

**Drug Abuse Warning Network, 2010:  
National Estimates of Drug-Related  
Emergency Department Visits**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Substance Abuse and Mental Health Services Administration  
Center for Behavioral Health Statistics and Quality**

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- Attachment B. Drug Abuse Warning Network Methodology Report, 2010 Update
- Attachment C. Guide to Drug Abuse Warning Network Trend Tables, 2010 Update

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## HIGHLIGHTS

This publication presents national estimates of drug-related visits to hospital emergency departments (EDs) for the calendar year 2010, based on data from the Drug Abuse Warning Network (DAWN). Also presented are comparisons of 2010 estimates with those for 2004, 2008, and 2009. DAWN is a public health surveillance system that monitors drug-related ED visits for the Nation and for selected metropolitan areas. The Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS), is the agency responsible for DAWN. SAMHSA is required to collect data on drug-related ED visits under section 505 of the Public Health Service Act.

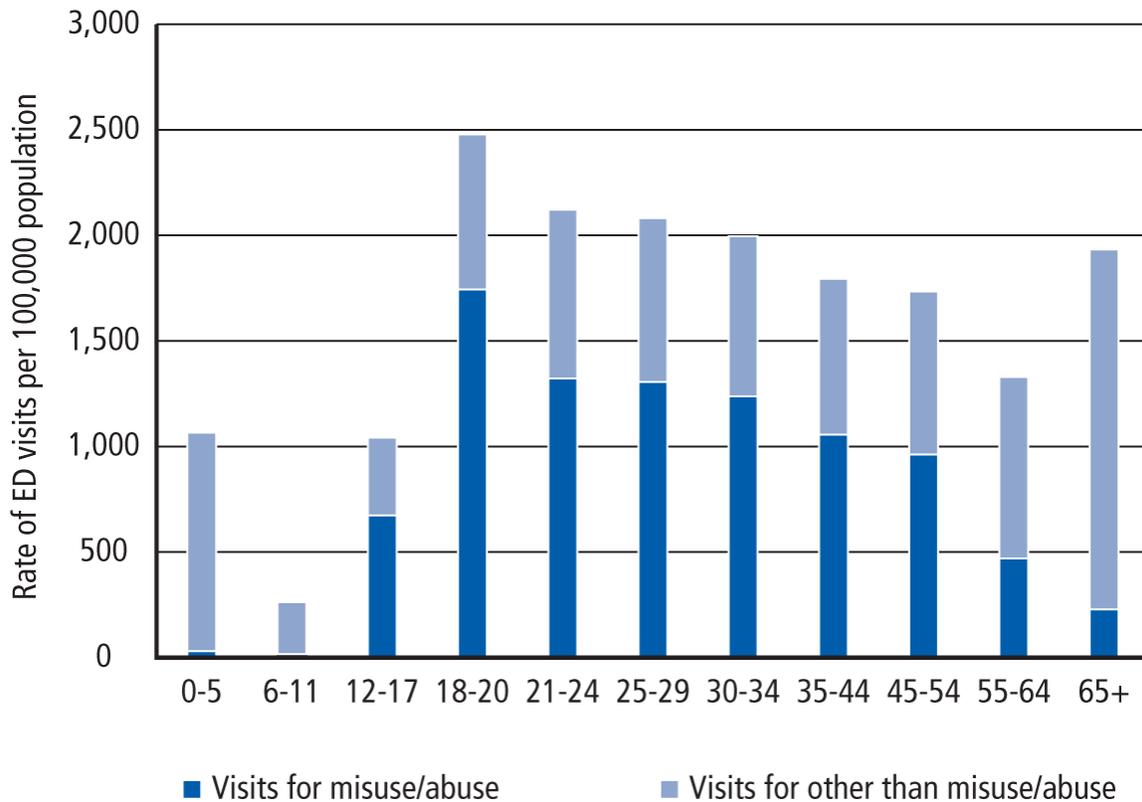
DAWN relies on a nationally representative sample of general, non-Federal hospitals operating 24-hour EDs, with oversampling of hospitals in selected metropolitan areas. In each participating hospital, ED medical records are reviewed retrospectively to find the ED visits that involved recent drug use. All types of drugs—illegal drugs, prescription drugs, over-the-counter pharmaceuticals (e.g., dietary supplements, cough medicine), and substances inhaled for their psychoactive effects—are included. Alcohol is considered an illicit drug when consumed by patients aged 20 or younger. For patients aged 21 or older, though, alcohol is reported only when it is used in conjunction with other drugs.

Marked findings of this report are (a) a 94 percent increase in the number of drug-related ED visits overall between 2004 and 2010, and (b) large increases in the involvement of a wide range of pharmaceuticals (e.g., prescription drugs, over-the-counter medications, supplements) over that period. It is likely that there are multiple causes contributing to these increases. Some portion of these increases may be associated with the greater number of prescriptions being written and with more people taking multiple prescription drugs, often in combination with over-the-counter preparations, as part of their long-term medical care. The greater availability of prescription drugs also facilitates their diversion for intentional misuse as well as accidental ingestion. It is beyond the scope of this report, though, to explore more fully the causes behind the growing numbers of ED visits involving pharmaceuticals, and further analysis is needed.

### All Drug-Related ED Visits

In 2010, over 125 million visits were made to EDs in general-purpose, non-Federal hospitals operating 24-hour EDs in the United States. DAWN estimates that just under 5 million of these visits, or 1,589.0 ED visits per 100,000 population, were related to drugs, a 94 percent increase since 2004. In 2010, drug-related visits range from a high of 2,478.3 visits per 100,000 population aged 18 to 20 to a low of 263.3 visits per 100,000 population aged 6 to 11 (Figure 1).

**Figure 1. Rates of drug-related ED visits per 100,000 population, by age group, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

### Overall Drug Misuse or Abuse

In 2010, DAWN estimates that about 2.3 million ED visits resulted from medical emergencies involving drug misuse or abuse, the equivalent of 743.7 ED visits per 100,000 population. For those aged 20 or younger, the rate is 476.1 visits; for those aged 21 or older, the rate is 849.4 visits.

Understanding that a visit may appear in more than one group, DAWN found that out of all drug misuse or abuse ED visits,

- 1,173,654 ED visits, or 51.0 percent, involved nonmedical use of pharmaceuticals;
- 1,171,024 ED visits, or 50.9 percent, involved illicit drugs; and
- 687,574 ED visits, or 29.9 percent, involved alcohol.

Although the overall number of ED visits attributable to drug misuse or abuse was stable from 2004 to 2010, ED visits related to the use of pharmaceuticals with no other drug involvement rose substantially (132% increase), as did the use of pharmaceuticals with illicit drugs (139% increase), pharmaceuticals with alcohol (63% increase), and pharmaceuticals combined with both illicit drugs and alcohol (94% increase).

## Illicit Drugs

DAWN estimates that 1,171,024 ED visits in 2010 involved an illicit drug. That is, 50.9 percent of all the drug misuse or abuse ED visits during the year involved one or more illicit drugs taken alone or in combination with pharmaceuticals, alcohol, or both. Among all visits involving illicit drugs,

- cocaine was involved in 488,101 visits, or 41.7 percent;
- marijuana was involved in 461,028 visits, or 39.4 percent;
- heroin was involved in 224,706 visits, or 19.2 percent;
- amphetamines/methamphetamine were involved in 137,947 visits, or 11.8 percent;
- PCP was involved in 53,542 visits, or 4.6 percent; and
- other illicit drugs—such as PCP, MDMA (“Ecstasy”), synthetic cannabinoids, inhalants, hallucinogens, LSD, GHB, ketamine, and flunitrazepam (e.g., Rohypnol<sup>®</sup>)—were each involved in fewer than 2.0 percent.

Synthetic cannabinoids, also known as “Spice” or “K2,” appeared for the first time at reportable levels in DAWN in 2010; they were involved in 11,406 ED visits (1.0%).

In 2010, there were 378.5 ED visits that involved illicit drugs for each 100,000 persons in the U.S. population. The highest rates were found for cocaine involvement (157.8 ED visits per 100,000 population) and marijuana (149.0 visits), followed by heroin (72.6 visits), amphetamines/methamphetamine (44.6 visits), PCP (17.3 visits), Ecstasy (7.1 visits), inhalants (3.7 visits), and synthetic cannabinoids (3.7 visits). Lower-incidence drugs had rates below 2 visits per 100,000 population.

For most illicit drugs, including cocaine, heroin, marijuana, and amphetamines/methamphetamine, the rate was higher for males than for females. Looking across age categories, the rate of marijuana involvement was highest for patients aged 18 to 20 (529.3 visits per 100,000 population), and cocaine was highest for those aged 35 to 44 (327.6 visits). Heroin and amphetamines/methamphetamine involvement was highest for those aged 25 to 29 (186.9 and 124.3 visits per 100,000 population, respectively).

Overall, 40.9 percent of visits involving illicit drugs resulted in some form of follow-up, including admission to the hospital (23.9%), transfer to another health care facility (10.8%), or referral to a detox/dependency program (6.3%). Most other patients (48.1%) were treated and released to home, with the remainder (11.0%) experiencing other outcomes.

While the overall level of ED visits involving illicit drugs from 2004 to 2008 was stable, DAWN observed an 18 percent increase in illicit drug–related visits between 2008 and 2010. Contributing to that rise were visits involving cannabinoids (including marijuana and synthetic cannabinoids), which increased 26 percent between 2008 and 2010, and visits involving amphetamines/methamphetamine, which increased 50 percent. The balance of amphetamines versus methamphetamine visits has shifted over the period from 2004 to 2010. In 2004, there were

almost four methamphetamine-involved visits for every amphetamines-related visit; in 2010, there were fewer than two.

## **Drugs and Alcohol Taken Together**

In 2010, over half a million ED visits, or 24.5 percent of all drug misuse or abuse ED visits, involved drugs combined with alcohol. The rate of alcohol-related ED visits per 100,000 population for males (240.1 visits) was higher than that for females (126.7 visits). The highest level was seen for patients aged 21 to 24 (354.6 visits).

Almost half (46.2%) of patients received some sort of follow-up care: 28.6 percent were admitted to the hospital, 11.7 percent were transferred to another facility, and 5.9 percent were referred to detox. The remaining patients were treated and released to home (44.9%) or had other outcomes (8.9%).

Illicit drugs were involved in over half (59.8%) of ED visits involving alcohol and other drugs, with cocaine or marijuana representing the greatest proportion of such visits (30.2% and 26.7%, respectively). One or more pharmaceuticals were also involved in over half (55.8%) of these visits. Pain relievers were observed in 23.0 percent of visits, with narcotic pain relievers accounting for over half of that (14.0%). Drugs for insomnia and anxiety were involved in 23.1 percent of visits, with the largest part of that being benzodiazepines (19.7%). Psychotherapeutic agents (antidepressants and antipsychotics) were involved in less than 8 percent of visits involving alcohol-drug combinations.

Between 2004 and 2010, involvement of alcohol in drug misuse or abuse ED visits remained stable.

## **Underage Drinking**

There were over 189,060 medical emergencies involving alcohol for patients aged 20 or younger in 2010, representing almost half (45.2%) of all drug misuse or abuse ED visits made by patients aged 20 or younger. The rate of medical emergencies involving the abuse of alcohol by youths was 291.0 visits per 100,000 population aged 12 to 17 and 848.7 visits per 100,000 population aged 18 to 20, almost a threefold difference. The pattern is similar when looking at ED visits for either alcohol alone or alcohol used in combination with other drugs. Between 2004 and 2010, levels of ED visits involving underage drinking remained constant for youth aged 12 to 17 and young adults aged 18 to 20.

## **Nonmedical Use of Pharmaceuticals**

There is growing concern in the public health community about the misuse of pharmaceuticals. For 2010, DAWN estimates that 1,173,654 ED visits involved nonmedical use of prescription medicines, over-the-counter drugs, or other types of pharmaceuticals. This represents about a quarter (23.9%) of all drug-related ED visits and over half (51.0%) of ED visits for drug misuse or

abuse. Over half (54.7%) of ED visits resulting from nonmedical use of pharmaceuticals involved multiple drugs, and about one in five (17.4%) involved alcohol.

Visits for nonmedical use of pharmaceuticals did not differ significantly between males and females (374.2 and 383.9 visits per 100,000 population, respectively). On the other hand, notable differences were seen between age categories: rates for patients aged 21 to 34 were over 600 visits per 100,000 population, with lower levels observed for younger and older patients.

Almost 40 percent (37.4%) of patients misusing pharmaceuticals received some form of follow-up care, including referral to detox/treatment (2.4%), admission to the hospital (25.5%), or transfer to another facility (9.5%). Of the remaining patients, most were treated and released to home (54.0%) or had other outcomes (8.6%).

The most common type of drug involved in ED visits for the nonmedical use of pharmaceuticals was pain relievers (48.3%), with the highest levels seen for the narcotic pain relievers oxycodone, hydrocodone, and methadone (12.5%, 8.2%, and 5.6%, respectively). Drugs used to treat anxiety and insomnia were also seen frequently (34.0%) in visits related to the misuse of pharmaceuticals. Of these, benzodiazepines accounted for the majority (29.5%) of these ED visits, specifically alprazolam (e.g., Xanax<sup>®</sup>), which was indicated in about a third (10.6%) of visits involving benzodiazepines.

From 2004 to 2010, medical emergencies related to the nonmedical use of pharmaceuticals increased 119 percent. Contributing to this rise was the 149 percent increase in the number of visits involving narcotic pain relievers. Specific narcotic drugs that more than doubled their involvement in ED visits between 2004 and 2010 were fentanyl, hydrocodone, hydromorphone, morphine, and oxycodone. Visits involving tramadol (e.g., Ultram<sup>®</sup>), a narcotic-like opiate agonist used for moderate-to-severe pain, increased 235 percent.

Between 2004 and 2010, the number of visits involving drugs for anxiety and insomnia increased 125 percent. Involvement of drugs in the benzodiazepine family experienced a 141 percent increase. Zolpidem (e.g., Ambien<sup>®</sup>), a sleeping aid with benzodiazepine-like properties, increased 150 percent. Muscle relaxants (e.g., carisprodol, cyclobenzaprine) increased 107 percent. The attention deficit hyperactivity disorder (ADHD) drug amphetamine-dextroamphetamine (e.g., Adderall<sup>®</sup>) saw a 392 percent increase between 2004 and 2010.

## **Drug-Related Suicide Attempts**

Substance abuse is strongly associated with suicide attempts. DAWN estimates that there were 212,736 medical emergencies resulting in ED visits for drug-related suicide attempts in 2010. Almost all (94.7%) of these ED visits involved a prescription drug or over-the-counter medication; about two thirds (62.6%) involved multiple drugs; about a quarter (25.3%) involved alcohol; and about a fifth (17.8%) involved illicit drugs.

Pharmaceuticals were much more common than illicit drugs in ED visits for drug-related suicide attempts. More than a third (37.1%) of these visits involved pain relievers, with narcotic pain relievers accounting for almost half that number (15.5%). Benzodiazepines were involved in more than a quarter (28.4%) of visits, with alprazolam accounting for about a third of that number (10.6%). Antidepressants were involved in 19.9 percent of ED visits for drug-related suicide attempts, with about half (10.5%) of these involving SSRI antidepressants such as sertraline (e.g., Zoloft®), fluoxetine (e.g., Prozac®), and citalopram (e.g., Celexa®).

The rate of drug-related suicide-attempt visits for females (80.8 visits per 100,000 population) was higher than that for males (56.3 visits per 100,000). With regard to age, rates ranged from 13.4 visits per 100,000 population for those aged 65 or older to 160.1 visits per 100,000 population for those aged 18 to 20.

Following the ED visit, 77.8 percent of patients who attempted suicide received some form of follow-up care. About half (49.9%) were admitted for inpatient hospital care, with 17.9 percent admitted to intensive or critical care units (ICUs) and 12.7 percent admitted to psychiatric units. A quarter (24.8%) of patients were transferred to another health care facility, and 3.0 percent were discharged with a referral to detox or substance abuse treatment services. The remaining patients (22.2%) were treated and released to home or had other dispositions.

The number of drug-related suicide attempts remained stable from 2004 to 2010. However, the involvement of narcotic pain relievers increased 95 percent during this time. Specifically, hydrocodone (e.g., Vicodin®) and oxycodone (e.g., OxyContin®) increased 83 percent and 147 percent, respectively. There was also a 53 percent rise observed between 2004 and 2010 for drugs used to treat anxiety and insomnia. Benzodiazepine involvement, in general, rose 63 percent, with substantial increases observed for alprazolam (e.g., Xanax), clonazepam (e.g., Klonopin®), lorazepam (e.g., Ativan®), and zolpidem (e.g., Ambien).

## Seeking Detox Services

The category of visits referred to as “seeking detox” includes nonemergency requests for admission for detoxification, visits to obtain medical clearance before entry to a detox program, and acute emergencies in which an individual who is experiencing withdrawal symptoms is seeking detox. DAWN estimates that there were 232,542 drug-related ED visits for patients seeking detox or substance abuse treatment services during 2010. Visits for more than two thirds (67.8%) of patients seeking detox involved multiple drugs, and 29.8 percent involved alcohol.

Males were more likely than females to seek detox services (99.2 and 51.9 visits per 100,000 population, respectively). Rates of visits for patients seeking detox peaked at 206.7 visits per 100,000 population for those aged 21 to 24.

More than half (58.1%) of ED patients seeking detox obtained some form of follow-up: 32.2 percent were admitted to the hospital, 17.3 percent were referred to detox/treatment services, and 8.6 percent were transferred to another facility. The remaining patients were treated and released to home (31.1%) or had other outcomes.

As to the types of drugs involved, cocaine was observed in 27.6 percent of visits by patients seeking detox, heroin in 26.7 percent, marijuana in 18.5 percent, and amphetamines/methamphetamine in 5.9 percent. Among pharmaceuticals, narcotic pain relievers were observed in 45.4 percent of visits, including oxycodone at 28.8 percent. Benzodiazepines were observed in 23.1 percent of visits, with alprazolam at 12.2 percent.

The overall number of ED visits by patients seeking detox has not grown significantly since 2004, though pharmaceutical involvement has become more common in recent years. There was a 22 percent increase between 2009 and 2010 in pharmaceutical involvement overall, a 35 percent increase in narcotic pain relievers, and a 47 percent increase in oxycodone.

## **Adverse Reactions to Pharmaceuticals**

Adverse reactions among ambulatory populations are a growing public health concern in the United States because people are being prescribed more drugs and the number of older persons who typically take more medications has increased. In 2010, DAWN estimates that 2,329,221 ED visits involved adverse reactions to prescription medicines, over-the-counter drugs, or other therapeutic substances used as prescribed or indicated. This represents just under half (47.4%) of all drug-related ED visits.

The drugs most commonly involved in adverse reactions, anti-infectives (e.g., antibiotics), were involved in 21.7 percent of visits. As a general category, pain relievers were involved in 16.3 percent of visits, with narcotic pain relievers accounting for 8.9 percent. Cardiovascular agents appeared in 10.4 percent of visits. Coagulation modifiers were involved in 7.9 percent, and metabolic agents, such as insulin and lipid-lowering drugs, were found in 7.6 percent of visits.

When population size and sampling error were taken into account, women had notably more visits than men (909.3 and 590.2 visits per 100,000 population, respectively) involving drug-related adverse reactions. For children aged 5 and under, the rate of ED visits for adverse reactions was 736.0 visits per 100,000 population. The rate dropped to a low of 231.8 visits for children aged 6 to 11 and then rose consistently to reach a high of 1,678.9 visits for patients aged 65 or older. About three quarters (75.6%) of patients were treated and released, a fifth (20.7%) were admitted to the hospital, and the remainder (3.7%) had other outcomes.

Overall, ED visits resulting from adverse reactions to pharmaceuticals increased 86 percent in the period from 2005 to 2010, rising from about 1.3 million visits to over 2.3 million. Noteworthy trends and heavily involved drugs include the following:

- anti-anxiety drugs and sleeping aids – 108 percent increase (e.g., zolpidem, alprazolam, clonazepam, lorazepam);
- antidepressants – 119 percent increase;
- anticonvulsants – 85 percent increase;
- antidiabetic drugs – 87 percent increase (e.g., insulin, biguanides, sulfonylureas);
- anti-infectives – 65 percent increase (e.g., amebicides, cephalosporins, lincomycin derivatives, macrolide derivatives, penicillins, quinolones, sulfonamides, tetracyclines);
- antineoplastics (chemotherapy drugs) – 157 percent increase;
- antipsychotics – 110 percent increase (e.g., quetiapines);
- cardiovascular agents – 108 percent (e.g., ACE inhibitors, beta blockers, calcium channel blockers, diuretics);
- hormone-based drugs – 148 percent increase (e.g., adrenal cortical steroids, sex hormones, thyroid hormones);
- immunological drugs (bacterial and viral vaccines) – 157 percent increase;
- nutritional products – 185 percent increase (e.g., minerals and electrolytes products, oral nutritional supplements, vitamins); and
- pain relievers – 70 percent increase (e.g., hydrocodone and oxycodone products).

## Accidental Ingestion of Drugs

Accidental ingestion of drugs by children is an eminently preventable health risk. Nonetheless, poison control centers find that over half of human exposure calls involve children aged 5 and under, and the majority of substances involved in pediatric exposures are drugs. The danger of accidental ingestion of drugs by children is even more apparent in the 2010 DAWN findings, where over two thirds (67.9%) of the 107,632 accidental ingestion ED visits involved children aged 5 and under. DAWN found the rate of ED visits for accidental ingestion by children aged 5 and under to be almost 25 times higher than for adults: 300.2 ED visits per 100,000 children aged 5 and under compared with 12.7 ED visits per 100,000 for adults aged 21 and older. Two-year-olds are at greatest risk, with a rate of 701.1 visits.

Pain relievers, cardiac medications, aspirin products, antidepressants, antidiabetic medications, camphor-containing salves (when ingested), eye drops, and nasal sprays are recognized as being particularly dangerous when accidentally ingested by children. For ED patients aged 5 and under, DAWN found that pain relief medication was the most common class of drugs involved in accidental ingestion, with 28.0 percent of visits. Cardiovascular agents were involved in 13.1 percent of visits, antidepressants in 6.4 percent of visits, and antidiabetic drugs in 2.5 percent. Other drugs DAWN found involved in pediatric poisonings included respiratory agents (e.g., antihistamines, bronchodilators, and a broad range of combination products used to treat upper respiratory conditions; 11.6%); acetaminophen products (10.5%); anxiolytics, sedatives, and hypnotics (drugs to treat insomnia and anxiety; 9.9%); antipsychotics (5.3%); and topical agents (5.3%).

The large majority (83.9%) of accidental ingestion ED patients aged 5 and under were treated and discharged home. About 15 percent received more extensive follow-up care: either admission to the hospital (10.4%), or transfer to another facility (4.2%). Medical emergencies related to accidental ingestions by patients aged 5 and under were stable from 2004 to 2010, though increases were observed for particular drug groups. Involvement of pain relievers in general saw a 70 percent increase since 2004, and involvement of antihistamines rose 162 percent.

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# 1. INTRODUCTION

This publication presents estimates of drug-related emergency department (ED) visits from the Drug Abuse Warning Network (DAWN) for 2010, with comparison of estimates for 2004, 2008, and 2009. DAWN is a public health surveillance system that monitors patients' medical records of ED visits for the Nation to identify those visits that are related to drug use, misuse, and abuse. The Center for Behavioral Health Statistics and Quality (CBHSQ) of the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS), has been responsible for DAWN operations since 1992.

This introduction provides a brief description of the major features of DAWN and the statistics presented in this report. Survey findings, as well as comparisons to earlier years' data, are organized in eight following sections, with each section focusing on a specific type of ED visit (as listed in Table 1). Additional details on DAWN terminology and methodology are provided as attachments to this document. Detailed tables of DAWN estimates, this document, its attachments, other reports using DAWN data, and other methodology reports are available at the DAWN Web site.<sup>1</sup> As they become available, DAWN data are accessible through SAMHSA's Data Archive (SAMHDA).<sup>2</sup>

**Table 1. DAWN analytic groups**

Analytic group	Description
All Visits	This group includes all visits that are reportable to DAWN without regard for the reason for the visit or the specific drugs involved. It includes visits involving all forms of drug misuse or abuse plus visits resulting from adverse reaction, accidental ingestion, suicide attempts, and visits seeking detoxification services. These estimates are useful for looking at overall levels of drug involvement in ED visits.
	<b>Drug-related ED visits that involve drug misuse or abuse</b>
All Misuse and Abuse	This analytic category includes ED visits that involve all forms of drug misuse or abuse, as defined by DAWN. This category is the combination of visits from the following four analytic groups: illicit drug visits, nonmedical use of pharmaceuticals, alcohol-related visits, and underage drinking. A visit may appear in more than one of those subgroups, but it will appear only once in this overall group. Suicide-attempt visits and seeking detox visits will be included in this category if illicit drugs were involved.

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<sup>1</sup> DAWN documents can be found on the DAWN Web site at <http://www.samhsa.gov/data/DAWN.aspx>.

<sup>2</sup> DAWN data can be found on the SAMHDA Web site at <http://www.icpsr.umich.edu/icpsrweb/SAMHDA/studies/31264?q=DAWN>.

**Table 1. DAWN analytic groups (continued)**

Analytic group	Description
Illicits (excluding alcohol)	This analytic category includes ED visits that involve the use of drugs that have limited or no therapeutic value and are generally illegal if taken without a prescription. These substances include cocaine, heroin, marijuana, synthetic cannabinoids, amphetamines, methamphetamine, MDMA (Ecstasy), GHB (4-hydroxybutanoic acid), flunitrazepam (Rohypnol), ketamine, LSD, PCP, and hallucinogens. Visits involving the inhalation of substances for their psychoactive properties (e.g., sniffing model airplane glue) are included.
Nonmedical Use of Pharmaceuticals	This analytic category includes ED visits that involve nonmedical use of pharmaceuticals: patients who took a higher than prescribed or recommended dose of their own medication, patients who took a pharmaceutical prescribed for another person, malicious poisoning of the patient by another individual, and documented substance abuse involving pharmaceuticals.
All Alcohol	This analytic category includes ED visits involving alcohol. For adults aged 21 and older, the alcohol was found in combination with other drugs. For patients under the age of 21, the visit may involve alcohol alone or in combination with other drugs.
Underage Drinking	This analytic category includes ED visits that involve alcohol use (alone or with other drugs) for patients under the age of 21. Underage drinking is an important barometer of adolescent drinking patterns and a predictor of more serious substance abuse problems in young adults.
Suicide Attempts	This analytic category includes ED visits that involve drug-related suicide attempts. It includes visits for drug overdoses and for suicide attempts by other means (e.g., using a firearm) if drugs were involved or related to the suicide attempt. Inclusion in this analytic category has no restrictions on the type of drug used.
Seeking Detox	This analytic category includes nonemergency requests made through the ED for admission to detoxification unit, visits to obtain medical clearance before being incarcerated, and acute emergencies where an individual is experiencing withdrawal symptoms and requests detox. These estimates do not include patients who seek or enter the hospital's detox unit through other avenues.
<b>Drug-related ED visits that do NOT involve drug misuse or abuse</b>	
Adverse Reactions	This analytic category includes ED visits in which an adverse health consequence (e.g., side effects or an allergic reaction) resulted when taking prescription drugs, over-the-counter medications, or dietary supplements as prescribed or recommended.
Accidental Ingestions	This analytic category includes ED visits in which an individual accidentally or unknowingly used or was administered a prescription drug, over-the-counter medication, or dietary supplement. Drug-related accidental ingestions typically involve patients aged 5 and under.

## 1.1 Major Features of DAWN

### 1.1.1 What Is a DAWN Case?

A DAWN case is any ED visit involving recent drug use that is implicated in the ED visit. The reason a patient used a drug is not part of the criteria for considering a visit to be drug related. Therefore, DAWN includes ED visits resulting from accidental ingestions and adverse reactions as well as explicit drug abuse.

### 1.1.2 What Drugs Are Included in DAWN?

DAWN captures drugs that are explicitly named in the medical record as being involved in the ED visit. The relationship between the ED visit and the drug use need not be causal. That is, an implicated drug may or may not have directly caused the condition generating the ED visit; the ED staff simply named it as being involved. Conversely, DAWN does not report medications or pharmaceuticals that the ED medical records mention as having been taken by the patient but that are unrelated to the ED visit.

Within those guidelines, DAWN collects data on all types of drugs, including the following:

- illegal drugs, e.g., heroin, cocaine, marijuana (including synthetic cannabinoids), MDMA (Ecstasy), PCP, club drugs, ketamine;
- substances that have psychoactive effects when inhaled;
- narcotic pain relievers, e.g., OxyContin, Vicodin;
- prescription drugs for anxiety, depression, sleeplessness, and other behavior disorders, e.g., Xanax, Ritalin<sup>®</sup>, Prozac;
- prescription drugs used in the treatment of other medical conditions, e.g., antibiotics, anti-coagulants, insulin, chemotherapy drugs;
- anesthetic gases;
- over-the-counter medications, e.g., acetaminophen, ibuprofen, multi-ingredient cough and cold remedies;
- dietary supplements, e.g., vitamins, herbal remedies, nutritional products;
- alcohol when used in combination with other drugs; and
- alcohol alone, in patients aged 20 or younger.

### 1.1.3 What Is Covered in This Publication?

This report provides detailed information on ED visits involving drug use, misuse, or abuse for the years 2004 through 2010. The types of ED visits (referred to as analytic groups) highlighted in this publication are listed in Table 1. The analytic groups are defined by the reason for the visit and the types of drugs involved. Because a visit may involve multiple types of drugs (e.g., an illicit drug, such as marijuana, and a pharmaceutical, such as hydrocodone), a single visit may appear in multiple analytic groups.

## 1.2 Hospital Participation in 2010

DAWN relies on a nationally representative sample of hospitals with oversampling of hospitals in selected metropolitan areas. The universe of hospitals eligible for DAWN includes non-Federal, short-stay, general medical and surgical facilities in the United States that operate 24-hour EDs. DAWN excludes specialty hospitals (e.g., pediatric hospitals), long-term care facilities, and Federal facilities (e.g., Veterans Health Administration hospitals). The American Hospital Association Annual Survey Database (ASDB) was used to identify the original frame members. Subsequent ASDB surveys are used annually to identify “births” of new hospitals that open and “deaths” of hospitals that close or merge with other hospitals.

For 2010, 7.2 million charts out of a universe of 11.6 million charts were reviewed to determine if a visit was drug related. Data on 304,110 drug-related ED visits submitted by 237 hospitals were used for estimation. The overall visit weighted response rate was 34.2 percent.

## 1.3 Estimates of ED Visits

This publication reports nationally representative estimates of drug-related ED visits for the United States. Estimates are calculated by applying weights and adjustments to the data provided by the sampled hospitals participating in DAWN. The primary sampling weights reflect the probability of hospital selection, and separate adjustment factors are included to account for sampling of ED visits, nonresponse, data quality, and the known total of ED visits delivered by the universe of eligible hospitals, as reported by the most current ASDB survey.

Many of the tables in this report provide estimates of visits, by drug. DAWN is able to identify more than 3,300 individual drugs (which map to more than 19,000 individual brands and street names).<sup>3</sup> The more commonly involved drugs and drug categories were selected for inclusion in the drug detail tables appearing in this report. Because (a) a single ED visit may involve multiple drugs, or (b) the same drug may be reported both under its specific drug name and under its drug category, the sum of ED visits from different rows in the drug detail tables will be greater than the total number of visits. For the same reason, percentages will add to more than 100.

## 1.4 Rates of ED Visits per 100,000 Population

Standardized measures are helpful when comparing levels of drug-related ED visits for different age and sex groups. This publication reports rates of ED visits per 100,000 population by age groups and sex groups per year, e.g., visits in 2010 per 100,000 population aged 12 to 17; visits in 2004 per 100,000 male population. Population estimates are based on counts provided by the U.S.

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<sup>3</sup> The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN’s unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

Census Bureau.<sup>4</sup> Population-based rates for race/ethnicity categories are not reported because race/ethnicity information is often missing from ED records; a dash (—) is displayed instead.

## 1.5 Sampling Error

Because DAWN relies on a sample of hospitals, each estimate produced from the DAWN ED data is subject to sampling variability, the variation in estimates that would be observed naturally if different samples were drawn from the same population using the same procedures. One measure of sampling variability of an estimate used in this publication is the relative standard error (RSE). The precision of an estimate is inversely related to its RSE. That is, the greater the RSE, the lower the precision. A second measure of sampling error used in this publication is the 95 percent confidence interval (CI). A 95 percent CI means that if repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the true population value would fall within the CI 95 percent of the time. A CI, which is expressed as a range of values, is useful because the interval reflects both the estimate and its particular margin of error. For example, in 2010, there were 2,301,050 ED visits associated with drug misuse or abuse with a CI of 1,987,721 to 2,614,380. The CI indicates with a high degree of confidence that the actual number was within this range.

## 1.6 Suppression

An asterisk (\*) is displayed in the place of suppressed estimates and rates. Data may be suppressed to protect patient confidentiality or to ensure that published findings meet statistical standards of reliability for survey results. In all DAWN published materials, estimates are suppressed according to the following rules:

- *The RSE of the estimate is greater than 50 percent.* The RSE is a measure of the relative precision and is calculated by dividing the estimate's standard error by the estimate itself. When the RSE is greater than 50 percent, the lower bound of the 95 percent CI approaches or includes the value zero. A CI that includes zero means that the estimate is not statistically different from zero at this precision level.
- *The estimate is based on fewer than 30 ED visits.* Estimates based on a small number of cases are typically suppressed because the RSE is greater than 50 percent. Estimates that do meet RSE criteria for publication but are based on fewer than 30 ED visits (weighted or unweighted) are deemed too unreliable for publication. Such estimates are also suppressed to protect patient privacy.

Ratios (percentages or rates per 100,000 population) based on suppressed estimates are likewise suppressed.

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<sup>4</sup> For 2010, population counts were drawn from the 2010 United States Resident Population Census files (available from the U.S. Census Bureau at [http://www2.census.gov/census\\_2010/03-Demographic\\_Profile/](http://www2.census.gov/census_2010/03-Demographic_Profile/)).

## 1.7 Comparisons Across Years

In this publication, between-year changes are assessed by comparing estimates for 2010 with those for 2004, 2008, and 2009.<sup>5</sup> This publication reports only those between-year changes that are statistically significant at the  $p < 0.05$  level. The  $p$ -value is a measure of the probability ( $p$ ) that the difference between two estimates could have occurred by chance, if the estimates being compared were really the same. The larger the  $p$ -value, the more likely the difference could have occurred by chance. For example, if the difference between two DAWN estimates has a  $p$ -value of 0.01, it means that there is a 1 percent probability that the difference observed could be due to chance alone.

The redesign of DAWN in 2003 altered most of DAWN's core features. Changes were made to the design of the hospital sample, the protocol for selecting charts to review, the eligibility criteria for being a DAWN case, and the data items submitted on these cases. These changes created a permanent disruption in trends. As a result, comparisons cannot be made between old DAWN (2003 and prior years) and the redesigned DAWN (2004 and forward).

## 1.8 Limitations of the Data

Readers are advised to consider the following limitations to the DAWN data when interpreting results:

- DAWN data collectors attempt to identify, with a high degree of specificity, the exact drugs involved in an ED visit, but extant medical records vary in specificity and detail. If extant medical records include only a general description of a drug (e.g., "benzodiazepines"), the drug is grouped in a general category (e.g., "benzodiazepines not otherwise specified").
- DAWN relies on the assessment made by ED medical staff to determine which drugs are related to the visit and records only those drugs indicated as being related.
- DAWN does not assess the medical reasons for the visit, and it cannot be assumed that a drug was the direct cause of the medical emergency. For example, a soporific may have caused the patient to fall asleep while driving and then to have an accident.
- Use of illicit drugs is assumed to constitute drug abuse. The determination of nonmedical use of pharmaceuticals, though, must be supported by information provided by medical personnel in the ED records.
- In cases where multiple pharmaceuticals are involved, it is not necessary that both drugs are misused. The medical emergency might stem from the interaction between two pharmaceuticals, one of which was used nonmedically, and the other of which was taken as prescribed.
- While DAWN seeks to report only the drugs that are related to the ED visit, some unrelated drugs may be included if ED records fail to indicate that they were obtained through a legitimate prescription, were taken as prescribed or indicated, and were unrelated to the

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<sup>5</sup> Due to data limitations in 2004, long-term comparisons for ED visits resulting from adverse reactions are made between 2005 and the current year.

ED visit. For example, anecdotal evidence suggests that ED records may mention methadone but fail to indicate that the patient was enrolled in a methadone treatment program and that the methadone was unrelated to the medical emergency leading to the ED visit.

- Information on race and ethnicity is often poorly documented in extant ED records. In addition, some hospitals consider race/ethnicity to be private information and will not make it available to DAWN Field Reporters. Overall, about 15 percent of visits each year do not contain race/ethnicity information. DAWN does not produce rates (visits per 100,000 population) for race/ethnicity groups because these missing data will result in the understatement of visits by race/ethnicity category. This might affect racial/ethnic groups differentially and produce misleading findings.
- Although DAWN documents whether a drug was positively confirmed by toxicology testing, DAWN does not require that drugs reported for the ED visit be confirmed by laboratory testing. Toxicology tests are not used consistently across EDs, and some toxicology tests are not specific enough to identify particular drugs. Furthermore, a positive toxicology test is not necessarily evidence of recent drug involvement in an ED visit if it is a current medication or a drug that persists in the system long after it was used. For this reason, DAWN requires that the involvement of drugs be mentioned in the ED record, not just in the toxicology testing results, for the visit to be considered a DAWN case.
- Information on drug-related visits is based on a sample and is therefore subject to sampling variability. Standard error measurements are provided in many tables to reflect the sampling variability that occurs (a) by chance because only a sample rather than the entire universe is surveyed, and (b) due to nonresponse.
- As in any survey, a low response rate is of concern because it creates larger-than-expected sampling errors plus the opportunity for unpredictable biases. DAWN addresses these issues for the short term by always reporting standard errors based on the actual sample of respondents and for the long term by continuing its efforts to raise the hospital participation rate.



## 2. OVERALL DRUG MISUSE OR ABUSE

### 2.1 ED Visits Involving Overall Drug Misuse or Abuse, 2010

For 2010, DAWN estimates that there were over 4.9 million drug-related ED visits. Of these, over 2.3 million ED visits were associated with drug misuse or abuse (Table 2). That is the equivalent of 743.7 ED visits for each 100,000 persons in the Nation; for those aged 20 or younger, the rate is 476.1 visits; for those aged 21 or older, the rate is 849.4 visits.

**Table 2. ED visits involving drug misuse or abuse, by drug combinations, 2010**

Drug combinations (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, drug misuse or abuse (2)</b>	<b>2,301,050</b>	<b>100.0</b>	<b>6.9</b>	<b>1,987,721</b>	<b>2,614,380</b>
Illicit drug(s) only	583,018	25.3	11.9	447,473	718,564
Alcohol only (age < 21) (3)	122,778	5.3	10.1	98,370	147,187
Pharmaceutical(s) only	780,175	33.9	6.7	677,264	883,086
Combinations	—	—	—	—	—
Illicit drug(s) with alcohol (4)	249,608	10.8	11.4	193,826	305,390
Illicit drug(s) with pharmaceutical(s)	250,283	10.9	20.4	150,042	350,524
Alcohol with pharmaceutical(s)	227,073	9.9	7.7	192,669	261,476
Illicit drug(s) with alcohol and pharmaceutical(s)	88,115	3.8	10.7	69,698	106,532

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED patients aged 21 or older for whom alcohol was the only drug associated with their ED visits are not considered DAWN cases.

(4) When present with other drugs, alcohol is reportable for patients of all ages.

