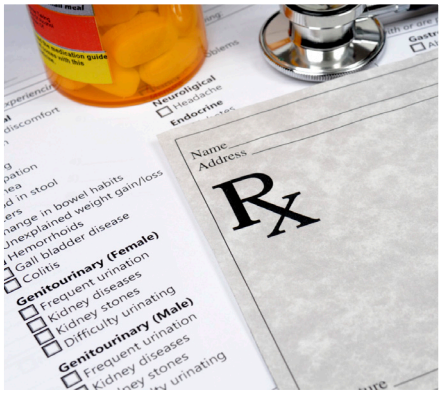
Consensus Recommendations for National and State Poisoning Surveillance



REPORT FROM THE INJURY SURVEILLANCE WORKGROUP (ISW7)

April 2012

SAFE STATES

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Methodology for this report:
The Injury Surveillance Workgroup 7 worked from July 2009 through April 2012 using monthly conference calls, and more frequently through small subgroup calls, to develop this report. A full list of workgroup members can be seen in Appendix D.

Disclaimer:
The findings and conclusion in this report are those of the Workgroup and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Foreword

Faced with a growing epidemic of fatal poisonings in the United States, primarily due to prescription drugs, the Safe States Injury Surveillance Workgroup on Poisoning (ISW7) initiated its work in the summer of 2009. Its goal was developing more comprehensive conceptual and operational definitions of poisoning and recommendations for improving poisoning surveillance. This report, and the surveillance tools contained herein, was designed to assist state injury and substance abuse prevention professionals in standardizing their efforts to conduct surveillance on drug and non-drug-related poisonings, with the goal that they will then be better equipped to design and evaluate interventions aimed at prevention. The term "poisoning," used throughout this report, is inclusive of fatal and nonfatal events and is also associated with the more colloquial term "drug overdose." The report has been shared in draft form at several scientific conferences and has gone through dozens of revisions. Much of the discussion focused on the conceptual definition of poisoning.

There is no universally accepted conceptual definition of a poisoning. The conceptual definition put forth by this ISW is deliberately broad and includes conditions resulting from both acute and chronic poisoning as well as conditions that are traditionally not thought of as poisoning. This document's usefulness to public health agencies was maximized by establishing a logical and comprehensive definition that focuses on injury and substance use. At the same time, the conceptual definition put forth addresses some inconsistencies and limitations of previous definitions.

In operationalizing this definition for conducting surveillance, the ISW7 also broadened the traditional International Classification of Disease (ICD) based definitions of poisoning used nationally and by states. To be in line with the conceptual definition, the ISW7's ICD-based operational definitions of poisoning events includes other conditions related to the acute and chronic effects of substance abuse (e.g. abuse and dependence as well as diseases resulting from the acute and chronic exposure to a substance), adverse effects of drugs and biologics in therapeutic use, and the chronic disease effects of poisoning.

The operational definitions are laid out in a matrix (row-by-column) format to provide users with the flexibility to include or exclude various categories of acute and chronic poisoning events based on what is needed for their analyses. It is hoped that the Matrices help to clarify the breadth of the conceptual definitions and are used by injury and substance abuse professionals and others to construct new indicators of drug and nondrug-related poisonings. As these new indicators are developed and tested, it is anticipated that shortcomings may surface and point to future definitional work that is still needed to improve these poisoning surveillance tools. Wide adoption of indicators based on these Matrices could help standardize the characterization of the burden of poisonings and lead to new intervention strategies to reduce poisoning – the leading mechanism of injury death in the United States.

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Executive Summary

Poisoning was the leading mechanism of injury mortality and the second leading mechanism of unintentional injury mortality in the United States in 2009 [1]. Poison deaths, mostly due to drugs, have risen sharply over the past 25 years [2]. The 2012 Safe States Injury Surveillance Workgroup Report: Consensus Recommendations for National and State Poisoning Surveillance puts forth:

- A consensus conceptual definition of all poisonings and drug poisonings for public health surveillance purposes;
- A framework or organizational grid within which poisonings can be subcategorized by various poisoning agents and by various circumstances;
- Operational definitions for use with mortality and morbidity data sources based on the International Classification of Diseases 10th Revision (ICD-10), and the 9th Revision, Clinical Modification (ICD-9-CM), respectively;
- A summary of data sources relevant to poisoning surveillance in the U.S., including a description of their strengths and limitations;
- A new set of potential surveillance indicators for fatal and nonfatal poisoning; and
- Recommendations on future work needed to improve poisoning surveillance.

Key products of the ISW7 include:

Conceptual definitions:

- A "poisoning" is an exposure to any extrinsic substance[1] by ingestion, inhalation, injection, or absorption through the skin or mucous membranes that results in at least one related adverse clinical effect[2].
- A "drug" is any chemical compound that is chiefly 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.

The ICD-10 and ICD-9-CM poison matrices:

- The poison Matrices group ICD codes for different agents or classes of agents (both drug and nondrug agents) in a row format and group ICD codes for different general categories of poisoning in a column format. These Matrices are based on the ISW7's conceptual definition of poisoning and operationalize this definition for use when analyzing ICD-based data sets. (Appendix B1 and C1)

The inventory of poison data sources:

- Over 25 databases containing information on poisoning events in the U.S. were identified. The inventory provides a basic description of these databases, geographic scope, and contact information, and details their strength and limitations for poison surveillance. This inventory can be found at: (Appendix A)

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1 Extrinsic substances can include solids, liquids, or gases and natural or synthetic chemicals.
2 A sign, symptom, or laboratory abnormality

Recommendations for further development and testing of five new fatal and nonfatal poisoning surveillance indicators for state and local jurisdictions, based upon the ISW's conceptual and operational definitions. These are:

- Acute or chronic poisonings due to the effects of drugs
- Acute poisonings due to the effects of drugs
- Acute or chronic drug poisonings associated with the effects of opium, heroin, and/or opioid analgesics
- Acute drug poisonings associated with the effects of opium, heroin, and/or opioid analgesics
- Acute drug poisonings associated with the effects of opioid analgesics

Recommendations for improving poisoning surveillance at the state and local level. These include:

- Increase the specificity of ICD coding to minimize the use of nonspecific ICD-10 poison codes in morbidity and mortality databases
- Supplement state vital records data with medical examiner/coroner databases
- Examine methods for counting cases in hospital and emergency department databases
- Create special data systems and use nontraditional health data to capture nonfatal poisonings

Recommendations for surveillance improvements to be made at the national level. These include:

- Standardize death certification for poisoning
- Review the ascertainment of events due to the acute and chronic effects of poisoning in the NCHS drug-induced death definition

Overall, the intent of the ISW7 is that these tools and recommendations will strengthen the ability of state health departments and other agencies and groups to conduct surveillance on a diverse range of poisoning events improve the comparability of poisoning data across jurisdictions, enhance abilities to test and evaluate poison prevention interventions, and in the long run, effectively reduce the national health burden of poisoning.

Introduction

In the past two decades, poisoning, particularly drug poisoning, has emerged as an area of significant public health concern in the US [2-5]. Poisoning affects individuals across their lifespan and encompasses events that represent a wide array of causes, intents, and substances. The causes of poisoning include overdoses due to illicit drug use, environmental toxin exposures, suicides and suicide attempts, homicides, unintended medication misuse, unintended ingestion of household products, and many others.

Poisoning surveillance faces challenges that can hamper poisoning prevention and evaluation efforts [6-8]. These include a lack of formal standardized definitions for surveillance of poisonings due to 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 International Classification of Diseases (ICD) external-cause-of-injury coded data and exposure data from poison centers. 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 are indicative of 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-9-CM and ICD-10 codes. The aim is to improve the available poisoning surveillance tools not only for injury prevention research and practice, but also for the control and prevention of substance use disorders.

Safe States Alliance is a non-governmental membership association, whose mission is to serve as the national voice in support of state and local injury and violence prevention professionals engaged in building a safer, healthier America, convened the Injury Surveillance Workgroup on Poisoning (ISW7) to improve the surveillance of fatal and non-fatal poisonings. Representation on the ISW7 included individuals from the National Center for Injury Prevention and Control (NCIPC), the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC), the Substance Abuse and Mental Health Services Administration (SAMSHA), the Council of State and Territorial Epidemiologists (CSTE), the American Association of Poison Control Centers (AAPCC), the Association of State and Territorial Health Officials (ASTHO), the Society for the Advancement of Injury Research (SAVIR), state health departments, academic centers, the occupational health research community, and private research organizations. The group met regularly from August 2009 – January 2012 to:

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 for each new poisoning subcategory that reflect the ISW7 conceptual definition for use with mortality and morbidity data sources based on the International Classification of Diseases10th Revision (ICD-10), and the 9th Revision, Clinical Modification (ICD-9-CM), respectively;
4. Develop a summary of data sources relevant to poisoning surveillance in the U.S., including a description of their strengths and limitations (Appendix A); and
5. Provide recommendations on future work needed to improve poisoning surveillance.

The tools described in this report are intended to be used by public health and medical care providers, 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. It is also hoped that they will provide a standard but flexible approach to presenting poisoning surveillance data that will meet many of the diverse needs of injury and substance abuse prevention practitioners, occupational and environmental health professionals, policy makers, 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[1]

Rank among Leading Causes of Injury

Poisoning is the leading mechanism of injury mortality and the second leading mechanism of unintentional injury mortality in the United States (as of 2009). Among people 25-64 years old, poisoning is the leading cause of unintentional injury death, surpassing even motor vehicle crash deaths. Poisoning accounts for 8.0% of all years of potential life lost (YPLL) before age 65 and 26.2% of all YPLL before age 65 because of injury (as of 2009). Unintentional poisoning accounts for 34.7% of all YPLL before age 65 because of unintentional injury [1]. More than three quarters of the poisoning deaths and YPLL are now caused by drug poisoning. Drug poisoning mortality has increased dramatically in recent years. The drug poisoning death rate in 2009 was four times the rate in 1999 [3].

Unintentional poisoning is the tenth leading mechanism of nonfatal injuries seen in emergency departments (ED) (as of 2009). Among injury related ED visits leading to admission to a hospital or transfer for specialized medical care, it is the fourth leading cause. Among these more serious ED visits, unintentional poisoning is the second leading cause in the 1-4 years age group, and self-harm poisoning is the leading cause in the 25-34 years age group [1].

Mortality

Poisoning was the underlying cause of death for 41,592 Americans in 2009, an age-adjusted rate of 13.4/100,000 population. Among these poisoning deaths, 76.4% were unintentional, 15.4% were suicides, 8.1% were of undetermined intent, and less than 1% were homicides or the result of legal intervention. Males accounted for 62.4% of poisoning deaths. Poisoning death rates among children <14 years were highest among those less than two years old. Poisoning death rates increase gradually among teens, rise to a peak in the 45-49 years age group, and then decline in older age groups [1].

Hospitalizations

In the US in 2009, there were an estimated 310,708 poisoning ED visits that led to admission to a hospital or transfer for specialized medical care, an age-adjusted rate of 101.0/100,000 population [1]. Direct admissions bypassing the ED are not included in this figure.

ED Visits

In 2009, poisoning led to an estimated 919,582 ED visits in the US, an age-adjusted rate of 299.5/100,000 population. Of these, 708,318 (77%) were unintentional; 209,977 (23%) were self-harm; and 1,287 (0.1%) were assaults or the result of legal intervention. ED visit rates peaked in the 20-24 years and 45-49 years age groups. Males accounted for 55.5% of poisoning visits [1].

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1 In this section, "poisoning" deaths, hospitalizations and Emergency Department (ED) visits are defined according to the 2010? definition used by the National Center for Health Statistics.

Contacts with Poison Centers

In 2009, 4,280,391 calls were captured by the National Poison Data System (NPDS), including 2,479,355 calls about exposures to putatively toxic substances. The top five substance classes involved in all human exposures were analgesics (11.7%), cosmetics/personal care products (7.7%), household cleaning substances (7.4%), sedatives/hypnotics/anti-psychotics (5.8%), and foreign bodies/toys/miscellaneous (4.3%). Analgesic exposures as a class increased the most rapidly (12,494 calls per year on average) over the last decade. NPDS documented 1,158 exposure-related fatalities in 2009. Sedatives/hypnotics/antipsychotics, cardiovascular drugs, and opioids were the top three drug classes among fatalities[10].

Economic costs

In 2005, poisonings led to $3.2 billion in total lifetime medical costs and made up 5.0% of the total lifetime medical costs ($63.5 billion) of all injuries in the United States [1}. Males accounted for about 71.1% ($29.9 billion) of the total lifetime medical and lifetime work loss costs of poisonings ($42 billion) [1].

Currently, poisoning surveillance faces serious challenges due in part to the different definitions of poisoning in use and the limitations in the classifications of types of poisons. The goal of the ISW7 was to create a more comprehensive framework for poisoning surveillance that would be inclusive of the major existing poisoning definitions and would allow for explicit clarification of what was included and excluded in the operational definitions which follow. The starting point for this effort was the creation of the following conceptual definitions of the terms “poisoning” and “drug.”

Conceptual Definitions of Poisoning and Drug

Poisoning

The consensus definition of a poisoning was the following:

> ***A poisoning is an exposure to any extrinsic substance[2] by ingestion, inhalation, injection, or absorption through the skin or mucous membranes that results in at least one related adverse clinical effect[3].***

This definition specifically includes:

- Acute and chronic exposures;
- Adverse drug reactions (ADR)[4];
- Other adverse drug events (ADE)[5];
- Exposures to venoms and other preformed biological toxins (Toxin exposures include bacterial foodborne intoxications, e.g. staphylococcal food poisoning and botulism, as well as seafood "poisoning," (e.g. ciguatera and scombroid fish poisoning); and
- Exposures to radioactive substances incorporated into the body (ingested polonium).

This definition specifically excludes:

- Bites and stings without envenomation;
- Infections (e.g. food and waterborne infections such as hepatitis A, cryptosporidiosis, and salmonella, and infections resulting from the injection of drugs); and
- Exposure to radiation where the radiation source remains external to the body.

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" [10]. The definition proposed here is the ISW7 consensus definition designed for use in public health surveillance. Other definitions might be more useful or preferred for other fields of specialization.

The simplest approach, defining "poisonous" as an inherent characteristic of a substance, is not helpful given that any substance can be toxic if given 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" [11].

Therefore, a poison is best defined not by what it is, but by what it has done in certain circumstances. From this perspective then, 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 as well as substances

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2 Extrinsic substances can include solids, liquids, or gases and natural or synthetic chemicals.
3 A sign, symptom, or laboratory abnormality
4 An ADR is a harm directly caused by the correct drug properly administered in therapeutic, prophylactic, or diagnostic dosage. ADRs are also commonly referred to as "side effects" or "adverse effects" of drugs.
5 An ADE is a harm caused by any use of a drug. ADEs include harms resulting from drug misuse or abuse, accidental exposure to a drug, and wrong drugs given or taken in error. ADEs do not include medication errors that did not result in harm.

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 not as a poisoning but as adverse drug reactions or effects [12]. However, despite the fact that the primary purpose of a pharmaceutical is beneficial, any undesirable effects still meet the ISW7 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, the event is not considered a poisoning by the ISW7 or by most previous attempts at poisoning definition. Therefore, many gastrointestinal infections are not poisoning by the definition, despite the fact that they are commonly referred to as "food poisoning" in the vernacular. In contrast, exposures to preformed toxins or noxious food agents, (e.g. staphylococcal food "poisoning" and intoxication from mushrooms or berries), do meet the ISW7 consensus definition.

As defined here, a poisoning is the result of an exposure to any extrinsic substance. By definition then, the substance that leads to the poisoning is external to the person. Therefore, physiologic events are not considered a poisoning (such as the clinical effects of excess production of thyroid hormone).

Also, a premise of the definition of a poisoning is that the exposure is to a "substance" or physical agent rather than to a form of energy. Therefore, the effects of external irradiation whether infrared (thermal burns), ultraviolet (sunburn) or ionizing (X-ray burn) are not included. Exposure to mechanical energy such as occurs when struck by or cut by external objects is also not included. Bites and stings without envenomation are considered exposures to mechanical energy and are therefore not included. These distinctions are consistent with the most widely accepted classification of diseases and injury, the International Classification of Diseases, 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 ISW7 definition includes all types of clinical effects, whether acute or chronic, with no time limit imposed between exposure and effect. 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). The ISW7 recognized, however, that establishing the connection between exposure and effect in individual cases becomes increasingly difficult with longer latency periods following exposure, especially in circumstances when the exposure was one of many possible triggers for a sequence of physiological events that might only occur under the right circumstances; e.g. a genetic predisposition for a disease. Therefore, the ISW7 definition includes only those effects that are always and explicitly the result of an exposure (e.g. alcohol-induced cirrhosis rather than unspecified cirrhosis, or cardiomyopathy due to drugs rather than unspecified cardiomyopathy).

Drug

Monitoring the subset of poisoning involving drugs (i.e. drug poisoning) as a public health concern also requires a conceptual definition of a "drug." The ISW7 consensus definition of a drug is as follows:

> ***A drug is any chemical compound that is chiefly 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.***

This definition specifically includes:

- Street drugs such as heroin, cocaine, and hallucinogens;
- Prescription drugs;

- Over-the-counter drugs;
- Biological substances such as vaccinations;
- Veterinary drugs;
- Dietary supplements; and
- Non-medicinal substances used primarily for the feeling they cause.

This definition specifically excludes:

- Alcohol;
- Tobacco; and
- Chemicals that are deliberately inhaled for the feeling they cause but are chiefly used for other purposes (i.e. organic solvents and halogen derivatives of aliphatic and aromatic hydrocarbons).

A drug belongs to one of two categories: substances used chiefly for medicinal purposes or substances used chiefly for the feeling they cause. The medicinal category is relatively easy to define by its therapeutic purpose. The other category is more difficult to define because many substances are produced for non-medicinal purposes but are often employed for the feeling they cause, such as organic solvents. Others, like heroin, are employed for the feeling they cause and have limited alternative uses. The ISW7 defined non-medicinal substances whose primary use was for the feeling they caused as drugs. Non-medicinal substances chiefly used for other purposes, such as glue and solvents, were not defined as drugs, even though they might also be used for the feeling they cause. This distinction is similar to that made by the International Classification of Disease coding systems.

Similarly, the ISW7 did not include alcohol and tobacco in their 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 similar to some other non-medicinal drugs. In fact, SAMHSA incorporates “alcohol and other drugs” within its framework of substance use disorders [13]. However, in this case the ISW7 chose to be consistent with the major coding schemes for morbidity and mortality in the US, 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 NCHS [14]. Alcohol is also not classified as a drug in the World Health Organization’s ICD-10, where drug poisoning external cause codes (i.e. X40-X44) precede a separate code for alcohol (i.e. X45). Similarly, in the ICD-9-CM, the alcohol poisoning code is included in the “Other solid and liquid substances” category rather than in the “Drugs, medicinal substances, and biological” category.

Operational Definitions of Poisoning and Drug Poisoning

Based on the conceptual definitions above, the ISW7 created two row–by-column Matrices to display operational definitions of poisoning (i.e. drug, non-drug, unspecified, and all types of poisonings) for the two major U.S. morbidity and mortality data classification systems: ICD-9-CM and ICD-10, respectively. The purpose of developing these Matrices was to provide a framework for displaying the diagnosis and external cause-of-injury codes making up subcategories of poisoning events (e.g. grouped by intent or other circumstance, or by poison agent) within the context of the ISW7's broad conceptual definition of a poisoning. Subcategories were identified based on their utility for surveillance and their feasibility given the limitations of these coding systems. Both Matrices provide users with the flexibility to identify columns, rows or cells that are useful to their surveillance efforts.

It is important to recognize that the Matrices reflect the broader ISW7 conceptual definition for poisoning. These Matrices therefore include a much larger spectrum of events than is included in the external cause-of-injury Matrix which is used to generate the State Injury Indicators by the CDC-funded Core Violence and Injury Prevention Programs and others [15]. Specifically, these ISW7 Matrices include codes not traditionally included in injury research (e.g., drug- and alcohol-induced diseases, mental health conditions involving abuse and dependence, adverse drug reactions) in addition to codes included in the traditional range.

Another important consideration is that the Matrices cannot overcome limitations in the data collected on mortality or morbidity and in the ICD classification system. For example, hospital discharge data often are not external cause coded, so this limits the utility of these data. For mortality data, the specific drugs involved in the death is not recorded on the death certificate, so this limits the ability to describe drug-specific mortality rates. The recommendation section includes suggestions for improving these limitations in data collection.

Description of the Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Purpose

The Poisoning Matrix for ICD-9-CM Coded Morbidity Data is based on the broad ISW7 conceptual definition of poisoning and provides a framework for categorizing relevant ICD-9-CM codes. This Matrix, which is found in Appendix C1, was developed as a tool to help state and national groups standardize the poisoning categories for morbidity data based on ICD-9-CM codes for public health surveillance purposes (e.g. monitoring trends, comparing findings across populations of interest). It can also serve as a guide for examining the differences among the wide range of existing approaches to defining and operationalizing "poisoning" indicators for surveillance, and for developing or refining a number of new poisoning-related indicators.

The Poisoning Matrix for ICD-9-CM Coded Morbidity Data:

- Organizes poisoning by type of poison (i.e. drug-related, non-drug-related and unspecified) in the rows and categories of causes of morbidity (i.e. intent, envenomation) in the columns;
- Displays each ICD-9-CM external cause-of-injury/diagnosis code meeting the conceptual definition of poisoning within the Matrix;
- Provides a structure to display poisoning morbidity counts and rates;
- Allows users to compare existing operational definitions and indicators, and to create their own operational definitions based on subsets of the Matrix to meet their specific policy or programmatic needs.

The Matrix can be used to analyze and categorize poisoning events using national or state-based hospital discharge or ED data sources, and for ICD-coded survey data as well. Using the Matrix requires a basic understanding of the ICD coding system. If unfamiliar with the ICD coding system, users should refer to the ICD manual and seek guidance from an epidemiologist, statistician, or data analyst familiar with the ICD, the data sources, and the appropriate use of analytic methods. This section provides general guidance and examples for how to use the Matrix with either hospital or emergency department data.

How to Use the Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Case selection and analysis using principal diagnosis or any diagnosis.
The simplest approach to case selection and analysis of hospital discharge or ED data is to select one diagnosis to analyze. This is often the principal diagnosis or in the case when primacy is not determined, the first-listed diagnosis. In cases where external cause-of-injury-codes (E codes) are also included in case definitions, such as the ISW7 poisoning operational definition, the principal or first listed external cause codes should also be used. The principal diagnosis generally represents the primary reason for the health care contact. For hospitalizations, the principal or primary diagnosis is the condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care. In the case of ED visits, the principal or primary diagnosis code is that diagnosis established to be chiefly responsible for occasioning the visit to the ED. Selection of poisoning cases based on the principal diagnostic code only, therefore, is a more traditional way to capture hospitalizations or ED visits due primarily to poisoning, and may underestimate the true prevalence of poisonings requiring medical care within an ED or hospital.

Depending on the purpose of the poisoning surveillance, the analyst may want to cast a wider net to quantify a fuller range of poisoning in hospital and ED data sets. For example, the analyst can use all available diagnosis codes and E codes to identify records that are associated with a poisoning. This is sometimes referred to as “any mention” or “at least one mention.” The use of any mention of poisoning codes in any coding field produces a much different and larger subset of data than those created using only the principal diagnosis and E code field codes. This approach may be used to identify the overall burden of hospitalization or ED utilization associated with any type of poison diagnosis, which may be useful for resource allocation or program planning and evaluation.

