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Drug Abuse Warning Network, 2007: National Estimates of Drug-Related Emergency Department Visits

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
Office of Applied Studies

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HIGHLIGHTS

This publication presents national estimates of drug-related visits to hospital emergency departments (EDs) for 2007, based on data from the Drug Abuse Warning Network (DAWN). Also presented are comparisons of 2007 estimates with those for 2004, 2005, and 2006. DAWN is a public health surveillance system that monitors drug-related ED visits for the Nation and for selected metropolitan areas. DAWN estimates pertain to the entire United States, including Alaska, Hawaii, and the District of Columbia. The Substance Abuse and Mental Health Services Administration (SAMHSA) 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 national sample of general, non-Federal hospitals operating 24-hour EDs. The sample is national in scope, 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 and over-the-counter pharmaceuticals (e.g., dietary supplements, cough medicine), and nonpharmaceutical inhalants—are included. Alcohol is considered a reportable drug when consumed by patients younger than 21. For patients aged 21 or older, though, alcohol is reported only when it is used in conjunction with other drugs.

Drug misuse or abuse

In 2007, hospitals in the United States delivered over 116 million ED visits, and DAWN estimates that about 1.9 million (1,883,272 [CI: 1,561,490 to 2,205,054])[1] were associated with drug misuse or abuse.

Of the 1.9 million visits associated with drug misuse or abuse in 2007,

- 31 percent involved nonmedical use of pharmaceuticals only,
- 28 percent involved illicit drugs only,
- 13 percent involved illicit drugs with alcohol,
- 10 percent involved alcohol with nonmedical use of pharmaceuticals,
- 8 percent involved illicit drugs with any pharmaceuticals,
- 7 percent involved alcohol only in patients younger than 21, and
- 4 percent involved illicit drugs with pharmaceuticals plus alcohol.

Although the overall number of ED visits attributable to drug misuse and abuse was stable from 2004 to 2007, ED visits involving nonmedical use of pharmaceuticals with no other drug involvement rose significantly (73%), as did the nonmedical use of pharmaceuticals with alcohol (36%).

Illicit drugs

For 2007, DAWN estimates that 974,272 (CI: 728,104 to 1,220,440) ED visits involved an illicit drug. That is, more than half (52%) of all the drug misuse/abuse ED visits during the year involved an illicit drug; multiple illicit drugs; or illicit drugs in combination with pharmaceuticals, alcohol, or both:

[1] The 95 percent confidence interval (CI) accounts for the margin of error of the estimate. It indicates with a high degree of confidence that the true population value was between 1,561,490 and 2,205,054 drug-related ED visits.

- Cocaine was involved in 553,530 (CI: 382,646 to 724,414) ED visits, or 29 percent of drug misuse and abuse visits.
- Marijuana was involved in 308,547 (CI: 250,529 to 366,564) ED visits, or 16 percent.
- Heroin was involved in 188,162 (CI: 130,391 to 245,932) ED visits, or 10 percent.
- Stimulants, including amphetamines and methamphetamine, were involved in 85,043 (CI: 48,398 to 121,689) ED visits, or 5 percent.
- Other illicit drugs, such as PCP, Ecstasy, and GHB, were involved in fewer than 2 percent of the drug misuse and abuse visits.

For each 100,000 persons in the U.S. population, over the course of a year, there are a little more than 180 ED visits (181.8 [CI: 125.7 to 237.9]) involving cocaine. This is followed by marijuana (101.3 ED visits per 100,000 persons), heroin (61.8), and stimulants (27.9). Lower incidence drugs have rates below 10 visits per 100,000 population. When the margin of error is taken into account, cocaine was involved significantly more often than any other illicit drug, and stimulants (amphetamines and methamphetamines) were involved less often than cocaine, marijuana, or heroin. Cocaine and heroin involvement were more common for patients aged 21 to 54 and less common for younger and older patients. Marijuana involvement was higher for patients aged 18 to 24, and stimulants involvement was higher for patients aged 18 to 44. Males were more likely than females to have a drug-related ED visit involving cocaine, marijuana, heroin, or stimulants. Just under half of the patients had some type of follow-up (i.e., referral to detox, admission to the hospital, or transfer to another facility).

Overall, the level of ED visits involving illicit drugs from 2004 to 2007 appeared stable for cocaine, marijuana, and heroin. The involvement of stimulants has declined consistently over that period, with about 75,000 fewer visits in 2007 than in 2004.

Drugs and alcohol taken together

The combination of drugs and alcohol is of particular concern because many illicit drugs and pharmaceuticals have additive or interactive effects with alcohol that can result in acute intoxication and impairment. In 2007, DAWN estimates 497,283 (CI: 406,698 to 587,868) ED visits, or 26 percent of all drug misuse or abuse visits, involved the use of alcohol in combination with other drugs. The drugs that alcohol was combined with most often included

- cocaine (39% of visits),
- marijuana (24%),
- benzodiazepines (17%),
- opioid/opiate pain medications (14%), and
- antidepressants (6%).