**NOTE:** CI = confidence interval. RSE = relative standard error. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Of the ED visits in 2010 that involved drug misuse or abuse, nearly two thirds (64.6%) were associated with a single drug type (illicit drugs, alcohol, or pharmaceuticals). Illicit drugs alone were involved in 25.3 percent of drug misuse or abuse visits, pharmaceuticals alone were involved in 33.9 percent, and alcohol with no other drug (aged 20 or younger only) was involved in 5.3 percent. The remaining visits (35.4%) involved some combination of illicit drugs, alcohol, and pharmaceuticals.

Understanding that a visit may appear in more than one group, DAWN found, that out of all drug misuse or abuse ED visits,

- 1,173,654 ED visits, or 51.0 percent of drug misuse or abuse ED visits, involved nonmedical use of pharmaceuticals;
- 1,171,024 ED visits, or 50.9 percent, involved illicit drugs; and
- 687,574 ED visits, or 29.9 percent, involved alcohol.

## **2.2 Trends in ED Visits Involving Drug Misuse or Abuse, 2004–2010**

This section presents the trends in the estimates of ED visits involving drug misuse or abuse for the period from 2004 through 2010 (Table 3). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

Between 2004 and 2010, the overall number of ED visits attributable to drug misuse or abuse has not increased significantly, though there was a 15 percent increase over the past two years (2008–2010). ED visits related to the use of pharmaceuticals with no other drug involvement rose substantially (132%), as did the use of pharmaceuticals with illicit drugs (139%), pharmaceuticals with alcohol (63%), and pharmaceuticals combined with both illicit drugs and alcohol (94%). The increases reflect over 440,000 more ED visits related to pharmaceuticals alone in 2010 compared with 2004, over 145,000 more ED visits related to pharmaceuticals and illicit drugs, almost 90,000 more ED visits related to pharmaceuticals and alcohol, and over 40,000 more visits related to all three types of substances.

**Table 3. Trends in ED visits involving drug misuse or abuse, by drug combinations, 2004–2010**

Drug combinations (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, overall drug misuse or abuse (3)</b>	<b>1,619,056</b>	<b>1,616,400</b>	<b>1,742,942</b>	<b>1,883,280</b>	<b>1,999,877</b>	<b>2,070,451</b>	<b>2,301,050</b>	—	15	11
Illicit drug(s) only	502,864	518,218	537,271	522,964	510,907	476,495	583,018	—	—	22
Alcohol only (age < 21) (4)	150,988	110,599	126,705	137,375	132,859	138,614	122,778	—	—	—
Pharmaceutical(s) only	336,753	443,980	485,914	581,887	663,614	729,611	780,175	132	18	—
Combinations	—	—	—	—	—	—	—	—	—	—
Illicit drug(s) with alcohol (5)	338,732	222,268	219,830	238,046	229,704	211,710	249,608	—	—	—
Illicit drug(s) with pharmaceutical(s)	104,525	127,004	142,232	143,765	168,445	206,082	250,283	139	49	21
Alcohol with pharmaceutical(s) (5)	139,675	139,807	171,459	189,387	208,896	227,842	227,073	63	—	—
Illicit drug(s) with alcohol and pharmaceutical(s) (5)	45,519	54,523	59,531	69,855	85,453	80,098	88,115	94	—	—

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(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED patients aged 21 or older for whom alcohol was the only drug associated with their ED visits are not considered DAWN cases.

(5) When present with other drugs, alcohol is reportable for patients of all ages.

**NOTE:** A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.



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## 3. ILLICIT DRUGS

### 3.1 ED Visits Involving Illicit Drugs, 2010

For analysis, DAWN groups together ED visits that involve illicit drugs. These substances include cocaine, heroin, marijuana, synthetic cannabinoids, amphetamines/methamphetamine, MDMA (Ecstasy), GHB (4-hydroxybutanoic acid), flunitrazepam (Rohypnol), ketamine, LSD, PCP, and hallucinogens. Visits involving the inhalation of nonmedical substances for their psychoactive properties (e.g., sniffing model airplane glue) are also included.<sup>6</sup>

Of the approximately 2.3 million drug misuse or abuse ED visits that occurred during 2010, a total of 1,171,024, or just over half, involved illicit drugs (Table 4). A majority (58.8%) of illicit drug ED visits involved multiple drugs. Overall, 28.8 percent of visits involving illicit drugs also involved alcohol.

Cocaine and marijuana were the most commonly involved drugs, with 488,101 ED visits (41.7%) and 461,028 ED visits (39.4%), respectively. Cocaine and marijuana were followed by heroin, at 224,706 ED visits, or 19.2 percent, and then by amphetamines/methamphetamine, at 137,947 visits, or 11.8 percent.<sup>7</sup>

Other illicit drugs involved in ED visits occurred at levels under 5 percent and included the following:

- PCP, in 53,542 visits;
- MDMA (Ecstasy), in 21,836 visits;
- synthetic cannabinoids, in 11,406 visits;
- inhalants, in 11,401 visits;
- hallucinogens (not elsewhere classified), in 6,107 visits;
- LSD, in 3,817 visits;
- GHB, in 1,787 visits;
- ketamine, in 915 visits; and
- flunitrazepam (Rohypnol), in 657 visits.

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<sup>6</sup> Drugs that DAWN considers to be illicit yet have legitimate medicinal uses include amphetamines; ketamine; and anesthetic gases, such as nitrous oxide (“laughing gas”). DAWN Field Reporters are careful to distinguish abuse from adverse reactions when classifying visits involving these drugs.

<sup>7</sup> Heroin-related ED visits may be slightly underestimated. When drugs related to an ED visit are determined through toxicology tests, heroin metabolites are indistinguishable from other opiates. If there is no evidence in the written record that heroin, specifically, was involved, the visit will be grouped with pharmaceuticals labeled “unspecified opiate” and not classified as heroin, an illicit drug. The number of drug misuse or abuse ED visits involving unspecified opiates is estimated at 135,965 visits, and about 60 percent of these (78,660 visits) were determined through toxicology testing. What portion of these toxicology results is attributable to heroin is unknown.

**Table 4. ED visits involving illicit drugs, 2010**

Drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, illicit drugs (2,3)</b>	<b>1,171,024</b>	<b>100.0</b>	<b>10.3</b>	<b>935,542</b>	<b>1,406,507</b>
Single drug	482,935	41.2	12.0	369,505	596,364
Multiple drugs	688,090	58.8	11.0	539,572	836,608
Alcohol present	337,723	28.8	10.4	268,559	406,887
Cocaine	488,101	41.7	15.3	341,721	634,481
Heroin	224,706	19.2	11.1	175,848	273,564
Cannabinoids	470,845	40.2	9.1	386,408	555,282
Marijuana	461,028	39.4	9.3	376,672	545,384
Synthetic cannabinoids	11,406	1.0	23.9	6,066	16,746
Amphetamines/methamphetamine	137,947	11.8	16.9	92,168	183,727
Amphetamines	51,703	4.4	17.2	34,312	69,095
Methamphetamine	94,929	8.1	20.2	57,415	132,443
MDMA (Ecstasy)	21,836	1.9	14.8	15,517	28,155
GHB	1,787	0.2	20.1	1,084	2,489
Flunitrazepam (Rohypnol)	657	0.1	40.8	131	1,182
Ketamine	915	0.1	30.9	361	1,470
LSD	3,817	0.3	22.3	2,148	5,487
PCP	53,542	4.6	38.9	12,733	94,351
Misc. hallucinogens	6,107	0.5	21.3	3,555	8,660
Inhalants	11,401	1.0	17.0	7,606	15,196
Combinations not tabulated above	6,041	0.5	24.9	3,091	8,991

- (1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.
- (2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.
- (3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Synthetic cannabinoids, also known as “Spice” or “K2,” appeared for the first time at reportable levels in DAWN in 2010; they were involved in 11,406 ED visits (1.0%). While there appears to be a number of different chemical compositions, synthetic cannabinoids are functionally similar

to  $\Delta^9$ -tetrahydrocannabinol (THC), the active ingredient in cannabis.<sup>8</sup> Users report effects similar to those produced by marijuana, and regular users may experience withdrawal and addiction symptoms.<sup>9</sup> According to the Monitoring the Future survey, almost one in nine, or 11.4 percent, of high school seniors reported using synthetic cannabinoids in 2011.<sup>10,11</sup>

In 2010, there were 378.5 ED visits that involved illicit drugs for each 100,000 persons in the U.S. population (Table 5). The highest rates were found for cocaine involvement (157.8 ED visits per 100,000 population) and marijuana (149.0 visits) (Figure 2). These were followed by heroin (72.6 visits per 100,000 population), amphetamines/methamphetamine (44.6 visits), PCP (17.3 visits), MDMA (Ecstasy) (7.1 visits), inhalants (3.7 visits), and synthetic cannabinoids (3.7 visits). Lower-incidence drugs had rates below 2.0 visits per 100,000 population.

Table 6 presents estimates of the number of ED visits in 2010 involving illicit drugs, by sex, age, and race/ethnicity categories. To facilitate comparisons between demographic groups (e.g., compare males to females), Table 7 and Figure 3 present the rates of ED visits per 100,000 population. For most illicit drugs, the rates were higher for males than for females. The commonly found drugs varied by age: 18- to 20-year-olds had the highest rate of medical emergencies involving marijuana (516.2 visits per 100,000 population aged 18 to 20), 25- to 29-year-olds had the highest rates for heroin (186.9 visits per 100,000 population aged 25 to 29) and amphetamines/methamphetamine (124.3 visits), and 35- to 44-year-olds had the highest rates for cocaine (327.6 visits per 100,000 population aged 35 to 44).

Considering race/ethnicity, 50.1 percent of patients were White, 30.4 percent were Black, 11.6 percent were Hispanic, 1.1 percent were of other or multiple race/ethnic groups, and 6.8 percent were of unknown race/ethnicity. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

Overall, 40.9 percent of visits involving illicit drugs resulted in some form of follow-up, including admission to the hospital (23.9%), transfer to another health care facility (10.8%), or referral to a drug detox/dependency program (6.3%) (Table 8). Most other patients (48.1%) were treated and released to home, with the remainder (11.0%) experiencing other outcomes.

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<sup>8</sup> European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2009). *Understanding the 'Spice' phenomenon* (EMCDDA Thematic Paper). Luxembourg: Office for Official Publications of the European Communities. Retrieved May 5, 2012, from <http://www.emcdda.europa.eu/publications/thematic-papers/spice>.

<sup>9</sup> National Institute on Drug Abuse (NIDA). (2012, May). *DrugFacts: Spice (Synthetic marijuana)*. Retrieved May 5, 2012, from <http://www.drugabuse.gov/publications/drugfacts/spice-synthetic-marijuana>.

<sup>10</sup> Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2011, December 14). Marijuana use continues to rise among U.S. teens, while alcohol use hits historic lows [Press release]. Ann Arbor, MI: University of Michigan News Service. Retrieved May 5, 2012, from <http://www.monitoringthefuture.org>.

<sup>11</sup> See *Glossary of DAWN Terms, 2010 Update*, for additional information on synthetic cannabinoids and their reporting by DAWN.

**Table 5. Rates of ED visits per 100,000 population involving illicit drugs, 2010**

Drugs (1)	Rate of ED visits per 100,000 population (2)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, illicit drugs (3)</b>	<b>378.5</b>	<b>10.3</b>	<b>302.4</b>	<b>454.6</b>
Cocaine	157.8	15.3	110.4	205.1
Heroin	72.6	11.1	56.8	88.4
Cannabinoids	152.2	9.1	124.9	179.5
Marijuana	149.0	9.3	121.7	176.3
Synthetic cannabinoids	3.7	23.9	2.0	5.4
Amphetamines/methamphetamine	44.6	16.9	29.8	59.4
Amphetamines	16.7	17.2	11.1	22.3
Methamphetamine	30.7	20.2	18.6	42.8
MDMA (Ecstasy)	7.1	14.8	5.0	9.1
GHB	0.6	20.1	0.4	0.8
Flunitrazepam (Rohypnol)	0.2	40.8	0.0	0.4
Ketamine	0.3	30.9	0.1	0.5
LSD	1.2	22.3	0.7	1.8
PCP	17.3	38.9	4.1	30.5
Misc. hallucinogens	2.0	21.3	1.1	2.8
Inhalants	3.7	17.0	2.5	4.9
Combinations not tabulated above	2.0	24.9	1.0	2.9

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

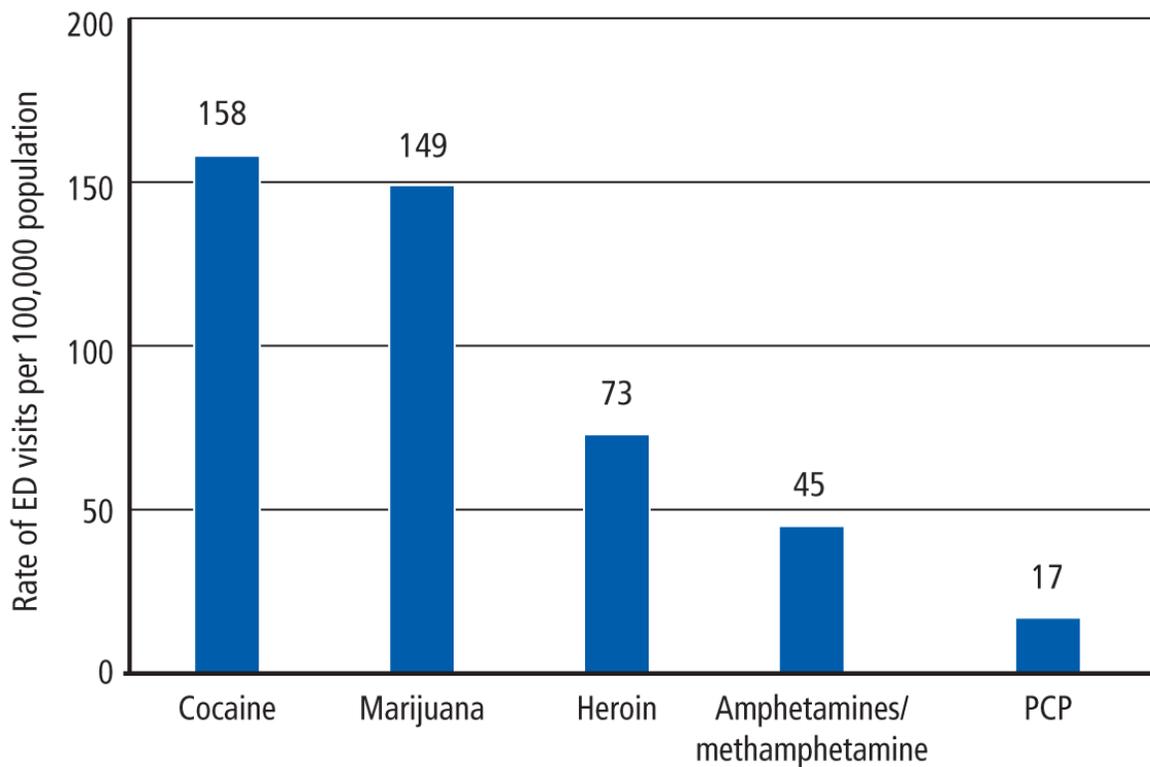
(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 2. Rates of ED visits per 100,000 population involving illicit drugs, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 6. ED visits involving illicit drugs, by patient demographics, 2010**

Patient demographics	All illicit	Cocaine	Heroin	Marijuana	Amphetamines/ methamphet- amine	MDMA (Ecstasy)	GHB	LSD	PCP
<b>Total ED visits, illicit drugs (1,2,3)</b>	<b>1,171,024</b>	<b>488,101</b>	<b>224,706</b>	<b>461,028</b>	<b>137,947</b>	<b>21,836</b>	<b>1,787</b>	<b>3,817</b>	<b>53,542</b>
<b>Sex</b>	—	—	—	—	—	—	—	—	—
Male	766,196	313,303	148,693	304,149	77,674	13,250	1,007	2,702	38,111
Female	404,135	174,609	75,760	156,774	60,138	8,586	779	1,115	15,431
Unknown	694	*	*	*	*	*	*	*	*
<b>Age</b>	—	—	—	—	—	—	—	—	—
0–5 years	679	*	*	*	*	*	*	*	*
6–11 years	831	*	*	*	*	*	*	*	*
12–17 years	73,308	5,151	3,119	56,361	5,014	6,356	*	1,027	989
18–20 years	104,725	15,497	15,421	69,778	10,867	4,949	*	*	*
21–24 years	134,949	33,307	28,660	70,828	17,795	4,495	389	296	8,221
25–29 years	163,634	53,596	39,483	68,506	26,257	2,649	369	308	10,184
30–34 years	150,783	60,158	30,610	56,313	23,834	1,164	281	121	10,581
35–44 years	247,634	134,131	51,683	70,834	31,001	2,043	184	*	11,075
45–54 years	221,354	139,856	39,739	52,954	18,224	149	101	*	5,530
55–64 years	67,081	42,689	14,577	14,019	4,230	*	*	*	983
65 years and older	5,714	3,226	1,367	1,186	227	*	*	*	*
Unknown	332	*	*	*	*	*	*	*	*
<b>Race/ethnicity</b>	—	—	—	—	—	—	—	—	—
White	586,237	192,415	133,811	257,127	87,615	9,763	1,200	2,819	14,546
Black	356,291	218,941	38,761	124,333	9,425	4,265	*	*	32,459
Hispanic	136,013	46,115	30,473	47,545	25,138	5,537	*	*	2,828
Other/2+ race/ethnicities	13,242	3,441	1,876	5,531	3,637	*	*	*	*
Unknown	79,242	27,189	19,785	26,492	12,132	1,648	341	265	3,396

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 7. Rates of ED visits per 100,000 population involving illicit drugs, by patient demographics, 2010**

Patient demographics	All illicit	Cocaine	Heroin	Marijuana	Amphetamines/ methamphet- amine	MDMA (Ecstasy)	GHB	LSD	PCP
<b>Rates of ED visits, illicit drugs (1,2,3)</b>	<b>378.5</b>	<b>157.8</b>	<b>72.6</b>	<b>149.0</b>	<b>44.6</b>	<b>7.1</b>	<b>0.6</b>	<b>1.2</b>	<b>17.3</b>
<b>Sex</b>	—	—	—	—	—	—	—	—	—
Male	503.7	206.0	97.7	199.9	51.1	8.7	0.7	1.8	25.1
Female	257.0	111.0	48.2	99.7	38.2	5.5	0.5	0.7	9.8
<b>Age</b>	—	—	—	—	—	—	—	—	—
0–5 years	2.8	*	*	*	*	*	*	*	*
6–11 years	3.4	*	*	*	*	*	*	*	*
12–17 years	289.4	20.3	12.3	222.5	19.8	25.1	*	4.1	3.9
18–20 years	774.7	114.6	114.1	516.2	80.4	36.6	*	*	*
21–24 years	785.4	193.9	166.8	412.2	103.6	26.2	2.3	1.7	47.8
25–29 years	774.5	253.7	186.9	324.2	124.3	12.5	1.7	1.5	48.2
30–34 years	750.8	299.6	152.4	280.4	118.7	5.8	1.4	0.6	52.7
35–44 years	604.8	327.6	126.2	173.0	75.7	5.0	0.4	*	27.1
45–54 years	491.5	310.5	88.2	117.6	40.5	0.3	0.2	*	12.3
55–64 years	182.3	116.0	39.6	38.1	11.5	*	*	*	2.7
65 years and older	14.1	8.0	3.4	2.9	0.6	*	*	*	*

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

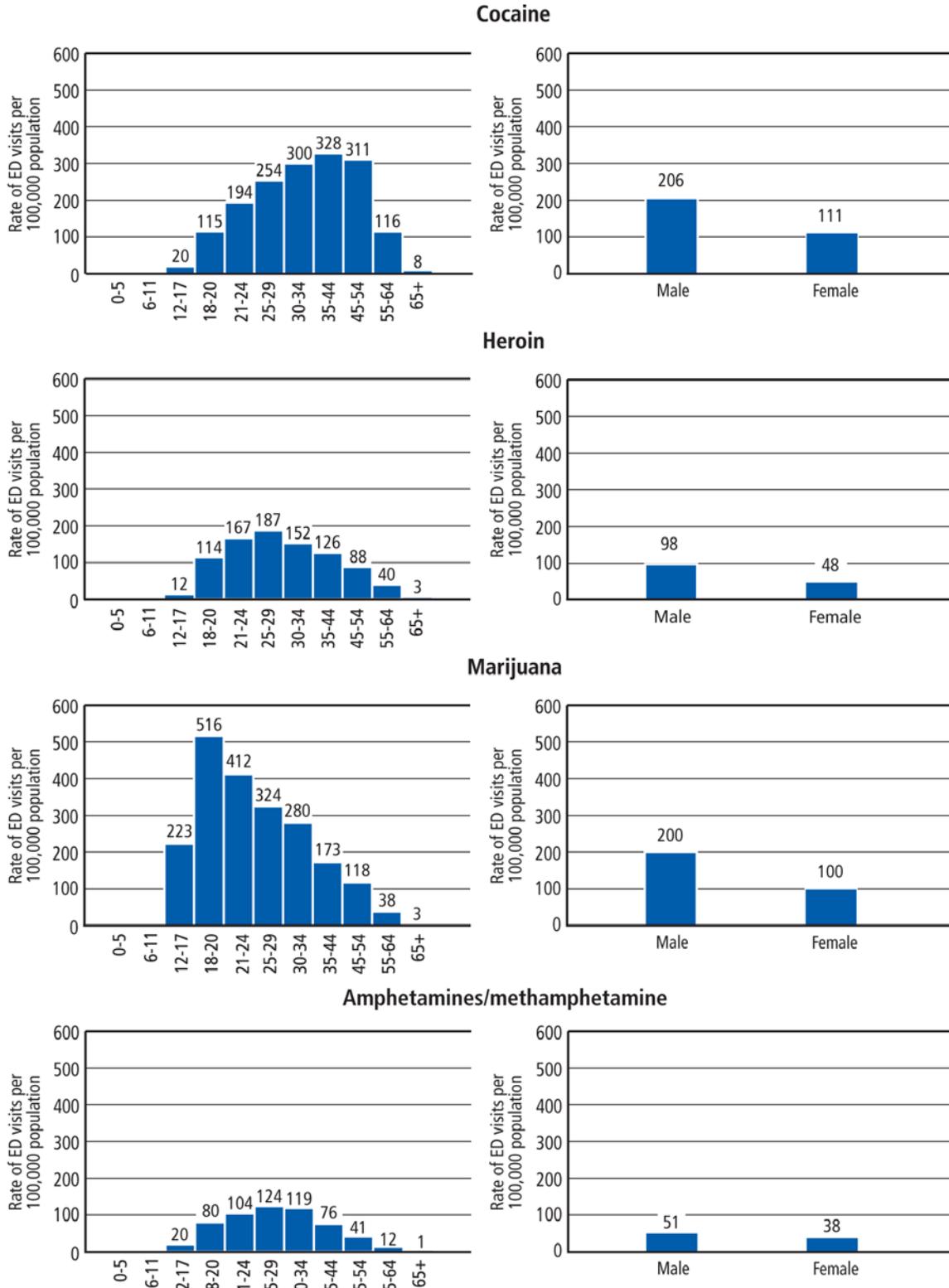
(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 3. Rates of ED visits per 100,000 population involving illicit drugs, by selected drugs, age, and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 8. ED visits and rates involving illicit drugs, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, illicit drugs (2)</b>	<b>1,171,024</b>	<b>100.0</b>	<b>378.5</b>
<b>Treated and released</b>	<b>685,104</b>	<b>58.5</b>	<b>221.4</b>
Discharged home	563,051	48.1	182.0
Released to police/jail	48,849	4.2	15.8
Referred to detox/treatment	73,204	6.3	23.7
<b>Admitted to this hospital</b>	<b>280,056</b>	<b>23.9</b>	<b>90.5</b>
ICU/critical care	31,953	2.7	10.3
Surgery	2,222	0.2	0.7
Chemical dependency/detox	26,672	2.3	8.6
Psychiatric unit	77,873	6.6	25.2
Other inpatient unit	141,336	12.1	45.7
<b>Other disposition</b>	<b>205,864</b>	<b>17.6</b>	<b>66.5</b>
Transferred	126,059	10.8	40.7
Left against medical advice	22,527	1.9	7.3
Died	1,907	0.2	0.6
Other	*	*	*
Not documented	*	*	*

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

### 3.2 Trends in ED Visits Involving Illicit Drugs, 2004–2010

This section presents the trends in the estimates of ED visits involving illicit drugs for the period from 2004 through 2010 (Table 9). Differences between years are presented in terms of the percentage increase or decrease in visits in 2009 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

**Table 9. Trends in ED visits involving illicit drugs, by selected drugs, 2004–2010**

Drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, illicit drugs (3,4)</b>	<b>991,640</b>	<b>922,013</b>	<b>958,864</b>	<b>974,631</b>	<b>994,508</b>	<b>974,384</b>	<b>1,171,024</b>	—	18	20
Cocaine	475,425	483,865	548,608	553,530	482,188	422,901	488,101	—	—	—
Heroin	214,432	187,493	189,787	188,162	200,666	213,118	224,706	—	—	—
Cannabinoids	281,619	279,668	290,565	308,547	374,438	376,488	470,845	67	26	25
Marijuana	281,619	279,668	290,565	308,547	374,438	376,486	461,028	64	—	22
Synthetic cannabinoids	*	*	*	*	*	*	11,406	—	—	—
Amphetamines/ methamphetamine	162,435	137,806	107,586	85,043	91,945	93,564	137,947	—	50	47
Amphetamines	34,085	35,083	32,251	21,545	31,534	37,431	51,703	—	64	38
Methamphetamine	132,576	109,655	79,924	67,954	66,308	64,117	94,929	—	43	48
MDMA (Ecstasy)	10,227	11,287	16,784	12,751	17,886	22,846	21,836	114	—	—
GHB	1,789	1,036	1,084	2,207	1,441	1,758	1,787	—	—	—
Flunitrazepam (Rohypnol)	*	*	*	*	*	800	657	—	—	—
Ketamine	*	303	270	291	344	529	915	—	—	—
LSD	2,146	2,001	4,002	3,561	3,287	4,028	3,817	—	—	—
PCP	31,342	14,825	21,960	28,035	37,266	36,719	53,542	—	44	—
Misc. hallucinogens	3,153	3,194	3,900	4,898	6,122	6,620	6,107	—	—	—
Inhalants	9,525	5,163	5,650	7,920	7,115	6,137	11,401	—	—	86
Combinations not tabulated above	*	4,256	3,530	4,612	4,924	4,791	6,041	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). Thus, the sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

The overall level of ED visits involving illicit drugs was stable between 2004 and 2008. From 2008 to 2010, though, there was a significant uptick (18% increase). Marijuana involvement has seen a steady increase between 2004 and 2009, with a notable uptick (22% increase) between 2009 and 2010. This rise echoes the increase in the rate of marijuana use between 2007 and 2010 found by the 2010 National Survey of Drug Use and Health (NSDUH) (5.8% to 6.9%).<sup>12</sup>

Amphetamines/methamphetamine involvement declined between 2004 and 2009 but saw a 47 percent increase between 2009 and 2010 that returned this usage to its 2005 level. Looked at separately, however, the ratio of amphetamines-involved visits to methamphetamine-involved visits is quite different between 2004 and 2010. In 2004, there were almost four methamphetamine-involved visits for every amphetamines-related visit; in 2010, there were fewer than two. MDMA (Ecstasy) involvement also increased gradually between 2004 and 2009 but appeared to stabilize between 2009 and 2010.

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<sup>12</sup> Substance Abuse and Mental Health Services Administration (SAMHSA). (2011). *Results from the 2010 National Survey of Drug Use and Health: Volume I. Summary of national findings* (Office of Applied Studies, NSDUH Series H-41, HHS Publication No. [SMA] 11-4658). Rockville, MD. Retrieved May 5, 2012, from <http://www.samhsa.gov/data/NSDUH/2k10NSDUH/2k10Results.htm>.



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## 4. ALCOHOL

### 4.1 ED Visits Involving Drugs and Alcohol Taken Together, 2010

According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA), more than 150 medications have harmful additive or interactive effects when combined with alcohol. The harmful effects of combining drugs with alcohol are heightened by drugs that depress the central nervous system, such as heroin, opiate pain relievers, benzodiazepines (anti-anxiety drugs), antihistamines, and antidepressants. These drug-alcohol interactions may result in increased risk of illness, injury, and even death. Medications for certain disorders—including diabetes, high blood pressure, and heart disease—also can have harmful interactions with alcohol.<sup>13</sup>

In 2010, over 500,000 ED visits involved drugs combined with alcohol (Table 10). This represents nearly a quarter of all ED visits associated with drug misuse or abuse.

**Table 10. ED visits involving alcohol, 2010**

Alcohol use category (1)	ED visits (2)	Percent of all drug misuse/abuse visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Alcohol present with drugs (3)	564,796	24.5	7.9	477,871	651,720

- (1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.
- (2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.
- (3) For patients of all ages, DAWN records whether alcohol is present in addition to other drugs.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Illicit drugs were involved in over half (59.8%) of ED visits involving alcohol-drug combinations, with cocaine and marijuana representing the greater proportions of such visits (30.2% and 26.7%, respectively) (Table 11). Pharmaceuticals were involved in over half (55.8%) of such visits. Anxiolytics, sedatives, and hypnotics (drugs to treat insomnia and anxiety) were involved in 23.1 percent of visits, with the largest part of that category being benzodiazepines (19.7%). Pain relievers were involved in a similar number of visits (23.0%), with narcotic pain relievers accounting for over half of that number (14.0%). Psychotherapeutic agents (antidepressants and antipsychotics) were involved in 7.9 percent of visits involving alcohol-drug combinations.

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<sup>13</sup> National Institute on Alcohol Abuse and Alcoholism (NIAAA). (2008, July). *Alcohol and other drugs*. Retrieved June 22, 2012, from <http://pubs.niaaa.nih.gov/publications/AA76/AA76.htm>.

**Table 11. ED visits involving drugs and alcohol taken together, 2010**

Drugs reported with alcohol (1)	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (2)
<b>Total ED visits, drugs with alcohol (3,4)</b>	<b>564,796</b>	<b>100.0</b>	<b>182.5</b>
<b>Illicit drugs</b>	<b>337,723</b>	<b>59.8</b>	<b>109.2</b>
Cocaine	170,753	30.2	55.2
Heroin	43,827	7.8	14.2
Cannabinoids	152,465	27.0	49.3
Marijuana	150,795	26.7	48.7
Synthetic cannabinoids	1,776	0.3	0.6
Amphetamines/methamphetamine	27,878	4.9	9.0
<b>Pharmaceuticals</b>	<b>315,188</b>	<b>55.8</b>	<b>101.9</b>
<i>Anxiolytics, sedatives, and hypnotics</i>	130,386	23.1	42.1
Benzodiazepines	111,165	19.7	35.9
Alprazolam	39,573	7.0	12.8
Clonazepam	22,089	3.9	7.1
<i>Pain relievers</i>	129,820	23.0	42.0
Opiates/opioids	99,892	17.7	32.3
Acetaminophen products	13,494	2.4	4.4
Narcotic pain relievers	78,829	14.0	25.5
Hydrocodone products	26,143	4.6	8.4
Oxycodone products	35,878	6.4	11.6
<i>Psychotherapeutic agents</i>	44,613	7.9	14.4
Antidepressants	29,949	5.3	9.7
Antipsychotics	18,918	3.3	6.1
Atypical antipsychotics	15,978	2.8	5.2

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) All visits in this table involve alcohol and another drug. Some involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving alcohol, marijuana, and hydrocodone will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Looking at alcohol involvement from the perspective of all visits involving drug misuse or abuse, DAWN found that 28.8 percent of visits involving illicit drugs also involved alcohol (Table 12). Above-average levels of alcohol involvement were found for visits involving ketamine (40.2%), MDMA (Ecstasy) (38.0%), LSD (35.6%), cocaine (35.0%), and marijuana (32.7%). Among visits involving pharmaceuticals, 23.4 percent of visits also involved alcohol. Above-average levels of alcohol involvement were found for visits involving central nervous system stimulants (e.g., ADHD drugs) (37.5%), nonsteroidal anti-inflammatories (32.2%), antidepressants (28.5%), antipsychotics (27.4%), and benzodiazepines (27.2%).

The rate of ED visits involving alcohol was higher for males (240.1 visits) than for females (126.7 visits) (Table 13, Figure 4). By age, the highest rate was found for patients aged 21 to 24 (354.6 visits).

Considering race/ethnicity, 58.8 percent of patients were White, 22.8 percent were Black, 10.7 percent were Hispanic, 1.3 percent were of other or multiple race/ethnic groups, and 6.4 percent were of unknown race/ethnicity. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

Just under half (46.2%) of patients seen for alcohol-related ED visits received follow-up care: 28.6 percent were admitted to the hospital, 11.7 percent were transferred to another facility, and the balance (5.9%) was referred to detox/treatment (Table 14). The remaining patients were treated and released to home (44.9%) or had other outcomes (10.2%).

**Table 12. ED visits involving drugs and alcohol taken together, by selected drugs, 2010**

<b>Drugs category and selected drugs (1)</b>	<b>ED visits</b>	<b>Percent involving alcohol</b>
<b>Total ED visits, drug misuse or abuse (2,3)</b>	<b>2,301,050</b>	<b>29.9</b>
<b>Illicit drugs</b>	<b>1,171,024</b>	<b>28.8</b>
Cocaine	488,101	35.0
Heroin	224,706	19.5
Marijuana	461,028	32.7
Amphetamines/methamphetamine	137,947	20.2
MDMA (Ecstasy)	21,836	38.0
GHB	1,787	27.7
Ketamine	915	40.2
LSD	3,817	35.6
PCP	53,542	28.9
Misc. hallucinogens	6,107	23.2
Inhalants	11,401	18.4
<b>Pharmaceuticals</b>	<b>1,345,645</b>	<b>23.4</b>
Anticonvulsants	49,360	22.8
Antidepressants	105,229	28.5
Antihistamines	9,902	17.6
Antipsychotics	69,149	27.4
Anxiolytics, sedatives, and hypnotics	472,769	27.6
Benzodiazepines	408,021	27.2
Central nervous system stimulants (e.g., ADHD drugs)	31,507	37.5
Muscle relaxants	58,783	20.5
Pain relievers	659,969	19.7
Aspirin products	15,308	20.5
Narcotic pain relievers	425,247	18.5
Nonsteroidal anti-inflammatories (NSAIDs)	41,471	32.2
Penicillins	3,160	23.0
Respiratory agents	39,012	20.7

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) All visits in this table involve alcohol and another drug. Some involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving alcohol, marijuana, and antidepressants will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 13. ED visits involving drugs and alcohol taken together, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, drugs and alcohol (2)</b>	<b>564,796</b>	<b>100.0</b>	<b>182.5</b>
<b>Sex</b>	—	—	—
Male	365,257	64.7	240.1
Female	199,300	35.3	126.7
Unknown	*	*	*
<b>Age</b>	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	26,718	4.7	105.5
18–20 years	39,447	7.0	291.8
21–24 years	60,917	10.8	354.6
25–29 years	64,389	11.4	304.8
30–34 years	62,473	11.1	311.1
35–44 years	126,973	22.5	310.1
45–54 years	130,835	23.2	290.5
55–64 years	43,870	7.8	119.2
65 years and older	8,871	1.6	21.9
Unknown	*	*	*
<b>Race/ethnicity</b>	—	—	—
White	332,022	58.8	—
Black	128,657	22.8	—
Hispanic	60,429	10.7	—
Other or two or more race/ethnicities	7,342	1.3	—
Unknown	36,346	6.4	—

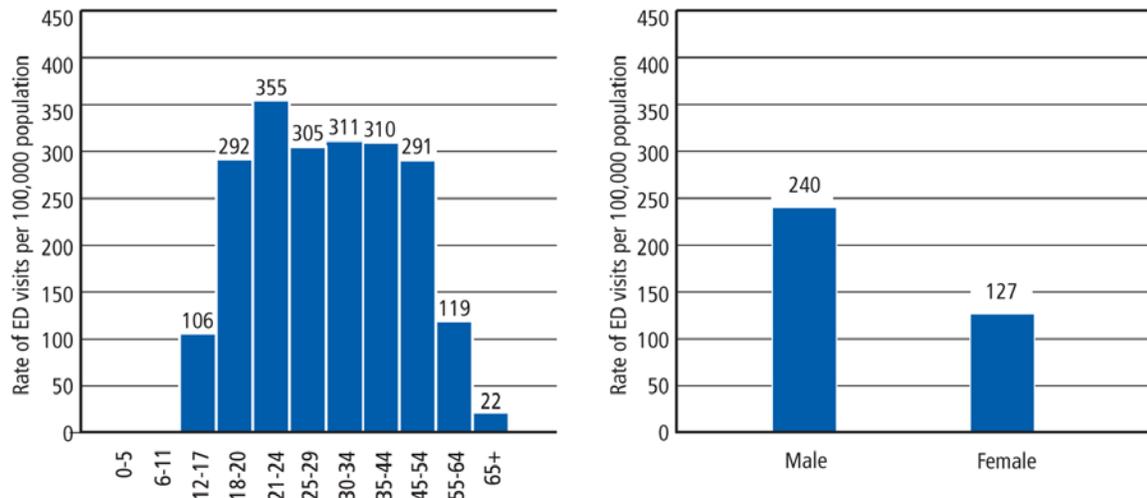
(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 4. Rates of ED visits per 100,000 population involving alcohol, by age and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 14. ED visits involving drugs and alcohol taken together, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, drugs with alcohol (2)</b>	<b>564,796</b>	<b>100.0</b>	<b>182.5</b>
<b>Treated and released</b>	<b>304,233</b>	<b>53.9</b>	<b>98.3</b>
Discharged home	253,522	44.9	81.9
Released to police/jail	17,270	3.1	5.6
Referred to detox/treatment	33,441	5.9	10.8
<b>Admitted to this hospital</b>	<b>161,527</b>	<b>28.6</b>	<b>52.2</b>
ICU/critical care	34,275	6.1	11.1
Surgery	743	0.1	0.2
Chemical dependency/detox	14,438	2.6	4.7
Psychiatric unit	40,339	7.1	13.0
Other inpatient unit	71,732	12.7	23.2
<b>Other disposition</b>	<b>99,035</b>	<b>17.5</b>	<b>32.0</b>
Transferred	65,937	11.7	21.3
Left against medical advice	7,605	1.3	2.5
Died	*	*	*
Other	*	*	*
Not documented	*	*	*

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## 4.2 Underage Drinking

The use of alcohol by those under the age of 21 is of substantial concern to substance abuse professionals and public health agencies. Alcohol abuse can have many immediate adverse consequences for youth and also lead to dangerous patterns of alcohol abuse in adulthood. Intervention at an early age is critical to preventing these patterns from developing. Intervention during an ED visit may be an efficient way to identify those youth at higher risk.

In 2010, of the nearly 460,000 drug abuse–related ED visits made by patients aged 20 or younger, almost half (189,060, or 45.2%) involved alcohol (Table 15).

**Table 15. ED visits involving underage drinking, 2010**

Alcohol use category (1)	ED visits (2)	Percent of drug misuse/abuse visits made by patients < 21	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Underage drinking (3)	189,060	45.2	9.8	152,580	225,539

- (1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.
- (2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.
- (3) Underage drinking includes ED visits for patients aged 20 or younger that involve alcohol with or without concurrent use of other drugs.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Of these ED visits involving underage drinking, 73,716 visits were made by patients aged 12 to 17, and 114,722 visits were made by patients aged 18 to 20 (Table 16). For both age groups, about two thirds of these visits involved just alcohol, with the remainder involving alcohol taken with other drugs.

The rate of medical emergencies involving use of alcohol was 291.0 visits per 100,000 population aged 12 to 17 and 848.7 per 100,000 population aged 18 to 20, almost a threefold difference. The pattern is similar when looking at ED visits for either alcohol alone or alcohol used in combination with other drugs (Figure 5).

