD case definition you choose may restrict what MCOD codes you can look for. It is best to choose a broad UCOD case definition.
    - **Part 2:** MCOD case definition to identify specific substances
        - Select any cell or combination of cells from the MCOD column, based on your needs.

2. Analysis Approach

- **UCOD Only:** Search the UCOD field for the presence of a code within your case definition. This provides a consistent, straightforward way to identify and classify deaths by their primary initiating cause. Each death only has one UCOD code, therefore UCOD data provides unduplicated counts of various types of poisoning.
- **UCOD and MCOD:** Utilizing both the UCOD and MCOD codes is the recommended approach for the most complete surveillance, because these data provide the best overview and greatest specificity of poisoning deaths. Using the UCOD codes to create a subset of poisoning deaths, the MCOD diagnostic codes can provide a breakdown of the specific substances involved. However, because each death may involve multiple codes, UCOD with MCOD analyses are more difficult than UCOD only.
    - **Step 1:** Create a subset of data based on your UCOD case definition (i.e., search the UCOD field for any death with a code that is part of your UCOD case definition).
    - **Step 2:** Within that subset, search all available MCOD fields for codes in your MCOD case definition.[18]
- **UCOD (plus/minus MCOD) plus Text-Based Searching:** Search the UCOD field (plus/minus MCOD fields) as described above. Search for substrings related to poisoning/overdose terms (e.g., "intoxication," "toxicity," "overdose," "poisoning," etc.) in the text fields of the death certificate: Part I (Cause of Death fields a–d), Part II (Other Significant Conditions contributing to death), and the "How Injury Occurred" field. See the "General coding approach to using the matrices" section below for implementation guidance.

3. Analysis Considerations

- It is good practice to always report the specific codes in your case definition, as well as the analysis approach you used including the number of MCOD fields collected in your death dataset if applicable.
- If using MCOD data, avoid double counting when a single death record contains more than one of the ICD-10 codes in your surveillance case definition. In other words, count a record only once if it contains any code in your case definition.
- There are two types of MCOD codes, entity axis and record axis codes. The entity axis codes include the ICD coded conditions from the death certificate and information about the location of the condition of the certificate (e.g., Part I or Part II, Line number). The entity axis codes are edited for consistency and duplicative information (e.g., two of the same code) by the suite of software for coding the causes of death. The resulting codes are referred to as record axis codes. Because the record axis codes are edited, the ISW7 recommends using these codes with the matrix.

- There are other considerations when interpreting MCOD data, particularly limitations in drug specificity and coding structure. Individual MCOD codes cannot appear twice in one record, even if the code refers to two different drugs, because duplicate codes are deleted in the editing process for record axis MCOD files. Moreover, many MCOD codes aggregate multiple substances under a single code, limiting the ability to distinguish specific drugs implicated in overdose deaths. For example, poisoning by fentanyl would be coded as T40.4, which also includes other synthetic opioids such as meperidine and tramadol. Similarly, methamphetamine is coded under T43.6 (psychostimulants with abuse potential), a category that includes other substances. As a result, the presence of multiple drugs within the same category may be missed.
- As mentioned above, some deaths might be missed or included in error when relying solely on UCOD and/or MCOD codes; consideration of incorporating literal text field searching is therefore encouraged. See above for additional information and the "General coding approach to using the matrices" below for implementation guidance.

Table 6. Example operational case definitions

Source of Poisoning	ICD-10-CM Morbidity	ICD-10 Mortality
All Poisonings	Any mention of T36-T65, Y35.2, Y38.6, Y38.7, Y36.7, Y37.7 with 7th character of A or missing	UCOD code X40-X49, X20-X29, X60-X69, X85-X90, U01.6, U01.7, Y35.2, Y36.7, Y37.7, Y10-Y19, Y40-Y59
Drug Poisoning*	Any mention of T36-T50 with intent character of 1-4 and 7th character of A or missing	UCOD code X40-X44, X60-X64, X85, Y10-Y14
Unintentional Drug Poisoning*†	Any mention of T36-T50 with intent character of 1 and 7th character of A or missing	UCOD code X40-X44
Opioid Poisoning*	Any mention of T40.0-T40.4, T40.6 with intent character of 1-4 and 7th character of A or missing	UCOD code X40-X44, X60-X64, X85, Y10-Y14 AND Any mention of T40.0-T40.4, T40.6 in MCOD
Self-harm Carbon Monoxide Poisoning	Any mention of T58 with intent character of 2 and 7th character of A or missing	UCOD code X67 AND Any mention of T58 in MCOD
Poisoning Due to Adverse Effects of Drugs	Any mention of T36-T50 with intent character of 5 and 7th character of A or missing	UCOD code Y40-Y59
Nondrug Poisoning	Any mention of T51-T65, Y35.2, Y38.6, Y38.7, Y36.7, Y37.7 with 7th character of A or missing	UCOD code X20-X29, X45-X49, X65-X69, X86-X90, Y15-Y19, Y35.2, U01.6, U01.7, Y36.7, Y37.7
Alcohol Poisoning	Any mention of T51 code with 7th character of A or missing	UCOD code X45, X65, Y15 AND Any mention of T51.0 in MCOD (to focus on ethanol poisoning vs. other types of alcohol)

** Excludes adverse effects*
† Consider including poisonings of undetermined intent when assessing unintentional intent - the determination for those poisonings is most often between unintentional and intentional (e.g., suicide/suicide attempt). Inclusion of undetermined intent would ensure that no true unintentional poisonings are missed and likely would not greatly overestimate the proportion. Among deaths, although poisonings account for a sizeable portion of undetermined intent deaths, undetermined intent deaths account for only a small portion of all unintentional/undetermined intent poisoning deaths.

General coding approach to using the matrices

- Normalize all ICD-10-CM or ICD-10 coded fields (i.e., convert to uppercase, remove dots, remove spaces).
- If incorporating text search, normalize all text fields (Part I (Cause of Death fields a–d), Part II (Other Significant Conditions contributing to death), and the "How Injury Occurred" field) (i.e., convert to uppercase)
- Create a regular expression (regex) that captures the codes you want to include in your surveillance case definition(s).
- If incorporating text search, create a regex that captures the words you want to search for and accounts for common variations in spelling/tense (i.e., OVERDOSE, OVERDOSED, OVER DOSE)
- Validate your regexes on known examples (rows that should hit, and rows that shouldn't) to confirm the logic before scaling to the full dataset. Pick a regex engine and use it consistently.
- Handle missing values appropriately (i.e., ICD-10-CM or ICD-10 coded fields or text fields that do not contain any data) to prevent unwanted behavior such as NA propagation, etc.
- Define search method and priority among multiple code matches. If a record contains several matching codes, make clear whether you want to analyze all matches, only match a certain field, or the first match in any field with a specific priority order. The examples below search for the first match in any field and prioritize the fields in a specific order.
- If you are analyzing many indicators at once, you should alter your coding approach for efficiency.

Implementation in SAS

- Create an array of the ICD coded fields you wish to search.
    - The order of fields in your array is important as it will inform the interpretation of your array position indicator variable.
- Create an indicator variable that will tell you if (and in which field) a code included in your case definition was found in your data.
- Loop over each field in your array to find a regular expression match.
    - If a match is found, store the matched code & array position, exit loop.
    - If no match is found, do nothing, exit loop.

- The array position variable can be used to implement various search method logic because it allows you to tell which field contained a matching code (i.e., was it the primary diagnosis field or the UCOD field?).
- If incorporating text search
    - Create an array of the text fields you wish to search
    - Create an indicator variable that will tell you if any (and which term) of your search terms were found

SAS Example for ICD-10-CM

```
Data WANT;
Set HAVE;
/*create regular expression*/
retain REGEX_INDICATOR;
if _N_=1 then REGEX_INDICATOR = prxparse('/^T(3[6-9]|4[0-9]|50)[A-Z0-9]{3}(A|$|\b)/'); *example for ICD-10-CM;

/*create array of ICD-10-CM coded fields*/
array FIELD_ARRAY (*) PRIM_DX DX2-DX10 ECODE1-ECODE5; *example for ICD-10-CM;

/*indicator variable & variable to store matched code*/
length INDICATOR 8 INDICATOR_POSITION 8 CODE_INDICATOR $7;

/*loop over fields & store first matched code, position found*/
do i=1 to dim(FIELD_ARRAY);
    if prxmatch(REGEX_INDICATOR, FIELD_ARRAY[i])>0 then do;
            CODE_INDICATOR =FIELD_ARRAY[i];
            INDICATOR=1;
            INDICATOR_POSITION = i;
            leave;
    end;
end;
drop regex_: i;

*Choose ONE of the if statements below to run and comment out the rest;
if INDICATOR_POSITION>0 then output; *for any mention analysis;
*if INDICATOR_POSITION=1 then output; *for principal/primary or first-listed diagnosis field analysis;

run;
```

SAS Example for ICD-10

```
Data WANT;
Set HAVE;
/*create regular expression*/
retain REGEX_UCOD REGEX_MCOD REGEX_TEXT;
if _N_=1 then do;
    REGEX_UCOD = prxparse('/^X[46][0-4]|^X85|^Y1[0-4]/'); *example for ICD-10 UCOD;
    REGEX_MCOD = prxparse('/^T40[0-46]/'); *example for ICD-10 MCOD;
```

```
    REGEX_TEXT = prxparse('/(OVER\s?DOSED?|TOXICITY|POISON)/i'); *example for text search;
End;

/*create arrays of ICD-10 coded fields & text fields*/
array FIELD_ARRAY (*) UCOD RAXIS1-RAXIS30; *example for ICD-10 coded fields;
array TEXT_ARRAY(*) DCODL DCODL2 DINJCAUSE; *example for text fields;

/*indicator variable & variable to store matched code*/
length UCOD_INDICATOR 8 MCOD_INDICATOR 8 MCOD_POSITION 8 MCOD_MATCH $7;

/*loop over fields & store first matched code, position found*/
do i=1 to dim(FIELD_ARRAY);
    if i=1 then do; /*UCOD*/
            if prxmatch(REGEX_UCOD, FIELD_ARRAY[i])>0 then do;
            UCOD_INDICATOR=1;
            end;
    end;
    else do; /*MCOD*/
            if prxmatch(REGEX_MCOD, FIELD_ARRAY[i]) > 0 then do;
                    MCOD_MATCH= FIELD_ARRAY[i];
                    MCOD_INDICATOR=1;
                    MCOD_POSITION =i;
                    leave;
            end;
    end;
end;

/*indicator variable & variable to store matched code*/
length TEXT_POSITION 8 TEXT_MATCH $50;

/*loop over text fields & store first matched word, and position found*/
do i=1 to dim(TEXT_ARRAY);
    if prxmatch(REGEX_TEXT, TEXT_ARRAY[i]) > 0 then do;
            call prxposn(REGEX_TEXT, 1, _start, _len);
            if _start > 0 and _len > 0 then TEXT_MATCH = substr(TEXT_ARRAY[i], _start, _len);
            TEXT_POSITION = i;
            leave;
    end;
end;

drop regex_: i _: ;

*Choose ONE of the if statements below to run and comment out the rest;
if UCOD_INDICATOR=1 then output; *for UCOD analysis, regardless of MCOD presence;
*if UCOD_INDICATOR=1 and MCOD_POSITION>0 then output; *for UCOD/MCOD analysis;
*if UCOD_INDICATOR ne 1 and MCOD_POSITION>0 then output; *to explore records not included in
UCOD subset;
```

```
*if UCOD_INDICATOR ne 1 and TEXT_POSITION>0 then output; *to explore records not included in
UCOD subset with a text match;

run;
```

Implementation in R

- Create character vector of the ICD coded fields you wish to search
    - The order of fields in your array is important as it will inform the interpretation of your array position indicator variable.
- Search each column (Base R) or matrix (Tidyverse) to find a regular expression match
- Bind all results together into a logical matrix
- Collapse across columns by row, flagging whether any column matched, position of first match, and matching code
- If incorporating text search
    - Create a character vector of the text fields you wish to search
    - Search each column (Base R) or matrix (Tidyverse) to find a regular expression match

R Example for ICD-10-CM

```
# Create regular expression
REGEX_INDICATOR <- "^T(3[6-9]|4[0-9]|50)[A-Z0-9]{3}(A|$|\\b)"

# Create character vector of ICD-10-CM coded fields
SEARCH_COLS   <- c("PRIM_DX",paste0("DX", 2:10), paste0("ECODE", 1:5))
```

Base R

```
# Build ICD matrix and standardize missing to ""
X <- as.matrix(df[SEARCH_COLS])
X[is.na(X)] <- ""

# Build hits matrix
hits <- matrix(grepl(REGEX_INDICATOR, X, perl = TRUE), nrow = nrow(X))

# store first matching code & position found
INDICATOR <- as.integer(rowSums(hits) > 0L)
INDICATOR_POSITION <- ifelse(INDICATOR> 0, max.col(hits, ties.method = "first"), NA_integer_)
CODE_INDICATOR <- rep(NA_character_, nrow(X))
idx <- which(INDICATOR == 1L)
if (length(idx)) {
  CODE_INDICATOR[idx] <- X[cbind(idx, INDICATOR_POSITION[idx])]
}
# Add variables into df
df$INDICATOR <- INDICATOR
df$ INDICATOR_POSITION <- INDICATOR_POSITION
df$ CODE_INDICATOR <- CODE_INDICATOR
```

```
## any mention analysis
df_any_mention <- df[!is.na(df$INDICATOR_POSITION) & df$INDICATOR_POSITION > 0L, ]
## principal/first-listed analysis
df_primary_only <- df[!is.na(df$INDICATOR_POSITION) & df$INDICATOR_POSITION == 1L, ]
```

Tidyverse

```
library(dplyr)
library(stringr)

df1 <- df %>% mutate(
   # Build ICD matrix and standardize missing to ""
   .X = as.matrix(pick(all_of(SEARCH_COLS))),
   .X = ifelse(is.na(.X), "", .X),

# Build hits matrix
   .hits = {
    X0 <- ifelse(is.na(.X), "", .X)
    matrix(str_detect(X0, REGEX_INDICATOR), nrow = nrow(X0))},

# store first matching code & position found
   INDICATOR= as.integer(rowSums(.hits) > 0L),
   INDICATOR_POSITION = if_else(INDICATOR == 1L, max.col(.hits, ties.method = "first"),
NA_integer_),
   CODE_INDICATOR = {
    X0 <- .X
    X0[is.na(X0)] <- ""
    out <- rep(NA_character_, n())
    idx <- which(INDICATOR == 1L)
    if (length(idx)) out[idx] <- X0[cbind(idx, INDICATOR_POSITION[idx])]
    out}
  ) %>% select(-.X, -.hits)

# any mention analysis
df_any_mention <- df1 %>%
  filter(INDICATOR_POSITION > 0)
# principal/first-listed analysis
df_primary_only <- df1 %>%
  filter(INDICATOR_POSITION == 1)
```

R Example for ICD-10

```
# Create regular expressions
REGEX_UCOD <- "^X[46][0-4]|^X85|^Y1[0-4]"   # UCOD example
REGEX_MCOD <- "^T40[0-46]"                  # MCOD example
REGEX_TEXT <- "(OVER\\s?DOSED?|TOXICITY|POISON)"
```

```
# Create character vector of ICD-10 coded fields (UCOD first, then MCOD fields)
SEARCH_COLS <- c("UCOD", paste0("RAXIS", 1:30))
# Create character vector of text fields
TEXT_COLS  <- c("DCODL", "DCODL2", "DINJCAUSE")
```

Base R

```
# Build ICD matrix and standardize missing to ""
X <- as.matrix(df[SEARCH_COLS])
X[is.na(X)] <- ""

# Flag UCOD subset
UCOD_INDICATOR <- grepl(REGEX_UCOD, X[, 1, drop = TRUE], perl = TRUE)

# Build MCOD hits matrix
hits <- if (ncol(X) > 1L) {
  matrix(grepl(REGEX_MCOD, X[, -1, drop = FALSE], perl = TRUE), nrow = nrow(X))
} else {
  matrix(FALSE, nrow = nrow(X), ncol = 0)
}

# store first MCOD absolute position (offset +1) & matching code
MCOD_INDICATOR <- as.integer(rowSums(hits) > 0L)
MCOD_POSITION <- ifelse(MCOD_INDICATOR> 0L, 1L + max.col(hits, ties.method = "first"), NA_integer_)
MCOD_MATCH <- rep(NA_character_, nrow(X))
idx <- which(MCOD_INDICATOR== 1L)
if (length(idx)) {
MCOD_MATCH[idx] <- X[cbind(idx, MCOD_POSITION[idx])]
}

# Build text matrix and standardize missing to ""
T <- as.matrix(df[TEXT_COLS])
T[is.na(T)] <- ""

# Build text hits matrix
t_hits <- matrix(grepl(REGEX_TEXT, T, perl = TRUE, ignore.case = TRUE), nrow = nrow(T))

# store first text match position & matched word/term
TEXT_POSITION <- ifelse(rowSums(t_hits) > 0L, max.col(t_hits, ties.method = "first"), NA_integer_)
TEXT_MATCH <- rep(NA_character_, nrow(T))
idx <- which(!is.na(TEXT_POSITION))
if (length(idx)) {
txt <- T[cbind(idx, TEXT_POSITION[idx])]
m <- regexpr(REGEX_TEXT, txt, perl = TRUE, ignore.case = TRUE)
TEXT_MATCH[idx] <- ifelse(m > 0L, substr(txt, m, m + attr(m, "match.length") - 1L), NA_character_)
}
```

```
# Add variables into df
    df$UCOD_INDICATOR <- as.integer(UCOD_INDICATOR)
    df$MCOD_INDICATOR<- MCOD_INDICATOR
    df$MCOD_POSITION<- MCOD_POSITION
    df$MCOD_MATCH <- MCOD_MATCH
    df$TEXT_POSITION <- TEXT_POSITION
    df$TEXT_MATCH    <- TEXT_MATCH

    ## UCOD analysis, regardless of MCOD presence
    df_ucod <- df[df$UCOD_INDICATOR== 1L, ]

    ## UCOD/MCOD analysis
    df_ucod_mcod <- df[df$UCOD_INDICATOR== 1L & !is.na(df$MCOD_POSITION) & df$MCOD_POSITION
    > 0L, ]

    ## Explore records NOT included in UCOD subset BUT with an MCOD match found
    df_mcod_outside <- df[df$UCOD_INDICATOR!= 1L & !is.na(df$MCOD_POSITION) &
    df$MCOD_POSITION > 0L, ]

    ## Explore records NOT included in UCOD subset BUT with a text match found
    df_text_outside <- df[df$UCOD_INDICATOR!= 1L & !is.na(df$TEXT_POSITION) & df$TEXT_POSITION > 0L,
    ]
```

Tidyverse

```
    library(dplyr)
    library(stringr)
    df1 <- df %>% mutate(
      # Build ICD matrix and standardize missing to ""
      .X = as.matrix(pick(all_of(SEARCH_COLS))),
      .X = ifelse(is.na(.X), "", .X),

      # Flag UCOD subset
      UCOD_INDICATOR = as.integer(str_detect(ifelse(is.na(.X[, 1]), "", .X[, 1]), REGEX_UCOD)),

      # Build MCOD hits matrix
      .hits = if (ncol(.X) > 1) {
        X0 <- ifelse(is.na(.X[, -1, drop = FALSE]), "", .X[, -1, drop = FALSE])
        matrix(str_detect(X0, REGEX_MCOD), nrow = nrow(.X))
      } else {
        matrix(FALSE, nrow = nrow(.X), ncol = 0)
      },

      # store first MCOD match & absolute position (offset +1) & matching code
      MCOD_INDICATOR= as.integer(rowSums(.hits) > 0L),
      MCOD_POSITION= if_else(MCOD_INDICATOR== 1L, 1L + max.col(.hits, ties.method = "first"),
    NA_integer_),
      MCOD_MATCH = {
       X0 <- .X
       X0[is.na(X0)] <- ""
       out <- rep(NA_character_, n())
```

```
  idx <- which(MCOD_INDICATOR== 1L)
  if (length(idx)) out[idx] <- X0[cbind(idx, MCOD_POSITION[idx])]
  out
 },

# Build text matrix and standardize missing to ""
 .T = as.matrix(pick(all_of(TEXT_COLS))),
 .T = ifelse(is.na(.T), "", .T),

 # Build text hits matrix
 .t_hits = matrix(str_detect(.T, regex(REGEX_TEXT, ignore_case = TRUE)),
                  nrow = nrow(.T)),

# store first text match position & matched word/term
 TEXT_POSITION = if_else(
  rowSums(.t_hits) > 0L,
  as.integer(max.col(.t_hits, ties.method = "first")),
  NA_integer_
 ),
 TEXT_MATCH = {
  out <- rep(NA_character_, n())
  idx <- which(!is.na(TEXT_POSITION))
  if (length(idx)) {
   txt <- .T[cbind(idx, TEXT_POSITION[idx])]
   out[idx] <- str_match(txt, regex(REGEX_TEXT, ignore_case = TRUE))[, 2]
  }
  out
 }) %>%
select(-.X, -.hits, -.T, -.t_hits)

## UCOD analysis, regardless of MCOD presence
df_ucod <- df1 %>%
 filter(UCOD_INDICATOR== 1L)

## UCOD/MCOD analysis
df_ucod_mcod <- df1 %>%
 filter(UCOD_INDICATOR== 1L & MCOD_POSITION> 0L)

## Explore records NOT included in UCOD subset BUT with an MCOD match found
df_mcod_outside <- df1 %>%
 filter(UCOD_INDICATOR!= 1L & MCOD_POSITION> 0L)

## Explore records NOT included in UCOD subset BUT with a text match found
df_text_outside <- df1 %>%
 filter(UCOD_INDICATOR!= 1L & TEXT_POSITION > 0L)
```

Alcohol Poisoning Surveillance

Although alcohol consumption is legal in the U.S. for those 21 and older, it is still a leading preventable cause of death. About 178,000 people die from excessive alcohol use each year and research has shown that there is no level of safe or healthy alcohol use.[25,26] These deaths occur from both drinking alcohol over time resulting in a chronic health condition or drinking too much on one occasion and experiencing an acute injury event.

CDC Alcohol-Related Disease Impact Application

The CDC Alcohol-Related Disease Impact (ARDI) application "provides national and state estimates of alcohol-related health impacts, including deaths and years of potential life lost." These estimates are calculated using U.S. death certificate data with the primary cause of death listed as one of 58 alcohol-related causes. Some of these 58 causes of death, like alcohol poisoning, are 100% attributable to alcohol. Other causes of death, like cancer or stroke, are considered partly related to alcohol. Estimates of alcohol-attributable death are calculated using population estimates of the total proportion of deaths for various causes that are attributable to alcohol use. These proportions, called alcohol-attributable fractions (AAFs), are either measured directly or calculated indirectly using current scientific literature.[27]

ARDI is intended to help state health departments assess impacts and inform evidence-based public health strategies to prevent health outcomes associated with excessive alcohol consumption. State health departments, state substance use agencies, academic researchers, and organizations involved with prevention and treatment of excessive alcohol consumption are among the intended audiences for ARDI.[27]

Given the scope of this guidance document, the following sections focus on acute alcohol poisoning surveillance. When conducting and disseminating alcohol poisoning surveillance, be mindful that alcohol poisoning is only one of many alcohol-attributable causes of mortality and morbidity.

Conceptual Definition for Alcohol Poisoning

Below is the ARDI application's definition for alcohol poisoning:

> **Alcohol Poisoning:** A serious health condition resulting from consuming a toxic amount of alcohol faster than the liver can process it, which impairs vital life-support functions like breathing, heart rate, and temperature control, potentially leading to brain damage or death.

[25] Centers for Disease Control and Prevention. (n.d.). Alcohol facts and statistics [Web page]. Retrieved December 16, 2025, from https://www.cdc.gov/alcohol/facts-stats/index.html
[26] US Alcohol Policy Alliance. (n.d.). Alcohol consumption guidelines for the American people [PDF]. Retrieved December 16, 2025, from https://drive.google.com/file/d/1Dy0NSyvhDyrB0zMU5tZB3ReouSUi4ulH/view
[27] Centers for Disease Control and Prevention. 2024 Alcohol Related Disease Impact (ARDI) Application website. www.cdc.gov/ARDI. Accessed December 16, 2025.