The rate of ED visits for males (207.3 per 100,000 population) was higher than that for females (120.5 per 100,000 population). Rates by age group showed a general pattern of being lower for those younger than 18 or older than 54 and higher for those aged 18 to 54.

Almost half of the patients (49%) received some sort of follow-up treatment. Slightly more than a quarter (28%) of patients were admitted to the hospital, just under a fifth (14%) were transferred to another health care facility, and 8 percent were referred to a detox program.

From 2004 to 2007, no significant increases or decreases were found in the number of ED visits involving alcohol and other drugs. This finding was consistent for all age groups.

ED visits involving alcohol and no other drug are reportable to DAWN only if the patient is younger than 21. Consequently, these estimates do not represent the number of ED visits involving just alcohol among adults.

Alcohol use by patients aged 12 to 17 and 18 to 20

In 2007, almost 60,000 ED visits involved alcohol use with other drugs for patients aged 12 to 20, and more than 136,000 involved alcohol alone. More than two thirds (70%) of the total ED visits involving any type of alcohol use for this age group were associated with alcohol alone and no other drugs. Comparing patients aged 12 to 17 with those aged 18 to 20, the rates of ED visits per 100,000 population for use of alcohol alone were 223.2 and 619.9, respectively. The rates for the use of alcohol with other drugs were 105.3 and 249.5, respectively. Within both age groups, the rate of ED visits involving the use of alcohol alone is more than double that of alcohol plus drugs. Between age groups, the rate for patients aged 18 to 20 is more than double that of younger patients aged 12 to 17.

Looking across patients of all ages, no significant changes were found from 2004 to 2007 in the number of ED visits related to alcohol use alone in patients younger than 21. However, when the data are broken down by age groups, ED visits involving alcohol alone for patients aged 12 to 17 increased significantly (31%) from 2005 to 2007.

Nonmedical use of pharmaceuticals

For 2007, DAWN estimates that 855,838 (CI: 719,765 to 991,910) ED visits involved nonmedical use of prescription or over-the-counter pharmaceuticals or dietary supplements. Slightly more than half (52%) of these visits involved multiple drugs, and 19 percent involved alcohol. The rate of nonmedical use of pharmaceuticals did not differ between males and females. Most patients (53%) were treated and discharged home after their ED visit.

Central nervous system agents (present in 49% of nonmedical-use visits) and psychotherapeutic agents (41%) were the most frequent types of drugs reported in the nonmedical-use category of ED visits.

Among the central nervous system agents, the most frequent drugs were opiate/opioid pain medications (present in 34% of nonmedical-use visits). Methadone, oxycodone, and hydrocodone were the most frequently involved types of opioids.

Among the psychotherapeutic agents, the anxiolytics (anti-anxiety agents), sedatives, and hypnotics were the most frequent, occurring in almost a third (30%) of visits associated with nonmedical use of pharmaceuticals. ED visits involving benzodiazepines clearly outnumber those involving any of the other types of psychotherapeutic agents. DAWN estimates that 218,640 (CI: 179,649 to 257,632) ED visits, or 26 percent of nonmedical use of pharmaceuticals, involved benzodiazepines in 2007. Alprazolam was the most common type of benzodiazepine involved and was present in more than 80,000 visits.

ED visits involving nonmedical use of pharmaceuticals increased 60 percent in the period from 2004 to 2007. ED visits involving psychotherapeutic drugs, as an overarching drug category, increased 43 percent, a jump of more than 100,000 ED visits. Most types of psychotherapeutics—except antidepressants—saw significant increases in the period from 2004 to 2007. For example, benzodiazepines rose 52 percent, and central nervous system stimulants (a type of psychotherapeutic agent including amphetamine-dextroamphetamine and methylphenidate) rose 89 percent.

ED visits involving central nervous system agents, as an overarching category, increased 47 percent, a jump of more than 130,000 ED visits. Most of those visits were related to a 66 percent increase in opiate/opioid pain medications.

Drug-related suicide attempts

DAWN estimates 197,053 (CI: 164,564 to 229,542) ED visits for drug-related suicide attempts in 2007.[2] Females are more likely than males to be seen in the ED for a drug-related suicide attempt (78 visits per 100,000 population compared with 52). Rates are highest for those aged 18 to 20 (152 visits per 100,000 population). Almost all (94%) involved a pharmaceutical of some sort. More than half (57%) involved psychotherapeutic agents, nearly half (48%) involved central nervous system agents, just under a third (29%) involved alcohol, and about a fifth (19%) involved illicit drugs.[3] Nearly two thirds (63%) of ED visits for drug-related suicide attempts involved multiple drugs.