**Table 16. ED visits involving alcohol, by patients aged 12 to 17 and 18 to 20, 2010**

Alcohol use category (1)	ED visits (2)	Rate of ED visits per 100,000 population (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Alcohol abuse, patients aged 12 to 17</b>	<b>73,716</b>	<b>291.0</b>	<b>10.8</b>	<b>58,133</b>	<b>89,300</b>
Alcohol with drugs	26,718	105.5	13.7	19,528	33,907
Alcohol alone	46,999	185.6	10.3	37,473	56,524
<b>Alcohol abuse, patients aged 18 to 20</b>	<b>114,722</b>	<b>848.7</b>	<b>11.0</b>	<b>90,076</b>	<b>139,367</b>
Alcohol with drugs	39,447	291.8	12.0	30,147	48,748
Alcohol alone	75,275	556.9	11.4	58,400	92,149

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

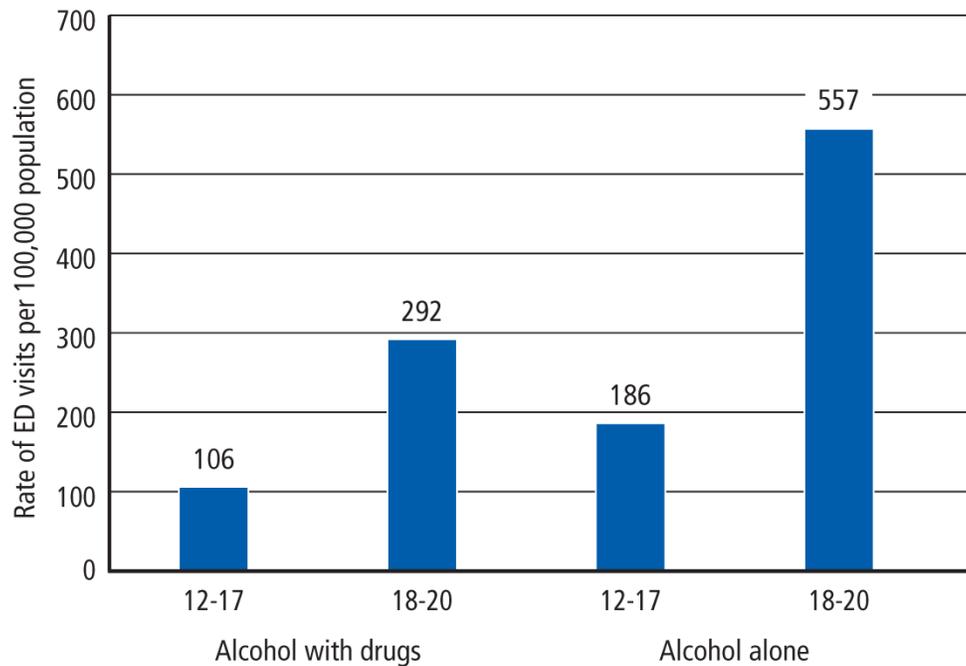
(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 5. Rates of ED visits per 100,000 population involving alcohol, by patients aged 12 to 17 and 18 to 20, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

### **4.3 Trends in ED Visits Involving Alcohol, 2004–2010**

This section presents the trends in the estimates of ED visits involving alcohol for the period from 2004 through 2010 (Table 17). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

Involvement of alcohol in drug-related medical emergencies has remained stable over the period from 2004 through 2010. Underage drinking has, likewise, remained constant for youth aged 12 to 17 and young adults aged 18 to 20.

**Table 17. Trends in ED visits involving alcohol, 2004–2010**

Alcohol use category (1,2)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (3)	Percent change, 2008, 2010 (3)	Percent change, 2009, 2010 (3)
Alcohol with drugs (all ages) (4)	523,926	416,599	450,820	497,288	524,052	519,650	564,796	—	—	—
Underage drinking (5)	204,910	158,393	183,260	196,208	190,015	199,429	189,060	—	—	—
Patients aged 12 to 17	67,589	62,459	76,760	82,364	74,991	76,918	73,716	—	—	—
Patients aged 18 to 20	135,313	95,166	105,675	112,563	113,993	120,853	114,722	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(4) For patients of all ages, DAWN always records whether alcohol is involved in a drug-related visit. ED visits involving alcohol and no other drugs are reportable to DAWN only if the patient is aged 20 or younger. DAWN estimates do not represent visits involving just alcohol for adults aged 21 or older.

(5) Underage drinking includes ED visits for patients aged 20 or younger that involve alcohol with or without concurrent use of other drugs.

**NOTE:** A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

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## 5. NONMEDICAL USE OF PHARMACEUTICALS

### 5.1 ED Visits Involving Nonmedical Use of Pharmaceuticals, 2010

There is growing concern in the public health community about the misuse or abuse of pharmaceuticals. When taken as directed for legitimate medical purposes, pharmaceuticals are usually safe and effective. However, when misused, pharmaceuticals can be just as dangerous and debilitating as illegal drugs.<sup>14</sup> Furthermore, as documented by the 2010 National Survey of Drug Use and Health (NSDUH), misuse of pharmaceuticals appears to be widespread. In 2010, NSDUH estimated that 7.0 million persons aged 12 or older used prescription-type pain relievers, tranquilizers, stimulants, or sedatives nonmedically in the past month. Initiation rates for nonmedical pain reliever use continue to be second only to marijuana rates, with 2 million or more new nonmedical pain reliever users each year since 2002, including over 500,000 who initiate use without ever having used another illicit drug. The number of persons receiving substance use treatment within the past year for misuse of pain relievers more than doubled between 2002 and 2010, from 199,000 to 406,000.<sup>15</sup>

DAWN defines nonmedical use to include misuse or abuse of any therapeutic substance. While use of any illicit drug is assumed to constitute drug abuse, nonmedical use of pharmaceuticals must be substantiated in the patient's ED medical records. Evidence supporting nonmedical use includes the following:

- taking more than the prescribed dose of a prescription drug;
- taking more than the recommended dose of an over-the-counter pharmaceutical or supplement;
- taking a drug prescribed for another individual;
- taking a drug obtained illegally or without a legitimate prescription;
- deliberate poisoning with a pharmaceutical by another person; and
- any use of a prescription drug, an over-the-counter pharmaceutical, or a dietary supplement that ED medical staff document in the patient's medical record as misuse or abuse.

Nonmedical use of pharmaceuticals may involve a single pharmaceutical, multiple pharmaceuticals, or pharmaceuticals in combination with illicit drugs or alcohol. Pharmaceuticals

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<sup>14</sup> Office of National Drug Control Policy (ONDCP). (2011). *A response to the epidemic of prescription drug abuse*. Retrieved May 5, 2012, from <http://www.whitehouse.gov/ondcp/ondcp-fact-sheets/response-to-the-epidemic-of-prescription-drug-abuse>.

<sup>15</sup> Substance Abuse and Mental Health Services Administration (SAMHSA). (2011). *Results from the 2010 National Survey of Drug Use and Health: Volume I. Summary of national findings* (Office of Applied Studies, NSDUH Series H-41, HHS Publication No. [SMA] 11-4658). Rockville, MD. Retrieved May 5, 2012 from <http://store.samhsa.gov/product/Results-from-the-2010-National-Survey-on-Drug-Use-and-Health-NSDUH-/SMA11-4658>.

that the patient may have taken recently but that are not related to the reason for the ED visit are not included in the DAWN data.<sup>16</sup>

For 2010, DAWN estimates that 1,173,654 ED visits involved nonmedical use of prescription medicines, over-the-counter drugs, or other types of pharmaceuticals (Table 18). This represents about a quarter (23.9%) of all drug-related ED visits and over half (51.0%) of ED visits for drug abuse or misuse. Over half (54.7%) of medical emergencies seen in the ED resulting from nonmedical use of pharmaceuticals involved multiple drugs.<sup>17</sup> About one in five (17.4%) of ED visits involving nonmedical use of pharmaceuticals also involved alcohol.

At 48.3 percent, pain relievers were the most common type of drugs involved in medical emergencies associated with nonmedical use of pharmaceuticals, with narcotic pain relievers accounting for 30.7 percent. Specific narcotic pain relievers seen more commonly were oxycodone, hydrocodone, and methadone at 12.5, 8.2, and 5.6 percent, respectively.<sup>18</sup> Non-narcotic pain relievers—such as acetaminophen, nonsteroidal anti-inflammatories (e.g., ibuprofen, naproxen), and aspirin—were seen at lower levels of between 1 and 4 percent.

Anxiolytics, sedatives, and hypnotics (drugs to treat anxiety and insomnia) were found in 34.0 percent of visits related to nonmedical use of pharmaceuticals. Benzodiazepines (anti-anxiety drugs) were involved in 29.5 percent of ED visits, with alprazolam (e.g., Xanax) indicated in about a third (10.6%) of such visits.

Among other major categories of drugs, psychotherapeutic agents (antidepressants and antipsychotics) were involved in 11.2 percent of ED visits related to nonmedical use of pharmaceuticals. Respiratory agents, cardiovascular agents, muscle relaxants, and anticonvulsants each were involved in about 3 to 5 percent of ED visits.

When population size and sampling error are taken into account, visits for nonmedical use of pharmaceuticals did not differ between males and females (374.2 and 383.9 visits per 100,000 population, respectively; Table 19, Figure 6). The rate of ED visits for patients in age categories

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<sup>16</sup> DAWN tries to capture only pharmaceuticals that are related to the ED visit and actively discourages reporting of current medications that are unrelated to the visit. Given the limitations of medical record documentation, though, it is not always possible to distinguish and exclude current medications that are unrelated to the visit. This limitation may have the effect of overstating the variety of pharmaceuticals involved in ED visits.

<sup>17</sup> Multiple drugs may not all be taken for the same reason; a patient may misuse one type of prescription medication while taking another medication as prescribed. To be counted as a DAWN case involving multiple drugs, though, both drugs must be involved as a reason for the ED visit (e.g., the drugs' interaction caused or worsened the medical emergency).

<sup>18</sup> ED records frequently do not distinguish methadone used properly for the treatment of opiate addiction (and not specifically related to the ED visit) from nonmedical methadone use (related to the ED visit). This could result in overreporting the estimated number of ED visits related to methadone, but the extent of the overreporting is unknown.

between 21 and 34 were all over 600 visits per 100,000 population, with lower levels observed for younger and older patients.

**Table 18. ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2010**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, nonmedical use (2,3)</b>	<b>1,173,654</b>	<b>100.0</b>	<b>7.8</b>	<b>994,249</b>	<b>1,353,060</b>
Single drug	531,490	45.3	7.4	454,774	608,207
Multiple drugs	642,164	54.7	10.4	511,197	773,131
Alcohol present	203,682	17.4	8.2	170,759	236,606
<b>Pharmaceuticals</b>	<b>1,173,654</b>	<b>100.0</b>	<b>7.8</b>	<b>994,249</b>	<b>1,353,060</b>
<i>Anorexiant</i>	2,144	0.2	32.9	762	3,526
<i>Anticonvulsants</i>	43,934	3.7	9.5	35,791	52,077
<i>Antiemetic/antivertigo agents</i>	2,357	0.2	36.7	661	4,053
<i>Anti-Parkinson agents</i>	3,532	0.3	26.7	1,685	5,379
<i>Anxiolytics, sedatives, and hypnotics</i>	399,061	34.0	13.2	296,005	502,118
Barbiturates	11,586	1.0	12.3	8,788	14,385
Benzodiazepines	345,691	29.5	14.5	247,777	443,605
Alprazolam	124,902	10.6	15.4	87,155	162,650
Clonazepam	62,811	5.4	8.6	52,221	73,400
Diazepam	26,860	2.3	11.4	20,857	32,864
Lorazepam	36,675	3.1	9.9	29,575	43,775
Diphenhydramine	14,082	1.2	10.9	11,078	17,087
Hydroxyzine	5,902	0.5	18.8	3,731	8,073
Zolpidem	31,994	2.7	9.4	26,106	37,882
<i>Cardiovascular agents</i>	43,698	3.7	5.5	38,954	48,441
Alpha agonists, central	5,742	0.5	18.7	3,635	7,848
Beta blockers	16,925	1.4	7.9	14,316	19,535
Calcium channel blocking agents	6,894	0.6	13.4	5,080	8,708
Diuretics	7,965	0.7	16.3	5,426	10,504
<i>Central nervous system stimulants</i>	28,316	2.4	11.1	22,137	34,495
Amphetamine-dextroamphetamine	11,327	1.0	17.6	7,417	15,238
Caffeine	2,712	0.2	21.0	1,593	3,830
Methylphenidate	4,089	0.3	24.6	2,118	6,061
<i>Gastrointestinal agents</i>	13,549	1.2	16.7	9,102	17,996
<i>Hormones</i>	9,370	0.8	10.5	7,445	11,295
<i>Metabolic agents</i>	34,504	2.9	7.8	29,246	39,762
<i>Muscle relaxants</i>	53,708	4.6	14.0	38,938	68,477
Carisoprodol	29,864	2.5	17.1	19,878	39,850
Cyclobenzaprine	12,411	1.1	18.3	7,950	16,872
<i>Nutritional products</i>	10,969	0.9	13.5	8,063	13,875
<i>Pain relievers</i>	567,316	48.3	9.6	460,062	674,570
Acetaminophen products	47,176	4.0	9.6	38,293	56,060
Aspirin products	12,979	1.1	12.2	9,877	16,081
Nonsteroidal anti-inflammatories	33,767	2.9	8.2	28,368	39,165
Ibuprofen	25,184	2.1	10.4	20,026	30,342
Naproxen	6,223	0.5	18.6	3,952	8,494

**Table 18. ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2010  
(continued)**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Opiates/opioids	474,133	40.4	11.0	371,570	576,696
Narcotic pain relievers	359,921	30.7	8.6	299,061	420,782
Buprenorphine products	15,778	1.3	16.0	10,815	20,741
Codeine products	7,928	0.7	18.7	5,024	10,833
Fentanyl products	21,196	1.8	12.8	15,872	26,520
Hydrocodone products	95,972	8.2	11.4	74,472	117,472
Hydromorphone products	17,666	1.5	14.9	12,502	22,830
Meperidine products	1,151	0.1	37.1	315	1,988
Methadone	65,945	5.6	10.7	52,085	79,806
Morphine products	29,605	2.5	9.2	24,279	34,930
Oxycodone products	146,355	12.5	14.0	106,109	186,602
Propoxyphene products	8,832	0.8	34.3	2,891	14,773
Opiates/opioids NOS	124,249	10.6	22.0	70,584	177,914
Tramadol products	16,251	1.4	10.2	13,016	19,485
<i>Psychotherapeutic agents</i>	131,698	11.2	5.4	117,862	145,535
Antidepressants	88,919	7.6	6.0	78,503	99,335
SSRI antidepressants	38,366	3.3	7.3	32,843	43,889
Tricyclic antidepressants	15,240	1.3	15.2	10,685	19,795
Antipsychotics	57,199	4.9	6.3	50,158	64,241
<i>Respiratory agents</i>	34,588	2.9	8.9	28,534	40,643
Antihistamines	8,617	0.7	25.0	4,400	12,834
Bronchodilators	4,386	0.4	20.7	2,605	6,167
Decongestants	894	0.1	45.2	102	1,687
Expectorants	3,035	0.3	35.1	948	5,122
Upper respiratory products	14,984	1.3	11.0	11,767	18,201

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both methadone and tramadol will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. NOS = not otherwise specified. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 19. ED visits and rates involving nonmedical use of pharmaceuticals, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, nonmedical use (2)</b>	<b>1,171,873</b>	<b>100.0</b>	<b>378.8</b>
<b>Sex</b>	—	—	—
Male	569,324	48.5	374.2
Female	603,740	51.4	383.9
Unknown	*	*	*
<b>Age</b>	—	—	—
0–5 years	6,335	0.5	26.0
6–11 years	3,140	0.3	12.8
12–17 years	66,517	5.7	262.6
18–20 years	75,610	6.4	559.4
21–24 years	116,004	9.9	675.2
25–29 years	144,633	12.3	684.6
30–34 years	129,059	11.0	642.7
35–44 years	213,276	18.2	520.9
45–54 years	228,501	19.5	507.4
55–64 years	107,523	9.2	292.1
65 years and older	82,662	7.0	204.3
Unknown	*	*	*
<b>Race/ethnicity</b>	—	—	—
White	837,357	71.3	—
Black	147,922	12.6	—
Hispanic	98,036	8.4	—
Other or two or more race/ethnicities	19,272	1.6	—
Unknown	71,068	6.1	—

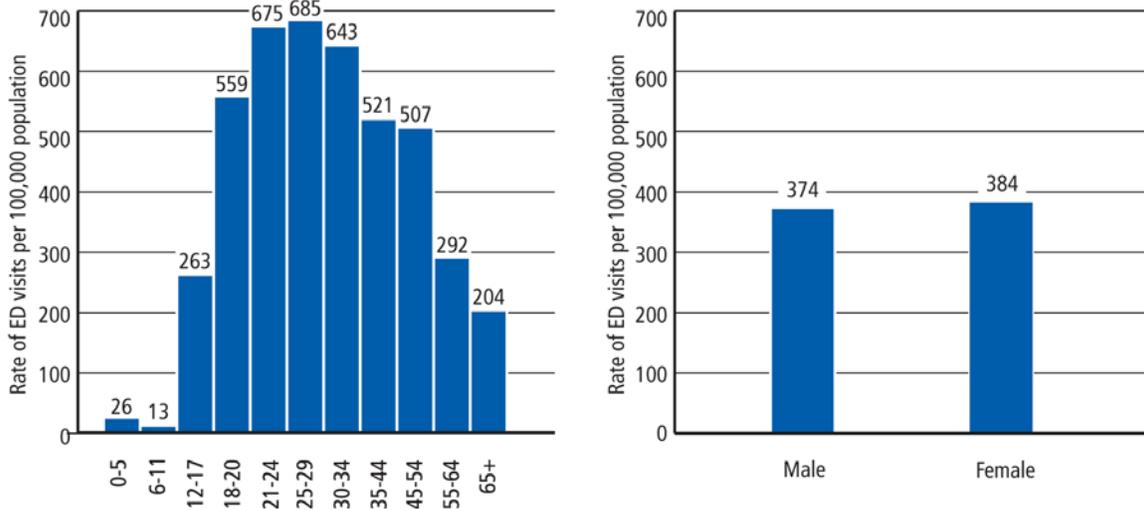
(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50% or an estimate based on fewer than 30 visits has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 6. Rates of ED visits per 100,000 population involving nonmedical use of pharmaceuticals, by age and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

In terms of race and ethnicity, 71.3 percent of visits related to nonmedical use of pharmaceuticals involved patients who were White, 12.6 percent were Black, and 8.4 percent were Hispanic. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

Some form of follow-up was observed for 37.4 percent of patients whose visits involved nonmedical use of pharmaceuticals (Table 20). Follow-up included admission to the hospital (25.5%), transfer to another facility (9.5%), and referral to detox/treatment (2.4%). Of the remainder, 54.0 percent of patients were treated and released to home, and 8.6 percent had other outcomes. This distribution of outcomes is similar to that found for patients whose ED visits involved illicit drugs (see Table 8).

**Table 20. ED visits and rates involving nonmedical use of pharmaceuticals, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, nonmedical use (2)</b>	<b>1,173,654</b>	<b>100.0</b>	<b>379.3</b>
<b>Treated and released</b>	<b>688,637</b>	<b>58.7</b>	<b>222.6</b>
Discharged home	633,217	54.0	204.7
Released to police/jail	26,879	2.3	8.7
Referred to detox/treatment	28,541	2.4	9.2
<b>Admitted to this hospital</b>	<b>299,213</b>	<b>25.5</b>	<b>96.7</b>
ICU/critical care	80,255	6.8	25.9
Surgery	2,135	0.2	0.7
Chemical dependency/detox	*	*	*
Psychiatric unit	45,548	3.9	14.7
Other inpatient unit	168,668	14.4	54.5
<b>Other disposition</b>	<b>185,805</b>	<b>15.8</b>	<b>60.1</b>
Transferred	111,393	9.5	36.0
Left against medical advice	20,096	1.7	6.5
Died	2,273	0.2	0.7
Other	14,759	1.3	4.8
Not documented	*	*	*

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## 5.2 Trends in ED Visits Involving Nonmedical Use of Pharmaceuticals, 2004–2010

This section presents the trends in the estimates of ED visits involving nonmedical use of pharmaceuticals for the period from 2004 through 2010 (Table 21). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

Table 21. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2010

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, nonmedical use (3,4)</b>	<b>535,449</b>	<b>668,211</b>	<b>740,457</b>	<b>855,479</b>	<b>970,661</b>	<b>1,078,741</b>	<b>1,173,654</b>	<b>119</b>	<b>21</b>	—
<b>Pharmaceuticals</b>	<b>535,449</b>	<b>668,211</b>	<b>740,457</b>	<b>855,479</b>	<b>970,661</b>	<b>1,078,741</b>	<b>1,173,654</b>	<b>119</b>	<b>21</b>	—
<i>Anorexiant</i>	*	1,757	1,168	758	1,526	1,698	2,144	—	—	—
<i>Anticonvulsants</i>	28,655	27,645	31,169	35,403	37,439	42,073	43,934	—	—	—
<i>Antiemetic/antivertigo agents</i>	1,680	1,771	1,360	1,646	1,661	2,667	2,357	—	—	—
<i>Anti-Parkinson agents</i>	2,472	1,692	3,816	3,764	3,802	4,775	3,532	—	—	—
<i>Anxiolytics, sedatives, and hypnotics</i>	177,394	227,486	233,875	259,983	325,041	363,270	399,061	125	23	—
Barbiturates	11,721	14,693	10,991	9,877	9,603	11,824	11,586	—	—	—
Benzodiazepines	143,546	189,704	195,625	218,640	271,698	312,931	345,691	141	27	—
Alprazolam	46,526	57,419	65,236	80,313	104,762	112,552	124,902	168	—	—
Clonazepam	28,178	30,648	33,557	40,920	48,385	57,633	62,811	123	30	—
Diazepam	15,619	18,433	19,936	19,674	26,518	25,150	26,860	72	—	—
Lorazepam	17,674	23,210	23,720	26,213	36,602	36,582	36,675	108	—	—
Diphenhydramine	10,452	10,294	12,291	12,539	13,531	13,321	14,082	—	—	—
Hydroxyzine	2,363	2,179	2,679	2,447	5,647	3,690	5,902	150	—	60
Zolpidem	12,792	14,730	17,257	18,464	28,262	29,127	31,994	150	—	—
<i>Cardiovascular agents</i>	27,397	37,096	36,343	35,605	41,520	46,408	43,698	59	—	—
Alpha agonists, central	3,616	5,125	4,810	4,751	6,197	5,258	5,742	—	—	—
Beta blockers	7,094	9,824	11,729	11,668	13,000	16,204	16,925	139	—	—
Calcium channel blocking agents	3,115	5,435	5,227	4,493	5,857	6,428	6,894	121	—	—
Diuretics	3,626	5,332	5,102	5,465	4,812	7,555	7,965	120	—	—
<i>Central nervous system stimulants</i>	9,803	11,283	13,904	18,578	18,786	21,799	28,316	189	51	30
Amphetamine-dextroamphetamine	2,303	2,669	5,027	6,372	6,500	8,656	11,327	392	—	—
Caffeine	2,736	4,567	4,409	2,165	1,876	2,072	2,712	—	—	—
Methylphenidate	2,446	2,519	2,192	4,782	3,173	4,953	4,089	—	—	—

Table 21. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2010 (continued)

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Gastrointestinal agents</i>	9,351	7,295	10,549	11,053	13,273	14,825	13,549	—	—	—
<i>Hormones</i>	5,203	6,897	7,868	8,036	7,846	10,420	9,370	80	—	—
<i>Metabolic agents</i>	11,340	21,011	23,416	27,097	25,330	31,193	34,504	204	36	—
<i>Muscle relaxants</i>	25,934	33,695	38,918	40,769	54,151	50,878	53,708	107	—	—
Carisoprodol	14,736	20,082	24,505	27,128	34,155	29,980	29,864	103	—	—
Cyclobenzaprine	6,183	7,629	7,142	6,197	12,748	11,178	12,411	101	—	—
<i>Nutritional products</i>	4,921	5,564	4,861	6,761	6,029	7,779	10,969	123	82	—
<i>Pain relievers</i>	241,584	294,258	323,580	363,720	458,438	516,409	567,316	135	24	—
Acetaminophen products	39,167	43,558	44,314	43,872	49,984	52,995	47,176	—	—	—
Aspirin products	9,580	12,123	10,399	9,726	13,007	13,930	12,979	—	—	—
Nonsteroidal anti-inflammatories	27,362	28,837	27,693	30,822	30,345	35,571	33,767	—	—	—
Ibuprofen	22,127	22,268	20,541	20,892	23,539	27,339	25,184	—	—	—
Naproxen	4,715	5,190	6,682	7,208	4,528	6,236	6,223	—	—	—
Opiates/opioids	172,732	217,600	247,669	286,618	366,821	416,814	474,133	174	29	—
Narcotic pain relievers	144,650	168,379	201,280	237,239	305,891	342,983	359,921	149	—	—
Buprenorphine products	*	*	4,440	7,136	12,544	14,266	15,778	—	—	—
Codeine products	7,171	6,181	6,928	5,648	8,235	7,962	7,928	—	—	—
Fentanyl products	9,823	11,211	16,012	15,947	20,179	20,945	21,196	116	—	—
Hydrocodone products	39,846	47,194	57,550	65,734	89,051	86,258	95,972	141	—	—
Hydromorphone products	3,385	4,714	6,780	9,497	12,142	14,337	17,666	422	—	—
Meperidine products	782	383	1,440	997	1,435	1,350	1,151	—	—	—
Methadone	36,806	42,684	45,130	53,950	63,629	63,031	65,945	79	—	—
Morphine products	14,090	15,762	20,416	29,591	28,818	31,731	29,605	110	—	—
Oxycodone products	41,701	52,943	64,891	76,684	105,526	148,974	146,355	251	39	—
Propoxyphene products	6,744	7,648	6,220	7,401	13,364	9,526	8,832	—	—	—
Opiates/opioids not otherwise specified	31,864	52,673	50,978	52,997	66,585	84,144	124,249	290	87	48
Tramadol products	4,849	5,918	6,048	8,039	11,850	15,349	16,251	235	37	—

**Table 21. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2010 (continued)**

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Psychotherapeutic agents</i>	91,268	101,451	112,856	119,787	124,331	132,482	131,698	44	—	—
Antidepressants	66,917	67,051	79,682	82,009	80,881	89,070	88,919	—	—	—
SSRI antidepressants	32,285	30,374	35,370	37,446	39,780	39,814	38,366	—	—	—
Tricyclic antidepressants	12,412	14,515	16,564	16,600	13,246	18,303	15,240	—	—	—
Antipsychotics	35,198	44,396	44,733	52,752	55,005	58,018	57,199	63	—	—
<i>Respiratory agents</i>	22,310	28,027	28,867	31,016	31,414	35,869	34,588	55	—	—
Antihistamines	5,761	4,429	4,130	5,096	8,282	9,439	8,617	—	—	—
Bronchodilators	2,294	3,043	2,920	3,043	3,046	3,123	4,386	—	—	—
Decongestants	1,864	1,309	1,511	1,758	1,160	1,108	894	—	—	—
Expectorants	832	1,966	2,125	2,293	2,089	4,172	3,035	265	—	—
Upper respiratory products	10,333	15,839	15,115	16,680	14,901	15,484	14,984	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both methadone and tramadol will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Large increases in the number of ED visits involving nonmedical use of pharmaceuticals were observed between 2004 and 2010. It is likely that there are multiple causes contributing to these increases. Some portion may be associated with the greater number of prescriptions being written, making prescription drugs more accessible and able to be diverted. Also, as more people are taking prescription medications as part of their regular health care, there is more risk that drugs taken as prescribed will interact with other drugs that are being used nonmedically. It is beyond the scope of this report to explore the causes behind the growing numbers of ED visits involving misuse or abuse of pharmaceuticals, and further research is needed.

Medical emergencies related to nonmedical use of pharmaceuticals increased 119 percent in the period from 2004 to 2010, rising from about a half million visits (535,449 visits) to over one million visits (1,173,654 visits). Contributing to this rise were significant long-term increases in the number of visits involving narcotic pain relievers, which increased 149 percent, or 215,271 visits, beyond its 2004 level of 144,650 visits. ED visits for narcotic pain relievers that more than doubled during this period were fentanyl, hydrocodone, hydromorphone, morphine, and oxycodone. Visits involving tramadol (e.g., Ultram), a narcotic-like opiate agonist used for moderate to severe pain, increased 235 percent, reaching 16,251 visits in 2010.

Between 2004 and 2010, the number of visits involving drugs for anxiety and insomnia increased 125 percent overall—a jump of more than 221,000 visits over the 2004 level of 177,394 visits. Benzodiazepines (e.g., alprazolam, clonazepam, diazepam, lorazepam) have shown a regular upward trend, with 202,145 more visits in 2010 than in 2004. Visits involving zolpidem (e.g., Ambien), a sleeping aid with benzodiazepine-like properties, increased 150 percent, reaching 31,994 visits in 2010. Muscle relaxants (e.g., carisprodol, cyclobenzaprine) increased 107 percent, reaching 53,708 visits in 2010. One of the drugs used to treat attention deficit hyperactivity disorder (ADHD), amphetamine-dextroamphetamine (e.g., Adderall), saw a 392 percent increase between 2004 and 2010 for a total of 11,327 visits in 2010.

A 59 percent increase was seen for visits involving cardiovascular agents for a total of 43,698 visits in 2010. While part of the increase in visits involving cardiovascular agents may signal an increase in their misuse, part may be due to the interaction of cardiovascular agents taken as prescribed with other drugs and therapeutic substances used medically and nonmedically.



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## 6. DRUG-RELATED SUICIDE ATTEMPTS

### 6.1 ED Visits Involving Drug-Related Suicide Attempts, 2010

In 2008, more than 36,000 suicides occurred in the United States, and suicide was the second leading cause of death for adults aged 25 to 34.<sup>19</sup> This is the equivalent of 1 suicide every 15 minutes, or 11.6 suicides per 100,000 population. Substance abuse is strongly associated with suicide attempts. Evidence suggests that one third of those who died by suicide were positive for alcohol at the time of death and that nearly one in five had evidence of opiates.<sup>20</sup> Highlighting the relevance of drugs to the overall problem of life-threatening suicide attempts, the Centers for Disease Control and Prevention's National Electronic Injury Surveillance System estimated that overall there were about 325,000 ED visits in 2008 for suicide attempts by all methods by patients aged 18 or older that resulted in ED visits; for the same year and age range, DAWN estimated there were about 175,000 ED visits for suicide attempts involving drugs.

DAWN data provide a unique window to study life-threatening suicide attempts that involve drugs in respect to the types of drugs involved, the characteristics of the patients, and the follow-up treatments provided. DAWN reports on suicide attempts involving all types of illicit drugs and prescription drugs as well as over-the-counter products and attempts involving alcohol alone for patients aged 20 or younger. DAWN cases are not limited to drug overdoses. Suicide attempts involving firearms, for example, are included as DAWN cases if drugs are noted as being involved at the time of the suicide attempt.<sup>21</sup>

DAWN estimated there were 212,736 ED visits resulting from drug-related suicide attempts in 2010 (Table 22). Almost all (94.7%) involved a prescription drug or over-the-counter medication, about two thirds (62.6%) involved multiple drugs, and about one quarter (25.3%) involved alcohol.

About a fifth (17.6%) involved illicit drugs. Marijuana and cocaine were the more commonly involved illicit drugs, appearing in 8.1 and 7.4 percent of visits, respectively.

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<sup>19</sup> Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control (NCIPC). (2012). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved January 9, 2012, from <http://www.cdc.gov/injury/wisqars/>.

<sup>20</sup> Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control (NCIPC). (2010, Summer). *Suicide: Facts at a glance*. Retrieved May 5, 2012, from <http://www.cdc.gov/ViolencePrevention/pdf/Suicide-DataSheet-a.pdf>.

<sup>21</sup> Excluded are suicide-related behaviors documented as something other than actual attempts (e.g., suicidal ideation, suicidal gesture, or suicidal thoughts).

**Table 22. ED visits involving drug-related suicide attempts, by selected drugs, 2010**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, suicide attempts (2,3)</b>	<b>212,736</b>	<b>100.0</b>	<b>10.1</b>	<b>170,532</b>	<b>254,940</b>
Single drug	79,460	37.4	10.9	62,410	96,509
Multiple drugs	133,277	62.6	11.1	104,391	162,162
Alcohol present	53,799	25.3	11.1	42,108	65,490
<b>Illicit drugs</b>	<b>37,382</b>	<b>17.6</b>	<b>18.9</b>	<b>23,521</b>	<b>51,244</b>
Cocaine	15,721	7.4	29.4	6,662	24,781
Heroin	6,017	2.8	22.2	3,399	8,635
Marijuana	17,219	8.1	19.3	10,709	23,730
Amphetamines/methamphetamine	1,196	0.6	33.4	413	1,979
<b>Pharmaceuticals</b>	<b>201,519</b>	<b>94.7</b>	<b>10.4</b>	<b>160,396</b>	<b>242,643</b>
<i>Anticonvulsants</i>	14,318	6.7	14.6	10,214	18,422
<i>Antidepressants</i>	42,276	19.9	11.8	32,519	52,033
SSRI antidepressants	22,365	10.5	11.9	17,144	27,586
Citalopram	5,114	2.4	17.2	3,391	6,838
Fluoxetine	4,680	2.2	18.3	3,002	6,359
Paroxetine	2,563	1.2	19.0	1,608	3,517
Sertraline	5,890	2.8	26.6	2,817	8,963
Trazodone	10,873	5.1	14.4	7,813	13,932
<i>Antipsychotics</i>	28,618	13.5	21.0	16,844	40,391
Atypical antipsychotics	23,507	11.0	20.7	13,958	33,055
Quetiapine	13,776	6.5	21.0	8,093	19,460
Risperidone	3,464	1.6	26.6	1,659	5,269
Lithium	3,830	1.8	32.0	1,431	6,228
<i>Anxiolytics, sedatives, hypnotics</i>	80,748	38.0	9.4	65,807	95,690
Barbiturates	452	0.2	40.6	92	812
Benzodiazepines	60,318	28.4	10.4	48,059	72,578
Alprazolam	22,473	10.6	13.3	16,595	28,352
Clonazepam	20,033	9.4	16.6	13,506	26,560
Diazepam	6,236	2.9	16.0	4,276	8,197
Lorazepam	10,605	5.0	13.4	7,811	13,400
Diphenhydramine	7,195	3.4	14.9	5,087	9,302
Hydroxyzine	2,714	1.3	22.2	1,534	3,894
Zolpidem	11,092	5.2	12.0	8,472	13,711
<i>Cardiovascular agents</i>	14,291	6.7	16.5	9,673	18,910
Alpha agonists, central	2,317	1.1	38.6	562	4,072
Beta blockers	3,571	1.7	18.3	2,291	4,850
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	4,404	2.1	25.2	2,231	6,578
<i>Gastrointestinal agents</i>	3,643	1.7	28.7	1,595	5,692
<i>Hormones</i>	2,359	1.1	26.9	1,113	3,605
<i>Metabolic agents</i>	5,305	2.5	14.8	3,761	6,848
Antidiabetic agents	3,498	1.6	15.1	2,463	4,532

**Table 22. ED visits involving drug-related suicide attempts, by selected drugs, 2010  
(continued)**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<i>Muscle relaxants</i>	11,210	5.3	14.6	7,992	14,429
Carisoprodol	4,158	2.0	19.5	2,568	5,748
Cyclobenzaprine	4,621	2.2	24.2	2,433	6,809
<i>Pain relievers</i>	78,830	37.1	11.3	61,391	96,269
Acetaminophen products	28,747	13.5	20.6	17,162	40,333
Aspirin products	4,861	2.3	19.0	3,055	6,667
Narcotic pain relievers	32,987	15.5	11.5	25,560	40,414
Codeine products	2,433	1.1	25.2	1,232	3,633
Hydrocodone products	12,863	6.0	13.1	9,553	16,173
Morphine products	2,343	1.1	28.5	1,035	3,652
Oxycodone products	13,199	6.2	20.0	8,022	18,376
Propoxyphene products	2,222	1.0	25.2	1,124	3,319
Nonsteroidal anti-inflammatories (NSAIDs)	18,603	8.7	11.9	14,258	22,947
Tramadol products	2,669	1.3	19.6	1,643	3,695
<i>Respiratory agents</i>	10,593	5.0	14.6	7,560	13,625
Antihistamines	3,369	1.6	17.5	2,216	4,523
Upper respiratory products	4,243	2.0	23.7	2,274	6,212

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Pharmaceuticals were much more common than illicit drugs in suicide attempts:

- Pain relievers were found to be involved in 37.1 percent of drug-related suicide attempts. Narcotic pain relievers accounted for almost half that number (15.5%), and acetaminophen products accounted for about a third (13.5%).
- Benzodiazepines (anti-anxiety drugs) were found to be involved in 28.4 percent of drug-related suicide attempts. Alprazolam (e.g., Xanax) and clonazepam (e.g., Klonopin) each accounted about a third (10.6% and 9.4%, respectively).
- Antidepressants appeared in 19.9 percent of visits. About half (10.5%) of those visits involved SSRI antidepressants such as sertraline (e.g., Zoloft), fluoxetine (e.g., Prozac), and citalopram (e.g., Celexa). Trazodone (e.g., Desyrel®) accounted for about a quarter (5.1%).

- Antipsychotics, as a whole, appeared in 13.5 percent of visits. At 11.0 percent, the newer types of atypical antipsychotics accounted for most of those visits. Quetiapine (e.g., Seroquel®) was the most common atypical antipsychotic (6.5%).

After population size and sampling error are taken into account, the rate of drug-related suicide-attempt visits for females (80.8 visits per 100,000 population) was higher than that for males (56.3 visits per 100,000) (Table 23, Figure 7). In respect to age, rates ranged from 13.4 visits per 100,000 population for those aged 65 or older to 160.1 visits for those aged 18 to 20.

Considering race/ethnicity, 63.6 percent of the suicide attempts involved patients who were White, 15.8 percent were Black, 11.1 percent were Hispanic, 2.6 percent were of other or multiple race/ethnic groups, and 6.9 percent were of unknown race/ethnicity. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

Overall, 77.8 percent of patients attempting drug-related suicide had some form of follow-up. About half (49.9%) were admitted for inpatient hospital care (17.9% were admitted to an intensive or critical care unit [ICU], 12.7% went to a psychiatric unit, and 19.1% went to other units); a quarter (24.8%) were transferred to another health care facility; and 3.0 percent were discharged with a referral to detox/treatment (Table 24). The remainder of patients were either treated and discharged to home (16.0%) or had other outcomes (6.2%).

DAWN only records death as the outcome if the patient died in the ED after admission. DAWN does not record deaths for patients who died prior to admission to the ED or after admission to inpatient units of the hospital or transfer to another facility. Therefore, death as an ED disposition is rarely observed by DAWN.