The use of all available ICD-9-CM diagnosis or E codes to identify records associated with poisoning requires caution due to the complexity of including multiple codes per hospital or ED case. In particular, care must be taken when attempting to create a total unduplicated count of total encounters related to poisoning. Tabulating poisonings based on all cases in which there was “any mention” of a particular poisoning category provides a total count of encounters associated with specific types of poisoning, but can result in double counting of hospital and ED cases when more than one type of poison code exists. For instance, hospital discharge and ED visit databases often have separate fields for the principal diagnostic code and for E codes for each record. Therefore, it is possible to double count cases in which there is both a principal diagnostic code (e.g., 965.01- unintentional heroin poisoning) and a first-listed E code (e.g., E860.0 – unintentional alcohol poisoning) for two different types of poisonings (drug and non-drug) that were associated with the same health encounter. To tabulate total poisoning encounters, steps should be taken to minimize double counting.

In addition, analyses of poisoning encounters using the any mention approach can create potential problems when making comparisons across jurisdictions (e.g. states) that collect different numbers of ICD-9-CM diagnosis codes and E-codes per hospitalization or ED visit. In general, more cases will be identified as the number of available diagnosis and/or E-code fields increases. Therefore, the number of diagnosis and designated E-code fields to be searched for these ICD-9-CM codes should be the same across jurisdictions and over time. Analysts who intend to compare indicators across jurisdictions should restrict their analyses to the lowest number of diagnostic fields and dedicated E-code fields in use among all the jurisdictions for which comparisons are planned.

How to Use the Poisoning Matrix for Morbidity Data

Once the decision is made on whether to use the principal/first-listed diagnosis only or any mention approaches for identifying potential poisoning cases, users can begin by creating poisoning data sets from the hospital and/or emergency department data sources using the full range of ICD-9-CM codes in the Matrix (these codes are listed in the cell at bottom right corner of the Matrix). These initial poisoning data sets provide the basis for further analyses and can be used to create numerous poisoning indicators. Generalized SAS programs designed to operationalize the Matrix and create poisoning data sets are provided in Appendix C1.

For morbidity analyses, the Matrix is designed as a row-by-column spreadsheet of ICD-9-CM codes. The rows in the Matrix list the poison agents under three broad categories (Drug; Non-drug; and Unspecified type of poison), and a total row for all types of poisons. Only selected agents or their broader classes are listed on separate rows in the Matrix. The selection was based on a combination of the public health importance and the availability of specific ICD-9-CM codes of the agents or classes of drugs and non-drugs. For example, the two broad categories of analgesics are displayed in the Matrix: (1) Nonopioid analgesics/Antipyretics and Antirheumatics and (2) Opiates/Opioids. Under the row for non-opioid analgesics, there is a separate listing for 4-aminophenol derivatives because it includes acetaminophen -- a drug that is known to be frequently implicated in poisonings but for which there isn't a specific ICD-9-CM code. Likewise, three subcategories of drugs are listed under the row for Opiates/Opioids: heroin, pharmaceutical opioids, and methadone as a subset of pharmaceutical opioids. Methadone is the only pharmaceutical opioid for which there is a specific ICD-9-CM code. Counts of poisonings due to the other specific pharmaceutical opioids such as hydrocodone and oxycodone are included in the more general row category "pharmaceutical opioids".

The columns organize ICD-9-CM codes by categories of poisoning. The columns are divided into three broad categories by cause of poisoning event – External causes; Drug and alcohol induced diseases; and Poisoning classified by nature (or diagnostic codes) of the poisoning. There is also a total column – "All poisoning" - containing the list of all the ICD-9-CM codes for causes of poisoning. Two of the three categories are further broken down into sub-categories. External causes are divided into the standard intent groups (e.g. unintentional, assault, self-harm, undetermined intent) and envenomation, and adverse drug effects. The Poisoning classified by nature column also has the following sub-categories: Non-venom, Non-foodborne poisoning; Envenomation; and Foodborne Illness.

The Matrix can be used to produce counts and rates of poisoning morbidity using hospital or ED discharge records. For example, the Matrix allows a user to:

- Produce a count of cases based on an individual code or set of codes within the Matrix structure. For example, the codes for unintentional poisoning due to non-opioid analgesics (E850.3-.8) can be found at the intersection of the row for "Non-opioid analgesics" and the column for "Unintentional Intent"). It is important to note the extent to which one can locate specific groups of codes within the Matrix structure is dependent upon their existence in the ICD-9-CM coding schema. For example, there are no specific ICD-9-CM codes for self-inflicted poisoning due to non-opioid analgesics. These events are coded to a broader category/row.
- Create marginal total counts based on the codes included in the separate rows and columns (e.g. "All types of poison" (Row) by "Unintentional poisoning" (Column) corresponds to the codes E850-E869).

To generate a total count of poisoning morbidity events based on all ICD-9-CM codes for all types of poisons, the user would use the marginal grand total cell containing all the ICD-9-CM poisoning codes (i.e. Row:- All Types of Poisons & Column: All Poisoning). However as mentioned above, the user should take steps in the analysis to provide an unduplicated count of cases. The marginal (unduplicated) grand total reflects the number of cases meeting the ISW7's conceptual definition of poisoning and can be used

as a broad morbidity indicator for hospital discharge or ED visit poisonings encounters (not individual patients) identified within hospital discharge or ED visit records.

The Matrix can also be applied to generate counts using existing poisoning definitions and indicators that are based on ICD-9-CM codes (e.g. NCHS drug-induced indicator, NCIPC's core injury core indicators, adverse effects, etc.), explore current poisoning issues of interest (e.g. drug poisonings and opioid-specific drug poisoning), and create other case definitions to meet specific purposes. For example, users can produce an indicator for "drug poisoning" morbidity data based on the explicit subset of poisoning categories captured in the Matrix cell at the intersection of the Drug row by the All Poisoning column (e.g. all ICD-9-CM codes for drug poisoning morbidity only). Use of explicit case definitions based on the Matrix maintains the overall standardized approach to public health surveillance (e.g. use of a single overall Morbidity Poisoning Indicator) for comparison purposes, while also allowing the creation of additional subset indicators. Use of the Matrix can also help avoid inappropriate comparisons by making explicit what codes are included in any subindicator created.

Description of Poisoning Matrix for ICD-10 Coded Mortality Data

Purpose

The Poisoning Matrix for Mortality Data is also based on the broad ISW7 conceptual poisoning definition and provides a framework which categorizes all relevant poisoning ICD-10 codes. This Matrix, which can be found in Appendix B1 was developed as a tool to help state and national groups standardize the ICD-10 categories of mortality poisonings for public health surveillance purposes. It can also serve as a guide for examining the differences among the wide range of existing approaches to defining and operationalizing "poisoning" indicators for surveillance, and for developing or refining a number of new surveillance indicators.

The Matrix:

- Organizes poisoning by type of poison (Rows) and underlying and contributory causes of death (Columns) based on the ISW7 conceptual poisoning definition;
- Displays each poisoning ICD-10 code within this conceptual structure;
- Provides a structure to display poisoning death counts and rates; and
- Allows users to compare existing operational definitions and indicators, and to create their own operational definitions based on subsets of the Matrix to meet their specific policy or programmatic needs.

How to Use the Poisoning Matrix for ICD-10 Coded Mortality Data

The Matrix can be used to analyze both underlying cause of death (UCOD) and multiple cause of death (MCOD) data. Most users will be able to access mortality data sets containing UCOD. Some users may have access to files containing both the UCOD and the MCOD data. Using the Matrix with either UCOD or MCOD is valuable, but each application has strengths and challenges. This section provides some general guidance and examples of how to use the Matrix with both data sets.

The ISW7 recommends the use of files that contain both the UCOD and MCOD files for the most complete surveillance, because these data provide the best overview and greatest specificity of poisoning deaths. However, use of the MCOD data must be undertaken with caution due to the complexity of the data and should be done under the guidance of an epidemiologist, statistician, or data analyst familiar with both the structure of the data files and the appropriate use of analytic methods. Using the Matrix requires a basic understanding of the ICD-10 coding scheme. The use of ICD-10 began with the 1999 mortality data in the US. Before 1999 data, mortality data were coded using the ICD-9. Caution must be taken in making any comparisons of mortality data prior to 1999 with later years.

The UCOD of death data and the MCOD death data can be accessed using the interactive on-line data access system, called WONDER http://wonder.cdc.gov/mcd.htm. WONDER has a MCOD application which is capable of producing the counts and rates of deaths for the Matrix. The application can produce state-based estimates. For those with programming skills, SAS programs are provided in a link (Appendix B2) to this report for use in generating poisoning death counts using the poisoning data at the national, state, or local level.

The Matrix can be used to examine existing poisoning definitions and indicators that are based on ICD-10 codes (e.g. NCHS drug induced indicator, NCIPC's core injury indicators, adverse effects), explore current poisoning issues of interest (e.g. drug poisonings and drug opioid poisonings), and to develop case definitions to meet specific purposes. For example, users can produce drug poisoning mortality data based on the explicit subset of poisoning categories captured in the Matrix cell at the intersection of the Drug row by the All Codes column (e.g. all UCOD codes for drug poisoning deaths only). This flexibility is a strength of the Matrix because it allows users to identify what codes are included in existing poisoning indicators and create their own explicit case definitions (i.e. ICD-10 codes to be included/excluded) in a standard way. Use of explicit case definitions based on the Matrix maintains the overall standardized approach to public health surveillance (e.g. use of a single overall Mortality Poisoning Indicator) for comparison purposes, while also allowing the creation of additional subset indicators.

Using the Matrix for Underlying Cause of Death Data Only

The Matrix is designed to highlight the use of UCOD codes as a way to identify and count poisoning deaths. UCOD data are generally available and are more straightforward to analyze because each death is assigned a single ICD-10 code as the underlying cause of death. In the ICD, the underlying cause of death is the disease or injury that initiated the chain of events leading directly to death. Users will note that the range of UCOD codes representing poison deaths in the ICD-10 Matrix includes not only the traditional external cause-of-injury codes for poisoning (X40-X49, X60-X69, X85-X90, Y10-Y19, Y35.2, U01(.6-.7) categorized by intent) but also codes for foodborne intoxications, evenomation, substance abuse and chronic disease conditions induced by poisoning. Given that each death is assigned only one underlying cause code, UCOD data provides unduplicated counts of various types of poisoning.

For UCOD analyses, the Matrix is designed as a row-by-column spreadsheet of ICD-10 codes. The Matrix lists the types of poisons in the rows based on the categorizations developed by the ISW7. The columns display the categories of poisonings available in ICD-10 that can be used to indicate the UCOD. (NOTE: The grey columns to the right include the ICD-10 categories of poisoning available from the MCOD file and are not relevant to analyses limited to UCOD data.) The Matrix allows a user to:

- Locate an individual code or set of codes within the Matrix structure; e.g. the code for death due to unintentional poisoning by nonopioid analgesics (X40) can be found at the intersection of the row for Nonopioid analgesics and the column for Unintentional intent;
- Create marginal totals for separate columns and rows; e.g. "Unintentional poisoning" (column) by "All types of poison" (row) corresponds to the codes X40-49; and
- Create a single overall count for all types and categories of poisoning deaths meeting the ISW's conceptual definition of a "poison death"; i.e., the codes for all underlying causes due to all types of poisons can be found in the cell at the intersection of the "All types of poison" row and the "All codes" column .

Using the Matrix for both Underlying and Multiple Cause of Death Data

MCOD data reflects the fact that deaths are complex and may have multiple causal factors. ICD-10 poisoning codes which describe the "nature of injury," (as opposed to the ICD-10 poisoning codes which describe the cause-of-injury) are only found in the MCOD data, are laid out in the final three

columns of the Matrix. These codes generally provide additional specificity about the type of poison (e.g. methadone, carbon monoxide) involved in the death and are described below. These columns should be used to supplement the analyses conducted with the UCOD data. For example, using the subset of UCOD codes for drug poisonings, the MCOD diagnostic codes can provide a breakdown of the specific drugs included. Thus, MCOD data significantly improves the ability to identify and count specific substances involved in poisoning deaths. However, because each death may involve more than one ICD-10 code, the MCOD files are more difficult to analyze than UCOD data.

National MCOD data are available on CDC interactive data system WONDER in the MCOD application http://wonder.cdc.gov/mcd.htm. SAS programs for use with the micro data are available in Appendix B2. The public-use MCOD file for the United States is available for download at the following website (http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm). From 2005 onward the public-use MCOD files do not contain state or county identifiers. However, these may be had by request 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.

The national MCOD file contains all the relevant data needed for analysis using the Matrix. However, some state files are available prior to the release of the national file and these may be useful for surveillance. At the state level the MCOD data are not always part of the standard death files and accessing them may also require a special request. Each state vital statistics office will normally be able to tell users if they have the MCOD files and how they can access them. Seeking expert assistance to assure their proper use is strongly suggested given the complexity of these files.

The MCOD data file includes fields for both the UCOD and other causes of death. Because of this structure, each individual death may contain multiple codes to describe the death. There are two types of multiple cause of death 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 ISW-7 recommends using these codes with the Matrix.

As described above, ICD-10 codes in the range T36-T65, which describe drugs and toxic substances, cannot be an underlying cause of death but are included in the MCOD fields to provide additional detail on the substances involved in poisoning deaths. For example, a death caused by a heroin overdose may contain both X42, unintentional poisoning by narcotics, and T40.1, poisoning by heroin; but only the external cause code, X42, can be the UCOD. However, the MCOD fields may also contain other causes of death (including other external causes) that were involved in the death but were not the underlying cause.

In addition, more than one drug might be reported as a cause of death. If both oxycodone and a benzodiazepine are recorded on the death certificate, there will be at least three ICD-10 codes: X42 and two ICD diagnostic codes (T40.1 and T42.4) listed in the MCOD data. There are other considerations when interpreting MCOD data. For example, individual MCOD codes can't 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. For example, poisoning by fentanyl and poisoning by meperidine would both be coded as T40.4. However T40.4 would be only included once in the record axis MCOD data.

One additional factor to consider when analyzing the MCOD data is that codes in the T36-T65 range might sometimes appear in the list of multiple contributory causes for a death whose UCOD is not considered a poisoning by the ISW7 definition. For example, drug intoxication might contribute to a death whose underlying cause is a motor vehicle crash. For most purposes, the ISW7 recommends analyzing MCOD data only for deaths whose UCOD was included in the poisoning Matrix.

Operational Definitions for Other Major Data Sources

Description of the National Poison Data System (NPDS)

Currently, there are 57 Poison Centers (PCs) in the US providing poison emergency services to the entire population of the 50 states, American Samoa, the District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the U.S. Virgin Islands. The American Association of Poison Centers (AAPCC) and the National Center for Environmental Health, Health Studies Branch at CDC have combined efforts to help local PCs detect and record chemical exposure events and ensure effective responses. The focus of these efforts is the use of the near real-time NPDS database to improve public health surveillance of chemical exposures and other potential health hazards. Every PC uploads their case data continuously (mean time to upload 19.9 minutes) to the NPDS. Operational since 1985, the NPDS captures 99.8% of all poison exposures reported to PC's nationwide. CDC and AAPCC have developed methods to use NPDS data for real-time automated alerting that generate more immediate and effective responses to public health threats related to toxins or chemicals in the environment.

All U.S. residents can access a PC toll free 24/7 by phoning 1.800.222.1222. Encounter information is documented contemporaneously into their case management system. Calls are managed by healthcare professionals who have received specialized training in clinical toxicology and managing exposure emergencies. These providers include medical and clinical toxicologists, registered nurses, doctors of pharmacy (PharmDs), pharmacists, chemists, hazardous materials specialists, and epidemiologists. Centers are accredited by the AAPCC based on strict standards and must be reaccredited every 5 years. The PCs represent a unique system in that health care professionals can always speak with a physician or clinical toxicologist.

Many of the exposure encounters captured in the NPDS would be considered poisoning according to the ISW7 conceptual definition. However, NPDS does not use the ICD coding systems (ICD-9-CM and ICD-10) to define and classify encounters. Instead PCs use the Poisindex® poison information and management system [16]. This system has a comprehensive products database that lists the active and inactive ingredients in over 390,000 household, chemical, and pharmaceutical products. Each product has a unique identification number and is classified into one of 975 generic codes. These product and generic codes allow for precise searching and data retrieval, which provides for a richer level of detail than is available in IDC-9-CM codes for instance.

Thus, no attempt is made to create or cross walk the poison center operational definition of poisoning with the ISW7 system presented in this report. The ISW7 recommends care must be exercised in comparing results generated from the NPDS system and the ISW7 operational definition provided for the ICD coding systems.

Description of the Drug Abuse Warning Network (DAWN) for ED data

DAWN is a public health surveillance system administered by the Substance Abuse and Mental Health Administration that continuously monitors drug-related ED visits for the Nation and for selected metropolitan areas.

A DAWN drug case is any ED visit involving recent drug use. DAWN does not capture information on non-drug poisoning visits. The criteria for inclusion encompass all types of drug-related visits, including accidental ingestion, intentional ingestion (e.g. self harm) and adverse reaction, as well as drug misuse or abuse. DAWN also includes ED visits for underage persons involving alcohol only and alcohol in combination with other drug(s).

Most of the ED visits included in DAWN are considered poisoning according to the ISW7 conceptual

definition. However, currently the number of visits meeting the definition is unknown as the data are not ICD coded. In DAWN, drug cases are identified by the systematic review of ED medical records in participating hospitals and provide for greater specificity in the classification of drugs than in other data systems based on administrative health care provider data. In addition, DAWN includes a broader range of ED visit types than are encompassed by the ISW7 operational definition of drug poisoning based on principal diagnosis only; namely, DAWN captures both ED visits that are directly caused by drugs and those in which drugs are a contributing factor, but not the direct cause of the ED visit. An example would be a person who consumed drugs and alcohol, and crashed his car, and then was taken to the ED. Using the DAWN protocol, the immediate cause of this ED visit would be identified as injuries sustained in the car crash, but it would be noted that drugs contributed to the crash.

Due to the complexity of the task and time limitations, the ISW7 was unable to create or cross walk an operational definition of drug poisoning with the ISW7 conceptual definition of poisoning. The ISW7 recommends that care be exercised in comparing estimates of drug related poisoning generated from the DAWN system and estimates from other ED data systems which use the ISW7 operational definition for ICD coded data.

General information about DAWN is currently available at http://DAWNinfo.samhsa.gov/, including detail on the DAWN data program and the methodologies used to collect, process, and report data. DAWN publications are available at the SAMHSA website at http://www.samhsa.gov/data/. See the data source summary of DAWN in Appendix A.

Inventory of Poisoning Data Sources

The ISW7 compiled and summarized a list of twenty-eight poison surveillance data systems/sources in the U.S. that may be useful for public health surveillance, which are listed in Appendix A. Although fairly comprehensive, this inventory is not meant to be exhaustive. These data sources have been grouped into the following broad categories according to their primary usefulness: mortality, morbidity, medication, surveys, and workplace or occupational sources. Many data sources can fit into more than one category. For each data source, a summary table is provided in Appendix A with the following information:

- Name the of data source or system;
- Contact information (website, address or phone number if applicable);
- Data type and purpose;
- Geographical range covered by the data;
- Frequency of data collection;
- Whether data are available on-line;
- Whether data are free to the public;
- Data collection methodology;
- What is included in the data including details on demographic information;
- Years of data availability;
- Specific information about poison data available including codes if relevant;
- Strengths and weaknesses of the data source; and
- Other relevant information that may help the reader to determine the utility of the data source.

The summary tables in Appendix A are intended as a quick snapshot to give the reader highlights about the data sources and help them make an initial determination about the usefulness of the sources to their poison surveillance. They have not been rated on their importance to a particular field or type of poisoning. For further information, the website/phone number of the agency or organization administrating the database is provided for the reader. The websites were current as of October 2011.

General Considerations and Recommendations for Improving Poisoning Surveillance

General considerations

- The ISW7 conceptual definition of poisoning includes both the acute and chronic health effects of poisoning. As a result, the proposed indicators below include some health conditions not traditionally classified in the rubrics reserved for injuries and poisonings. For example, in the ICD, many of the health conditions resulting from poisonings occur immediately after exposure to a poisonous substance, and these are generally classified using ICD external cause codes. However, poisonings can also occur from chronic exposure occurring over many years. In these cases, poisonings (whether from drugs or other agents) are generally classified as diseases or chronic conditions associated with long term exposure to a drug or nondrug agent and are therefore, classified under the ICD chapters reserved for diseases rather than injuries.
- While the ICD-9-CM and ICD-10 poison Matrices presented earlier do not have labels that distinguish which ICD codes relate to acute or chronic poisonings, the Matrices do display all of the codes identified by ISW7 as fitting the broad conceptual definition of poisoning. The proposed indicators specify code ranges either taken directly in total or using selected individual codes from the appropriate cells of the Matrix.
- In the US, most health events meeting the ISW7 definition of poisoning are due to drugs, whether in reference to fatal or nonfatal events. Nondrug-related poisonings are due to a variety of agents, both environmental and occupational. Measures of total poisoning are not good substitutes for drug poisoning, and vice-versa. Therefore, the recommended indicators presented by the ISW7 are limited to a set of specific drug poisoning indicators.
- Death and other health events (e.g. hospitalizations and ED-visits) resulting directly or indirectly from the chronic use or abuse of drugs may not be recorded consistently by health care providers and medical examiners/coroners (ME/Cs). Differences in language used on hospital discharge records or death certificates, for example, can lead to different principal diagnosis or underlying cause of death (UCOD) codes. In addition, some jurisdictions are more specific than others in the recording of drug types involved because of differences in documentation or toxicological testing practices. These variations can result in artificial differences in poisoning rates. No consensus has been established on indicators for surveillance of drug poisoning, and the indicators proposed below have not been fully evaluated. Evaluation of the indicators using formal criteria (e.g. those available at http://ipru3.otago.ac.nz/ipru/ReportsPDFs/OR070.pdf) is needed to test their usefulness for state poisoning surveillance [17].

Recommendations for proposed drug poisoning indicators for surveillance for state and local jurisdictions

To use the Matrices to create the ISW7 proposed indicators, health agencies and other users are advised to create mortality and morbidity datasets inclusive of all records that have any of the ICD codes (i.e. ICD-9-CM codes in any coding fields; ICD-10 codes among the underlying or multiple causes of deaths) contained in the ISW7 Matrices in this report. These datasets can then be used to derive any of the indicators proposed below or other specified indicators constructed from code sets within the rows and columns in these Matrices.

For morbidity data coded with ICD-9-CM, two options are provided for working with multiple diagnoses. Option A is recommended if a conservative measure of health encounters more likely to be the direct result of acute or chronic drug poisoning is desired. Option B is recommended if a more inclusive measure of hospital encounters to which an acute or chronic drug poisoning contributed or was associated is desired. Option B might include some encounters where the adverse clinical effects of drugs were a result of them being used for treatment of a disease or injury in the hospital or where the poisoning is a co-morbid condition (e.g., a result of substance abuse or dependence) and not the principal reason for the encounter. The sensitivity, specificity and positive predictive value of these options for drug poisoning have not been measured.

ACUTE OR CHRONIC POISONINGS DUE TO THE EFFECTS OF DRUGS

ICD-10 definition of deaths:

Deaths with an underlying cause of death code of D52.1, D59 (.0, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24.2, E27.3, E66.1, F11-F16, F19, G21.1, G24.0, G25 (.1, .4, 6), G44.4, G62.0, G72.0, I95.2, J70 (.2-.4), K85.3, L10.5, L27 (.0, .1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2, X40-X44, X60-X64, X85, Y10-Y14, or Y40-Y59

ICD-9-CM definition of hospitalizations or ED visits:

Option A: Events with an ICD-9-CM code in the principal diagnosis field of 244 (.2,.3), 275.02, 288.03, 289.84, 292, 304 (.00-.02,.10-.12), [304-305] (.20-.22,.30-.32,.40-.42,.50-.52,.60-.62,.70-.72,.80-.82,.90-.92), 332.1, 333.85, 336.8, 357.6, 359.24, 648.3, 655.5, 692.3, 693.0, 760 (.72-.78), 779 (.4,.5), 909 (.0,.5), 960-979, 995 (.2,.4,.86,.89), 999 (.4-.7); or E850-E858, E930-E949, [E950, E980] (.0-.5), or E962.0 as the first-listed external cause-of-injury code.