Table 7. ICD Codes for Alcohol Poisoning Deaths

Cause	ICD-9	ICD-10
Alcohol poisoning (unintentional or undetermined intent)	980.0, 980.1, E860.0, E860.1, E860.2, E860.9	X45, Y15
Suicide by and exposure to alcohol	No ICD-9 code available, the condition is new to ICD-10	X65

Alcohol Poisoning Morbidity Surveillance

Surveillance of alcohol-related morbidity is not limited to data from EDs, it can also include data from emergency medical services (EMS) and hospitalizations. Any of these sources, like mortality surveillance, could be used to monitor alcohol poisonings – a subset of the larger impact of alcohol on these settings. Surveillance case definitions often utilize diagnosis codes, keywords, or a combination of codes and keywords to identify EMS encounters, ED visits, or hospitalizations related to acute intoxication. These incidents may not be true poisonings; rather, they may be other injury events that occurred while the individuals were intoxicated. Some jurisdictions may also wish to track events related to alcohol use disorder and dependence or the broadest category of any alcohol-related event (acute intoxication, abuse and dependence, and chronic alcohol-related conditions like pancreatitis). There are currently no nationally agreed upon morbidity case definitions and no morbidity tool like ARDI with estimates of alcohol-attributable fractions for these events. This means that definitions should be reviewed and adapted by jurisdictions to their specific surveillance activities and any definition would be missing partially alcohol-attributable causes, which is therefore an underestimate of alcohol's impacts.

While standard national case definitions are not available, a CDC publication on ED visit trends related to acute alcohol consumption included a supplement with a list of discharge diagnosis codes. This list is often used by alcohol epidemiologists as a starting point for developing their case definitions. Refer to **Appendix D** for the full list. Additionally, see the CSTE Alcohol Subcommittee's How-to-Guide with a list of ICD-10-CM codes to include when conducting surveillance on hospitalizations related to alcohol.

Additional Considerations for Alcohol Poisoning Surveillance

Language: When conducting surveillance of alcohol's public health impacts, some events may be referred to as alcohol-attributable, alcohol-related, or alcohol-involved. These categories are nuanced, and their usage may vary across jurisdictions. When deciding on the appropriate language, consider whether you are presenting information about deaths or nonfatal events, population- or individual-level events, and events entirely or only partially due to alcohol.

Alcohol and other injuries: Some jurisdictions may wish to further analyze drug overdose deaths with opioids, cocaine, and other drugs that also include alcohol. Alcohol is a depressant, and when used in combination with other substances it can increase a person's risk of overdose. Death certificates, ME/C reports, and/or your jurisdiction's State Unintentional Drug Overdose Reporting

System (SUDORS) data are useful sources for understanding overdose deaths which also involved alcohol.

Though not necessarily an alcohol poisoning event, jurisdictions may wish to conduct surveillance on alcohol involvement in other injuries; for example, alcohol-involved motor vehicle crashes. An individual may not be intoxicated to the point of alcohol poisoning to have their driving impaired.

Alcohol testing: Testing rates of blood alcohol concentration (BAC) vary across jurisdictions and across settings. In some cases, state-level jurisdictions could collaborate with their medical examiner/coroner (ME/C) offices to understand how alcohol is captured on death certificates (i.e., whether alcohol poisoning occurred or alcohol was involved in a poisoning-related death). Understanding how BAC is tested and coded in hospital systems may also help account for any potential biases in estimates of alcohol-involved events. Interpretation of postmortem BAC results is further complicated by endogenous alcohol production during body decomposition, which can lead to elevated ethanol levels unrelated to antemortem alcohol consumption. Overall, understanding the validity and limitations of BAC readings is critical for proper surveillance interpretation.

Framing: When conducting surveillance on alcohol poisonings, and other alcohol-related health outcomes, it's important to remember that alcohol is a legal substance for those 21 and older. This means that while surveillance of other poisonings may look at events among youth under 18, you may wish to expand the youth category for alcohol surveillance to those under 21 ("underage drinking").

Some jurisdictions may include alcohol in a Good Samaritan law offering legal protections for the underage, intoxicated person and the individual who contacts emergency medical providers to prevent an alcohol poisoning. Understanding the protections your jurisdiction has in place and communicating that alongside surveillance data can help encourage people to seek help in the event of an alcohol poisoning.

Finally, remember to put alcohol poisonings in context with the additional alcohol-related health outcomes, both other acute events and chronic conditions. Sharing data on alcohol poisonings without a reminder of those additional impacts underrepresents the larger public health impacts of this substance.

Additional Resources for Alcohol Poisoning Surveillance

- ARDI ICD Codes | Alcohol and Public Health | CDC
- CSTE Data Directory for Alcohol-Related Public Health Surveillance
- Funding States to Prevent Excessive Alcohol Use | Alcohol Use | CDC
- How-to Guide (2020) Developmental Indicator: Hospitalizations Related to Alcohol in the United States Using ICD-10-CM Codes
- National Violent Death Reporting System | NVDRS | CDC
- Trends in emergency department visits related to acute alcohol consumption before and during the COVID-19 pandemic in the United States, 2018–2020 - PMC

Environmental Poisonings

One recommendation from the ISW7 was to develop a set of ICD-10 codes that define "the effects of chronic nondrug poisoning," particularly for environmental exposures. While environmental poisonings are not new to federal, state, and local jurisdictions, they were not fully covered by the ISW7. The PSW recommended including environmental poisonings in this guidance to capture the full picture of poisoning surveillance.

Defining Environmental Poisoning

Environmental poisonings are considered poisonings caused by exposure to environmental toxins that typically are out of an individual's control. Sources of environmental poisoning include biological substances, carbon monoxide, chemicals, plants, and animals. Exposures can be considered environmental, occupational, or both. Environmental poisonings can result from natural sources like wildfires and harmful algal blooms (HABs) or from human-activities including agricultural runoff, air pollution from industrial facilities, and the use of lead-based paint. Routes of exposure include inhalation, ingestion, and skin absorption. The following sections provide surveillance considerations for common types of environmental poisoning. Appendices B and C also include ICD-10 and ICD-10-CM matrices for these sources of environmental poisoning.

Carbon Monoxide

CDC defines carbon monoxide as "an odorless, colorless gas produced during combustion of carbon-based fuels (e.g., charcoal, gasoline, propane)."[28] The 2021 CSTE position statement, "Standardized Surveillance for Carbon Monoxide Poisoning," provides detailed guidance on recommended data sources for carbon monoxide poisoning surveillance, case and exposure criteria, and case definitions and classifications.[29]

Examples of Surveillance

- The CDC National Environmental Public Health Tracking Network (Tracking Network) collects mortality and morbidity data for unintentional carbon monoxide poisoning.[30] Note that these data are limited to healthcare utilization related to carbon monoxide exposure (e.g., ED visits and hospitalizations).

[28] Centers for Disease Control and Prevention. (n.d.). Poisonings, envenomations, and toxic exposures during travel [Web page]. In CDC Yellow Book: Health information for international travel. Retrieved December 16, 2025, from https://www.cdc.gov/yellow-book/hcp/environmental-hazards-risks/poisonings-envenomations-and-toxic-exposures-during-travel.html

[29] Council of State and Territorial Epidemiologists. (2021). Standardized case definition for carbon monoxide poisoning [PDF]. Retrieved December 16, 2025, from https://cdn.ymaws.com/www.cste.org/resource/resmgr/2018_position_statements/18-EH-01_Updated_Apr_2021.pdf

[30] Centers for Disease Control and Prevention. (n.d.). Carbon monoxide poisoning [Web page]. Environmental Public Health Tracking. Retrieved December 16, 2025, from https://www.cdc.gov/environmental-health-tracking/php/data-research/carbon-monoxide-poisoning.html

- The Michigan Department of Health and Human Services (MDHHS) publishes an annual report on unintentional carbon monoxide poisoning in Michigan, which also provides detailed information on surveillance methods.[31] The MDHHS carbon monoxide poisoning surveillance system extracts data from medical records, death certificates, emergency medical services, and Poison Control Center calls into a standardized case reporting form that is housed in the Michigan Disease Surveillance System (MDSS). MDSS cases are then categorized as Confirmed, Probable, Suspect, or Not a Case. After identifying potential cases, MDHHS applies the standardized national case definition.

Table 8. ICD-10-CM Codes for Nonfatal Carbon Monoxide Poisoning

Description	External Cause – Unintentional	External Cause – Self Harm	External Cause – Assault	External Cause – Undetermined	All Code Types
Carbon Monoxide	T58 with intent character of 1 and 7th character of A or missing	Any mention of T58 with intent character of 2 and 7th character of A or missing	T58 with intent character of 3 and 7th character of A or missing	T58 with intent character of 4 and 7th character of A or missing	T58

Table 9. ICD-10 Codes for Fatal Carbon Monoxide Poisoning

Description	External Cause: Unintentional	External Cause: Suicide	External Cause: Homicide	External Cause: Legal Intervention or Operation of War	External Cause: Undetermined	All Code Types	MCOD Codes
Other gases, fumes, and vapors (including carbon monoxide)	X47	X67	X88	X35.2	Y17	X47, X67, X88, Y35.2, Y17	T58
Carbon monoxide	X47.0-X47.4	X67.0-X67.4	X88.0-X88.4		Y17.0-Y17.4	X47.0-X47.4, X67.0-X67.4, X88.0-X88.4, Y17.0-Y17.4	T58

Related Data Sources in Appendix A

Refer to Appendix A for more details on these surveillance systems and data sources that include carbon monoxide poisoning data:

[31] Michigan Department of Health and Human Services. (2023). Annual report on carbon monoxide poisoning in Michigan [PDF]. Retrieved December 16, 2025, from https://www.michigan.gov/mdhhs/-/media/Project/Websites/mdhhs/Safety-and-Injury-Prevention/Environmental-Health/Carbon-Monoxide/Documents/2023-Annual-Report-on-Carbon-Monoxide-Poisoning-in-Michigan.pdf

- CDC's National Violent Death Reporting System (NVDRS)
- Census of Fatal Occupational Injuries
- Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)
- National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP)

Pesticides

Common routes of non-occupational pesticide exposure include residue on foods, indoor pest control, lawn and garden treatments, and flea/tick products for pets. Occupational exposures pose a higher risk for farm workers, pesticide applicators, and greenhouse workers. Agricultural runoff and contaminated drinking water can also contribute to exposure. Health risks from pesticide exposure depend on how dangerous the pesticide is and the amount, duration, and route of pesticide exposure. Pesticides are categorized across the following functional classes:

- Disinfectants
- Fumigants
- Fungicides
- Herbicides
- Insecticides
- Repellents
- Rodenticides

Examples of Surveillance

- America's Poison Centers works with poison centers throughout the U.S. to collect pesticide exposure data. These data are then displayed in the National Poison Data System (NPDS). The Tracking Network uses data from America's Poison Centers and NPDS for its national portal. Specifically, the Tracking Network's "Reported Pesticide Exposures" indicator captures the annual number and rate of pesticide exposures that are reported to poison control centers.[32]
- The Pesticide Illness and Injury Surveillance Program – funding for state health departments via cooperative agreements from the National Institute for Occupational Safety and Health (NIOSH) and EPA – was created to protect workers from occupational pesticide exposure. This program uses data from NPDS and the Sentinel Event Notification System for Occupational Risk (SENSOR) - Pesticides Program (refer to Appendix A for more details on SENSOR).

ICD Code(s)

The following ICD-10 and ICD-10-CM codes are used for pesticide poisoning surveillance:

- ICD-10-CM (Nonfatal Poisonings)
    - Toxic effect of unspecified pesticide, accidental (unintentional), initial encounter: T60.91XA

[32] Centers for Disease Control and Prevention. (n.d.). Pesticide exposure [Web page]. Environmental Public Health Tracking. Retrieved December 16, 2025, from https://www.cdc.gov/environmental-health-tracking/php/data-research/pesticide-exposure.html

    - Toxic effect of pesticides: T60.0 through T60.4, T60.8, and T60.9
- ICD-10 (Fatal Poisonings)
    - External Cause – Unintentional: X48
    - External Cause – Suicide: X68
    - External Cause – Homicide: X87
    - External Cause – Undetermined: Y18
    - MCOD (this code is considered for poisoning deaths): T60

Harmful Algal and Cyanobacterial Blooms

CDC defines HABs as "the rapid growth of algae or cyanobacteria in water that can harm people, animals, or the environment."[33] HABs can produce toxins, become too dense, use oxygen in water, and/or release harmful gases which can then impact human health. Cyanobacteria, dinoflagellates, and diatoms most often cause HABs that can cause illness among people. Individuals are exposed to HABs or HAB toxins when swimming or wading in contaminated water, eating contaminated fish or shellfish, or using contaminated drinking water.[34]

Examples of Surveillance

- CDC's One Health Harmful Algal Bloom System (OHHABS) was launched in 2016 for HAB surveillance. This system collects data on HAB events that occur in fresh, brackish, or salt waters.[35]
- The National Centers for Coastal Ocean Science (NCCOS) developed the Algal Bloom Monitoring System that provides near real-time data for monitoring and quantifying HABs in coastal and lake regions of the U.S.[36]
- NPDS captures data on self-reported HAB exposure.[34]

ICD Code(s)

The following ICD-10 and ICD-10-CM codes are used for HAB poisoning surveillance. (Note: These codes may not be included in the broader ICD matrices for poisoning surveillance in this report, however they can be used for surveillance beyond common poisoning codes).

- ICD-10-CM
    - Toxic effect of harmful algae and algae toxins: T65.82
- ICD-10
    - Contact with and (suspected) exposure to harmful algae and algae toxins: Z77.121

[33] Centers for Disease Control and Prevention. (n.d.). About harmful algal blooms [Web page]. Retrieved December 16, 2025, from https://www.cdc.gov/harmful-algal-blooms/about/index.html
[34] Lavery AM, Kieszak SM, Law R, Bronstein AC, Funk AR, Banerji S, Brown K, Sollee DR, Backer LC. Harmful Algal Bloom Exposures Self-reported to Poison Centers in the United States, May-October 2019. Public Health Rep. 2023 Nov-Dec;138(6):865-869. doi: 10.1177/00333549221146654. Epub 2023 Jan 23. Erratum in: Public Health Rep. 2023 Nov-Dec;138(6):984. doi: 10.1177/00333549231187885. PMID: 36683453; PMCID: PMC10576485.
[35] Centers for Disease Control and Prevention. (n.d.). One Health Harmful Algal Bloom System (OHHABS) data [Web page]. Retrieved December 16, 2025, from https://www.cdc.gov/ohhabs/data/index.html
[36] National Oceanic and Atmospheric Administration. (n.d.). Harmful algal bloom monitoring system [Web page]. Retrieved December 16, 2025, from https://coastalscience.noaa.gov/science-areas/habs/hab-monitoring-system/

Wildfire Smoke

Wildfire smoke is defined by CDC as "a complex mixture of gases and particles from burning vegetation and other materials."[37] Several agencies play a role in wildfire smoke exposure surveillance. For example, NIOSH focuses on worker protection, while state health agencies may monitor the potential health impacts of smoke exposure through syndromic surveillance. Additionally, EPA monitors ambient air quality to inform public protection efforts. Wildfire smoke includes carbon monoxide, particulate matter, and other toxic compounds that present major health hazards, especially for the following vulnerable populations[38]:

- Outdoor workers
- People with chronic conditions
- People who are pregnant
- Children
- First responders

Examples of Surveillance

- Syndromic surveillance can provide timely data about acute health impacts from natural disasters, including wildfires. However, in some cases there may be data limitations due to "inconsistent coding by clinicians of terms related to smoke or fire exposure."[39] As the acute and chronic health impacts of wildfire smoke are more understood, poisoning surveillance systems at the national, state, and local levels can evolve to better estimate wildfire-associated health impacts.
- The EPA Wildfire Smoke Air Monitoring Response Technology is intended to strengthen air monitoring surveillance in areas that experience wildfire smoke but have data coverage gaps.[40]
- The Tracking Network collects national- and state-level data on wildfires. Specifically, "dynamic predictions of surface smoke and static measures of vulnerability."[41]

[37] Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. (2024, October 30). Wildland fire smoke. U.S. Department of Health and Human Services. https://www.cdc.gov/niosh/outdoor-workers/about/wildfire-smoke.html
[38] Centers for Disease Control and Prevention. (2024, April 19). How wildfire smoke affects your body. U.S. Department of Health and Human Services. https://www.cdc.gov/wildfires/risk-factors/index.html
[39] Kajita E, Chang K, de Leon V, et al. *Notes from the Field:* Emergency Department Use During the Los Angeles County Wildfires, January 2025. MMWR Morb Mortal Wkly Rep 2025;74:40–42. DOI: http://dx.doi.org/10.15585/mmwr.mm7403a2.
[40] United States Environmental Protection Agency. (2024, August 6). Wildfire smoke air monitoring response technology (WSMART). https://www.epa.gov/air-sensor-toolbox/wildfire-smoke-air-monitoring-response-technology-wsmart
[41] Centers for Disease Control and Prevention. (2024, July 15). Wildfire smoke and health tracking indicators. U.S. Department of Health and Human Services. https://ephtracking.cdc.gov/indicatorPages?selectedContentAreaAbbreviation=11&selectedIndicatorId=138&selectedMeasureId=

ICD Code(s)

The ICD-10-CM code **X01.1** for "exposure to smoke in uncontrolled fire, not in building or structure," includes exposure to *wildfire* smoke.[42] There are additional ICD-10-CM codes for other sources of smoke exposure. (Note: These codes may not be included in the broader ICD matrices for poisoning surveillance in this report, however they can be used for surveillance beyond common poisoning codes).

- ICD-10-CM
    - Exposure to controlled fire, not in building or structure (includes exposure to bonfire, campfire, and trash fire)[43]: X03
    - Toxic effect of smoke (excludes effect of cigarette, tobacco smoke)[42]: T59.81
    - Respiratory conditions due to smoke inhalation (excludes smoke inhalation due to chemicals, gases, fumes, and vapors)[44]: J70.5
- ICD-10
    - Exposure to fire and flames: X00-X09
        - Exposure to fire and flames, undetermined whether accidental or caused by intent: X00
        - Exposure to fire and flames, accidental: X01
        - Exposure to fire and flames, caused by intent: X02
    - Exposure to smoke and fumes resulting from natural disasters like wildfires: X40-X49

Air Pollution

Air pollution in the U.S. continues to threaten public health and is associated with various health outcomes including asthma, pneumonia, and bronchitis. The EPA regulates the following air pollutants by using "human health-based and environmentally-based criteria."[45]

- **Carbon monoxide** – A colorless, nonirritating, odorless, and tasteless gas found in both outdoor and indoor air.[46]
- **Lead** – A metal resulting from many human activities including burning fossil fuels, mining, and manufacturing.[47]
- **Nitrogen oxides** – A mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant nitrogen oxides are nitric oxide and nitrogen dioxide.[48]

[42] ICD10Data.com. (2025). X01.1 – Exposure to controlled fire in building or structure. https://www.icd10data.com/ICD10CM/Codes/V00-Y99/X00-X08/X01-/X01.1
[43] ICD10Data.com. (2025). X03 – Exposure to controlled fire, not in building or structure. https://www.icd10data.com/ICD10CM/Codes/V00-Y99/X00-X08/X03-/X03
[44] ICD10Data.com. (2025). J70.5 – Respiratory conditions due to smoke inhalation. https://www.icd10data.com/ICD10CM/Codes/J00-J99/J60-J70/J70-/J70.5
[45] Centers for Disease Control and Prevention. (2024, August 28). Air pollutants and health. U.S. Department of Health and Human Services. https://www.cdc.gov/air-quality/pollutants/index.html
[46] Centers for Disease Control and Prevention. (2024, September 12). Wildfire smoke (ToxFAQs™). U.S. Department of Health and Human Services. https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=253
[47] Centers for Disease Control and Prevention. (2024, September 12). Lead (ToxFAQs™). U.S. Department of Health and Human Services. https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=22
[48] Centers for Disease Control and Prevention. (2024, September 12). Nitrogen Oxides (ToxFAQs™). U.S. Department of Health and Human Services. https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=69

- **Ozone** – Ground-level ozone, a toxic gas, can trigger various health problems.[49]
- **Particulate matter** – Includes particles of dust, dirt, soot, smoke, and drops of liquid in the air.
- **Sulfur dioxide** – A colorless gas resulting from activities such as the burning of coal and oil at power plants or from copper smelting.[50]

Examples of Surveillance

- CDC and other federal agencies collaborate to collect and report air quality data via the Tracking Network. The Tracking Network captures data on ozone concentration, particulate matter concentration, air toxics indicators, forecasted air quality indicators, and wildfires indicators.[51]
- The EPA also collects air data through outdoor monitors across the U.S. These data are shared via AirNow, which tracks air quality levels at local, state, and national levels.[52]

ICD Code(s)

Refer to the carbon monoxide section for ICD codes related to carbon monoxide exposure. Additional ICD-10-CM codes related to air pollution are provided below. (Note: These codes may not be included in the broader ICD matrices for poisoning surveillance in this report, however they can be used for surveillance beyond common poisoning codes).

Description	ICD-10-CM Code
Contact with and (suspected) exposure to air pollution[53]	Z77.110
Toxic effect of nitrogen oxides, accidental (unintentional), includes injury, poisoning and certain other consequences of external causes[54]	T59.0X1
Toxic effect of sulfur dioxide, accidental (unintentional)[55]	T59.1X1

Lead

Lead is a naturally occurring metal which can cause a host of negative health impacts, including neurological, cognitive, cardiovascular, and reproductive. Lead poisoning among children continues to be a major public health issue due to their hand-to-mouth behavior.[56] People are at risk for lead

[49] United States Environmental Protection Agency. (2024, October 15). Ground-level ozone pollution. https://www.epa.gov/ground-level-ozone-pollution
[50] Centers for Disease Control and Prevention. (2024, September 12). *Sulfur Dioxide (ToxFAQs™)*. U.S. Department of Health and Human Services. https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=46
[51] Centers for Disease Control and Prevention. (2024, September 30). *Outdoor air quality and health*. U.S. Department of Health and Human Services. https://www.cdc.gov/environmental-health-tracking/php/data-research/air-quality-outdoor.html
[52] United States Environmental Protection Agency. (2024, November 20). AirNow. https://www.airnow.gov/?city=false&country=false
[53] ICD10Data.com. (2025). Z77.110 – Contact with and (suspected) exposure to environmental pollution and hazards. https://www.icd10data.com/ICD10CM/Codes/Z00-Z99/Z77-Z99/Z77-/Z77.110
[54] ICD10Data.com. (2025). T59.0X1 – Toxic effect of carbon monoxide, accidental (unintentional). https://www.icd10data.com/ICD10CM/Codes/S00-T88/T51-T65/T59-/T59.0X1
[55] ICD10Data.com. (2025). T59.1X1 – Toxic effect of other specified carbon monoxide derivatives, accidental (unintentional). https://www.icd10data.com/ICD10CM/Codes/S00-T88/T51-T65/T59-/T59.1X1
[56] Centers for Disease Control and Prevention. (2024, October 10). About lead poisoning prevention. U.S. Department of Health and Human Services. https://www.cdc.gov/lead-prevention/about/index.html

exposure from paint, water, soil, imported items, and industrial sources, and children can be exposed to lead from parents and caregivers through "take-home" or secondary exposure routes. The effects of lead poisoning can be permanent and disabling. Blood lead tests are used to determine whether children have lead poisoning, since they may not have visible signs or symptoms.

Examples of Surveillance

- CDC collects blood lead level data in the U.S. through the Childhood Blood Lead Surveillance (CBLS) system and Adult Blood Lead Epidemiology and Surveillance (ABLES) program.
    - The National Center for Environmental Health supports state and local public health departments with reporting childhood blood lead surveillance data to CDC. State public health departments often collect blood lead level data from clinical laboratories and health care providers.[57]
    - Blood lead level data for adults over 16 years of age, typically related to occupational exposures, are reported by state and/or labor agencies on a *voluntary* basis to ABLES (refer to Appendix A for more details on ABLES).