While few patients were treated and discharged home (13%), most received some sort of follow-up care after the ED visits (e.g., transfer to another facility or admittance to the hospital intensive care unit [ICU/critical care], psychiatric unit, or other inpatient unit).

ED visits for drug-related suicide attempts increased 30 percent between 2005 and 2007. The rise in these visits reflects increases in visits related to psychotherapeutic agents (e.g., antidepressants) and central nervous system agents (e.g., painkillers). From 2005 to 2007, ED visits involving psychotherapeutic agents rose by about 30,000 visits, and visits involving central nervous system agents rose by about 28,000 visits. Specific drugs that stand out are hydrocodone (88% increase), benzodiazepines (50% increase), and acetaminophen (42% increase).

Seeking detox services

DAWN collects data on ED visits related to patients seeking detox. DAWN estimates 139,908 (CI: 110,901 to 168,915) drug-related ED visits in 2007 by patients seeking detoxification or substance abuse treatment services. Males are more likely than females to seek detox services through the ED (61 visits per 100,000 population compared with 32 visits).[4]

Two thirds (66%) of the seeking detox ED visits involved multiple drugs. Among illicit drugs, cocaine was observed in almost half of the visits (47%), heroin in about a third (30%), and marijuana in about a fifth (19%). Stimulants were relatively uncommon (5%). Among pharmaceuticals, benzodiazepines were observed in 14 percent of visits. Narcotic pain medications were observed in 27 percent of visits: oxycodone in 14 percent, hydrocodone in 8 percent, and methadone in 5 percent.

Among those seeking detox, nearly 7 out of 10 (69%) received some type of follow-up care. Nearly a third (30%) of patients were released with a referral to a detox or treatment program, about a quarter (22%) were admitted to the detox unit in the hospital, 8 percent were admitted to another unit in the hospital, and 9 percent were transferred to other facilities. A quarter of patients (25%) were treated and discharged home.

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2 Although a drug was implicated in each visit, these attempts are not limited to drug overdoses.

3 Percentages add to greater than 100 percent because visits often involve multiple drugs.

4 These visits do not represent the full extent of the demand for detox services, as many programs do not require medical clearance through the ED for program entry.

The number of patients seeking detox services through the ED was relatively stable from 2004 through 2007. Some significant changes were observed at the drug level, though. A significant increase (41%) was observed in seeking detox visits involving opiate/opioid pain medications from 2005 to 2007. Narcotic painkillers in general, and hydrocodone and oxycodone in particular, were a large part of the increased visits observed in 2007. There has been no significant increase overall in the number of seeking detox visits that involve psychotherapeutic agents (e.g., antidepressants, sedatives).

INTRODUCTION

This publication presents estimates of drug-related emergency department (ED) visits from the Drug Abuse Warning Network (DAWN) for 2007, with comparison of estimates for 2004, 2005, and 2006. DAWN is a public health surveillance system that monitors drug-related ED visits for the Nation and for selected metropolitan areas. The Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services, 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. Findings are organized in six sections following this Introduction. Each section focuses on a specific type of ED visit. Appendix B: Glossary of Terms and Appendix C: DAWN Data Collection and Statistical Methods provide additional detail on all aspects of the DAWN sample, data collected and data collection methodology, response rates, survey weights and adjustments, statistical processing, and terms used in this report.

Major features of DAWN

What is a DAWN case?

A DAWN case is any ED visit involving recent drug use that is implicated in the ED visit. The relationship between the ED visit and the drug use need not be causal. That is, implicated drugs may or may not have directly caused the condition generating the ED visit. The reason a patient used a drug is not part of the criteria for considering a visit to be drug related. These criteria broadly encompass all types of drug-related events, including accidental ingestion and adverse reaction, as well as explicit drug abuse. DAWN does not report current medications (i.e., medications and pharmaceuticals taken regularly by the patient as prescribed or indicated) that are unrelated to the ED visit.

What drugs are included in DAWN?

DAWN collects data on all types of drugs, including

- illegal drugs, such as heroin, cocaine, marijuana, and Ecstasy;
- prescription drugs, such as Prozac®, Vicodin®, Oxycontin®, alprazolam, and methylphenidate;
- over-the-counter medications, such as aspirin, acetaminophen, ibuprofen, and multi-ingredient cough and cold remedies;
- dietary supplements, such as vitamins, herbal remedies, and nutritional products;
- anesthetic gases;
- substances that have psychoactive effects when inhaled;
- alcohol when used in combination with other drugs; and
- alcohol alone, in patients younger than 21 years.

What is covered in this publication?

This publication focuses primarily on ED visits involving drug misuse and abuse. Seven types of ED visits associated with drug misuse and abuse are highlighted in this publication:

- overall drug misuse and abuse,
- illicit drugs used alone or in combination with other drugs,

- alcohol used in combination with other drugs (all ages),
- underage drinking (alcohol use without the use of other drugs by persons under the age of 21),
- nonmedical use of pharmaceuticals,
- drug-related suicide attempts, and
- patients seeking detox services.