Option B[6] : Events with any of these ICD-9-CM codes in any diagnosis or dedicated E-code fields.

ACUTE* POISONINGS DUE TO THE EFFECTS OF DRUGS

ICD-10 definition of deaths:

Deaths with an underlying cause of death code of [F11 - F16] (.0), F19.0, X40-X44, X60-X64, X85, or Y10-Y14

ICD-9-CM definition of hospitalizations or ED visits:

Option A: Events with 960-979 in the principal diagnosis field; or E850-E858, [E950, E980] (.0-.5); or E962.0 as the first-listed external cause-of-injury code.

Option B: Events with any of these ICD9-CM codes in any diagnosis or dedicated E-code fields.

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6 The use of any-mention diagnosis is potentially a problem when comparisons across jurisdictions that collect different numbers of ICD-9-CM diagnoses codes per hospitalization or ED visits in hospital discharge or emergency department data systems, respectively. In general, more cases will be identified as the number of available diagnosis codes increases, so the number of diagnosis fields considered in the analysis may confound such comparisons. The sensitivity of searching varying numbers of fields is not known for drug poisoning. Where such variation across jurisdictions or over time exists, the number of diagnosis and designated E-code fields to be searched for these ICD-9-CM codes should be specified. Analysts that intend to compare indicators across jurisdictions should restrict their scope to the lowest number of diagnostic fields and dedicated E-code fields in use among all the jurisdictions.

**Excludes late effects and adverse effects of drugs.*

ACUTE OR CHRONIC DRUG POISONINGS ASSOCIATED WITH THE EFFECTS OF OPIUM, HEROIN, AND/OR OPIOID ANALGESICS

ICD-10 definition of deaths:

Deaths with an underlying cause of death code of F11 or Y45.0

OR

[Deaths with an underlying cause of death code of D52.1, D59 (.0, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24.2, E27.3, E66.1, F12-F16, F19, G21.1, G24.0, G25 (.1, .4, 6), G44.4, G62.0, G72.0, I95.2, J70 (.2-.4), K85.3, L10.5, L27 (.0, .1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2, X40-X44, X60-X64, X85, Y10-Y14, Y40-Y44, or Y46-Y59

AND

One or more of the following codes in any multiple cause of death field: F11, T40.0, T40.1, T40.2, T40.3, T40.4, T40.6 (See footnote in Matrix to determine the inclusion or exclusion of T40.6.)

ICD-9-CM definition of hospitalizations or ED visits:

Option A: Events with 304 (.00-.02, .70, .71, .72), 305 (.50-.52), 965.0 in the principal diagnosis field; or E850 (.0-.2), E935 (.0-.2) as the first-listed external cause-of-injury code.
Option B: Events with any of these ICD9-CM codes in any diagnosis or dedicated E-code fields.

ACUTE DRUG POISONINGS ASSOCIATED WITH THE EFFECTS OF OPIUM, HEROIN, AND/OR OPIOID ANALGESICS

ICD-10 definition of deaths:

Deaths with an underlying cause of death code of [F11 - F16] (.0), F19.0,
X40-X44, X60-X64, X85, or Y10-Y14

AND

One or more of the following codes in any multiple cause of death field: F11.0, T40.0, T40.1, T40.2, T40.3, T40.4, T40.6 (See footnote in Matrix to determine the inclusion or exclusion of T40.6)

ICD-9-CM definition of hospitalizations or ED visits:

Option A: Events with 965.0 in the principal diagnosis field, or E850 (.0-.2) as the first-listed external cause-of-injury code.
Option B: Events with any of these ICD-9-CM codes in any diagnosis or dedicated E-code fields.

ACUTE DRUG POISONINGS ASSOCIATED WITH THE EFFECTS OF OPIOID ANALGESICS

ICD-10 definition of deaths:

Deaths with an underlying cause of death code of [F11 - F16] (.0), F19.0
X40-X44, X60-X64, X85, or Y10-Y14

AND

One or more of the following codes in any multiple cause of death field: T40.2, T40.3, T40.4

ICD-9-CM definition of hospitalizations or ED visits:

Option A: Events with 965 (.02-.09) in the principal diagnosis field, or E850 (.1-.2) as the first-listed external cause-of-injury code.
Option B: Events with any of these ICD9-CM codes in any diagnosis or dedicated E-code fields.

Considerations for further sub-categorizations of indicators

Many states can stratify the annual poisoning mortality indicator rates by sex and age and maintain stable rates; other states may need to combine data across years. Rates for unintentional poisoning and suicidal poisoning will also typically be stable. Mortality rates for homicidal poisoning are typically much lower. Rates of deaths of undetermined intent vary widely be jurisdiction. Therefore, some local and national publications report all drug poisoning by combining all intents, to alleviate the problem of differing reporting of intent in some jurisdictions.

For hospital or ED data, indicators can be broken down by demographic variables such as age, sex, and race (if collection of race is mandated), as well as intent. Categorization by intent might be difficult, however, if the rate of E-coding of records is low or if the specificity of the poisoning agent is not consistent across intent categories (e.g. opiates in ICD-9-CM). Categorization by source of payment is also recommended to determine the fraction of medical care for drug poisoning paid by public insurers.

Recommendations to Improve Surveillance at the State or Local Level

Mortality surveillance

Increase the specificity of ICD coding to minimize the use of nonspecific ICD-10 codes.

Codes such as T40.6 ("other and unspecified narcotics") and T50.9 ("other and unspecified drugs") are uninformative for measuring rates of specific drug types. They result when the language used on death certificates is nonspecific or the death investigation was not thorough enough to identify specific drugs. The frequency of use of such codes varies widely across and within states, thus impairing geographic comparisons for deaths due to specific drug types and substantially undercounting the contribution of specific drugs to the overall drug poisoning problem. State agencies can demonstrate these disparities statistically to their ME/Cs as a way of motivating better death investigation and certification. State agencies might also be able to work with ME/Cs to determine what types of drugs or drug combinations typically receive a nonspecific code such as T40.6.

Supplement vital records with medical examiner/coroner databases.

ME/C databases are population-based and will usually contain more detail than can be captured on the standard death certificate such as the specific types of drugs, the routes of administration (e.g. injection), comorbidities, and sources of drugs. Such data might be available from the local ME/C offices. In addition, this data has been captured through 2010 in multiple metropolitan areas and states by the DAWN Medical Examiner Component and included in reports produced by SAMHSA and available at http://DAWNinfo.samhsa.gov/pubs/mepubs/default.asp.

Morbidity surveillance

Examine various approaches to counting cases.

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 the different case-selection approaches. There is some evidence that use of the first-listed diagnosis may be insensitive to serious cases [18].

Create special systems and use nontraditional health data to capture nonfatal poisonings.

Some states have established surveillance systems specifically to capture nonfatal poisonings in a more timely way. For example, New Mexico and Utah have required the reporting of drug overdoses to their state health departments [19, 20]. 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 contribute to them.

Improve external cause coding in hospital discharge data and ED data

The use of ICD-9-CM poisoning data from state-based hospital discharge and ED data systems depends on the completeness and specificity of external cause of injury codes. Effects have been underway for over two decades to improve external cause coding in these data systems. These efforts should continue. Two Healthy People 2020 Objectives have been established to track improvements in external cause coding in state-based hospital discharge and ED data systems (see Injury and Violence Objectives IVP-6 and IVP-7 at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=24). Data used to track these objectives suggest that many states are now reporting external cause codes for 90% or more of their injury-related hospital discharges and ED visits.

Recommendations to Improve Surveillance at the National Level

STANDARDIZE DEATH CERTIFICATION FOR POISONING

The investigation of poisoning deaths in the US is characterized by wide variations in the use of toxicology testing, case definitions, and specificity of language on death certificates. National associations of ME/Cs and toxicologists should promulgate standard methods for documenting the poisoning event, poisoning agents, and other associated circumstances during investigations and provide appropriate training. There is a need to document the variation within and across states in the way death investigation and certification for poisoning are completed, which results in variations in the codes applied, the degree of detail in specification of drugs, and the use of drug testing and autopsy.

REVIEW THE ASCERTAINMENT OF EVENTS DUE TO ACUTE AND CHRONIC EFFECTS OF DRUG POISONING IN THE NCHS DRUG-INDUCED INDICATOR DEFINITION.

This report used the set of ICD codes for drug-induced deaths developed by the NCHS to define acute and chronic effects of drugs. The NCHS drug-induced causes exclude accidents, homicides, and other causes indirectly related to drug use. It also excludes newborn deaths associated with the mother's drug use and some of the more uncommon causes of death that are due to drugs (e.g. N14.1, nephropathy induced drugs, medicaments, and biological substances). The ISW7 recommends that NCHS review the drug-induced death category and update it if necessary.

ASSEMBLE A SET OF CODES TO ASCERTAIN EVENTS DUE TO ACUTE AND CHRONIC EFFECTS OF NON-DRUG POISONING.

No equivalent set of codes exists that defines the effects of chronic nondrug poisoning in ICD-10. A list of ICD-9-CM and ICD-10 codes that represent diseases and injury due to nondrug poisons, presumably mostly the result of occupational and/or environmental exposure, should be assembled.

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 (http://apps.nccd.cdc.gov/DACH_ARDI/Info/ICDCodes.aspx). It identifies diseases and injuries that are either entirely or partially caused by alcohol and makes use of attributable fractions. A similar compilation should be created for drug-attributable mortality.

DEVELOP A FRAMEWORK FOR ICD-10-CM COMPARABLE TO THE ICD-9-CM FRAMEWORK PROVIDED IN THIS REPORT.

ICD-10-CM is scheduled to be implemented in the United States on October 1, 2013 (http://www.cdc.gov/nchs/icd/icd10cm.htm). In ICD-10-CM poisonings are classified entirely by the diagnosis codes (i.e. T36-T65), and there are no external cause codes for poisonings. The classification of intent of poisoning (e.g. unintentional, self-harm, assault, and undetermined intent) in ICD-10-CM is indicated in the 6th digit of the appropriate diagnosis code (i.e. T36-T65). In general, the ICD-10-CM represents a significant improvement over ICD-9-CM and ICD-10 and includes the ability to classify many more conditions.

General equivalence mappings between ICD-9-CM and ICD-10-CM are available so users can review the poisoning codes. However, a framework comparable to the ICD-9-CM framework provided in this report should be constructed for ICD-10-CM. The new ICD-10-CM framework is needed in the near future to facilitate analysis and presentation of state-based injury morbidity data to monitor temporal trends and demographic patterns in injury rates by mechanism (e.g. poisoning) and intent of injury, especially during the transition period from use of ICD-9-CM to ICD-10-CM.

References

1. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). [cited 2011 December 29]; Available from: www.cdc.gov/ncipc/wisqars.
2. Paulozzi, L.J. and J.L. Annest, US data show sharply rising drug-induced death rates. Inj Prev, 2007. 13(2): p. 130-2.
3. Paulozzi, L.J., et al., Vital Signs: Overdoses of Prescription Opioid Pain Relievers - United States, 1999-2008, 2011, MMWR. p. 1487-1492.
4. Centers for Disease Control and Prevention. Issue Brief: Unintentional drug poisoning in the United States. 2010 [cited 2011 October 4]; Available from: http://www.cdc.gov/HomeandRecreationalSafety/Poisoning/brief.htm.
5. Warner, M., L.H. Chen, and D.M. Makuc, Increase in fatal poisonings involving analgesics in the United States, 1999-2006, in NCHS Data Brief 2009, National Center for Health Statistics: Hyattsville, MD.
6. Soslow, A.R. and A.D. Woolf, Reliability of data sources for poisoning deaths in Massachusetts. Am J Emerg Med, 1992. 10(2): p. 124-7.
7. Webster, L.R. and N. Dasgupta, Obtaining adequate data to determine causes of opioid-related overdose deaths. Pain Med, 2011. 12 Suppl 2: p. S86-92.
8. Porucznik, C.A., et al., Studying adverse events related to prescription opioids: the Utah experience. Pain Med, 2011. 12 Suppl 2: p. S16-25.
9. Bronstein, A.C., et al., 2009 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 27th Annual Report. Clin Toxicol (Phila), 2010. 48(10): p. 979-1178.
10. Institute for Medicine. Committee on Poison Prevention Control, Forging a Poison Prevention and Control System2004: The National Academies Press.
11. Organizations, Joint Commission on Accredidation of Healthcare Organizations. Pain assessment and management standards -- hospitals. 09/29/04]; Available from: http://jcrinc.com/subscribers/perspectives/perspectives.asp?durki=3243.
12. Nebeker, J.R., P. Barach, and M.H. Samore, Clarifying adverse drug events: a clinician's guide to terminology, documentation, and reporting. Ann Intern Med, 2004. 140(10): p. 795-801.
13. Substance Abuse and Mental Health Services Administration (SAMHSA). Leading Change: A Plan for SAMHSA's Roles and Actions 2011 – 2014, Original draft posted October 4, 2010 at http://www.samhsa.gov/about/sidocs/SAMHSA_SI_paper.pdf.
14. Kenneth D. Kochanek, M.A.; Jiaquan Xu, M.D.; Sherry L. Murphy, B.S.; Arialdi M. Miniño M.P.H.; and Hsiang-Ching Kung, Ph.D., Deaths: Preliminary Data for 2009 National Vital Statistics Reports, Volume 59, Number 4 March 16, 2011.
15. Johnson, R.L., K.E. Thomas, and K. Sarmiento, State injury indicators: Instructions for preparing 2005 data, 2007, Centers for Disease Control and Prevention, National Center for Injury Prevention and Control: Atlanta, GA.
16. Micromedex® Healthcare Series [Internet database], updated periodically, Thomson Reuters (Healthcare) Inc.: Greenwood Village, CO.
17. Cryer, C. and J. Langley, Developing indicators of injury incidence that can be used to monitor global, regional and local trends, 2008, Injury Prevention Research Unit, University of Otago: Dunedin, New Zealand.
18. Xiang, Y., et al., ED visits for drug-related poisoning in the United States, 2007. Am J Emerg Med, 2012. 30(2): p. 293-301.
19. Shah, N., Overdose Surveillance in Hospital Emergency Departments in Northern New Mexico: a pilot study. New Mexico Epidemiology, 2006. 2006(3).

20. Controlled substance database - reporting of prescribed controlled substance overdose or poisoning. 2010; Available from: http://le.utah.gov/~2010/bills/hbillint/hb0035s02.pdf.
21. Kochanek, K., et al., Deaths: Preliminary data for 2009, in National Vital Statistics Reports 2011, National Center for Health Statistics: Hyattsville, MD.

Appendices

Appendix A: Detailed Description of Data Sources

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Drug Abuse Warning Network (DAWN)

Contact Info/Sponsor	Substance Abuse and Mental Health Services Association (SAMHSA) Center for Behavioral Health Statistics and Quality 1 Choke Cherry Road, Room 7-1044 Rockville, MD 20857 Website: www.samhsa.gov/data/DAWN.aspx
Data Type & Purpose[1]	Retrospective medical record review for surveillance purposes. DAWN cases are found by a retrospective review of all emergency department (ED) medical records or Medical Examiner/Coroner (ME/C) case files [Beginning in 2009, ED charts were sampled at 33% in most hospitals]. The review of source records is performed by a trained DAWN Reporter in each member facility. For each DAWN case found, the DAWN Reporter abstracts DAWN data items from the source record. Incident/Case Count -- A DAWN case is any ED visit or death related to recent drug use. The criteria for inclusion in DAWN are intentionally broad and simple, with few exceptions. *DAWN cases include:* Drug abuse and misuse; Suicide attempts/completions; Overmedication; Adverse reactions; Accidental ingestions; Malicious poisoning/homicide by drugs; Underage drinking; Patients seeking detoxification or drug abuse treatment; Other deaths related to drugs.
Geographic Scope[2]	The DAWN ED sample includes approximately 240 hospitals and is nationally representative. Additionally, 12 metropolitan areas are oversampled. Hospitals are stratified based on their geographic area, ownership (public or private), and size (based on total annual ED visits). Thus, it is important that there is participation by hospitals from each stratum, to ensure that all types of hospitals are well represented. DAWN staff work with ME/C offices to simplify the logistics for DAWN. ME/Cs are invited to join DAWN based on their location in selected metropolitan areas and States across the country. Mortality data are not nationally representative.
Implementation Status	ED component discontinued effective 12/31/2011; ME/C component discontinued effective 12/31/2010. Surveillance for drug-related ED visits will be resumed as part of the NCHS National Hospital Care Survey in 2013.
Availability ☒ Online Query System ☒ Public Use Data Set	Public Data set is available through Substance Abuse and Mental Health Data Archive. Standardized tables and report available through website.
Data Collection Methodology[3]	Retrospective medical record review.
Content	Included in the data set for *ED* cases (per the case report form) are the following data elements: facility, date of visit, time of visit, age, patient's home zip code,

[1] e.g. archival, administrative, registry, surveillance, survey
[2] i.e. national, state, regional, population based sample, etc.

[3] e.g. design, regularity, how data is collected, sampling, etc.

	sex, race/ethnicity, case description, substances involved (toxicology confirmation Y/N), alcohol involvement, route of administration, diagnosis, type of case (suicide attempt, overmedication, etc.), disposition, and comments. However, not all of these data elements are publically available. Included in the data set for *Mortality* cases (per the case report form) are the following data elements: facility, date of death, sex, age, patient's last known home zip code, place of death, zip code for place of death, race/ethnicity, manner of death, cause of death, case description, substances involved toxicology confirmation (Y/N), alcohol involvement, route of administration, and comments.
Demographic Information	Age, patient's home zip code, race/ethnicity, and sex.
Years of Data	ED component: 1972 through 2011, with a redesign in 2003.
Codes to Identify Poisoning Cases	Internal coding scheme used based on verbatim diagnosis text from source medical records.
Strengths for Poisoning Surveillance[4]	• Includes both fatal and nonfatal cases. • Opportunities to collect additional detail since collection method is a medical record review. • Includes all types of drug poisonings and detailed information on drugs.
Weaknesses for Poisoning Surveillance[5]	• Timeliness of the data for surveillance purposes since it is a medical record review is potential weakness. • Only includes drug poisoning data, and no other sources of poisonings. • Low hospital participation rate which can affect precision of estimates.
Other Relevant Information	DAWN collects data on thousands of drugs of all types. These include: Illegal drugs of abuse; prescription and over-the-counter medications; dietary supplements; non-pharmaceutical inhalants; alcohol in combination with other drugs (adults and children); and alcohol alone (age < 21 years).

[4] e.g. specificity of poisoning data, helpfulness for poisoning surveillance; relationship to drug poisoning issue
[5] e.g. lack of specificity of poisoning data

National Ambulatory Medical Care Survey (NAMCS)

Contact Info/Sponsor	Ambulatory and Hospital Care Statistics Branch National Center for Health Statistics 3311 Toledo Road Hyattsville, MD 20782 Phone: (301) 458-4600 Website: www.cdc.gov/nchs/ahcd.htm
Data Type & Purpose	Surveillance on the provision and use of ambulatory medical care services: visit estimates and risk factor surveillance (drugs prescribed, substance dependence). Non-federally employed physicians (excluding those in the specialties of anesthesiology, radiology, and pathology) who are classified by the American Medical Association (AMA) or the American Osteopathic Association (AOA) as primarily engaged in office-based patient care are randomly chosen to participate in the NAMCS. Approximately 3,000 are selected each year. Patient visit records are completed by the providers using a written, scannable questionnaire.
Geographic Scope	The geographic scope is the 50 states in the U.S. and the District of Columbia. Data are available for both national and regional (Northeast, Midwest, South, West) estimates. No state estimates are available.
Implementation Status	Fully implemented and ongoing.
Availability ☒ Online Query System ☒ Public Use Data Set	NAMCS public-use files for 1993-2008 contain sample design variables in masked form.
Data Collection Methodology	Non-federally employed office-based physicians complete a one-page questionnaire for each patient visit sampled during a one-week reporting period.
Content	Collected data include physician characteristics (obtained during a survey induction interview), patient demographic characteristics (age, sex, race, ethnicity), and visit characteristics (patients' symptoms, complaints or other reasons for the visit, providers' diagnoses, diagnostic and therapeutic services ordered or provided at the visit including medications, expected sources of payment, visit disposition, time spent with provider, type of provider seen, health education provided). Characterizes injury/poisoning-related visits by intent or adverse effect. Drugs given or continued during the visit are coded (up to 8) by NCHS (Multum Lexicon used for surveys 2006 onward, National Drug Code Directory used prior to 2006).
Demographic Information	Patient age, sex, race, ethnicity, zip code, and expected payer. Provider year of birth, race, ethnicity, medical degree, specialty, board certification.
Years of Data	Data are available annually from 1973 to 1981, in 1985, and annually since 1989.
Codes to Identify Poisoning Cases	Text-based diagnostic fields (3) are ICD-9-CM coded. Text-based patient complaints/reason for visit (3) are coded using classification scheme.

Strengths for Poisoning Surveillance	ICD-based specificity of poison agents. This data source provides information on intent, vital signs, diagnostic testing, and visit disposition.
Weaknesses for Poisoning Surveillance	No external cause of injury codes (E codes) which provide information on poisoning intent.
Other Relevant Information	Cannot calculate incidence or prevalence rates based on these estimates. This data source is useful for surveillance on poisonings treated in ambulatory practice settings, although it is limited by the fact that E codes are not included.