ICD Code(s)

The following ICD codes are used for lead poisoning surveillance (Note: These codes may not be included in the broader ICD matrices for poisoning surveillance in this report; however, they can be used for surveillance beyond common poisoning codes).

- ICD-10-CM
    - Abnormal lead level in blood[58]: R78.71
- ICD-10
    - Toxic effects of lead and its compounds: T56.0

Novel Outbreak Surveillance and Response

This section outlines general considerations and steps to identify and respond to poisoning outbreaks from new and emerging sources (e.g., drugs, environment, nondrug substances). Note that updated guidance on tracking and responding to an outbreak of other, more routine substances, is provided in CSTE's Overdose Anomaly Toolkit.

There are many resources that give detailed instructions for conducting an outbreak investigation and response (e.g., CDC's Field Epidemiology Manual and FEMA's National Incident Command System Training). The guidance outlined in this section is intended to complement traditional guides, not replace the core principles of outbreak investigations. This section focuses on the investigation of an outbreak (or unusual increase in negative health outcomes) involving an emerging substance.

[57] Centers for Disease Control and Prevention. (2024, October 10). Blood lead surveillance data. U.S. Department of Health and Human Services. https://www.cdc.gov/lead-prevention/php/data/blood-lead-surveillance.html
[58] ICD10Data.com. (2025). R78.71 – Blood lead level finding. https://www.icd10data.com/ICD10CM/Codes/R00-R99/R70-R79/R78-/R78.71

Step 1. Identifying an Outbreak

There are many ways that a potential emerging substance outbreak might come to your attention. The following scenarios are examples, not an exhaustive list, of emerging substance outbreaks.

- An epidemiologist, through **routine surveillance of poisoning events**, may notice an unusual increase in total cases (deaths, ED visits, EMS encounters, etc.). If upon further analysis, substances included in routine surveillance are not responsible for the increase, then this may indicate that a new substance is causing an uptick in poisoning events. An increase in more generic poisoning codes (i.e., T50.9: poisoning by, adverse effect of and underdosing of other and unspecified drugs, medicaments and biological substances) may also indicate an emerging substance.
- A news article, national or local, may alert you to a possible emerging substance outbreak. Setting up **news alerts** with relevant phrases can help bring these to your attention.
- **National alerts**, including notices of product recalls from the FDA or CDC's Health Alert Network (HAN), may alert you to a substance of concern. HAN alerts may go to your State Epidemiologist. You can sign up to receive HAN messages but note that you will receive all messages going out to the network, not just those related to poisoning events. Leadership may review these alerts and forward them to the appropriate subject matter experts.
- A question from a **key partner** about something in the field may prompt you to review the data to identify a possible emerging substance outbreak. Developing and maintaining partnerships across your jurisdiction, before an event occurs, is critical to ensure that you are alerted early on should an outbreak happen. Partners may include:
    - Drug checking programs – multiple samples begin showing the presence of a substance that did not previously occur in the drug market.
    - Harm reduction partners/syringe service programs – begin hearing from participants about new substances and/or new and unusual reactions after taking a product.
    - Poison Control Center – receiving an increase in similar calls.
    - ED providers – seeing an increase in ED visits with similar symptoms and/or similar substance involvement.
    - Medical examiners/coroners/toxicologists - begin identifying substances not often or ever seen in fatalities.
    - Communicable disease and/or syndromic surveillance epidemiologists – partners at medical centers may already be directly connected with epidemiologists working in your jurisdiction who focus on other topics.
    - Leadership in your agency – may receive questions from state legislators or other local decision makers who were notified of a concern by a constituent. In many instances, these notices are anecdotal and may just be a singular story and not indicative of an outbreak. Further investigation and analysis are needed to understand the true burden and determine if this is a novel substance outbreak.

Step 2. Reviewing Data Sources for Outbreak Cases

After you have been alerted to a possible novel substance outbreak, first decide how you will identify potential cases. Looking across multiple data sources is the best course of action, but you may wish to start with the source that originally alerted you to the potential outbreak. For example, if you were notified of an emerging substance by your medical examiner/coroner system, then understanding the death data might be a reasonable starting point for the investigation. Nonfatal data (ED visits, EMS encounters, Poison Center calls) are also a helpful place to start as they can serve as earlier indicators of a change. Establishing regular access to these data systems in non-urgent times is important to ensure that you are not trying to establish access during a potential outbreak.

Considerations for **nonfatal and fatal data sources**:

- Routine methods of surveillance may not be sufficient for identifying cases. If the increase is due to an emerging substance, there may not be an existing ICD-10-CM or ICD-10 code to use for identifying these cases. Cases may be assigned a less descriptive code or may be lumped in with another substance code.
- If you have access to free text fields like chief complaint, triage notes, or others, utilize them. These fields may be the best way to identify cases and understand the nature of these events.

As you work to identify cases and develop a case definition, looking to other jurisdictions for guidance may inform your process. The list below provides ways to connect with individuals for support:

- Check the National Syndromic Surveillance Program (NSSP)'s Knowledge Repository for case definitions built by other jurisdictions that may track similar emerging substances. Over the course of your investigation, you may make modifications to a case definition to better fit your jurisdiction's events, but this is a valuable resource to get started.
- Make a post on the appropriate CSTE Connect forum asking if other epidemiologists have experience tracking a similar substance. Even if no one has a case definition to share, you may find others who are hearing of similar increases in their jurisdiction, and you can collaborate on case definition development.
- Contact the chair of the appropriate CSTE subcommittee to ask if they can send a direct email to their members and/or give you an opportunity to discuss your investigation during a future subcommittee call. Consider contacting the Overdose, Alcohol, Cannabis, and/or Injury Subcommittees, as appropriate.
- For additional notes on developing a case definition refer to the CDC page on Outbreak and Case Definitions.

Step 3. Conducting Data Analysis

Consulting with experts from different fields throughout your investigation is critical. Experts in other fields may give insight into what questions to ask of the data in your analysis plan and may shed light on how to interpret the results of your analysis. You may wish to reach out to preventionists, toxicologists, medical providers, harm reductionists, and/or law enforcement partners.

The questions below are not an exhaustive list, but suggestions of ways to consider key circumstances when developing your analysis plan:

- **Who** is most impacted?
  - Review counts and rates of the health outcome (ED visits, EMS encounters, deaths) by demographics. Are there any disparities by age, sex, race, and/or ethnicity?
  - Consider stratifying cases by multiple variables in combination to determine whether a specific population is more at risk (e.g., are rates highest among White males, ages 13-17 years old?).
- **What** is causing the increase?
  - What product type is associated with the increase? Is the product purchased at a store, is it a street drug, or a prescription medicine? Is there a particular brand of concern?
  - Without comprehensive toxicology testing, you may not know from your data sources what specific substance is causing the increase in poisoning cases. Consider which substance class may be driving the negative health outcomes—is it the substance itself or an adulterant?
  - What is the method of consumption? Do you eat, drink, smoke, and/or inject the product?
  - Review ICD-10-CM codes (nonfatal data) and ICD-10 codes (fatal data) as well as free text fields for any reoccurring mentions of the substance and/or product.
- **Where** are cases occurring?
  - Review frequencies of events by location. This may be a comparison of regions, counties, cities, or even census tracts depending on your jurisdiction and the granularity of your data sources.
  - Reach out to neighboring jurisdictions to understand if this is a localized event or part of something at a larger geographical scale.
- **When** did cases occur?
  - Look at the number of cases by day/week/month/year. When was the first case? Are cases increasing, decreasing, or holding steady?
  - Develop an epi curve to track the distribution of cases over time.
- **Why** did this outbreak occur?
  - Use the results of your analysis and context from experts in other fields to piece together the cause of the outbreak.
  - If cases occurred on the same day, or same weekend, then did an event occur during that timeframe that may be connected to the outbreak?
  - If cases are more common among a particular demographic or place, then is a specific product more appealing or more available to that demographic or in that place?
  - Was there a "bad batch" of an existing product? Or is a new substance gaining popularity?
  - You may not definitively know the "why," but working towards an understanding will help inform your response efforts.

Step 4. Responding to an Outbreak

After determining that an unusual increase is occurring, connect with partners in your jurisdiction who are experienced in outbreak response. If you do not routinely respond to outbreaks, then lean on partners who respond to foodborne illness or communicable disease outbreaks. These partners may be the first to learn of a novel substance outbreak from federal partners (CDC or FDA) or local hospitals, as their point of contact if often the State Epidemiologist. Epidemiologists who regularly respond to outbreaks may also be a resource for requesting medical records, contacting providers for case follow-up, and accessing tools like REDCap (a secure web application for building surveys and collecting data, often used by CDC in investigations). Establishing and maintaining partnerships with epidemiologists across sectors can ensure that you are made aware of relevant outbreak events and contacted for your subject matter expertise.

Epi-Aid Investigations

The CDC can provide "rapid, generally onsite, technical assistance" through Epi-Aid investigations. These investigations are provided at no cost to states, Tribes, or localities that request federal assistance with investigations. In 2024, the National Center for Injury Prevention and Control (NCIPC) deployed Epi-Aid investigators to support overdose investigations in four jurisdictions. Through these investigations, Epidemic Intelligence Service (EIS) officers identified overdoses that were linked to new contaminants in illegal drug supplies, including xylazine and medetomidine.[59,60] They assessed community needs for overdose prevention and evaluated new opportunities to complement overdose surveillance. EIS officers worked with jurisdictions to develop guidance for clinicians when treating overdose patients and strategic plans to improve overdose prevention. In an outbreak response, jurisdictions should consider requesting Epi-Aid support for the following reasons:

- Unexpected or unexplained surges in nonfatal or fatal overdoses from an unknown substance.
- A series of individuals presenting to the ED with reports of novel drug use.
- A cluster of atypical illness among people who use opioids illicitly.
- Reports of illness due to a new drug.
- Need epidemiological data or laboratory analysis of environmental or biological specimens related to the cases described above.

According to the NCIPC, a local jurisdiction's public health official may contact NCIPC directly or via the EIS program (EpiAid@cdc.gov) to discuss technical assistance needs. Public health authorities who can request an Epi-Aid include state and territorial public health authorities, elected Tribal leaders of federally recognized Tribes, and federal agency officials.

[59] Kariisa M, O'Donnell J, Kumar S, Mattson CL, Goldberger BA. Illicitly Manufactured Fentanyl–Involved Overdose Deaths with Detected Xylazine — United States, January 2019–June 2022. MMWR Morb Mortal Wkly Rep 2023;72:721–727. DOI: http://dx.doi.org/10.15585/mmwr.mm7226a4.

[60] Centers for Disease Control and Prevention. (2025, March 21). *Overdoses involving medetomidine mixed with opioids — Chicago, Illinois, May 2024* [EIS Conference]. U.S. Department of Health & Human Services. https://www.cdc.gov/eis-conference/php/media-resources/medetomidine-mixed-with-opioids.html

Step 5. Reporting Results and Next Steps

Timely and transparent reporting of outbreak findings supports effective decision-making for community leaders, public health preventionists, medical providers, harm reductionists, and people who use drugs. When developing a plan for disseminating findings, jurisdictions should consider the following:

- Provide contextual information
    - Who is most impacted?
    - What is causing the increase?
    - Where are cases occurring?
    - When did cases occur?
    - Why did this outbreak occur?
- Identify your target audience
    - Is the audience internal or external? This may impact the level of detail shared. Be mindful of sharing information that may identify an individual.
    - Internal reports should document more specifics of the case definition and analysis methodology that would allow for replication of the process for future outbreaks and/or updating the analysis.
    - Reporting to some audiences may solely be for situational awareness. The following are examples of additional information you may wish to include with certain audiences.
        - Medical providers: consider including specific descriptions of medical symptoms and/or toxicology findings.
        - Prevention partners, harm reductionists: consider including specifics on program-level prevention strategies.
        - People who are most at risk: consider including product description/name/photos, individual prevention strategies, and what to do in the event of an exposure.
- Consider timing for your communications
    - If the increase in cases was identified in real-time through active surveillance, then messaging should be quick, frequent, and widespread. The goal is to prevent additional poisoning cases.
    - If the outbreak was identified sometime later through passive surveillance, then sharing results is still important, but the goal may now shift to raising awareness and ensuring you are better prepared for a future event.
- Determine effective format(s) for your communications
    - Use the audience and timing considerations above as you develop your dissemination resources. Some audiences may benefit from tabular and graphical representations of your analysis results. Others may wish to read a detailed report. A brief safety bulletin may be best to inform people who are most at risk.

- Use press releases, email updates to partner listservs, website updates, healthcare provider memos, and social media to share resources.
- Collaborate with partner organizations who are already in communication with people who are most at risk.
- Consider presenting at conferences or publishing in journals to contribute to broader scientific knowledge.

Continued Surveillance

In cases which appear to be related to a singular event, jurisdictions should continue surveillance of the emerging substance until events return to the rates seen pre-outbreak. Findings may indicate that the emerging substance is (1) becoming more common in the drug supply; (2) becoming a more frequent environmental exposure; or (3) necessitates modifying ongoing surveillance activities to include the emerging substance.

Case Story: Fentanyl

Now a part of routine surveillance as the primary driver of the overdose epidemic in many jurisdictions, fentanyl was once an emerging substance. Jurisdictions throughout the U.S. began to call attention to outbreaks in overdoses involving synthetic opioids, mainly illicitly manufactured fentanyl (IMF). As time went on, IMF became more prevalent in the drug supply and the rate of overdoses due to IMF continued to climb. No longer a novel substance, surveillance of fentanyl-involved overdoses has become a regular piece of overdose surveillance across the country.

Surveillance of fentanyl's involvement in nonfatal overdose became more routine in October 2020 when the fiscal year 2021 ICD-10-CM specifications were released.[61] The update included three new codes to replace the broad T40.4X code, one of which is poisoning by, adverse effect of, and underdosing of fentanyl or fentanyl analogs (T40.41). Though not yet adopted by the U.S., ICD-11 also includes specific fentanyl codes.

Case Story: Synthetic Cannabinoids and Brodifacoum

A commercially available rodenticide, brodifacoum, has become more frequently identified in synthetic cannabinoid products (e.g., K2 and Spice). Brodifacoum is classified as a "superwarfarin" due to its high potency and long duration of its anticoagulant effect. Beginning with a case in 2018 in Illinois, 160 people from additional states who used synthetic cannabinoid products presented to healthcare facilities with unexplained bleeding. Brodifacoum exposure was confirmed in 60 individuals; 7 synthetic cannabinoid samples related to these cases tested positive for brodifacoum. Additionally, in 2018, the FDA released an alert stating that brodifacoum was detected in the plasma of donors who used synthetic cannabinoids. For more information on brodifacoum, indicators of toxicity, and recommendations for clinicians and laboratories, refer to these resources:

- Toxic Adulterant Alert on Brodifacoum in Synthetic Cannabinoids (August 2023)
- Moritz E, Austin C, Wahl M, et al. Notes from the Field: Outbreak of Severe Illness Linked to the Vitamin K Antagonist Brodifacoum and Use of Synthetic Cannabinoids — Illinois, March–April 2018. MMWR Morb Mortal Wkly Rep 2018;67:607–608. DOI: http://dx.doi.org/10.15585/mmwr.mm6721a4

[61] Centers for Medicare & Medicaid Services. (2020). *FY 2021 Addendum B: IPF PPS Final Rule ICD-10 code-first update* [PDF]. U.S. Department of Health & Human Services. https://www.cms.gov/files/document/fy-2021-addendum-b-ipf-pps-final-rule-icd-10-code-first-update.pdf

EXAMPLES OF EMERGING SUBSTANCE OUTBREAK INVESTIGATIONS

The following articles from the Morbidity and Mortality Weekly Report (MMWR) provide additional information on emerging substance outbreak investigations:

- Increases in Fentanyl-Related Overdose Deaths — Florida and Ohio, 2013–2015
- Fentanyl Law Enforcement Submissions and Increases in Synthetic Opioid-Involved Overdose Deaths — 27 States, 2013–2014
- Deaths Involving Fentanyl, Fentanyl Analogs, and U-47700 — 10 States, July–December 2016
- Opioid Overdose Outbreak — West Virginia, August 2016
- Notes from the Field: Severe Health Outcomes Linked to Consumption of Mushroom-Based Psychoactive Microdosing Products — Arizona, June–October 2024

Poisoning Data Sources

The PSW compiled a list of 21 data systems and sources in Appendix A that may be helpful for poisoning surveillance. This list is not exhaustive but intended to present the most relevant sources within the current landscape. The PSW intentionally included sources that provide a count of poisoning cases. The PSW excluded data sources from the full table description that were a measure of exposure or of use rather than a measure of poisoning; these are included in a list of additional data sources.

A few data sources originally included in the ISW7 were excluded from this document due to retirement of the system or discontinuation of the collection of new data (e.g., Drug Abuse Warning Network[62], National Hospital Discharge Survey). Drug monitoring systems, such as prescription drug monitoring programs or syringe service drug testing programs, were also excluded; these can provide an understanding of current consumption but are not directly related to poisoning.

Within Appendix A, data sources and systems are organized into tables with the following information:

[62] Roberts CD. Data quality of the Drug Abuse Warning Network. Am J Drug Alcohol Abuse. 1996 Aug;22(3):389-401. doi: 10.3109/00952999609001667. PMID: 8841687.

- Contact Information/Sponsor
- Description
- Geographic Scope
- Availability
- Data Collection Methodology
- Content
- Demographic Information
- Years of Data
- Codes to Identify Poisoning Cases
- Important Data Considerations
- Other Relevant Information

The data systems and sources are:

- Adult Blood Lead Surveillance and Evaluation System (ABLES)
- Census of Fatal Occupational Injuries
- Child Death Review (CDR) Reporting System
- Drug Overdose Surveillance Epidemiology System, Discharge/Medical Billing Data Surveillance (DOSE-DIS)
- Drug Overdose Surveillance Epidemiology System, Syndromic Surveillance (DOSE-SYS)
- Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)
- National Ambulatory Medical Care Survey (NAMCS)
- National Emergency Department Sample (NEDS)
- National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP)
- National Electronic Injury Surveillance System – Cooperative Adverse Drug Event Surveillance (NEISS-CADES)
- National Emergency Medical Services Information System (NEMSIS)
- National (Nationwide) Inpatient Sample (NIS)
- National Poison Data System (NPDS)
- National Violent Death Reporting System (NVDRS)
- National Vital Statistics System (NVSS) – Mortality (ICD-10)
- Sentinel Event Notification System for Occupational Risk (SENSOR)
- State Level Emergency Department Data
- State Level Hospital Inpatient Discharge Data
- State Unintentional Drug Overdose Reporting System (SUDORS)
- State Vital Statistics: Death Certificates
- State-level Workers' Compensation Data

For additional information, the website and/or phone number of the agency or organization coordinating the database are provided. The websites for these data systems and sources were current as of December 2025.

General Considerations and Recommendations for Improving Poisoning Surveillance

Recommendations to Improve Surveillance at the National Level

Standardize Death Certification for Poisoning

The investigation of poisoning deaths in the U.S. continues to show substantial variation in toxicology testing, case definitions, and the specificity of information recorded on death certificates. National organizations representing medical examiners, coroners, and toxicologists should establish and promote standardized methods for documenting the poisoning event, identifying substances involved, and recording other relevant circumstances, along with providing training and guidance for consistent implementation. For example, the National Association of Medical Examiners published recommendations for the investigation and certification of overdose deaths related to opioids and other drugs.[63]

There remains a critical need to systematically document how death investigations and certifications for poisoning vary within and across states. Differences in coding practices, the level of detail used to specify drugs, and the extent of toxicology testing or autopsy all affect the accuracy, comparability, and usefulness of national mortality data. Standardization would improve surveillance, enhance public health research, and support evidence-based prevention strategies.

Acute and Chronic Effects of Nondrug Poisoning

Review the ascertainment of events due to acute and chronic effects of drug poisoning in the NCHS drug-induced indicator definition.

This report previously used the set of ICD codes for drug-induced deaths developed by NCHS to define acute and chronic effects of drugs. The current NCHS drug-induced death definition includes deaths from unintentional injuries, self-harm, homicide/intentional poisonings, and deaths of undetermined intent, while excluding causes only indirectly related to drug use. It also excludes neonatal deaths linked to maternal drug use and some less common drug-related conditions (e.g., N14.1, drug-induced nephropathy).

Ongoing review of the drug-induced death category is needed to ensure it reflects current knowledge, emerging substances, and evolving patterns of drug-related harm. Updating these definitions would improve accuracy, comparability, and public health utility of mortality data.

[63] National Association of Medical Examiners Expert Panel on Evaluating and Reporting Opioid and Other Drug Deaths. Recommendations for the investigation, diagnosis, and certification of deaths related to opioid and other drugs. Position paper. December 17, 2019–December 17, 2024. Accessed December 15, 2025. Available at: https://www.thename.org/assets/docs/Opioid%20position%20paper%20Final%2012-17-2019.pdf

Assemble a set of codes to ascertain events due to acute and chronic effects of nondrug poisoning.

Currently, there is no standardized set of ICD-10 codes that defines chronic or acute effects of nondrug poisoning. A comprehensive list of ICD-10 codes—and crosswalks from ICD-9-CM where appropriate—should be assembled to capture diseases and injuries resulting from nondrug toxic exposures, including those related to occupational, environmental, or unintentional sources.[64]

Creating this code set would support consistent surveillance, enable comparisons over time, and help public health agencies better understand and prevent nondrug poisoning events.

Develop a drug-attributable mortality measure.

NCHS has a list of alcohol-induced disease codes that identify outcomes entirely attributable to alcohol [21]. A larger list of codes of alcohol-related diseases has been compiled (https://www.cdc.gov/alcohol/ardi/alcohol-related-icd-codes.html). It identifies diseases and injuries that are either entirely or partially caused by alcohol and makes use of attributable fractions.

A similar, modern framework is needed for drugs. Although overdose deaths are well-tracked, there is no standardized, national list of ICD-10 codes for diseases and injuries fully or partially caused by drug use (including prescription drugs, illicit drugs, polysubstance exposure, and long-term consequences of substance use). Creating this compilation—and developing attributable fractions for each condition—would allow for more accurate, consistent measurement of drug-attributable mortality across jurisdictions.

Such a measure would improve surveillance, strengthen comparisons over time, support public health planning, and provide a clearer picture of the full burden of drug use in the United States.

Develop a framework for ICD-10-CM comparable to the ICD-9-CM framework provided in this report.

Under ICD-10-CM, poisonings are classified entirely through diagnosis codes (T36–T65), and intent—such as unintentional, self-harm, assault, or undetermined—is captured in the 6th character of those codes. ICD-10-CM offers much greater specificity than ICD-9-CM and allows coding of a wider range of substances, circumstances, and clinical presentations.

Although general equivalence mappings (GEMs) exist to link ICD-9-CM and ICD-10-CM codes, they do not provide a clear, surveillance-focused framework for poisoning comparable to what was available under ICD-9-CM. Public health agencies, poison centers, and researchers would benefit from a standardized ICD-10-CM framework that groups poisoning codes by mechanism and intent in a consistent and analytically useful way.

Such a framework is essential for tracking trends over time, supporting state and national injury surveillance, and ensuring that poisoning data can be interpreted accurately across jurisdictions,

[64] Centers for Medicare & Medicaid Services. (2019). ICD-10-CM table of drugs and chemicals. https://www.cms.gov/files/document/icd10-2019-cm-table-drugs-and-chemicals-pdf.pdf

especially as substances evolve, polysubstance exposures increase, and coding practices continue to change.

Recommendations to Improve Surveillance at the State or Local Level

Mortality Surveillance

Encourage thorough death investigations by providing enhanced toxicological testing and standardized training opportunities.