Drug misuse and abuse is an overarching category that includes all drug-related ED visits involving drug misuse or abuse. Use of illicit drugs is singled out for analysis as it involves the use of substances that are generally illegal. By definition, this is substance abuse. Visits involving alcohol used in combination with other drugs are analyzed as a group to better understand the interactive effects of alcohol and drugs on morbidity. ED visits involving underage drinking (without use of other drugs) are an important barometer of dangerous drinking patterns in youths. Nonmedical use of pharmaceuticals concerns ED visits related to the misuse or abuse of prescription or over-the-counter medications or dietary supplements. This might result from taking a higher-than-prescribed or -recommended dose of a pharmaceutical (i.e., contrary to directions or labeling), taking a pharmaceutical prescribed for another individual, malicious poisoning of the patient by another individual, and substance abuse involving pharmaceuticals. Drug-related suicide attempts involve drug overdoses as well as suicide attempts by other means (e.g., by gun) if drugs were involved. "Seeking detox" includes various situations such as nonemergency requests for admission for detox, visits to obtain medical clearance before entry to a detox program, and acute emergencies in which an individual is in distress (i.e., displaying active withdrawal symptoms) and seeking detox.

Hospital participation in 2007

For 2007, 207 hospitals submitted data that were used for estimation. The overall weighted response rate was 29.6 percent. For the 12 oversampled metropolitan areas and divisions, the individual response rates ranged from 30.7 percent in the Houston metropolitan area to 76.3 percent in the Detroit metropolitan area.[5]

DAWN cases are found through a retrospective review of medical records in participating hospitals. Across all participating hospitals in 2007, 10.4 million charts were reviewed to find the drug-related ED visits that met the DAWN case criteria. On the basis of the review of charts, 375,030 drug-related visits were found and submitted. On average, a DAWN member hospital submitted 1,183 DAWN cases. However, the number of submitted cases varied widely across hospitals, from 3 cases to 6,532 cases (median 953) in a single hospital during 2007.

Estimates in this publication

The estimates provided in this publication represent drug-related ED visits for the United States. The universe of hospitals eligible for inclusion in DAWN includes non-Federal, short-stay, general medical and surgical hospitals in the United States that operate 24-hour EDs. The American Hospital Association's (AHA) 2001 Annual Survey was used to identify the original frame members. Subsequent AHA surveys are used annually to identify "births" of new hospitals that open and the "deaths" of hospitals that close or merge with other hospitals.

The DAWN sample of hospitals includes an oversampling of hospitals in selected metropolitan areas, supplemented with a sample of hospitals from the remainder of the United States, which includes other metropolitan

[5] Table C1 in Appendix C provides detail on response rates for each metropolitan area.

areas as well as nonmetropolitan and rural areas. The metropolitan area boundaries correspond to the definitions issued by the Office of Management and Budget (OMB) in June 2003.

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, and 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 AHA survey.

DAWN currently collects drug information using more than 17,000 individual codes.[6] These highly detailed codes are grouped up (mapped) to 3,200 drug names. Drug names are then grouped into 500 broader drug categories. About 100 of the more common drugs and drug categories were selected for inclusion in the drug detail tables in this report. Because a single ED visit may involve multiple drugs and 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.

Margin of error for estimates

Because DAWN relies on a sample of hospitals, each estimate produced from the DAWN ED data is subject to sampling variability, referred to as the "margin of error." Margin of error is 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 is inversely related to its sampling variability, as measured by the RSE. That is, the greater the RSE, the lower the precision.

DAWN estimates with RSE values greater than 50 percent or fewer than 30 ED visits, or both, are regarded as too imprecise for publication and are not shown. An asterisk (*) is displayed in the place of suppressed estimates. Ratios (percentages or rates per 100,000 population) based on suppressed estimates are likewise suppressed.

In this publication, 95 percent confidence intervals (CIs) are included in many of the tables and are cited in the text along with the estimates. 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 confidence interval 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.

Comparisons across years

In this publication, between-year changes are assessed by comparing estimates for 2007 with those for 2004, 2005, and 2006. This publication reports only those between-year changes that are statistically significant at the $p < 0.05$ level.

Major changes to DAWN were instituted during 2003 as the result of a redesign that altered most of DAWN's core features. Changes included the design of the hospital sample, the drug-related cases eligible for DAWN, the

[6] The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A.

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, comparisons cannot be made between old DAWN (2003 and prior years) and the redesigned DAWN (2004 and forward).