**Table 23. ED visits involving drug-related suicide attempts, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, suicide attempts (2)</b>	<b>212,736</b>	<b>100.0</b>	<b>68.8</b>
<b>Sex</b>	—	—	—
Male	85,598	40.2	56.3
Female	127,029	59.7	80.8
Unknown	*	*	*
<b>Age</b>	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	23,459	11.0	92.6
18–20 years	21,636	10.2	160.1
21–24 years	23,484	11.0	136.7
25–29 years	25,105	11.8	118.8
30–34 years	22,173	10.4	110.4
35–44 years	41,694	19.6	101.8
45–54 years	35,628	16.7	79.1
55–64 years	13,925	6.5	37.8
65 years and older	5,403	2.5	13.4
Unknown	*	*	*
<b>Race/ethnicity</b>	—	—	—
White	135,331	63.6	—
Black	33,693	15.8	—
Hispanic	23,628	11.1	—
Other or two or more race/ethnicities	5,428	2.6	—
Unknown	14,657	6.9	—

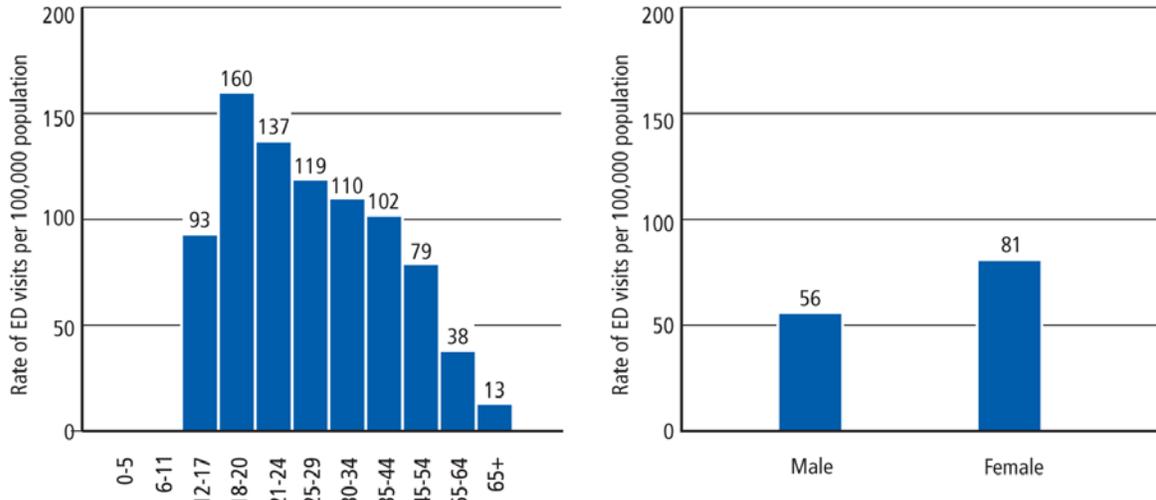
(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 7. Rates of ED visits per 100,000 population involving drug-related suicide attempts, by age and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 24. ED visits involving drug-related suicide attempts, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, suicide attempts (2)</b>	<b>212,736</b>	<b>100.0</b>	<b>68.8</b>
<b>Treated and released</b>	<b>43,348</b>	<b>20.4</b>	<b>14.0</b>
Discharged home	34,006	16.0	11.0
Released to police/jail	2,917	1.4	0.9
Referred to detox/treatment	6,424	3.0	2.1
<b>Admitted to this hospital</b>	<b>106,205</b>	<b>49.9</b>	<b>34.3</b>
ICU/critical care	38,135	17.9	12.3
Surgery	*	*	*
Chemical dependency/detox	*	*	*
Psychiatric unit	27,095	12.7	8.8
Other inpatient unit	40,667	19.1	13.1
<b>Other disposition</b>	<b>63,184</b>	<b>29.7</b>	<b>20.4</b>
Transferred	52,845	24.8	17.1
Left against medical advice	*	*	*
Died	*	*	*
Other	*	*	*
Not documented	1,724	0.8	0.6

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## 6.2 Trends in ED Visits Involving Drug-Related Suicide Attempts, 2004–2010

This section presents the trends in the estimates of drug-related ED visits involving suicide attempts for the period from 2004 through 2010. Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the tables.

With 212,736 visits in 2010, the number of drug-related suicide attempts has been stable from 2004 to 2010 (Table 25). There have been changes, however, in the types of drugs involved. A 95 percent rise in involvement of narcotic pain relievers occurred between 2004 and 2010. Hydrocodone (e.g., Vicodin) and oxycodone (e.g., OxyContin) increased 83 percent and 147 percent, respectively.

A large rise (53%) was also observed between 2004 and 2010 for drugs used to treat anxiety and insomnia. Benzodiazepine involvement in general rose 63 percent, with large increases observed for each of the following drugs: alprazolam (e.g., Xanax), clonazepam (e.g., Klonopin), lorazepam (e.g., Ativan), and zolpidem (e.g., Ambien).

Table 25. Trends in ED visits for drug-related suicide attempts, by selected drugs, 2004–2010

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, suicide attempts (3,4)</b>	<b>161,586</b>	<b>151,568</b>	<b>182,805</b>	<b>197,053</b>	<b>199,469</b>	<b>198,403</b>	<b>212,736</b>	—	—	—
<b>Illicit drugs</b>	<b>34,767</b>	<b>33,787</b>	<b>42,169</b>	<b>37,355</b>	<b>36,735</b>	<b>35,685</b>	37,382	—	—	—
Cocaine	19,520	19,628	26,510	26,462	19,614	17,969	15,721	—	—	—
Heroin	4,579	3,167	4,265	4,444	4,249	5,019	6,017	—	—	—
Marijuana	12,074	11,955	15,272	12,115	17,285	14,176	17,219	—	—	—
Amphetamines/methamphetamine	4,535	5,411	4,829	2,665	2,788	3,429	3,573	—	—	—
<b>Pharmaceuticals</b>	<b>145,496</b>	<b>138,447</b>	<b>169,040</b>	<b>185,270</b>	<b>188,644</b>	<b>186,883</b>	<b>201,519</b>	—	—	—
<i>Anticonvulsants</i>	10,957	9,391	12,580	11,803	14,486	13,299	14,318	—	—	—
<i>Antidepressants</i>	33,366	27,086	36,677	38,870	40,985	36,154	42,276	—	—	—
SSRI antidepressants	18,513	13,377	16,973	18,884	19,988	17,548	22,365	—	—	—
Citalopram	2,115	886	3,047	3,358	3,563	3,810	5,114	142	—	—
Fluoxetine	3,477	3,292	3,923	3,790	5,730	5,307	4,680	—	—	—
Paroxetine	4,509	2,927	2,054	2,071	2,013	1,777	2,563	-43	—	—
Sertraline	4,852	4,109	4,263	5,413	4,197	4,526	5,890	—	—	—
Trazodone	6,995	6,635	9,021	8,014	9,594	8,298	10,870	—	—	—
<i>Antipsychotics</i>	17,807	17,129	22,491	25,479	25,451	23,910	28,618	—	—	—
Atypical antipsychotics	15,016	14,300	19,429	20,250	21,228	20,499	23,507	—	—	—
Quetiapine	8,308	8,649	10,756	14,051	13,522	12,219	13,776	—	—	—
Risperidone	3,255	2,036	2,536	2,367	2,309	2,014	3,464	—	—	—
Lithium	1,832	1,281	1,298	2,751	2,948	2,663	3,830	—	—	—
<i>Anxiolytics, sedatives, and hypnotics</i>	52,657	52,022	68,180	72,637	78,990	77,623	80,748	53	—	—
Barbiturates	1,948	1,219	2,031	1,663	1,480	1,605	452	-77	—	-72
Benzodiazepines	36,995	35,676	50,431	53,509	55,823	56,851	60,318	63	—	—
Alprazolam	11,354	14,530	15,633	19,167	21,220	23,250	22,473	98	—	—
Clonazepam	9,402	9,064	14,173	14,455	14,571	16,060	20,033	113	—	—
Diazepam	4,630	3,968	5,909	6,912	5,313	6,120	6,236	—	—	—
Lorazepam	6,065	5,182	6,682	9,527	9,973	9,897	10,605	75	—	—
Diphenhydramine	7,461	6,583	7,759	7,618	8,414	8,384	7,195	—	—	—
Hydroxyzine	2,346	1,795	1,956	2,027	3,310	2,843	2,714	—	—	—
Zolpidem	4,355	4,972	6,674	7,405	9,533	10,815	11,092	155	—	—
<i>Cardiovascular agents</i>	7,667	5,814	7,963	7,873	13,012	10,662	14,291	86	—	34
Alpha agonists, central	995	912	1,929	790	1,715	1,204	2,317	—	—	—
Beta blockers	2,105	1,916	1,999	2,501	5,094	3,829	3,571	—	—	—
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	1,654	1,938	1,951	2,273	3,255	3,376	4,404	—	—	—

Table 25. Trends in ED visits for drug-related suicide attempts, by selected drugs, 2004–2010 (continued)

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Gastrointestinal agents</i>	2,276	2,542	2,236	2,010	3,606	3,040	3,643	—	—	—
<i>Hormones</i>	1,123	533	1,573	2,016	2,161	2,021	2,359	—	—	—
<i>Metabolic agents</i>	2,145	3,048	3,720	2,252	3,181	4,918	5,305	147	67	—
Antidiabetic agents	1,841	2,580	2,941	1,438	2,749	3,602	3,498	90	—	—
<i>Muscle relaxants</i>	5,921	5,785	7,072	9,772	8,053	8,350	11,210	89	—	34
Carisoprodol	1,864	2,038	3,811	4,301	3,452	2,516	4,158	123	—	—
Cyclobenzaprine	2,966	2,784	2,096	3,839	3,438	3,955	4,621	—	—	—
<i>Pain relievers</i>	61,097	54,860	67,625	78,948	74,598	75,547	78,830	—	—	—
Acetaminophen products	20,703	21,019	25,312	29,861	26,406	24,072	28,747	—	—	—
Aspirin products	6,211	4,645	5,403	5,980	5,480	6,892	4,861	—	—	-29
Narcotic pain relievers	16,930	17,803	24,470	29,886	26,817	29,595	32,987	95	—	—
Codeine products	1,752	2,656	2,349	1,637	2,315	1,512	2,433	—	—	—
Hydrocodone products	7,034	7,035	8,998	13,238	11,676	13,701	12,863	83	—	—
Morphine products	714	1,210	*	1,690	1,161	1,423	2,343	—	102	—
Oxycodone products	5,342	4,229	7,842	9,351	8,760	10,945	13,199	147	—	—
Propoxyphene products	1,888	2,129	2,811	1,754	1,559	1,410	2,222	—	—	—
Nonsteroidal anti-inflammatories (NSAIDs)	19,114	14,117	15,956	18,810	18,658	19,127	18,603	—	—	—
<i>Respiratory agents</i>	8,363	7,747	8,415	10,178	9,153	7,807	10,593	—	—	—
Antihistamines	2,059	1,650	1,627	3,813	2,979	2,475	3,369	—	—	—
Upper respiratory products	4,820	4,289	3,982	4,067	4,641	3,166	4,243	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.



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## 7. SEEKING DETOX SERVICES

### 7.1 ED Visits Involving Seeking Detox Services, 2010

The category of visits referred to as “seeking detox” includes nonemergency requests for admission for detoxification and visits to obtain medical clearance before entry to a detox program as well as acute emergencies in which an individual is experiencing withdrawal symptoms and seeking detox.<sup>22</sup> Because detox may be sought through other avenues (e.g., direct admission to a hospital, services provided through private clinics, entry into programs outside the community), the overall demand for detox services is most likely higher than suggested by DAWN estimates.

DAWN estimates that there were 232,542 drug-related ED visits for patients seeking detox or substance abuse treatment services during 2009 (Table 26). Visits for almost three quarters (67.8%) of patients seeking detox involved multiple drugs. On average, 29.8 percent of visits associated with seeking detox involved alcohol.<sup>23</sup> Cocaine was observed in 27.6 percent of visits, heroin in 26.7 percent, marijuana in 18.5 percent, and amphetamines/methamphetamine in 5.9 percent. Other illicit drugs were seen at lower levels. Among pharmaceuticals, narcotic pain relievers were observed in 45.4 percent of visits, including oxycodone at 28.8 percent. Benzodiazepines (anti-anxiety drugs) were observed in 23.1 percent of visits, with alprazolam (e.g., Xanax) at 12.2 percent and clonazepam (e.g., Klonopin) at 2.8 percent.

When population size and sampling error are taken into account, the rate of seeking detox visits for males (99.2 per 100,000 population) was higher than that for females (51.9 per 100,000 population) (Table 27, Figure 8). Rates of seeking detox visits were over 100 visits per 100,000 population for those aged 18 to 44, peaking at 206.7 for those aged 21 to 24.

In terms of race/ethnicity, the majority (76.8%) of seeking detox visits involved patients who were White, and 14.3 percent were Black. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing in ED records.

Nearly 60 percent (58.1%) of ED patients classified as seeking detox obtained some follow-up: 32.2 percent were admitted to the hospital, 17.3 percent were referred to detox/treatment services, and 8.6 percent were transferred to another facility (Table 28). The plurality of those admitted to the hospital were sent to the chemical dependency/detox unit. The remaining patients were treated and discharged home (31.1%) or had other outcomes.

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<sup>22</sup> Some detox programs, in the hospital or the community, require medical clearance before a person can be admitted to a program. Medical clearance establishes whether a person has any special medical needs (e.g., person is diabetic and needs insulin) or is not suitable to mingle with other patients in the program (e.g., person has an infectious disease or is mentally unstable).

<sup>23</sup> The role of alcohol may be underrepresented here because, for patients aged 21 and older, DAWN captures alcohol use only when it is combined with the use of other drugs.

**Table 26. ED visits involving seeking detox services, by selected drugs, 2010**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, seeking detox (2,3)</b>	<b>232,542</b>	<b>100.0</b>	<b>24.3</b>	<b>121,967</b>	<b>343,116</b>
Single drug	74,846	32.2	22.3	42,135	107,556
Multiple drugs	157,696	67.8	25.5	78,736	236,656
Alcohol involved	69,398	29.8	15.9	47,727	91,069
<b>Illicit drugs</b>	<b>141,837</b>	<b>61.0</b>	<b>17.7</b>	<b>92,531</b>	<b>191,144</b>
Cocaine	64,211	27.6	17.6	42,077	86,345
Heroin	62,078	26.7	13.6	45,576	78,581
Marijuana	43,040	18.5	27.9	19,497	66,583
Amphetamines/methamphetamine	13,633	5.9	32.7	4,887	22,380
Amphetamines	3,611	1.6	40.2	766	6,456
Methamphetamine	10,125	4.4	32.3	3,720	16,531
MDMA (Ecstasy)	1,686	0.7	40.1	361	3,011
GHB	*	*	*	*	*
Flunitrazepam (Rohypnol)	*	*	*	*	*
Ketamine	*	*	*	*	*
LSD	*	*	*	*	*
PCP	1,309	0.6	40.5	271	2,347
Inhalants	*	*	*	*	*
<b>Pharmaceuticals</b>	<b>150,505</b>	<b>64.7</b>	<b>36.3</b>	<b>43,520</b>	<b>257,489</b>
<i>Anxiolytics, sedatives, and hypnotics</i>	55,482	23.9	38.3	13,817	97,147
Barbiturates	*	*	*	*	*
Benzodiazepines	53,830	23.1	39.1	12,617	95,042
Alprazolam	28,396	12.2	46.9	2,274	54,519
Clonazepam	6,478	2.8	27.2	3,030	9,927
Diazepam	3,711	1.6	33.7	1,261	6,160
<i>Cardiovascular agents</i>	634	0.3	47.4	45	1,223
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	1,288	0.6	32.5	467	2,110
<i>Muscle relaxants</i>	2,192	0.9	37.5	580	3,804
<i>Pain relievers</i>	121,456	52.2	39.1	28,357	214,554
Opiates/opioids	118,527	51.0	38.9	28,165	208,888
Narcotic pain relievers	105,684	45.4	38.8	25,400	185,967
Fentanyl products	2,766	1.2	34.9	875	4,657
Hydrocodone products	30,288	13.0	49.0	1,195	59,380
Hydromorphone products	3,731	1.6	38.4	920	6,543
Methadone	16,868	7.3	46.4	1,525	32,211
Morphine products	6,134	2.6	26.4	2,966	9,302
Oxycodone products	67,079	28.8	37.6	17,607	116,552

**Table 26. ED visits involving seeking detox services, by selected drugs, 2010 (continued)**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<i>Psychotherapeutic agents</i>	3,663	1.6	45.0	433	6,893
Antidepressants	1,410	0.6	40.3	297	2,523
Respiratory agents	1,215	0.5	42.0	215	2,214

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. NOS = not otherwise specified. RSE = relative standard error. An asterisk (\*) indicates that an estimate with an RSE greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 27. ED visits involving seeking detox services, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, seeking detox (2)</b>	<b>232,542</b>	<b>100.0</b>	<b>75.2</b>
<b>Sex</b>	—	—	—
Male	150,954	64.9	99.2
Female	81,576	35.1	51.9
Unknown	*	*	*
<b>Age</b>	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	3,048	1.3	12.0
18–20 years	22,140	9.5	163.8
21–24 years	35,508	15.3	206.7
25–29 years	43,310	18.6	205.0
30–34 years	28,178	12.1	140.3
35–44 years	50,308	21.6	122.9
45–54 years	38,511	16.6	85.5
55–64 years	10,375	4.5	28.2
65 years and older	1,124	0.5	2.8
Unknown	*	*	*
<b>Race/ethnicity</b>	—	—	—
White	178,478	76.8	—
Black	33,164	14.3	—
Hispanic	9,841	4.2	—
Other or two or more race/ethnicities	807	0.3	—
Unknown	10,251	4.4	—

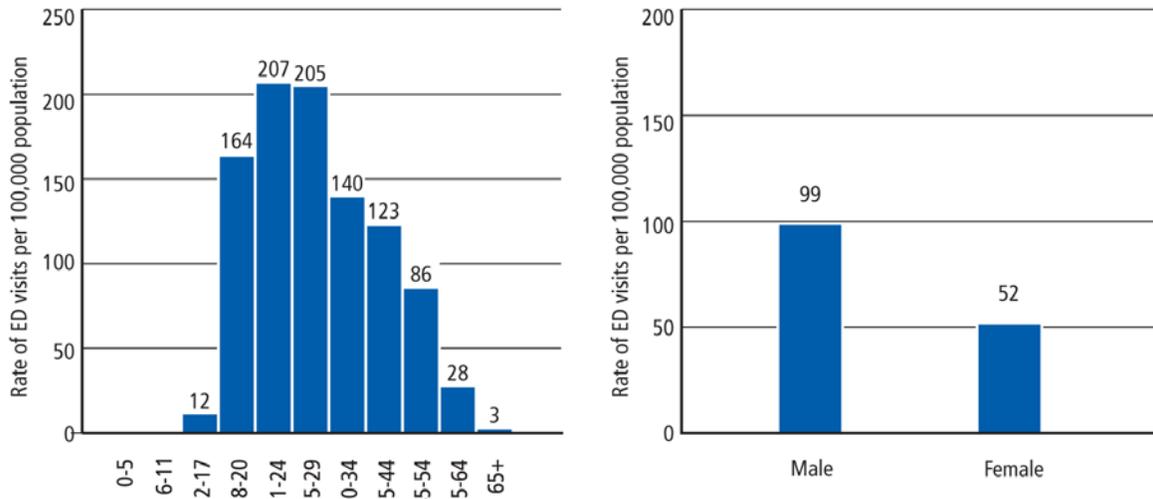
(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 8. Rates of ED visits per 100,000 population involving seeking detox services, by age and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 28. ED visits involving seeking detox services, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, seeking detox (2)</b>	<b>232,542</b>	<b>100.0</b>	<b>75.2</b>
<b>Treated and released</b>	<b>113,113</b>	<b>48.6</b>	<b>36.6</b>
Discharged home	72,406	31.1	23.4
Released to police/jail	*	*	*
Referred to detox/treatment	40,321	17.3	13.0
<b>Admitted to this hospital</b>	<b>74,993</b>	<b>32.2</b>	<b>24.2</b>
ICU/critical care	1,061	0.5	0.3
Surgery	*	*	*
Chemical dependency/detox	32,731	14.1	10.6
Psychiatric unit	14,234	6.1	4.6
Other inpatient unit	*	*	*
<b>Other disposition</b>	<b>44,435</b>	<b>19.1</b>	<b>14.4</b>
Transferred	19,930	8.6	6.4
Left against medical advice	5,459	2.3	1.8
Died	*	*	*
Other	7,789	3.3	2.5
Not documented	*	*	*

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## **7.2 Trends in ED Visits Involving Seeking Detox Services, 2004–2010**

This section presents the trends in the estimates of ED visits involving seeking detox services for the period from 2004 through 2010 (Table 29). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

While ED visits by patients seeking detox for illicit drugs did not change significantly either in the long term or short term, a short-term increase of 22 percent between 2009 and 2010 was observed for pharmaceutical involvement. A major contributor to the increase were pain relievers, which saw a 34 percent increase; specifically, oxycodone-related ED visits increased 47 percent between 2009 and 2010.

Table 29. Trends in ED visits involving seeking detox services, by selected drugs, 2004–2010

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, seeking detox (3,4)</b>	<b>141,867</b>	<b>126,226</b>	<b>118,355</b>	<b>139,908</b>	<b>177,879</b>	<b>205,407</b>	<b>232,542</b>	—	—	—
<b>Illicit drugs</b>	<b>110,798</b>	<b>101,250</b>	<b>92,387</b>	<b>106,662</b>	<b>124,375</b>	<b>131,163</b>	<b>141,837</b>	—	—	—
Cocaine	62,989	56,061	57,738	65,124	68,824	60,076	64,211	—	—	—
Heroin	47,035	40,895	34,464	42,242	51,932	58,233	62,078	—	—	—
Marijuana	25,965	22,486	22,104	25,970	32,887	37,513	43,040	—	—	—
Amphetamines/methamphetamine	11,760	15,402	8,128	7,161	12,418	11,085	13,633	—	—	—
Amphetamines	*	*	2,034	979	2,658	2,699	3,611	—	—	—
Methamphetamine	*	*	6,211	6,287	9,908	9,580	10,125	—	—	—
MDMA (Ecstasy)	882	511	483	654	775	1,042	1,686	—	—	—
GHB	*	*	*	*	*	*	*	—	—	—
Flunitrazepam (Rohypnol)	*	*	*	*	*	*	*	—	—	—
Ketamine	*	*	*	*	*	*	*	—	—	—
LSD	*	*	*	*	71	*	*	—	—	—
PCP	827	729	989	*	1,478	1,134	1,309	—	—	—
Inhalants	*	*	*	*	*	*	*	—	—	—
<b>Pharmaceuticals</b>	<b>48,646</b>	<b>44,727</b>	<b>44,457</b>	<b>59,660</b>	<b>94,949</b>	<b>123,080</b>	<b>150,505</b>	—	—	<b>22</b>
<i>Anxiolytics, sedatives, and hypnotics</i>	15,748	16,533	16,799	20,365	42,178	49,768	55,482	—	—	—
Barbiturates	852	684	530	722	551	766	*	—	—	—
Benzodiazepines	14,717	15,734	15,801	19,301	41,576	48,769	53,830	—	—	—
Alprazolam	6,061	6,253	7,063	9,138	*	27,647	28,396	—	—	—
Clonazepam	1,510	1,805	2,119	2,635	5,683	8,475	6,478	329	—	—
Diazepam	2,975	2,058	1,431	3,172	*	3,019	3,711	—	—	—
Lorazepam	1,012	987	1,479	1,980	2,847	2,437	*	—	—	—
Temazepam	*	*	*	*	*	*	*	—	—	—
<i>Cardiovascular agents</i>	*	285	302	632	227	90	634	—	—	—
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	*	829	589	1,049	*	1,994	1,288	—	—	—
<i>Muscle relaxants</i>	1,356	1,204	1,214	1,701	1,381	2,332	2,192	—	—	—

Table 29. Trends in ED visits involving seeking detox services, by selected drugs, 2004–2010 (continued)

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Pain relievers</i>	34,730	30,114	31,797	42,785	69,604	90,381	121,456	—	—	34
Opiates/opioids	33,296	29,330	30,893	41,250	65,632	87,670	118,527	—	—	35
Narcotic pain relievers	29,894	25,550	26,987	37,049	58,491	78,426	105,684	—	—	35
Fentanyl products	704	1,265	1,054	1,359	1,126	1,644	2,766	293	—	—
Hydrocodone products	8,114	8,929	8,092	10,425	21,595	*	30,288	—	—	—
Hydromorphone products	962	617	*	*	1,447	3,184	3,731	—	—	—
Methadone	8,109	4,172	5,294	6,886	10,022	*	16,868	—	—	—
Morphine products	1,638	2,399	3,002	3,341	5,066	3,597	6,134	275	—	—
Oxycodone products	15,917	14,028	14,831	18,905	34,306	45,591	67,079	—	96	47
<i>Psychotherapeutic agents</i>	1,419	1,380	1,364	1,654	3,671	2,267	3,663	—	—	—
Antidepressants	1,024	1,195	1,141	1,314	1,894	1,769	1,410	—	—	—
<i>Respiratory agents</i>	*	*	*	*	348	*	1,215	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both cocaine and marijuana will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

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## 8. ADVERSE REACTIONS TO PHARMACEUTICALS

### 8.1 ED Visits Involving Adverse Reactions to Pharmaceuticals, 2010

Adverse reactions to pharmaceuticals are a growing problem in the United States. It is likely that there are multiple causes contributing to increases in adverse reactions. Some portion may be associated with the greater number of prescriptions being written and more people taking prescription drugs as part of their medical care. Additionally, people of all ages are increasingly being prescribed multiple drugs simultaneously, which, in turn, increases the possibility for unintended interactions. This is particularly common among older populations who are placed on long-term medication for chronic conditions, and the number of older persons in the nation is growing.<sup>24</sup> While it is beyond the scope of this report to assess the precise impact of these different causes, DAWN data provide insight concerning the number and characteristics of medical emergencies resulting from the recent use of prescription drugs, over-the-counter pharmaceuticals, or other therapeutic substances used as prescribed or indicated. Included in DAWN are ED visits related to side effects, drug-drug interactions, and drug-alcohol interactions. Visits involving illicit drug abuse, alcohol abuse, or documented misuse of pharmaceuticals are excluded from this grouping.<sup>25</sup>

As with all ED visits that DAWN considers to be drug related, the involvement of a drug must be documented in the ED records. If the relationship between a drug and an adverse reaction is not recognized, a visit will not be considered drug related and will not be captured by DAWN. Also, adverse reactions that are identified in different medical settings (e.g., during a visit to the doctor's office or while a patient is already hospitalized) will not be captured by DAWN. Therefore, the total number of people experiencing adverse drug reactions is greater than reported by DAWN.

For 2010, DAWN estimates that 2,329,221 ED visits (Table 30), or 752.8 visits per 100,000 population (Table 31), involved adverse reactions to prescription medicines, over-the-counter drugs, or other types of pharmaceuticals. This represents just under half (47.4%) of all drug-related ED visits. About one in five (18.8%) involved multiple drugs. Alcohol was a contributing factor in just 1.3 percent of adverse reaction visits.

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<sup>24</sup> Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Behavioral Health Statistics and Quality (CBHSQ). (2011). *The DAWN Report: Emergency department visits involving adverse reactions to medications among older adults*. Rockville, MD.

<sup>25</sup> While adverse reactions are typically limited to pharmaceuticals, a small number involve drugs classified as illicit by DAWN for which there are legitimate medicinal uses (e.g., nitrous oxide when used by a dentist for sedation; cocaine when used as a topical anesthetic for eye surgery).

**Table 30. ED visits involving adverse reaction to pharmaceuticals, 2010**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, adverse reaction (2,3)</b>	<b>2,329,221</b>	<b>100.0</b>	<b>6.1</b>	<b>2,048,969</b>	<b>2,609,473</b>
Single drug	1,891,676	81.2	6.1	1,664,765	2,118,587
Multiple drugs	437,545	18.8	7.6	372,668	502,423
Alcohol present	29,181	1.3	13.6	21,410	36,951
<b>Pharmaceuticals</b>	<b>2,329,221</b>	<b>100.0</b>	<b>6.1</b>	<b>2,048,969</b>	<b>2,609,473</b>
<i>Anticonvulsants</i>	81,954	3.5	7.3	70,156	93,751
<i>Antidepressants</i>	102,369	4.4	6.7	88,955	115,783
<i>Anti-infectives</i>	506,119	21.7	5.7	449,672	562,565
Amebicides	23,372	1.0	15.9	16,105	30,638
Cephalosporins	54,007	2.3	9.8	43,595	64,418
Lincomycin derivatives	22,412	1.0	11.5	17,376	27,448
Macrolide derivatives	50,656	2.2	6.5	44,166	57,145
Penicillins	136,711	5.9	8.8	113,037	160,384
Quinolones	69,521	3.0	10.1	55,776	83,266
Sulfonamides	85,905	3.7	6.5	74,911	96,898
Tetracyclines	26,625	1.1	9.4	21,708	31,543
<i>Antineoplastics (chemotherapy drugs)</i>	124,589	5.3	20.3	74,976	174,202
<i>Antipsychotics</i>	84,842	3.6	5.4	75,903	93,782
Atypical antipsychotics	55,068	2.4	5.5	49,079	61,058
Quetiapine	22,250	1.0	11.4	17,294	27,205
Risperidone	8,769	0.4	11.4	6,805	10,734
<i>Anxiolytics, sedatives, and hypnotics</i>	102,125	4.4	7.4	87,278	116,972
Benzodiazepines	59,055	2.5	7.4	50,516	67,595
Zolpidem	19,487	0.8	10.2	15,586	23,388
<i>Cardiovascular agents</i>	242,190	10.4	9.0	199,322	285,059
ACE inhibitors	69,196	3.0	9.1	56,787	81,605
Beta blockers	59,842	2.6	12.3	45,403	74,282
Calcium channel blocking agents	27,233	1.2	12.3	20,667	33,798
Diuretics	44,809	1.9	13.7	32,758	56,860
<i>Coagulation modifiers</i>	183,648	7.9	9.1	150,898	216,397
Anticoagulants	157,911	6.8	8.9	130,228	185,595
Antiplatelet agents	25,818	1.1	15.9	17,751	33,885
<i>Gastrointestinal agents</i>	80,623	3.5	8.4	67,301	93,945
Laxatives	25,729	1.1	11.5	19,920	31,537
<i>Herbal and nutraceutical products (alternative medicines)</i>	15,123	0.6	16.4	10,275	19,971
<i>Hormones</i>	123,709	5.3	8.3	103,661	143,758
Adrenal cortical steroids	52,753	2.3	10.7	41,727	63,778
Sex hormones	29,543	1.3	8.3	24,738	34,347

**Table 30. ED visits involving adverse reaction to pharmaceuticals, 2010 (continued)**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<i>Immunologic agents</i>	94,537	4.1	9.0	77,815	111,259
Viral vaccines	38,060	1.6	9.6	30,923	45,197
<i>Metabolic agents</i>	177,848	7.6	12.0	136,008	219,688
Antidiabetic agents	145,530	6.2	13.8	106,053	185,007
Antihyperlipidemic agents	29,123	1.3	10.0	23,442	34,804
<i>Muscle relaxants</i>	28,265	1.2	8.3	23,675	32,855
<i>Nutritional products</i>	76,679	3.3	7.9	64,863	88,496
<i>Pain relievers</i>	379,260	16.3	5.9	335,586	422,934
Acetaminophen products	26,178	1.1	7.2	22,481	29,875
Aspirin products	38,997	1.7	12.6	29,251	48,744
Narcotic pain relievers	207,322	8.9	6.5	180,863	233,780
Hydrocodone products	83,518	3.6	8.6	69,420	97,616
Oxycodone products	57,223	2.5	10.6	45,368	69,079
Nonsteroidal anti-inflammatories (NSAIDs)	79,248	3.4	8.2	66,447	92,049
Tramadol products	25,887	1.1	7.4	22,132	29,643
<i>Radiologic agents</i>	16,396	0.7	13.0	12,207	20,585
<i>Respiratory agents</i>	82,132	3.5	5.4	73,491	90,774
<i>Topical agents</i>	61,035	2.6	8.3	51,142	70,928

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both penicillin and tramadol will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. RSE = relative standard error.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

With reference to the specific types of drugs involved, adverse reactions show a very different pattern from nonmedical use of pharmaceuticals. Whereas nonmedical use clusters around certain types of drugs (e.g., 30.7% of nonmedical use visits involve a narcotic pain reliever, with oxycodone being the most commonly involved at 12.5%), adverse reactions involve a wider variety of drugs found at lower levels. For example, narcotic pain relievers accounted for only 8.9 percent of adverse reaction visits, and while oxycodone is still one of the more commonly found narcotic pain relievers, it was involved in just 2.5 percent of visits.

Drugs more often involved in adverse reaction visits are therapeutic medications used to treat common medical conditions. For example, anti-infectives (e.g., antibiotics) were found in

21.7 percent of adverse reaction visits, cardiovascular agents in 10.4 percent, coagulation modifiers in 7.9 percent, metabolic agents in 7.6 percent, antidiabetic agents in 6.2 percent, and antineoplastics (chemotherapy drugs) in 5.3 percent. Among anti-infectives, penicillins were involved in 5.9 percent of adverse reaction visits, followed by sulfonamides (e.g., sulfa drugs) at 3.7 percent, quinolones (e.g., Cipro<sup>®</sup>) at 3.0 percent, cephalosporins (e.g., Keflex<sup>®</sup>) at 2.3 percent, and macrolides (e.g., Zithromax<sup>®</sup>) at 2.2 percent. Cardiovascular agents appearing most often were angiotensin-converting enzyme (ACE) inhibitors (e.g., Prinivil<sup>®</sup>, Zestril<sup>®</sup>) at 3.0 percent, and beta blockers (e.g., Lopressor<sup>®</sup>, Toprol XL<sup>®</sup>) at 2.6 percent. The coagulation modifiers more commonly seen were blood thinners, such as coumarins (e.g., Coumadin<sup>®</sup>), at 6.5 percent. Insulin was the most common antidiabetic agent.

Antidepressants and antipsychotics were observed in 4.4 and 3.6 percent of visits, respectively. Drugs used to treat insomnia and anxiety were evident in 4.4 percent of adverse reaction visits, with benzodiazepines being the most common among those drugs (2.5%). Among non-narcotic pain relievers, nonsteroidal anti-inflammatories (e.g., ibuprofen and naproxen products) were in evidence in 3.4 percent of adverse reaction visits, aspirin in 1.7 percent, and acetaminophen in 1.1 percent.

When population size and sampling error were taken into account, women had notably more visits than men (909.3 and 590.2 visits per 100,000 population, respectively; Table 31, Figure 9). For children aged 5 and under, the rate of ED visits for adverse reactions was 736.0 visits per 100,000 population. The rate dropped to a low of 231.8 visits for children aged 6 to 11 and then rose consistently to reach a high of 1,678.9 visits for patients aged 65 or older.

In terms of race and ethnicity, 65.5 percent of visits related to adverse reaction to pharmaceuticals involved patients who were White, 14.1 percent were Black, and 10.2 percent were Hispanic. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

About three quarters (75.6%) of patients were treated and released (Table 32). About a fifth (20.7%) of patients were admitted to the hospital, and the remainder (3.7%) had other outcomes.

**Table 31. ED visits and rates involving adverse reaction to pharmaceuticals, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, adverse reaction (2)</b>	<b>2,329,221</b>	<b>100.0</b>	<b>752.8</b>
<b>Sex</b>	—	—	—
Male	897,914	38.5	590.2
Female	1,430,179	61.4	909.3
Unknown	1,128	0.0	—
<b>Age</b>	—	—	—
0–5 years	179,262	7.7	736.0
6–11 years	56,946	2.4	231.8
12–17 years	70,527	3.0	278.5
18–20 years	74,424	3.2	550.6
21–24 years	106,721	4.6	621.2
25–29 years	134,864	5.8	638.3
30–34 years	129,791	5.6	646.3
35–44 years	269,650	11.6	658.6
45–54 years	323,798	13.9	719.0
55–64 years	303,503	13.0	824.6
65 years and older	679,160	29.2	1,678.9
Unknown	575	0.0	—
<b>Race/ethnicity</b>	—	—	—
White	1,525,370	65.5	—
Black	327,749	14.1	—
Hispanic	236,752	10.2	—
Other or two or more race/ethnicities	63,793	2.7	—
Unknown	175,558	7.5	—

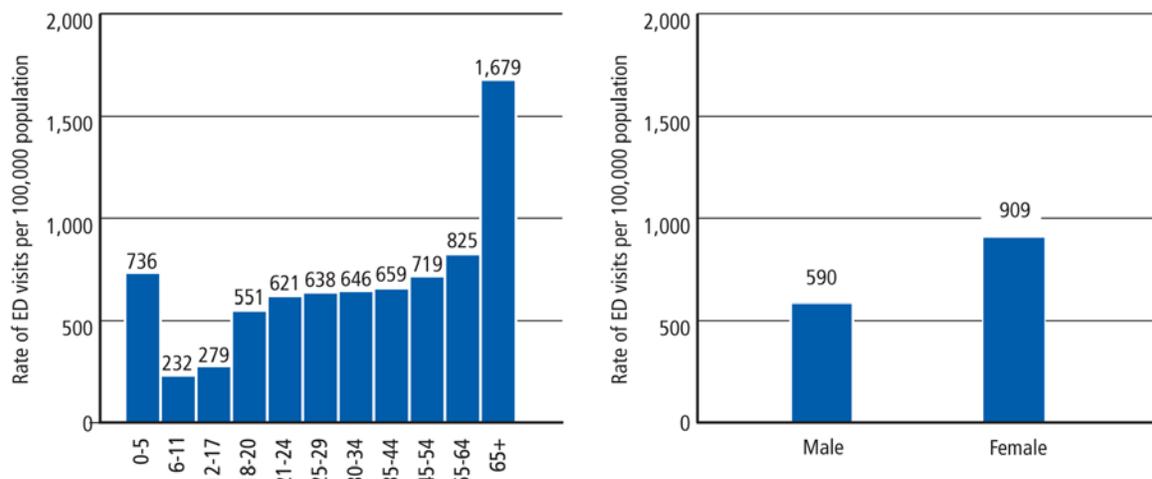
(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Figure 9. Rates of ED visits per 100,000 population involving adverse reaction to pharmaceuticals, by age and sex, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 32. ED visits and rates involving adverse reaction to pharmaceuticals, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, adverse reaction (2)</b>	<b>2,329,221</b>	<b>100.0</b>	<b>752.8</b>
<b>Treated and released</b>	<b>1,761,024</b>	<b>75.6</b>	<b>569.2</b>
Discharged home	1,754,973	75.3	567.2
Released to police/jail	3,659	0.2	1.2
Referred to detox/treatment	2,391	0.1	0.8
<b>Admitted to this hospital</b>	<b>483,011</b>	<b>20.7</b>	<b>156.1</b>
ICU/critical care	40,453	1.7	13.1
Surgery	*	*	*
Chemical dependency/detox	*	*	*
Psychiatric unit	7,518	0.3	2.4
Other inpatient unit	424,731	18.2	137.3
<b>Other disposition</b>	<b>85,187</b>	<b>3.7</b>	<b>27.5</b>
Transferred	35,384	1.5	11.4
Left against medical advice	13,087	0.6	4.2
Died	561	0.0	0.2
Other	10,444	0.4	3.4
Not documented	*	*	*

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## 8.2 Trends in ED Visits Involving Adverse Reaction to Pharmaceuticals, 2005–2010

This section presents the trends in the estimates of ED visits involving adverse reactions for the period from 2005 through 2010 (Table 33). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2005 (long-term trends) and for 2008 and 2010 (short-term trends).<sup>26</sup> Only statistically significant changes are discussed and displayed in the table.