When the language used on death certificates is nonspecific or the death investigation is not thorough enough to identify specific drugs, nonspecific UCOD and MCOD codes such as X44 or T50.9 ("other and unspecified drugs, medicaments and biological substances") may be assigned. The frequency of such codes can vary widely across and within states, impairing geographic comparisons and potentially undercounting the contribution of specific drugs to poisoning mortality for a population. The necessity of these nonspecific codes, however, has decreased over past decades, as the percentage of death certificates listing one or more specific drugs as involved increased from 75% in 2002 to 96% in 2022.[65] Before analyzing poisoning rates for a particular substance, consider reviewing the percentage of all poisonings that are coded as unspecified over time, geographically, and by demographic categories. State agencies can demonstrate these disparities statistically to their ME/Cs as a way of motivating thorough death investigation and certification. Regular training and education opportunities for ME/Cs and certifiers may also provide an opportunity for standardization of investigations and consistency in surveillance data across jurisdictions. Lastly, support for enhanced toxicological testing of postmortem samples may also promote more specific characterization of substances contributing to the cause of death.

Advocate for modernization, integration, and interoperability of data systems.

ME/C databases are population-based and often contain more detail than can be captured on the standard death certificate, such as the specific substances involved, the routes of administration (e.g., injection), comorbidities, and sources of drugs. Similarly, toxicology reports provide insight into specific substances (or combinations thereof) involved in drug deaths. ME/C offices may find improved utility, efficiency, and sustainability in modernized record-keeping systems that not only streamline investigations and case reporting but are more likely to be interoperable with state-level surveillance systems, laboratory information management systems, and national databases. By nature, interoperable data systems also promote interagency collaboration for cross-sector surveillance and prevention efforts.

[65] Spencer MR, Garnett MF, Miniño AM. Drug overdose deaths in the United States, 2002–2022. NCHS Data Brief, no 491. Hyattsville, MD: National Center for Health Statistics. 2024. DOI: https://dx.doi.org/10.15620/cdc:135849

Morbidity Surveillance

Validate and adopt standardized case definitions.

While case definitions may be created and validated at the national level, validity may not necessarily be conferred ubiquitously. Use of the principal diagnosis, first-listed diagnosis, or any diagnosis to identify poisoning cases needs to be examined with state data to determine the limitations and biases of different case-selection approaches.

Leverage nontraditional approaches to capture nonfatal poisonings.

Some states have established surveillance systems specifically to capture nonfatal poisonings in a timelier way. For example, New Mexico and Utah have required the reporting of drug overdoses to their state health departments. Once evaluated, the public health impact of these measures and the experience within the states should be considered.

Partner with other state health agencies.

State health agencies should consider partnering with local poison centers, prescription drug monitoring, workers' compensation, and Medicaid programs, all of which have databases that might be used to monitor nonfatal poisonings and the behaviors that are associated with them.

Improve external cause coding in hospital discharge data and ED data.

The utility of ICD-10-CM poisoning data from state-based hospital discharge and ED data systems depends on the completeness and specificity of external cause of injury codes. Led by CDC, efforts have been underway for over two decades to improve external cause coding in these data systems.[66]

[66] Centers for Disease Control and Prevention. (2019). ICD-10-CM external cause of injury codes. https://www.cdc.gov/injury/wisqars/pdf/icd-10-cm_external_cause_injury_codes-a.pdf

Appendix A: Detailed Description of Data Sources

Adult Blood Lead Epidemiology and Surveillance (ABLES)

Category	Description
Contact Information/Sponsor	National Institute for Occupational Safety and Health (NIOSH), U.S. Centers for Disease Control and Prevention Website: https://www.cdc.gov/niosh/index.html
Description	Identifies elevated blood lead levels (EBLLs) among working adults 16 years and older. This information is used to guide interventions and prevent work-related lead exposures.
Geographic Scope	37 states (as of November 2025)
Availability	Via NIOSH website https://wwwn.cdc.gov/Niosh-whc/source/ables More information at the individual state level might be obtained by contacting a state's ABLES program.
Data Collection Methodology	Each year, participating health departments or their designees submit the following for EBLL cases: • Blood lead level • Occupation and industry • Demographics
Content	EBLL charts are based on data from the NIOSH ABLES program. These charts summarize EBLL cases (BLL>5 µg/dL, BLL>10 µg/dL, BLL>25 µg/dL) among employed adults (ages 16 years and up).
Demographic Information	Age, sex, race, ethnicity, state and county of exposure, state and county of residence, worker occupation, worker industry
Years of Data	1994-2024 (as of November 2025)
Codes to Identify Poisoning Cases	N/A
Important Data Considerations	ABLES data cannot be generalized to the U.S. population. Work-relatedness cannot be ascertained for all adult EBLL cases. ABLES data are an underestimate of the number of adults with EBLL since not all adults get tested for lead.

Census of Fatal Occupational Injuries (CFOI)

Category	Description
Contact Information/Sponsor	Bureau of Labor Statistics (BLS), U.S. Department of Labor Phone: 202-691-6170 Website: https://www.bls.gov/iif/ Link for data requests: https://www.bls.gov/iif/iif-data-requests.htm
Description	The Census of Fatal Occupational Injuries (CFOI) provides an annual census of fatal work injuries. Conducted by BLS in collaboration with state agencies, it is intended to provide information to guide and evaluate efforts to prevent work-related deaths and injuries. More than 30 separate data elements, including information on the worker, the fatal incident, and the machinery, equipment or chemicals involved, are reported. Data elements can be found: Concepts: Handbook of Methods: U.S. Bureau of Labor Statistics.
Geographic Scope	Data are available nationally, in all 50 states and the District of Columbia.
Availability	Tables and reports are available from www.bls.gov/iif. There is an online data query system. Data requests may be submitted to the agency.
Data Collection Methodology	CFOI includes injury fatalities that are the result of work-related incidents. For a death to be counted, the decedent must have been working for pay, compensation or profit at the time of the event, or working as a volunteer exposed to similar hazards as paid workers; and engaged in legal activity. The census includes unintentional injuries such as falls and acute poisonings, as well as intentional injuries including both homicides and suicides at work. CFOI uses multiple data sources to identify, verify and describe each fatal work injury. These include, among others: death certificates, State Workers' Compensation records, Occupational Health and Safety Administration (OSHA) records, Coast Guard reports, news media and other federal, state, and local government agencies, and private sources. At least two independent source documents are required to verify the death as work related. The Bureau has developed the Occupational Injury and Illness Classification System (OIICS) to permit standardized and uniform coding of the nature, body part, event and source. Data are coded using this system by BLS and participating state agencies.
Content	CFOI can provide counts and rates of fatal work injury by nature of injury (e.g., poisonings), source of injury (e.g., specific chemicals) and event (e.g., exposure to harmful substances/environments). Source codes provide detail about select substances involved in the poisonings.
Demographic Information	Sex, age, race or ethnic origin, country of birth, occupation, industry
Years of Data	Since 1992

Category	Description
Codes to Identify Poisoning Cases	The following codes refer to the coding system used in the OIICS Manual: (OIICS has an updated data series 2023-onward with version 3.0) Nature of Injury Code: 160 (poisonings). Some additional poisonings may be identified under codes for systemic conditions (e.g., Nature of Injury Code: 521 for abnormal blood lead level). Source codes provide detailed information about the substance involved (e.g., source code: 1214: carbon monoxide). Event codes may also be useful (e.g., event code 553: inhalation of substance). For accurate coding, users should consult the "Nature," "Event," and "Source/Secondary Source" tabs of the OIICS 3.02 spreadsheet available from BLS along with previous versions. Occupational Injury and Illness Classification (OIICS) Manual: U.S. Bureau of Labor Statistics
Important Data Considerations	*Strengths:* CFOI can provide yearly standardized counts and rates of work-related deaths due to acute poisonings for the nation and by state. Source codes provide detailed information about some specific substances involved. Data can be cross tabulated to examine poisoning deaths by industry, occupation, and other demographic characteristics. Cause of death information is obtained from death certificates and in some cases autopsy reports. Because these data are a census of all cases, they are not subject to sampling error. *Weaknesses:* CFOI data are not released until 8 months after the close of the calendar year. BLS has strict publication requirements based on the reliability of estimates; numbers and rates are not published or released by BLS if the estimates do not meet these guidelines. This can be an issue with generating state-specific data on low numbers of poisoning deaths.

Child Death Review (CDR) Reporting System

Category	Description
Contact Information/Sponsor	National Center for Fatality Review and Prevention c/o Michigan Public Health Institute Address: 2395 Jolly Road, Suite 120, Okemos, MI 48864 Phone: 800-656-2434 | Fax: 517-324-7365 | Website: https://ncfrp.org/ State Spotlights: https://ncfrp.org/cdr-map/
Description	The National MCH Center for Child Death Review, in collaboration with state Child Death Review (CDR) programs, developed a web-based CDR Case Reporting System primarily to capture data surrounding the circumstances of child deaths from CDR team reviews. Information on Child Death Review programs can be found at https://ncfrp.org/cdr/ under Tools for Teams.
Geographic Scope	There are CDR programs in all 50 states. Data can be aggregated regionally and nationally.

Category	Description
Availability	The online system is available to individuals pre-approved by state or national CDR programs that participate in the system. All users must be approved by the appropriate state administration and adhere to the data use agreement. Authorized state and local users can generate standardized aggregate reports directly within NFR-CRS using filters such as case type, date range, data entry, and team. Aggregate multi-state data are only available through the National Center with individual state approvals.
Data Collection Methodology	Designed primarily to meet the data and reporting needs of local and state CDR teams. Teams collect standard comprehensive information on child deaths based on CDR Team reviews and information provided by multiple participating agencies. Local and state teams may have their own protocols and procedures for selecting cases for review and data entry (e.g., all child deaths, coroner cases only). For some states, data are population based, while for others, data are based on a "convenience" sample of child deaths.
Content	The standard case reporting form can be found here: CDR_NFR-CRS_v6-2.pdf. Generally, ages covered include 0-17 years, but there is local and state variability. Data sections on child information, biological parent, primary caregiver(s), supervisor, incident, investigation, official manner and primary cause of death, detailed information by cause of death, other circumstances of incident, person responsible, services to family and community, findings identified, review meeting process, sudden unexpected infant deaths (SUID) and sudden death in the young (SDY) case registry, and narrative.
Demographic Information	Child and biological parent demographic information (e.g., county and ZIP Code of residence, date of birth, date of death, age, sex, ethnicity, and race).
Years of Data (current as of September 2025)	The CDR Case Reporting System was initially created in 2003. Child death data are primarily from 2005-2020 child deaths, but some states have information up to 2022.
Codes to Identify Poisoning Cases	Section G (Official Manner and Primary Cause of Death) contains several items that could be used to identify poisoning deaths, including ICD-10 code for underlying cause of death and an item for selecting the major causes, one of which is "poisoning, overdose or acute intoxication."

Category	Description

Important Data Considerations	*Strengths:*
	• Multi-state and agency system with local CDR participation – all 50 states participating.
	• Multi-agency data sources combined to provide a more detailed picture of the circumstances surrounding the poisoning using a standard data collection form. Real-time access for pre-approved individuals to data entered. Data collected close to the original event and data primary sources. Child Dynamic Analysis and Statistics Hubs (DASH) dashboard coming soon.
	• Contains in-depth information on poisoning deaths under Section H7 POISONING, OVERDOSE OR ACUTE INTOXICATION:
	  ○ Types of substance involved (i.e., prescription drug, over the counter drug, illicit drugs, other substances)
	  ○ Source of substance
	  ○ Stored in locked cabinet?
	  ○ How substance was taken. Was the incident the result of… (selections indicate intentionality of poisoning)?
	  ○ Did the child have a prescription for a controlled substance within the previous 24 months?
	  ○ Did the child have a nonfatal overdose within the previous 12 months?
	  ○ Was Poison Control contacted?
	  ○ For CO poisoning, was a CO alarm present?
	  ○ Narrative field available for more description of the incident
	Weaknesses:
	• Deaths only.
	• Generally, only children younger than 18 years of age.
	• Local and state CDR team variability in terms of completeness and quality.
	• Includes all child deaths reviewed but captures only poisoning incidents severe enough to cause death among children (<18 years).
	• This data source is not a census of all child deaths in all locations.

Other Relevant Information	The National Center is supported by funding through a cooperative agreement from the Health Resources and Services Administration and by the Centers for Disease Control and Prevention.

Drug Overdose Surveillance and Epidemiology System, Discharge/Medical Billing Data Surveillance (DOSE-DIS)

Category	Description
Contact Information/Sponsor	Epidemiology & Surveillance Branch, Division of Overdose Prevention (DOP), National Center for Injury Control and Prevention (NCIPC), U.S. Centers for Disease Control and Prevention Website: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-discharge-data.html DOSE Overview: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/about-dose-system.html Fact Sheet: https://www.cdc.gov/overdose-resources/media/pdfs/2025/04/DOSE_FactSheet_December-2024.pdf
Description	Counts of drug overdoses (coded as ICD-10-CM poisoning codes that fall within T36-T50) leveraging finalized discharge data from ED visits and inpatient hospitalizations to estimate trends in nonfatal overdoses and calculate burden. Discharge data offer a more complete and accurate understanding of overdose burden compared to syndromic surveillance data, which mainly focuses on trends.
Geographic Scope	Currently, 34 states and DC share discharge data with DOSE: 31 states and DC share both ED and inpatient hospitalization discharge data, no states share only ED discharge data, and 3 states share only inpatient hospitalization discharge data.
Availability	A public-facing data dashboard with visualizations are available at: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-discharge-data.html.
Data Collection Methodology	DOSE Discharge/billing data use Uniform Billing 04 (UB04)/CMS1450 form data elements and associated value sets.
Content	Jurisdictions provide CDC line-level data submissions including all drug overdose-related visits. This includes any visit with a T36–T50 drug poisoning-related code, all intents and encounters and adverse effects as well as underdosing. Denominator data are collected in aggregate and are stratified by sex, age, race, ethnicity, as well as county of residence.
Demographic Information	Sex, age, race, ethnicity
Years of Data	2018-2024
Codes to Identify Poisoning Cases	ICD-10-CM: T36-T50 (any cause or intent)
Important Data Considerations	• Facility inclusion/exclusion criteria: Only include data from nonfederal, acute care-affiliated facilities; exclude Veterans Affairs (VA) and other federal hospitals, rehabilitation centers, and psychiatric hospitals. • Excludes deaths. • Include all transfers (i.e., do not exclude any transfers from point of origin or discharge disposition variables).

Drug Overdose Surveillance and Epidemiology System, Syndromic Surveillance (DOSE-SYS)

Category	Description
Contact Information/ Sponsor	Epidemiology & Surveillance Branch, Division of Overdose Prevention (DOP), National Center for Injury Control and Prevention (NCIPC), U.S. Centers for Disease Control and Prevention Website: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-surveillance-data.html DOSE Overview: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/about-dose-system.html Fact Sheet: https://www.cdc.gov/overdose-resources/media/pdfs/2025/04/DOSE_FactSheet_December-2024.pdf
Description	As part of the Overdose Data to Action in States program, DOSE-SYS leverages timely ED syndromic surveillance data captured by health departments to rapidly assess trends and maintain situational awareness of changes in suspected nonfatal drug overdose-related ED visits at the state and national level. On average, National Syndromic Surveillance Program (NSSP) covers about 80% of ED facilities across the United States.
Geographic Scope	As of August 29, 2025, 46 states and the District of Columbia share syndromic surveillance data with DOSE-SYS.
Availability	• Select patient and visit characteristics are publicly available through the CDC DOSE-SYS Dashboard: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-surveillance-data.html • Dashboard data can be downloaded in .xlsx format; this file includes a data dictionary, as well as an overall and state-level dataset of monthly and annual suspected nonfatal drug overdose visit estimates per 10,000 ED visits of suspected nonfatal drug overdose by each of 8 DOSE-SYS syndrome definitions. Overall estimates are stratified by age group and sex. • Dashboard data are available from January 2019 to the most recently reported monthly data.
Data Collection Methodology	ED visits for suspected nonfatal drug overdose are reported to DOSE-SYS using electronic health record text queries from syndromic surveillance systems reported monthly.
Content	Monthly ED visit counts overall and for each of the 8 DOSE-SYS syndrome definitions. Data are disaggregated by age group, sex, race, and ethnicity, and by county of residence.
Demographic Information	DOSE-SYS data reporting includes aggregate counts of suspected overdoses by age group, sex, race, and ethnicity and by county of residence for each of the 8 DOSE-SYS syndrome definitions.
Years of Data	2018–2025

Category	Description
Codes to Identify Poisoning Cases	• The DOSE system uses standardized syndromic surveillance definitions for suspected nonfatal all drug, benzodiazepine-, cocaine-, fentanyl-, heroin-, methamphetamine-, all opioid-, and all stimulant-involved overdoses established by CDC. All definitions draw from multiple fields within ED data to classify visits as overdose-related. • Suspected nonfatal overdose-related ED visits are identified according to diagnosis codes used for clinical diagnosis and insurance billing purposes, specifically, ICD-10-CM codes, ICD-9-CM codes, and SNOMED CT (Systematized Nomenclature of Medicine – Clinical Terms) codes. Where manner of injury is defined, only diagnosis codes for "unintentional" or "undetermined" intent drug poisoning are included in the DOSE standardized syndromic surveillance definitions. • Although many diagnosis codes provide sufficient indication of a suspected drug overdose, other diagnosis codes specific to opioid drug use, abuse, and dependence, without a mention of intoxication, are less specific (e.g., F11.10: Opioid abuse, uncomplicated); therefore, when these are the only codes present, additional information (e.g., chief complaint field) is needed for the ED visit to be captured as a suspected opioid-involved overdose. • Syndromic surveillance definitions also utilize the free text field called "chief complaint", which represents the purpose of an ED visit, for example, "Patient was found unresponsive. EMS provided Narcan and patient said took heroin." The amount and type of information provided in unstandardized text such as the chief complaint field can vary. To be included as an opioid overdose based solely on chief complaint, the field must include a naloxone term such as "naloxone" or "Narcan." For records not including naloxone terms, records must include two components: 1) text indicating an overdose or poisoning and 2) text indicating the involvement of a drug or a diagnosis code for opioid use, abuse, and dependence without intoxication. The free text search of the chief complaint field is not case sensitive and common misspellings of key search terms, for example, "heroine" instead of "heroin", are also included. A list of exclusions is applied to the chief complaint field after all inclusion criteria have been assessed. For example, if a diagnosis code for heroin-involved poisoning is not present, exclusions such as "no loss of consciousness", "denied heroin", "detox", and "withdrawal" would be applied and therefore the visit would not be captured as a suspected heroin-involved overdose. • The syndromic surveillance definitions are not mutually exclusive but rather reflect nesting of drug categories (depicted in the figure below) and some overdose visits may involve multiple substances (e.g., a given overdose-related ED visit could have involved both opioids and stimulants). • The syndrome definitions reported are suspected all drug overdose, all opioid overdose, all stimulant overdose, cocaine overdose, methamphetamine overdose, fentanyl overdose, and heroin overdose.

Category	Description
Important Data Considerations	• Data from 2018 are excluded from the DOSE-SYS dashboard due to over 40% of jurisdictions reporting facility coverage below 70% [mean: 76.9%, median: 84.4%, range: 1.5%-100%]. Of the 47 jurisdictions who currently submit data to DOSE-SYS, 19 jurisdictions reported facility coverage less than 70% in 2018, and an additional 4 did not submit data to DOSE in 2018 (e.g., were not yet enrolled). • Some data may be missing. Data sent from EDs to health departments may be delayed or paused for a period of time. Missing data are noted in footnotes, where applicable. • Nonfatal Drug Overdose Surveillance and Epidemiology – Syndromic Data (DOSE-SYS) Dashboard may differ from data accessible through the National Syndromic Surveillance Program (NSSP) BioSense Platform. Many jurisdictions extract data from NSSP's Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) database as part of their data submission process. However, DOSE-SYS data may differ from NSSP ESSENCE data due to differences in jurisdiction data preparation as well as the dynamic nature of NSSP's progressively updating data. • Reporting facilities and the data they report can change. Several jurisdictions continue efforts to onboard new facilities that can begin to share data in syndromic surveillance systems, and some facilities experience periodic interruptions in, or might stop, syndromic surveillance data feeds. Some of these issues became more pronounced during the earlier phase of the COVID-19 pandemic[2]. Syndromic data also can be updated with new information over time, for example, with additional diagnosis codes. Therefore, estimates reported might change over time as more facilities begin sharing data or sharing higher quality data or stop sharing data for a period of time. Some EDs might also have increases in the proportion of ED visits in syndromic data that contain diagnosis codes, which facilitates the identification of drug overdose-related visits. The reason a patient seeks medical care (called the chief complaint) is available in NSSP often within 24 hours for ~80% of ED visits. DOSE-SYS data are reported with a two-month lag and not typically updated. • These are suspected nonfatal drug overdose-related ED visits. Because data used to identify suspected nonfatal drug overdose visits are based on ED visit chief complaints and diagnosis codes from initial clinical impressions or observations, syndromic data may not represent the final, most updated information about the ED visit. Additionally, toxicological testing is not uniformly captured in these data[3] and therefore may underreport specific drug types involved. • Data likely represent an undercount, given potential inaccuracies in preliminary coding and potentially incomplete clinical descriptions captured in chief complaint information. • New ICD-10-CM codes were added for fentanyl and methamphetamine poisonings in recent years: Syndrome definitions use information from both the chief complaint and diagnosis codes to identify drug overdose cases. ICD-10-CM diagnosis codes were introduced to address gaps in the classification of fentanyl poisonings (T40.41, effective October 1, 2020) and methamphetamine poisonings (T43.65, effective October 1, 2022). Prior to the availability of these codes, suspected fentanyl or methamphetamine poisonings may have been classified under a broader drug overdose or poisoning code, decreasing the likelihood that the visit would be captured by the drug-specific syndrome definition. Additionally, incorporating new ICD-10-CM codes into routine use at healthcare facilities may vary among facilities or jurisdictions. Due to these limitations, comparisons of data collected before and after the introduction of the respective codes should be interpreted with caution. • Drug overdose visit numbers are not mutually exclusive but rather reflect nesting of drug categories; some drug overdose visits involved multiple substances (e.g., a given drug overdose ED visit could have involved both opioids and stimulants). • DOSE-SYS dashboard data could be suppressed for a variety of reasons. For example, rates based on 1-19 overdose counts are suppressed to avoid sharing information that could be identifiable and because of possible instability of rate estimates. For more information, please see Healthy People 2010 Criteria for Data Suppression. Additionally, data are shown for the period beginning January 2019 and exclude several months during the onset of the COVID-19 pandemic (i.e., March 2020-August 2020) for all jurisdictions. Other situations in which data coverage was incomplete may also lead to data suppression.

Category	Description
Other Relevant Information	https://www.cdc.gov/overdose-prevention/data-research/facts-stats/about-dose-system.html

Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)

Category	Description
Contact Information/Sponsor	National Syndromic Surveillance Program (NSSP), U.S. Centers for Disease Control and Prevention (CDC) Website: https://www.cdc.gov/nssp/php/onboarding-toolkits/essence.html
Description	Syndromic surveillance system designed to provide early detection and situational awareness of community-based health threats, including poisonings, overdoses, and outbreaks.
Geographic Scope	More than 7,200 health care facilities covering all 50 states, the District of Columbia, and Guam contribute data to NSSP daily. Coverage varies depending on facility participation within each state.
Availability	Dataset has restricted access for approved public health practitioners through data use agreements (not for public use).
Data Collection Methodology	Near real-time data are provided by one or more of the following, depending upon the state/jurisdiction: EDs, urgent care centers, poison control centers, and EMS. Data include diagnosis codes and chief complaint text (some jurisdictions have access to additional data such as triage notes). Data are standardized and categorized into syndrome definitions for monitoring and analysis.
Content	ED and urgent care visits, EMS runs, poison control center calls, and limited laboratory/pharmacy data (where available). Syndrome groupings pertaining to poisoning include drug overdose and carbon monoxide poisoning/exposure.
Demographic Information	Age, sex, race/ethnicity (where available), facility location, date and time of visit.
Years of Data	National NSSP-ESSENCE data are available from 2016 to present; some local and state systems may have earlier data.
Codes to Identify Poisoning Cases	Poisoning cases are identified through syndrome definitions using ICD-10-CM diagnosis codes (e.g., T36–T50 for drug poisonings, T58 for carbon monoxide), external cause codes (X40–X49 for unintentional, X60–X69 for intentional poisonings), and keyword searches of chief complaints (e.g., "OD," "overdose," "poison," "CO exposure"). Poison center call classifications (e.g., opioid, CO, other chemicals) are also used where available.