Contact Info/Sponsor	National Center for Injury Prevention and Control, CDC Phone: 770.488.4804 Email Contact: Lee Annest at lannest@cdc.gov
Data Type & Purpose	National estimates of incidents of injuries treated in US Hospital Emergency Departments (EDs); ED Surveillance; data are weighted to provide national estimates.
Geographic Scope	National only.
Implementation Status	Fully implemented and ongoing. Used as part of WISQARS.
Availability ☒Online Query System ☒ Public Use Data Set	NEISS-AIP nonfatal injury data by intent and mechanism of injury are available for query in WISQARS (http://www.cdc.gov/injury/wisqars). Public use data files with annual NEISS-AIP data and associated codebooks and documentation are available at the Interuniversity Consortium for Political and Social Research (http://www.icpsr.org), University of Michigan, Ann Arbor, MI.
Data Collection Methodology	Data are collected using the NEISS operated by the US Consumer Product Safety Commission. The NEISS-AIP is an ongoing ED-based surveillance system. Data are obtained from a nationally representative sample of 66 US hospitals with EDs. The sample design is a stratified probability sample of US hospital EDs; there are five strata—four defined by size based on number of annual ED visits (very large, large, medium and small) and one for pediatric hospital EDs. All ED records are reviewed every day of the week; data are then abstracted on all first-time injury-related visits for an injury incident.
Content	External cause of injury (22 major cause groupings consistent with the CDC E-code matrix), intent of injury (unintentional/undetermined, assault, intentional self-harm, legal intervention), principal diagnosis, primary body part affected, up to two consumer products involved, place of occurrence, ED discharge disposition.
Demographic Information	Age and sex; race and ethnicity are also available, but are missing for about 20% of cases.
Years of Data	2001 through 2008
Codes to Identify Poisoning Cases	Precipitating and immediate cause-of-injury grouping codes. The external-cause-of-injury grouping for poisoning is coded consistent with ICD-9-CM coding guidelines. However, specific E-codes are not assigned. "Poisoning" definition used in NEISS-AIP: Ingestion, inhalation, injection, or cutaneous absorption of a drug, toxin (biologic or non-biologic), or other chemical agent in a quantity sufficient to cause a harmful effect. Includes: Poisoning as the result of: overdose of drug (e.g., anti-epileptics, sedatives and hypnotics, narcotics, hallucinogens, drugs acting on autonomic nervous system unspecified drugs and medications); extreme/acute alcohol intoxication (e.g., unresponsive, unconscious); overdose of illicit drugs; wrong drug given or taken in error; drug taken inadvertently; other chemical (solid, liquid, gas, or vapor); unintentional misuse of a drug during medical procedures; administration of drugs with homicidal or suicidal intent; poisoning with undetermined intent; legal intervention involving gases; toxic effect of other noxious substances (e.g.,

	poisonous mushrooms or berries). Excludes: Adverse effects of drugs and bacterial illness, such as: the adverse effects of therapeutic use of drugs; food poisoning.
Strengths for Poisoning Surveillance	A brief narrative is captured on each ED case. These narratives sometimes have information about the type of drug and whether alcohol was involved. Narratives could be reviewed to identify and classify cases of drug-related poisonings. However, the specific names of the drugs are not usually indicated in the narrative. All drug poisonings (illicit and prescription drugs) are included in NEISS-AIP. NEISS-AIP poisoning data are useful to provide broadly-defined national estimates of poisonings associated with drugs, alcohol, carbon monoxide, other gases/liquids and other consumer products by age and sex of patients. The narratives usually indicate whether the case was an overdose and sometimes whether there were toxic effects (seizures, tremors, nausea, dizziness, weakness, vomiting, rash all over body).
Weaknesses for Poisoning Surveillance	NEISS-AIP would likely not be useful for making national estimates of specific types of drug-related poisonings.
Other Relevant Information	

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

Contact Info/Sponsor	Medication Safety Program, Division of Healthcare Quality Promotion, National Center for Emerging and Zoonotic Infectious Diseases, CDC Phone: 800-232-4636 Email Contact: medicationsafety@cdc.gov
Data Type & Purpose	ED surveillance based on nationally representative sample of 66 US hospitals with EDs; data are weighted to provide national estimates.
Geographic Scope	National only.
Implementation Status	Fully implemented and ongoing.
Availability ☒ Online Query System ☒ Public Use Data Set	No public use data files.
Data Collection Methodology	Data are collected using the NEISS operated by the US Consumer Product Safety Commission (CPSC). Data are obtained on an ongoing basis from a nationally representative sample of 66 US hospitals with EDs. The sample design is a stratified probability sample of US hospital EDs; there are five strata—four defined by size based on number of annual ED visits (very large, large, medium and small) and one for pediatric hospital EDs. All ED records are reviewed every day of the week; data are then abstracted on all first-time injury-related visits for an injury incident. National weighting of cases are completed by CPSC on an annual basis.
Content	National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP) variables plus coded variables for mechanism (cause) of the ADE visit (unintentional overdose, allergic reaction, adverse effect, secondary effect, vaccine reaction); up to two drugs implicated in the ADE; dose, route, frequency, and duration of drug use (when documented); up to eight MedDRA codes describing the clinical manifestations of the ADE; and up to two MedDRA codes describing medication errors (when documented). Additional free text variables include chief complaint/reason for visit, clinical diagnosis, testing performed, treatments rendered, and concomitant drugs reported.
Demographic Information	Age and sex; race and ethnicity are also available, but are not standardized and missing for about 20% of cases.
Years of Data	Data are not publically available. Data collection began in 2004.
Codes to Identify Poisoning Cases	ICD-9-CM codes are not used to identify or classify cases. Cases are identified by algorithmic manual chart review. Determination of the mechanism of injury is made by interpretation of the diagnoses, testing, treatments, and circumstances of the case as described in the narrative. The case definition for "Adverse Drug Events" used in NEISS-CADES is an ED visit because of: Allergic reaction to a drug*; Side effect of a drug*; Taking a drug* in the wrong way; or Taking the wrong drug*. Cases due to self-harm or drug abuse are excluded.

	*Drugs include: prescription medications, over-the-counter medications, topical medications, vaccines, and vitamins and nutritional supplements. Alcohol, illicit substances, tobacco products, and foods are not considered "drugs." Drugs are standardized using an adapted version of the Veterans Health Administration National Drug Formulary. To distinguish dose-related ADEs from non-dose-related ADEs (such as allergic reactions), the mechanism code of "unintentional overdose" may be used.
Strengths for Poisoning Surveillance	The medication error codes can be used to help identify contributing causes of unintentional overdoses (e.g., child ingestions, wrong drug administered, incorrect dose administered, etc.). The standardized medication names can be used to identify specific active ingredients. The MedDRA codes can be used to identify the specific manifestations of drug-related toxicity (e.g., seizures, tremors, nausea, dizziness, weakness, vomiting, rash all over body). Reviewing the free text narratives of each ED case may provide additional contextual information on medication-related overdoses that are related to therapeutic use but not abuse or self-harm. NEISS-CADES ADE data are useful to provide national estimates of ED visits due to *acute* adverse effects of medications by age and sex of patients, by specific medications, and by clinical manifestations.
Weaknesses for Poisoning Surveillance	NEISS-CADES is *not* useful for making national estimates of poisonings due to illicit drugs, foods, or any substances or than medications, dietary supplements or vaccines because these other substances are not included in the case definition of "drugs". NEISS-CADES is *not* useful for making national estimates of poisonings due to abuse/recreational use or self-harm attempts because these intents of medication lie outside the case definition of "adverse drug events". NEISS-CADES is *not* useful for identifying sub-acute poisonings or long-term effects of poisonings, or chronic effects of poisonings.
Other Relevant Information	MedDRA is the internationally recognized standard nomenclature for classifying adverse event manifestations of biopharmaceuticals (www.meddramsso.com)

National Emergency Medical Services Information System (NEMSIS)

Contact Info/Sponsor	National Highway Traffic Safety Administration (NHTSA), Office of Emergency Medical Services Phone: (801) 585-9161 Email: nhtsa.ems@dot.gov Website: NEMSIS Technical Assistance Center: www.nemsis.org/
Data Type & Purpose	Ongoing collection and storage of EMS event data from states and territories nationwide (registry).
Geographic Scope	National, state, and local EMS data.
Implementation Status	According to the NHTSA EMS web site, all U.S. states and territories have signed Memoranda of Understanding (MOU) with NHTSA to participate in the system. Implementation has varied by state.
Availability ☒Online Query System ☒ Public Use Data Set	Information from each state is available from the NHTSA web site at: www.nemsis.org/support/stateProgressReports/index.html. To date, several million EMS records have been submitted electronically to the database. Data does not contain information identifying patients, EMS agencies, or receiving hospitals.
Data Collection Methodology	Data are collected electronically by states from EMS agencies. Through signed MOUs, some participating states routinely send standardized data electronically to the NHTSA, NEMSIS data storage system.
Content	Pre-hospital EMS event data without identifiers. Identifier information is only available in compliance with HIPAA requirements.
Demographic Information	Extensive demographics on patient (age, sex, race ethnicity, home address, insurance, occupation, industry, and EMS Agency and personnel information (in demographic data set only), scene demographics including date/time, GPS location; incident address and location type; destination address and GPS. See NHTSA standards for MEMSIS data collection. Data Dictionary available on-line: www.nemsis.org/v2/downloads/datasetDictionaries.html.
Years of Data	NHTSA began signing MOUs with states in 2003. Implementation has been ongoing since then, with some states making more progress than others.
Codes to Identify Poisoning Cases	There are cause of injury codes for: chemical poisoning; drug poisoning; venomous stings. In addition there are "patient condition codes" which include 1) alcohol intoxication or drug overdose, 2) poisons, 3) severe alcohol intoxication, and 4) animal bites/sting/envenomation categories, as well as some ICD-9-CM codes of the patient condition that can be used for identifying poison cases. See NHTSA NEMSIS Data Dictionary at NHTSA EMS web site.
Strengths for Poisoning Surveillance	Poisoning cases treated and transported by pre-hospital EMS agencies. A query of the data would need to be done to determine the specificity of poisoning data.
Weaknesses for Poisoning Surveillance	Many poisoning cases are not seen by pre-hospital EMS agencies. Not great for surveillance of specific poison agents unless combined with narrative or other information. Not nationally representative at the present time.

Other Relevant Information	This database is particularly useful for identifying the number and location of poisonings involving EMS transfer, the type of locations they are occurring, as well as patient physical exam findings and procedures performed at the scene. Various information related to EMS responses - see NHTSA, NEMSIS web site.

National Hospital Ambulatory Medical Care Survey (NHAMCS)

Contact Info/Sponsor	Centers for Disease Control and Prevention (CDC)/National Center for Health Statistics (NCHS). Ambulatory and Hospital Care Statistics Branch National Center for Health Statistics 3311 Toledo Road, Hyattsville, MD 20782 Phone: (301) 458-4600 Website: www.cdc.gov/nchs/ahcd.htm
Data Type & Purpose	Surveillance on the provision and utilization of ambulatory care services in hospital emergency and outpatient departments in the U.S.: visit estimates and risk factor surveillance (drugs prescribed and substance dependence). A nationally representative sample of hospitals is selected (approximately 500 provide data annually). The survey uses a four-stage probability design with samples of geographically defined areas, hospitals within these areas, clinics within the outpatient departments and emergency service areas within the emergency departments of these hospitals, and patients visits to these clinics and emergency services areas. Hospital staff complete patient record forms for a systematic random sample of patient visits during a randomly assigned 4-week reporting period. Medical coding is performed by NCHS.
Geographic Scope	Randomly selected sample of non-Federal general and short-stay hospitals, located in the 50 States and the District of Columbia, that have a 24-hour ED or an outpatient department with physician services clinics are eligible for participation in the NHAMCS.
Implementation Status	Fully implemented and ongoing.
Availability ☒ Online Query System ☒ Public Use Data Set	Public micro-files available.
Data Collection Methodology	The survey instrument is the Patient Record form, which is provided in two versions, one for use in outpatient departments and another for use in emergency departments.
Content	Data are obtained on demographic characteristics of patients, expected source(s) of payment, patients' complaints, physicians' diagnoses, diagnostic/screening services, procedures, medication therapy, disposition, types of health care professionals seen, cause and intent of injury where applicable, and certain characteristics of the hospital, such as type of ownership.
Demographic Information	Date and time of visit, patient zip code, date of birth, sex, race, ethnicity, and expected payer.
Years of Data	This survey has been conducted annually since 1992.
Codes to Identify Poisoning Cases	Text-based cause of injury field (1) and provider diagnosis fields (3) are ICD-9-CM coded. The text-based patient complaints/reason for visit (3), coded using classification scheme, could potentially be used as well.

Strengths for Poisoning Surveillance	ICD-based specificity of poison agents or class of agents. Additional strengths are the physiologic variables (vital signs, pulse oximetry, Glasgow Coma Score), mode of transport (ambulance Y/N), diagnostic testing, procedures performed, and visit disposition.
Weaknesses for Poisoning Surveillance	Specificity of the poisoning data is limited by the ICD-9-CM coding scheme. Provides only national estimates.
Other Relevant Information	The ICD-9-CM external cause-of-injury and injury diagnosis codes are useful for poison surveillance.

National Hospital Discharge Survey (NHDS)

Contact Info/Sponsor	CDC/National Center for Health Statistics, Hospital Care Team, Ambulatory and Hospital Care Statistics Branch, Phone: (301) 458-4321 Email: nhds@cdc.gov Website: www.cdc.gov/nchs/nhds.htm
Data Type & Purpose	Hospital discharges from short-stay non-institutional hospitals, general and children's general hospitals regardless of length of stay, exclusive of military and U.S. Department of Veteran Affairs hospitals, located within the 50 States and the District of Columbia. NHDS is a provider-based survey. The NHDS utilizes a three-stage probability design that includes primary sampling units (PSUs) used for the 1985–94 NHIS, hospitals within PSUs, and discharges within hospitals. The largest hospitals were selected with certainty. The annual number of records included in the survey is approximately 300,000. For years 2008-2010, the number of records included in the survey is approximately 150,000.
Geographic Scope	National
Implementation Status	Fully implemented and ongoing.
Availability ☒ Online Query System ☒ Public Use Data Set	Data from the NHDS are available annually and are used to examine important topics of interest in public health and for a variety of activities by governmental, scientific, academic, and commercial institutions. NHDS data are available in publications, CD-ROMs and downloadable files from the FTP server.
Data Collection Methodology	Manual sample selection and abstraction of inpatient medical records by field personnel or automated data collection through the purchase of electronic files from commercial abstracting sources, states, or hospitals.
Content	Variables collected include: age; gender; race; ethnicity; admission and discharge dates (length of stay); discharge status; source of payment; hospital size, ownership, and region; up to7 ICD-9-CM diagnosis codes; and up to 4 ICD-9-CM procedure codes. For the 2010 data collection up to 15 diagnoses were collected and up to 8 procedures.
Demographic Information	Patient's age, gender, race, and ethnicity.
Years of Data	1965 to present.
Codes to Identify Poisoning Cases	Using discharge diagnoses coded using ICD-9-CM. Prior to 2010, the NHDS recorded up to 7 codes. In 2010, the NHDS began collecting up to 15 codes.
Strengths for Poisoning Surveillance	• National in scope. • Good for study of trends.
Weaknesses for Poisoning Surveillance	• Lack of detail regarding the circumstances of the poisoning. • Inability to look at geographic regions other than national and four U.S. Census Bureau regions.

Other Relevant Information	The NHDS is national in scope and includes all discharges, so poisonings could be seen in relation to other external causes and other natural causes. Starting in 2011, the NHDS will form the inpatient component of the new National Hospital Care Survey.

National Poison Data System (NPDS)

Contact Info/Sponsor	American Association of Poison Control Centers' (AAPCC) 515 King Street, Suite 510, Alexandria, VA 22314, USA. Phone: 703-894-1858. Email: info@ aapcc.org & datarequests@aapcc.org Website: www.aapcc.org/DNN/
Data Type & Purpose	NPDS is a near real-time national exposure database and surveillance system. NPDS collects call data from all 57 US Poison Centers serving all 50 States, Washington, DC, Puerto Rico, US Virgin Islands, and 3 Pacific jurisdictions. Median time to case upload is every 19 minutes for all 57 centers. Upload includes spatial, temporal, product and medical outcome information on humans and animal exposures.
Geographic Scope	National, based on 57 Poisoning Centers across us. Map: www.aapcc.org/dnn/About/MapofUSPoisonCenters/tabid/388/Default.aspx. NPDS contains over 53 million records.
Implementation Status	Fully implemented and ongoing. Data are available in near real-time starting in 1983.
Availability ☒Online Query System ☒ Public Use Data Set	The AAPCC publishes an Annual Report on poisoning statistics and trends. All Annual Reports (1983 to date) are available on-line at www.aapcc.org. Poison centers and their designees such as state health departments can access both regional and national aggregate data NPDS data on-line free of charge. Manufacturers are able to request data sets on their products and national aggregate data on a fee for service basis.
Data Collection Methodology	Calls reported to the poison centers are self-reported from the public and health care providers. Exposure cases are followed to known medical outcome. Poison center staff includes: RNs, PharmDs, pharmacists, and physicians specially trained in medical and clinical toxicology. Data is collected contemporaneously at each center and transmitted in near real-time to NPDS. All death cases are peer reviewed by a team of clinical and medical toxicologists. NPDS has a set of tools for real-time volume and case-based surveillance.
Content	NPDS collects basic demographics (patient information, caller information, location), exposure information (substance(s) from chemical, pharmaceutical, infectious such as foodborne), clinical effects, medical treatment including antidote therapy, and medical outcome,. NPDS contains a robust products database of more than 390,000 pharmaceutical, chemical and household products that allow for identification down to the generic or brand name. These data are used to identify emerging public health hazards, prevention needs, public and professional education needs, areas for clinical research, direct training, and detect chemical/bioterrorism incidents. NPDS data has been used to prompt product reformulations, repackaging, recalls, and bans to support regulatory actions and contribute to post-marketing surveillance on newly released drugs and products.
Demographic Information	Call time, center, state, ZIP code, age, gender, and pregnancy status.
Years of Data	The NPDS database was initiated in 1983, and provides a baseline of more than 53 million human exposure cases through 2011. Real-time data available on-line since 2000.

Codes to Identify Poisoning Cases	The NPDS categorizes generic and brand name products into one of 975 pharmaceutical or non-pharmaceutical generic codes. NPDS encounters are categorized by product name and associated generic code, and medical outcome. Poison Centers do not assign ICD-9-CM diagnosis or external cause-of-injury codes to call encounters.
Strengths for Poisoning Surveillance	The NPDS is the only comprehensive near real-time, on-line poisoning exposure and information surveillance database in the United States. The NPDS is unmatched for its call volume and immediacy collecting an estimated half of all US poisoning exposures. The comprehensive product database and generic code system allow for individual product identification and case specificity. All death cases are peer reviewed for relationship to exposure and causality. Encounter clinical effects are coded by relationship to the exposure. Historical volume and case-based surveillance definitions can be created with a variety of statistical parameters to detect encounter anomalies for public health review. Because the data are collected by health care professions in each of the 57 poison centers, cases of interest can be tracked back to the caller for public health investigation.
Weaknesses for Poisoning Surveillance	The NPDS is a passive reporting system. Case records in this database are from self-reported calls reflecting only information provided when the public or healthcare professionals report an actual or potential exposure to a substance (e.g., an ingestion, inhalation, or topical exposure, etc.), or request information/educational materials. Exposures do not necessarily represent a poisoning or overdose.
Other Relevant Information	CDC's National Center for Environmental Health, Health Studies Branch uses the NPDS every day. Poison centers and their public health departments can access NPDS regional and national data at no cost. Manufacturers may obtain data reports on their products on a fee for service basis. The NPDS data are important for public health poisoning surveillance and to better understand the wider poisoning and exposure issue. The NPDS provides a broad surveillance definition capability and captures information on exposures down to the product level.

Nationwide Emergency Department Sample (NEDS)

Contact Info/Sponsor	Healthcare Cost and Utilization Project (HCUP) Agency for Healthcare Research and Quality (AHRQ) Ryan Mutter 301-427-1415 Email: hcup@ahrq.gov Phone (toll free): 1-866-290-HCUP Website: www.hcup-us.ahrq.gov/nedsoverview.jsp
Data Type & Purpose	The NEDS was developed as part of HCUP. The NEDS was created to enable analyses of emergency department (ED) utilization patterns and support public health professionals, administrators, policymakers, and clinicians in their decision-making regarding this critical source of care.
Geographic Scope	The NEDS provides national estimates of ED visits. The NEDS is built using a 20% stratified sample of institutions (hospitals) based on: region, teaching status, control, urban-rural location, and trauma center designation. It may be possible to construct an estimate for all ED visits in a State, if the State participates in both State Inpatient Database (SID) and State Emergency Department System (SEDD). All visits within the sample of selected EDs are included. The NEDS does not contain any state identifiers.
Implementation Status	Fully implemented and ongoing. • The 2008 NEDS included over 28 million ED visits from 980 hospital-based EDs in 28 states. • The 2007 NEDS included about 27 million ED visits from almost 970 hospital-based EDs in 27 states. • The 2006 NEDS included almost 26 million ED visits from over 950 hospital-based EDs in 24 states.
Availability ☒ Online Query System ☒ Public Use Data Set	Public data sets available for purchase at HCUP Central Distributor ; limited reports.
Data Collection Methodology	The NEDS is constructed from the State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). Both the NEDS and National Inpatient Sample (NIS) include records for ED visits that resulted in an admission. The NEDS also includes ED visits that did not result in admission (e.g., treated and released, transferred to another hospital, transferred to another type of health facility, left against medical advice, or died in ED). The **SIDS files** (NIS): 40 States, and over 90% of all inpatient discharges. The **SEDDS (non-admitted ED visits):** 27 states and covers over 50% of all ED visits that do not result in admission. The data are required by the states for administrative purposes. State-based organizations submit abstracts of the Inpatient/ED visits to HCUP, which then 'translates' the data into a uniform format.
Content	AHRQ develops a CORE set of variables that are reasonably consistent across all states. The data include primary and secondary ICD-9-CM diagnoses; CPT-4 procedures; discharge status from the ED; patient demographics (e.g., gender, age, median income for ZIP Code); expected payment source; total ED charges (for ED visits) and total hospital charges (for inpatient stays for those visits that result in admission), and hospital characteristics (e.g., region, trauma center indicator, urban-rural location, teaching status).

Demographic Information	Age, gender, income, and for some states, race/ethnicity.
Years of Data	Purchase of the NEDS beginning in 2006 is open to all users who sign a Data Use Agreement.
Codes to Identify Poisoning Cases	Primary and secondary ICD-9-CM diagnoses; primary and secondary ICD-9-CM and CPT-4 procedures; and E codes.
Strengths for Poisoning Surveillance	Weighted data from participating states can be used to create national estimates of ED visits. In the participating states, there are data on the ED visits for every hospital. In 2009, 93.2% of injury-related ED discharges were E-coded.
Weaknesses for Poisoning Surveillance	General limitations of the ICD-9 CM coding system. Lack of detailed information/specificity for most drugs.
Other Relevant Information	Cost: NEDS is available for a fee. Timeliness: 2008 data are currently available. These files run a little behind (a year or so) depending on the state. Many states have ED data available at the state level.

Nationwide Inpatient Sample (NIS)

Contact Info/Sponsor	Nationwide Inpatient Sample (NIS) is developed as part of the Healthcare Cost and Utilization Project (HCUP), sponsored by Agency for Healthcare Research and Quality (AHRQ). Phone (toll free): 1-866-290-HCUP Email: hcup@ahrq.gov (User's support) Website: www.hcup-us.ahrq.gov/overview.jsp
Data Type & Purpose	Encounter or Case Count Data. Hospital Discharge Data.
Geographic Scope	The sampling frame for the 2007 NIS is a sample of hospitals that comprises approximately 90 percent of all hospital discharges in the United States. The 2007 NIS contains all discharge data from 1,044 hospitals located in 40 States, approximating a 20-percent stratified sample of U.S. community hospitals.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	The data are available from AHRQ for a fee. NIS data are also available through an online query system— HCUPnet: http://hcupnet.ahrq.gov/
Data Collection Methodology	HCUP databases bring together existing data from state data organizations, hospital associations, private data organizations, and the federal government.
Content	The NIS contains encounter-level information for all payers. The dataset contains clinical and resource use information included in a typical discharge abstract, with safeguards to protect the privacy of individual patients, physicians, and hospitals (as required by data sources).
Demographic Information	For most states, the NIS includes hospital identifiers that permit linkages to the American Hospital Association (AHA) Annual Survey Database and county identifiers that permit linkages to the Area Resource File. The demographic information available for each case includes age, sex, urban/rural status of patient, median income for patient's zip code, and race (for 30 states).
Years of Data	Starting in 1988.
Codes to Identify Poisoning Cases	ICD-9-CM diagnostic and procedure codes and E codes.
Strengths for Poisoning Surveillance	The large number of records (case level information for about 8 million total discharges annually) makes it a good resource for relatively rare events. It also contains additional variables not always found in other HDD data sources (procedure codes, total charges, hospital characteristics). In 2009, 92.3% of injury-related hospital discharges were E-coded.
Weaknesses for Poisoning Surveillance	Case identification based on ICD-9-CM diagnosis and external cause of injury codes.
Other Relevant Information	HCUP periodically produces a similar dataset limited to those 20 years of age and younger called the Kid's Inpatient Database (KID). It is based on the same data sources as the NIS but with a different sampling scheme. In 2006, it included information on approximately 3 million discharges in 38 states.