ED visits resulting from adverse reactions to pharmaceuticals increased 86 percent in the period from 2005 to 2010, rising from about 1.3 million visits to over 2.3 million visits. Noteworthy drugs and trends include the following:

- Anti-anxiety drugs and sleeping aids saw a 108 percent increase since 2005 for a total of 102,125 ED visits in 2010. Zolpidem (e.g., Ambien) saw the largest rate of increase (219%) and a high level of involvement (19,487 visits). With 13,000 to 18,000 visits, other drugs with significant increases included alprazolam, clonazepam, and lorazepam.
- Antidepressants saw a 119 percent increase for a total of 102,369 ED visits.
- Anticonvulsants saw an 85 percent increase for a total of 81,954 ED visits.
- Antidiabetic drugs (e.g., insulin, biguanides, sulfonylureas) saw an 87 percent increase for a total of 145,530 ED visits.
- Anti-infectives (e.g., antibiotics) saw a 65 percent increase for a total of 506,119 ED visits. The most commonly involved anti-infectives in 2010 were penicillins (136,711 visits), quinolones (69,521 visits), cephalosporins (54,007 visits), and macrolide derivatives (50,656 visits). Antibiotics with increasing involvement include sulfonamides, whose involvement rose 133 percent, reaching 85,905 visits. Other anti-infectives experiencing smaller yet significant increases in involvement were amebicides, lincomycin derivatives, and tetracyclines.
- Antineoplastics (chemotherapy drugs) saw a 157 percent increase for a total of 124,589 ED visits.
- Antipsychotics saw a 110 percent increase for a total of 84,842 ED visits; atypical antipsychotics—in particular, quetiapine—contributed to that rise.
- Cardiovascular agents rose 108 percent for a total of 242,190 visits. Drugs that had significant increases and appeared at higher levels included ACE inhibitors, beta blockers, calcium channel blockers, and diuretics.
- Hormone-based drugs saw a 148 percent increase for a total of 123,709 ED visits; adrenal cortical steroids (e.g., anti-inflammatory drugs), sex hormones (e.g., contraceptives), and thyroid hormones were contributors to the rise.
- Immunological drugs (e.g., bacterial and viral vaccines) saw a 157 percent increase for a total of 94,537 ED visits.

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<sup>26</sup> Due to data limitations in 2004, long-term trends for adverse reaction visits are assessed for the period from 2005 through 2010, not 2004 through 2010.

- Nutritional products—including minerals and electrolytes products, oral nutritional supplements, and vitamins—saw a 185 percent increase for a total of 76,679 ED visits.
- Pain relievers, as a general category, saw a 70 percent increase for a total of 379,260 ED visits. Narcotic pain relievers in general rose 78 percent, with hydrocodone products rising 98 percent and oxycodone products rising 101 percent.

Table 33. Trends in ED visits involving adverse reaction to pharmaceuticals, by selected drugs, 2005–2010

Drug category and selected drugs (1)	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2005, 2010 (2,3)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, adverse reaction (4,5)</b>	<b>1,250,377</b>	<b>1,526,010</b>	<b>1,908,928</b>	<b>2,157,128</b>	<b>2,287,273</b>	<b>2,329,221</b>	<b>86</b>	<b>—</b>	<b>—</b>
<b>Pharmaceuticals</b>	1,250,377	1,526,010	1,908,928	2,157,128	2,287,273	2,329,221	86	—	—
<i>Anticonvulsants</i>	44,281	59,924	73,256	83,018	86,835	81,954	85	—	—
<i>Antidepressants</i>	46,693	65,452	76,216	84,600	91,391	102,369	119	—	—
<i>Anti-infectives</i>	306,258	367,256	426,738	487,885	477,151	506,119	65	—	—
<i>Amebicides</i>	7,895	11,875	14,814	17,459	16,626	23,372	196	—	—
<i>Cephalosporins</i>	38,442	44,794	48,713	53,648	52,408	54,007	—	—	—
<i>Lincomycin derivatives</i>	8,824	11,966	19,436	20,529	23,867	22,412	154	—	—
<i>Macrolide derivatives</i>	39,981	42,982	42,478	47,074	48,960	50,656	—	—	—
<i>Penicillins</i>	97,308	104,693	122,910	134,340	128,283	136,711	—	—	—
<i>Quinolones</i>	46,791	59,683	65,308	76,114	67,151	69,521	49	—	—
<i>Sulfonamides</i>	36,868	47,622	59,681	75,391	75,904	85,905	133	—	—
<i>Tetracyclines</i>	10,200	16,476	18,662	18,226	21,688	26,625	161	46	—
<i>Antineoplastics (chemotherapy drugs)</i>	48,569	51,273	70,618	94,805	105,086	124,589	157	—	—
<i>Antipsychotics</i>	40,330	55,941	65,818	75,531	79,002	84,842	110	—	—
<i>Atypical antipsychotics</i>	25,662	39,542	40,038	51,803	49,619	55,068	115	—	—
<i>Quetiapine</i>	8,063	12,622	13,825	15,818	16,654	22,250	176	—	—
<i>Risperidone</i>	7,259	11,837	7,787	11,330	10,539	8,769	—	—	—
<i>Anxiolytics, sedatives, and hypnotics</i>	49,038	57,467	79,269	100,700	104,332	102,125	108	—	—
<i>Benzodiazepines</i>	25,520	33,482	48,129	61,880	63,494	59,055	131	—	—
<i>Zolpidem</i>	6,111	6,680	12,417	16,188	19,951	19,487	219	—	—

Table 33. Trends in ED visits involving adverse reaction to pharmaceuticals, by selected drugs, 2005–2010 (continued)

Drug category and selected drugs (1)	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2005, 2010 (2,3)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Cardiovascular agents</i>	116,278	170,231	207,342	238,169	247,994	242,190	108	—	—
ACE inhibitors	27,100	38,781	53,707	69,041	72,219	69,196	155	—	—
Beta blockers	24,669	40,653	56,551	54,778	58,179	59,842	143	—	—
Calcium channel blocking agents	12,742	18,200	22,935	22,926	30,354	27,233	114	—	—
Diuretics	19,023	33,779	42,425	46,008	44,745	44,809	136	—	—
<i>Coagulation modifiers</i>	121,062	143,412	194,329	220,473	217,347	183,648	—	-17	—
Anticoagulants	108,180	125,687	167,929	189,574	194,696	157,911	—	-17	-19
Antiplatelet agents	13,756	20,831	29,938	33,043	26,078	25,818	—	—	—
<i>Gastrointestinal agents</i>	36,070	50,170	61,582	72,763	82,664	80,623	124	—	—
Laxatives	8,850	11,980	15,929	23,604	23,278	25,729	191	—	—
<i>Herbal and nutraceutical products (alternative medicines)</i>	6,738	6,326	9,654	11,852	12,340	15,123	124	—	—
<i>Hormones</i>	49,979	70,770	89,722	104,168	114,651	123,709	148	—	—
Adrenal cortical steroids	29,506	37,292	44,431	44,756	49,403	52,753	79	—	—
Sex hormones	7,661	11,196	17,503	23,147	26,293	29,543	286	—	—
<i>Immunologic agents</i>	36,733	50,065	64,139	82,291	100,403	94,537	157	—	—
Viral vaccines	13,372	18,817	21,535	29,324	52,625	38,060	185	—	-28
<i>Metabolic agents</i>	95,665	136,089	199,873	176,954	178,426	177,848	86	—	—
Antidiabetic agents	77,625	115,505	165,985	136,871	139,892	145,530	87	—	—
Antihyperlipidemic agents	13,839	19,583	32,779	37,798	36,387	29,123	110	—	—
<i>Muscle relaxants</i>	12,173	15,454	22,285	26,556	27,551	28,265	132	—	—
<i>Nutritional products</i>	26,874	38,332	44,828	63,459	67,178	76,679	185	—	—

**Table 33. Trends in ED visits involving adverse reaction to pharmaceuticals, by selected drugs, 2005–2010 (continued)**

Drug category and selected drugs (1)	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2005, 2010 (2,3)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Pain relievers</i>	223,592	266,495	321,244	363,880	387,197	379,260	70	—	—
Acetaminophen products	15,491	17,033	20,485	17,405	22,997	26,178	—	50	—
Aspirin products	24,435	36,450	40,851	47,722	42,983	38,997	—	—	—
Narcotic pain relievers	116,677	139,021	174,720	198,891	218,366	207,322	78	—	—
Hydrocodone products	42,260	52,307	62,948	80,270	79,877	83,518	98	—	—
Oxycodone products	28,511	36,404	54,433	54,868	65,146	57,223	101	—	—
Nonsteroidal anti-inflammatories (NSAIDs)	55,753	61,156	72,249	70,865	70,035	79,248	—	—	—
Tramadol products	10,091	12,746	16,946	23,756	25,884	25,887	157	—	—
<i>Radiologic agents</i>	12,598	14,388	17,896	18,600	20,294	16,396	—	—	-19
<i>Respiratory agents</i>	61,466	68,399	82,715	90,302	95,397	82,132	—	—	-14
<i>Topical agents</i>	30,503	36,888	44,125	44,178	51,434	61,035	100	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Due to data limitations in 2004, long-term trends for adverse reaction visits are assessed for the period from 2005 through 2009, not from 2004 through 2009.

(4) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(5) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both penicillin and tramadol will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.



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## 9. ACCIDENTAL INGESTION OF DRUGS

### 9.1 ED Visits Involving Accidental Ingestion of Drugs, 2010

To be classified by DAWN as an accidental ingestion ED visit, a drug must have been taken unintentionally or without it being known which drug was actually taken. The drug may be taken by the patient or given to the patient by someone else (e.g., a parent giving medication to a child).<sup>27</sup>

Because of accidental ingestion's significance as an entirely preventable health risk, this chapter focuses on the characteristics of accidental ingestion ED visits for children aged 5 and under. As soon as infants learn to crawl and especially once they learn to walk, their mobility, curiosity, and tendency to put things in their mouths make many substances in the home a potential danger.<sup>28</sup> Pharmaceutical products belonging to other household members present a particularly critical danger to children because, due to their physiology and smaller size, children's unintended ingestions of even small amounts can lead to medical emergencies requiring care in an ED.<sup>29</sup> This combination of propensity, accessibility, and susceptibility is evidenced in poison control centers, where over half (51.0%) of human exposure calls involve children aged 5 and under and where 14 of the top 25 substances involved in pediatric exposure are drugs and therapeutic substances.<sup>30</sup>

The danger of accidental ingestion of drugs by children is even more apparent in the 2010 DAWN findings, where over two thirds (67.9%) of the 107,632 accidental ingestion ED visits involved children aged 5 and under. The rate of these ED visits was almost 25 times higher for children aged 5 and under than for adults: 300.2 visits per 100,000 children aged 5 and under compared with 12.7 visits per 100,000 for the general adult population aged 21 or older (Figure 10). Two-year-olds are at greatest risk, with a rate of 701.1 visits (not shown). DAWN's findings are echoed in Centers for Disease Control and Prevention reports from the National Electronic Injury Surveillance System (NEISS). For 2010, NEISS reported a rate of 338.8 drug poisoning injuries treated in an ED per 100,000 population aged 0 to 4, exceeding the rate of injuries related to any other product, including playground equipment.<sup>31</sup>

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<sup>27</sup> A visit is not considered as resulting from accidental ingestion if a patient took too much of his or her own medications because he or she forgot having taken a dose earlier.

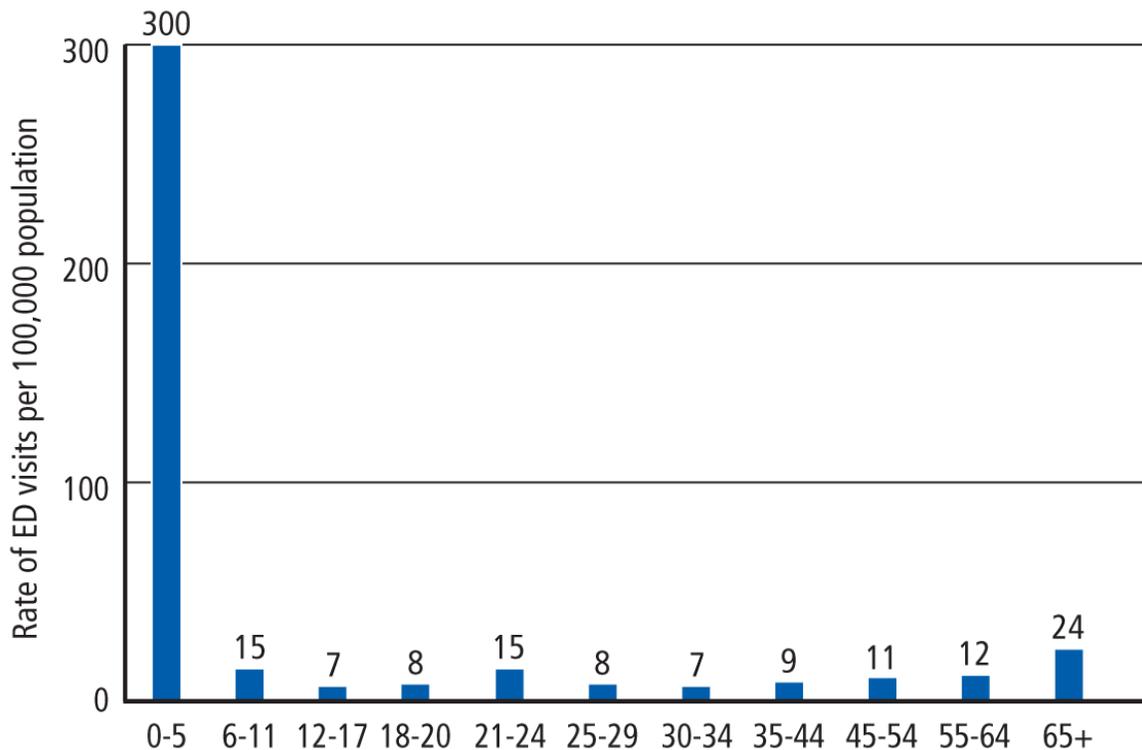
<sup>28</sup> Ma, D. (2009). Keep curious kids safe by poison proofing your home. *AAP News*, 30(11), 2. Retrieved May 5, 2012, from <http://aapnews.aappublications.org/content/30/11>.

<sup>29</sup> Centers for Disease Control and Prevention (CDC). (2006). Nonfatal, unintentional medication exposures among children—United States, 2001–2003. *Morbidity and Mortality Weekly Report*, 55(1), 1–5. Retrieved May 5, 2012, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5501a1.htm>.

<sup>30</sup> Bronstein, A. C., Spyker, D. A., Cantilena, L. R., Jr., Green, J. L., Rumack, B. H., & Dart, R. C. (2011). *2010 Annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 28th annual report. Clinical Toxicology*, 49, 910–941. Retrieved December 18, 2012, from <http://www.poison.org/stats/2010%20NPDS%20Annual%20Report.pdf>.

<sup>31</sup> NEISS 2010 Data Highlights, retrieved May 5, 2012, from <http://www.cpsc.gov/library/neiss.html>.

**Figure 10. Rates of ED visits per 100,000 population involving accidental ingestion of pharmaceuticals, by age, 2010**



**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Drugs recognized as being particularly dangerous when accidentally ingested by children include pain medications, such as narcotic pain relievers (e.g., oxycodone, hydrocodone); cardiac medications, such as calcium channel blockers (“heart pills”) and blood pressure medicines (e.g., clonidine); aspirin products; antidepressants (e.g., Elavil®, Wellbutrin®, Zyban®); antidiabetic medications; camphor-containing salves (when ingested); eye drops (e.g., Clear Eyes®); and nasal sprays (e.g., Afrin®).<sup>32</sup>

Considering only these particularly dangerous drugs, DAWN found the following:

- Pain relief medication was the most common class of drugs involved in accidental ingestion among children aged 5 and under, with 28.0 percent of visits (Table 34). Among pain relievers, acetaminophen products were involved in 10.5 percent of accidental ingestion visits, narcotic pain relievers in 7.0 percent, nonsteroidal anti-inflammatories (e.g., ibuprofen and naproxen products) in 6.0 percent, and aspirin products in 2.6 percent.

<sup>32</sup> Eldridge, D. L., Mutter, K. W., & Holstege, C. P. (2010). An evidence-based review of single pills and swallows that can kill a child. *Pediatric Emergency Medicine Practice*, 7(3).

- Cardiovascular agents were involved in 13.1 percent of visits. Of these, ACE inhibitors, beta blockers, blood pressure drugs, calcium channel blocking agents, and diuretics each accounted for between 1 and 4 percent of visits.
- Antidepressants were involved in 6.4 percent of visits, and antipsychotics were involved in 5.3 percent.
- Antidiabetic medications were found in 2.5 percent of visits.
- Counts of accidental ingestion of eye drops, nasal sprays, and camphor-containing salves were not observed at reportable levels.

**Table 34. ED visits involving accidental ingestion of drugs by patients aged 5 and under, 2010**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Total ED visits, accidental ingestion (2,3)</b>	<b>73,115</b>	<b>100.0</b>	<b>10.5</b>	<b>58,074</b>	<b>88,156</b>
<b>Alcohol</b>	*	*	*	*	*
<b>Illicit drugs</b>	*	*	*	*	*
<b>Pharmaceuticals</b>	<b>72,795</b>	<b>99.6</b>	<b>10.5</b>	<b>57,823</b>	<b>87,767</b>
<i>Anticonvulsants</i>	2,931	4.0	27.9	1,330	4,532
<i>Antidepressants</i>	4,709	6.4	22.7	2,611	6,807
<i>Anti-infectives</i>	1,347	1.8	32.8	480	2,213
<i>Antipsychotics</i>	3,875	5.3	36.0	1,139	6,611
<i>Anxiolytics, sedatives, and hypnotics</i>	7,269	9.9	13.7	5,312	9,225
Benzodiazepines	3,932	5.4	16.8	2,635	5,228
Alprazolam	900	1.2	31.7	340	1,460
Clonazepam	1,233	1.7	33.1	434	2,032
Lorazepam	870	1.2	39.6	194	1,546
Diphenhydramine	2,304	3.2	31.2	893	3,714
<i>Cardiovascular agents</i>	9,553	13.1	16.3	6,497	12,609
ACE inhibitors	1,461	2.0	29.8	608	2,314
Beta blockers	3,252	4.4	40.8	653	5,850
Blood pressure drugs	1,702	2.3	32.0	635	2,768
Calcium channel blocking agents	736	1.0	44.4	96	1,375
Diuretics	1,008	1.4	35.1	315	1,700
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	2,352	3.2	22.4	1,320	3,385
Amphetamine-dextroamphetamine	1,027	1.4	36.8	287	1,767
<i>Gastrointestinal agents</i>	3,186	4.4	24.7	1,641	4,731
Laxatives	799	1.1	33.3	278	1,320
<i>Hormones</i>	1,497	2.0	25.0	762	2,231
Thyroid drugs	1,126	1.5	36.4	323	1,929

**Table 34. ED visits involving accidental ingestion of drugs by patients aged 5 and under, 2010 (continued)**

Drug category and selected drugs (1)	ED visits	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<i>Metabolic agents</i>	2,866	3.9	18.1	1,851	3,881
Antidiabetic agents	1,850	2.5	24.6	958	2,742
Antihyperlipidemic agents	889	1.2	40.0	191	1,587
<i>Muscle relaxants</i>	1,510	2.1	32.9	535	2,485
<i>Nutritional products</i>	3,119	4.3	21.7	1,790	4,447
<i>Pain relievers</i>	20,441	28.0	10.3	16,306	24,575
Acetaminophen products	7,709	10.5	11.4	5,989	9,429
Aspirin products	1,923	2.6	31.5	737	3,109
Narcotic pain relievers	5,113	7.0	33.2	1,782	8,444
Hydrocodone products	1,208	1.7	45.6	128	2,287
Nonsteroidal anti-inflammatories (NSAIDs)	4,373	6.0	19.6	2,692	6,054
<i>Psychotherapeutic agents</i>	8,452	11.6	21.0	4,973	11,932
<i>Respiratory agents</i>	8,490	11.6	18.1	5,473	11,507
Antihistamines	3,659	5.0	23.7	1,959	5,360
Upper respiratory products	2,206	3.0	26.1	1,078	3,334
<i>Topical agents</i>	3,899	5.3	21.8	2,231	5,566

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(3) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both aspirin and antihistamines will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** CI = confidence interval. RSE = relative standard error. An asterisk (\*) indicates that an estimate with an RSE greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

Other drugs found at measureable levels included the following:

- Respiratory agents—e.g., antihistamines, bronchodilators, and a broad range of combination products used to treat upper respiratory conditions—were found in 11.6 percent of visits.
- Anxiolytics, sedatives, and hypnotics (drugs to treat insomnia and anxiety) were found in 9.9 percent of visits, with well over half (5.4%) of those being some type of benzodiazepines (e.g., alprazolam, clonazepam) and a third (3.2%) being the anti-allergy drug diphenhydramine (e.g., Benadryl®).

- Topical agents were found in 5.3 percent of visits; these include anesthetics (e.g., benzocaine) that are found in gels for teething pain (e.g., Orajel®), antihistamines (e.g., calamine lotion), and anti-infectives (e.g., hydrogen peroxide).
- Other types of drugs involved in under 5 percent of visits included nutritional products (e.g., vitamins; 4.3%); anticonvulsants (4.0%); central nervous system stimulants (e.g., ADHD drugs; 3.2%); muscle relaxants (2.1%); anti-infectives (e.g., penicillins; 1.8%); and thyroid medications (1.5%).

A negligible number of visits involved alcohol or illicit drugs.

DAWN found no sex differences for accidental ingestion among patients aged 5 and under (Table 35). In terms of race and ethnicity, 63.3 percent of visits related to accidental ingestion of drugs by patients aged 5 and under involved patients who were White, 9.2 percent who were Black, and 14.5 percent who were Hispanic. DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information is often missing from ED records.

**Table 35. ED visits and rates involving accidental ingestion of drugs by patients aged 5 and under, by patient demographics, 2010**

Patient demographics	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, accidental ingestion (2)</b>	<b>73,115</b>	<b>100.0</b>	<b>300.2</b>
<b>Sex</b>	—	—	—
Male	36,233	49.4	291.2
Female	36,757	50.1	308.5
Unknown	*	*	—
<b>Race/ethnicity</b>	—	—	—
White	46,306	63.3	—
Black	6,762	9.2	—
Hispanic	10,577	14.5	—
Other or two or more race/ethnicities	2,041	2.8	—
Unknown	7,429	10.2	—

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell. Rates are not provided for race and ethnicity subgroups because of data limitations.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

The large majority (83.9%) of patients aged 5 and under were treated and discharged home (Table 36). About 15 percent received more extensive follow-up care: either admission to the hospital (10.4%), or transfer to another facility (4.2%).

**Table 36. ED visits and rates involving accidental ingestion of drugs by patients aged 5 and under, by patient disposition, 2010**

Patient disposition	ED visits	Percent of ED visits	Rate of ED visits per 100,000 population (1)
<b>Total ED visits, accidental ingestion (2)</b>	<b>73,115</b>	<b>100.0</b>	<b>300.2</b>
<b>Treated and released</b>	<b>61,375</b>	<b>83.9</b>	<b>252.0</b>
Discharged home	61,370	83.9	252.0
Released to police/jail	*	*	*
Referred to detox/treatment	*	*	*
<b>Admitted to this hospital</b>	<b>7,589</b>	<b>10.4</b>	<b>31.2</b>
ICU/critical care	1,737	2.4	7.1
Surgery	*	*	*
Chemical dependency/detox	*	*	*
Psychiatric unit	*	*	*
Other inpatient unit	5,689	7.8	23.4
<b>Other disposition</b>	<b>4,151</b>	<b>5.7</b>	<b>17.0</b>
Transferred	3,097	4.2	12.7
Left against medical advice	*	*	*
Died	*	*	*
Other	*	*	*
Not documented	*	*	—

(1) All rates are ED visits per 100,000 population. Population estimates are drawn from the set of United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010) issued by the U.S. Census Bureau.

(2) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## **9.2 Trends in ED Visits Involving Accidental Ingestion of Drugs by Patients Aged 5 and Under, 2004–2010**

This section presents the trends in the estimates of ED visits involving accidental ingestion of drugs by patients aged 5 and under for the period from 2004 through 2010 (Table 37). Differences between years are presented in terms of the percentage increase or decrease in visits in 2010 compared with the estimates for 2004 (long-term trends) and for 2008 and 2009 (short-term trends). Only statistically significant changes are discussed and displayed in the table.

Medical emergencies related to accidental ingestions by patients aged 5 and under were stable from 2004 to 2010, though increases were observed for particular drug groups. Involvement of pain relievers in general saw a 70 percent increase since 2004. Antihistamines to treat respiratory conditions rose 162 percent.

Table 37. Trends in ED visits involving accidental ingestion of drugs by patients aged 5 and under, by selected drugs, 2004–2010

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<b>Total ED visits, accidental ingestion (3,4)</b>	<b>50,503</b>	<b>44,663</b>	<b>57,422</b>	<b>65,408</b>	<b>69,121</b>	<b>62,696</b>	<b>73,115</b>	—	—	—
<b>Alcohol</b>	*	*	*	*	*	*	*	—	—	—
<b>Illicit drugs</b>	*	*	*	*	*	862	*	—	—	—
<b>Pharmaceuticals</b>	<b>50,098</b>	<b>44,477</b>	<b>57,285</b>	<b>64,779</b>	<b>68,431</b>	<b>61,894</b>	<b>72,795</b>	—	—	—
<i>Anticonvulsants</i>	2,447	1,764	832	861	1,944	1,877	2,931	—	—	—
<i>Antidepressants</i>	2,845	3,838	5,351	3,227	4,286	3,646	4,709	—	—	—
<i>Anti-infectives</i>	1,242	930	1,564	1,624	1,925	1,283	1,347	—	—	—
<i>Antipsychotics</i>	1,667	1,441	1,230	1,667	2,034	1,690	3,875	—	—	—
<i>Anxiolytics, sedatives, and hypnotics</i>	3,854	3,045	5,706	6,260	8,035	7,065	7,269	—	—	—
Benzodiazepines	1,870	1,424	3,041	3,361	5,325	3,688	3,932	—	—	—
Alprazolam	*	*	*	856	608	975	900	—	—	—
Clonazepam	584	680	1,133	*	3,103	1,216	1,233	—	—	—
Lorazepam	*	171	782	1,334	951	804	870	—	—	—
Diphenhydramine	1,513	880	1,900	2,478	1,802	2,121	2,304	—	—	—
<i>Cardiovascular agents</i>	7,300	7,287	9,329	11,275	10,878	9,100	9,553	—	—	—
ACE inhibitors	834	1,057	886	1,245	3,028	1,629	1,461	—	—	—
Beta blockers	2,267	2,448	2,741	2,986	3,299	2,372	3,252	—	—	—
Blood pressure drugs	884	1,264	2,427	2,009	1,661	792	1,702	—	—	—
Calcium channel blocking agents	1,108	876	524	1,637	1,049	1,656	736	—	—	—
Diuretics	977	*	729	1,759	411	623	1,008	—	—	—
<i>Central nervous system stimulants (e.g., ADHD drugs)</i>	1,919	900	2,451	3,723	1,862	1,628	2,352	—	—	—
Amphetamine-dextroamphetamine	*	*	1,179	*	358	924	1,027	—	—	—
<i>Coagulation modifiers</i>	*	480	*	*	369	492	*	—	—	—
<i>Gastrointestinal agents</i>	2,423	2,105	2,345	2,950	3,300	2,261	3,186	—	—	—
Laxatives	*	963	*	*	1,033	393	799	—	—	—
<i>Hormones</i>	564	1,662	1,443	1,519	2,814	1,497	1,497	—	—	—
Thyroid drugs	*	793	960	746	*	811	1,126	—	—	—

**Table 37. Trends in ED visits involving accidental ingestion of drugs by patients aged 5 and under, by selected drugs, 2004–2010 (continued)**

Drug category and selected drugs (1)	ED visits, 2004	ED visits, 2005	ED visits, 2006	ED visits, 2007	ED visits, 2008	ED visits, 2009	ED visits, 2010	Percent change, 2004, 2010 (2)	Percent change, 2008, 2010 (2)	Percent change, 2009, 2010 (2)
<i>Metabolic agents</i>	*	2,727	2,292	3,296	3,448	2,409	2,866	—	—	—
Antidiabetic agents	*	2,060	1,414	2,343	2,705	785	1,850	—	—	—
Antihyperlipidemic agents	*	932	808	*	444	1,456	889	—	—	—
<i>Muscle relaxants</i>	*	473	1,616	451	1,134	1,125	1,510	—	—	—
<i>Nutritional products</i>	2,660	2,187	2,176	4,837	2,333	2,891	3,119	—	—	—
<i>Pain relievers</i>	12,048	9,631	14,451	13,606	14,576	17,797	20,441	70	40	—
Acetaminophen products	6,198	4,760	5,915	5,523	7,008	8,348	7,709	—	—	—
Aspirin products	722	589	1,251	1,753	528	604	1,923	—	264	219
Narcotic pain relievers	1,596	1,866	2,798	2,434	2,679	4,755	5,113	—	—	—
Hydrocodone products	*	662	776	617	915	1,291	1,208	—	—	—
Nonsteroidal anti-inflammatories (NSAIDs)	2,635	2,108	4,681	3,795	4,581	3,896	4,373	—	—	—
<i>Psychotherapeutic agents</i>	4,499	5,182	6,486	4,870	5,969	5,195	8,452	—	—	—
<i>Respiratory agents</i>	7,163	5,290	5,531	9,831	7,112	5,330	8,490	—	—	59
Antihistamines	1,398	1,322	646	1,260	1,761	1,009	3,659	162	108	263
Upper respiratory combinations	3,835	2,366	2,587	4,135	3,302	2,646	2,206	-42	—	—
<i>Topical agents</i>	2,382	2,242	3,313	3,569	6,104	5,656	3,899	—	-36	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc. and/or Cerner Multum, Inc. The classification was modified to meet DAWN's unique requirements (2010). The Multum Licensing Agreement governing use of the Lexicon can be found on the DAWN Web site at <http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>.

(2) This column denotes statistically significant ( $p < 0.05$ ) increases or decreases between estimates for the periods shown.

(3) Estimates of ED visits are based on a representative sample of general, non-Federal, short-stay hospitals in the United States with 24-hour EDs.

(4) ED visits often involve multiple drugs. Such visits will appear multiple times in this table (e.g., a visit involving both aspirin and antihistamines will appear twice in this table). The sum of visits by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

**NOTE:** An asterisk (\*) indicates that an estimate with a relative standard error greater than 50%, or an estimate based on fewer than 30 visits, has been suppressed. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.



**Attachment A**  
**Glossary of DAWN Terms,**  
**2010 Update**



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## DAWN GLOSSARY, 2010 UPDATE

This glossary defines terms used in data collection activities, analyses, and publications associated with the emergency department (ED) component of the Drug Abuse Warning Network (DAWN). The glossary is updated to reflect terms and conventions applicable in the 2010 data collection year.

**Accidental ingestion:** This category of drug-related ED visits includes those involving the accidental ingestion of a drug, for example, childhood drug poisonings and individuals who take the wrong medication by mistake. It includes a caregiver administering the wrong medicine by mistake. It does not include a patient taking more medicine than directed because the patient forgot to take it earlier. (See **Nonmedical use of pharmaceuticals**, *Overmedication*.)

**Adverse reaction:** This category of drug-related ED visits represents the use of a prescription or over-the-counter pharmaceutical for therapeutic purposes that results in an ED visit due to adverse drug reactions, side effects, drug-drug interactions, and drug-alcohol interactions. Although adverse reactions are typically limited to pharmaceuticals, a small number of adverse reaction visits involve (a) illicit drugs for which there are legitimate pharmaceutical versions, and (b) pharmaceutical inhalants (such as anesthetic gases).

**Alcohol use:** DAWN notes whether alcohol was involved in addition to other drug(s) for patients of all ages. Because alcohol is considered an illicit drug for minors, alcohol without the involvement of other drugs is considered a drug-related ED visit for patients under the age of 21. (See **Drug misuse or abuse** and **Underage drinking**.)

**Case description:** A description of how the drug(s) were related to the patient's ED visit. The case description, in conjunction with other documentation in the ED medical record, is used to determine whether the ED visit is reportable to DAWN. It is copied verbatim from the patient's chart when possible.

**Case type:** See **Type of case**.

**Case type other:** See **Drug misuse or abuse**.

**Confidence interval (CI):** An interval estimate, that is, a range of values around a point estimate that takes sampling error into account. A broadly accepted standard of confidence is 95 percent. If repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the true population value would fall within the CI 95 percent of the time. A 95 percent CI is a straightforward way to summarize both the estimate and its margin of error.

**Diagnosis:** The condition(s) for which the patient was treated as determined by the clinician after evaluation.

**Disposition:** The location or facility to which an ED patient was referred, transferred, or released.

*Treated and released* includes three categories:

- *Discharged home*—In this context, “home” refers to the patient’s residence at the time of the ED visit. This could be a personal residence; for students residing at nearby universities, home means their university; for travelers, it may mean their hotel or wherever they are staying.
- *Released to police/jail*—Patients that are released to police/jail were usually brought to the ED by the police for treatment of an acute medical problem or for medical clearance before being placed in the jail population.
- *Referred to detox/treatment*—The chart indicates that the patient was referred to a substance abuse treatment or detox program, facility, or provider other than the chemical dependency/detox unit maintained at the hospital.

*Admitted to this hospital* includes five categories of inpatient units:

- intensive or critical care unit (ICU),
- surgical unit,
- chemical dependency/detox unit,
- psychiatric unit, and
- other inpatient units (the inpatient unit was not specified or does not match one of the preceding units).

*Other disposition* includes five categories:

- *Transferred*—The patient was transferred to another health care facility.
- *Left against medical advice*—The patient left the treatment setting without a physician’s approval.
- *Died*—The patient died after being admitted to the ED but before being discharged, admitted, or transferred.
- *Other*—The discharge status is documented in the patient’s chart but does not fit into any of the preceding categories.
- *Not documented*—The patient’s discharge status was not documented in the medical chart.

**Drug:** A substance that is (a) used as a medication or in the preparation of medication; (b) an illicit substance that causes addiction, habituation, or a marked change in consciousness; or (c) both. Substances reportable to DAWN include alcohol; illicit drugs (e.g., club drugs, cocaine, heroin, marijuana, synthetic cannabinoids, amphetamines/methamphetamine); nonpharmaceutical inhalants; prescription drugs (e.g., drugs for attention deficit hyperactivity disorder, antibiotics, antidepressants, antipsychotics, anticoagulants, beta blockers, birth control pills, hormone replacement, insulin, muscle relaxants, pain relievers, sleeping aids); drugs used in treatment of medical conditions (e.g., respiratory therapy, chemotherapy, radiation therapy); vaccines; dietary

supplements; vitamins; and other over-the-counter pharmaceutical products. DAWN publications use the term “drug” to refer to any of these substances. Multiple substances can be reported for each DAWN case. Therefore, the total number of drugs exceeds the total number of DAWN cases reported.

**Drug category:** A generic grouping of related pharmaceuticals or other substances reported to DAWN, based on the classification system developed by Multum Information Services, a subsidiary of the Cerner Corporation, and modified for use with DAWN. The Multum *Lexicon* is available at <http://www.multum.com/>. In general, the Multum drug categories reflect the therapeutic uses for prescription and over-the-counter pharmaceuticals.

Additional clarification is provided for the following drug categories, because these are unique to DAWN:

- *Alcohol alone*—DAWN treats alcohol as an illicit drug for minors. Therefore, DAWN collects data on ED visits involving alcohol and no other drugs if the patient is under the age of 21.
- *Alcohol-in-combination*—DAWN records whether alcohol was involved in all drug-related ED visits for patients of all ages.

**Drug misuse or abuse:** A group of ED visits defined broadly to include all visits associated with illicit drugs, alcohol use in combination with other drugs, alcohol use alone among those younger than 21 years, and nonmedical use of pharmaceuticals. (See also **Alcohol use, Illicit drug use, Nonmedical use of pharmaceuticals, and Underage drinking.**)

**Drug-related ED visit:** This category includes any ED visit related to recent drug use. To be a DAWN case, the ED visit must have involved a drug, either as the direct cause of the visit or as a contributing factor. (See also **Single-drug case.**) One patient may make repeated visits to an ED or to several EDs, thus producing a number of visits. The number of unique patients involved in the reported drug-related ED visits cannot be estimated because no direct patient identifiers are collected by DAWN.

There are some circumstances in which ED visits are not reviewed for DAWN. These include persons who left before being seen by a physician, visits for suture removal, and direct admission to the hospital through the ED for women in labor.

**Estimate:** A statistical estimate is the value of a parameter (such as the number of drug-related ED visits) for the universe that is derived by applying sampling weights and other adjustments to data from a sample. Estimates of drug-related ED visits are calculated by applying weights and adjustments to the data provided by the sampled hospitals participating in DAWN. The sampling weights reflect the probability of selection; separate adjustment factors account for nonresponse, data quality, and the known total of ED visits delivered by the universe of eligible hospitals as identified by the American Hospital Association (AHA) Annual Survey Database (ASDB) for the relevant time period.

**GHB:** Gamma hydroxybutyrate, a hallucinogen and depressant frequently combined with alcohol and other beverages. Also used by bodybuilders to aid in fat reduction and muscle building. For further information, see <http://www.drugabuse.gov/infofacts/infofactsindex.html>.

**Hospital emergency department (ED):** An emergency department (ED) (also known as an emergency room) is a medical treatment facility, specializing in acute care of patients who present without prior appointment, either by their own means or by ambulance. EDs are usually found in hospitals or other primary care centers. Only EDs in hospitals that meet DAWN's eligibility criteria may participate in DAWN. For information on drug-related ED visits, DAWN relies exclusively on medical records maintained by EDs. No patients, ED staff, or other records are consulted. DAWN is based on a sample of hospitals; in the cases where there are multiple EDs in a hospital, records from all the EDs are reviewed to identify drug-related cases. (See **Universe**.)

**Illicit drug use:** This category of drug-related ED visits includes all visits related to the use of illicit or illegal drugs. Illicit drugs include

- cocaine,
- heroin,
- marijuana,
- synthetic cannabinoids,
- amphetamines/methamphetamine,
- MDMA,
- GHB,
- flunitrazepam (Rohypnol),
- ketamine,
- LSD,
- PCP,
- other hallucinogens,
- nonpharmaceutical inhalants,
- combinations of illicit drugs, and
- alcohol when used by patients under the age of 21.

Additional clarification is provided for the following drug categories:

- *Synthetic cannabinoids*—This drug category was introduced in 2010 to reflect the emergence of synthetic cannabinoids in drug-related ED visits. Synthetic cannabinoids are substances that are designed to be chemically similar to the psychoactive ingredient in marijuana, delta-9-tetrahydrocannabinol (THC). (See also **Synthetic cannabinoids**.)
- *Amphetamines/methamphetamine*—This drug category includes amphetamines, methamphetamine, and piperazines. These drugs are often combined for analysis because medical records and toxicology tests often fail to distinguish among them, referring to them simply as “amphetamines.” The category excludes central nervous system stimulant medications, such as amphetamine-dextroamphetamine and methylphenidate (drugs to treat attention deficit hyperactivity disorder), and products containing caffeine.

- *Inhalants*—This category includes (a) anesthetic gases, and (b) any nonpharmaceutical substance that has psychoactive effects when inhaled, sniffed, or snorted. Excluded from the inhalant category are carbon monoxide and nonpharmaceutical inhalants, if the exposure was accidental (e.g., inhaling paint fumes while painting a closet).
  - (a) *Anesthetic gases*—Anesthetic gases are presumed to have been inhaled. Included in this category are, for example, nitrous oxide, ether, and chloroform.
  - (b) *Nonpharmaceuticals*—The route of administration for psychoactive nonpharmaceuticals is not assumed and must be documented in ED records specifically as inhalation. Psychoactive nonpharmaceuticals, when inhaled, fall into three main categories: volatile solvents, nitrites, and chlorofluorohydrocarbons. Examples of substances in each of these three categories include the following:
    - **Volatile solvents**—This category of inhalants includes adhesives (model airplane glue, rubber cement, household glue); aerosols (spray paint, hairspray, air freshener, deodorant, fabric protector); solvents and gases (nail polish remover, paint thinner, correction fluid and thinner, toxic markers, pure toluene, lighter fluid, gasoline, carburetor cleaner, octane booster); cleaning agents (dry cleaning fluid, spot remover, degreaser); food products (vegetable cooking spray, dessert topping spray such as whipped cream or “whippets”); and gases (butane, propane, helium).
    - **Nitrites**—This category of inhalants includes amyl nitrites (“poppers,” “snappers”) and butyl nitrites (“rush,” “locker room,” “bolt,” “climax,” video head cleaner).
    - **Chlorofluorohydrocarbons**—Freons are an example of this category of inhalants.
- *Combinations not tabulated above (NTA)*—This category includes combinations composed of two or more major substances of abuse that are mixed and taken together. For example, “speedball,” which usually refers to the combination of heroin and cocaine taken at once, would be classified as a “Combination NTA,” whereas heroin and cocaine used separately would be classified separately in the categories heroin and cocaine. Combinations consisting of a major substance of abuse and another substance are classified in the category of the major substance (e.g., heroin with scopolamine is classified as heroin).