Category	Description
Important Data Considerations	Strengths: Near real-time surveillance across multiple data sources; useful for rapid detection of spikes and emerging trends; flexible syndrome definitions. Weaknesses: Facility participation and data completeness vary by state; chief complaint text can be inconsistent; data are intended for situational awareness and may not match confirmed case counts.
Other Relevant Information	ESSENCE is the analytic platform of the National Syndromic Surveillance Program (NSSP) and is also maintained by many state and local health departments for their own surveillance activities.

National Ambulatory Medical Care Survey (NAMCS)

Category	Description
Contact Information/Sponsor	National Center for Health Statistics (NCHS), RTI International, and Booz Allen Hamilton
Description	NAMCS collects data about the experiences of office-based healthcare providers working with patients in office-based health care settings. NAMCS collects data about patients who also visit health centers.[67]
Geographic Scope	National-level data as of December 2024[68]
Availability	NCHS publishes reports, web tables, and other products featuring NAMCS data. NCHS also provides preliminary NAMCS data from health centers in an interactive dashboard. In producing these resources, NAMCS staff prioritizes protecting the privacy of participating healthcare providers, health centers, and patients. NAMCS public use data files are available to download in multiple formats. All potentially identifiable information has been removed to ensure the confidentiality of respondents and patients. Restricted data files are available through the NCHS Research Data Center (RDC) for a fee. To access restricted NCHS data, researchers must submit requests to the Standard Application Process portal. The RDC provides instructions for preparing and submitting an application to access restricted data.

[67] Centers for Disease Control and Prevention. (2025, December 17). National Ambulatory Medical Care Survey. Retrieved January 13, 2026, from https://www.cdc.gov/nchs/namcs/about/index.html
[68] National Center for Health Statistics. Preliminary Estimates of Visits to Health Centers in the United States. Generated interactively: January 13, 2026, from https://www.cdc.gov/nchs/dhcs/prelim-hc-visits/index.htm

Category	Description
Data Collection Methodology	NCHS launched NAMCS in 1973 and conducted an annual survey to gather data from 1973 through 1981, in 1985, and annually since 1989. NAMCS data are collected from two types of ambulatory care providers including (1) office-based physicians and other healthcare professionals who are not employed by the federal government and (2) health centers that serve areas and groups with limited access to medical care, including centers that either receive or do not receive federal funds. NAMCS uses a survey to collect data from office-based providers and respondents can complete the survey online or with a paper questionnaire.
Content	NAMCS data provide information about patients using health centers and office-based healthcare providers; medical conditions most often seen in health centers; and diagnosis and treatment services, including prescription medications, provided in health centers.
Demographic Information	Patient age, sex, race and Hispanic ethnicity, marital status[69]
Years of Data	1973 through 1981, 1985, and 1989 to 2024
Codes to Identify Poisoning Cases	The codebook for the 2023 NAMCS Health Center Component public use data file includes the following:[70] • Variable name: DX1-DX30 • Description: Diagnosis #1-Diagnosis #30 (ICD-10-CM), diagnosis code truncated to 4 characters (no decimal) Restricted NAMCS data files are available through the NCHS Research Data Center (RDC) for a fee. To access restricted NCHS data, researchers must submit requests to the Standard Application Process portal. The RDC provides instructions for preparing and submitting an application to access restricted data.
Important Data Considerations	NAMCS data cannot be used to estimate how many people have received a specific diagnosis because the data are not representative of the nation's population. NAMCS collects data based on a sample of visits rather than a sample of people. Policy makers, researchers, medical schools, medical associations, public health professionals, and the media use NAMCS data to understand health care in the United States. NAMCS data can answer questions about what medical care is being used, how it is provided, and how that has changed over time.

[69] National Center for Health Statistics, Division of Health Care Statistics. (2025, August). 2023 National Ambulatory Medical Care Survey Health Center (NAMCS HC) component: Technical documentation [PDF]. Hyattsville, MD: Centers for Disease Control and Prevention. Retrieved January 13, 2026, from https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NAMCS_HC/2023/2023-NAMCS-HC-Component-Tech-Doc.pdf

[70] National Center for Health Statistics, Division of Health Care Statistics. (2025, August). 2023 National Ambulatory Medical Care Survey Health Center (NAMCS HC) component: Public use file (PUF) codebook [PDF]. Hyattsville, MD: Centers for Disease Control and Prevention. Retrieved January 13, 2026, from https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NAMCS_HC/2023/2023-NAMCS-HC-Component-PUF-Codebook.pdf

National Emergency Department Sample (NEDS)

Category	Description
Contact Information/Sponsor	NEDS is part of a family of databases and software tools developed for the Healthcare Cost and Utilization Project (HCUP). Website: https://hcup-us.ahrq.gov/nedsoverview.jsp
Description	NEDS is the largest all-payer ED database in the United States, yielding national estimates of hospital-owned ED visits. Unweighted, it contains data from about 32 million ED visits in 2022. Weighted, it estimates roughly 137 million ED visits. Developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality, HCUP data inform decision making at the national, State, and community levels.
Geographic Scope	Currently, NEDS contains discharge data for ED visits from 993 hospitals located in 41 States and the District of Columbia, approximating a 20-percent stratified sample of U.S. hospital-owned EDs.
Availability	NEDS releases for data years 2006 through 2022 are available for purchase through the HCUP Central Distributor.
Data Collection Methodology	NEDS is sampled from the State Inpatient Databases (SID) and State Emergency Department Databases (SEDD). The SID contains information on patients initially seen in the ED and subsequently admitted to the same hospital. The SEDD captures information on ED visits that do not result in hospital admission (i.e., treat-and-release visits and transfers to another hospital).
Content	The NEDS contains clinical and resource-use information that is included in a typical discharge abstract, with safeguards to protect the privacy of individual patients, physicians, and hospitals (as required by data sources). The NEDS is composed of more than 100 clinical and nonclinical variables for each hospital stay. These include: • ICD-10-CM/PCS diagnosis, procedure, and external cause of morbidity codes (starting on October 1, 2015) • ICD-9-CM diagnosis, procedures, and external cause of injury codes (prior to October 1, 2015) • Current Procedural Terminology, Fourth Edition (CPT®-4) procedure codes on ED visits that do not result in an admission to the same hospital • Identification of injury-related ED visits and the mechanism and intent of injury (the availability of these data elements varies over time) • Discharge status • Patient demographics characteristics (e.g., sex, age, race/ethnicity, urban-rural designation of residence, national quartile of median household income for patient's ZIP Code) • Expected payment source (e.g., Medicare, Medicaid, private insurance, self-pay, no charge, and other insurance type) • Total ED charges (for ED visits) and total hospital charges (for inpatient stays for ED visits that result in admission) • Hospital characteristics (e.g., region, trauma center indicator, urban-rural location, teaching status) • Data elements derived from the HCUP software tools beginning with data year 2018[2]

Category	Description

Content (*continued*)	Generally, the NEDS is a set of annual files including several discharge-level files and one hospital-level file:
	
	Discharge-Level Files
	• *Core File* contains records for all the ED visits in the SID and SEDD—whether resulting in admission or not—from the sample of hospitals in participating States and the District of Columbia.
	  ○ This file is available in all years of the NEDS.
	• *Supplemental ED File* contains additional information for patients who were treated in the ED and not admitted directly to the hospital (e.g., released home, transferred). This information came from the SEDD.
	  ○ This file is available in all years of the NEDS.
	  ○ The unique NEDS record identifier (KEY_ED) provides the linkage between the NEDS Core File and the Supplemental ED File. For patients seen in the ED and admitted to the same hospital (SID records), information about the stay is contained in the Supplemental Inpatient File.
	• *Supplemental Inpatient File* contains data elements that are specific to the inpatient stay, such as total charges, length of inpatient stay, and procedure codes from the SID record. Procedures reported on the SID records may have been performed in the ED, but currently there is no way to verify this information.
	  ○ This file is available in all years of the NEDS.
	  ○ The unique NEDS record identifier (KEY_ED) provides the linkage between the NEDS Core File and the Supplemental Inpatient File.
	• *Diagnosis and Procedure Groups Files* contain additional information on the ICD-10-CM/PCS diagnoses and procedures created by the HCUP software tools.
	  ○ This file is available in the NEDS beginning with data year 2018.
	
	Hospital-Level File
	• *Hospital File* contains one observation for each hospital-owned ED sampled for the NEDS, with its weight and variance estimation data elements. The unit of observation is the ED.
	  ○ This file is available in all years of the NEDS.
	The HCUP ED hospital identifier (HOSP_ED) provides the linkage between the NEDS Core File and the Hospital Weights File.

Demographic Information	Sex, age, race/ethnicity, urban-rural designation of residence, national quartile of median household income for patient's ZIP Code
Years of Data	NEDS data are available from 2006 through 2022.
Codes to Identify Poisoning Cases	See the poisoning matrix for ICD-10-CM morbidity codes relevant to poisoning.

Category	Description
Other Relevant Information	The NEDS dataset is extremely large. The data are distributed as comma-separated value (CSV) files delivered via secure digital download from the Online HCUP Central Distributor. The files are compressed and encrypted with 7-Zip©. With a file this size and without careful planning, space could easily become a problem in a multi-step process. It is common to produce several versions of a file during data preparation, as well as multiple versions for analysis. Therefore, the amount of space required could escalate rapidly.

National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP)

Category	Description
Contact Information/Sponsor	U.S. Consumer Product Safety Commission (CPSC) and U.S. Centers for Disease Control and Prevention; jointly administered
Description	Data on consumer product-related injuries occurring in the United States, nonfatal
Geographic Scope	100 hospitals as national sample
Availability	Via CDC WISQARS and via CPSC at https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx
Data Collection Methodology	NEISS hospitals are a stratified probability sample of all U.S. hospitals that have at least 6 beds and provide 24-hour ED services. The NEISS-AIP data are collected at a subset of these hospitals and include very large inner-city hospitals with trauma centers, as well as large urban, suburban, rural, and children's hospitals. Trained, onsite hospital coders abstract and code data for injury-related cases from electronic ED records. Coded data and a narrative are transmitted electronically to the NEISS-AIP program where quality assurance coders review and complete the coding. Data are weighted to produce national estimates.
Content	NEISS-AIP collects demographic data, cause and mechanism of injury, intent of injury, principal diagnosis, locale where injury occurred and whether the injury is work-related.
Demographic Information	Age, race, ethnicity
Years of Data	2001-2022
Codes to Identify Poisoning Cases	NEISS coding manual Diagnosis poisoning code = 68 carbon monoxide poisoning = 65
Important Data Considerations	Surveillance data (passive data collection) collected at a sample of U.S. hospital EDs.

Category	Description

Other Relevant Information	• For some incidents identified at the NEISS surveillance level, follow-back investigations are conducted through telephone and on-site interviews with the patient or the patient's relative. Investigation reports provide important information about the likely causes of the incident, including the interaction among person, product, and environment.
	• Commission staff use this information to:
	  ○ Classify incidents by hazard pattern;
	  ○ Provide insight into the type of actions needed to reduce or eliminate the hazards;
	  ○ Identify defective products; and
	  ○ Evaluate the effectiveness of safety standards.

National Electronic Injury Surveillance System – Cooperative Adverse Drug Event Surveillance (NEISS-CADES)

Category	Description
Contact Information/Sponsor	U.S. Consumer Product Safety Commission (CPSC), Food and Drug Administration (FDA) and U.S. Centers for Disease Control and Prevention; jointly administered
Description	NEISS-CADES collects data on all adverse drug events (ADEs) treated in U.S. hospital EDs, whether associated with consumer products or not
Geographic Scope	Subset of NEISS AIP EDs
Availability	2004-2022
Data Collection Methodology	NEISS hospitals are a stratified probability sample of all U.S. hospitals that have at least 6 beds and provide 24- hour ED services. The NEISS-CADES data are collected at a subset of these hospitals and include very large inner-city hospitals with trauma centers, as well as large urban, suburban, rural, and children's hospitals. Trained onsite hospital coders abstract and code data for all cases of adverse drug events (ADEs) treated in the hospital ED. ADEs include allergic reactions, side effects, unintentional overdoses, secondary effects, nonmedical use, and self-harm. Injuries resulting solely from alcohol, tobacco, or illicit drug use are excluded. Data are weighted to produce national estimate
Content	NEISS-CADES collects demographic data, diagnoses, drug data (name of medication, dose, concomitant medications), and tests and treatments performed in the ED
Demographic Information	Age, race, ethnicity
Years of Data	2004-present

Category	Description
Codes to Identify Poisoning Cases	NEISS coding manual Diagnosis poisoning code = 68

National Emergency Medical Services Information System (NEMSIS)

Category	Description
Contact Information/Sponsor	NEMSIS is a product of the National Highway Traffic Safety Administration (NHTSA)'s Office of EMS. The University of Utah is the host of the Technical Assistance Center (TAC). Website: https://nemsis.org/
Description	NEMSIS provides the framework for collecting, storing, and sharing standardized EMS data from states nationwide. The NEMSIS uniform dataset and database help local, state and national EMS partners more accurately assess EMS needs and performance, as well as support better strategic planning for the EMS systems of tomorrow. Data from NEMSIS is also used to help benchmark performance, determine the effectiveness of clinical interventions, and facilitate cost-benefit analyses.
Geographic Scope	As of September 2025, 50 states and three territories (Guam, the U.S. Virgin Islands, and the Northern Mariana Islands) participate in NEMSIS Version 3. Fifty states participate in NEMSIS Version 3.5.
Availability	Each state is allowed four NEMSIS User Accounts. Those accounts are assigned to the following individuals: EMS Data Manager, EMS Medical Director, EMS Director, and EMSC Program Manager.
Data Collection Methodology	Local agencies select elements according to their needs, keeping the national and state elements as part of their selected elements. States select elements from the NEMSIS Dataset according to their needs, keeping the national elements as part of their selection. The national elements are transmitted to the NEMSIS TAC.
Content	Information about the type of EMS data collected by NEMSIS can be found here: https://nemsis.org/technical-resources/version-3/version-3-data-dictionaries/.
Demographic Information	Name, home address, home city, home county, home ZIP Code, country of residence, home census tract, race, age, age units, date of birth, phone number, patient's preferred language(s), sex
Years of Data	NEMSIS V3 data are available from 2017 to present.

Category	Description
Codes to Identify Poisoning Cases	Opioid overdose is a standardized case definition within NEMSIS V3. That case definition can be found here: https://nemsis.org/media/nemsis_v3/master/CaseDefinitions/OpioidOverdose.pdf. *eDispatch.01 - Dispatch Reason* • 2301053 overdose/poisoning/ingestion *eProtocols.01 - Protocols Used* • 9914135 general-overdose/poisoning/toxic ingestion • 9914215 medical-beta blocker poisoning/overdose • 9914217 medical-calcium channel blocker poisoning/overdose • 9914219 medical-opioid poisoning/overdose • 9914225 medical-stimulant poisoning/overdose • 9914135 general-overdose/poisoning/toxic ingestion *dConfiguration.10 - EMS Agency Protocols* • 9914135 general-overdose/poisoning/toxic ingestion • 9914215 medical-beta blocker poisoning/overdose • 9914217 medical-calcium channel blocker poisoning/overdose • 9914219 medical-opioid poisoning/overdose • 9914225 medical-stimulant poisoning/overdose *sConfiguration.06 - Protocols Permitted by the State* • 9914135 general-overdose/poisoning/toxic ingestion • 9914215 medical-beta blocker poisoning/overdose • 9914219 medical-opioid poisoning/overdose • 9914225 medical-stimulant poisoning/overdose

National (Nationwide) Inpatient Sample (NIS)

Category	Description
Contact Information/Sponsor	The National (Nationwide) Inpatient Sample (NIS) is part of a family of databases and software tools developed for the Healthcare Cost and Utilization Project (HCUP). The NIS is the largest publicly available all-payer inpatient healthcare database designed to produce U.S. regional and national estimates of inpatient utilization, access, cost, quality, and outcomes. Unweighted, it contains data from around 7 million hospital stays each year. Weighted, it estimates around 35 million hospitalizations nationally. Developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP data inform decision making at the national, State, and community levels.[71]
Description	The NIS includes a full calendar year of data with diagnosis and procedure codes reported using the ICD-10-CM/PCS coding system. Researchers and policymakers use the NIS to make national estimates of health care utilization, cost, quality, and outcomes. The NIS contains information on all hospital stays, regardless of expected payer for the hospital stay. NIS data are available from 1988 through 2022, which allows analysis of trends over time. Beginning with the 2012 data year, the NIS approximates a 20-percent stratified sample of all discharges from U.S. community hospitals, excluding rehabilitation and long-term acute care hospitals. The NIS was redesigned to improve national estimates.
Geographic Scope	Currently, the number of States participating in the NIS has grown from 8 in the first year to 47, plus the District of Columbia.
Availability	NIS releases for data years 1988 through 2022 are available for purchase online through the Online HCUP Central Distributor.
Data Collection Methodology	The NIS is sampled from the State Inpatient Databases (SID), including all inpatient data that are currently contributed to HCUP.

[71] HCUP Databases. Healthcare Cost and Utilization Project (HCUP). December 2025. Agency for Healthcare Research and Quality, Rockville, MD. hcup-us.ahrq.gov/nisoverview.jsp

Category	Description

Content	The NIS is an annual calendar-year file. There are three discharge-level files and one hospital-level file.
	
	Discharge-level Files
	• *Core File* is a single file containing commonly used data elements (e.g., age, expected primary payer, discharge status, ICD-10-CM/PCS codes, total charges).
	  ○ This file is available in all years of the NIS.
	  ○ Linkage between the discharge-level files
	  ▪ Prior to the 2012 NIS, the HCUP unique record identifier (KEY) provided the linkage between the discharge-level files.
	• *Severity File* is a single file containing additional data elements to aid in identifying the severity of the condition for a specific discharge.
	  ○ This file is available beginning with the 2002 NIS.
	• *Diagnosis and Procedure Groups File* is a single file containing additional information on the ICD-10-CM diagnoses and ICD-10-PCS procedures that is created by the Agency for Healthcare Research and Quality (AHRQ) software tools.
	  ○ This file is available beginning with the 2005 NIS.
	  ○ For data years 2016-2017, this file was not available in the NIS. Data elements derived from the ICD-10-CM/PCS-based AHRQ software tools were not included in the NIS because they were still in development and testing.
	  ○ Beginning with data year 2018, this file is available in the NIS and includes data elements derived from the Clinical Classifications Software Refined (CCSR) for ICD-10-CM diagnoses.
	  ○ Beginning with data year 2019, data elements derived from the Elixhauser Comorbidity Software Refined for ICD-10-CM, the CCSR for ICD-10-PCS procedures, and Procedure Classes Refined for ICD-10-PCS are also available in this file.
	
	Hospital-level Files
	• *Hospital File* is a single file containing information on hospital characteristics.
	  ○ This file is available in all years of the NIS.
	  ○ Linkage between the Inpatient Core File and the Hospital File
	  ▪ Prior to the 2012 NIS, the HCUP hospital identifier (HOSPID) provided the linkage between the NIS Inpatient Core File and the Hospital File.
	  ▪ Beginning with the 2012 NIS, the NIS hospital number (HOSP_NIS) provides the linkage between the NIS Inpatient Core File and the Hospital File. The HOSP_NIS values are reassigned each year, so they cannot be used to link hospitals across years.

Demographic Information	Sex, age, race, median household income for ZIP Code
Years of Data	The NIS is available for years 2000-2014 with ICD-9-CM and 2016-2022 with ICD-10-CM.
Codes to Identify Poisoning Cases	See the poisoning matrix for ICD-10-CM morbidity codes relevant to poisoning.

Category	Description
Important Data Considerations	• AHRQ strongly advises researchers against using the NIS to estimate State-specific statistics. Prior to 2012, State is available as a NIS data element. However, these NIS samples were not designed to yield a representative sample of hospitals at the State level. • Each NIS sample is drawn from the sampling frame consisting of discharge data submitted by HCUP Partners—statewide data organizations that agree to participate in the NIS. Data from non-Partner States are missing completely from the sampling frame, and data from Partner States are sometimes incomplete because of different State reporting requirements, different State restrictions, or other data omissions. The NIS is designed to represent hospitals and discharges nationally, including those outside the sampling frame. • To accomplish this, within each hospital sampling stratum the NIS draws a number of hospitals from the sampling frame required to net a total of 20 percent of hospitals nationally. The sampling strata are defined by census region (4 regions), hospital ownership (3 categories), urban-rural location, teaching status, and bed size (3 categories). As a result, the proportion of NIS hospitals in a stratum that are from a given State is unlikely to equal the State's actual proportion of hospitals in that stratum. Consequently, the sample of NIS hospitals is unlikely to be representative of hospitals in the State, and the NIS sample weights will not be appropriate at the State level. • The level of this "misrepresentation" varies across the States in any given year of the NIS, which further confounds State-to-State comparisons on the basis of State-specific estimates from the NIS. Moreover, for a given State the level of misrepresentation changes from year to year as States (and hospitals) enter and exit the sampling frame over time. This further confounds State-specific trends on the basis of State-specific estimates from the NIS. • Finally, because the NIS was not designed to be representative at the State level, design-based estimates of standard errors are not possible, which severely hampers State-level inferences. Moreover, the NIS is composed of all discharges from a sample of hospitals (a cluster sample). The hospital-to-hospital variation and the small number of hospitals available in the NIS for many States make State-level estimates very imprecise at best and biased at worst.

National Poison Data System® (NPDS)

Category	Description
Contact Information/Sponsor	America's Poison Centers® Address: 4601 Fairfax Drive, Suite 630, Arlington, VA, 22203 Website: https://www.poisonhelp.org/dashboards/ NPDS Data Definitions: https://www.npds.us/Help/NPDS%20Coding%20User%20Manual%20(August%202025).pdf; NPDS Coding Manual: https://www.npds.us/Help/NPDS%20Coding%20User%20Manual%20(June%202023).pdf
Data Description	The National Poison Data System (NPDS) is the data warehouse for the nation's 53 Poison Centers. Each Poison Center submits de-identified case data to NPDS after providing necessary poison exposure management and/or information services to callers. This case information is uploaded to NPDS in near real time, making NPDS a tool for rapid toxicosurveillance and response. Currently, the time to upload data for all Poison Centers is 4.88 minutes. NPDS is used to (1) improve national surveillance capacity for public health threats, (2) identify early markers of incidents of public health significance (IPHSs), and (3) enhance situational awareness and inform public health response during a suspected or known public health threat.
Geographic Scope	53 regional Poison Centers (PCs) serve the entire population of the 50 United States, American Samoa, the District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the U.S. Virgin Islands.
Availability	As of April 2025, all 53 of the nation's Poison Centers upload case data automatically to NPDS.[2] Each year, America's Poison Centers publishes a National Poison Data System (NPDS) annual report. An individual year's report is typically published the following December to allow Poison Centers time to track patient outcomes and update case information.[72] Individual poison centers own their data and may share it professionally by request. NPDS data (national data) may be licensed for a fee.
Data Collection Methodology	America's Poison Centers analyzed case data using methodology from previous years. Cases with medical outcomes of death were evaluated by a team of medical and clinical toxicologists using an ordinal scale of 1-6 to assess the Relative Contribution to Fatality of the exposure.[2] In 2025, all 53 U.S. Poison Centers uploaded case data automatically to NPDS in near real-time, making NPDS one of the few operational systems of its kind. Poison center staff record cases contemporaneously in 1 of 5 electronic medical record systems. Each poison center uploads case data automatically.