Rates of ED visits per 100,000 population

Standardized measures are helpful when comparing levels of drug-related ED visits for different age groups and genders. This publication reports rates of ED visits per 100,000 persons by age and gender. Rates are based on population data from the U.S. Census Bureau. If an estimate is suppressed, the rate will also be suppressed. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. Furthermore, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

Limitations to data

Information on drug-related visits is based on a sample and is, therefore, subject to sampling variability. Readers are advised to consider the standard error measurements provided in many tables to reflect the sampling variability that occurs by chance because only a sample rather than the entire universe is surveyed. Hospital participation rates in oversampled metropolitan areas typically have been 50 percent or higher. However, the participation rate in the remainder of the United States has been lower, in the range of 20 to 30 percent, since the DAWN redesign in 2003. In any sample survey, a low response rate is of concern because it creates the opportunity for bias. That is, nonparticipating hospitals may have different characteristics than participating hospitals, possibly including differences in the drugs reported, patient disposition, or population demographics. DAWN is addressing these issues by developing statistical and data collection methods that help to avoid or minimize bias and improve response rates within available resources.

Although every effort is made during the data collection phase to collect data accurately and precisely, extant medical records vary in specificity and detail. Therefore, 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. If extant medical records include only a general description of a drug (e.g., "benzodiazepines" or "opiates"), the drug is grouped in a general category (e.g., benzodiazepines not otherwise specified [NOS]). Similarly, records often describe a drug as amphetamines without specifying if it is methamphetamine.
- DAWN seeks to report only drugs that are related to the ED visit, and not drugs/medications that the patient may be taking on a regular basis as prescribed by a doctor. If the ED record is not clear on this point, drugs may be included in the data that are not specifically related to the visit. For example, anecdotal evidence suggests that methadone may be overreported when the medical records fail to mention that the patient is in a methadone treatment program. Similarly, pharmaceuticals may be overreported if records fail to indicate that they were obtained through a legitimate prescription, are taken on a regular basis, and are unrelated to the ED visit.

ED visits involving drug misuse or abuse, 2007

For 2007, DAWN estimates that almost 1.9 million ED visits were associated with drug misuse or abuse (Table 1). This estimate includes

- 985,316 (CI: 842,172 to 1,128,461) ED visits, or 52 percent, involving nonmedical use of pharmaceuticals alone or use of any pharmaceuticals with illicit drugs or alcohol;
- 974,272 (CI: 728,104 to 1,220,440) ED visits, or 52 percent, involving illicit drugs alone or in combination with other drugs;
- 497,283 (CI: 406,698 to 587,868) ED visits, or 26 percent, involving the use of alcohol in combination with other drugs; and
- 137,369 (CI: 114,635 to 160,103) ED visits, or 7 percent, involving underage drinking with no other drug involvement.[7]

Table 1. ED visits involving drug misuse and abuse, by drug combinations, 2007

Drug combinations (1)	ED visits (2)	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, drug misuse/abuse	1,883,272	100.0	8.7	1,561,490	2,205,054
Illicit drugs only	522,650	27.8	15.9	360,142	685,158
Alcohol only (age < 21)	137,369	7.3	8.4	114,635	160,103
Nonmedical use of pharmaceuticals only	582,187	30.9	9.0	479,464	684,909
Combinations	—	—	—	—	—
Illicit drugs with alcohol (3)	237,936	12.6	12.6	179,073	296,799
Illicit drugs with any pharmaceuticals	143,783	7.6	10.8	113,436	174,129
Alcohol with nonmedical use of pharmaceuticals	189,444	10.1	7.4	162,068	216,821
Illicit drugs with alcohol and any pharmaceuticals	69,903	3.7	13.2	51,877	87,929

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(3) DAWN excludes ED visits involving alcohol-only for patients aged 21 years or older. Alcohol, when present with other drugs, is reportable for patients of all ages.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

[7] These four categories of ED visits are not mutually exclusive. The sum of visits or rates by category will be greater than the total, and the sum of percentages will be greater than 100.

Of the almost 1.9 million drug misuse/abuse visits, about two thirds (66%) were associated with a single drug type (illicit drugs, alcohol, or nonmedical use of pharmaceuticals). Illicit drugs alone were involved in 28 percent of drug misuse/abuse visits in 2007. Nonmedical use of pharmaceuticals alone was involved in 31 percent. About 7 percent of drug misuse/abuse visits involved consumption of alcohol (and no other drug) by a minor.[8] The remaining visits (34%) involved some combination of illicit drugs, alcohol, and nonmedical use of pharmaceuticals.

These figures do not suggest that the majority of ED drug misuse/abuse visits involved a single drug. In fact, the typical drug-related ED visit involves multiple drugs, but they may be of a common type. For example, an ED visit involving illicit drugs alone often involves more than one illicit drug (e.g., cocaine and heroin).

Trends in ED visits involving drug misuse and abuse, 2004–2007

This section presents the trends in the estimates of ED visits involving drug misuse and abuse for the period 2004 through 2007 (Table 2). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the table.