**LSD:** d-lysergic acid diethylamide, a hallucinogen usually taken orally. For further information, see <http://www.drugabuse.gov/infofacts/infofactsindex.html>.

**Malicious poisoning:** See **Nonmedical use of pharmaceuticals**.

**MDMA:** Methylenedioxymethamphetamine, a hallucinogen with stimulant effects, usually taken orally. For further information, see <http://www.drugabuse.gov/infofacts/infofactsindex.html>.

**Metropolitan area:** An area comprising a relatively large core city or cities and the adjacent geographic areas. Conceptually, these areas are integrated economic and social units with a large

population center. Unless otherwise noted, DAWN metropolitan areas correspond to Metropolitan Statistical Areas (MSAs) established by the Office of Management and Budget (OMB) based on the 2000 decennial census and updated in 2003. DAWN also prepares estimates for subsections of three of the large MSAs that correspond to MSA Divisions; in a fourth MSA, subsections were established by local users of DAWN data.

**Nonmedical use of pharmaceuticals:** Nonmedical use of pharmaceuticals includes taking more than the prescribed dose of a prescription pharmaceutical or more than the recommended dose of an over-the-counter pharmaceutical or supplement; taking a pharmaceutical prescribed for another individual; deliberate poisoning with a pharmaceutical by another person; and documented misuse or abuse of a prescription drug, an over-the-counter pharmaceutical, or a dietary supplement. Nonmedical use of pharmaceuticals may involve pharmaceuticals alone or pharmaceuticals in combination with illicit drugs or alcohol. Nonmedical use of pharmaceuticals includes prescription and over-the-counter pharmaceuticals in ED visits that are of the following types of cases:

- *Overmedication*—Patient took too much of his/her prescription medication or over-the-counter medication/dietary supplement.
- *Malicious poisoning*—Drug use in which the patient was administered a drug by another person for a malicious purpose (drug-facilitated sexual assault is one type of malicious poisoning, but other types of malicious poisonings, such as product tampering, would be classified in this category as well).
- *Case type other*—All drug-related ED visits that could not be assigned to any of the other seven types (by design, most cases of documented drug abuse will fall into this category).

(See also **Drug misuse or abuse** and **Type of case**.)

**Not otherwise specified (NOS):** This is the catchall category for substances that are not specifically named but are known to be reportable to DAWN. Terms are classified into an NOS category only when assignment to a more specific category is not possible based on the information in the source documentation (ED patient charts).

**Not tabulated above (NTA):** This designation is used when drugs or drug categories are not explicitly listed in a table. Low-incidence drugs (or drug categories) falling under a broader drug classification may be summarized into a single row under that classification and labeled as NTA.

**Overmedication:** See **Nonmedical use of pharmaceuticals**.

**Oversampling:** Without oversampling, one would expect a sample to resemble the population from which it was drawn. Oversampling implies the deliberate selection of a much higher proportion of certain types of sampling units than would normally be obtained in a simple, random sample. The deliberate selection of certain types of sample units is done to improve the precision of estimates of the properties of these types of sampling units. This is a form of stratified sampling. (See also **Sampling, Sample frame, and Sampling unit**.) In DAWN, selected metropolitan areas are oversampled so that estimates can be produced for those areas.

**p-value:** A measure of the probability ( $p$ ) that the difference between two estimates could have occurred by chance, if the estimates being compared were really the same. The larger the  $p$ -value, the more likely the difference could have occurred by chance. For example, if the difference between two DAWN estimates has a  $p$ -value of 0.05, it means that there is no more than a 5 percent probability that the difference observed could be due to chance alone.

**PCP:** Phencyclidine, a hallucinogenic white crystalline powder that is readily soluble in water or alcohol or may be snorted or smoked. For further information, see <http://www.drugabuse.gov/infofacts/infofactsindex.html>.

**Population:** See **Universe**.

**Precision:** The extent to which an estimate agrees with its mean value in repeated sampling. The precision of an estimate is measured inversely by its standard error (SE) or relative standard error (RSE). In DAWN publications, estimates with RSEs greater than 50 percent are regarded as too imprecise to be published. ED table cells where such estimates would have appeared contain the asterisk symbol (\*). (See also **Relative standard error**.)

**Race/ethnicity:** Race/ethnicity data in DAWN are collected retrospectively from the medical record. This approach involves a single question listing six race/ethnicity groups (plus not documented) and allows for multiple responses.<sup>1</sup> For published reports, DAWN collapses the reported race/ethnicity information into four mutually exclusive categories, plus an unknown category, as follows:

- *White*—A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. Those who are identified as White and Hispanic are classified as Hispanic.
- *Black*—A person having origins in any of the Black racial groups of Africa. Those who are identified as Black or African American and Hispanic are classified as Hispanic.
- *Hispanic*—A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. Those who are identified as Hispanic are classified as Hispanic, regardless of any other race/ethnicity designations.
- *Race/ethnicity not tabulated above*—A person who is an American Indian, Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or a person of two or more race/ethnicities.
- *Unknown*—Race/ethnicity is unknown.

Race/ethnicity is missing from ED patient records about 10 to 20 percent of the time, although this varies widely by hospital. In some cases, the race information is ambiguous (e.g., “European”), and detail about multiple races/ethnicities is often missing. Rates of ED visits per 100,000 are not calculated for race/ethnicity categories because of these data limitations.

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<sup>1</sup> See Office of Management and Budget, Revisions to the standards for the classification of Federal data on race and ethnicity, 62 Fed. Reg. 58,782 (October 30, 1997).

**Rate:** A measure of the incidence of drug-related ED visits per 100,000 population. A rate can be calculated for the total population or for any subset defined by characteristics such as age and sex.

**Relative standard error (RSE):** A measure of an estimate's relative precision. The RSE of an estimate is equal to the estimate's standard error (SE) divided by the estimate itself. For example, an estimate of 2,000 cocaine visits with an SE of 200 visits has an RSE of 0.1 and is multiplied by 100 to change it to a percentage. This resulting RSE percent value is 10 percent. The larger the RSE, the less precise the estimate. Estimates with an RSE of 50 percent or greater are not published by DAWN. (See also **Precision**.)

**Sample frame:** A list of units from which a sample is drawn. In DAWN, the hospital is the unit used for the ED sample. All members of the sampling frame have a known probability of being selected. A sampling frame is constructed such that there is no duplication and each unit is identifiable. Ideally, the sampling frame and the universe are the same. The sampling frame for the DAWN hospital ED sample is derived from the American Hospital Association (AHA) Annual Survey Database (ASDB). (See also **Universe**.)

**Sampling:** Sampling is the process of selecting a proper subset of elements from the full population so that the subset can be used to make inference to the population as a whole. A probability sample is one in which each element has a known and positive chance (probability) of selection. A simple random sample is one in which each member has the same chance of selection. In DAWN, a sample of hospitals is selected to make inference to all hospitals; DAWN uses simple random sampling within strata.

**Sampling unit:** A member of a sample selected from a sampling frame. For the DAWN sample, the units are hospitals, and data are collected for drug-related ED visits at the responding hospitals selected for the sample.

**Sampling weights:** Numeric coefficients used to derive population estimates from a sample by adjusting for deviations from the original sample design due to unequal probability sampling, variable nonresponse, and other potential sources of bias.

**Seeking detox:** This category of drug-related ED visits reflects patients seeking substance abuse treatment, drug rehabilitation, or medical clearance for admission to a drug treatment or detoxification unit. They are classified separately because they often reflect administrative practices that vary across hospitals and may vary over time within the same hospital. Seeking detox visits tend to be concentrated in those facilities that operate specialized inpatient units providing substance abuse treatment or detoxification services, and the largest numbers are found in facilities that require medical clearance for entry into such treatment to be granted in their EDs.

**Single-drug case:** An ED visit in which only one drug was involved. The single drug may be the direct cause of the visit or a contributing factor as determined by the medical evaluation done in the ED. Because DAWN considers alcohol to be an illicit drug for minors, DAWN includes visits where alcohol is the single drug if the patient is younger than 21 years of age.

**Statistically significant:** A difference between two estimates is said to be statistically significant if the value of the statistic used to test the difference is larger or smaller than would be expected by chance alone. For DAWN ED estimates, a difference is considered statistically significant if the  $p$ -value is less than 0.05. (See also  **$p$ -value.**)

**Strata (plural), stratum (singular):** Subgroups of a universe within which separate ED samples are drawn. Stratification is used to increase the precision of estimates for a given sample size or, conversely, to reduce the sample size required to achieve the desired level of precision. The DAWN ED sample is stratified into metropolitan area cells plus an additional cell for the remainder of the United States. To ensure thorough coverage within metropolitan areas, the universe of hospitals in each is allocated into substrata identified by (a) two types of hospital ownership (public, private), and (b) up to four size categories (measured in terms of the number of ED visits annually). This allocation creates up to eight substrata in each metropolitan area stratum. Hospitals in the stratum that covers the rest of the United States are stratified first by census region, type of ownership, and size (also measured in terms of ED visits). A systematic sample is selected from each of the geographic strata.

**Suicide attempt:** This type of drug-related ED visit captures suicide attempts that are documented in the medical record and in which a drug was involved. Suicidal gestures, thoughts, or ideation, including attempts to harm oneself, are not included in this category.

**Synthetic cannabinoids:** Synthetic cannabinoids are substances that are designed to be chemically similar to the psychoactive ingredient in marijuana, delta-9-tetrahydrocannabinol (THC). They were initially developed over the past 40 years as therapeutic agents but more recently have been packaged as herbal smoking mixtures or “herbal incense” and marketed with claims that their effects mimic those of marijuana. Even though certain synthetic cannabinoids and/or specific chemicals contained in these preparations were made illegal in some states, a comprehensive national ban was not enacted until July 2012. Therefore, products containing synthetic cannabinoids were frequently marketed as “legal” and “not for human consumption” and could be purchased online and in legal retail outlets such as convenience stores. Leading brands were marketed under the names “Spice” and “K2,” but many other brands appeared later; these are specified in the DAWN Drug Reference Vocabulary. For further information, see <http://www.drugabuse.gov/publications/drugfacts/spice-synthetic-marijuana>. (See also **Illicit drug use.**)

**Type of case:** A classification used to define similar DAWN cases for analysis. Each case must be assigned a type and may not be assigned more than one type. Cases are classified into one of the following eight categories: suicide attempt, seeking detox, alcohol only (age younger than 21), adverse reaction, overmedication, malicious poisoning, accidental ingestion, and other. The case is coded into the first group that meets the inclusion criteria for that group.

**Underage drinking:** An ED visit where the patient is under the age of 21 and alcohol is involved. Because DAWN considers alcohol to be an illicit drug for minors, DAWN includes visits where alcohol is the only drug involved and visits where alcohol is present with other drugs.

**Universe:** The entire set of units for which generalizations are drawn. The universe for the DAWN ED sample is all non-Federal, short-stay, general medical and surgical hospitals in the United States that operate one or more EDs 24 hours a day, 7 days a week. Specialty hospitals, hospital units of institutions, long-term care facilities, pediatric hospitals, hospitals operating part-time EDs, and hospitals operated by the Veterans Health Administration and the Indian Health Service are excluded. The universe of EDs is identified from the American Hospital Association (AHA) Annual Survey Database (ASDB).

**Attachment B**

**Drug Abuse Warning Network**

**Methodology Report,**

**2010 Update**



# **Drug Abuse Warning Network Methodology Report, 2010 Update**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Substance Abuse and Mental Health Services Administration  
Center for Behavioral Health Statistics and Quality**

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# INTRODUCTION

This publication describes the methodologies used by the Drug Abuse Warning Network (DAWN), a program of the Center for Behavioral Health Statistics and Quality (CBHSQ), Substance Abuse and Mental Health Services Administration (SAMHSA), to collect, prepare, and analyze information on drug-related emergency department (ED) visits in the United States. An understanding of the methodology behind the collection and processing of DAWN data allows data users to better evaluate the validity, representativeness, and meaning of the findings. The methods described here were initiated in 2004 and are current as of 2010. Comparisons across data collection years can only be made for 2004–2010. Due to changes introduced to core survey features—such as the design of the sample, protocol for selecting charts to review, and the eligibility criteria for being a DAWN case in 2004—DAWN data for 2004 and forward are not comparable to data for earlier years (2003 and earlier).

This report is organized into eight parts:

1. *Summary of DAWN Methodology, 2010 Update*—Methodological highlights of the 2010 data collection year.
2. *Overview of the DAWN data program*—Brief summary of DAWN and its purpose.
3. *Information collected by DAWN*—What constitutes a drug-related ED visit and the data items collected for each visit.
4. *Development of the ED component of DAWN*—How DAWN data on drug-related ED visits are collected and processed to make representative national and metropolitan area estimates using survey data.
5. *DAWN publications and data dissemination*—How DAWN data are organized, summarized, and presented to address different statistical and analytic goals.
6. *Quality assurance/quality control*—Methods and procedures used to ensure that DAWN data are as accurate, precise, and reliable as possible.
7. *Data limitations*—DAWN collects data on ED visits from a sample of hospitals and relies solely on existing medical records maintained by these hospitals; as a result, there are some limitations to consider when interpreting results.
8. *History of DAWN, 1970–2011*—How DAWN came into existence and has been maintained for 40 years.

For convenience, the *2010 DAWN ED Annual Report* includes as attachments all methodological documents related to the 2010 data collection year. These attachments include the following:

- DAWN Glossary, 2010 Update,
- DAWN Methodology Report 2010 Update (this report),
- *Guide to DAWN Trend Tables, 2010 Update* (including link to 2010 Trend Tables), and
- *2007–2011 ED Reference Guide* (instructions for DAWN Field Reporters).

These items individually as well as additional information about DAWN are provided on the DAWN Web site.<sup>1</sup> Available at the site are

- annual reports for 2004 through 2010 that summarize overall DAWN ED findings;
- short reports that highlight DAWN findings on specialized topics for the nation and select metropolitan areas;
- detailed tables of DAWN estimates for the Nation and select metropolitan areas for the years 2004 through 2010;
- additional, more detailed methodology and design reports;
- background information on SAMHSA, CBHSQ, and the contractors responsible for DAWN data collection and analysis;
- Multum *Lexicon* Licensing Agreement (terms for use of the Multum *Lexicon*, © 2011);
- Details on the *Drug Reference Vocabulary* (DRV, drug name coding system used by DAWN); and
- links to other materials on the SAMHSA Web site.

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<sup>1</sup> DAWN documents can be found on the DAWN Web site (<http://www.samhsa.gov/data/DAWN.aspx>).

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# 1. SUMMARY OF DAWN METHODOLOGY, 2010 UPDATE

This section documents the participation of sampled hospitals in 2010 and other survey methodology information relevant for the Drug Abuse Warning Network (DAWN) data collection year 2010. Additional detail on the basic DAWN data collection and survey methodology is provided in subsequent sections.

## 1.1 2010 hospital participation and response rates

DAWN relies on a longitudinal probability sample of hospitals located throughout the United States, including Alaska and Hawaii. To be eligible for selection into the DAWN sample, a hospital must be a non-Federal, short-stay, general surgical and medical hospital located in the United States, with at least one 24-hour emergency department (ED).

For data collection year 2010, data were collected from a representative sample of hospitals in the Nation and select metropolitan areas. Data submitted by 237 participating hospitals were used for estimation.<sup>2</sup> About 7.2 million ED visit charts out of a universe of 11.6 million charts at participating hospitals were reviewed, and a total of 304,110 drug-related ED visits was identified for use in estimation (**Table 1**). With about 62 percent of all charts reviewed, the average number of drug-related cases per hospital was 1,104 visits, with a median of 957 visits and a range of 21 to 6,797 visits.<sup>3</sup>

Estimates for the entire universe of DAWN-eligible hospitals in the United States are produced by applying poststratified weights to the data received from the participating sampled hospitals. Thus, for 2010, a total of 304,110 submitted cases was extrapolated to an estimate of 4,916,328 drug-related ED visits. Considering the margin of error, this estimate may range from 4,520,835 to 5,311,821 drug-related ED visits out of approximately 125 million total ED visits estimated for the United States. Of these approximately 5 million drug-related visits, 2,301,050 were considered to involve drug misuse or abuse, with the balance involving adverse reactions and accidental ingestions.

---

<sup>2</sup> Not all hospitals participating in DAWN are part of the current sample. These hospitals' data are provided to them for local use. Therefore, the number of drug-related ED visits used in estimation is smaller than the total number identified.

<sup>3</sup> DAWN draws a systematic sample of eligible charts to review.

**Table 1. Drug-related ED visits and drugs, by type of case, 2010**

Type of visit	Unweighted sample data	Weighted estimates	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
<b>Drug-related ED visits (1)</b>	—	—	—	—	—
Drug-related suicide attempt	12,576	212,736	10.1	170,532	254,940
Seeking detox	18,904	232,542	24.3	121,967	343,116
Alcohol only (age < 21)	10,162	122,778	10.1	98,370	147,187
Adverse reaction	123,548	2,329,221	6.1	2,048,969	2,609,473
Overmedication	25,931	422,330	6.1	371,528	473,132
Malicious poisoning	1,025	15,682	14.5	11,234	20,130
Accidental ingestion	4,607	107,632	8.6	89,435	125,829
Other	107,455	1,474,194	9.4	1,201,362	1,747,026
Total drug-related ED visits	<b>304,110</b>	<b>4,916,328</b>	<b>4.1</b>	<b>4,520,835</b>	<b>5,311,821</b>
Total drug misuse or abuse visits	<b>167,114</b>	<b>2,301,050</b>	<b>6.9</b>	<b>1,987,721</b>	<b>2,614,380</b>
Total ED visits (all reasons)	<b>11,582,707</b>	<b>125,235,392</b>	<b>0.0</b>	—	—
<b>Drugs (2)</b>	—	—	—	—	—
Drug-related suicide attempt	27,462	470,634	11.0	369,130	572,138
Seeking detox	38,613	515,697	26.5	248,034	783,360
Alcohol only (age < 21)	10,162	122,778	10.1	98,370	147,187
Adverse reaction	167,850	3,125,890	5.8	2,770,770	3,481,011
Overmedication	47,631	797,434	8.3	668,015	926,852
Malicious poisoning	1,896	27,737	14.8	19,682	35,792
Accidental ingestion	6,156	139,580	8.9	115,348	163,812
Other	183,363	2,609,529	9.5	2,125,982	3,093,075
Drugs in all drug-related ED visits	<b>483,035</b>	<b>7,808,492</b>	<b>4.8</b>	<b>7,068,491</b>	<b>8,548,493</b>
Drugs in all misuse or abuse ED visits	<b>295,258</b>	<b>4,239,698</b>	<b>7.8</b>	<b>3,589,612</b>	<b>4,889,783</b>

(1) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs.

(2) These are estimates of drugs involved in ED visits. Because a single ED visit may involve multiple drugs, the number of drugs is greater than the number of visits.

NOTE: CI = confidence interval. RSE = relative standard error. A dash (—) indicates a blank cell.

**SOURCE:** Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

**Table 2** lists hospital, design, and visit response rates for the Nation and the 12 metropolitan statistical areas (MSAs) that had sufficient participation in 2010 to warrant separate estimates.<sup>4</sup> The national hospital response rate was 42.6 percent; the design weight response rate was 29.6 percent; and the visits weighted response rate was 34.2 percent. At the metropolitan area level, the hospital response rate ranged from 31.8 percent to 86.4 percent; the design weight response rate ranged from 33.3 percent to 86.4 percent; and the visit weighted response rate ranged from 21.0 percent to 92.2 percent.

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<sup>4</sup> In 2010, data for Houston MSA were considered of sufficient quality to support separate estimates for the purpose of weighting but not publication. Therefore, there are 12 MSAs included in the weighting process but only 11 sets of published estimates at the MSA level.

**Table 2. DAWN sample characteristics, 2010**

Geographic area	Total eligible hospitals (1)	Eligible hospitals in sample (1)	Responding hospitals in sample	Response rate for sampled hospitals (%)	Design weight response rate (%)	Visits weighted response rate (%)
<b>Total United States (2,3)</b>	<b>4,627</b>	<b>556</b>	<b>237</b>	<b>42.6</b>	<b>29.6</b>	<b>34.2</b>
Boston-Cambridge-Quincy, MA-NH, MSA	41	29	19	65.5	65.5	65.8
Chicago-Naperville-Joliet, IL-IN-WI, MSA	88	71	31	43.7	45.4	39.6
Denver-Aurora, CO, MSA	17	16	11	68.8	68.8	77.3
Detroit-Warren-Livonia, MI, MSA	37	24	17	70.8	73.0	85.2
Houston-Baytown-Sugar Land, TX, MSA	59	44	14	31.8	33.3	21.0
Dade County Division of Miami-Fort Lauderdale-Miami Beach, FL, MSA (4)	22	16	9	56.3	51.7	59.6
Fort Lauderdale and West Palm Beach Divisions of Miami-Fort Lauderdale-Miami Beach, FL, MSA (5)	28	21	9	42.9	41.0	52.7
Minneapolis-St. Paul-Bloomington, MN-WI, MSA	26	26	12	46.2	46.2	57.8
New York—Five Boroughs (part of Newark-Edison, NY-NJ-PA, MSA) (6)	43	34	22	64.7	61.1	71.7
Phoenix-Mesa-Scottsdale, AZ, MSA	30	29	13	44.8	44.8	50.2
San Francisco Division of San Francisco-Oakland-Fremont, CA, MSA (7)	18	18	7	38.9	38.9	53.5
Seattle-Tacoma-Bellevue, WA, MSA	24	22	19	86.4	86.4	92.2

(1) General, non-Federal, short-stay hospitals in the United States with 24-hour EDs, based on the American Hospital Association Annual Survey, are eligible for DAWN.

(2) The total number of eligible hospitals includes the sampled and participating hospitals from metropolitan areas shown in this table, plus hospitals in the remainder of the United States. Components shown here do not sum to the total.

(3) Unless otherwise noted, DAWN defines metropolitan areas using the MSA and Division definitions issued by the Office of Management and Budget in June 2003 (available at <http://www.whitehouse.gov/omb/bulletins/b03-04.html>).

(4) Miami-Miami Beach-Kendall, FL, Division.

(5) Fort Lauderdale-Pompano Beach-Deerfield Beach, FL, and West Palm Beach-Boca Raton-Boynton Beach, FL, Divisions.

(6) Bronx, Kings, New York, Queens, and Richmond Counties, NY.

(7) San Francisco-San Mateo-Redwood City, CA, Division.

NOTE: MSA = Metropolitan Statistical Area.

SOURCE: Center for Behavioral Health Statistics and Quality, SAMHSA, Drug Abuse Warning Network, 2010.

## 1.2 Determination of sample size for response rate calculation

In 2010, the initial DAWN sample included 1,279 hospitals divided among 48 metropolitan areas, 9 submetropolitan areas, and 1 area representing hospitals located outside those metropolitan

areas. Response rates and nonresponse bias were assessed to determine which of these areas had sufficient participation to warrant separate estimates. In 2010, a total of 12 areas (9 metropolitan areas and 3 submetropolitan areas) was determined to be able to support separate estimates. Oversampled hospitals in the areas that could not support separate estimates were treated as if they were not sampled. For 2010, this has the effect of reducing the sample from 1,279 hospitals to 556 hospitals, the number used for purposes of computing the overall response rates.

### 1.3 Population estimates

Population estimates used to generate rates (visits per 100,000 population) for 2010 are provided in **Table 3**.

**Table 3. U.S. population, by age and sex, 2010**

Age	Total United States	Males	Females
<b>Total</b>	<b>309,401,254</b>	<b>152,124,573</b>	<b>157,276,681</b>
0–5 years	24,354,970	12,440,793	11,914,177
6–11 years	24,568,889	12,552,439	12,016,450
12–17 years	25,327,973	12,971,868	12,356,105
18–20 years	13,517,335	6,921,201	6,596,134
21–24 years	17,181,193	8,766,693	8,414,501
25–29 years	21,127,944	10,656,252	10,471,692
30–34 years	20,082,345	10,058,392	10,023,953
35–44 years	40,943,644	20,378,156	20,565,488
45–54 years	45,036,630	22,161,482	22,875,148
55–65 years	36,806,975	17,760,522	19,046,452
65 years and older	40,453,356	17,456,775	22,996,581

SOURCE: U.S. Census Bureau, United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin (Vintage 2010).

### 1.4 Analytic groups

DAWN produces estimates of ED visits for different types of visits, referred to as DAWN analytic groups. The analytic groups are defined by the reason for the visit and the types of drugs involved (see Section 5.1). Unlike the type of case categories, DAWN analytic groups are not mutually exclusive. For example, a visit that involves cocaine and oxycodone will be counted in both the illicit drugs analytic group and the nonmedical use of pharmaceuticals analytic group.

The total number of ED visits for the seven analytic groups related to drug misuse or abuse are as follows:

- ED visits resulting from medical emergencies involving drug misuse or abuse - 2,301,050 visits:
  - ED visits involving illicit drugs - 1,171,024 visits;
  - ED visits involving use of alcohol in combination with other drugs - 564,796 visits;
  - ED visits involving underage drinking - 189,060 visits;
  - ED visits involving nonmedical use of pharmaceuticals - 1,173,654 visits;
  - ED visits resulting from drug-related suicide attempts - 212,736 visits; and
  - ED visits for the purpose of seeking detox services - 232,542 visits.

Estimates for ED visits related to adverse reactions to and accidental ingestions of pharmaceuticals, medications, and other health-related products available over the counter are also produced. These groups are not related to drug abuse or misuse and are as follows:

- ED visits resulting from an adverse reaction to a drug - 2,273,844 visits; and
- ED visits resulting from accidental ingestion of a drug - 106,041 visits (of these, 72,839 visits were by patients aged 5 and under).

---

## 2. OVERVIEW OF DAWN DATA PROGRAM

### 2.1 Overview of DAWN

DAWN is a public health surveillance system that reports on drug-related visits to hospital EDs.<sup>5</sup> DAWN is used to monitor trends in drug misuse and abuse, identify the emergence of new substances and drug combinations, assess health hazards associated with drug use and abuse, and estimate the impact of drug use, misuse, and abuse on the Nation's health care system.

### 2.2 Hospitals eligible to participate in DAWN

DAWN's target sample frame consists of all non-Federal, short-stay, general medical and surgical hospitals in the United States that have one or more EDs open 24 hours a day. DAWN employs a multistage sampling design for the selection of EDs for analysis. Stratified simple random sampling with oversampling in selected metropolitan areas is used to select the hospitals.

### 2.3 ED visits eligible for inclusion in DAWN

A DAWN case is any ED visit involving recent drug use. DAWN cases are identified through the review of ED medical records in participating hospitals. 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. These criteria encompass all types of drug-related events, including accidental ingestion and adverse reaction, as well as drug misuse or abuse. Within each hospital, 50 percent to 100 percent of the days of the month are systematically selected, and a census of ED visits is selected for review for these days.

### 2.4 Drugs reported for DAWN ED visits

DAWN collects data on all types of drugs—illegal drugs, prescription and over-the-counter medications, dietary supplements, and both pharmaceutical and nonpharmaceutical inhalants. DAWN notes whether alcohol is involved in addition to drug(s) for patients of all ages. Because alcohol is considered an illicit drug for minors, alcohol abuse without the involvement of other drugs is considered a drug-related ED visit for patients under the age of 21. DAWN does not report current medications (i.e., medications and pharmaceuticals taken regularly by the patient as prescribed or indicated) that are deemed by the ED medical staff to be unrelated to the ED visit.

DAWN classifies drugs using a modified version of the Multum *Lexicon*, © 2011, a drug vocabulary and classification tool originated by Multum Information Services, Inc. DAWN has adapted the *Lexicon* to allow for the inclusion of illegal drugs, inhalants, and alternative medicines that are reported to DAWN.

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<sup>5</sup> Drug-related visits are defined by DAWN as any ED visit related to recent drug use. Additional detail on DAWN's definition of drug-related visits is provided in Section 3.2.

## 2.5 DAWN estimates of ED visits

Annually, DAWN produces estimates of drug-related visits to hospital EDs for the Nation as a whole and for selected metropolitan areas. *DAWN Trend Tables* contain weighted estimates of drug-related ED visits that are the result of drug misuse or abuse, adverse reactions to drugs, and accidental ingestion of drugs. Among visits resulting from drug misuse or abuse, separate estimates are made of visits involving illicit drugs, nonmedical use of pharmaceuticals, and alcohol. Estimates are also made of ED visits resulting from drug-related suicide attempts, ED visits made by patients seeking detoxification services, and visits involving alcohol (with or without other drugs) for patients under the age of 21. For each of these types of visits, estimates are available by patient sex, age group, and race/ethnicity. Estimates are also provided for each visit's disposition (e.g., treated and released, admitted to the hospital intensive or critical care unit [ICU], died). Estimates are made of the different types of drugs involved in each of these categories of visits. These sets of estimates are prepared for the Nation as a whole and for selected metropolitan areas where hospital participation was high enough to produce reliable results.

*DAWN Trend Tables* containing ED estimates are available at the DAWN Web site.<sup>6</sup> The document *Guide to the DAWN Trend Tables* provides guidance on accessing these tables, understanding their content, and locating data items of interest.<sup>7</sup>

## 2.6 DAWN public use files

The DAWN public use file (PUF) containing ED visit-level data is available through the Substance Abuse and Mental Health Data Archive (SAMHDA).<sup>8</sup> The SAMHDA site offers a query capacity to build tables online using the DAWN PUF data as well as the means to download data files. The presentation *Analyzing the Drug Abuse Warning Network (DAWN) Data* available at the DAWN Web site provides guidance on accessing, interpreting, and analyzing DAWN PUF data. Additional detailed documentation for the DAWN PUF is also available at the SAMHDA site. The weights needed to produce estimates representative of the Nation and select metropolitan areas are provided in the DAWN PUF. A lengthier description of SAMHDA's services is provided in Section 5.9 of this document.

## 2.7 Uses of DAWN data

DAWN is a major component of the Nation's capacity to monitor trends in the morbidity and mortality associated with drug misuse and abuse. DAWN is the only national data system providing estimates of the number of ED admissions associated with drug misuse and abuse and the particular drugs involved both for the United States as a whole and also for selected metropolitan areas. Additionally, DAWN is the only national data collection system on drug abuse

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<sup>6</sup> DAWN documents can be found on the DAWN Web site at <http://www.samhsa.gov/data/DAWN.aspx>.

<sup>7</sup> *Guide to the DAWN Trend Tables* is available as an attachment to the *DAWN ED Annual Reports* and as a freestanding document at the DAWN Web site.

<sup>8</sup> DAWN data can be found on the SAMHDA Web site at <http://www.icpsr.umich.edu/icpsrweb/SAMHDA/>.

with the capacity to monitor specific and relatively infrequently used substances of abuse (e.g., club drugs, phencyclidine [PCP], or medications used to treat attention deficit hyperactivity disorder [ADHD]) as they emerge and diffuse across population groups and geographic areas.

Within the Substance Abuse and Mental Health Services Administration (SAMHSA), DAWN data help SAMHSA to target program resources to areas of greatest need and to assess program impact. For example, as part of its intervention programming, SAMHSA uses DAWN data to monitor adverse events associated with buprenorphine treatment for opiate addiction. Additionally, DAWN data are used by the Center for Behavioral Health Statistics and Quality (CBHSQ) to prepare reports on topics of interest to the public health community, to provide regular updates to SAMHSA and other federal agencies on trends in drug involvement, and to respond to ad hoc inquiries from public health researchers. DAWN estimates are used to monitor trends in major substances of abuse (e.g., heroin, cocaine, marijuana); to assess alcohol use by minors that results in ED visits; to identify emerging new drugs of abuse (e.g., synthetic cannabinoids, “bath salts”); and to identify the misuse and abuse potential of prescription and over-the-counter drugs. The DAWN Web site provides a complete listing of all publicly available reports developed by SAMHSA using DAWN data.

Outside of SAMHSA, DAWN is used by national, state, and local health professionals, policymakers, law enforcement officers, and pharmacologists to understand the consequences of drug use and abuse and to identify emerging trends and changing patterns of drug use. The White House Office of National Drug Control Policy uses DAWN data to monitor national trends; the Drug Enforcement Administration uses it for surveillance, diversion control, and intelligence; and, at the direction of the Food and Drug Administration, the pharmaceutical industry uses it to conduct post-marketing surveillance of prescription and over-the-counter pharmaceuticals, monitor adverse events associated with medications, and assess the abuse potential that drives labeling and scheduling decisions. State and local professionals, including law enforcement and the Community Epidemiology Work Group, use DAWN to assess changes in local trends and patterns of drug use.



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## 3. INFORMATION COLLECTED BY DAWN

### 3.1 Approach to DAWN data collection

DAWN data are collected through a retrospective review of ED medical records for patients treated in the ED. Patients or families are never interviewed. The review of source records is performed by a trained DAWN Reporter in each member facility. Depending on the needs of the facility, the DAWN Reporter may be an employee of the hospital or an employee of the DAWN operations contractor. For each facility that participates in DAWN, the designated DAWN Reporter reviews all medical records to find ED visits related to drug use. The DAWN Reporter submits an electronic case report to the DAWN system for each ED visit that meets the specific case selection criteria. DAWN Reporters also track, on a copy of the ED registration log, their progress in reviewing the universe of ED visits. Because of the volume in some EDs, a sample of medical records is obtained rather than reviewing a census. This subsampling introduces another component of variance that is accounted for in the weighting and estimation process.

### 3.2 ED visits eligible for DAWN

A DAWN case is any ED visit where the patient was treated in the ED for a condition that was induced by or related to recent drug use. The patient chart is reviewed by the DAWN Reporter to determine if there is evidence that a drug(s) is involved. The patient ED chart has three key areas, and this evidence may come from any one of these areas: patient's chief complaint; physician's, nurse's, and/or other appropriate clinician's assessment; and/or diagnosis detail. The drug use must be implicated in the ED visit, but it does not need to be the direct cause. The reason a patient used a drug is not a factor in determining whether the ED visit is a DAWN case. Only drugs that are determined to be involved are recorded in the DAWN system. Unrelated drugs that are simply "on board" are not recorded.

As a result of these criteria and approaches, DAWN includes ED visits associated with substance abuse and misuse, both intentional and accidental, as well as ED visits related to the use of drugs for legitimate therapeutic purposes and under a doctor's direction. The DAWN visit eligibility criteria are intended to be broad and inclusive and to have few exceptions. They take into account the fact that documentation in medical records varies in clarity and completeness across hospitals and among clinicians within hospitals. The criteria are designed to minimize the potential for DAWN Reporter judgments that could cause data to vary systematically and unexpectedly across different data collectors and hospitals. In addition, the criteria allow for the capture of a diverse set of drug-related visits that can be aggregated or disaggregated to serve a variety of analytical purposes and the interests of multiple audiences.

There are a few clearly delineated exceptions to the DAWN eligibility criteria. An ED visit is *not* a DAWN visit if

- there is no evidence of recent drug use;
- the patient left the ED without being treated;
- the patient consumed a nonpharmaceutical substance but did not inhale it;
- the patient has a history of drug use but no recent use;
- alcohol is the only substance involved, and the patient is an adult (aged 21 or older);
- all the drugs mentioned in the ED record are not related to the ED visit (e.g., list of current medications);
- drugs identified in toxicology testing are not related to the visit, and the medical record does not contain any additional drug-related information that would make the visit a DAWN case; or
- the patient is being treated as a consequence of undermedication (i.e., taking too little of a drug).

### 3.3 Case types in DAWN

By design, DAWN's broad case criteria yield a diverse set of visits. To bring order to this heterogeneous mix of ED visits, DAWN Field Reporters assign each visit to one of eight case types.<sup>9</sup> The eight case types are as follows:

- drug-related suicide attempt;
- patient seeking detoxification;
- alcohol use only, in patients younger than 21;
- adverse reaction;
- overmedication;
- malicious poisoning (e.g., drug-facilitated sexual assault, product tampering);
- accidental ingestion; and
- other.

Each ED visit is assigned to a single case type. Because many ED visits meet the criteria for more than one case type, the case types are assigned based on an algorithm depicted in the DAWN Decision Tree (**Figure 1**). Each ED visit is assigned to the first applicable case type. To assist DAWN Reporters with case assignment, a series of questions and decision rules is included with the DAWN Decision Tree; detailed instructions are included in the *2007–2011 ED Reference Guide*.<sup>10</sup>

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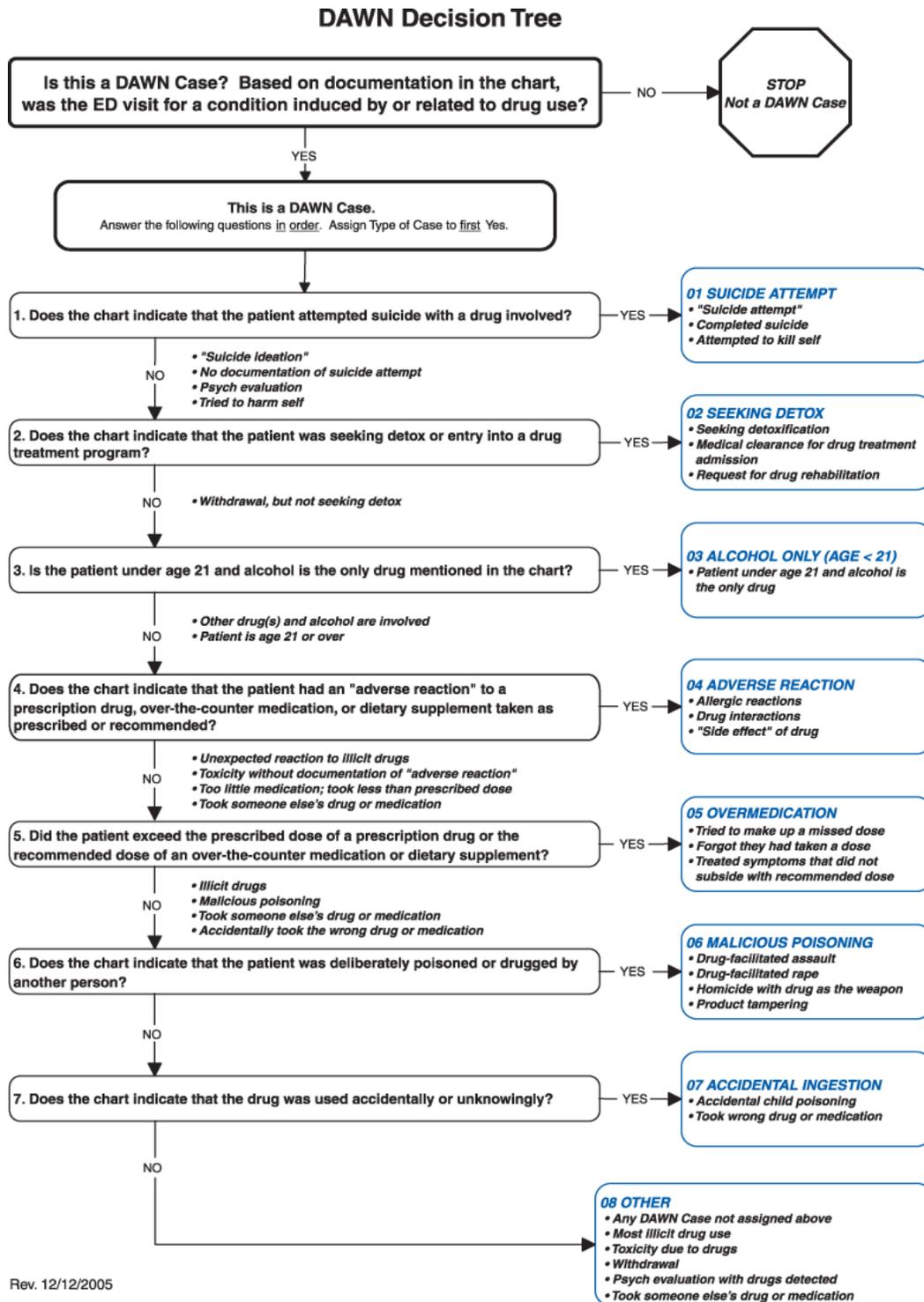
<sup>9</sup> DAWN Reporters are responsible for reviewing ED visit records, deciding if a visit is eligible for DAWN, and, if so, recording select data items for the visit. Additional information on collection of DAWN data is provided in Section 3.2.