[72] Michael C. Beuhler, Ryan Feldman, David D. Gummin, James B. Mowry, Laura J. Rivers, Kaitlyn Brown, Nathaniel P. T. Pham, Krys Johnson-O'Leary, Daniel A. Spyker & Alvin C. Bronstein (2025) 2024 Annual Report of the National Poison Data System® (NPDS) from America's Poison Centers®: 42nd Annual Report, Clinical Toxicology, 63:12, 1029-1280, DOI: 10.1080/15563650.2025.2571299

Category	Description

Content	NPDS surveillance tools include:
	• Volume Alert Surveillance Definitions
	  ○ Total Encounter Volume
	  ○ Human Exposure Case Volume
	  ○ Animal Exposure Case Volume
	  ○ Information Request Volume
	  ○ Clinical Effects Volume (signs and symptoms, or laboratory abnormalities)
	  ○ Syndromic Surveillance Volume allows Boolean based definitions utilizing various NPDS data fields to be run based on historical trends for user defined periods of interest
	• Case-Based Surveillance Definitions utilizing various NPDS data fields linked in Boolean expressions
	  ○ Substance
	  ○ Clinical Effects
	  ○ Species
	  ○ Medical Outcome and others
	• NPDS fatality cases are recorded as Death or Death (Indirect Report).
	  ○ A medical outcome of Death means that the poison center was notified of a death in a case in which poison center personnel were involved in some aspect.
	• Non-human exposures by animal type
	• Distribution of information requests (e.g., could be related to drug, environmental, medical, and occupational poisonings)
	• Site of call and site of exposure in human exposure cases
	• Number of substances involved in human exposure cases
	• Reason for human exposure cases
	• Scenarios for therapeutic errors
	• Route of exposure for human exposure cases
	• Decontamination and therapeutic interventions
	• Prevalence of healthcare utilization and medical outcomes

Demographic Information	Age, sex, pregnancy
Years of Data	Annual data reports are available from 1983 through 2024.
Important Data Considerations	NPDS entries are human or animal "exposure cases," rather than "calls," because a single call may describe more than one case and because the management of an NPDS case often requires more than a single telephone call or contact. The information in this report reflects only individual case entries that are not duplicates, and only those cases that have been designated by the regional poison center as being "closed." A case is closed when the poison center has determined that no further follow-up/recommendations are required or when no further information is available.

Category	Description
Other Relevant Information	Each year, the database is locked prior to extraction of annual report data to ensure consistent, reproducible reports. Additional information including autopsy data on fatalities may be added after the lock date as an addendum to the fatality abstract. Each year since the 2007 annual report, the authors have highlighted a trend in NPDS data with public health importance (e.g., COVID-19, e-cigarette vaping-associated lung injury, adolescent suicides, cannabinoid exposures, and fentanyl fatalities).

National Violent Death Reporting System (NVDRS)

Category	Description
Contact Information/Sponsor	National Center for Injury Prevention and Control (NCIPC), U.S. Centers for Disease Control and Prevention Address: 4770 Buford Hwy, Atlanta, GA, 30341 Website: https://www.cdc.gov/nvdrs/about/index.html
Description	Incident/case count surveillance system for participating states. NVDRS compiles detailed data for these types of cases: suicides, homicides, deaths that occur while in custody of law enforcement or a correctional facility (excluding legal executions), all firearm related deaths, and deaths of underdetermined manner, including undetermined intent drug overdose deaths. The goals of NVDRS are to: • collect and analyze timely, high-quality data for monitoring the magnitude and characteristics of violent deaths and suicides at national, state, and local levels; • ensure data are disseminated routinely and expeditiously to public health officials, law enforcement officials, policymakers, and the public; • ensure data are used to develop, implement, and evaluate programs and strategies that are intended to reduce and prevent violent deaths and suicides at national, state, and local levels; and • build and strengthen partnerships among organizations and communities at national, state, and local levels to ensure that data are collected and used to reduce and prevent violent deaths and suicides.
Geographic Scope	50 U.S. states, the District of Columbia, and Puerto Rico
Availability	CDC's Injury Center distributes information from NVDRS at the national level in both summary and topic-specific reports. Fact sheets for data providers including law enforcement, and ME/Cs are available on the NVDRS Resources webpage. Descriptive data can be accessed free of charge from the Web-Based Injury Statistics Query and Reporting System (WISQARS) NVDRS module. The NVDRS Restricted Access Database (RAD) is also available to researchers who meet specific criteria.

Category	Description
Data Collection Methodology	NVDRS-participating states collect existing data using standardized format from four major sources: death certificates, ME/C reports (including toxicology); law enforcement and crime lab reports.
Content	NVDRS collects detailed information about violent deaths, for all age groups and includes information on: • Injury characteristics (e.g., cause of death, type of location) • Demographics (e.g., sex, race/ethnicity) • Circumstances that preceded or were related to a victim's death • Mental health diagnoses • Toxicology • Narratives that provide a summary of the incident based on law enforcement and ME/C reports • More than 600 other unique data elements
Demographic Information	Person type (victim or suspect), age, date of birth, sex, race categories, ethnicity, residential address, autopsy performed, pregnant, manner of death, date, time of injury, type of location of incident, injured at work, injury address, survival time, education, usual occupation, and industry
Years of Data	Varies by state starting in 2003
Codes to Identify Poisoning Cases	• Poison Variables: Type of poison, poison code, patient drug obtained for, strength of pill (mg), number of pills (upper, lower bound), estimated amount of liquid poison ingested (mL), and carbon monoxide source, if CO. • Toxicology Variables (Victim only): Date, time specimens collected, alcohol testing, blood alcohol level, drug testing, amphetamines, antidepressants, cocaine, marijuana, opiates, other drugs.
Important Data Considerations	NVDRS includes intentional or undetermined intent drug overdose deaths. Unlike the existing national data systems, such as death certificates and the Federal Bureau of Investigation's Supplementary Homicide Reports, NVDRS can identify specific subtypes of violence, such as combination murder-suicides and assault weapon shootings, and can identify cases of intimate partner violence and child abuse (but not neglect) deaths with more precision. This is because NVDRS collects data on circumstances and scene evidence to provide additional context surrounding violent deaths. Undetermined intent drug overdose deaths are also captured in the State Unintentional Drug Overdose Reporting System (SUDORS), with additional details about overdose-specific circumstances available in that system; see SUDORS table below.
Other Relevant Information	Restricted data contain confidential information that could lead to disclosure of the identity of suspects and victims. CDC protects these data by maintaining them on a secure, non-networked server. Individuals who apply for and complete a restricted access data agreement may obtain access to these data for legitimate research purposes.

National Vital Statistics System (NVSS) – Mortality (ICD-10)

Category	Description
Contact Information/Sponsor	Division of Vital Statistics, National Center for Health Statistics (NCHS), U.S. Centers for Disease Control and Prevention (CDC) Address: 3311 Toledo Rd, Hyattsville, MD 20782 Website: https://www.cdc.gov/nchs/nvss/
Description	Census of all death certificates filed in the 50 States and the District of Columbia. Non-resident deaths occurring in the U.S. are included in the national data file. Official tabulations, however, are typically limited to U.S. residents.
Geographic Scope	50 states, two cities (Washington DC and New York City), and five territories (Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands).
Availability	• Public-use multiple cause of death (MCOD) files are available online at: http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm#Mortality_Multiple • From 2005 onward the public-use MCOD files do not contain state or county identifiers. Request these data by submitting a proposal (see http://www.cdc.gov/nchs/nvss/dvs_data_release.htm). • Other items such as birth dates and death dates can be accessed via NCHS' Research Data Center. • MCOD data are available on CDC interactive data system WONDER in the MCOD application https://wonder.cdc.gov/mcd.html. • Data on leading causes of injury death and counts and rates by mechanism and intent of injury are available from WISQARS (www.cdc.gov/injury/wisqars). • Provisional data on drug overdose deaths, with a shorter time lag but subject to change, are available at: Products - Vital Statistics Rapid Release - Provisional Drug Overdose Data
Data Collection Methodology	Administrative records (death certificates) completed by physicians, ME/Cs and funeral directors are filed with State vital statistics offices; selected statistical information is forwarded to NCHS to be merged into a national statistical file. Beginning with 1989, revised standard certificates replaced the 1978 versions; another revision was done in 2003. Demographic information on the death certificate is provided by the funeral director and is based on information supplied by an informant. Medical certification of cause of death is provided by the physician or ME/C.
Content	Public-use: Year of death, day of week, month of death, underlying and multiple causes of death, injury at work (beginning in 1993), place of death, educational attainment (beginning in 1989) for selected state, whether an autopsy was performed (missing 1995-2002). Restricted access: state and county of decedent's residence, state and county death occurred.
Demographic Information	Sex, race, Hispanic origin (beginning in 1984), age at death, place of decedent's residence, educational attainment (beginning in 1989) for selected states, marital status (beginning in 1979). Restricted access: place of birth (state), date of birth (after 1989).

Category	Description
Years of Data	The data system began in 1900, but not all states participated before 1933. Coverage for deaths has been complete since 1933. Electronic data files have been available since 1968.
Codes to Identify Poisoning Cases	• Up to 20 causes of death reported using ICD-10 (1999 to present); ICD-9 (1979- 1998); Underlying Cause of Death ICD-10: X40-X49, X60-X69, X85-X90, T10-Y19, Y35.2 (Acute Poisonings and Intoxications) X20-X29 (Venomous Plants & Animals) • Immediate and Contributing Causes of Death ICD-10: T36-T50 (Drugs, Medicaments, & Biological Substances) T51-T65 (Non-medical Toxic Affects)
Important Data Considerations	Several factors related to death investigation and reporting may affect measurement of death rates involving specific drugs. At autopsy, toxicological lab tests may be performed to determine the type of legal and illegal drugs present. The substances tested for and circumstances in which the tests are performed vary by jurisdiction. Increased attention to fatal poisonings associated with prescription pain medication may have led to changes in reporting practices over time such as increasing the level of substance specific detail included on the death certificates. Substance specific death rates are more susceptible to measurement error related to these factors than the overall poisoning death rate.

Sentinel Event Notification System for Occupational Risk (SENSOR) - Pesticides

Category	Description
Contact Information/Sponsor	National Institute for Occupational Safety and Health (NIOSH), U.S. Centers for Disease Control and Prevention In some states, EPA also contributes funding.
Description	In general, SENSOR is a program to identify 'sentinel' events to uncover root causes of adverse health outcomes to facilitate the prevention of such cases. SENSOR-Pesticides focuses on acute occupational pesticide-related injury and illness (note that some states include non-occupational cases). The data collected are used to identify high risk groups, identify clusters, detect trends, identify high-risk active ingredients, identify illnesses that occur even when the pesticide is used correctly, and refer cases to regulatory agencies for intervention.
Geographic Scope	11 states (as of November 2025)
Availability	Data from participating states are presented at: https://wwwn.cdc.gov/Niosh-whc/source/SENSOR. Note that these data are limited to 1998-2011.

Category	Description
Data Collection Methodology	All states in the program require physicians to report pesticide-related injuries and illnesses; however, most states collect the majority of their data from workers' compensation claims, poison control centers, and state agencies with jurisdiction over pesticide use, such as state departments of agriculture. States may request medical records and attempt patient interviews. Once all information is gathered for a reported pesticide poisoning case, the health department (or its designee) classifies it into one of the following categories: Definite, Probable, Possible, Suspicious, Unlikely, Insufficient Information, Asymptomatic, or Unrelated. Only cases meeting classifications of Definite, Probable, Possible, and Suspicious are reported to the National Public Health Surveillance system. States submit data to NIOSH annually to create a national database. In addition to identifying, classifying, and tabulating pesticide poisoning cases, states investigate pesticide-related events and develop interventions aimed at particular industries or pesticide hazards.
Content	Acute pesticide-related illness or injury. Data collected include the pesticide product information, the industry, occupation, and exposure details, the health effects, and contributing factors.
Demographic Information	Sex, age, race, ethnicity, industry, occupation
Years of Data	1998-2011
Codes to Identify Poisoning Cases	Potential cases may be found within ICD-10-CM diagnosis code T60 (Toxic effect of pesticides) National Poison Data System Call Subcategory codes 500, 510
Important Data Considerations	• The term 'pesticide' includes insecticides, herbicides, fungicides, rodenticides, and disinfectants. • A case of pesticide-related illness or injury is characterized by an acute onset of symptoms that are temporally related to pesticide exposure. • The assignment of case status (e.g., Definite, Probable) is based on criteria related to 1) documentation of exposure; 2) documentation of adverse health effects; and 3) evidence supporting a causal relationship between the pesticide exposure and health effects. For more information on case classification, see the Council of State and Territorial Epidemiologists (CSTE) position statement 09-OH-03 at https://www.cste.org/page/PositionStatements. • Cases are classified as occupational if exposure occurs at work unless the case was a suicide or an attempted suicide. Illness severity is assigned as low, moderate, severe, or fatal.
Other Relevant Information	For more information on pesticide poisoning surveillance, see: https://www.cdc.gov/niosh/surveillance/pesticide/build-a-pesticide-surveillance-program.html.

State Level Emergency Department Data

Category	Description
Contact Information/Sponsor	All Payers Claims Databases and other billing datasets can either be housed in a state agency or by a separate entity; the contact information and sponsor will vary depending on the jurisdiction.
Description	An administrative billing dataset containing diagnosis and procedure codes reported using the ICD-10-CM/PCS coding system for insurance billing purposes.
Geographic Scope	The billing dataset contains ZIP Code, county, and state-level information, though data use agreements may have sharing limitations at the ZIP Code-level.
Availability	Available through contracts and data use agreements with the jurisdiction's health authority. Jurisdictions participating in the Overdose Data to Action grant report discharge data to the CDC, which is compiled on a national dashboard available online: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-discharge-data.html.
Data Collection Methodology	The ICD-10-CM is a morbidity classification for classifying diagnoses and reason for visits in all healthcare settings. Healthcare providers assign codes to diagnoses in patient medical records and then is sent to insurers for billing and health authorities for public health tracking.
Content	Primary Diagnosis and Diagnoses 2-30, Current Procedure Terminology (CPT) Codes 1-15, date of birth, injury codes, length of stay, patient status (at discharge), patient geographic information (ZIP Code, county of residence, state of residence), insurance payer information, place of service, priority of admission, admit and discharge dates, demographic information (sex, race, ethnicity), sometimes Admitting Diagnosis, sometimes medical record number.
Demographic Information	Age, sex, race, ethnicity (sometimes combined with race), date of birth, county of residence
Years of Data	Data for 2018-2024 are available in CDC's Nonfatal Drug Overdose ED and Inpatient Hospitalization Data Dashboard. (The transition to ICD-10-CM occurred on October 1, 2015; data may not be fully comparable to ICD-9-CM codes from before the transition).

Category	Description
Codes to Identify Poisoning Cases	• All drug overdose: T36-T50.XX(1-4)A • Drugs with abuse potential: T40.(0-9)x(1-4)A, T42.3X(1-4)A, T42.4X(1-4)A, T43.6X(1-4)A, T51.0X(1-4)A, T65.2X(1-4)A • Any opioid (includes prescription sources, fentanyl, and heroin): T40.(0-4)X(1-4)A, T40.60(1-4)A, T40.69(1-4)A • Heroin: T40.1X(1-4)A • Synthetic opioids: T40.4x(1-4)A • Benzodiazepines: T42.4X(1-4)A • Muscle relaxants: T48.1X(1-4)A • Anticonvulsant/anti-seizure drugs: T42.6X(1-4)A, T42.7X(1-4)A • Cocaine: T40.5X(1-4)A • Non-cocaine stimulants (includes amphetamines): T43.60(1-4)A, T43.6(1-4)(1-4)A, T43.69(1-4)A • Amphetamines: T43.62(1-4)A
Important Data Considerations	ICD-10-CM codes are used for administrative billing data and may not necessarily capture all information relevant to a nonfatal overdose or poisoning.

State Level Hospital Inpatient Discharge Data

Category	Description
Contact Information/Sponsor	All Payers Claims Databases and other billing datasets can either be housed in a state agency or by a separate entity; the contact information and sponsor will vary depending on the jurisdiction.
Description	An administrative billing dataset containing diagnosis and procedure codes reported using the ICD-10-CM/PCS coding system for insurance billing purposes.
Geographic Scope	The billing dataset contains ZIP Code, county, and state-level information, though data use agreements may have sharing limitations at the ZIP Code-level.
Availability	Available through contracts and data use agreements with the jurisdiction's health authority. Jurisdictions participating in the Overdose Data to Action grant report discharge data to the CDC, which is compiled on a national dashboard available online: https://www.cdc.gov/overdose-prevention/data-research/facts-stats/dose-dashboard-nonfatal-discharge-data.html.
Data Collection Methodology	The ICD-10-CM is a morbidity classification for classifying diagnoses and reason for visits in all healthcare settings. Healthcare providers assign codes to diagnoses in patient medical records, which are sent to insurers for billing and health authorities for public health tracking.

Category	Description
Content	Primary Diagnosis and Diagnoses 2-30, Current Procedure Terminology (CPT) Codes 1-15, date of birth, injury codes, length of stay, patient status (at discharge), patient geographic information (ZIP Code, county of residence, state of residence), insurance payer information, place of service, priority of admission, admit and discharge dates, demographic information (sex, race, ethnicity), sometimes Admitting Diagnosis, sometimes medical record number.
Demographic Information	Age, sex, race, ethnicity (sometimes combined with race), date of birth, county of residence
Years of Data	Data for 2018-2024 are available in CDC's Nonfatal Drug Overdose ED and Inpatient Hospitalization Data Dashboard. (The transition to ICD-10-CM occurred on October 1, 2015; data may not be fully comparable to ICD-9-CM codes from before the transition).
Codes to Identify Poisoning Cases	• All drug overdose: T36-T50.XX(1-4)A • Drugs with abuse potential: T40.(0-9)x(1-4)A, T42.3X(1-4)A, T42.4X(1-4)A, T43.6X(1-4)A, T51.0X(1-4)A, T65.2X(1-4)A • Any opioid (includes prescription sources, fentanyl, and heroin): T40.(0-4)X(1-4)A, T40.60(1-4)A, T40.69(1-4)A • Heroin: T40.1X(1-4)A • Synthetic opioids: T40.4x(1-4)A • Benzodiazepines: T42.4X(1-4)A • Muscle relaxants: T48.1X(1-4)A • Anticonvulsant/anti-seizure drugs: T42.6X(1-4)A, T42.7X(1-4)A • Cocaine: T40.5X(1-4)A • Non-cocaine stimulants (includes amphetamines): T43.60(1-4)A, T43.6(1-4)(1-4)A, T43.69(1-4)A • Amphetamines: T43.62(1-4)A
Important Data Considerations	ICD-10-CM codes are used for administrative billing data and may not necessarily capture all information relevant to a nonfatal overdose or poisoning.

State Unintentional Drug Overdose Reporting System (SUDORS)

Category	Description
Contact Information/Sponsor	National Center for Injury Prevention and Control (NCIPC), U.S. Centers for Disease Control and Prevention Address: 4770 Buford Hwy, Atlanta, GA, 30341 Website: About the State Unintentional Drug Overdose Reporting System (SUDORS) | Overdose Prevention | CDC
Description	CDC's Overdose Data to Action in States (OD2A-S) program supports 49 states and the District of Columbia to provide comprehensive data to the State Unintentional Drug Overdose Reporting System (SUDORS). Each of these 50 funded jurisdictions collects and abstracts data on unintentional and undetermined intent drug overdose deaths from death certificates, ME/C reports, and postmortem toxicology reports for entry into a web-based CDC platform that is shared with the National Violent Death Reporting System (NVDRS). The goal of SUDORS is to inform overdose prevention and response efforts by: • Providing a better understanding of the circumstances that surround overdose deaths, • Identifying specific substances causing or contributing to overdose deaths, as well as emerging and polysubstance overdose trends, and • Improving fatal overdose data timeliness and accuracy.
Geographic Scope	49 U.S. states and the District of Columbia. North Dakota is the only state not participating.
Availability	CDC's Injury Center distributes information from SUDORS at the national level in both summary and topic-specific reports. Descriptive data can be accessed free of charge from the SUDORS Dashboard: Fatal Drug Overdose Data | Overdose Prevention | CDC. Some jurisdictions produce additional reports by state or locality. Access to line-level data by state program varies.
Data Collection Methodology	SUDORS-participating jurisdictions collect existing data on drug overdose deaths using a standardized format from three major sources: death certificates, ME/C reports, and postmortem toxicology reports.

Category	Description
Content	SUDORS collects the same data elements as NVDRS due to the shared web-based CDC platform, in addition to drug and circumstance data specific to unintentional and undetermined intent drug overdose deaths. These fields include: *Death Certificates* • Demographics • County and state where overdose occurred • Cause and manner of death • Other significant conditions contributing to death • How overdose occurred • Place of death (e.g., hospital, home) • Date of death *Medical Examiner/Coroner Reports* • History of prior overdoses • Treatment for substance use disorders • Prescription drug misuse or illegal drug use history • Routes of drug use (e.g., injection, smoking) • Presence of bystanders • Naloxone administration *Postmortem Toxicology* • All drugs detected • Drugs contributing to death • Date specimens were collected
Demographic Information	Age, date of birth, sex, race categories, ethnicity, residential address, autopsy performed, pregnant, manner of death, date, time of injury, type of location of incident, injured at work, injury address, survival time, education, usual occupation, and industry.
Years of Data	Varies by state starting in 2016 for opioid overdose deaths and in 2019 for all drug overdose deaths.
Codes to Identify Poisoning Cases	All deaths included in SUDORS are unintentional or undetermined intent overdose deaths and therefore are all poisoning cases. Multiple methods are used by funded jurisdictions to identify unintentional and undetermined intent drug overdose deaths for inclusion in SUDORS. Jurisdictions can use relevant ICD-10 cause of death codes (X40–X44 and Y10–Y14), for unintentional and undetermined intent overdose deaths, respectively; scans of the text-based cause of death information; and reviews of ME/C reports to identify unintentional and undetermined intent drug overdose deaths.

Category	Description
Important Data Considerations	SUDORS includes unintentional and undetermined intent drug overdose deaths through the detection of cases using multiple methods, including ICD-10 cause of death codes, text-based scans of cause of death information, and reviews of ME/C reports. SUDORS includes data on the drugs that caused death as well as additional drugs detected to provide a more thorough picture of what drugs were being used at the time of death and of polysubstance use than is available elsewhere. The SUDORS system is flexible, allowing for new drugs to be added in real-time so that SUDORS staff can quickly capture newly emerging drugs. It captures information on specific drugs rather than just drug classes. SUDORS data on circumstances and scene evidence provide the context surrounding overdose deaths.
Other Relevant Information	Restricted data contain confidential information that could lead to disclosure of the identity of individuals. CDC protects these data by maintaining them on a secure, non-networked server.

State Vital Statistics: Death Certificates

Category	Description
Contact Information/Sponsor	State Office of Vital Records
Description	Death certificates provide the official, legal record of a death. Every death in the United States must be legally registered. The information contained on death certificates is useful for surveillance purposes to monitor causes of death in the United States.
Geographic Scope	Currently, all fifty states maintain vital statistics from death certificates, which are sent to the National Vital Statistics System (NVSS).
Availability	Accessibility of state vital statistics depends on the jurisdiction.
Data Collection Methodology	On a death certificate, demographic information is typically completed by a funeral director (e.g., name, race, marital status), and a physician or ME/C completes the medical information (e.g., immediate cause of death, underlying conditions). Death certificates are filed either electronically through an electronic death registration system (EDRS) or via paper filing to the local registrar. The State Office of Vital Records reviews submitted death certificates for data completion and accuracy before submission to the NVSS.
Content	Death certificates contain demographic information and death information, including ICD-10 mortality codes.
Demographic Information	Death certificates usually include name, sex, date of birth and death, age at death, place of death, place of residence, race, ethnicity, marital status, education level, occupation, industry, and place of birth.

Category	Description
Years of Data	The years of data available through the State Office of Vital Records depends on the jurisdiction.
Codes to Identify Poisoning Cases	See the poisoning matrix for ICD-10 mortality codes relevant to poisoning.