Table 2. Trends in ED visits involving drug misuse and abuse, by drug combinations, 2004–2007

Drug combinations (1)	ED visits, 2004 (2)	ED visits, 2005 (2)	ED visits, 2006 (2)	ED visits, 2007 (2)	Percent change 2004, 2007 (3)	Percent change 2005, 2007 (3)	Percent change 2006, 2007 (3)
All types of drug misuse/abuse	1,619,054	1,616,311	1,742,887	1,883,272	—	—	—
Illicit drugs only	502,136	517,558	536,554	522,650	—	—	—
Alcohol only (age < 21)	150,988	110,599	126,704	137,369	—	—	—
Nonmedical use of pharmaceuticals only	336,987	444,309	486,276	582,187	73	—	20
Combinations	—	—	—	—	—	—	—
Illicit drugs with alcohol	338,638	221,823	219,521	237,936	—	—	—
Illicit drugs with pharmaceuticals	105,017	127,245	142,535	143,783	—	—	—
Alcohol with nonmedical use of pharmaceuticals	139,716	140,275	171,743	189,444	36	35	—
Illicit drugs with alcohol and pharmaceuticals	45,571	54,500	59,553	69,903	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

[8] ED patients aged 21 or older for whom alcohol was the only drug associated with their ED visits are not considered DAWN cases.

The number of ED visits attributable to drug misuse and abuse was stable from 2004 to 2007. The small changes seen in the estimates each year are within the boundaries of expected sample variation. From 2004 to 2007, however, ED visits related to the use of pharmaceuticals with no other drug involvement rose significantly (73%), as did the use of pharmaceuticals with alcohol (36%). These increases reflect nearly a quarter-million more ED visits related to pharmaceuticals alone and about 50,000 more ED visits related to pharmaceuticals and alcohol in 2007 than in 2004.

By way of comparison, hospitals in the United States delivered a total of more than 116 million ED visits in 2007, an increase of 7.0 percent over 2004. The population of the United States increased 3.9 percent, from 294 million to 304 million, over the same period.

ED visits involving illicit drugs, 2007

For 2007, DAWN estimates that 974,272 (CI: 728,104 to 1,220,440) ED visits involved one or more illicit drugs (Table 3). This represents about half (52%) of the approximately 1.9 million drug misuse and abuse ED visits that occurred during 2007. Cocaine was the most commonly involved drug, with 553,530 (CI: 382,646 to 724,414) ED visits. Nearly one in three drug misuse/abuse ED visits (29%) involved cocaine. Marijuana followed cocaine, with 308,547 (CI: 250,529 to 366,564) ED visits, or 16 percent. Heroin was involved in 188,162 (CI: 130,391 to 245,932) ED visits, or approximately 10 percent of drug misuse/abuse ED visits overall.[9] Stimulants, including amphetamines and methamphetamine, were involved in 85,043 (CI: 48,398 to 121,689) ED visits, about 5 percent of drug misuse/abuse ED visits.

Other illicit drugs involved in ED visits at lower levels include the following:

- PCP in 28,035 (CI: 6,585 to 49,484) ED visits;
- MDMA (Ecstasy) in 12,748 (CI: 8,120 to 17,376) ED visits;
- miscellaneous hallucinogens in 4,839 (CI: 3,097 to 6,582) ED visits;
- LSD in 3,561 (CI: 2,009 to 5,112) ED visits;
- GHB in 2,207 (CI: 663 to 3,752) ED visits; and
- ketamine in 291 (CI: 120 to 463) ED visits.

The rates of ED visits involving illicit drugs are reported in Table 4. For each 100,000 persons in the U.S. population, over the course of a year, more than 600 ED visits relate to drug misuse or abuse (618.5 [CI: 512.8 to 724.2]). About half of those visits involve illicit drugs. Cocaine is involved at a rate of 181.8 (CI: 125.7 to 237.9) ED visits per 100,000 persons in the United States, followed by marijuana (101.3 [CI: 82.3 to 120.4] ED visits per 100,000 persons), heroin (61.8 [CI: 42.8 to 80.8]), and stimulants (27.9 [CI: 15.9 to 40.0]). Lower-incidence drugs have rates below 10 persons per 100,000 population.

Figure 1 displays the rates of ED visits per 100,000 population for the four major types of illicit drugs: cocaine, marijuana, heroin, and stimulants.

[9] Heroin ED visits may be underestimated. When drugs related to an ED visit are determined through toxicology tests, often the results do not distinguish heroin from the general category of "unspecified opiates." The number of drug misuse/abuse ED visits involving unspecified opiates is estimated at 57,219 (CI: 43,872 to 70,566) visits, and about half of these (30,568) were determined through toxicology testing. What portion of these toxicology results is attributable to heroin is unknown.