<sup>10</sup> The *2007–2011 ED Reference Guide* is available as an attachment to the *DAWN ED Annual Reports* and as a freestanding document at the DAWN Web site (<http://www.samhsa.gov/data/DAWN.aspx>).

The final category in the decision tree, Other, is reserved for DAWN visits that do not meet any of the rules for classification into one of the first seven types. Most cases of drug abuse are classified as Other. This approach, which never directly identifies drug abuse, comes from the recognition that medical records frequently lack explicit documentation of substance abuse. This lack of documentation may occur for several reasons. First, the distinctions among use, misuse, and abuse are often subjective. Second, if there is a low index of suspicion for drug abuse in some types of patients (e.g., older adults), ED physicians may be unlikely to label those types of patients as drug abusers. Third, ED staff may be concerned that the patient's insurance company will disallow coverage if the visit is related to substance abuse.

The case type of a visit, in combination with the types of drugs involved, is used to construct groupings of visits that have similar characteristics—for example, visits for drug abuse involving illicit drugs. Section 5.1 provides additional details on how visits are grouped for the purpose of analyses.

Figure 1. Type of case decision tree



### 3.4 Key data items

**Figure 2** depicts the data items collected by DAWN. Additional detail on key items is provided in the following sections.

**Figure 2. DAWN ED case form**



**DAWN**  
DRUG ABUSE  
WARNING NETWORK

OMB No. 0930-0078 Expires 12/31/2008

## Emergency Department Case Report

U.S. Department of Health and Human Services • Substance Abuse and Mental Health Services Administration

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**1. Facility**

**2. Date of Visit**  
MONTH DAY YEAR  
  20

**3. Time of Visit**  
HOUR MINUTE  
   a.m.  
 p.m.  
 military

**4. Age**  
  Less than 1 year  
 Not documented

---

**5. Patient's Home ZIP Code**

*Otherwise, select one response:*

No fixed address (e.g. homeless)  
 Institution (e.g. shelter/jail/hospital)  
 Outside U.S.  
 Not documented

**6. Sex**  
 Male  
 Female  
 Not documented

**7. Race/Ethnicity**  
*Select one or more:*

White  
 Black or African American  
 Hispanic or Latino  
 Asian  
 American Indian or Alaska Native  
 Native Hawaiian or Other Pacific Islander  
 Not documented

---

**8. Diagnosis** *List up to 4 diagnoses noted in the patient's chart. Do not list ICD codes.*

1. \_\_\_\_\_ 3. \_\_\_\_\_  
2. \_\_\_\_\_ 4. \_\_\_\_\_

---

**9. Case Description** *Beginning with the presenting complaint, describe how the drug(s) was related to the ED visit. Copy verbatim from the patient's chart when possible.*

\_\_\_\_\_

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**10. Substance(s) Involved** *Using available documentation, list all substances that caused or contributed to the ED visit. Record substances as specifically as possible (i.e., brand [trade] name preferred over generic name preferred over chemical name, etc.). Do not record the same substance by two different names. Do not record current medications unrelated to the visit.*

1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_

**Route of Administration**  
*Select One*

Mark if confirmed by toxicology test:

	Oral	Injected	Inhaled, sniffed, snorted	Smoked	Other	Not documented
Alcohol involved? <input type="checkbox"/> Yes <input type="checkbox"/> No/Not documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

---

**11. Type of Case**  
*Using the Decision Tree, select the first category that applies:*

Suicide attempt  
 Seeking detox  
 Alcohol only (age <21)  
 Adverse reaction  
 Overmedication  
 Malicious poisoning  
 Accidental ingestion  
 Other

**12. Disposition** *Select one:*

<p><b>Treated and released:</b></p> <p><input type="checkbox"/> Discharged home <input type="checkbox"/> Released to police/jail <input type="checkbox"/> Referred to detox/treatment</p>	<p><b>Admitted to <i>this</i> hospital:</b></p> <p><input type="checkbox"/> ICU/Critical care <input type="checkbox"/> Surgery <input type="checkbox"/> Chemical dependency/detox <input type="checkbox"/> Psychiatric unit <input type="checkbox"/> Other inpatient unit</p>	<p><b>Other disposition:</b></p> <p><input type="checkbox"/> Transferred <input type="checkbox"/> Left against medical advice <input type="checkbox"/> Died <input type="checkbox"/> Other <input type="checkbox"/> Not documented</p>
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**13. Comments** *Enter here any questions or issues you have about this case. Do not include information that could identify the patient.*

\_\_\_\_\_

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SMA 100-1 REV. 12/2005

DAWN is operated by the Substance Abuse and Mental Health Services Administration (SAMHSA) of the U.S. Department of Health and Human Services, as required in Section 505 of the Public Health Service Act (42 U.S.C. 290aa-4). DAWN is used to monitor trends in the adverse health consequences associated with drug use. Section 501(n) of the Public Health Service Act prohibits SAMHSA from using or disclosing DAWN data for any purpose other than that for which they were collected.

Public reporting burden for DAWN emergency departments is estimated at 77 minutes per case. This includes time for reviewing ED charts and completing case report and activity report forms. Send comments regarding burden to SAMHSA Reports clearance Officer, Paperwork Reduction Project 0930-0078, 1 Choke Cherry Road, Room 7-1044, Rockville, MD 20857. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number for this project is 0930-0078.

### 3.4.1 Patient demographics

DAWN collects information on basic patient demographics: sex, age, race/ethnicity, and patient home ZIP code. The ZIP code variable has space to indicate if the patient was homeless, institutionalized, or from outside the United States and, therefore, has no home ZIP code.

ED records vary in the level and type of detail provided. Although sex, age, and ZIP code are usually present in patients' ED records, race/ethnicity is often missing or insufficient (e.g., "European"). Although it is possible to record multiple race/ethnicities, for reporting purposes race/ethnicity is collapsed into a single variable with five levels:

- non-Hispanic White,
- non-Hispanic Black,
- Hispanic,
- race/ethnicity not tabulated above, and
- race/ethnicity undocumented.

### 3.4.2 Visit characteristics

DAWN collects detailed information about each visit. The data items include

- date and time of visit;
- type of visit (e.g., suicide attempt, seeking detox, adverse reaction);
- up to 22 drugs or substances for every visit;
- diagnoses reflecting one or more conditions for which the patient was treated, as determined by the clinician after evaluation in the ED; and
- disposition, or the location or facility to which an ED patient was referred, transferred, or released at the conclusion of the ED visit.

DAWN Reporters also provide a brief description of the visit, drawn directly from the ED record, which includes the reason for the visit and any other information necessary to document that the visit is a DAWN case.

### 3.4.3 Drugs and drug categories

For the purpose of DAWN, a drug is any substance that is (a) used as a medication or in the preparation of medication; (b) an illicit substance that causes addiction, habituation, or a marked change in consciousness; or (c) both. Substances reportable to DAWN include illicit drugs (e.g., club drugs, cocaine, heroin, marijuana, stimulants, and alcohol when used by a minor<sup>11</sup>),

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<sup>11</sup> Alcohol use by a minor with no other drug involvement is eligible for DAWN. Alcohol use by an adult must be accompanied by another drug to be eligible for DAWN.

nonpharmaceutical inhalants,<sup>12</sup> prescription drugs (e.g., drugs for ADHD, antibiotics, antidepressants, antipsychotics, anticoagulants, beta blockers, birth control pills, hormone replacement, insulin, muscle relaxants, pain relievers, sleeping aids), drugs used in treatment of medical conditions (e.g., respiratory therapy, chemotherapy, radiation therapy), vaccines, dietary supplements, vitamins, and other over-the-counter pharmaceutical products.

Using the DAWN Drug Reference Vocabulary (DAWN DRV), DAWN is able to identify more than 3,300 individual drugs (which map to more than 19,000 individual brands and street names). The DAWN DRV is a comprehensive drug vocabulary and classification system based on the Multum *Lexicon*, © 2011, that has been modified to meet DAWN's unique requirements. The DRV includes codes for brand (trade) names, generic names, chemical names, metabolites, nonspecific drug terms, and street terms for legal and illegal substances, including prescription and over-the-counter pharmaceuticals and selected nonpharmaceuticals that are abused by inhalation.

DAWN Reporters collect the most specific information about each drug that is available in the ED record. Up to 22 drugs implicated in a visit are assigned a code using the DRV. Because multiple substances can be reported for each DAWN case, the total number of drugs exceeds the total number of DAWN cases reported.

The DRV provides the flexibility needed to accommodate the varying level of drug detail provided in ED records. A drug might be recorded in the ED records by its brand name (e.g., OxyContin<sup>®</sup>), a generic name (e.g., oxycodone), or by the class to which it belongs (e.g., an unspecified narcotic pain reliever). Each of these has a code in the DRV. Narcotic pain relievers are mapped to the larger grouping "Opioid/opiate Pain Relievers," which is part of the broader category "Pain Relievers," which is one of the categories among "Central Nervous System Agents." Illicit drugs and other DAWN-reportable substances are maintained in a similar tiered structure in the DRV.

The Multum *Lexicon*, © 2011, is updated every 2 months to incorporate new products and, occasionally, to introduce new drug categories; the DAWN DRV is updated at the same time. In addition, DAWN continually modifies the DRV to include any drugs reported by EDs that are not in the Multum *Lexicon* (e.g., imported drugs, new combinations of illicit drugs). At the end of each data year, all the drug data received from EDs—the current year's data and data from all previous years—are coded using the most recent DRV. This process ensures that estimates of visits by drug across years are comparable.

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<sup>12</sup> To be reportable as an illicit drug, a nonpharmaceutical substance must be intentionally consumed by inhalation, sniffing, or snorting, and it must have a psychoactive effect when inhaled. Carbon monoxide is excluded from the inhalants. Cases involving accidental exposures to inhalants (e.g., exposure to paint fumes while one is painting a closet) are excluded.

Additional information on the Multum *Lexicon*, © 2011, the DAWN DRV, and the Multum Licensing Agreement governing use of the *Lexicon* can be found on the DAWN Web site.<sup>13</sup> Readers interested in exploring the DRV and the manner in which it classifies drugs may obtain the full set of DAWN DRV tables in the relational database named “DAWN\_DRV.mdb.”<sup>14</sup> Queries are used to join tables and display relationships between different drugs and drug groupings. The DRV is also available as a spreadsheet named “DAWN\_\_Final\_Table.xls.”

#### 3.4.4 Visit disposition

The visit disposition records where the patient went after leaving the ED. There are three major categories: treated and released, admitted to this hospital, and other dispositions. Additional detail is provided with subcategories.

*Treated and released* includes three categories:

- *Discharged home*—In this context, “home” refers to the patient’s personal residence. For students residing at nearby universities, home means their university; for travelers who get sick on the road, it may mean their hotel or wherever they are staying.
- *Released to police/jail*—Patients who are released to police/jail were usually brought to the ED by the police for treatment of an acute medical problem or for medical clearance before being placed in the jail population.
- *Referred to detox/treatment*—The chart indicates that the patient was referred to a substance abuse treatment or detox program, facility, or provider other than the chemical dependency/detox unit maintained at the hospital.

*Admitted to this hospital* includes five categories of inpatient units:

- intensive or critical care unit (ICU),
- surgical unit,
- chemical dependency/detox unit,
- psychiatric unit, and
- other inpatient units.<sup>15</sup>

*Other disposition* includes five categories:

- *Transferred*—The patient was transferred to another health care facility.
- *Left against medical advice*—The patient left the treatment setting without a physician’s approval.

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<sup>13</sup> DAWN documents can be found on the DAWN Web site (<http://www.samhsa.gov/data/dawn/MultumLicenseAgreement.pdf>).

<sup>14</sup> These files and DRV documentation are available at the DAWN Web site at <http://www.samhsa.gov/data/dawn/DRV/Drug%20Reference%20Vocabulary.zip>.

<sup>15</sup> This code may be applied if the inpatient unit was not specified or does not match one of the preceding units. Also included herein are “combo” units, e.g., a unit that offers both psychiatric and detox services.

- *Died*—The patient died after being admitted to the ED but before being discharged, admitted, or transferred.
- *Other*—The discharge status is documented in the patient's chart but does not fit into any of the preceding categories.
- *Not documented*—The patient's discharge status was not documented in the medical chart.

Visit dispositions may be reported using the three major categories or 13 subcategories, as noted above. A third way of reporting disposition that often appears in DAWN reports and tables groups ED visits based on whether there is any indication in the ED record that the patient received some type of follow-up treatment. "Evidence of follow-up" includes patients who were referred to detox/treatment, admitted to the hospital (any unit), or transferred. "No evidence of follow-up" includes patients with any other disposition.



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## 4. DEVELOPMENT OF THE ED COMPONENT OF DAWN

### 4.1 DAWN ED sample design overview

The statistical and methodological design of the current DAWN system was introduced in data collection year 2004. A new stratified simple random sample of hospitals was drawn at that time from among the universe of eligible hospitals in the Nation; oversampling was conducted in selected metropolitan areas.<sup>16</sup> For each participating sampled hospital and for each month of the year, days of the month are systematically selected and all ED visits for these days are reviewed for eligibility as DAWN cases. Data collection following the new sampling plan was fully implemented for the first time in the 2004 data collection year, and the original sample of hospitals has been followed longitudinally since then. That is, each year since 2004, new hospitals are given the opportunity to be sampled into the longitudinal panel of hospitals.

#### 4.1.1 Sample frame of hospitals

The DAWN sampling frame was built from among all hospitals meeting the DAWN criteria for eligible hospitals (i.e., non-Federal, short-stay, general medical and surgical hospitals in the United States that have one or more EDs open 24 hours a day, 7 days a week) that appeared on the 2001 American Hospital Association (AHA) Annual Survey Database (ASDB).<sup>17</sup> A probability sample proportionate to the number of ED visits in each facility was drawn from among eligible hospitals.

#### 4.1.2 Metropolitan areas represented in DAWN

Samples were drawn from the initial frame to provide the capability to make estimates for the Nation as well as selected metropolitan areas. The metropolitan areas are referred to as oversampled areas (OS areas) or DAWN metropolitan areas. Two goals guided the selection of the DAWN metropolitan areas. The first was to preserve the ability to represent the 21 areas that had been part of DAWN since its inception. The second was to improve population and geographic coverage beyond these 21 legacy areas. Accordingly, the design ensured representation of the original 21 legacy areas plus the 5 most populous MSAs in each of the 9 census divisions. Oversamples were selected in a total of 48 MSAs; in 4 of those 48 MSAs, additional oversamples were drawn to allow reporting for subareas within those MSAs. Resources available to DAWN have allowed for data collection in only a portion of the OS areas.

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<sup>16</sup> The redesign of the DAWN ED component is described in detail in *DAWN: Development of a New Design*, which is available at the DAWN Web site (<http://www.samhsa.gov/data/DAWN.aspx>).

<sup>17</sup> The 24-hour status of hospitals is not contained on the AHA file and is determined by contacting otherwise eligible hospitals directly.

### 4.1.3 Metropolitan-level stratification

The DAWN sample design was conceived to provide the statistical infrastructure to produce reliable and representative estimates for the Nation and a portion of DAWN metropolitan areas (OS areas), depending on available resources and interest. To accomplish this objective, a subset of the hospitals within each OS area was identified a priori as having a dual purpose in estimation. Referred to as dual-purpose hospitals, these designated hospitals can contribute either to an estimate for the OS area in which they are located or to the estimate for the remainder area outside of OS areas. Dual-purpose hospitals carry two probabilities of selection (POS) and two stratum identifiers. One POS/stratum is associated with membership in an OS area oversample, and the other is associated with membership in the remainder area sample.<sup>18</sup>

Each data year, the response rates and nonresponse patterns for each OS area are reviewed to determine data quality. Those OS areas with acceptable data quality are allowed to stand on their own as the basis for separate estimates; they are referred to as stand-alone OS areas. If it is determined on the basis of response rates and bias analyses that an OS area cannot stand alone, the design provides that the OS area is eliminated as a separate area but becomes part of the remainder area.

DAWN national-level estimates are the sum of the estimates for stand-alone OS areas plus the remainder area. The formula for the national estimate is

$$\left( \sum_{i=1}^N a_i \right) + b$$

where  $a_i$  is the estimate for stand-alone OS area  $i$ ,  $N$  is the number of stand-alone OS areas, and  $b$  is the remainder area estimate inclusive of dual-purpose hospitals in OS areas that do not stand alone.

### 4.1.4 Hospital size and ownership stratification

Sampled hospitals in each of the OS areas were stratified by hospital size (up to four categories, on the basis of the number of ED visits<sup>19</sup>) and ownership type (public and private). The stratification plan included an additional geographic construct to represent the remainder of the United States outside the OS areas. Hospitals in the remainder area were divided into 24 strata on

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<sup>18</sup> Hospitals in the four MSAs with submetropolitan area oversampling can have up to three nonzero POS/strata: (1) POS/stratum for membership in the MSA, (2) POS/stratum for membership in the submetropolitan area, and (3) POS/stratum for membership in the remainder area.

<sup>19</sup> In DAWN metropolitan areas, size categories were determined independently for each OS area. The number of hospitals determined the unique size categories: fewer than four hospitals were placed in one size category; four to seven hospitals were placed in two size categories; and eight or more hospitals were placed in four size categories. Areas outside of DAWN metropolitan areas were organized into three size categories.

the basis of four regions (Northeast, South, Midwest, West), three size categories, and ownership type.

#### 4.1.5 Sample size and sample allocation

Each hospital in the DAWN sample was selected through a random process, which theoretically could have been repeated many times, resulting in many hypothetical samples. Sampling variance, or the margin of error, refers to the extent to which these samples were likely to have varied. Two measures of this variability are the standard error (SE) and the relative standard error (RSE), which is defined as the SE of the estimate divided by the estimate itself. The precision of an estimate is inversely related to the sampling variance, as measured by the RSE. The greater the RSE value, the lower the precision. DAWN is designed to have estimates for major drug categories (i.e., all drug-related ED visits plus ED visits for cocaine, heroin, and marijuana), wherein the RSEs are less than or equal to 10 percent for metropolitan area estimates and less than or equal to 15 percent for national estimates. Sample sizes for each metropolitan area and the Nation were set using these targeted precision levels in combination with the theory of optimal allocation for stratified samples.

## 4.2 Data collection procedures

This section documents the methodologies used to collect DAWN data. The DAWN operations contractor (DOC) is responsible for collecting DAWN data. Additional detail on data collection methodology is available in the *2007–2011 ED Reference Guide*.<sup>20</sup>

### 4.2.1 Review of ED medical records

DAWN ED data are collected directly from the medical records of patients treated in the ED. The review is done after the ED visit is completed. Patients, their families, and clinical staff are never interviewed. The data are collected by trained DAWN Reporters who review ED medical records to identify ED visits related to recent drug use. For each DAWN case, an electronic case report is completed (**Figure 2**, in Section 3, depicts the data elements collected). Case reports are submitted electronically using the Electronic Hospital Emergency Reporting System (eHERS), a customized system developed specifically for DAWN. DAWN Reporters also submit an activity report detailing their progress in reviewing the ED charts, and they report the monthly census of all ED visits made to the hospital. Data collection is performed on an ongoing basis as soon after the ED visit as possible.

The majority of DAWN ED data are collected on site at hospitals by a DAWN Reporter who reviews paper or electronic records. A growing number of hospitals have centralized electronic medical records systems that can be accessed from the outside. In these cases, DAWN Reporters

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<sup>20</sup> The *2007–2011 ED Reference Guide* is available as an attachment to the *DAWN ED Annual Reports* and as a freestanding document at the DAWN Web site (<http://www.samhsa.gov/data/DAWN.aspx>).

access the systems via remote access from the DOC's headquarters. A secured transmission line is maintained for this purpose by the DOC.

#### **4.2.2 Selection of ED medical records**

The original DAWN redesign protocol called for direct review of all available ED records. After careful review and testing, however, it was established that a sample of ED visits could be used to produce sufficiently precise estimates in comparison to a census of visits provided that the cost savings be redirected toward recruiting additional hospitals. In 2008, a protocol was developed for drawing a systematic sample of each ED's medical records based on the date of the ED visit. In those EDs with sampling, the DAWN Reporter is sent a list each month of designated dates for chart review, and the charts for all the ED visits occurring on the designated dates are reviewed for drug-related visits. By 2010, sampling of ED records had been introduced in all larger hospitals and many smaller ones.

A vast majority of sampled records are reviewed, but there are some instances when they are not. Unintentional gaps in chart review may occur due to such factors as a DAWN Reporter's unexpected absence or circumstances at the hospital that preclude review of some ED records (e.g., limitations on the hours or days that a DAWN Reporter may access ED records, removal of records from facility). A similar method of within-hospital visit weighting is used to compensate for both intentional sampling of ED records as well as unintentional gaps in record review (see Section 4.4.3).

#### **4.3 Data preparation**

The DOC performs numerous reviews that begin at the point of entry and continue through the final delivery of the data to SAMHSA. Automated systems check DAWN case data to confirm eligibility of cases submitted and for case type discrepancies. In addition, edit programs are run to identify range and consistency errors. "Unknown" drugs entered by the DAWN Reporter are reviewed by CBHSQ; when possible, they are upcoded to extant codes or new drug codes are added to the DRV, when appropriate. At the end of every data collection year, an extensive data review is conducted. Statistical process control (SPC) is used to evaluate the monthly counts of ED visits, charts reviewed, and cases reported for each ED. If any monthly count of visits, charts, or cases is identified as inconsistent by SPC, that count is investigated via communication with contacts from the ED. The results of the investigation are documented and sent along with the final delivery. As a final step, the SPC results and monthly counts for each ED are reviewed by the DOC, the Data Analysis Contractor (DAC), and representatives from CBHSQ.

#### **4.4 ED data and statistical processing**

The DOC prepares the database as described in Section 4.3, at which point the annual data files and the current DRV are transferred to the DAC. The DAC performs a number of data quality and data processing steps to prepare the file for weighting and for developing estimates (see

Section 4.4.1). Sample maintenance is then performed (see Section 4.4.2). Weights and adjustments are then developed (see Section 4.4.3). Section 4.4.4 describes the sequential processing steps for developing and applying weights and adjustments.

#### **4.4.1 ED data processing**

Because up to 22 drugs may be reported for each visit, the DAC begins its processing by ensuring that no duplicate drugs are recorded for a visit. The DRV, the database that defines how drugs are classified and mapped to drugs, is applied to the microdata received from the DOC to derive drug IDs and the standard drug list (SDL) classification associated with each drug.<sup>21</sup> The resulting drug IDs for a visit are compared with one another to ensure that a drug appears only once for a visit.<sup>22</sup> After the initial deduplication, codes for mouthwash and alcohol are deduplicated. Lastly, a check is run to ensure there are no cases that involve only alcohol for respondents aged 21 or older. The data are classified originally on a brand level and then are processed to a drug ID level; a final step is to flatten the data file to a visit level. Discrepancies or irregularities are resolved through discussion among the DOC, the DAC, and the DAWN team at CBHSQ.

#### **4.4.2 DAWN sample maintenance**

As noted above, the initial DAWN sample was selected from a sampling frame created from the 2001 AHA ASDB. Because DAWN is a longitudinal survey, maintenance is conducted every year to ensure that the sample remains representative of the target population of eligible hospitals. Over time, new hospitals will be opened, some will close, some will merge with other hospitals, and some will “demerge” to form two or more smaller hospitals. Some hospitals no longer maintain 24-hour EDs and become ineligible; others open them and become eligible. Each year the sampling frame is updated to reflect new, closed, merged, and demerged hospitals on the basis of information in the most current AHA ASDB. Since 2004, a master file has been maintained of the changes to the frame and originally sampled hospitals, plus information on all new frame and sampled hospitals. All variables in the AHA master file are assigned consistent names from year to year, even if there are variable name changes in later AHA ASDBs. Conversely, documentation accompanying the AHA ASDB each year is carefully reviewed to ensure that variables with the same name still mean what they did in earlier years.

Newly eligible hospitals identified on the most current ASA ASDB, and confirmed for having a 24-hour ED, are provided the opportunity to be selected into the sample on the basis of the sampling fraction of the stratum in which each newly eligible hospital is located.

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<sup>21</sup> This version of the annual data is referred to as the “microdata” because it includes one record for every brand of drug mentioned in a visit. There are up to 22 records for each visit.

<sup>22</sup> Identical drug IDs can result when different brand codes map to the same drug ID. When the duplicate drug ID is removed, the brand code associated with it will be lost because only one brand is retained for each unique drug ID in the visit-level file. The detailed information on all brands is retained in the brand-level file and can be retrieved, if needed.

### 4.4.3 Weights and adjustments

Each year, weights and adjustments are calculated and applied to the collected data to ensure that the survey results represent the target population. Sampling weights are first calculated as the inverse of the probability of selection and then adjusted for variable nonresponse by a procedure known as poststratification, or benchmark adjustment. For steps involving within-hospital adjustments, the processing is carried out at the facility/month level; that is, adjustments are made to data for each month within each facility within each hospital. The derivation of weights to adjust for unequal POS, nonresponse, and other sources of bias is processed at the hospital/stratum/region level.

**Probabilities of selection.** DAWN hospitals are selected using stratified simple random sampling with oversampling in DAWN metropolitan areas. A hospital can have up to three POSs: a remainder-level POS, a division-level POS, and an OS area-level POS (see Section 4.1.3). Decisions about which POS to use are made after an analysis of response rate and nonresponse bias is conducted for each OS area.

**Within-hospital weighting adjustment.** Charts may be intentionally sampled, or there may be unintentional gaps due to problems in collecting data or obtaining access to records (see Section 4.2.2). To compensate for within-hospital nonresponse, the DAWN weighting plan includes a nonresponse adjustment factor for each month of data collection within each facility; it is equal to the number of ED visits divided by the number of charts reviewed for each of 12 months in the data collection year. The within-hospital weights are applied to the by-month count of visits. That is, the visit counts for a given facility/month are first summed for each drug and then multiplied by the corresponding within-hospital adjustment factor for that facility/month. The weighted totals are then summed over all facilities and months to give a total weighted visit count for each drug for each hospital.

**Weighting adjustment for hospital nonresponse.** Hospital-level nonresponse occurs when hospitals fail to provide valid data for at least 3 months of the data collection year. To minimize the impact of hospital nonresponse, the DAWN weighting plan includes nonresponse adjustment factors that are developed and applied within each weighting class. Weighting classes are formed on the basis of the aforementioned sampling stratification schemes. Within each weighting class, the nonresponse adjustment factor is calculated as the sum of the sampled hospital weights divided by the sum of the weights of the responding hospitals. The hospital nonresponse adjustment factors are checked to make sure the adjustments are within reasonable bounds. If a nonresponse adjustment factor is too large, adjacent weighting classes are collapsed, and new nonresponse adjustment factors are calculated.

When the hospital-level nonresponse adjustment factors are finalized, a nonresponse-adjusted sampling weight is then calculated as the product of the nonresponse adjustment factor and the sampling weight. For each weighting class, a verification check is conducted to ensure that the

sum of the nonresponse-adjusted sampling weights is equal to the sum of the sampled hospital weights.

**Weighting adjustment for population benchmarks (poststratification).** The DAWN weighting plan also includes a poststratification adjustment factor that reconciles the weighted number of total visits for responding hospitals with the number of total visits from the most recent AHA ASDB. DAWN uses a ratio adjustment within strata to implement this adjustment.

Within each stratum, the adjustment factor is calculated as the ratio of the AHA count of total visits to the weighted sum of total visits for responding hospitals. The factors are verified to ensure they are within reasonable bounds. If they are out of bounds (either too small or too large), adjacent poststratification strata are collapsed, and new poststratification adjustment factors are calculated.

When the poststratification adjustment factors are finalized, a poststratified weight is then calculated. The final weight is calculated as the product of the poststratification adjustment factor and the nonresponse-adjusted sampling weight. For each poststratification stratum, a validity check is conducted to ensure that the sum of the poststratified weighted total visits is equal to the corresponding AHA count of total visits from each stratum.

Estimates for the entire universe of DAWN-eligible hospitals in the United States are produced by applying poststratified weights to the data received from the sampled hospitals.

#### **4.4.4 Sequential process of developing and applying weights and adjustments**

The order of processing the weights and adjustments is as follows:

1. Identify the design strata. Variance estimation strata are formed on the same basis as the design strata, where selected strata are collapsed to ensure that there are at least two hospitals in each estimation stratum.
2. Compute hospital-level, design-based weights on the basis of design-based selection probabilities.
3. Apply an initial weight adjustment to correct for minor discrepancies in the selection probabilities.
4. Define variance estimation strata.
5. Define weighting classes that are sufficiently large and internally homogeneous for nonresponse adjustment. These usually are combinations of variance estimation strata.
6. Compute nonresponse adjustments within weighting class.
7. Define poststratification classes (may be similar to nonresponse weighting classes).
8. Compute poststratification adjustment factors on the basis of reported visits for responding hospitals and poststratum totals from the AHA frame.
9. Prepare an output file with each of the hospital-level weights and weight adjustment factors listed individually for quality control (QC) review.
10. Compute the final case weights.

11. Conduct QC of weights.
12. Perform QC review.

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## 5. DAWN PUBLICATIONS AND DATA DISSEMINATION

DAWN issues both regular and ad hoc reports, tables, and related data products. In addition, DAWN PUFs are available on the SAMHDA Web site. This section describes the characteristics of these data products and the standards DAWN uses to compile data, present estimates, and produce data files.

### 5.1 Analytic groups

For the purpose of analysis, DAWN developed a set of categories to use when reporting on ED visits. Referred to as “analytic groups,” these categories combine visits with similar characteristics to produce summary statistics. The DAWN analytic groups and their definitions are provided in **Table 4**. The analytic groups fall into one of three types: all visits (regardless of intent), visits where there is an indication of some type of drug misuse or abuse, and visits where there is no indication of misuse or abuse.

Because of DAWN’s focus on drug misuse and abuse, this topic is addressed by several analytic groups, including all drug misuse or abuse, all visits involving illicit drugs, visits involving nonmedical use of pharmaceuticals, visits involving alcohol for patients of all ages, and visits involving alcohol for patients under the age of 21. Also isolated for analysis are visits involving drug-related suicide attempts and visits made by patients seeking detoxification services. The subgroups under “All Misuse and Abuse” in **Table 4** are not mutually exclusive because a single visit can involve multiple types of drugs. For example, an ED visit involving marijuana and oxycodone would be grouped with other visits involving illicit drugs, as well as with visits involving nonmedical use of pharmaceuticals.

Annually, DAWN produces comprehensive sets of tables, the *DAWN Trend Tables*, that provide estimates and rates of drug-related ED visits by type of drug, patient sex and age, visit disposition, and other characteristics; each table includes estimates and rates for the current year and all prior years. A complete set of tables is produced for each analytic group listed in **Table 4**. Each set is reproduced for the Nation and for metropolitan areas with sufficiently high levels of participation (see **Table 1**). A more detailed description of the *DAWN Trend Tables* is provided in the *Guide to the DAWN Trend Tables*.<sup>23</sup>

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<sup>23</sup> The *Guide to the DAWN Trend Tables* is available as an attachment to the *DAWN ED Annual Reports* and as a freestanding document at the DAWN Web site (<http://www.samhsa.gov/data/DAWN.aspx>).

**Table 4. DAWN analytic groups**

Analytic group	Description
All Visits	This group includes all visits that are reportable to DAWN without regard for the reason for the visit or the specific drugs involved. It includes visits involving all forms of drug misuse or abuse plus visits resulting from adverse reaction, accidental ingestion, suicide attempts, and visits seeking detoxification services. These estimates are useful for looking at overall levels of drug involvement in ED visits.
	Drug-related ED visits that involve drug misuse or abuse
All Misuse and Abuse	This analytic category includes visits that involve all forms of drug misuse or abuse as defined by DAWN. This is the combination of visits from the following four analytic groups: illicit drug visits, nonmedical use of pharmaceuticals, alcohol-related visits, and underage drinking. A visit may appear in more than one of those subgroups, but it will appear only once in this overall group. Suicide-attempt visits and seeking detox visits will be included in this category if illicit drugs were involved.
Illicits (excluding alcohol)	This analytic category includes visits that involve the use of drugs that have limited or no therapeutic value and are generally illegal if taken without a prescription. These substances include cocaine, heroin, marijuana, synthetic cannabinoids, amphetamines, methamphetamine, MDMA (Ecstasy), GHB (4-hydroxybutanoic acid), flunitrazepam (Rohypnol®), ketamine, LSD, PCP, and hallucinogens. Visits involving the inhalation of substances for their psychotherapeutic properties (e.g., sniffing model airplane glue) are included.
Nonmedical Use of Pharmaceuticals	This analytic category includes visits that involve nonmedical use of pharmaceuticals: patients who took a higher than prescribed or recommended dose of their own medication, patients who took a pharmaceutical prescribed for another person, malicious poisoning of the patient by another individual, and documented substance abuse involving pharmaceuticals.
All Alcohol	This analytic category includes ED visits involving alcohol. For adults aged 21 and older, the alcohol was found in combination with other drugs. For patients under the age of 21, the visit may involve alcohol alone or in combination with other drugs.
Underage Drinking	This analytic category includes ED visits that involve alcohol use (alone or with other drugs) for patients under the age of 21. Underage drinking is an important barometer of adolescent drinking patterns and a predictor of more serious substance abuse problems in young adults.
Suicide Attempts	This analytic category includes ED visits that involve drug-related suicide attempts. It includes visits for drug overdoses, as well as suicide attempts by other means (e.g., using a firearm) if drugs were involved or related to the suicide attempt. Inclusion in this analytic category has no restrictions on the type of drug used.
Seeking Detox	This analytic category includes nonemergency requests made through the ED for admission to detoxification unit, visits to obtain medical clearance before being incarcerated, and acute emergencies where an individual is experiencing withdrawal symptoms and requests detox. These estimates do not include patients who seek or enter the hospital's detox unit through other avenues.
	Drug-related ED visits that do NOT involve drug misuse or abuse
Adverse Reactions	This analytic category includes ED visits in which an adverse health consequence (e.g., side effects or an allergic reaction) resulted when taking prescription drugs, over-the-counter medications, or dietary supplements as prescribed or recommended.
Accidental Ingestions	This analytic category includes ED visits in which an individual accidentally or unknowingly used a prescription drug, over-the-counter medication, or dietary supplement. Drug-related accidental ingestion typically involves patients aged 5 and under.

## 5.2 Drug lists

In addition to being a coding system that accommodates different levels of drug detail, the DAWN DRV provides a method for aggregating drugs into meaningful, higher-level groupings. DAWN currently collects drug information on thousands of individual products. The individual products are mapped to their generic drug name; currently, DAWN reports on approximately 3,300 generic

drugs. The *DAWN Trend Tables* provide estimates and rates using a shorter list of approximately 500 drugs, known as the “standard drug list.” The tables in the *DAWN ED Annual Reports* highlight approximately 100 drugs selected from the standard drug list.

### 5.3 Estimates of visits versus drugs

All estimates provided in DAWN publications and tables are calculated using data that have been weighted as described in Section 4.4. Estimates for any variable of interest are determined by first summing the case totals within facility/month, applying the within-hospital weight, summing to the hospital level, applying the final hospital weight, and summing over all hospitals.

The *DAWN ED Annual Reports*, short reports, and the *DAWN Trend Tables* include predominantly estimates at the ED visit level—that is, how many visits involved a certain drug. Another measure is the total number of drugs reported. Because most ED visits involve more than one drug, the total drug reports will always exceed the total drug-related ED visits. To illustrate the difference, consider a visit involving oxycodone and aspirin. Both drugs are pain relievers. This visit will count as one visit involving oxycodone and one visit involving aspirin. When reporting the number of visits involving pain relievers in general, this visit will be counted just once even though two types of pain relievers were involved.

### 5.4 Standardized rates

*DAWN ED Annual Reports* and the *DAWN Trend Tables* include population-based rates as well as estimates. Rates are standardized measures that are helpful when comparing levels of drug-related ED visits for different years and drug groups. DAWN rates for years and drug groups are based on the whole population; for example, there were 636.9 ED visits involving drug misuse or abuse per 100,000 population in 2010 compared with 440.5 visits in 2004. For specific age groups and sexes, the denominator is limited to the population in that age group or sex; for example, there were 1,744.4 ED visits involving drug misuse or abuse per 100,000 persons aged 18 to 20 in 2010 compared with 1,056.0 visits per 100,000 persons aged 35 to 44. For age in particular, the size of the underlying population differs considerably across DAWN age groups; for example, the number of individuals aged 18 to 20 in the United States is much lower than the number of individuals aged 35 to 44. All other factors being the same, a higher estimate of the number of ED visits would be expected to occur naturally for the larger group. To adjust for that, rates are standardized to be equal to the number of ED visits per 100,000 persons in that age group. The rate is calculated by dividing the estimate for a particular group by the population of that group and then multiplying by 100,000. Because they are reported as percentages, the RSEs provided in DAWN tables apply equally to the estimates and the rates.

### 5.5 Population estimates used to calculate rates

Every reporting year, DAWN recalculates estimates and rates for all years (2004 through current data collection year) using the current DAWN DRV and the U.S. Census Bureau’s most recent

population estimates for all years.<sup>24</sup> For DAWN reporting years 2004 through 2009, rates were calculated using population data from the U.S. Census Bureau based on the 2000 decennial census. Population estimates used to generate rates are as of July in the data collection year. National-level population estimates for these intercensal years were obtained from the U.S. Census Bureau Postcensal Resident Population National Population Dataset, National Estimates by Demographic Characteristics—Single Year of Age, Sex, Race, and Hispanic Origin, Monthly Population Estimates. Estimates at the metropolitan area level were drawn from the U.S. Census Bureau Postcensal Resident Population County Population Datasets, County Estimates by Demographic Characteristics—Age, Sex, Race, and Hispanic Origin, State Datasets.

For the 2010 data year, the methodology was adjusted to take advantage of the newly available 2010 decennial census data. The 2010 decennial census data, though, had an effective date of April 1, 2010. It was necessary to roll it forward to July 1 to be consistent with previous DAWN reports. To that end, the national census counts were adjusted by a factor equivalent to one quarter of the annual growth as shown in the difference between the vintage 2009 counts for 2009 and the 2009 vintage projection for 2010.<sup>25</sup> National counts for the 36 age-by-sex (18 age and 2 sex categories) categories used for DAWN were likewise adjusted. National counts for the years 2004–2009, including the age-by-sex categories, were brought into line with the decennial estimate by multiplying by an appropriate factor to reflect the difference between the vintage 2009 projection of 2010 and the adjusted (for July 1) actual census count. Overall, these adjustments used the most current data available for 2010 while preserving the existing relationship among the counts for the years 2004–2009.

In 2010, an extra step was required to make age-by-sex counts for metropolitan areas as the U.S. Census Bureau had not produced age-by-sex counts at the county level at the time the DAWN 2010 data were processed. A vintage 2009 projection for 2010 was created using the growth of 2009 over 2008 as a best estimate of the growth of 2010 over 2009. A ratio adjustment was created that took into account projected county growth for 2009 versus actual growth experienced as reported in the 2010 Census, an adjustment that was proportionately reduced as applied to the previous years 2004–2009. That is, 2009 received 90 percent of the total adjustment, 2008 received 80 percent, and 2004 received only 40 percent, where over the 10-year intercensal span, an incremental 10 percent of the adjustment is reflected each year until the entire adjustment is reflected in the tenth year, 2010. The ratio adjustments were developed and applied at the age-by-sex category level within each county and were applied to the vintage 2009 county counts for

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<sup>24</sup> The U.S. Census Bureau issues population estimates for each year between decennial censuses. Each year, the estimates for the current year are issued, and estimates for all years since the decennial are reissued. Each year's estimates are referred to as "Vintage 20xx." DAWN uses the most current vintage estimates.