State Level Emergency Department Data

Contact Info/Sponsor	This summary is a generic description of State Level Emergency Department (ED) data sets, and may not be accurate for any specific state. For example, states may differ on the availability, quality and completeness of the data collected. Contact the State Hospital Association, Public Health Department or Health Statistics Office.
Data Type & Purpose	Administrative data systems designed primarily to capture billing and licensing information, but often used for health planning and surveillance purposes.
Geographic Scope	Primarily a state level data system. ED data are collected from all licensed EDs in each state, and excludes federal and tribal EDs. State level data can be disaggregated to region, county and zip code levels. There are several national level aggregations of state level data (e.g., HCUP).
Implementation Status	Depends on state. Contact State Emergency Medicine, Public Health Department, or Hospital Association for details.
Availability ☒Online Query System ☒ Public Use Data Set	Depends on the state; many have both query systems and public data sets. Contact the state Emergency Medicine Department, Public Health Department, or Hospital Association for details.
Data Collection Methodology	Hospital level reporting requirements are based on state and national laws and regulations. Data quality and completeness may vary (e.g., E-coding compliance). But each state's system is consistent with American Hospital Association (AHA) and National Center for Health Statistics (NCHS) agreements.
Content	*Patient information:* Demographics, source of admission, area of residence; principal and secondary diagnoses (ICD-9-CM diagnosis codes), procedures, type of discharge, external cause of injury E codes), source of payment, length of stay, charges; hospital type of ownership, capacity, financing; staffing ratios and location.
Demographic Information	Age, sex, and for some states, race/ethnicity; county and zip code of residence and ED; date of birth, date of admission, date of discharge, source of payment.
Years of Data	Depends on the state; Generally this data source has not been in place as long as Hospital Inpatient Discharge Data.
Codes to Identify Poisoning Cases	ICD-9-CM codes consistent with CDC and NCHS. www.cdc.gov/nchs/icd/icd9cm_addenda_guidelines.htm .
Strengths for Poisoning Surveillance	Uses standard ICD-9-CM coding scheme. Many more poisoning cases are seen in the emergency department than are hospitalized and the types of substances and patient demographics may vary significantly than what can be found using hospitalization data alone. Most states have well established systems for collecting, monitoring & reporting these data.
Weaknesses for Poisoning Surveillance	ICD-9-CM coding system lacks specificity of poisoning codes for specific poisoning incidents and drugs; potential duplicate counts of individuals; variability among states in the completeness and quality of external cause coding (E Codes). Not all states have state-level ED data systems.

Other Relevant Information	Difficult to determine the incidence of injury given potential duplicate counts of same injury event (e.g., need to count a person-injury event only once and to include only the first or initial visit for the injury). Currently, there are no standard guidelines or recommendations on how to de-duplicate injury surveillance data.

State Level Hospital Inpatient Discharge Data

Contact Info/Sponsor	This summary is a generic description of state level hospital patient discharge data sets, but it may not be accurate for any specific state. For example, states may differ on the quality and completeness of the data collected. Contact the state Hospital Association, Public Health Department or Health Statistics Office.
Data Type & Purpose	Data systems designed primarily to capture billing and licensing information, but often used for health planning and surveillance purposes.
Geographic Scope	Primarily a state level data system. Inpatient data collected from all licensed hospitals in each state. Licensed hospitals include general acute care, acute psychiatric, chemical dependency recovery, and psychiatric health facilities, but excludes federal and tribal hospitals. State level data can be disaggregated by region, county and zip code levels. There are some national level aggregations of state level data (e.g., HCUP; CDC/NCIPC Injury Indicators Project).
Implementation Status	Fully implemented and ongoing in all states.
Availability ☒Online Query System ☒ Public Use Data Set	Depends on the state; many have both query systems and public data sets. Contact the state Hospital Association, or Public Health Department, or Health Statistics Department for details.
Data Collection Methodology	Hospital level reporting requirements are based on state and national laws and regulations. Data quality and completeness may vary (e.g., E-coding compliance). Each state's system is consistent with American Hospital Association (AHA) and National Center for Health Statistics (NCHS) agreements: www.ahacentraloffice.com
Content	Dataset consists of a record for each inpatient discharged from a licensed hospital. Available data include patient demographics, source of admission, area of residence, principal and secondary diagnoses (ICD-9-CM diagnosis codes), procedures, type of discharge, cause of injury (ICD-9-CM E codes), source of payment, length of stay, charges, hospital type of ownership, capacity, financing, staffing ratios, location.
Demographic Information	Age, sex, ethnicity, race, county, zip code of residence and hospital, date of birth, date of admission, date of discharge, source of payment. Variables will vary across states.
Years of Data	Depends on the state, but generally this data source has been in place for decades (e.g. since the early 1990s)
Codes to Identify Poisoning Cases	ICD-9-CM codes consistent with CDC and NCHS. www.cdc.gov/nchs/icd/icd9cm_addenda_guidelines.htm . For SAS program: http://www.cdc.gov/nchs/data/ice/icd9cm_morbiditysascode.txt.

Strengths for Poisoning Surveillance	• Data set captures poisoning incidents severe enough to be hospitalized. • Uses ICD-9-CM coding scheme. • Most states have well established systems for collecting, monitoring and reporting these data.
Weaknesses for Poisoning Surveillance	• Lack of specificity of poisoning codes for specific poisoning incidents and drugs. • Potential duplicate counts of individuals; variability among states in the completeness and quality of external cause coding. • Hospitalizations generally represent the most severe poisoning cases; there are substantially fewer cases than are seen in emergency departments, and their characteristics may not be representative of all poisonings.
Other Relevant Information	Difficult to determine the incidence of injury given potential duplicate counts of same injury event (e.g., need to count a person-injury event only once and to include only the first or initial visit for the injury). Currently, there are no standard guidelines or recommendations on how to de-duplicate injury surveillance data.

Child Death Review (CDR) Reporting System

Contact Info/Sponsor	National Center for Child Death Review Policy and Practice c/o Michigan Public Health Institute 2440 Woodlake Circle, Suite 150, Okemos, MI 48864 Phone: 800-656-2434 Fax: 517-324-7365 Email: info@childdeathreview.org Website: www.childdeathreview.org - State Spotlights
Data Type & Purpose	Registry for surveillance purposes. 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 (secure website – https://www.cdrdata.org) primarily to capture data surrounding the circumstances of child deaths from CDR team reviews. General information on the Case Reporting Form and web-based reporting system at www.childdeathreview.org under Tools for Teams.
Geographic Scope	Primarily a local and state level data system, but state level data can be aggregated within regions and nationally.
Implementation Status	Implemented and ongoing in 35+ states. Over 80,000 child deaths entered.
Availability ☒Online Query System ☒ Public Use Data Set	Online system available to individuals pre-approved by state or national CDR programs that participate in system. All users must be approved by the appropriate state administration and adhere to the data use agreement. 32 standardized aggregate reports available to state and local users. Aggregate multi-state data only available through National Center with individual state approvals.
Data Collection Methodology	Designed primarily to meet the data and reporting needs of local and state CDR teams. Collects 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 is population-based, while for others, data are based on a "convenience" sample of child deaths.
Content	Standard case reporting form developed– http://www.childdeathreview.org/toolsforteams.htm under Tools for Teams. Generally ages covered include 0-17 years, but there is local and state variability. Data sections on child information, principal caregiver, supervisor, incident, investigation, official manner and primary cause, detailed information by cause, other circumstances, acts of commission and omission, services, key risk factors, actions recommended and/or taken by the CDR team to prevent other deaths review process, narrative, and notes.
Demographic Information	Child and parent demographic information - e.g., county and zip code of residence, date of birth, date of death, age, gender, ethnicity, and race.

Years of Data	The *CDR Case Reporting System* was initially created in 2003-4, piloted with 14 states in 2006 and currently has over 35 states participating. Child death data are primarily from 2005-2010 child deaths.
Codes to Identify Poisoning Cases	Does not use "codes" but provides details by cause of death in Section 9 - POISONING, OVERDOSE OR ACUTE INTOXICATION: a. Type of substance involved: prescription drug; over the counter drug; cosmetics/personal care products; cleaning substances; and other substances. b. Where was the substance stored? c. Was the product in its original container? d. Did container have a child safety cap? e. If prescription, was it child's? f. Was the incident the result of? g. Was Poison Control called? If yes, who called: h. For CO poisoning, was a CO detector present? Also has narrative field.
Strengths for Poisoning Surveillance	Multi-state and agency system with local CDR participation – over 35 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.
Weaknesses for Poisoning Surveillance	• Deaths only. • Generally only children less than 18 years. • Not national in scope. • 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).
Other Relevant Information	The National MCH Center for Child Death Review is supported in part by Grant No. 1 U49MC00225 from the Maternal and Child Health Bureau (Title V, Social Security Act), Health Resources and Services Administration, Department of Health and Human Services.

Fatality Analysis Reporting System (FARS)

Contact Info/Sponsor	FARS - National Highway Transportation and Safety Administration (NHTSA) 1200 New Jersey Avenue, SE, West Building, Washington, DC 20590 Data requests at 1-800-934-8517, Email: ncsaweb@nhtsa.dot.gov Website: www.nhtsa.gov/FARS
Data Type & Purpose	Incident/case reports; NHTSA has a contract with an agency in each state to provide information on fatal crashes. FARS analysts are state employees who extract the information and put it in a standard format.
Geographic Scope	FARS contains data on all fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico. The data system was conceived, designed, and developed by the National Center for Statistics and Analysis (NCSA) to assist the traffic safety community in identifying traffic safety problems, developing and implementing vehicle and driver countermeasures, and evaluating motor vehicle safety standards and highway safety initiatives.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Query systems (FARS Query System); limited access; fact sheets. Some states might have state datasets available.
Data Collection Methodology	Data on fatal motor vehicle traffic crashes are gathered from the state's own source documents, and are coded on standard FARS forms. The analysts obtain the documents needed to complete the FARS forms, which generally include some or all of the following: Police Accident Reports (PARS) ; State vehicle registration files ; state driver licensing files ; state highway department data; vital statistics; death certificates; coroner/medical examiner reports; toxicology reports when available; hospital medical records .
Content	To be included in FARS, a crash must involve a motor vehicle travelling on a traffic way customarily open to the public, and result in the death of a person (either an occupant of a vehicle or a non-motorist) within 30 days of the crash. The FARS file contains descriptions of each fatal crash reported. Each case has more than 100 coded data elements that characterize the crash, the vehicles, and the people involved.
Demographic Information	Age, sex, and race/ethnicity.
Years of Data	Data are available for every year since FARS was established in 1975.
Codes to Identify Poisoning Cases	Alcohol and other drug involvement are included in overall dataset. However, full toxicology reports are not always incorporated into FARS.
Strengths for Poisoning Surveillance	FARS is useful for poisoning surveillance in tracking alcohol involved fatal crashes and may be of some value for 'other drugs' depending on the degree of identification and specificity of other drugs.
Weaknesses for Poisoning Surveillance	Only related to automobile crashes where a death has occurred. Except for alcohol, not specific for types of poisonings or types of drugs.

Other Relevant Information	Data files tend to be rather difficult to use. The people files are not the same as the motor vehicle files. Several states have NTSA-funded Crash Outcome Data Evaluation System (CODES) projects to link traffic and medical data.

National Violent Death Reporting System (NVDRS)

Contact Info/Sponsor	Centers for Disease Control and Prevention/ National Center for injury Prevention and Control 4770 Buford Hwy, Atlanta, GA, 30341 www.cdc.gov/ViolencePrevention/NVDRS/index.html
Data Type & Purpose	Incident/case count surveillance system for participating states. NVDRS provides detailed data on violent deaths (e.g., homicide, suicide) in participating states; states can access all of the data elements from one central database. NVDRS has four main objectives: 1) to link records on violent deaths that occurred in the same incident to help identify risk factors for multiple homicides or homicides-suicides; 2) to provide timely preliminary information on violent deaths (e.g., basic counts of murders and suicides) through faster data retrieval - currently, vital statistics data are not available for 1-2 years after a death; 3) to describe in detail the circumstances that may have contributed to a violent death; and 4) to better characterize perpetrators, including their relationships to victim(s).
Geographic Scope	18 states currently receive CDC NVDRS funding: Alaska; Colorado; Georgia; Kentucky; Maryland; Massachusetts; Michigan; New Jersey; New Mexico; North Carolina; Ohio; Oklahoma; Oregon; Rhode Island; South Carolina; Utah; Virginia; Wisconsin.
Implementation Status	Implemented in 18 states; the plan is that all 50 states will eventually participate.
Availability ☒Online Query System ☒ Public Use Data Set	An incident-based, relational database collects and stores the data and is available free of charge online from WISQARS NVDRS www.cdc.gov/injury/wisqars/nvdrs.html Limited access to data sets is available to researchers, policymakers, and others so they can better understand and evaluate avenues to prevent interpersonal violence and suicide (e.g., research only and IRB required). Some states produce additional reports by state. Data access by state program varies.
Data Collection Methodology	NVDRS-participating states collect existing data using standardized format from four major sources: death certificates, coroner/medical examiner reports; law enforcement and crime lab reports.
Content	NVDRS collects detailed information on victims and offenders, including: demographics; substance use; relationship of victim to offender; circumstances leading to the injury; whether the event occurred at home or work; date and location of the incident; and weapon type.
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.
Strengths for Poisoning Surveillance	• The data include only violent deaths but are very detailed if data available to state. • Information on toxicology available if testing was done. • Data can be accessed on WISQARS. More detailed requests can be made through the website. WISQARS NVDRS online at www.cdc.gov/injury/wisqars/index.html. • 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.
Weaknesses for Poisoning Surveillance	• Violent deaths only. • Limited number of states involved and variable lengths of reporting based on funding.
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-9 and ICD-10)

Contact Info/Sponsor	Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS). Division of Vital Statistics, 3311 Toledo Rd, Hyattsville, MD 20782 Website: www.cdc.gov/nchs/nvss.htm.
Data Type & Purpose	Census of all death certificates filed in the 50 States and the District of Columbia. Non-resident deaths occurring in the US are included in the national data file. Official tabulations, however, are typically limited to US residents.
Geographic Scope	NVSS mortality files include data for the 50 States and the District of Columbia. Data for the territories of Puerto Rico, Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Marianas are included in separate files.
Implementation Status	Ongoing and currently available on-line.
Availability ☒Online Query System ☒ Public Use Data Set	Mortality data generally have a 2-3 year data lag from the current year. However, this is improving with states moving toward the use of electronic death records. 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 http://wonder.cdc.gov/mcd.htm. 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).
Data Collection Methodology	Administrative records (death certificates) completed by physicians, coroners, medical examiners, 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, medical examiner, or coroner.
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).
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 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)
Strengths for Poisoning Surveillance	• Complete count of death. • Use of standard ICD coding system. • National in scope, but also included state and county FIPS codes. • Ability to place poisoning mortality within larger context of all mortality.
Weaknesses for Poisoning Surveillance	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.
Other Relevant Information	

State Level Medical Examiner (ME) and Coroner (C) Data

Contact Info/Sponsor	Medical examiner (ME) and coroner data systems vary between states and data are not housed at a centralized national location. Some states have statewide medical examiner data systems, other states have a mixture of individual medical examiners and coroners jurisdictions with their own data systems, and other states only have coroner systems. Contact your state Public Health Department to determine what is available in your jurisdiction.
Data Type & Purpose	Mortality data collected during death investigation. File notes and narratives may be part of a closed confidential file. Some jurisdictions are electronically based while other jurisdictions use a paper-based system (or a combination of the two systems). In general, most states mandate the investigation of all "unnatural" or "unusual" deaths including suspected homicides, suicides, fatal accidents, sudden/unexplained death, or deaths unattended by a physician. In many states this could also include poisoning deaths. Population-based incident/case count of deaths occurring in the jurisdiction of the medical examiner or coroner. About 20% of all deaths are referred to the ME/C.
Geographic Scope	States have various systems in place: 2,200 separate jurisdictions. Twenty-two states are organized on a state-wide system. The remaining states contain a county (2,068 jurisdictions) or regional system (95 jurisdictions)[2]. Currently, there are more jurisdictions helmed by coroners, although a greater percentage of the population falls under the medical examiner based system.
Implementation Status	Fully implemented and ongoing at state or local jurisdictional levels.
Availability ☒Online Query System ☒ Public Use Data Set	No centralized national source. Potentially useful for surveillance at a state or local level. Accessibility varies by jurisdiction and statues.
Data Collection Methodology	Medical examiners/coroners may collect pertinent information from a variety of sources including: death scene investigations, toxicology results, and clinical examination results. Key information from the death scene is noted (e.g., prescription bottles, drug paraphernalia, medical cabinet inventories, etc). In addition, key interviews with family members or others can provide additional insight and background into these deaths. Death Incident Reports are then gathered by the ME/C to help establish and determine the cause and manner of death and associated factors.
Content	ME and Coroner data may vary considerably from state to state due to differences in state laws, regulations, and customs. In general, ME data provide at least enough information to complete the medical portion of a death certificate. MEs/Coroners must certify the cause and manner of death including name, sex, race, and residence, date/time pronounced dead, underlying causes of death, manner of death, pregnancy status, tobacco use, cause of injury (if applicable). ME/coroner data may also include autopsy results, toxicological information, and other post-mortem examinations/results. Some ME systems may provide information on history of past overdoses, substance abuse problem or treatment, mental health information, and etc. In addition, some jurisdictions

	have a prescription monitoring program that MEs can access in order to review past prescription data.
Demographic Information	Most data will include basic demographics: sex, race, age, residence, Hispanic origin, education level, marital status, occupation, hospital name, and location of injury.
Years of Data	Varies by jurisdiction but generally available in a timelier basis than death certificates.
Codes to Identify Poisoning Cases	Varies by jurisdiction. Often the ME/C will not assign ICD codes, but rather just list the causes and manner which will be used for formal coding at the state or national level. If the ME/C office has ICD codes, they may include the underlying cause of death code and multiple contributing-cause-of-death codes from ICD-10 for deaths occurring in 1999 or later.
Strengths for Poisoning Surveillance	• Critical information can be gathered from medical examiners' data that cannot be found elsewhere; specifically, toxicology results to determine cause of death. • If accessible, more timely than death certificates. • For those states that have access to information on prescriptions dispensed to the decedent through the ME/C office, this can help determine whether misuse, abuse, or diversion played a role.
Weaknesses for Poisoning Surveillance	• No centralized national data source. Only 22 states have statewide medical examiner data systems. • States vary in the process by which they collect and report data pertaining to poisonings. State comparisons are challenging.
Other Relevant Information	***State Medical Examiner System (21 States and DC):*** Alaska, Arizona, Connecticut, Delaware, District of Columbia, Florida, Iowa, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, Oklahoma, Oregon, Rhode Island, Tennessee, Utah, Vermont, Virginia, and West Virginia. ***Mixed Medical Examiner/Coroner Systems (18 states):*** **State ME and County ME/C (7):** Alabama, Arkansas, Georgia, Kentucky, Mississippi, Montana, and North Carolina. **County ME/C (11 states):** California, Hawaii, Illinois, Minnesota, Missouri, New York, Ohio, Pennsylvania, Texas, Washington, and Wisconsin. ***Coroner Systems (11 states):*** **District Coroners (2 states):** Kansas and Nevada. **County Coroners (9 states):** Colorado, Idaho, Indiana, Louisiana, Nebraska, North Dakota, South Carolina, South Dakota, and Wyoming.

State Vital Statistics: Death Certificates

Contact Info/Sponsor	This summary is a generic description of state level death certificates data sets. For a complete listing of uniform data elements for the nation see NVSS description. However, additional elements may be available in certain states. For example, states may differ on the quality and completeness of the data collected. Contact your state Public Health Department or Health Statistics Office.
Data Type & Purpose	Census of all death certificates filed in the State or the District of Columbia. Non-resident deaths occurring in the US are included in the national data file. Official tabulations, however, are typically limited to US residents.
Geographic Scope	State
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Varies by state. Some states have online query systems; e.g., Utah, California.
Data Collection Methodology	Administrative records (death certificates) completed by physicians, coroners, medical examiners, and funeral directors are filed with State vital statistics offices;
Content	Based on the Standard US Death certificates (see description of NVSS). States may include additional elements.
Demographic Information	Name, social security number, date of birth, data of death, age, race, Hispanic origin, residence.
Years of Data	Varies by state with 1-3 year delay for complete annual data sets
Codes to Identify Poisoning Cases	ICD-10 coding schemes enacted in 1999. 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)
Strengths for Poisoning Surveillance	• State Vital Statistics are complete, population-based data sources (i.e., not samples) of all resident and in-state fatalities and contain strong demographic variables. • Though the data source varies state to state, the cause of death information is consistently recorded using ICD-10 codes and can capture all fatal poisonings when accurately recorded through death investigations • Death certificate data can also provide strong historical trends.
Weaknesses for Poisoning Surveillance	• The State Vital Statistics data sources have limited circumstances of death information. • It is difficult to identify specific agents involved in poisoning deaths because details may not be supplied and ICD codes may not be specific.
Other Relevant Information	May have strict access protocols. State Vital Statistics is case level information allowing a variety of in-depth analyses.

Medication Monitoring Data Sources

Adverse Event Reporting System (AERS)

Contact Info/Sponsor	Food and Drug Administration (FDA); Center for Drug Evaluation and Research; Division of Surveillance, Research, and Communication Support. Phone: (888) 463-6332 Email: cderosetracking@fda.hhs.gov Website: www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveillance/AdverseDrugEffects/default.htm
Data Type & Purpose	Passive post-marketing surveillance. Voluntary case reports of adverse drug events and medication errors from providers and consumers. Manufacturers are required to submit any such reports they receive to the FDA.
Geographic Scope	The system covers the entire United States, but it also collects a significant number of reports from foreign reporters.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Data files available for download. Standardized reports available on-line: www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveillance/AdverseDrugEffects/ucm070093.htm.
Data Collection Methodology	Reporters obtain FDA form 3500 on the FDA website. Forms can be faxed, mailed, or called in.
Content	Individual reports of serious adverse events involving drugs. The FDA defines an adverse event as "any incident where the use of a medication at any dose, a medical device, or a special nutritional product is suspected to have resulted in an adverse outcome in a patient." This definition includes intentional and unintentional overdoses. "Serious" events are those where the patient outcome was death, hospitalization, disability, birth defect, or other "important" medical event. Variables include demographics, type of event, suspected product name, dose, reason for use, and reporter identifiers. Free text fields are captured but not included in the data files available for research use. Adverse events involving vaccines are reported to a different system, the Vaccine Adverse Event Reporting System of the CDC.
Demographic Information	Patient unique ID number, age, sex, weight, reporter occupation, and date of event.
Years of Data	Quarterly electronic data files for research use are available from January, 2005 through June, 2009 (as of December, 2010) Statistics about data from 2000 forward are available on the website. The same database system has been used since 1998. Paper forms have been collected since 1969.
Codes to Identify Poisoning Cases	Event types are categorized into adverse events, product problems, product use error, or problems with different manufacturer of same medicine. Poisoning would be classified as adverse events in this system. Adverse events in AERS are coded to terms in the Medical Dictionary for Regulatory Activities (MedDRA).(www.meddramsso.com/index.asp)

Strengths for Poisoning Surveillance	• AERS is the largest and most detailed database in the US for monitoring the safety of drugs. • Consistent data are available at least back to 2005 on-line. • Data is relatively timely and might be even more timely if access is gained to the still incomplete quarterly data files. • OTC drugs and dietary supplements are included.
Weaknesses for Poisoning Surveillance	AERS is a passive reporting system without a defined population such as the number of people taking a given drug. The outcome observed may not have been caused by the drug; suspected cases are also reportable. Reporting rates may vary between drugs and for the same drug over time. Estimates of the proportion of serious adverse events that are reported to AERS vary from 0.3% to 33%. For methadone-related poisoning deaths from 1999 through 2005, <7% were reported to AERS. Therefore, the data could easily be non-representative, and counts of adverse events related to specific drugs should not be confused with the true incidence. In addition, the data collection instrument does not identify patient's place of residence, so distribution of cases by state is not obtainable. Illicit drugs are not included, nor are reports where the specific drug involved could not be identified. Some reports are prompted by legal claims.
Other Relevant Information	A recent report of AERS data can be found in: Moore et al, Serious adverse drug events reported to the Food and Drug Administration, 1998-2005. Arch Int Med 2007;167:1752-1759. The database includes what would be considered drug "overdoses" when drugs are not used as directed as well as adverse drug reactions, when drugs were used as directed. So the scope of the system includes the growing problem of prescription drug overdoses. Narrative information provides significant detail about the adverse events.