Table 3. ED visits involving illicit drugs, 2007

Drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, drug misuse/abuse	1,883,272	100.0	8.7	1,561,490	2,205,054
Total ED visits, illicit drugs	974,272	51.7	12.9	728,104	1,220,440
Visits involving a single illicit drug	425,833	22.6	16.6	287,025	564,641
Visits involving multiple drugs	548,439	29.1	11.3	427,160	669,718
Cocaine	553,530	29.4	15.8	382,646	724,414
Heroin	188,162	10.0	15.7	130,391	245,932
Marijuana	308,547	16.4	9.6	250,529	366,564
Stimulants	85,043	4.5	22.0	48,398	121,689
Amphetamines	21,545	1.1	17.4	14,194	28,896
Methamphetamine	67,954	3.6	25.3	34,266	101,641
MDMA (Ecstasy)	12,748	0.7	18.5	8,120	17,376
GHB	2,207	0.1	35.7	663	3,752
Flunitrazepam (Rohypnol)	*	*	*	*	*
Ketamine	291	<0.1	30.1	120	463
LSD	3,561	0.2	22.2	2,009	5,112
PCP	28,035	1.5	39.0	6,585	49,484
Miscellaneous hallucinogens	4,839	0.3	18.4	3,097	6,582
Inhalants	7,920	0.4	17.8	5,159	10,681
Combinations not tabulated above	3,989	0.2	28.4	1,766	6,213

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 4. Rates of ED visits per 100,000 population involving illicit drugs, 2007

Drugs (1)	Rate of ED visits per 100,000 population (2,3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, drug misuse/abuse	618.5	8.7	512.8	724.2
Total ED visits, illicit drugs	320.0	12.9	239.1	400.8
Cocaine	181.8	15.8	125.7	237.9
Heroin	61.8	15.7	42.8	80.8
Marijuana	101.3	9.6	82.3	120.4
Stimulants	27.9	22.0	15.9	40.0
Amphetamines	7.1	17.4	4.7	9.5
Methamphetamine	22.3	25.3	11.3	33.4
MDMA (Ecstasy)	4.2	18.5	2.7	5.7
GHB	0.7	35.7	0.2	1.2
Flunitrazepam (Rohypnol)	*	*	*	*
Ketamine	0.1	30.1	0.0	0.2
LSD	1.2	22.2	0.7	1.7
PCP	9.2	39.0	2.2	16.3
Miscellaneous hallucinogens	1.6	18.4	1.0	2.2
Inhalants	2.6	17.8	1.7	3.5
Combinations not tabulated above	1.3	28.4	0.6	2.0

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

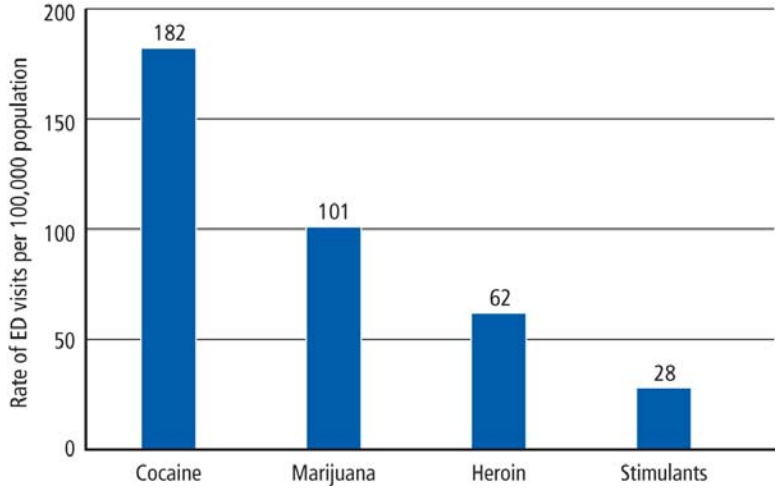
(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

(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 or rates 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 1. Rates of ED visits per 100,000 population involving illicit drugs, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 5 presents estimates of the number of ED visits in 2007 involving illicit drugs for males and females, different age groups, and race/ethnicity categories. To facilitate comparisons, Table 6 and Figure 2 present the rates of ED visits per 100,000 persons for these same groups. The rates for visits involving cocaine, marijuana, heroin, and stimulants were consistently higher for males than for females. As to the age of the patient, rates of ED visits involving illicit drugs are generally higher for those aged 18 to 54. Notable exceptions are the higher rates found for 12- to 17-year-olds for marijuana, MDMA (Ecstasy), and PCP. Within the 18-to-54 age group, rates of ED visits involving cocaine peak at about 434 visits per 100,000 persons for patients aged 35 to 44, with heroin and stimulants found at lower levels and more evenly dispersed across the 18-to-54 age range.

Estimates of ED visits related to illicit drugs reveal that 46 percent of patients are white, 32 percent are black, 13 percent are Hispanic, 1 percent are other or multiple races/ethnicities, and 9 percent are of unknown race/ethnicity. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. By necessity, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

EDs are a potential site to intercept patients for follow-up treatment for drug use problems. Table 7 displays patient disposition after ED visits involving illicit drugs. A majority of patients (57%) are treated and released, about a quarter (26%) are admitted to the hospital, and the balance (17%) have other outcomes.