Additional Data Sources

- State-level workers' compensation data
- FDA Adverse Event Reporting System (FAERS)
- Automation of Reports and Consolidated Orders System (ARCOS)
- National Electronic Injury Surveillance System – Occupational Supplement (NEISS-Work)
- Prescription Drug Monitoring Programs (PDMP)
- Surveys
    - Behavioral Risk Factor Surveillance System (BRFSS)
    - Monitoring the Future (MTF)
    - National Hospital Care Survey (NHCS)
    - National Survey on Drug Use and Health (NSDUH)
    - Survey of Occupational Injuries and Illnesses (SOII)
    - Youth Risk Behavior Surveillance System (YRBSS)

Appendix B: Poisoning Matrix for ICD-10-CM Coded Morbidity Data

Notes:

- An asterisk (*) beside a category/subcategory indicates that rows nested below that category/subcategory do NOT include all possible codes.
- Intent information is captured in the 5th character of the following codes: T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9. Intent is captured in 6th character of all other T36-T50 codes.
- Intent information is captured in the 5th character of the following codes: T51.9, T52.9, T53.9, T54.9, T56.9, T57.9, T58.0, T58.1, T58.9, T59.9, T60.9, T61.0, T61.1, T61.9, T62.9, T63.9, T64.0, T64.8, and T65.9. Intent is captured in 6th character of all other T51-T65 codes.
- All codes must have 7th character of A or missing indicative of initial encounter, active treatment

Drug

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
Drug (All)	**T36-T50 with intent character of 1**	**T36-T50 with intent character of 2**	**T36-T50 with intent character of 3**	**T36-T50 with intent character of 4**	**T36-T50 with intent character of 5**	**T36-T50**
Systemic Antibiotics, Anti-infectives, antiparasitics	T36, T37 with intent character of 1	T36, T37 with intent character of 2	T36, T37 with intent character of 3	T36, T37 with intent character of 4	T36, T37 with intent character of 5	T36, T37
Hormones and Synthetic substitutes	T38 with intent character of 1	T38 with intent character of 2	T38 with intent character of 3	T38 with intent character of 4	T38 with intent character of 5	T38
Nonopioid analgesics, Antipyretics, and Antirheumatics*	T39 with intent character of 1	T39 with intent character of 2	T39 with intent character of 3	T39 with intent character of 4	T39 with intent character of 5	T39

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
4-Aminophenol derivatives (incl. acetaminophen)	T39.1					T39.1
Opioids*	T40.0-T40.4, T40.6 with intent character of 1	T40.0-T40.4, T40.6 with intent character of 2	T40.0-T40.4, T40.6 with intent character of 3	T40.0-T40.4, T40.6 with intent character of 4	T40.0-T40.4, T40.6 with intent character of 5	T40.0-T40.4, T40.6
Heroin	T40.1 with intent character of 1	T40.1 with intent character of 2	T40.1 with intent character of 3	T40.1 with intent character of 4	T40.1 with intent character of 5	T40.1
Methadone	T40.3 with intent character of 1	T40.3 with intent character of 2	T40.3 with intent character of 3	T40.3 with intent character of 4	T40.3 with intent character of 5	T40.3
*Synthetic narcotics**	T40.4 with intent character of 1	T40.4 with intent character of 2	T40.4 with intent character of 3	T40.4 with intent character of 4	T40.4 with intent character of 5	T40.4
Fentanyl or Fentanyl analogs	T40.41 with intent character of 1	T40.41 with intent character of 2	T40.41 with intent character of 3	T40.41 with intent character of 4	T40.41 with intent character of 5	T40.41
Cocaine	T40.5 with intent character of 1	T40.5 with intent character of 2	T40.5 with intent character of 3	T40.5 with intent character of 4	T40.5 with intent character of 5	T40.5
Psychostimulants*	T43.6 with intent character of 1	T43.6 with intent character of 2	T43.6 with intent character of 3	T43.6 with intent character of 4	T43.6 with intent character of 5	T43.6
Amphetamines	T43.62 with intent character of 1	T43.62 with intent character of 2	T43.62 with intent character of 3	T43.62 with intent character of 4	T43.62 with intent character of 5	T43.62
Ecstasy	T43.64 with intent character of 1	T43.64 with intent character of 2	T43.64 with intent character of 3	T43.64 with intent character of 4	T43.64 with intent character of 5	T43.64
Methamphetamine	T43.65 with intent character of 1	T43.65 with intent character of 2	T43.65 with intent character of 3	T43.65 with intent character of 4	T43.65 with intent character of 5	T43.65
Cannabis	T40.7 with intent character of 1	T40.7 with intent character of 2	T40.7 with intent character of 3	T40.7 with intent character of 4	T40.7 with intent character of 5	T40.7
Other Psychodysleptics	T40.8, T40.9 with intent character of 1	T40.8, T40.9 with intent character of 2	T40.8, T40.9 with intent character of 3	T40.8, T40.9 with intent character of 4	T40.8, T40.9 with intent character of 5	T40.8, T40.9

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
Antidepressants	T43.0-T43.2 with intent character of 1	T43.0-T43.2 with intent character of 2	T43.0-T43.2 with intent character of 3	T43.0-T43.2 with intent character of 4	T43.0-T43.2 with intent character of 5	T43.0-T43.2
Other Psychotropic Drugs	T43.3-T43.5, T43.8, T43.9 with intent character of 1	T43.3-T43.5, T43.8, T43.9 with intent character of 2	T43.3-T43.5, T43.8, T43.9 with intent character of 3	T43.3-T43.5, T43.8, T43.9 with intent character of 4	T43.3-T43.5, T43.8, T43.9 with intent character of 5	T43.3-T43.5, T43.8, T43.9
Anesthetics and therapeutic gases	T41 with intent character of 1	T41 with intent character of 2	T41 with intent character of 3	T41 with intent character of 4	T41 with intent character of 5	T41
Antiepileptic, sedative-hypnotic and antiparkinsonism drugs*	T42 with intent character of 1	T42 with intent character of 2	T42 with intent character of 3	T42 with intent character of 4	T42 with intent character of 5	T42
Barbiturates	T42.3 with intent character of 1	T42.3 with intent character of 2	T42.3 with intent character of 3	T42.3 with intent character of 4	T42.3 with intent character of 5	T42.3
Benzodiazepines	T42.4 with intent character of 1	T42.4 with intent character of 2	T42.4 with intent character of 3	T42.4 with intent character of 4	T42.4 with intent character of 5	T42.4
Drugs primarily affective the autonomic nervous system	T44 with intent character of 1	T44 with intent character of 2	T44 with intent character of 3	T44 with intent character of 4	T44 with intent character of 5	T44
Primarily systemic and hematological agents	T45 with intent character of 1	T45 with intent character of 2	T45 with intent character of 3	T45 with intent character of 4	T45 with intent character of 5	T45
Anticoagulants	T45.5 with intent character of 1	T45.5 with intent character of 2	T45.5 with intent character of 3	T45.5 with intent character of 4	T45.5 with intent character of 5	T45.5
Drugs primarily affecting the Cardiovascular, Gastrointestinal, Smooth & skeletal muscle, & Respiratory systems	T46-T48 with intent character of 1	T46-T48 with intent character of 2	T46-T48 with intent character of 3	T46-T48 with intent character of 4	T46-T48 with intent character of 5	T46-T48

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
Topical agents, ophthalmological, otorhinolaryngological and dental drugs	T49 with intent character of 1	T49 with intent character of 2	T49 with intent character of 3	T49 with intent character of 4	T49 with intent character of 5	T49
Other drugs, medicaments, and biological substances	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99 with intent character of 1	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99 with intent character of 2	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99 with intent character of 3	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99 with intent character of 4	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99 with intent character of 5	T50.0-T50.8, T50.A, T50.B, T50.Z, T50.99
Unspecified drugs, medicaments, and biological substances	T50.90, T50.91 with intent character of 1	T50.90, T50.91 with intent character of 2	T50.90, T50.91 with intent character of 3	T50.90, T50.91 with intent character of 4	T50.90, T50.91 with intent character of 5	T50.90, T50.91

Nondrug

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Legal Intervention/ Operation of War	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
Nondrug (All)	**T51-T65 with intent character of 1**	**T51-T65 with intent character of 2**	**T51-T65 with intent character of 3 Y38.6, Y38.7**	**Y35.2, Y36.7, Y37.7**	**T51-T65 with intent character of 4**	**N/A**	**T51-T65, Y35.2, Y38.6, Y38.7, Y36.7, Y37.7**
Alcohol*	T51 with intent character of 1	T51 with intent character of 2	T51 with intent character of 3		T51 with intent character of 4		T51
Ethanol	T51.0 with intent character of 1	T51.0 with intent character of 2	T51.0 with intent character of 3		T51.0 with intent character of 4		T51.0
Tobacco & Nicotine	T65.2 with intent character of 1	T65.2 with intent character of 2	T65.2 with intent character of 3		T65.2 with intent character of 4		T65.2
Carbon monoxide	T58 with intent character of 1	T58 with intent character of 2	T58 with intent character of 3		T58 with intent character of 4		T58

Source of Poisoning	External Cause - Unintentional	External Cause - Self Harm	External Cause - Assault	External Cause - Legal Intervention/ Operation of War	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types
Organic solvents & their vapors	T52 with intent character of 1	T52 with intent character of 2	T52 with intent character of 3		T52 with intent character of 4		T52
Halogenated hydrocarbons & their vapors	T53 with intent character of 1	T53 with intent character of 2	T53 with intent character of 3		T53 with intent character of 4		T53
Other gases, fumes, & vapors	T59 with intent character of 1	T59 with intent character of 2	T59 with intent character of 3	Y35.2	T59 with intent character of 4		T59, Y35.2
Noxious substances eaten as food	T61, T62, T64 with intent character of 1	T61, T62, T64 with intent character of 2	T61, T62, T64 with intent character of 3		T61, T62, T64 with intent character of 4		T61, T62, T64
Envenomation	T63 with intent character of 1	T63 with intent character of 2	T63 with intent character of 3		T63 with intent character of 4		T63
Plants	T63.7 with intent character of 1	T63.7 with intent character of 2	T63.7 with intent character of 3		T63.7 with intent character of 4		T63.7
Animals	T63.1-T63.6, T63.8-T63.9 with intent character of 1	T63.1-T63.6, T63.8-T63.9 with intent character of 2	T63.1-T63.6, T63.8-T63.9 with intent character of 3		T63.1-T63.6, T63.8-T63.9 with intent character of 4		T63.1-T63.6, T63.8-T63.9
Other specified nondrugs	T54-T57, T60, T65.0-T65.1, T65.3-T65.6, T65.8 with intent character of 1	T54-T57, T60, T65.0-T65.1, T65.3-T65.6, T65.8 with intent character of 2	T54-T57, T60, T65.0-T65.1, T65.3-T65.6, T65.8 with intent character of 3		T54-T57, T60, T65.0-T65.1, T65.3-T65.6, T65.8 with intent character of 4		T54-T57, T60, T65.0-T65.1, T65.3-T65.6, T65.8
Unspecified nondrugs	T65.9 with intent character of 1	T65.9 with intent character of 2	T65.9 with intent character of 3 Y38.6, Y38.7	Y36.7, Y37.7	T65.9 with intent character of 4		T65.9, Y38.6, Y38.7, Y36.7, Y37.7
All Types of Poison	**T36-T65 with intent character of 1**	**T36-T65 with intent character of 2**	**T36-T65 with intent character of 3 Y38.6, Y38.7**	**Y35.2, Y36.7, Y37.7**	**T36-T65 with intent character of 4**	**T36-T50 with intent character of 5**	**T36-T65, Y35.2, Y38.6, Y38.7, Y36.7, Y37.7**

Appendix C: Poisoning Matrix for ICD-10 Coded Mortality Data

Note: An asterisk (*) beside a category/subcategory indicates that rows nested below that category/subcategory do NOT include all possible codes.

Drug

Source of Poisoning	External Cause - Unintentional	External Cause - Suicide	External Cause - Homicide	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types	**Multiple Cause of Death Codes –** *These codes are only considered for poisoning deaths (i.e., deaths where the UCOD is a relevant poisoning code)*
Drug (All)	**X40-X44**	**X60-X64**	**X85**	**Y10-Y14**	**Y40-Y59**	**X40-X44, X60-X64, X85, Y10-Y14, Y40-Y59**	**T36-T50**
Nonopioid analgesics, Antipyretics, and Antirheumatics*	X40	X60		Y10	Y45.1-Y45.9	X40, X60, Y10, Y45.1-Y45.9	T39
4-Aminophenol derivatives (incl. acetaminophen)					Y45.5	Y45.5	T39.1
Antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified	X41	X61		Y11	Y46, Y47, Y49.0-Y49.5, Y49.7-Y49.9	X41, X61, Y11, Y46, Y47, Y49.0-Y49.5, Y49.7-Y49.9	T42, T43
Antidepressants					Y49.0-Y49.2	Y49.0-Y49.2	T43.0-T43.2
Psychostimulants					Y49.7	Y49.7	T43.6
Other Psychotropic Drugs					Y49.3-Y49.5, Y49.8, Y49.9	Y49.3-Y49.5, Y49.8, Y49.9	T43.3-T43.5, T43.8, T43.9
*Antiepileptic, sedative- hypnotic and antiparkinsonism drugs**					Y47	Y47	T42

Source of Poisoning	External Cause - Unintentional	External Cause - Suicide	External Cause - Homicide	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types	**Multiple Cause of Death Codes –** *These codes are only considered for poisoning deaths (i.e., deaths where the UCOD is a relevant poisoning code)*
Barbiturates					Y47.0	Y47.0	T42.3
Benzodiazepines					Y47.1	Y47.1	T42.4
Narcotics and psychodysleptics [hallucinogens], not elsewhere classified	X42	X62		Y12	Y45.0, Y49.6, Y49.7	X42, X62, Y12, Y45.0, Y49.6, Y49.7	T40
Opioids*					Y45.0	Y45.0	T40.0-T40.4, T40.6
Heroin							T40.1
National and semi-synthetic opioid analgesics							T40.2
Methadone							T40.3
Synthetic narcotics (synthetic opioid analgesics excluding methadone)							T40.4
Cannabis							T40.7
Other Psychodysleptics					Y49.6	Y49.6	T40.8, T40.9
Cocaine							T40.5
Drugs primarily acting on the autonomic nervous system	X43	X63		Y13	Y51	X43, X63, Y13, Y51	T44
Other and unspecified drugs, medicaments and biological substances	X44	X64	X85	Y14	Y40-Y44, Y48, Y50, Y52-Y59	X44, X64, X85, Y14, Y40-Y44, Y48, Y50, Y52-Y59	T36-T38, T41, T45-T50

Source of Poisoning	External Cause - Unintentional	External Cause - Suicide	External Cause - Homicide	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types	**Multiple Cause of Death Codes –** *These codes are only considered for poisoning deaths (i.e., deaths where the UCOD is a relevant poisoning code)*
Systemic Antibiotics, Anti-infectives, antiparasitics					Y40, Y41	Y40, Y41	T36, T37
Hormones & Synthetic substitutes					Y42	Y42	T38
Anesthetics and therapeutic gases					Y48	Y48	T41
Drugs primarily affecting the Cardiovascular, Gastrointestinal, Smooth & skeletal muscle, & Respiratory systems					Y52-Y55	Y52-Y55	T46, T47, T48
Topical agents, ophthalmological, otorhinolaryngological and dental drugs					Y56	Y56	T49
*Primarily systemic and hematological agents**					Y43, Y44	Y43, Y44	T45
Anticoagulants					Y44.2	Y44.2	T45.5
Other and unspecified drugs, medicaments, and biological substances					Y50, Y57, Y58, Y59	Y50, Y57, Y58, Y59	T50

Nondrug

Source of Poisoning	External Cause - Unintentional	External Cause - Suicide	External Cause - Homicide	External Cause - Legal Intervention/ Operation of War	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types	**Multiple Cause of Death Codes –** *These codes are only considered for poisoning deaths (i.e., deaths where the UCOD is a relevant poisoning code)*
Nondrug (All)	**X45-X49, X20-X29**	**X65-X69**	**X86-X90, U01.6, U01.7**	**Y35.2, Y36.7, Y37.7**	**Y15-Y19**		**X45-X49, X20-X29, X65-X69, X86-X90, U01.6, U01.7, Y35.2, Y36.7, Y37.7, Y15-Y19**	**T51-T65**
Alcohol*	X45	X65			Y15		X45, X65, Y15	T51
Ethanol								T51.0
Organic solvents and halogenated hydrocarbons & their vapors	X46	X66			Y16		X46, X66, Y16	T52, T53
Other gases, fumes, & vapors (including carbon monoxide)*	X47	X67	X88	Y35.2	Y17		X47, X67, X88, Y35.2, Y17	T58, T59
Carbon monoxide	X47.0-X47.4	X67.0-X67.4	X88.0-X88.4		Y17.0-Y17.4		X47.0-X47.4, X67.0-X67.4, X88.0-X88.4, Y17.0-Y17.4	T58
Pesticides	X48	X68	X87		Y18		X48, X68, X87, Y18	T60
Other and unspecified chemicals and noxious substances	X49	X69	X86, X89, X90, U01.6, U01.7	Y36.7, Y37.7	Y19		X49, X69, X86, X89, X90, U01.6, U01.7, Y36.7, Y37.7, Y19	T54-T57, T65

Source of Poisoning	External Cause - Unintentional	External Cause - Suicide	External Cause - Homicide	External Cause - Legal Intervention/ Operation of War	External Cause - Undetermined	External Cause - Adverse Effect	All Code Types	**Multiple Cause of Death Codes –** *These codes are only considered for poisoning deaths (i.e., deaths where the UCOD is a relevant poisoning code)*
*Other specified nondrugs**			X86, X89				X86, X89	T54, T55, T56, T57, T65.0, T65.1, T65.3-T65.8
Tobacco & Nicotine								T65.2
Unspecified nondrugs			X90, U01.6, U01.7	Y36.7, Y37.7			X90, U01.6, U01.7, Y36.7, Y37.7	T65.9
Noxious substances eaten as food								T61, T62, T64
Envenomation (plants/animals)	X20-X29						X20-X29	T63
All Types of Poison	**X40-X49, X20-X29**	**X60-X69**	**X85-X90, U01.6, U01.7**	**Y35.2, Y36.7, Y37.7**	**Y10-Y19**	**Y40-Y59**	**X40-X49, X20-X29, X60-X69, X85-X90, U01.6, U01.7, Y35.2, Y36.7, Y37.7, Y10-Y19, Y40-Y59**	**T36-T65**

Appendix D: Surveillance of Acute Alcohol Poisonings

New Mexico DOH has been modeling their syndromic surveillance off methods described in a study on trends in ED visits for acute alcohol consumption.[73] The tables and query language included in this appendix provide discharge diagnosis codes and chief complain text for queries on ED visits related to acute alcohol consumption.

- Supplemental Table 1. Included and excluded discharge diagnosis codes and chief complaint text for query on emergency department visits related to acute alcohol consumption
- Supplemental Table 2. Query for emergency department visits related to acute alcohol consumption
- Supplemental Figure 1. Number of weekly alcohol-related emergency department visits by sex, 2018–2020
- Supplemental Figure 2. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by sex, 2018–2020
- Supplemental Figure 3. Number of weekly alcohol-related emergency department visits by age group, 2018–2020
- Supplemental Figure 4. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by age group, 2018–2020
- Supplemental Figure 5. Number of weekly alcohol-related emergency department visits by geographic region, 2018–2020
- Supplemental Figure 6. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by geographic region, 2018–2020
- Supplemental Figure 7. Number of weekly alcohol-related emergency department visits by the 10 regions of the Department of Health and Human Services, 2018–2020
- Supplemental Figure 8. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by HHS region, 2018–2020

[73] Esser MB, Idaikkadar N, Kite-Powell A, Thomas C, Greenlund KJ. Trends in emergency department visits related to acute alcohol consumption before and during the COVID-19 pandemic in the United States, 2018-2020. Drug Alcohol Depend Rep. 2022 Jun;3:100049. doi: 10.1016/j.dadr.2022.100049. Epub 2022 Mar 27. PMID: 35368619; PMCID: PMC8957715.

Supplemental Table 1. Included and excluded discharge diagnosis codes and chief complaint text for query on emergency department visits related to acute alcohol consumption

Discharge diagnoses and chief compliant	Codes and specific terms
Included discharge diagnoses	
ICD-10-CM elevated blood alcohol level	Y90, R78.0
ICD-10-CM alcohol use; abuse/dependence with intoxication	F10.12, F10.22, F10.9
ICD-10-CM toxic effect of ethanol/unspecified alcohol	T51.0, T51.9
ICD-9-CM idiosyncratic alcohol intoxication	291.4
ICD-9-CM toxic effect of ethanol/unspecified alcohol	980.0, 980.9
ICD-9-CM alcohol poisoning	E860.0, E860.1, E860.8, E860.9
ICD-9-CM elevated blood-alcohol level	790.3
ICD-9-CM alcohol use/abuse with intoxication	303.0, 305.0
SNOMED alcohol intoxication	25702006, 191802004, 191804003, 21000000
Included chief complaints	
Alcohol	etoh (eoth), alc, pint, pints, drunk, drinks too much, drank too much
Alcohol types, brands, and alcoholic beverages	consume, drank, or drink WITH beer, wine, tequila, bourb, whiske, vodka, moonshin, tallboys, liquor, 4 loko (4 loco, four loko), bud light, redds, miller light (miller lite), heineken (heinkein), michelob, dos equis, bacardi, coors light, hard cider, jose cuervo, blue moon, twisted tea, crown royal, white claw, jim beam (jim bean), jack dan, wild turkey, margarita, old fashion, mojito, moscow mule, martini, white russian, daiquiri, bloody mary, malt beverage, malt liq, mix drink, mixed drink, scotch, smirnov (smirnoff), hard lemon, sky blue, rum, gin, brandy, captain morgan, hennessy (various misspellings), binge, heavily, heavy
Excluded discharge diagnoses	
ICD-10-CM hepatic fibrosis	K74.0
ICD-10-CM cirrhosis of liver	K74.60, K74.69
ICD-10-CM encounter for blood-alcohol test	Z02.1, Z02.83
ICD-9-CM cirrhosis of liver	571.5
SNOMED patient encounter	305058001
Excluded chief complaints	

Discharge diagnoses and chief compliant	Codes and specific terms
Non-alcohol beverages	Drinks too much, drank too much WITH water, milk, coke, pepsi, soda, windex, cola, diet, juice, fluid
Not alcohol use	Denies alcohol, not drinking, not eating, not eatting, not eating or drinking, withdraw, delirium, tremens, drug alcohol assessment, drug alcohol test, alcohol blood drug test, drug alcohol screening, quit AND drink, has not drank, denied alcohol, denies any alcohol, denied any alcohol, denies drug alcohol, denied drug alcohol, denies drugs alcohol, denied drugs alcohol, denies drug or alcohol, denied drug or alcohol, denies drugs or alcohol, denied drugs or alcohol, denies any drug alcohol, denied any drug alcohol, denies any drugs alcohol, denied any drugs alcohol, denies any drug or alcohol, denied any drug or alcohol, denies any drugs or alcohol, denied any drugs or alcohol, denies drank, denies drink, denies drunk, denied drank, denied drink, denied drunk

[a] *Misspellings were included in the text searches (e.g., "eating", "jim bean"), in addition to the correct spellings for certain search terms to capture common spelling errors.*

Supplemental Table 2. Description of query for emergency department visits related to acute alcohol consumption

Description:

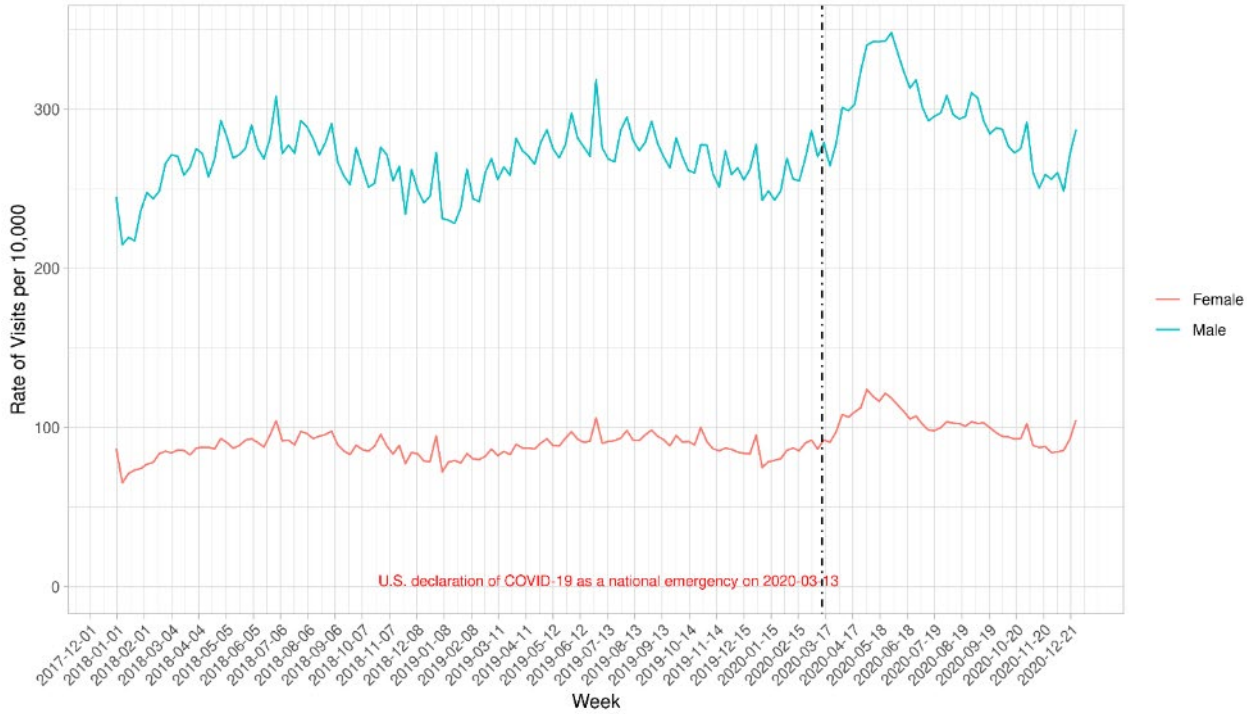
Using the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) to access the NSSP data, a query was designed for monitoring ED visits associated with acute alcohol consumption based on discharge diagnosis codes and chief complaint text (see Supplemental Table 1). The query includes ICD-10-CM diagnosis codes with evidence of acute alcohol use determined by blood alcohol level, acute alcohol use, alcohol abuse with intoxication, alcohol dependence with intoxication, and the toxic effect of ethanol or unspecified alcohol. Corresponding ICD-9-CM and Systematized Nomenclature of Medicine codes are also included, as those are used in some facilities. In addition, alcoholic beverage types and leading specific alcoholic beverages and brands are included in the query of chief complaint text. Discharge diagnosis codes and chief complaint free text suggesting non-alcoholic beverage or rubbing alcohol consumption, or alcohol withdrawal or detoxification were excluded.