Automation of Reports and Consolidated Orders System (ARCOS)

Contact Info/Sponsor	Drug Enforcement Administration (DEA) Office of Diversion Control 8701 Morrissette Drive Springfield, VA 22152 For special requests, contact Kyle Wright of DEA: Kyle.J.Wright@usdoj.gov Website: www.deadiversion.usdoj.gov/arcos/index.html
Data Type & Purpose	ARCOS is an automated, comprehensive drug reporting system that monitors the flow of DEA controlled substances from their point of manufacture through commercial distribution channels to point of sale or distribution at the dispensing/retail level - hospitals, retail pharmacies, practitioners, mid-level practitioners, and teaching institutions.
Geographic Scope	National. Available by state and 3-digit zip code within each state. DC and all US territories are included.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Limited access; data request form; limited data sets and posted annual reports.
Data Collection Methodology	About 1,100 distributors and manufacturers report distributions of each drug on special forms at least quarterly to ARCOS via DEA.
Content	Numbers of grams and grams per 100,000 people for codeine, oxycodone, hydrocodone, fentanyl, morphine, meperidine, methadone, buprenorphine, hydromorphone, and various amphetamines. Data is available in 7 retail drug summary reports on the website. www.deadiversion.usdoj.gov/arcos/retail_drug_summary/index.html
Demographic Information	State and 3-digit zip code to which drugs are distributed, type of drug, calendar quarter of distribution, type of business activity (e.g., hospital) to which drugs are distributed. No information on patients ultimately receiving the drugs is collected by the system.
Years of Data	1997 through 2006 are available on the website.
Codes to Identify Poisoning Cases	Not applicable. This system tracks drug distribution rather than persons using drugs. Data refer to drug names and categories.
Strengths for Poisoning Surveillance	ARCOS is a free, web-based source of information that can help estimate drug consumption in a given jurisdiction. It demonstrates the wide variation among states. Since data collection began in 1997, long trend lines are available. Some reports rank all states by rate of consumption. Comparable information based on commercial surveys of physician prescribing practices, e.g., Verispan or IMS, is extremely costly. Information on specific drugs is available rather than on all opioids combined, for example. Data is a complete census rather than a sample.

Weaknesses for Poisoning Surveillance	Timeliness is an issue. 2007 data is still not available as of 2/12. Special queries of the dataset are possible, but months elapse before they are fulfilled. Drugs sent to one state or zip code may be redistributed to other states by the mail order pharmacies that receive them. Patients may cross state lines to fill their prescriptions. Data does not account for wastage of drugs after distribution. Rates provided on the website are based on outdated (2000) population denominators. Not all schedule II opioids are included in the standard reports available at this web link, but the most important ones are. Information on specific formulations of parent opioids is not available.
Other Relevant Information	

Prescription Drug Monitoring Programs (PDMP)

Contact Info/Sponsor	Each state has its own contact. Not all states have a system. Managing agencies differ by state. PDMPs are managed most commonly by state boards of pharmacy and state health departments. A list of state contacts can be found at the Alliance of States with Prescription Monitoring Programs website: www.pmpalliance.org/
Data Type & Purpose	Registry of information from prescriptions for controlled drugs dispensed in the state/territory. Primary purpose is the prevention of prescription drug abuse and diversion.
Geographic Scope	As of March, 2012, two states (NH, MO) had not enacted PDMP legislation. Five states and one territory (NJ, DE, AK, WI, and Guam) had legislation but no operational program. All other states had operational PDMPs. No national database exists.
Implementation Status	Varies by state.
Availability ☒Online Query System ☒ Public Use Data Set	Authorized users, e.g., prescribing physicians, may query their patients' data online in some states. No states have online query systems to allow researchers/public health agencies to query even de-identified data. Requests for statistics must be made to the managing agency, and availability depends on what the legally authorized uses/users of the PDMP data are in the state/territory. Information on which states make data available for research can be found in the state profiles on the Alliance website, www.pmpalliance.org/content/state-profiles No public use data sets exist in any jurisdiction. Some PDMPs publish standard reports of aggregated data online, e.g., the KASPER program in Kentucky: http://chfs.ky.gov/os/oig/KASPER.htm .
Data Collection Methodology	A complete census of all prescriptions for controlled substances. Almost all PDMPs now monitor at least federal controlled substance schedules II through IV, which include the opioid analgesics and benzodiazepine sedatives, among other drugs. Information from prescriptions is entered at the dispensing pharmacy. Pharmacies submit data electronically to the managing agency. The frequency of the submissions varies from every 30 days to immediately. The managing agency links prescriptions for individual patients and providers. Some agencies provide patient/provider reports only on request; others issue unsolicited ("proactive") reports.
Content	**Prescription:** Number, date issued by prescriber, date filled, new or refill, number of refills, and state-issued serial number (optional). **Drug:** National Drug Code (NDC) for drug, quantity dispensed, days' supply dispensed, strength, and form. **Patient:** Collected by all states: name, address, date of birth, and sex. **Not collected by all states:** identification number, source of payment, and name of person who receives prescription if other than patient. **Prescriber:** Identification number. **Dispenser:** Identification number.
Demographic Information	Patient sex, age (calculated from date of birth), zip code of residence, type of insurance (from source of payment). Restrictions on available variables may vary by state.

Years of Data	Varies by state access and retention policies. Typically some data from the current year are available. State profiles on the Alliance website indicate the year that data collection began.
Codes to Identify Poisoning Cases	This is a behavioral surveillance system, not a health outcome surveillance system. Data refer to drug names and categories.
Strengths for Poisoning Surveillance	• High level of drug detail, including formulation, prescriber, and dispenser identifications. • Timeliness better than most other data sources. • Baseline has already been collected. • Statistical power, i.e., large enough numbers to detect small changes. • Population-basis allows use of numbers of prescriptions as a denominator for poisoning/overdose rates. • Longitudinal linkage of patient and provider data can track behavioral change over time. • Cost is limited to processing already existing data. • In some states data can be used by medical examiners in death investigations.
Weaknesses for Poisoning Surveillance	• Identifiers are probably not shareable with researchers/public health agencies, requiring use of the managing agency's linkages of patient's and doctor's prescriptions. Accuracy of state linkage methods might not have been validated. • PDMPs do not capture methadone from opioid treatment programs; they do capture methadone prescribed for pain. • Possibly other practical, technical, and legal challenges.
Other Relevant Information	Prescription drug monitoring program (PDMP) or prescription monitoring program (PMP). PDMPs may be known by other names, e.g., the CURES program in California or KASPER in Kentucky or CSRS in North Carolina. Extensive information about PDMPs is available at the Alliance website: www.pmpalliance.org/ and at the website of the PMP Center of Excellence at Brandeis University: www.pmpexcellence.org . The federal Bureau of Justice Assistance funds some PDMPs through its Harold Rogers grant program. SAMHSA has funded some PDMPs through its NASPER grant program. PDMPs were not designed as public health surveillance tools, but they are promising ways to monitor trends and distributions of drugs involved in poisoning, to monitor inappropriate drug usage such as "doctor shopping," and to evaluate the impact of state/federal legislation on such usage. To date, studies in WV, UT, NC and NM have linked persons dying of drug overdoses with their prescription histories from PDMPs. Descriptions of the prevalence of inappropriate drug usage based on PDMP data have been published for OH, MA, and CA.

Behavioral Risk Factor Surveillance System (BRFSS)

Contact Info/Sponsor	Centers for Disease Control and Prevention (CDC) National Center for Chronic Disease Prevention and Health Promotion 4770 Buford Highway, NE, Mailstop K-66, Atlanta, GA 30341 Fax: 770-488-8150 www.cdc.gov/brfss Each state has a State BRFSS Coordinator (usually in the state health or public health department) who manages BRFSS field operations following CDC guidelines; A list of State Coordinators available at: http://apps.nccd.cdc.gov/BRFSSCoordinators/coordinator.asp
Data Type & Purpose	BRFSS is a collaborative survey project of CDC and the states and U.S. territories that tracks health conditions and risk behaviors in the U.S. yearly since 1984. It is the world's largest, ongoing telephone health survey system that provides representative national and state prevalence estimates and trend of general adult health behaviors based on self-reports. States use BRFSS data to identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programs. Many states also use BRFSS data to support health-related legislative efforts.
Geographic Scope	Nationally & in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	National CDC Query system for national and state data; public data sets available; State specific data systems available in most states as well; Special requests for access to more detailed data sets (e.g., research only and IRB required) at both the national and state level.
Data Collection Methodology	BRFSS is a state-based system of telephone health surveys. It consists of a nationally representative sample of non-institutionalized households with more than 350,000 adults (18 years and older) interviewed nation-wide per annual survey cycle, with ongoing data collection monthly. Representative state estimates are produced as well. Every year, BRFSS has core and optional module questions on health and behaviors. Full documentation can be found at: http://www.cdc.gov/brfss/. States select which optional modules they want to include along with the core module and can also add their own questions. State use standard procedures to collect data through monthly telephone interviews. BRFSS interviewers ask questions related to behaviors that are associated with preventable chronic diseases, injuries, and infectious diseases. The Selected Metropolitan/Micropolitan Area Risk Trends (SMART) project uses BRFSS to analyze the data of selected metropolitan and micropolitan statistical areas (MMSAs) with 500 or more respondents. There are three types of core questions. Fixed core questions are asked every year. Rotating core questions are asked every other year. Emerging core

	questions typically focus on “late-breaking” health issues. These questions are evaluated at the end of a survey year to determine if they are valuable.
Content	Prevalence and trend data on a wide range of health conditions and risk factors; socio-demographic data; limited poisoning information.
Demographic Information	State; county & zip code, race, ethnicity, sex, age; marital, educational, employment, income, and veteran status. Full documentation can be found at: www.cdc.gov/brfss .
Years of Data	Since 1984.
Codes to Identify Poisoning Cases	Self-report survey data; general questions on alcohol and tobacco use and consequences; some optional module may have more specific poisoning questions.
Strengths for Poisoning Surveillance	• Representative national and state prevalence data. • Self-reported knowledge, consumption, risk factors, and consequences related to alcohol and tobacco use.
Weaknesses for Poisoning Surveillance	• Questions on poisoning generally limited to alcohol. • No specific prescription use/abuse questions as of 2011.
Other Relevant Information	While not historically collecting poisoning specific information, states could advocate CDC BRFSS or their state Coordinator to include specific questions. The cost varies. Some states have a fixed price per question while others can be included in the general data collection.

Monitoring the Future (MTF)

Contact Info/Sponsor	MTF is conducted at the Survey Research Center in the Institute for Social Research at the University of Michigan and is funded under a series of investigator-initiated competing research grants from the National Institute on Drug Abuse. For additional information regarding the Monitoring the Future study http://monitoringthefuture.org/ Email: MTFinfo@isr.umich.edu.
Data Type & Purpose	MTF is an ongoing series of national surveys of the behaviors, attitudes, and values of American secondary school students, college students, and young adults. The MTF project, begun in 1975, has many purposes. Among them is to study changes in the beliefs, attitudes, and behavior of young people in the United States. Study results are also used to monitor trends in substance use and abuse among adolescents and young adults and are used routinely in the White House Strategy on Drug Abuse.
Geographic Scope	A nationwide representative sample of students each year at each grade level.
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Download FREE copies of the most recent volumes at http://monitoringthefuture.org/pubs.html. Each year since 1975, MTF has published hardbound reference volumes containing summary statistics from the in-school surveys of high school seniors for purchase. However, beginning with the 2009 volume, only electronic copies will be produced. Publicly available MTF microdata from the cross-sectional in-school surveys may be obtained through the Substance Abuse and Mental Health Data Archive (SAMHDA), a part of the Inter-university Consortium for Political and Social Research (ICPSR).
Data Collection Methodology	Each year during the spring, a total of approximately 50,000 8th, 10th and 12th grade students are surveyed (12th graders since 1975, and 8th and 10th graders since 1991) from approximately 420 public and private high schools and middle schools. A multi-stage random sampling procedure is used for securing the nationwide representative cross section sample of students each year at each grade level. In addition, a randomly selected sample from each senior class has been followed up biannually after high school on a continuing basis with a mailed questionnaire. Participating students complete self-administered, machine-readable questionnaires in their normal classrooms, administered by University personnel. The study's design permits the investigators to examine four kinds of change: • Changes in particular years reflected across all age groups (secular trends or "period effects"). • Developmental changes that show up consistently for all panels ("age effects"). • Consistent differences among class cohorts through the life cycle ("cohort effects").

	• Changes linked to different types of environments (high school, college, employment) or role transitions (leaving the parental home, marriage, parenthood, etc.).
Content	MTF includes data on (a) the prevalence and frequency of drug use among American secondary school students in 8th, 10th, and 12th grades and (b) historical trends in use by students in those grades. Initially, 11 separate classes of drugs were distinguished (comparable with the National Survey of Drug Use and Health (NSDUH): marijuana (including hashish), inhalants, hallucinogens, cocaine, heroin, narcotics other than heroin (both natural and synthetic), amphetamines, sedatives, tranquilizers, alcohol, and tobacco. Separate statistics are now presented for a number of subclasses of drugs within these more general categories: PCP and LSD (both hallucinogens), barbiturates and methaqualone (both sedatives), amyl and butyl nitrites (a class of inhalants), methamphetamine, crystal methamphetamine ("ice"), and crack and other cocaine. Non-medical use of prescription drugs are now included.
Demographic Information	Age, gender, race, ethnicity, college plans, region of the country, population density, and parents' education.
Years of Data	Annually with 12th graders included since 1975, and 8th and 10th graders since 1991.
Codes to Identify Poisoning Cases	Self-report survey; questions refer to drug names and categories.
Strengths for Poisoning Surveillance	• Population-based national self-report survey data. • MTF surveys American adolescents and young adults on problem behaviors of illegal drug use, alcohol use, tobacco use, anabolic steroid use, and psychotherapeutic drug use. • Wide range of drugs and risk and protective factors covered.
Weaknesses for Poisoning Surveillance	• Data is based largely on self-reported frequency of usage patterns (e.g., # times in past mo./past yr.) • No data on either dosage or clinical effects. • No state or sub-state data available. • Covers self-report usage that might under or overestimate actual usage; not specific poisoning incidents.
Other Relevant Information	

National Survey on Drug Use and Health (NSDUH)

Contact Info/Sponsor	Substance Abuse and Mental Health Services Administration (SAMHSA) www.oas.samhsa.gov/NSDUH.HTM .
Data Type & Purpose	NSDUH, a nationally representative self-report survey, is the United States' primary source of information on the prevalence, patterns, risk factors, and consequences of alcohol, tobacco, non-medical use of prescription and over the counter drugs, and illegal drug use and abuse in the general civilian non-institutionalized population, age 12 and older.
Geographic Scope	Population based sample (50 states and District of Columbia)
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Query systems; canned reports/fact sheets; state reports Limited access to datasets.
Data Collection Methodology	A multi-stage random sampling procedure is used for securing the nationwide representative sample. Household interview-In person interviews are conducted using computer-assisted interviewing (CAI) including audio computer-assisted self interviews (ACASI).
Content	Questions on prevalence, patterns, risk factors, and consequences of drug and alcohol use and abuse in U.S. civilian non-institutionalized population age 12 years and older. Data are collected on the use of illicit drugs, the non-medical use of licit drugs, and use of alcohol and tobacco products.
Demographic Information	Age, sex, race (with Asian, Hispanic, Latino, Spanish origin breakdown); date of birth, state of residence, marital status, veteran status, education, employment, health insurance, self-reported health status, income, and household roster.
Years of Data	Annually since 1999.
Codes to Identify Poisoning Cases	Self-report survey; questions refer to drug names and categories.
Strengths for Poisoning Surveillance	• Population-based national and state self-report survey data produces prevalence estimates. • Sub-state data available by request. • Self-reported use of a wide range of substances and risk and protective factors are covered.
Weaknesses for Poisoning Surveillance	• Data are based largely on frequency of usage patterns (e.g., number of times in past mo./past yr.) • No data on either dosage or clinical effects. • Self-report data may under or over-estimate actual usage
Other Relevant Information	From 1971 through 1998, the survey employed paper and pencil data collection. Since 1999, the NSDUH interview has been carried out using CAI. Estimates from the pre-1999 surveys are not comparable with estimates from the current surveys.

Youth Risk Behavior Surveillance System (YRBSS)

Contact Info/Sponsor	CDC's National Center for Chronic Disease Prevention and Health Promotion Division of Adolescent and School Health (DASH), Atlanta, GA Website: www.cdc.gov/HealthyYouth/yrbs/index.htm.
Data Type & Purpose	The YRBSS national survey, conducted by CDC, provides data representative of 9th through 12th grade students in public and private schools in the United States. The state, territorial, tribal, and local surveys, conducted by departments of health and education, provide data representative of public high school students in each jurisdiction. YRBSS monitors priority health-risk behaviors including the prevalence of substance use, obesity and asthma among youth and young adults.
Geographic Scope	47 participating states; 42 with weighed data. National, state and some local estimates also available.
Implementation Status	Implemented in 42 states with weighted data (47 participated).
Availability ☒Online Query System ☒ Public Use Data Set	On-line query systems for national estimates. Public data sets available by request; Some states publish and make data available for research purposes.
Data Collection Methodology	National, state, territory, and local YRBSS data come from separate independent scientific samples of schools and students. All follow the same survey methodology and use the same core questionnaire. The national YRBSS sample is designed to be representative of students in grades 9-12 in public and private schools in the United States overall and therefore does not necessarily include students from every state. YRBSS is conducted every two years during the spring semester. States may add additions questions or grades (middle school).
Content	Six categories of priority health risk behaviors—behaviors that contribute to unintentional injuries and violence; tobacco use; alcohol and other drug use; sexual behaviors that contribute to unintended pregnancy and STDs, including HIV infection; unhealthy dietary behaviors; and physical inactivity—plus overweight and asthma.
Demographic Information	Age, sex, race, ethnicity, and grade.
Years of Data	Odd years: 1991-2005, 2007, 2009; ongoing.
Codes to Identify Poisoning Cases	Self-report survey; Questions refer to alcohol and drug names and categories.
Strengths for Poisoning Surveillance	• National and state prevalence estimates available. • National survey includes questions about alcohol, tobacco, and illegal drug use, and non-medical use of prescription drugs. • More detailed poisoning information may be available from specific state surveys.

Weaknesses for Poisoning Surveillance	• Data are based largely on self-reported frequency of usage patterns (e.g., # times in past mo./past yr.) • No data on either dosage or clinical effects. • Data apply only to youth who attend school; not representative of all persons in this age group. • Extent of underreporting or over-reporting of behaviors cannot be determined, although the survey questions demonstrate good test-retest reliability.
Other Relevant Information	

Adult Blood Lead Surveillance and Evaluation System (ABLES)

Contact Info/Sponsor	National Institute for Occupational Safety and Health (NIOSH) Centers for Disease Control and Prevention NIOSH ABLES Project Officer: Walter Alarcon, MD, MS wda@cdc.gov Phone: (513)841-4451 Website: http://www.cdc.gov/niosh/topics/ABLES/staff.html State Contacts for ABLES programs: http://www.cdc.gov/niosh/topics/ABLES/State-Contacts.html
Data Type & Purpose	The ABLES program is a state-based surveillance program of laboratory-reported adult blood lead levels (BLLs). The program objective is to build state capacity to initiate, expand, or improve adult blood lead surveillance programs, which can accurately measure trends in BLLs and effectively intervene to prevent overexposures to lead in the workplace. States participating in ABLES require that clinical laboratories report BLL results to the state health department or designee; state reporting levels vary (http://www.cdc.gov/niosh/topics/ables/State-Contacts.html). State data are reported to NIOSH biannually, and individual states may have more complete or current data than is reported to NIOSH.
Geographic Scope	Forty-one states participate in ABLES. Participating states provide data to NIOSH, and NIOSH publishes nationwide data. Each reporting state obtains the laboratory data on a statewide basis. For states with universal reporting (all BLLs required to be reported; 28 of 41 ABLES states), the data represent a census of all persons tested; for states requiring only elevated BLLs (10, 25, or 40+ µg/dL), the data represent a count of the most highly exposed of persons tested. It should be noted that the majority of BLL testing in adults (age 16+) is performed on persons exposed to lead at work, and not all employers who are required to BLL test their workers do so. Therefore, the data are an undercount of the actual total occupational lead exposures.
Implementation Status	Fully implemented and on-going.
Availability ☒Online Query System ☒ Public Use Data Set	Data tables and downloads are available from www.cdc.gov/niosh/topics/ables/state.html, as well as from some individual participating states. NIOSH also has an online interactive database (http://wwwn.cdc.gov/niosh-survapps/ables/default.aspx).
Data Collection Methodology	ABLES includes data on elevated blood lead levels in adults from 41 states that have laboratory-based surveillance systems for BLL reporting. States vary in their specific reporting requirements, although the majority (68%) of states require all BLLs to be reported. Timeliness of laboratory reporting to the state agency may also vary. The specific information required to be reported by the laboratory can vary by state, and some states may have BLL reporting by physicians as well as laboratories. Some states require reporting of all adults tested within their state, while others require the reporting of state residents. Many states have electronic BLL reporting systems in place.
Content	State and national ABLES data can provide counts and rates (prevalence) of elevated BLLs in adults, as well as incidence using the ABLES-specific definitions of incidence and prevalence. Data by geography, work-relatedness, occupation and industry classification, age, sex, race, Hispanic ethnicity, and non-

	occupational exposure source is available. (Not all data is presented by NIOSH on their website; individual states may be able to provide more information.)
Demographic Information	See above: age, sex, race, Hispanic ethnicity, geography (state and county), work-relatedness, occupation and industry classification (Data may be incomplete, especially at lower BLLs)
Years of Data	Elevated BLL counts, denominators, and rates are available for data from 1991 – 2005: http://www.cdc.gov/niosh/topics/ABLES/data.html and the interactive database is available for years 2002 – 2008 http://wwwn.cdc.gov/niosh-survapps/ables/default.aspx; state-specific counts are also available for 2002 – 2008: http://wwwn.cdc.gov/niosh-survapps/ables/AvailableData.html. Data for recent years will soon be updated to include the current definition of "elevated" (10+ µg/dL) rather than the former definition (25+ µg/dL) which is currently used on all NIOSH data tables and reports. Individual states may have data available for BLLs below 25 µg/dL, e.g., at the case-defining level of 10+ µg/dL (or for all BLLs), and for various years from 1987 – present (http://www.cdc.gov/niosh/topics/ables/State-Contacts.html).
Codes to Identify Poisoning Cases	Laboratory-reported results of BLLs are direct measurements of exposure and do not rely on coding to define poisoning. The BLL measurement itself can be stratified by the definition of "elevated" (e.g., 10+ µg/dL) to define "poisoning."
Strengths for Poisoning Surveillance	Because 82% of the states maintain adult BLL surveillance programs, the geographic coverage of this occupational health indicator is representative. The specificity is high since BLL is a direct measurement of exposure. Using BLL data to define the prevalence and severity of lead poisoning in adults as well as children (http://www.cdc.gov/nceh/lead) provides relatively complete and timely lead poisoning information for the U.S. population (among individuals that receive a BLL test).
Weaknesses for Poisoning Surveillance	Not all workers who are required under the OSHA lead standards to be in BLL testing programs are being tested, so the data is an undercount of lead poisoning cases. While the data is submitted by states to NIOSH in a relatively timely fashion, it may be incomplete at the time of submission. Not all states are able to obtain complete information on BLLs down to the level of 10 µg/dL, and thus are unable to report demographic data to NIOSH except for higher BLLs. There may be quality control issues between states in coding work-relatedness, occupation, and industry classification, making comparisons between states or over time difficult.
Other Relevant Information	Starting in 2009, the ABLES case definition for elevated blood lead levels was changed from 25 µg to 10 µg/dL, which is consistent with guidance from the Association of Occupational and Environmental Clinics (http://www.aoec.org/documents/positions/MMG_FINAL.pdf) and the Council of State and Territorial Epidemiologists (http://www.cste.org/ps2009/09-OH-02.pdf). CDC has also included in 2010, for the first time, elevated blood lead levels (defined as BLL at or above 10 µg/dL) in the list of nationally notifiable conditions (http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/lead_current.htm). The Healthy People 2020 Objective OSH-7 also uses 10 µg/dL as the definition of elevated.