<sup>25</sup> Each vintage year includes a projection of the population count for the next year. For instance, Vintage 2007 includes a projection of the population counts for 2008.

2009, yielding the counts needed to produce rates for the *DAWN Trend Tables* at the metropolitan area level.

## 5.6 Measures of precision and error

Each hospital in the DAWN sample was selected through a random process, which theoretically could have been repeated many times, resulting in many hypothetical samples. Sampling error refers to the extent to which these samples vary. Two measures of this variability are the SE and the RSE, which is defined as the SE of the estimate divided by the estimate itself. The precision of an estimate is inversely related to the sampling variance, as measured by the RSE. The greater the RSE value, the lower the precision.

For example, if 10,000 estimated visits involve a given drug, and this estimate has an SE of 500 visits, then the RSE value is 5 percent:

$$\text{RSE} = \text{SE}/\text{Estimate}$$

$$\text{RSE} = 500/10,000$$

$$\text{RSE} = 0.050$$

$$\text{RSE}\% = 5.0\% (\text{RSE} \times 100\%).$$

In addition to RSEs, confidence intervals (CIs) are often included in tables published by DAWN. The 95 percent CI is calculated as

$$\text{CI} = \text{Estimate} \pm (1.96 \times \text{RSE} \times \text{Estimate}),$$

where 1.96 comes from the table of normal distribution z-values and means that 95 percent of the normal distribution lies within 1.96 standard deviations of the mean.

Applying the formula to the example above, the 95 percent CI would be

$$10,000 \pm (1.96 \times 0.05 \times 10,000) = 10,000 \pm 980.0$$

$$\text{Lower limit: } 10,000 - 980 = 9,020$$

$$\text{Upper limit: } 10,000 + 980 = 10,980$$

$$95\% \text{ CI: } 9,020 \text{ to } 10,980.$$

If repeated samples were drawn from the same population of hospitals, using the same sampling and data collection procedures, then 95 percent of the time the true population values would fall between 9,020 and 10,980.

Both between- and within-hospital variance components are accounted for in the variance estimation process. Within-hospital variance is estimated using a replication strategy by which two random replicates are created within each hospital, and the variance between the two replicates

represents the within-hospital contribution. Typically, this component is considerably smaller than the between-hospital variance, which is calculated as the variance between weighted hospital totals within each stratum.

Variance estimates reported in the *DAWN Trend Tables* are determined using the Taylor series linearization variance estimation method available in SUDAAN® software. This method is particularly appropriate for analyzing cluster data, such as those that are generated by the DAWN sampling plan.

## 5.7 Suppression

DAWN uses a set of criteria to determine whether estimates can be released to the public. Data may be suppressed to protect patient confidentiality or to ensure that published findings meet statistical standards of reliability for survey results. In all published materials, estimates are suppressed according to the following rules:

- *The RSE of the estimate is greater than 50 percent*—When the RSE is greater than 50 percent, the lower bound of the 95 percent CI approaches or includes the value zero. A CI that includes zero means that the estimate is not statistically different from zero at this precision level.
- *The estimate is based on fewer than 30 ED visits*—Estimates based on a small number of cases are typically suppressed because the RSE is greater than 50 percent. Estimates that do meet RSE criteria for publication but are based on fewer than 30 ED visits (weighted or unweighted) are deemed too unreliable for publication. Such estimates are also suppressed to protect patient privacy.

It is mathematically possible that an estimate could have no sampling error and an RSE of zero. This occurs when the number of ED visits being estimated is small, all the hospitals contributing to that estimate were selected with certainty, and the absence of any sampled hospital is due to nonresponse. In most cases, an estimate with an RSE of zero is suppressed on the basis of the small number of cases. In the unlikely event that an estimate is published with an RSE of zero, it is most appropriate to interpret the RSE as signifying that the necessary data were not available to approximate the sampling error.

## 5.8 Cross-year comparisons

In *DAWN ED Annual Reports* and the *DAWN Trend Tables*, comparisons in the estimates of ED visits between years are presented in the form of percentage differences, calculated as the current estimate minus an earlier year's estimate divided by that estimate. For shorter-term comparisons, percent changes are calculated for the current year compared with last year and the current year compared with 2 years ago. For longer-term comparisons, estimates for the current year are compared with those for 2004.<sup>26</sup> The percent change is reported only if the difference is statistically significant at the  $p < 0.05$  level.

Tests for the significance of differences between two years' estimates consider the variance of each year's estimate and the covariance between the two. Hospitals that appear in both samples and provide data in both years will contribute to the covariance and thus decrease the overall sampling variance beyond the combined contribution of the two samples. That is, the variance estimation process used to establish significance takes into account any overlap between hospitals that participated in both years.

## 5.9 DAWN public use files

SAMHDA has primary responsibility for the collection, analysis, and dissemination of behavioral health data collected by SAMHSA. SAMHDA promotes the access and use of SAMHSA's substance abuse and mental health data by providing public-use data files and documentation for download and online analysis tools to support a better understanding of this critical area of public health. DAWN data are made available at the SAMHDA site as soon as the data are released by SAMHSA. Data are available in the following formats: SPSS, SAS, Stata, ASCII, and tab delimited. PDF and HTML codebooks are available online for all years.

Activities and services SAMHDA performs in support of public-use versions of data and documentation include the following:

- disclosure analysis to ensure that respondents remain anonymous,
- standardization of documentation and data formats,
- development of customized Web page for data system,
- online analysis tools to query restricted-use versions of data,
- searchable bibliography of publications based on SAMHDA data, and
- staff participation at approved outreach functions.

The SAMHDA Web site was first published on December 3, 1997. The University of Michigan's Inter-University Consortium for Political and Social Research is under contract to CBHSQ to disseminate data and to maintain the SAMHDA Web site and bibliography of publications.

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<sup>26</sup> Due to data limitations in 2004, long-term comparisons for ED visits resulting from adverse reactions are made between 2005 and the current year.



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## 6. QUALITY ASSURANCE/QUALITY CONTROL

Survey error, also referred to as bias, is the extent to which findings from the survey sample differ from those of the population of interest. Error can be introduced at any stage in the survey process, from building the sample frame to reporting estimates. This section documents methodologies employed by DAWN to help ensure that published estimates are representative, accurate, and reliable.

### 6.1 Minimization of nonsampling error

To control the nonsampling error components and produce data of high quality, DAWN has a well-defined and ongoing data quality assurance (QA) and data quality control (QC) program. The two primary components of the data QA/QC program are (1) the extensive and continuous monitoring of data quality during data collection and processing, and (2) annually, an intensive review of the monthly data for each ED in relation to other months for the current and all prior reporting years.

#### 6.1.1 Maintaining data quality during data collection and data preparation

Measures used to monitor data quality during data collection include but are not limited to onsite quality audit reviews and quarterly standardized error feedback reports. In addition to those measures, DAWN employs a custom-built software system (eHERS) to collect DAWN data. eHERS, which provides automated prompts to ensure that DAWN Reporters collect complete data, is populated with the most current detailed codes for drugs, race/ethnicity, visit disposition, and other categorical variables. It performs real-time data validation checks to ensure that the data are within valid ranges and consistent with other information collected for the visit. eHERS also checks across visits to ensure that visits are not entered multiple times and follows a procedure to resolve conflicts if multiple entries are detected.

#### 6.1.2 End-of-year data quality review

Before data are weighted, researchers responsible for the collection (the DAWN operations contractor) and analysis (data analysis contractor) of DAWN data meet with staff from CBHSQ to review the quality of the data. This process is referred to as the data quality review (DQR).

Before the DQR meeting, the DAWN operations contractor prepares an electronic file that summarizes what is known about the quality of the data that was collected in the prior year. The DQR spreadsheet contains descriptive information including facility ID, facility name, oversampled area name, stratum, eligibility, subsampling information, and participation status. In addition, the DQR spreadsheet includes summary data for each of the fields for each ED by month, as shown in **Table 5**. Review of these data items reveals what portion of ED visits in each hospital for each month were evaluated for inclusion in DAWN. Depending on the pattern of missing data for an ED, the review committee comes to a consensus about whether to delete, adjust, or impute the count of eligible ED visits, the count of medical charts reviewed, and the count of identified DAWN cases

in each ED for each month of the reporting year. These counts are vital to developing accurate within-facility adjustment factors for each month for each facility.

**Table 5. Data items in the data quality review spreadsheet**

Field	Month 1	Month 2	...	Month 12
Visits	—	—	—	—
Charts	—	—	—	—
Cases	—	—	—	—
Cases/charts	—	—	—	—
Subsampling rate	—	—	—	—
Left without being seen	—	—	—	—
Delete code	—	—	—	—
Adjust code	—	—	—	—
Impute code	—	—	—	—
Hard delete code	—	—	—	—
Donor code	—	—	—	—

## 6.2 Minimization of sampling error

The statistical methodologies described in Section 4.4 reflect efforts to minimize sampling error. For example, the DAWN statistical methodology provides for clearly defined criteria to construct the initial hospital sampling frame. Coverage error is minimized by using a sampling frame that has virtually 100 percent coverage of the target population. Weighting is introduced to account for the probability of selection, within-hospital nonresponse, hospital-level nonresponse, and the total number of visits in the sample frame as independently established by the AHA ASDB. Validity checks are made at each stage of weighting to ensure that the sum of weights at that stage equaled the relevant reference point.

## 6.3 Quality control on released reports and tables

All publications and tables issued by DAWN are subject to multitiered data QC measures. Tables are produced and independently verified by a separate statistician/programmer. Estimates are verified against other tables to ensure cross-table consistencies. Estimates for different years are verified against each other to ensure cross-year consistencies. Tables in reports are verified against source files. Text descriptions of findings are verified against report tables by three separate and independent readers. All observations in respect to the similarity or differences between estimates are established through statistical testing that is independently recomputed and verified.

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## 7. DATA LIMITATIONS

### 7.1 Limitations of survey data

Information on drug-related ED visits in DAWN is based on a sample and is, therefore, subject to sampling variability. The SE measurements and CIs provided for all estimates reflect the sampling variability that occurs (1) by chance because only a sample rather than the entire universe is surveyed, and (2) by nonresponse. As in any survey, nonresponse is of concern because it creates larger-than-expected sampling errors plus the opportunity for unpredictable biases. DAWN addresses these issues in the short term by always reporting SEs based on the actual sample of respondents and for the long term by continuing its efforts to raise the hospital participation rate.

### 7.2 Limitations of using extant medical records

Although every effort is made during the data collection phase to collect data accurately and precisely, extant medical records vary in specificity and detail. Factors that may affect the reliability and accuracy of the findings include the following:

- DAWN data collectors attempt to identify, with a high degree of specificity, the exact drugs involved in an ED visit, but extant medical records vary in specificity and detail. If extant medical records include only a general description of a drug (e.g., “benzodiazepines”), the drug is grouped in a general category (e.g., “benzodiazepines not otherwise specified”).
- DAWN relies on the assessment made by ED medical staff to determine which drugs are related to the visit and records only those drugs indicated as being related.
- DAWN does not assess the medical reasons for the visit, and it cannot be assumed that a drug was the direct cause of the medical emergency. For example, a soporific may have caused the patient to fall asleep while driving and have an accident.
- Use of illicit drugs is assumed to constitute drug abuse. The determination of nonmedical use of pharmaceuticals, though, must be supported by information provided by medical personnel in the ED records.
- In cases where multiple pharmaceuticals are involved, it is not necessary that both drugs are misused. The medical emergency might stem from the interaction between two pharmaceuticals, one of which was used nonmedically and the other of which was taken as prescribed.
- While DAWN seeks to report only the drugs that are related to the ED visit, some unrelated drugs may be included if ED records fail to indicate that they were obtained through a legitimate prescription, were taken as prescribed or indicated, and were unrelated to the ED visit. For example, anecdotal evidence suggests that ED records may mention methadone but fail to indicate that the patient was enrolled in a methadone treatment program and that the methadone was unrelated to the medical emergency leading to the ED visit.
- Information on race and ethnicity is often poorly documented in extant ED records. In addition, some hospitals consider race/ethnicity to be private information and will not

make it available to DAWN Field Reporters. Overall, about 15 percent of visits each year do not contain race/ethnicity information. DAWN does not produce rates (visits per 100,000 population) for race/ethnicity groups because these missing data will result in the understatement of visits by race/ethnicity category. This might affect racial/ethnic groups differentially and produce misleading findings.

### **7.3 Limitations on toxicology test finding**

Although DAWN documents whether a drug was positively confirmed by toxicology testing, DAWN does not require that all drugs reported for the ED visit be confirmed by laboratory testing. Toxicology tests are not used consistently across EDs, and some toxicology tests are not specific enough to identify particular drugs. Furthermore, a positive toxicology test is not necessarily evidence of recent drug involvement in an ED visit if it is a current medication or a drug that persists in the system long after it was used. For this reason, DAWN requires that the involvement of drugs be mentioned in the ED record, not just in the toxicology testing results, for the visit to be considered a DAWN case.

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## 8. HISTORY OF DAWN, 1970–2011

DAWN is a public health surveillance system that has monitored drug-related ED visits to hospitals since the early 1970s. DAWN was initially established by the U.S. Drug Enforcement Administration. DAWN was transferred to the U.S. Department of Health and Human Services (HHS) in 1980. Within HHS, the National Institute on Drug Abuse (NIDA) conducted DAWN from 1980 to 1992. For the period 1992 through 2011, CBHSQ (formerly the Office of Applied Studies) of SAMHSA was responsible for DAWN operations and reporting. CBHSQ ceased performing DAWN data collection as of the end of calendar year 2011, and the responsibility for collection of data on drug-related ED visits was passed to the National Center for Health Statistics (NCHS). NCHS incorporated DAWN data elements into the National Hospital Care Survey (NHCS). NCHS is observing DAWN conventions and methodologies to the greatest extent possible so that data collected via DAWN for the years 2004–2011 can be compared with the data collected by the NHCS for later years. For example, given its sample design and size, the drug-related ED visits data collected through NHCS will be representative of the nation but not the DAWN metropolitan areas. Additional information on NHCS and its collection of information on drug-related ED visits is available at the NHCS Web site.<sup>27</sup>

Since its inception, DAWN has relied on data collected from a sample of hospitals. However, over the years, the exact survey methodology has been adjusted to improve the quality, reliability, and generalizability of the information produced by DAWN. When NIDA assumed responsibility for DAWN in 1980, implementation of a sample of hospitals to produce representative estimates for the Nation and for selected metropolitan areas became a priority. This sample, refreshed with annual maintenance, continued to support DAWN estimates for the contiguous United States and 21 metropolitan areas until 2002. Major population shifts and changes in the hospital industry between 1980 and 2002 made apparent the need for a redesign of the sample of hospitals. Many other features of DAWN (e.g., definition of a DAWN visit to include all drug-related medical emergencies and not merely those involving misuse or abuse) were also introduced at that time.<sup>28</sup>

In the redesign in 2003, DAWN's goal remained to produce national as well as metropolitan area-level estimates. Retention of the original 21 metropolitan areas was important because of the ongoing demand for DAWN estimates by public health professionals in those areas. In addition, inclusion of major population centers in each of the nine census divisions was deemed important to improve DAWN's geographic and population coverage. A total of 48 metropolitan areas was identified for inclusion in DAWN. The composition of these metropolitan areas was based on the

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<sup>27</sup> Further information on NHCS and its data are available at <http://www.cdc.gov/nchs/nhcs.htm>.

<sup>28</sup> Additional detail on the 2003 redesign is available in the following publication: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. (2002). *Drug Abuse Warning Network: Development of a new design (methodology report)* (DAWN Series M-4, DHHS Publication No. SMA 02-3754). Rockville, MD: Author.

definitions issued by the Office of Management and Budget (OMB) in June 2003. For consistency, DAWN has maintained the 2003 definitions, even if counties were added in subsequent years.

Between 1980 and 2003, OMB had substantially enlarged the coverage areas for 4 of the original 21 metropolitan areas. Users of DAWN statistics in these 4 areas—Los Angeles, Miami, New York, and San Francisco—remained interested in obtaining estimates for the areas covered by the original 21 metropolitan areas. To address the needs of these users, DAWN subdivided these metropolitan areas according to their earlier composition and planned oversamples in the subdivided portions. That is, for each of these areas, there were an oversample for the metropolitan area as defined in 2003 and also additional oversampling in the submetropolitan areas. When participation is high enough, separate estimates are made for the submetropolitan areas as well as the entire metropolitan area.

In 2000, DAWN adopted the *Multum Lexicon*, © 2011, a drug vocabulary and classification tool developed and maintained by Lexi-Comp, Inc., a private firm that distributes the *Lexicon* and regular updates through its Web site. While the use of the *Lexicon* is free of charge, a licensing agreement specifies the terms required of users. In accordance with the licensing agreement, DAWN publications, tabulations, and software applications cite the *Multum Lexicon* as the source and basis for the system DAWN uses to code drugs.

The DAWN survey relies on a longitudinal probability sample of hospitals located throughout the United States. To be eligible for selection into the DAWN sample, a hospital must be a non-Federal, short-stay, general surgical and medical hospital located in the United States, with at least one 24-hour ED. This sampling strategy was first implemented in the 2004 data collection year and has been followed since that year.

**Attachment C**  
**Guide to Drug Abuse Warning**  
**Network Trend Tables,**  
**2010 Update**



**Guide to  
Drug Abuse Warning Network  
Trend Tables, 2010 Update**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Substance Abuse and Mental Health Services Administration  
Center for Behavioral Health Statistics and Quality**

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# 1. MAJOR FEATURES OF DAWN TREND TABLES, 2010 UPDATE

Drug Abuse Warning Network (DAWN) Trend Tables provide estimates of drug-related visits to hospital emergency departments (EDs) for different groups of patients, different years, and different geographic locations. Each year DAWN produces an updated set of DAWN Trend Tables that includes data for 2004 through the current year. The *DAWN Trend Tables, 2010 Update*, includes 120 Microsoft Excel workbooks: 10 workbooks contain estimates for the Nation, and the same 10 workbooks are repeated for each of 11 metropolitan areas. Each workbook contains 56 tables (1 table per worksheet). Each table presents data for 2004, 2005, 2006, 2007, 2008, 2009, and 2010. This document is intended to help DAWN users find the workbooks, tables, and estimates of interest to them.<sup>1</sup>

General information about DAWN is available at <http://www.samhsa.gov/data/DAWN.aspx>, including detail on the DAWN data program and the methodologies used to collect, process, and report data. Information on other sources of data on substance abuse and mental health from the Center for Behavioral Health Statistics and Quality is located at <http://www.samhsa.gov/data/>.

## 1.1 Analytic groups

DAWN analytic groups represent different groupings of visits that were developed to meet the data needs of a range of audiences. The DAWN analytic groups and their definitions are provided in **Table 1**.

## 1.2 Workbooks containing national estimates

Workbook names have three parts: a prefix that describes the geographic coverage of the workbook, a middle term that reflects the latest year of the data, and a suffix that describes the analytic group. **Table 2** lists the workbook names for the 10 workbooks containing estimates for the Nation. Each worksheet contains data for 2004 through 2010.<sup>2</sup>

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<sup>1</sup> Links to the DAWN Trend Tables, 2010 Update, for the Nation are located at <http://www.samhsa.gov/data/DAWN.aspx#DAWN 2010 ED Excel Files - National Tables>; links for metropolitan tables are at <http://www.samhsa.gov/data/DAWN.aspx#DAWN 2010 ED Excel Files - Metro Tables>.

<sup>2</sup> Major changes to DAWN were instituted in 2004 as the result of a redesign that altered most of DAWN's core features. Changes were made in the design of the hospital sample, the drug-related cases eligible for DAWN, the data items submitted on these cases, and the protocol for case finding and quality assurance. These improvements created a permanent disruption in trends. As a result, the base year for comparison to later years is 2004.

**Table 1. DAWN analytic groups**

Analytic group	Description
All Visits	This group includes all visits that are reportable to DAWN without regard for the reason for the visit or the specific drugs involved. It includes visits involving all forms of drug misuse or abuse plus visits resulting from adverse reaction, accidental ingestion, suicide attempts, and visits seeking detoxification services. These estimates are useful for looking at overall levels of drug involvement in ED visits.
	<b>Drug-related ED visits that involve drug misuse or abuse</b>
All Misuse and Abuse	This analytic category includes visits that involve all forms of drug misuse or abuse, as defined by DAWN. This category is the combination of visits from the following four analytic groups: illicit drug visits, nonmedical use of pharmaceuticals, alcohol-related visits, and underage drinking. A visit may appear in more than one of the subgroups listed below, but it will appear only once in this overall group. Suicide-attempt visits and seeking detox visits will be included in this category if illicit drugs were involved.
Illicits (excluding alcohol)	This analytic category includes visits that involve the use of drugs that have limited or no therapeutic value and are generally illegal if taken without a prescription. These substances include cocaine, heroin, marijuana, synthetic cannabinoids, amphetamines, methamphetamine, MDMA (Ecstasy), GHB (4-hydroxybutanoic acid), flunitrazepam (Rohypnol®), ketamine, LSD, PCP, and hallucinogens. Visits involving the inhalation of substances for their psychoactive properties (e.g., sniffing model airplane glue) are included.
Nonmedical Use of Pharmaceuticals	This analytic category includes ED visits that involve nonmedical use of pharmaceuticals: patients who took a higher than prescribed or recommended dose of their own medication, patients who took a pharmaceutical prescribed for another person, malicious poisoning of the patient by another individual, and documented substance abuse involving pharmaceuticals.
All Alcohol	This analytic category includes ED visits involving alcohol. For adults aged 21 and older, the alcohol was found in combination with other drugs. For patients under the age of 21, the visit may involve alcohol alone or in combination with other drugs.
Underage Drinking	This analytic category includes ED visits that involve alcohol use (alone or with other drugs) for patients under the age of 21. Underage drinking is an important barometer of adolescent drinking patterns and a predictor of more serious substance abuse problems in young adults.
Suicide Attempts	This analytic category includes ED visits that involve drug-related suicide attempts. It includes visits for drug overdoses and for suicide attempts by other means (e.g., using a firearm) if drugs were involved or related to the suicide attempt. Inclusion in this analytic category has no restrictions on the type of drug used.
Seeking Detox	This analytic category includes nonemergency requests made through the ED for admission to detoxification unit, visits to obtain medical clearance before being incarcerated, and acute emergencies where an individual is experiencing withdrawal symptoms and requests detox. These estimates do not include patients who seek or enter the hospital's detox unit through other avenues.
	<b>Drug-related ED visits that do NOT involve drug misuse or abuse</b>
Adverse Reactions	This analytic category includes ED visits in which an adverse health consequence (e.g., side effects or an allergic reaction) resulted when taking prescription drugs, over-the-counter medications, or dietary supplements as prescribed or recommended.
Accidental Ingestions	This analytic category includes ED visits in which an individual accidentally or unknowingly used or was administered a prescription drug, over-the-counter medication, or dietary supplement. Drug-related accidental ingestion typically involves patients aged 5 and under.

**Table 2. Workbook names for national estimates**

Analytic group	Abbreviated analytic group name	Workbook name for file with national estimates
All Misuse and Abuse	AllIMA	Nation_2010_AllIMA.xls
Illicits (excluding alcohol)	Illicit	Nation_2010_Illicit.xls
Nonmedical Use of Pharmaceuticals	NMUP	Nation_2010_NMUP.xls
All Alcohol	Alcohol	Nation_2010_Alcohol.xls
Underage Drinking	Underage	Nation_2010_Underage.xls
Suicide Attempts	Suicide	Nation_2010_Suicide.xls
Seeking Detox	Detox	Nation_2010_Detox.xls
Adverse Reactions	Adverse	Nation_2010_Adverse.xls
Accidental Ingestions	Accidental	Nation_2010_Accidental.xls
All Visits	All	Nation_2010_All.xls

### 1.3 Workbooks containing metropolitan area estimates

DAWN prepares estimates each year for DAWN metropolitan areas that have sufficient participation to support estimates with acceptable reliability and precision. **Table 3** lists the names of workbooks containing estimates for metropolitan areas and divisions. For example, the workbook containing national estimates for ED visits involving all drug misuse or abuse is named “Nation\_2010\_AllIMA.xls.” The workbook with parallel estimates for Boston is named “Boston\_2010\_AllIMA.xls.” Each of the 11 geographic areas listed in **Table 3** has a set of 10 Excel workbooks, one workbook for each analytic group listed in **Table 2**.

**Table 3. Workbook names for metropolitan areas and divisions**

<b>Metropolitan Statistical Areas (MSAs) and Divisions (1)</b>	<b>Workbook name</b>
Boston-Cambridge-Quincy, MA-NH	Boston_20XX_{analytic group}.xls
Chicago-Naperville-Joliet, IL-IN-WI	Chicago_20XX_{analytic group}.xls
Denver-Aurora, CO	Denver_20XX_{analytic group}.xls
Detroit-Warren-Livonia, MI	Detroit_20XX_{analytic group}.xls
Miami-Dade County Division (2)	Miami_Dade Div_20XX_{analytic group}.xls
Miami-Fort Lauderdale Divisions (3)	Miami_FortLauderdale Div_20XX_{analytic group}.xls
Minneapolis-St. Paul-Bloomington, MN-WI	Minneapolis_20XX_{analytic group}.xls
New York-5 Boroughs Division (4)	NewYork_5Boros Div_20XX_{analytic group}.xls
Phoenix-Mesa-Scottsdale, AZ	Phoenix_20XX_{analytic group}.xls
San Francisco-San Francisco Division	SanFrancisco_SF Div_20XX_{analytic group}.xls
Seattle-Tacoma-Bellevue, WA	Seattle_20XX_{analytic group}.xls

(1) Unless otherwise noted, DAWN defines metropolitan areas using the Metropolitan Statistical Area (MSA) and Division definitions issued by the Office of Management and Budget (OMB) in June 2003 (available at <http://www.whitehouse.gov/omb/bulletins/b03-04.html>). For consistency, DAWN uses these names and definitions even if they were subsequently changed by OMB.

(2) Miami-Miami Beach-Kendall, FL, Division.

(3) Fort Lauderdale-Pompano Beach-Deerfield Beach, FL, and West Palm Beach-Boca Raton-Boynton Beach, FL, Divisions.

(4) Bronx, Kings, New York, Queens, and Richmond Counties, NY.

## 1.4 Information organization and format

### Workbooks and worksheets

With minor exceptions, each Excel workbook in the DAWN Trend Tables is organized the same way. Each workbook represents one geographic area and one analytic group. Each workbook contains 56 tables (worksheets), with each table representing visits for a single demographic or visit characteristic. Examples of a demographic characteristic are “male patients” or “patients aged 0 to 5.” An example of a visit characteristic is “the patient was discharged home.” **Table 4** lists the tables that appear in each workbook. Unless otherwise noted in **Table 4**, each table in each workbook has the same arrangement of rows and columns.

**Table 4. Tables in each workbook of the DAWN Trend Tables**

Sheet tab label	Description of visits included in table
Contents	The Table of Contents lists each table that appears in the workbook. By clicking the table name, the user is taken automatically to that sheet in the workbook. A link to return to the Table of Contents is provided at the top and bottom of every spreadsheet.
Table Notes	The table notes that appear in this spreadsheet apply to each table in the workbook. Also included here is the suggested citation to use when reproducing a table.
ED Visits by Drug	All ED visits included in the analytic group (e.g., the workbook named "Nation_2010_Illicit.xls" includes just visits involving illicit drugs). See Table 1 for definitions of analytic groups. All tables in a workbook are limited to visits in the noted analytic group.
Male	Visits involving male patients.
Female	Visits involving female patients.
Gender UNK	Visits for which gender of patient is not documented in ED visit records.
Under 21	Visits involving patients under the age of 21.
21 and older	Visits involving patients aged 21 and older.
0 to 5	Visits involving patients aged 0 to 5.
6 to 11	Visits involving patients aged 6 to 11.
12 to 17	Visits involving patients aged 12 to 17.
18 to 20	Visits involving patients aged 18 to 20.
21 to 24	Visits involving patients aged 21 to 24.
25 to 29	Visits involving patients aged 25 to 29.
30 to 34	Visits involving patients aged 30 to 34.
35 to 44	Visits involving patients aged 35 to 44.
45 to 54	Visits involving patients aged 45 to 54.
55 to 64	Visits involving patients aged 55 to 64.
65 and older	Visits involving patients aged 65 and older.
Age UNK	Visits for which age of patient is not documented in ED visit records.
White	Visits involving patients reported as White and not Hispanic or any other race/ethnicity.
Black	Visits involving patients reported as Black and not Hispanic or any other race/ethnicity.
Hispanic	Visits involving patients reported as Hispanic regardless of any other reported race/ethnicities.
Race_Ethnicity All Other	Visits involving patients reported as one or more race/ethnicities other than White, Black, or Hispanic.
Race_Ethnicity UNK	Visits for which race/ethnicity of patient is not documented in ED visit records.
No Evidence of Follow-up	Visits involving patients for whom no evidence existed of follow-up care (e.g., treated and released to home or jail).

**Table 4. Tables in each workbook of the DAWN Trend Tables (continued)**

<b>Sheet tab label</b>	<b>Description of visits included in table</b>
Evidence of Follow-up	Visits involving patients for whom evidence existed of some type of follow-up care (e.g., referral to a detox program, admission to the hospital, transfer to another facility).
Disp_Treated and Released	Combined category for visits involving patients treated and released to home, police/jail, or detox program.
Disp_Home	Visits involving patients treated and released to home; subset of Disp_Treated and Released.
Disp_Police or Jail	Visits involving patients treated and released to the police or sent to jail; subset of Disp_Treated and Released.
Disp_Referred to Detox	Visits involving patients treated and released with a referral to a detox or treatment program; subset of Disp_Treated and Released.
Disp_Admitted	Combined category for visits involving patients admitted to the hospital's intensive care unit (ICU), surgery, detox, or psychiatric or other inpatient unit ("other inpatient" includes "combo" units: e.g., psychiatric/detox unit).
Disp_ICU	Visits involving patients admitted to the ICU; subset of Disp_Admitted.
Disp_Surgery	Visits involving patients admitted for surgery; subset of Disp_Admitted.
Disp_Detox	Visits involving patients admitted to the chemical dependency or detox unit in the hospital; subset of Disp_Admitted.
Disp_Psych	Visits involving patients admitted to the psychiatric unit in the hospital; subset of Disp_Admitted.
Disp_Other Inpatient	Visits involving patients admitted to another inpatient unit in the hospital; subset of Disp_Admitted.
Disp_All Other Disposition	Combined category for visits involving patients who transferred, left without being seen, or died; other dispositions; and unknown dispositions.
Disp_Transferred	Visits involving patients who transferred to another health care facility; subset of Disp_All Other Disposition.
Disp_Left Against Med Advice	Visits involving patients who left against medical advice; subset of Disp_All Other Disposition.
Disp_Died	Visits involving patients who died in the ED; subset of Disp_All Other Disposition.
Disp_Other	Visits involving patients who had other dispositions; subset of Disp_All Other Disposition.
Disp_UNK	Disposition of visit not documented in ED visit records; subset of Disp_All Other Disposition.
One Drug	Visits involving only one drug.
Multi Drug	Visits involving more than one drug.
Drugs with Alcohol	Visits involving alcohol. For adults, the alcohol must have been used in combination with another drug to be reportable to DAWN. For patients under the age of 21, the alcohol may have been used either alone, with no other drug involvement, or with other drugs.
Two Drugs	Visits involving exactly two drugs.
Three Drugs	Visits involving exactly three drugs.
Four Drugs	Visits involving exactly four drugs.
Five or More Drugs	Visits involving five or more drugs.

**Table 4. Tables in each workbook of the DAWN Trend Tables (continued)**

Sheet tab label	Description of visits included in table
Drug Combinations	This table reports ED visits for major and mutually exclusive drug combination groups. That is, each visit is counted in one and only one drug combination group. The rows in this table do not conform to the standard template, but the columns do.
Drug Frequency	This table reports counts of drugs, not ED visits. Each ED visit can involve up to 22 drugs. The estimates in this table reflect how often each drug was involved in ED visits. The rows and columns conform to the standard format.
Tox Confirmed Drugs	This table reports counts of drugs, not ED visits. Each ED visit can involve up to 22 drugs. The estimates in this table reflect how often each drug involved was confirmed through toxicology testing. The rows and columns conform to the standard format.
Illicit Drugs	This table reports ED visits for more detailed drugs and drug categories than are found in the standard format. The rows in this table do not conform to the standard template, but the columns do.
Psych Drugs	Similar to expanded listing of illicit drugs but provides estimates for psychotherapeutic drugs.
Gen Nerv System Drugs	Similar to expanded listing of illicit drugs but provides estimates for central nervous system drugs.
Respiratory Drugs	Similar to expanded listing of illicit drugs but provides estimates for respiratory drugs.
Cardiovascular Drugs	Similar to expanded listing of illicit drugs but provides estimates for cardiovascular drugs.

## Rows

The rows of the tables represent drug categories and drugs. Each drug and each drug category appear on the same row in each table (e.g., the estimates of ED visits involving cocaine appear on row 15 in every table). The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2011 Lexi-Comp, Inc., and/or Cerner Multum, Inc. The *Lexicon* was slightly modified to meet DAWN's need to report on illicit drugs using street names.

## Columns

The 39 columns in each table provide the following information:

- drug/drug group name;
- weighted annual estimates of ED visits for 2004 through 2010;
- rates of ED visits per 100,000 population for 2004 through 2010;
- relative standard error (RSE) of estimate and rate, expressed as a percentage, of the visit estimates for 2004 through 2010;
- tests for statistically significant differences between visit estimates for select years (e.g., in the *DAWN Trend Tables, 2010 Update*, estimates for 2010 are compared with those for 2004, 2008, and 2009);<sup>3</sup> and

<sup>3</sup> Because of data limitations in 2004, the 2010 data for visits involving adverse reactions are compared with 2005, not 2004.

- lower and upper 95 percent confidence intervals (CIs) for visit estimates for 2004 through 2010.

## **1.5 Special note on age categories**

The age categories used for reporting ED visits in the DAWN Trend Tables reflect critical junctures in drug use. For example, patients aged 5 and under are reported separately to facilitate study of visits involving accidental ingestion. Patients aged 12 to 17 are considered to be in their formative years, and understanding the nature of their drug use is important for prevention efforts. Patients under the age of 21 are reported separately to facilitate study of topics such as underage drinking. Patients aged 18 to 20 are reported separately from those aged 21 to 24 to isolate drug-taking behaviors before and after the critical age of 21. Older patients are grouped in wider categories where age differences are not as critical to intervention and treatment. As a consequence, the age categories are not evenly sized—for example, the age group 30 to 34 covers 5 years, whereas the age group 35 to 44 covers 10 years. The size of an age group is an important consideration when comparing estimates of ED visits for different age categories.

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## 2. VALUES REPORTED IN DAWN TREND TABLES

The following values appear in the cells of the DAWN Trend Tables. The order in which values are listed here corresponds to the order in which they appear in the standard table format, going from left to right across the table. The section headings below match the overarching headings that appear in row 6 of the standard table format.

### 2.1 Weighted annual estimates

Estimates of drug-related ED visits are calculated by applying weights and adjustments to the data provided by the sampled hospitals participating in DAWN. The primary sampling weights reflect the probability of selection, whereas separate adjustment factors are included to account for nonresponse, data quality, and the known total of ED visits delivered by the universe of eligible hospitals, as reported by the most current American Hospital Association survey.

Estimates of the number of visits are reported to the fifth decimal place, though they are formatted to appear as whole numbers. An asterisk (\*) appears if a value is suppressed (see Section 2.6). All estimate fields are populated with a value or an asterisk; blanks do not appear and are not valid.

### 2.2 Rates per 100,000 population

All rates in the DAWN Trend Tables are visits per 100,000 persons. Standardized measures are helpful when comparing levels of drug-related ED visits for different drug groups or years; e.g., there were 552.9 ED visits per 100,000 population involving drug misuse or abuse in 2004 compared with 743.7 in 2010. These rates are based on the whole population. Rates are also important when comparing age and sex groups; e.g., there were 853.1 ED visits per 100,000 males in 2010 compared to 636.9 visits for females. Rates for age and sex groups are based on the population for the specific age or sex group; e.g., there were 12.3 visits per 100,000 persons aged 18 to 20 and 45.6 visits per 100,000 male persons.

Rates are reported to the ninth decimal place, though they are formatted to display only the first decimal (e.g., 123.4). Rates based on suppressed estimates are likewise suppressed, with an asterisk (\*) appearing instead of a value (see Section 2.6). DAWN does not produce population-based rates for race/ethnicity categories because race/ethnicity information in ED records is often missing or is very limited. Three dots (...) appear in the rate fields in the race/ethnicity tables. All rate fields are populated with a value, asterisk, or three dots; blanks do not appear and are not valid.

### 2.3 Relative standard error (%)

Because DAWN relies on a sample of hospitals, each estimate produced from the DAWN ED data is subject to sampling variability, the variation in the estimate that would be observed naturally if

different samples were drawn from the same population using the same procedures. The sampling variability of an estimate in this publication is measured by its relative standard error (RSE). The precision of an estimate or rate is inversely related to its RSE. That is, the greater the RSE, the lower the precision.

RSEs are reported to the ninth decimal place, though they are formatted to display only the first decimal (e.g., 12.3). The RSE values reported are percentages (e.g., 12.3 = 12.3%). Because it is reported as a percentage, an RSE measure applies to both the estimate and the rate. RSEs based on suppressed estimates are likewise suppressed, with an asterisk (\*) appearing instead of a value (see Section 2.6). All RSE fields are populated with a value or an asterisk; blanks do not appear and are not valid.

## 2.4 Percent change ( $p < 0.05$ )

The DAWN Trend Tables assess between-year changes by comparing estimates as follows:

- most current year to first year,
- most current year to year before last, and
- most current year to last year.

In the *DAWN Trend Tables, 2010 Update*, 2010 estimates are compared with those for 2004 (first year), 2008 (year before last), and 2009 (last year). The underlying formula is of the form: ((estimate for earlier year – estimate for later year) / estimate for earlier year).

The resulting values are reported to the seventh decimal place, though they are formatted to display a whole number that represents a percentage difference (e.g., 12 = 12% increase in the number of visits). Declines in percentage difference appear as negative numbers (e.g., -12 = 12% decrease in the number of visits). The tables report percentage differences between years only if they are statistically significant at the  $p < 0.05$  level; otherwise, a blank appears. A blank also appears if either estimate in the percentage difference formula is suppressed (see Section 2.6). Percent change measures for rates are not provided.

## 2.5 Lower and upper 95 percent confidence limit on weighted annual estimate

The DAWN Trend Tables include the lower and upper boundaries of the confidence intervals (CIs) for all estimates at the 95 percent confidence level. For example, the estimate of the number of ED visits involving any type of drug misuse or abuse in 2010 was 2,301,050 visits. A 95 percent CI means that if repeated samples were drawn from the same population of hospitals using the same sampling and data collection procedures, the number of ED visits reported (2,301,050 visits) will fall between the lower boundaries (1,987,721 visits) and upper boundaries (2,614,380 visits) 95 percent of the time.

The confidence limit estimates are reported to the eighth decimal place, though they are formatted to appear as whole numbers. An asterisk (\*) appears if a value is suppressed (see Section 2.6). All CI fields are populated with a value or an asterisk; blanks do not appear and are not valid.

## **2.6 Suppression**

DAWN estimates with RSE values greater than 50 percent or estimates based on fewer than 30 ED visits (weighted or unweighted) are considered too imprecise for publication and are not shown. An asterisk (\*) is displayed in the place of a suppressed estimate or any value based on a suppressed estimate (i.e., rate, RSE, percent change, lower CI, upper CI).