Query text:

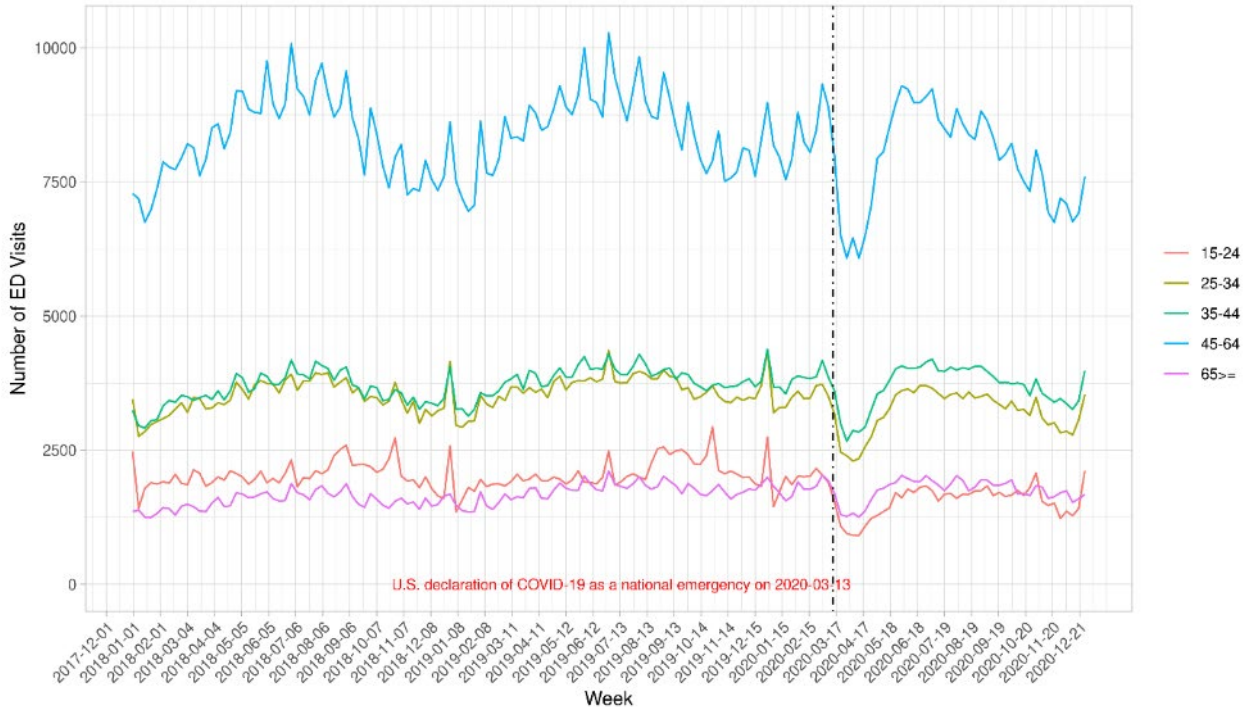
^[;/]Y90^,or,^[;/]F10.[12]2^,or,^[;/]F10.9^,or,^[;/]F10[12]2^,or,^[;/]F109^,or,^[;/]T51.[09]^,or,^[;/]T51[09]^,or,^[;/]R78.0^,or,^[;/]R780^,or,^[;/]291.4^,or,^[;/]2914^,or,^[;/]980.[09]^,or,^[;/]E860.[0189]^,or,^[;/]790.3^,or,^[;/]305.0^,or,^[;/]303.0^,or,^[;/]3050^,or,^[;/]3030^,or,^[;/]980[09]^,or,^[;/]E860[0189]^,or,^[;/]7903^,or,^[;/]25702006^,or,^[;/]191802004^,or,^[;/]191804003^,or,^[;/]21000000^,or,(,^etoh^,or,^eoth^,OR,^ alc^,or,alc^,or,^ pint ^,or,^ pints ^,or,^drunk^,OR,(,(,^drinks too much^,or,^drank too much^,),andnot,(,^water^,OR,^milk^,OR,^coke^,OR,^pepsi^,OR,^soda^,or,^windex^,or,^cola^,or,^diet^,or,^juice^,or,^fluid^,),),or,(,(,^consum^,or,^drank^,or,^drink^,),and,(,^beer^,or,^wine^,or,^tequila^,or,^bourb^,or,^whiske^,or,^vodka^,or,^moonshin^,or,^tallboys^,or,^liquor^,or,^4 loko^,or,^4 loco^,or,^four loko^,or,^bud light^,or,^redds^,or,^miller light^,or,^miller lite^,or,^heinkein^,or,^heineken^,or,^michelob^,or,^dos equis^,or,^bacardi^,or,^coors light^,or,^hard cider^,or,^jose cuervo^,or,^blue moon^,or,^twisted tea^,or,^crown royal^,or,^white claw^,or,^jim beam^,or,^jim bean^,or,^jack dan^,or,^wild turkey^,or,^margarita^,or,^old fashion^,or,^mojito^,or,^moscow mule^,or,^martini^,or,^white russian^,or,^daiquiri^,or,^bloody mary^,or,^malt beverage^,or,^malt liq^,or,^mix drink^,or,^mixed drink^,or,^scotch^,or,^smirnov^,or,^smirnoff^,or,^hard lemon^,or,^sky blue^,or,^ rum ^,or,^ gin ^,or,gin ^,or,rum ^,or,^ gin,or,^ rum,or,^brandy^,or,^captain morgan^,or,^ hennes[sye]^,or,^ henes[sye]^,or,hennes[sye]^,or,henes[sye]^,or,^ binge^,or,^heavily^,or,^heavy^,),),),ANDNOT,(,^water^,OR,^milk^,OR,^coke^,OR,^pepsi^,OR,^soda^,or,^windex^,or,^cola^,or,^diet^,or,^juice^,or,^fluid^,or,^denies alcohol^,or,^not drinking^,or,^not eating^,or,^not eatting^,or,^not eating or drinking^,or,^withdraw^,or,^delirium^,or,^tremens^,or,^drug alcohol assessment^,or,^drug alcohol test^,or,^alcohol blood drug test^,or,^drug alcohol screening^,or,^[;/]K74.0^,or,^[;/]K740^,or,^[;/]K74.6[09]^,or,^[;/]K746[09],or,^[;/]571.5^,or,^[;/]5715^,or,^[;/]z02.83^,or,^[;/]z0283^,or,^without mention of alc^,or,^detox^,or,^[;/]305058001^,or,^ rub^,or,^[;/]z02.1^,or,^[;/]z021^,or,(,^ quit^,and,^ drink^,),or,^has not drank^,or,^denie[sd] alcohol^,or,^denie[sd] any alcohol^,or,^denie[sd] drug alcohol^,or,^denie[sd] drugs alcohol^,or,^denie[sd] drug or alcohol^,or,^denie[sd] drugs or alcohol^, or,^denie[sd] any drug alcohol^,or,^denie[sd] any drugs alcohol^,or,^denie[sd] any drug or alcohol^,or,^denie[sd] any drugs or alcohol^,or,^denie[ds] dr[aui]nk^,)

Supplemental Figure 1. Number of weekly alcohol-related emergency department visits by sex, 2018–2020

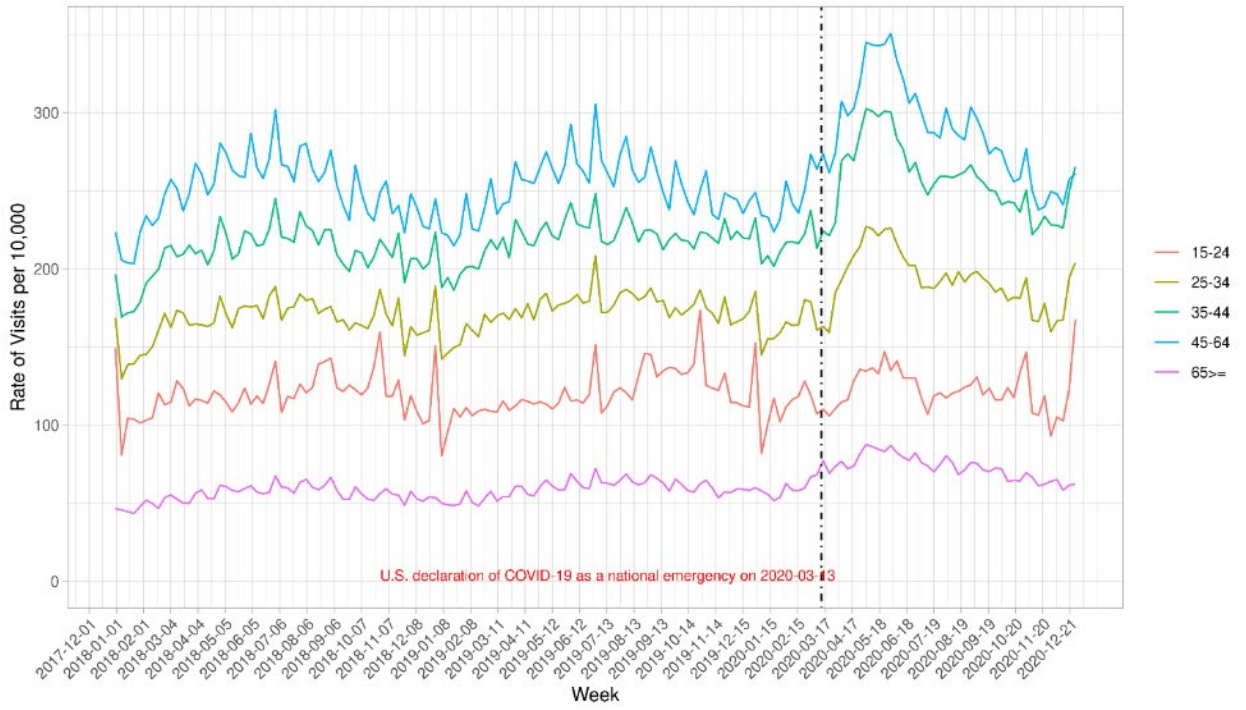
Supplemental Figure 2. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by sex, 2018–2020



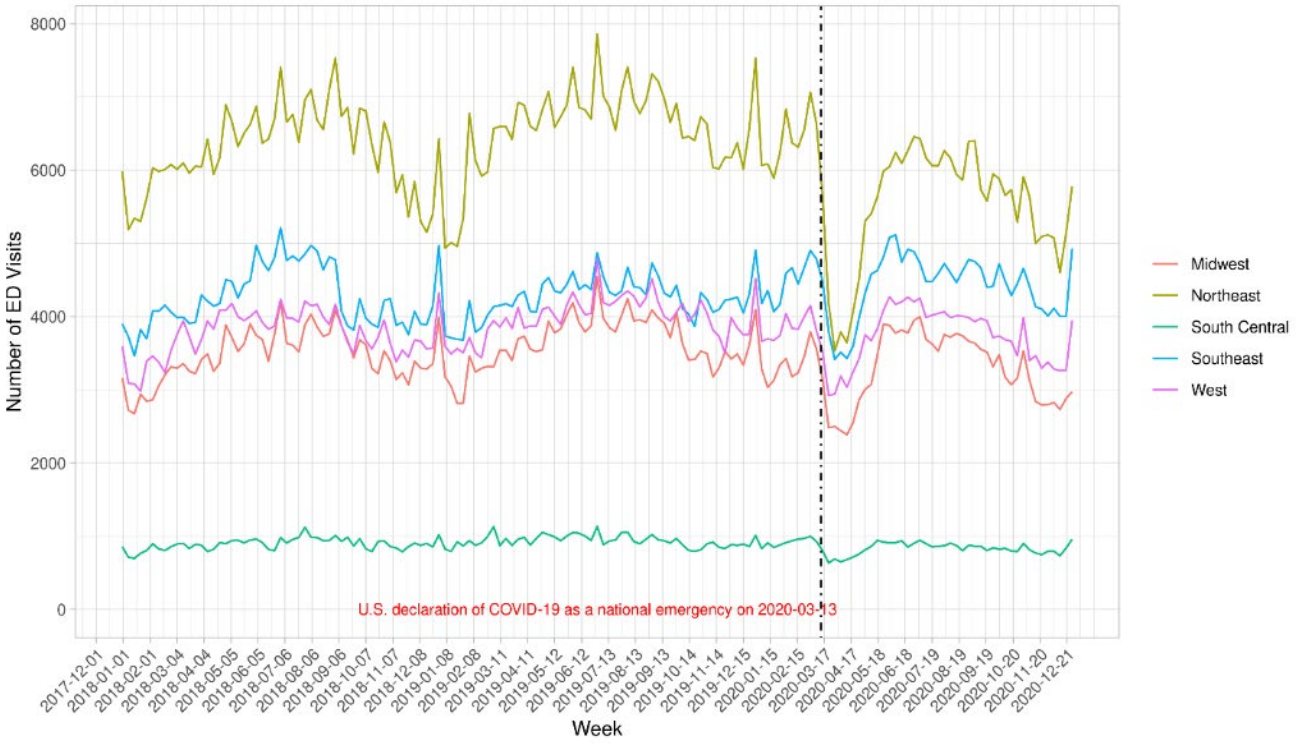
Supplemental Figure 3. Number of weekly alcohol-related emergency department visits by age group, 2018–2020



Supplemental Figure 4. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by age group, 2018–2020



Supplemental Figure 5. Number of weekly alcohol-related emergency department visits by geographic region,[a] 2018–2020

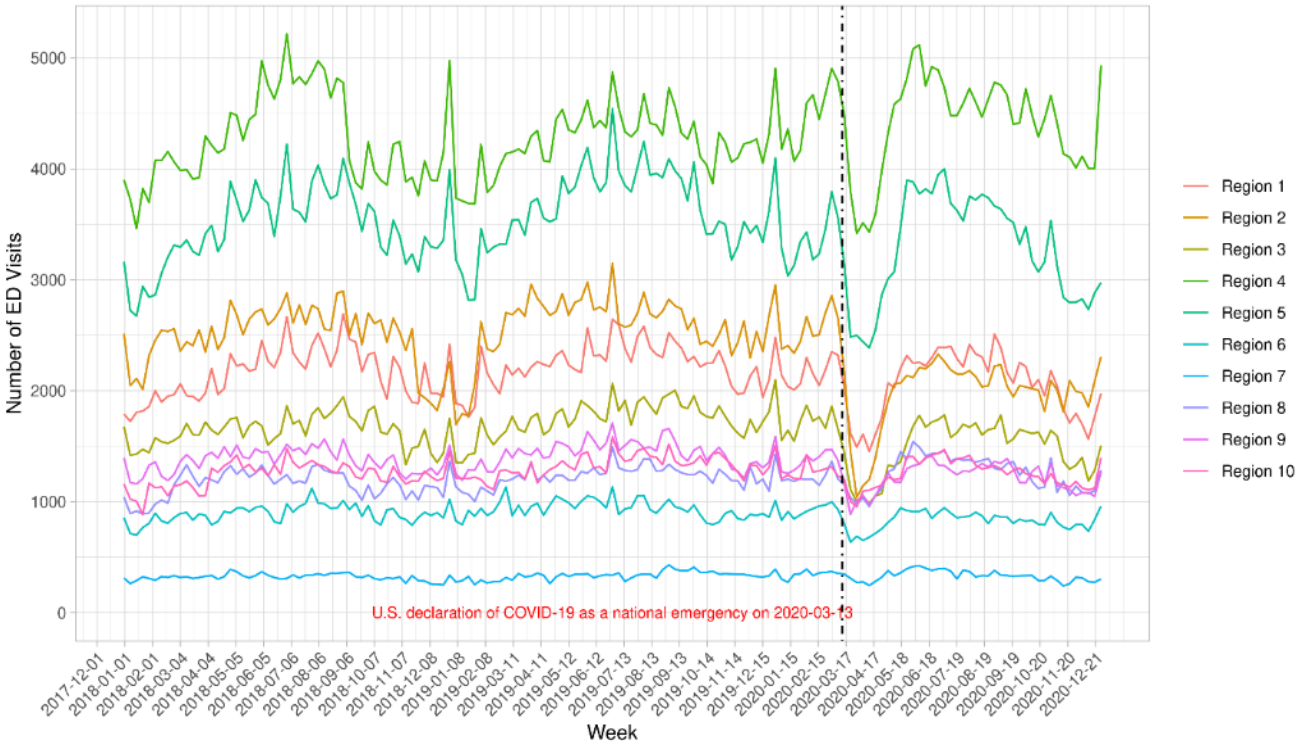


[a] *States are categorized into one of the geographic regions based on the 10 regions of the Department of Health and Human Services (HHS). The Northeast region includes HHS Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), HHS Region 2 (New Jersey and New York), and HHS Region 3 (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia); the Southeast region includes HHS Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee); the South Central region includes HHS Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas); the Midwest region includes HHS Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) and HHS Region 7 (Iowa, Kansas, Missouri, and Nebraska); and the West region includes HHS Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming), HHS Region 9 (Arizona, California, and Nevada), and HHS Region 10 (Alaska, Idaho, Oregon, and Washington). Data are not available for one state (Hawaii).*

Supplemental Figure 6. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by geographic region,[a] 2018–2020

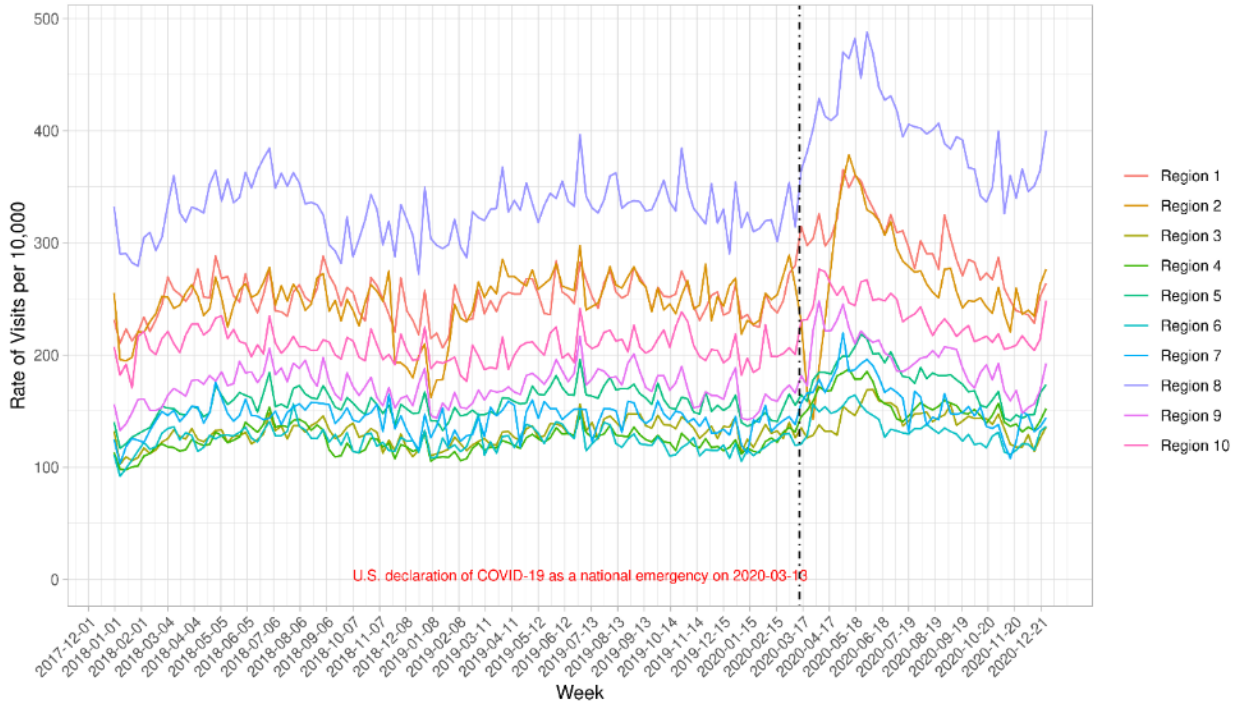
[a] *States are categorized into one of the geographic regions based on the 10 regions of the Department of Health and Human Services (HHS). The Northeast region includes HHS Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), HHS Region 2 (New Jersey and New York), and HHS Region 3 (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia); the Southeast region includes HHS Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee); the South Central region includes HHS Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas); the Midwest region includes HHS Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) and HHS Region 7 (Iowa, Kansas, Missouri, and Nebraska); and the West region includes HHS Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming), HHS Region 9 (Arizona, California, and Nevada), and HHS Region 10 (Alaska, Idaho, Oregon, and Washington). Data are not available for one state (Hawaii).*

Supplemental Figure 7. Number of weekly alcohol-related emergency department visits by the 10 regions[a] of the Department of Health and Human Services, 2018–2020



[a] *States are categorized in one of the 10 regions of the Department of Health and Human Services (HHS) including Region 1: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont; Region 2: New Jersey and New York; Region 3: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia; Region 4: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee; Region 5: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin; Region 6: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas; Region 7: Iowa, Kansas, Missouri, and Nebraska; Region 8: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming; Region 9: Arizona, California, and Nevada; Region 10: Alaska, Idaho, Oregon, and Washington. Data are not available for one state (Hawaii).*

Supplemental Figure 8. Weekly alcohol-related emergency department visit rates per 10,000 emergency department visits by HHS region,[a] 2018–2020



[a] *States are categorized in one of the 10 regions of the Department of Health and Human Services (HHS) including Region 1: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont; Region 2: New Jersey and New York; Region 3: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia; Region 4: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee; Region 5: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin; Region 6: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas; Region 7: Iowa, Kansas, Missouri, and Nebraska; Region 8: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming; Region 9: Arizona, California, and Nevada; Region 10: Alaska, Idaho, Oregon, and Washington. Data are not available for one state (Hawaii).*