Census of Fatal Occupational Injuries

Contact Info/Sponsor	Bureau of Labor and Statistics (BLS) U.S. Department of Labor Phone: 202-691-6170 Website: www.bls.gov/iif/ Email for data requests: iffstaff@bls.gov
Data Type & Purpose	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 28 separate data elements, including information on the worker, the fatal incident, and the machinery, equipment or chemicals involved, are reported.
Geographic Scope	National and state specific data are available annually.
Implementation Status	Fully implemented and on-going.
Availability ☒Online Query System ☒ Public Use Data Set	Tables and reports are available from www.bls.gov/iif. There are online query applications and data requests can also be submitted to the agency.
Data Collection Methodology	CFOI includes injury fatalities that are the result of traumatic 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 injures 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* 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
Codes to Identify Poisoning Cases	The following codes refer to the coding system used in the Occupational Injury and Illness Classification Manual: Nature of Injury code: 095 (poisonings). Some additional poisonings may be

	identified under codes for systemic conditions (e.g., Nature of Injury code: 4211 for abnormal blood lead level). Source codes provide detailed information about the substance involved (e.g., source code: 0941: carbon monoxide). Event codes may also be useful (e.g., Event Code 341: inhalation of substance).
Strengths for Poisoning Surveillance	CFOI can provide yearly standardized counts and rates of work-related deaths due to acute traumatic 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 for Poisoning Surveillance	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; number 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.
Other Relevant Information	

National Electronic Injury Surveillance System – Occupational Supplement (NEISS-Work)

Contact Info/Sponsor	National Institute for Occupational Safety and Health, CDC Phone: 304.285.5916 (Surveillance and Field Investigations Branch) Email Contact: Larry L. Jackson at LLJackson@cdc.gov Website: http://www2a.cdc.gov/risqs/
Data Type & Purpose	National estimates of nonfatal occupational injuries and illnesses treated in US Hospital Emergency Departments (EDs); ED Surveillance; data are weighted to provide national estimates
Geographic Scope	National only
Implementation Status	Fully implemented and ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Currently NEISS-Work data for 1998-2000 are available at Work-RISQS (http://www2a.cdc.gov/risqs/). Additional data years will be available in the future. Data requests may be submitted to the NIOSH, Division of Safety Research, Surveillance and Field Investigations Branch. No public use data sets are available.
Data Collection Methodology	Data are collected using the NEISS operated by the US Consumer Product Safety Commission. NEISS-Work is an ongoing ED-based surveillance system. Data are obtained from a nationally representative probability-based sample of US hospitals stratified by hospital size and children's hospitals. Hospital-based medical records abstractors identify work-related injuries and illnesses based on information in the medical record. Cases are considered work-related that occurred to a worker while conducting work for pay or other compensation, during agricultural production activities, or while doing volunteer work for an organized group. Limited details were collected about the worker and the circumstances of their injury or illness. From a brief injury/illness narrative, the source of the injury (i.e., the object, substance, bodily motion, or exposure which directly produced or inflicted the injury or illness) and the secondary source (i.e., the object, substance, or person that generated the source of injury or illness or that contributed to the event or exposure) were classified. For this classification the Bureau of Labor Statistics' Occupational Injury and Illness Classification System (OIICS) was used. Information on this hierarchical coding structure is available online at: wwwn.cdc.gov/oiics/.
Content	Patient demographics, principal diagnosis, primary body part affected, up to two consumer products involved, place of occurrence, ED discharge disposition, and an incident narrative. NIOSH uses the narrative to classify the event or exposure, source of the injury (i.e., the object, substance, bodily motion, or exposure which directly produced or inflicted the injury or illness) and the secondary source (i.e., the object, substance, or person that generated the source of injury or illness or that contributed to the event or exposure) by using the Bureau of Labor Statistics' Occupational Injury and Illness Classification System (OIICS). Information on this hierarchical coding structure is available online at: wwwn.cdc.gov/oiics/.
Demographic Information	Age, sex, and race and ethnicity (missing ≥20%)
Years of Data	1998 through the current year

Codes to Identify Poisoning Cases	Primary diagnosis code = poisoning or anoxia. Source codes provide detailed information about the substance involved (e.g., source code: 0941: carbon monoxide). Event codes may also be useful (e.g., Event Code 341: inhalation of substance).
Strengths for Poisoning Surveillance	NEISS-Work is a nationally representative sample of U.S. hospital EDs. It is one of only two national surveillance systems reporting on nonfatal occupational injuries and illnesses. Source codes provide detailed information about specific substances involved. Data can be cross-tabulated to examine poisoning cases selected incident and demographic characteristics.
Weaknesses for Poisoning Surveillance	NIOSH has strict publication requirements based on the reliability of estimates; number and rates are not published or released by NIOSH if the estimates do not meeting these guidelines. NEISS-Work has a relatively small number of cases captured in the hospital sample compared to the primary NEISS program. Also poisonings typically represent less than 1% of ED-treated occupational injuries/illnesses. Hence, small numbers limit the amount of reportable data.
Other Relevant Information	A diagnosis of poisoning includes when a patient: • Swallowed either a liquid or soluble chemical or drug/medication. (Chemicals that may cause poisoning include liquids such as furniture polish, bleach, lighter fluid, paint, gasoline and alcohol. Poisoning can also be caused by such non-liquid household substances as charcoal, powder detergents, toilet bowl cleaning tablets, spackling compounds and solid room deodorizers. These substances dissolve in liquid.) • Inhaled vapors, fumes or gases (e.g., from chemicals, cleaners or fuels). (Exception: vapors from carbon monoxide (CO) and smoke from fires are coded as Anoxia.) • Swallowed either a liquid or soluble chemical or drug and had an "allergic reaction" (including swelling, skin rashes, etc.) A diagnosis of anoxia includes when a patient: cannot obtain sufficient oxygen, either due to hampered breathing or lack of oxygen itself; when the physician's diagnosis is strangulation, suffocation or asphyxia; and when the patient has inhaled products of combustion, such as carbon monoxide (CO), smoke, soot, etc. (e.g., from a house fire, heating appliance, or machinery). Anoxia should only be used in conjunction with specific event or source codes to identify poisonings.

Sentinel Event Notification System for Occupational Risk (SENSOR)

Contact Info/Sponsor	CDC/ National Institute for Occupational Safety and Health (NIOSH) Website: http://www.cdc.gov/niosh/contact/ SENSOR Website: http://www.cdc.gov/niosh/topics/pesticides/overview.html
Data Type & Purpose	The mission of the Sentinel Event Notification System for Occupational Risk (SENSOR) program is to build and maintain occupational illness and injury surveillance capacity within state health departments around pesticide poisonings. SENSOR collects data on poisoning cases in 11 states: 5 funded by NIOSH (CA, MI, IA, NY, WA), 3 funded by EPA (FL, LA, NC), and 3 non-federally funded partners (OR, NM, TX). All of these states receive technical support from NIOSH. Case definition: for detailed information see: www.cdc.gov/niosh/topics/pesticides/pdfs/casedef2003_revAPR2005.pdf
Geographic Scope	States that participate in the SENSOR-Pesticides program (CA, FL, IA, LA, MI, NY, NC, NM, OR, TX, WA). Other states may be doing similar surveillance. NIOSH and the Council of State and Territorial Epidemiologists (CSTE) also use NPDS to track acute work-related pesticide poisoning. An incidence rate animated map derived from these data (2000—2009) is available: www.cdc.gov/niosh/topics/pesticides/AnimatedMap.html
Implementation Status	Varies by state and level of funding.
Availability ☒Online Query System ☒ Public Use Data Set	Varies by state. Some states generate specific reports and tools. National pesticides aggregated database available. Limited data are also available on-line: wwwn.cdc.gov/niosh-survapps/sensor.
Data Collection Methodology	Data collected in various ways, paper reports, some e-mail reports, some provide web-based data entry for reporters.
Content	Healthcare providers, poison control centers, workers' compensation claims, and state or local government agencies. Reporting sources vary by state and are detailed above.
Demographic Information	Completeness of demographic data varies by state. Basic demographics are available for all states combined and on a state-specific basis.
Years of Data	Varies by state. National aggregated database includes years 1998-2009.
Codes to Identify Poisoning Cases	Case definition, severity index, and standardized variable criteria can be found at: www.cdc.gov/niosh/topics/pesticides/case.html
Strengths for Poisoning Surveillance	Data are specifically related to pesticide poisoning. Standard definitions of cases are used across the states involved. Significant documentation is available on the NIOSH website in the event that a state/local group wants to establish a comparable program. Detailed information available on cases (e.g. activity at time of pesticide exposure, circumstances surrounding the pesticide exposure, information on root causes of the poisoning, details on the pesticide that caused the poisoning, information on the job and employer for work-related cases). Standardized index used to classify severity.

Weaknesses for Poisoning Surveillance	The major weaknesses of the program include the limited number of states involved, likely under-reporting of cases, variable number of years of data by state, and the predominant data source varies by state. In addition, access to data is unclear and very specific to pesticide poisoning.
Other Relevant Information	Cases can be grouped into possible, probable and definite case definition categories, based on strength of availability of evidence. Multiple data sources are used by states. This is not likely to capture drug poisonings, unless the drug is also a pesticide (e.g. lindane).

Survey of Occupational Injuries and Illnesses (SOII)

Contact Info/Sponsor	Bureau of Labor and Statistics(BLS) US Department of Labor Phone: 202 – 691-6170 Website: http://www.bls.gov/iif/ Email: iifstaff@bls.gov
Data Type & Purpose	The Survey of Occupational Injuries and Illness (SOII) provides annual estimates of the numbers and incident rates of nonfatal work-related injuries and illness nationwide. The purpose is to provide information to guide and evaluate prevention efforts. Each year, BLS surveys approximately 230,000 establishments collecting data on injuries and illnesses that employers are required to record under the Occupational Health and Safety record-keeping standard. These include all injuries requiring more than first aid, or resulting in loss of consciousness, lost time, or transfer to another job. More detailed information on worker demographics and the nature and circumstances of injury is collected for nonfatal cases involving at least 1 day away from work, beyond the day of injury or onset of illness. The SOII is a collaborative effort of BLS and state agencies that are funded to collect and code the data.
Geographic Scope	National estimates are currently available for private industry, and state and local government workers. Prior to 2008, national estimates were limited to private sector workers. State-specific data are available for most states.
Implementation Status	Fully implemented and on-going.
Availability ☒Online Query System ☒ Public Use Data Set	Tables and reports are available from Data & Statistics Page: www.bls.gov/iif/ . There are also online query applications and special data requests can be made to BLS.
Data Collection Methodology	A nationally representative sample of establishments is selected annually, with independent samples selected for most states. Employers are notified at the beginning of the year that they have been selected for inclusion in the survey. Data are collected for the entire calendar year after the close of the year. Employers provide information recorded on OSHA logs. To provide more detailed information on more serious cases, most employers use information from supplementary recordkeeping forms or state workers' compensation claim records to fill out the survey's "case form;" some, however, attach those forms when their narratives answer questions on the case form. BLS offers this option to help reduce respondent burden. To minimize the burden for larger employers, sampled establishments projected to have large numbers of cases involving days away from work receive instructions on how to sample those cases. The Bureau has developed the Occupational Injury and Illness Classification System to permit standardized and uniform coding of the nature, body part, event and source of injuries and illnesses involving days away from work. Data are coded by BLS and participating state agencies.
Content	The SOII can provide counts and rates of more serious cases 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 substances involved in the poisonings.
Demographic Information	Gender, age, race or ethnic origin, occupation, industry.

Years of Data	Case and demographic data have been available since 1992.
Codes to Identify Poisoning Cases	Nature of Injury code: 095 (poisonings). Some additional poisonings may be identified under codes for systemic conditions (e.g., Nature of Injury code: 4211 for abnormal blood lead level). Source codes provide detailed information about the substance involved (e.g., source code: 0941: carbon monoxide). Event codes may also be useful (e.g., Event Code 341: inhalation of substance).
Strengths for Poisoning Surveillance	The SOII can provide yearly standardized counts and rates of work-related poisoning cases, as reported by employers – nationwide and for most states. Source codes provide detailed information about specific substances involved. Data can be cross-tabulated to examine poisoning cases by industry, occupation, and other demographic characteristics.
Weaknesses for Poisoning Surveillance	While the SOII is an important source of information about work-related injuries and illnesses, it has a number of well recognized limitations. Occupational diseases (which encompass some types of poisonings) are not well documented and there is evidence of under-reporting of injuries as well. The survey excludes the self-employed that comprise approximately 7% of the workforce. Small farms with fewer than 11 employees, Federal government agencies, and household workers are also excluded. The findings, therefore, are conservative estimates of the extent of the problem. Reports are provided by employers and are not comparable to reports recorded according to clinical or epidemiologic case definitions. Data are not released until 11 months after the close of the calendar year. BLS has strict publication requirements based on the reliability of estimates; number and rates are not published or released by BLS if the estimates do not meeting these guidelines. Data cannot be aggregated over years.
Other Relevant Information	

Insurance Claims Databases

Contact Info/Sponsor	All Payer Claims Database Council (APDC): www.apcdcouncil.org/; Medicaid data (general info): www.cms.gov/MedicaidDataSourcesGenInfo/; Medicare data: www.cms.gov/home/rsds.asp; Commercial insurance data: (contact individual health insurance carriers). Contact State Insurance Commission.
Data Type & Purpose	Health insurance claims data may contain basic eligibility information, and information on products, members, providers, as well as administrative information on episodes of care, including ICD-based diagnostic codes, CPT procedure codes, pharmacy claims, and cost.
Geographic Scope	Population-based by National, State and Commercial carrier. Medicaid and Medicare data available for each state and for U.S. APCDs are currently present in several states.
Implementation Status	Medicaid and Medicare are fully implemented and ongoing data sources. APCDs are fully implemented in several states and just beginning implementation in others.
Availability ☒ Online Query System ☒ Public Use Data Set	Varies by state. Some data are available through query systems and public use data sets. Scope of information contained will vary.
Data Collection Methodology	Medicaid, Medicare, and Commercial insurance databases contain population-based information systematically collected by the specific insurer. APCDs are centralized repositories containing data from multiple insurance carriers.
Content	Data contained includes information on medical encounters, pharmacy claims, products, providers, and eligibility.
Demographic Information	Race, ethnicity, sex, place of residence, and age. Disability indicators may also be available.
Years of Data	APCD has been initiated during different years across implementing states.
Codes to Identify Poisoning Cases	ICD-9-CM codes for poisoning. E-codes for poisoning may be missing or lack specificity.
Strengths for Poisoning Surveillance	Although inpatient claims are included, these databases are primarily useful in quantifying outpatient and out-of-hospital encounters associated with poisoning, that are not available in traditional statewide ED or Inpatient databases. Other strengths include information on cost of treating poisoning and identifying the relationship of drug poisonings to previously prescribed medication.
Weaknesses for Poisoning Surveillance	May have low E-coding rates. Analysts are advised to assess these rates before beginning their analyses and if low, they may need to rely primarily on diagnosis codes to identify poison cases.
Other Relevant Information	Insurance Claims Databases includes State All Payer Claims Databases (APCDs), State Medicaid Databases, Medicare Database, and Insurance Company Databases.

Workers' Compensation (WC) Insurance Data

Contact Info/Sponsor	Workers' Compensation Agencies of the U.S.: http://www.worldlawdirect.com/article/3084/workers-compensation-agencies-u-s.html; and National Council on Compensation Insurance (NCCI): www.ncci.com
Data Type & Purpose	There are two potential data sources for workers' compensation (WC) data in the states: 1) the data maintained by state WC insurance agencies; and 2) the data provided by WC insurance companies to the National Council on Compensation Insurance. State WC agencies maintain administrative records of work-related illnesses and injury for purposes of administering WC benefits. NCCI is a private insurance rating and data collection bureau specializing in WC. NCCI serves as a repository for WC data for states that have designated NCCI as their insurance rating organization. Data from multiple states are compiled by NCCI to advise states on WC insurance ratings.
Geographic Scope	State WC systems vary from state to state. States may allow employers to self-insure, insure through private carriers, or insure through a state fund. Coverage exemptions differ from state to state; for example, some states do not include public sector workers. Benefits, waiting periods, and the statutes of limitations for filing claims that can affect what cases are likely to be captured in the system differ by state. NCCI has data for most but not all states. The data are submitted to NCCI by member WC insurance companies. The data runs are proprietary.
Implementation Status	Ongoing.
Availability ☒Online Query System ☒ Public Use Data Set	Individual state WC Administrators can explain what data may be available directly from the state worker's compensation agency. Not all states have databases that are useful for surveillance. Some states, like California, allow bona fide researchers to access workers' compensation data through MOUs. NCCI may be able to provide aggregated WC data for a fee. Raw claims-level data are difficult to obtain.
Data Collection Methodology	Data collection by state WC agencies and reporting practices differ widely by state. In some states, insured employers report to the insurer who then reports data to state in standard form. Typically, employers, insurers and employees report claims of work-related injuries/illnesses to appropriate state regulatory agencies for determination of medical and/or indemnity compensation benefits. This information is then coded in the state agency database (if there is one). Data are provided to NCCI directly by WC insurers. While most states also provide data to NCCI, several large industrial states, like Pennsylvania, California, and New York, have independent rating bureaus.
Content	Work-related injuries/illnesses. Different agencies may or may not code injuries/illnesses by cause, such as chemical exposures or poisonings. Many states have data from First Reports of Injury which show the nature of the injury and demographics about case. Some states have a supplemental report of injury (SROI) which includes claims data on type and amount of benefits paid. A few states have begun collecting detailed medical claims data as well.

Demographic Information	Sex, age, type of employment, medical costs, hours of work lost, employer and insurer information, place of injury by state.
Years of Data	Varies by state.
Codes to Identify Poisoning Cases	Varies by state.
Strengths for Poisoning Surveillance	Depending on the state, the WC agency's coding of poisoning data varies. Contact state authority about what might be available. Some systems have searchable fields that could be queried or searched for key words.
Weaknesses for Poisoning Surveillance	• Depending on the state, poisoning data may not be coded. • Completeness and accuracy of data in this system may be an issue. • The variability in WC laws across states significantly limits use of these data to make state-to-state comparisons.
Other Relevant Information	Insurance information in other health data sources, such as hospital discharge data, may include a variable for workers' compensation which can be used to identify work-related cases in these data sources. (See CSTE Occupational Health Indicators: http://www.cste.org/OHindicators.asp

Appendix B

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

Appendix B2: SAS Programs for Poisoning Matrix for ICD-10 Coded Mortality Data

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

Type of Poison†	Underlying Cause Codes*				
	Poisoning by Intent			Poisoning by Intent	
	Unintentional	Self harm/ suicide	Assault/ homicide	Legal Intervention/ Operation of War	Undetermined Intent
DRUG	X40-X44	X60-X64	X85	…	Y10-Y14
Nonopioid analgesics	X40	X60	…	…	Y10
4-Aminophenol derivatives	…	…	…	…	…
Antiepileptic, sedative-hypnotic, anti-Parkinsonism, antidepressant, and other psychotropic drugs, not elsewhere classified	X41	X61	…	…	Y11
Benzodiazepines	…	…	…	…	…
Methamphetamines and other psychostimulants with abuse potential	…	…	…	…	…
Anticoagulants	…	…	…	…	…
Narcotics and psychodysleptics not elsewhere classified****	X42	X62	…	…	Y12
Opiates/opioids	…	…	…	…	…
Heroin	…	…	…	…	…
Pharmaceutical opioids	…	…	…	…	…
Methadone	…	…	…	…	…
Cocaine	…	…	…	…	…
Other and unspecified narcotics*****	…	…	…	…	…
Other drugs acting on the autonomic nervous system	X43	X63	…	…	Y13
Drugs not elsewhere classified or unspecified	X44	X64	X85	…	Y14
NON-DRUG	X45-X49	X65-X69	X86-X90	…	Y15-Y19
Alcohol	X45	X65	…	…	Y15
Ethanol	…	…	…	…	…
Organic solvents, and halogen derivatives of aliphatic and aromatic hydrocarbons	X46	X66	…	…	Y16
Other gases and vapors (including carbon monoxide)	X47	X67	…	…	Y17
Carbon monoxide	…	…	…	…	…
Other specified non-drugs	X48	X68	X86-X89	…	Y18
Other nondrugs not elsewhere classified or unspecified	X49	X69	X90	…	Y19
UNSPECIFIED TYPE OF POISON	…	…	*U01.7	Y35.2	…
ALL TYPES OF POISON	X40-X49	X60-X69	X85-X90, *U01.7	Y35.2	Y10-Y19

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

	Underlying Cause Codes*			
Type of Poison†	**Poisoning by Envenomation**	**Poisoning by Adverse Effect of Drug in Therapeutic Use**	**Poisoning Secondary to Foodborne Illness: Intoxication**	**Poisoning Secondary to Mental/ Behavior Disorder: Acute Intoxication*** **
DRUG		Y40-Y59		[F11 - F16] (.0), F19.0
Nonopioid analgesics		Y45.5		…
4-Aminophenol derivatives		Y45.5		…
Antiepileptic, sedative-hypnotic, anti-Parkinsonism, antidepressant, and other psychotropic drugs, not elsewhere classified		Y46, Y47, Y49 (.0-.5, .7-.9)		…
Benzodiazepines		Y47.1		F13.0‡
Methamphetamines and other psychostimulants with abuse potential		Y49.7		F15.0
Anticoagulants		Y44.2		
Narcotics and psychodysleptics not elsewhere classified****		Y45.0, Y49.6		F11.0, F14.0, F16.0
Opiates/opioids		Y45.0		F11.0
Heroin		…		…
Pharmaceutical opioids		Y45.0		…
Methadone		…		…
Cocaine		…		F14.0
Other and unspecified narcotics*****		…		…
Other drugs acting on the autonomic nervous system		…		…
Drugs not elsewhere classified or unspecified		Y40-Y44.1, Y44 (.3-.9), Y45 (.1-.4, .8,.9), Y48, Y50-Y59		F12.0, F19.0
NON-DRUG	X20-X29		A05 (.0-.2, .4-.9)	F10.0, F17.0, F18.0
Alcohol			…	F10.0
Ethanol			…	…
Organic solvents, and halogen derivatives of aliphatic and aromatic hydrocarbons			…	F18.0
Other gases and vapors (including carbon monoxide)			…	…
Carbon monoxide			…	…
Other specified non-drugs	X20-X28		A05 (.0-.2, .4-.9)	F17.0
Other nondrugs not elsewhere classified or unspecified	X29		…	…
UNSPECIFIED TYPE OF POISON	…		…	…
ALL TYPES OF POISON	X20-X29	Y40-Y59	A05 (.0-.2, .4-.9)	[F10-F19] (.0)

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

Type of Poison†	Underlying Cause Codes*	
	Diseases Induced by Drugs and Other Substances ¶	**All Codes**
DRUG	D52.1, D59 (.0, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24.2, E27.3, E66.1, [F11-F16] (.1-.9), F19 (.1-.9), G21.1, G24.0, G25 (.1, .4,.6), G44.4, G62.0, G72.0, I95.2, J70 (.2-.4), K85.3, L10.5, L27 (.0, .1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2	X40-X44, X60-X64, X85, Y10-Y14, Y40-Y59, D52.1, D59 (.0, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24.2, E27.3, E66.1, F11-F16, F19, G21.1, G24.0, G25 (.1, .4, 6), G44.4, G62.0, G72.0, I95.2, J70 (.2-.4), K85.3, L10.5, L27 (.0, .1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2
Nonopioid analgesics	…	X40, X60, Y10, Y45.5
4-Aminophenol derivatives	…	Y45.5
Antiepileptic, sedative-hypnotic, anti-Parkinsonism, antidepressant, and other psychotropic drugs, not elsewhere classified	…	X41, X61, Y11, Y46, Y47, Y49 (.0-.5, .7-.9)
Benzodiazepines	F13‡ (.1-.9)	Y47.1, F13‡
Methamphetamines and other psychostimulants with abuse potential	F15(.1-.9)	F15, Y49.7
Anticoagulants	…	Y44.2
Narcotics and psychodysleptics not elsewhere classified****	…	X42, X62, Y12, Y45.0, Y49.6, F11.0, F14.0, F16.0
Opiates/opioids	F11 (.1-.9)	F11, Y45.0
Heroin	…	…
Pharmaceutical opioids	…	Y45.0
Methadone	…	…
Cocaine	F14 (.1-.9)	F14
Other and unspecified narcotics*****	…	…
Other drugs acting on the autonomic nervous system	…	X43, X63, Y13
Drugs not elsewhere classified or unspecified	F12 (.1-.9), F16 (.1-.9), F19 (.1-.9)	X44, X64, X85, Y14, Y40-Y44.1, Y44 (.3-.9), Y45 (.1-.4, .8, .9), Y48, Y50-Y59, F12, F19
NON-DRUG	E24.4, F10 (.1-.9), F17 (.1-.9), F18 (.1-.9), G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0	X20-X29, X45-X49, X65-X69, X86-X90, Y15-Y19, A05, E24.4, F10, F17, F18, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0
Alcohol	E24.4, F10 (.1-.9), G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0	X45, X65, Y15, E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0
Ethanol	…	…
Organic solvents, and halogen derivatives of aliphatic and aromatic hydrocarbons	F18 (.1-.9)	X46, X66, Y16, F18
Other gases and vapors (including carbon monoxide)	…	X47, X67, Y17
Carbon monoxide	…	…
Other specified non-drugs	F17 (.1-.9)	X20-X28, X48, X68, X86-X89, Y18, A05, F17
Other nondrugs not elsewhere classified or unspecified	…	X49, X69, X90,Y19, X29
UNSPECIFIED TYPE OF POISON	…	Y35.2, *U01.7
ALL TYPES OF POISON	D52.1, D59.(0,, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24 (.2, .4), E27.3, E66.1, [F10-F19] (.1-.9), G21.1, G24.0, G25 (.1, .4, .6), G31.2, G44.4, G62 (.0, .1), G62.1, G72 (.0, .1), I42.6, I95.2, J70 (.2-.4), K29.2, K70, K85 (.2, .3), K86.0, L10.5, L27 (.0,.1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2	X20-X29, X40-X49, X60-X69, X85-X90, Y35.2, Y10-Y19, Y40-Y59, *U01.7, A05 (.0-.2, .4-.9), D52.1, D59 (.0, .2), D61.1, D64.2, E06.4, E16.0, E23.1, E24 (.2, .4), E27.3, E66.1, F10-F19, G21.1, G24.0, G25 (.1, 4, .6), G31.2, G44.4, G62 (.0, .1), G72 (.0, .1), I42.6, I95.2, J70 (.2-.4), K29.2, K70, K85 (.2, .3), K86.0, L10.5, L27 (.0,.1), M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

	Contributing Cause Codes**		
Type of Poison†	**Drug and Other Non-venom, Non-foodborne Poisoning**	**Envenomation**	**Foodborne Illness: Intoxication**
DRUG	*T36-T50.9*		
Nonopioid analgesics	*T39*		
4-Aminophenol derivatives	*T39.1*		
Antiepileptic, sedative-hypnotic, anti-Parkinsonism, antidepressant, and other psychotropic drugs, not elsewhere classified	*T42, T43*		
Benzodiazepines	*T42.4*		
Methamphetamines and other psychostimulants with abuse potential	*T43.6*		
Anticoagulants	*T45.5*		
Narcotics and psychodysleptics not elsewhere classified****	*T36-T38.9, T40 (.0-.9), T41, T44, T45 (.0-.4), T45 (.6-.9), T46-T50.8*		
Opiates/opioids	*T40(.0-.4)*		
Heroin	*T40.1*		
Pharmaceutical opioids	*T40.0, T40 (.2-.4)*		
Methadone	*T40.3*		
Cocaine	*T40.5*		
Other and unspecified narcotics*****	*T40.6*		
Other drugs acting on the autonomic nervous system	…		
Drugs not elsewhere classified or unspecified	*T50.9*		
NON-DRUG	*T51-T60, T65*	*T63*	*T61, T62, T64*
Alcohol	*T51*		…
Ethanol	*T51.0*		…
Organic solvents, and halogen derivatives of aliphatic and aromatic hydrocarbons	*T52, T53*		…
Other gases and vapors (including carbon monoxide)	*T58, T59*		…
Carbon monoxide	*T58*		…
Other specified non-drugs	*T54-T57,T60, T65(.0-.8)*	*T63*	*T61-T62, T64*
Other nondrugs not elsewhere classified or unspecified	*T65.9*	…	…
UNSPECIFIED TYPE OF POISON		…	…
ALL TYPES OF POISON	*T36-T60, T65*	*T63*	*T61, T62, T64*

Appendix B1: Poisoning Matrix for ICD-10 Coded Mortality Data

Footnotes

† **Type of Poison**

Only selected classes of drugs and nondrugs are shown in the table. Classes were chosen based on their public health importance. For example, 4-aminophenol derivatives such as acetaminophen are not the only class of nonopioid analgesics in use, but the other classes are involved in fatal poisonings less frequently. Similarly, many classes of gases and vapors are involved in poisoning deaths, but none as frequently as carbon monoxide. ICD codes associated with radiation exposure and disease are not included as they lack information as to whether the source of the radiation is incorporated into the body.

* **Underlying cause codes**

This set of columns includes only the ICD codes that are used to code the underlying cause of death. These codes can be used to identify deaths of all types caused by each poison type.

Some of these codes and codes from the lists of multiple cause codes may be included on death certificates without being the underlying cause of death.

To identify deaths that may be drug-related but not necessarily drug-caused, selecting for deaths with codes in this column or in the contributing cause column would be valid.

** **Contributing cause codes**

Codes that may be used for any diagnoses included in Part I or Part II of the death certificate. These codes are used to identify the type of poison involved but not the intent of the poisoning. They cannot be used to identify the underlying cause of death.

*** **Poisoning Secondary to Mental/ behavior disorder: Acute Intoxication**

Acute intoxication codes in this column, [F10-F19](.0), have been discontinued. Beginning in 2007, NCHS decided that acute intoxication that was fatal should be coded as an external cause of mortality (injury) rather than a mental or behavioral disorder. F10.0 was discontinued in 2007 data. F11-F19 (.0) were discontinued in 2009 data.

**** **Narcotics and psychodysleptics not elsewhere classified**

The subcategories listed do not represent the full range of agents included in this code category.

***** **Other and unspecified narcotics (T40.6)**

This category is intended for other and unspecified drugs classified pharmacologically as narcotics (opioids/opiates). However, in practice it may also be used for drugs classified legally as narcotics such as cocaine.
The proportion of this category made up by opioids/opiates varies by jurisdiction, so inclusion of this code in any compilation of opioid deaths depends on more detailed analysis of death certificate text and/or medical examiner/coroner records in the jurisdiction.

‡ Benzodiazepines are not the only class of drug in this code category.

¶ **Diseases induced by drugs and other substances**

The set of drug-induced disease codes here differs from the drug-induced codes set developed by NCHS by the absence of the F17 codes for mental and behavioral disorders from the use of tobacco and the R78 codes for findings of drugs and other substances in the blood. The F17 codes are found in the "Non-Drug" row of this column because tobacco is not considered a drug by the ISW definition. The R78 codes do not meet the ISW poisoning definition.

A comprehensive list of all ICD-10 codes meeting our conceptual definition of poisoning (eg, including chronic pesticide exposures) has not been developed to date. Its development was considered beyond the scope of this project.

Notes

1. When a set of additional digits are required for International Classification of Diseases codes, the additional digits are in parentheses ( ) and apply to the preceding code or preceding range of codes in brackets [ ].
2. Empty cells in the matrix indicate that the Tenth Revision of the ICD does not specify that particular type of poisoning for that type of poison. In other words, that category does not apply. Some poison types may be specified only by the contributing cause codes and have no correspondingly specific underlying cause codes.

Appendix B2: SAS Programs for Poisoning Matrix for ICD-10 Coded Mortality Data

Program is not included in the package

Click here to view the SAS code

NOTE: a few small errors have been found, please use with caution. Contact Margaret Warner for more details (mmw9@cdc.gov).

Appendix C

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Appendix C2: SAS Programs for Poisoning Matrix for ICD-9-CM Coded Morbidity Data

NOTE: a few small errors have been found, please use with caution. Contact Margaret Warner for more details (mmw9@cdc.gov).

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Type of Poison††††	Poisonings Classified by External Cause Categories†				
	Poisoning by Intent				
	Unintentional	Self Harm	Assault	Legal Intervention/ Operation of War	Undetermined
DRUG	E850-E858	E950 (.0-.5)	E962.0	…	E980 (.0-.5)
Nonopioid analgesics, Antipyretics, and Antirheumatics	E850 (.3-.8)	…	…	…	…
4-Aminophenol derivatives	E850.4	…	…	…	…
Opiates/opioids	E850 (.0-.2)	…	…	…	…
Heroin	E850.0	…	…	…	…
Pharmaceutical opioids**	E850 (.1-.2)	…	…	…	…
Methadone	E850.1	…	…	…	…
Cocaine	E854.3*, E855.2*	…	…	…	…
Other and unspecified narcotics	…	…	…	…	…
Antidepressants, barbiturates and other antiepileptics, sedative-hypnotics, and psychotropic drugs not elsewhere classified	E851-E853, E854 (.0-.2,.8), E855.0	E950 (.1-.3)	…	…	E980 (.1-.3)
Benzodiazepines	E853.2	…	…	…	…
Psychostimulants with abuse potential including methamphetamine, MDMA (Ecstasy)	E854.2	…	…	…	…
Anticoagulants	…	…	…	…	…
Other specified and unspecified drugs	E850 (.9), E855 (.1,.3-.9), E856-E858	E950 (.0, .4, .5)	E962.0	…	E980 (.0, .4, .5)
NON-DRUG	E860-E869	E950 (.6-.8), E951-E952	E962 (.1,.2)	E972, E997.2	E980 (.6-.8), E981, E982 (.0,.1)
Alcohol	E860	…	…	…	…
Ethanol	E860 (.0-.1)	…	…	…	…
Carbon monoxide	E868 (.2-.9)	E952 (.0,.1)	…	…	E982 (.0,.1)
Petroleum products and other solvents and their vapors	E862	…	…	…	E981
Other specified and unspecified non-drugs	E861, E863-E867, E868 (.0-.1), E869	E950 (.6-.8), E951, E952 (.8, .9)	E962 (.1-.2)	E972, E997.2	E980 (.6-.8)
UNSPECIFIED TYPE OF POISON	…	E950.9	E962.9, E979.7	…	E980.9, E982 (.8,.9)
ALL TYPES OF POISON	E850-E869	E950-E952	E962, E979.7	E972, E997.2	E980-E982

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

	Poisonings Classified by External Cause Categories†		Drug and Alcohol Induced Diseases††
Type of Poison††††	**Envenomation**	**Adverse Drug Effect**	**Drug and Alcohol Induced Diseases**
DRUG		E930-E949	244 (.2,.3), 275.02, 288.03, 289.84, 292, 304 (.00-.02,.10-.12), [304-305] (.20-.22,.30-.32,.40-.42,.50-.52,.60-.62,.70-.72,.80-.82,.90-.92), 332.1, 333.85, 336.8, 357.6, 359.24, 648.3, 655.5, 692.3, 693.0, 760 (.72-.78), 779 (.4,.5)
Nonopioid analgesics, Antipyretics, and Antirheumatics		E935 (.3-.8)	...
4-Aminophenol derivatives		E935.4	...
Opiates/opioids		E935 (.0-.2)	304 (.00-.02, .70*, .71*, .72*), 305 (.50-.52)
Heroin		E935.0	...
Pharmaceutical opioids**		E935 (.1-.2)	...
Methadone		E935.1	...
Cocaine		E938.5*	304 (.20-.22), 305 (.60-.62), 760.75
Other and unspecified narcotics		...	760.72
Antidepressants, barbiturates and other antiepileptics, sedative-hypnotics, and psychotropic drugs not elsewhere classified		E936-E937, E939-E940	304 (.10-.12, .40-.42), 305 (.40-.42, .70-.72)
Benzodiazepines		E939.4	...
Psychostimulants with abuse potential including methamphetamine, MDMA (Ecstasy)		E939.7	304 (.40-.42), 305 (.70-.72)
Anticoagulants		E934.2	...
Other specified and unspecified drugs		E930-E933, E934 (.1,.3-.9), E935.9, E938 (.0-.4,.6-.9), E941-E949	304 (.30-.32, .50-.52,.60-.62, .80-.82, .90-.92), 305 (.20-.22, .30-.32, .80-.82, .90-.92), 760 (.73,.74,.76-.78)
NON-DRUG	E905		291 (.0-.5,.8,.9), 303 (.00-.02,.90-.92), 305 (.00-.02, .1), 357.5, 425.5, 535.3, 571 (.0-.3), 760.71
Alcohol			291 (.0-.5,.8,.9), 303 (.00-.02,.90-.92), 305 (.00-.02), 357.5, 425.5, 535.3, 571 (.0-.3), 760.71
Ethanol			...
Carbon monoxide			...
Petroleum products and other solvents and their vapors			...
Other specified and unspecified non-drugs	E905		305.1
UNSPECIFIED TYPE OF POISON			760 (.70,.79)
ALL TYPES OF POISON	E905	E930-E949	244 (.2,.3), 275.02, 288.03, 289.84, 291 (.0-.5,.8,.9), 292, 303 (.00-.02,.90-.92), 304 (.00-.02,.10-.12), 305 (.00-.02,.1), [304-305] (.20-.22,.30-.32,.40-.42,.50-.52,.60-.62,.70-.72,.80-.82,.90-.92), 332.1, 333.85, 336.8, 357 (.5,.6), 359.24, 425.5, 535.3, 571 (.0-.3), 648.3, 655.5, 692.3, 693.0, 760 (.7), 779 (.4,.5)

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Type of Poison††††	Poisonings Classifed by Nature (or Diagnostic Category) of the Poisoning†††		
	Non-venom, Non-foodborne Poisoning	Envenomation	Foodborne Illness: Intoxication
DRUG	909 (.0,.5), 960-979, 995 (.2,.4,.86,.89), 999 (.4-.7)		
Nonopioid analgesics, Antipyretics, and Antirheumatics	965 (.1-.8)		
4-Aminophenol derivatives	965.4		
Opiates/opioids	965.0		
Heroin	965.01		
Pharmaceutical opioids**	965 (.00, .02-.09)		
Methadone	965.02		
Cocaine	968.5*, 970.81		
Other and unspecified narcotics	...		
Antidepressants, barbiturates and other antiepileptics, sedative-hypnotics, and psychotropic drugs not elsewhere classified	966, 967, 969, 970 (.0,.1,.89)		
Benzodiazepines	969.4		
Psychostimulants with abuse potential including methamphetamine, MDMA (Ecstasy)	969.7		
Anticoagulants	964.2		
Other specified and unspecified drugs	909 (.0, .5), 960-963, 964 (.0, .1,.3-.9), 965.9, 968 (.0-.4, .6-.9), 970 (.9), 971-979, 995 (.2, .4, .86, .89), 999 (.4-.7)		
NON-DRUG	980-989	989.5	988, 989.7, 005 (.0-.3, .89)
Alcohol	980		
Ethanol	980.0		
Carbon monoxide	986		
Petroleum products and other solvents and their vapors	981-982		
Other specified and unspecified non-drugs	983-985, 987, 989 (.0-.4, .6), 989.81-989.9	989.5	988, 989.7, 005 (.0-.3, .89)
UNSPECIFIED TYPE OF POISON	...	...	...
ALL TYPES OF POISON	960-989, 999 (.4-.7)	989.5	988, 989.7, 005 (.0-.3,.89)

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Type of Poison††††	All Poisoning
DRUG	244 (.2,.3), 275.02, 288.03, 289.84, 292, 304 (.00-.02,.10-.12), [304-305] (.20-.22,.30-.32,.40-.42,.50-.52,.60-.62,.70-.72,.80-.82,.90-.92), 332.1, 333.85, 336.8, 357.6, 359.24, 648.3, 655.5, 692.3, 693.0, 760 (.72-.78), 779 (.4,.5), 909 (.0,.5), 960-979, 995 (.2,.4,.86,.89), 999 (.4-.7), E850-E858, E930-E949, [E950, E980] (.0-.5), E962.0
Nonopioid analgesics, Antipyretics, and Antirheumatics	965 (.1-.8), E850 (.3-.8), E935 (.3-.8)
4-Aminophenol derivatives	965.4, E850.4, E935.4
Opiates/opioids	304 (.00-.02, .70*, .71*, .72*), 305 (.50-.52), 965.0, E850 (.0-.2), E935 (.0-.2),
Heroin	965.01, E850.0, E935.0
Pharmaceutical opioids**	965 (.00,.02-.09), E850 (.1-.2), E935 (.1-.2)
Methadone	965.02, E850.1, E935.1
Cocaine	304 (.20-.22), 305 (.60-.62), 760.75, 968.5*, 970.81, E854.3*, E855.2*, E938.5*
Other and unspecified narcotics	760.72
Antidepressants, barbiturates and other antiepileptics, sedative-hypnotics, and psychotropic drugs not elsewhere classified	304 (.10-.12, .40-.42), 305 (.40-.42, .70-.72), 966, 967, 969, 970 (.0,.1,.89), E851-E853, E854 (.0,.1,.2,.8), E855.0, E936-E937, E939-E940, E950 (.1-.3), E980 (.1-.3)
Benzodiazepines	969.4, E853.2, E939.4
Psychostimulants with abuse potential including methamphetamine, MDMA (Ecstasy)	304 (.40-.42), 305 (.70-.72), 969.7, E854.2, E939.7
Anticoagulants	964.2, E934.2
Other specified and unspecified drugs	304 (.30-.32, .50-.52,.60-.62, .80-.82, .90-.92), 305 (.20, -.22, .30-.32, .80-.82, .90-.92), 760 (.73,.74,.76-.78), 909 (.0, .5), 960-963, 964 (.0, .1,.3-.9), 965.9, 968 (.0-.4, .6-.9), 970 (.9), 971-979, 995 (.2, .4, .86, .89), 999 (.4-.7), E850 (.9), E855 (.1,.3-.9), E856-E858, E950 (.0, .4, .5), E962.0, E980 (.0, .4, .5), E930-E933, E934 (.1,.3-.9), E935.9, E938 (.0-.4,.6-.9), E941-E949
NON-DRUG	005 (.0-.3, .89), 291 (.0-.5,.8,.9), 303 (.00-.02,.90-.92), 305 (.00-.02, .1), 357.5, 425.5, 535.3, 571 (.0-.3), 760.71, 980-989, E860-E869, E905, E950 (.6-.8), E951-E952 , E962 (.1-.2), E972, E980 (.6-.8), E981, E982 (.0,.1), E997.2
Alcohol	291 (.0-.5,.8,.9), 303 (.00-.02,.90-.92), 305 (.00-.02), 357.5, 425.5, 535.3, 571 (.0-.3), 760.71, 980, E860
Ethanol	980.0, E860 (.0-.1)
Carbon monoxide	986, E868 (.2-.9) ,E952 (.0,.1), E982 (.0,.1)
Petroleum products and other solvents and their vapors	981-982, E862, E981
Other specified and unspecified non-drugs	005 (.0-.3,.89), 305.1, 983-985, 987-989, E861, E863-E867, E868 (.0,.1), E869, E905, E950 (.6-.8), E951, E952 (.8-.9), E962 (.1-.2), E972, E980(.6-.8) , E997.2
UNSPECIFIED TYPE OF POISON	760 (.70,.79), E950.9, E962.9, E980.9, E979.7, E982 (.8,.9)
ALL TYPES OF POISON	005 (.0-.3,.89), 244 (.2,.3), 275.02, 288.03, 289.84, 291 (.0-.5,.8,.9), 292, 303 (.00-.02,.90-.92), 304 (.00-.02,.10-.12), 305 (.00-.02, .1), [304-305] (.20-.22,.30-.32,.40-.42,.50-.52,.60-.62,.70-.72,.80-.82,.90-.92), 332.1, 333.85, 336.8, 357 (.5,.6), 359.24, 425.5, 535.3, 571 (.0-.3), 648.3, 655.5, 692.3, 693.0, 760 (.7), 779 (.4,.5), 960-989, 999 (.4-.7), E850-E869, E905, E930-E952, E962, E972, E980-E982, E979.7, E997.2

Appendix C1: Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Footnotes

* Not the only poison in this category

** The term pharmaceutical is used to denote the availability of these agents through prescription and does not necessarily reflect the actual the source of these agents for any given poisoning.

† **Poisonings classified by external cause categories**

This set of columns includes cases which receive an external cause of injury code (E code) indicating a poisoning event.
Some hospitalizations and ED discharges may receive an external cause of injury code for poisoning but may not receive a diagnostic code for poisoning.

These codes may be in "dedicated" ICD-9-CM E code fields and/or they may be found in diagnostic code fields in a given database.
There is no separate column for poisonings related to foodborne illness as ICD-9-CM classifies these events under unintentional poisonings (E865).

†† **Drug and alcohol induced diseases**

This column includes cases which receive an ICD-9-CM diagnostic code for a disease condition which was induced by a poison.

These codes are found only in ICD-9-CM diagnostic fields

††† **Poisonings classified by the nature (or diagnostic category) of the poisoning**

These columns include cases which receive an ICD-9-CM diagnostic code for poisoning.
These codes can occurr in any diagnostic field in a database but are not found in any "dedicated" E code fields.

†††† **Type of Poison**

Only selected classes of drugs and nondrugs are shown in the table. Classes were chosen based on a combination of their public health importance and the availability of a specific ICD code range. For example, 4-aminophenol derivatives such as acetaminophen are not the only class of nonopioid analgesics in use, but the other classes are involved in fatal poisonings less frequently. Similarly, many classes of gases and vapors are involved in poisoning deaths, but none as frequently as carbon monoxide.

ICD codes associated with radiation exposure and disease are not included as they lack information as to whether the source of the radiation is incorporated into the body.

Notes

1 Nature and external cause of injury codes presented as three digit codes (e.g., E862) or code ranges (e.g., 981-981) are inclusive of any valid 4th and 5th digit codes. Where 4th and 5th digits exist for diagnostic codes, they must be used. Otherwise the code is considered invalid. For three digit codes which have a a subclassification scheme, the 3 digit code is invalid without the additional digit(s).

2 Dark grey hatched shading indicates that ICD codes in these cells are not possible.

Appendix C2: SAS Programs for Poisoning Matrix for ICD-9-CM Coded Morbidity Data

Program is not included in the package

Click here to view the SAS code

NOTE: a few small errors have been found, please use with caution. Contact Margaret Warner for more details (mmw9@cdc.gov).

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