Trends in ED visits involving illicit drugs, 2004–2007

This section presents the trends in the estimates of ED visits involving illicit drugs for the period 2004 through 2007 (Table 8). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the table.

Overall, the level of ED visits involving illicit drugs from 2004 to 2007 appeared stable, with no significant changes from 2004 to 2007 for three of the four major illicit drugs: cocaine, marijuana, and heroin. The fourth major illicit drug category, stimulants, has declined consistently since 2004, with about 75,000 fewer visits in 2007 than in 2004. Among the illicit drugs found at lower levels, PCP increased and MDMA (Ecstasy) declined from 2006 to 2007, resulting in about 6,000 more ED visits related to PCP and 4,000 fewer visits for MDMA. More years' data are needed to know if these changes signify trends.

Table 5. ED visits involving illicit drugs, by patient demographics, 2007

Patient demographics	All illicits (1)	Cocaine	Heroin	Marijuana	Stimulants	MDMA (Ecstasy)	GHB	LSD	PCP
Total ED visits, illicit drugs (2,3)	974,272	553,530	188,162	308,547	85,043	12,748	2,207	3,561	28,035
Gender	—	—	—	—	—	—	—	—	—
Male	639,799	352,320	132,662	205,308	54,025	7,607	1,994	2,742	20,528
Female	334,010	201,008	55,398	103,111	30,953	5,141	213	819	7,507
Unknown	463	*	*	*	*	*	*	*	*
Age	—	—	—	—	—	—	—	—	—
0–5 years	1,059	172	*	*	*	*	*	*	*
6–11 years	538	*	*	*	*	*	*	*	*
12–17 years	61,074	9,314	2,322	50,126	5,125	2,226	*	263	1,818
18–20 years	73,223	22,892	10,765	43,280	7,303	2,631	*	1,117	*
21–24 years	101,436	40,307	20,307	45,823	14,321	3,484	*	1,247	3,023
25–29 years	127,382	64,294	28,466	45,485	13,382	2,368	*	504	6,469
30–34 years	111,003	65,635	22,448	33,241	13,006	1,218	*	172	5,477
35–44 years	259,469	184,899	49,079	52,707	19,253	705	*	126	5,871
45–54 years	188,596	135,231	40,882	28,159	10,528	86	*	*	1,883
55–64 years	42,714	26,310	11,991	7,365	1,282	*	*	*	*
65 years and older	7,442	4,262	1,755	1,867	*	*	*	*	*
Unknown	337	157	*	*	*	*	*	*	*
Race/ethnicity	—	—	—	—	—	—	—	—	—
White	445,031	214,380	91,300	165,923	50,182	5,977	1,427	2,551	8,521
Black	307,860	225,923	40,751	80,774	6,033	3,192	*	76	14,761
Hispanic	122,055	61,108	32,764	35,112	*	1,453	*	264	2,792
Other or two or more race/ ethnicities	9,636	3,992	1,595	2,613	1,956	514	*	*	*
Unknown	89,689	48,126	21,752	24,125	12,111	1,611	*	374	1,687

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 6. Rates of ED visits per 100,000 population involving illicit drugs, by patient demographics, 2007

Patient demographics	All illicits (1)	Cocaine	Heroin	Marijuana	Stimulants	MDMA (Ecstasy)	GHB	LSD	PCP
Rates of ED visits, illicit drugs (2,3)	320.0	181.8	61.8	101.3	27.9	4.2	0.7	1.2	9.2
Gender	—	—	—	—	—	—	—	—	—
Male	426.1	234.6	88.3	136.7	36.0	5.1	1.3	1.8	13.7
Female	216.4	130.3	35.9	66.8	20.1	3.3	0.1	0.5	4.9
Age	—	—	—	—	—	—	—	—	—
0–5 years	4.2	0.7	*	*	*	*	*	*	*
6–11 years	2.3	*	*	*	*	*	*	*	*
12–17 years	243.6	37.2	9.3	199.9	20.4	8.9	*	1.0	7.3
18–20 years	565.6	176.8	83.1	334.3	56.4	20.3	*	8.6	*
21–24 years	599.7	238.3	120.1	270.9	84.7	20.6	*	7.4	17.9
25–29 years	593.5	299.6	132.6	211.9	62.3	11.0	*	2.3	30.1
30–34 years	563.1	333.0	113.9	168.6	66.0	6.2	*	0.9	27.8
35–44 years	608.9	433.9	115.2	123.7	45.2	1.7	*	0.3	13.8
45–54 years	424.9	304.7	92.1	63.4	23.7	0.2	*	*	4.2
55–64 years	126.9	78.1	35.6	21.9	3.8	*	*	*	*
65 years and older	19.2	11.0	4.5	4.8	*	*	*	*	*

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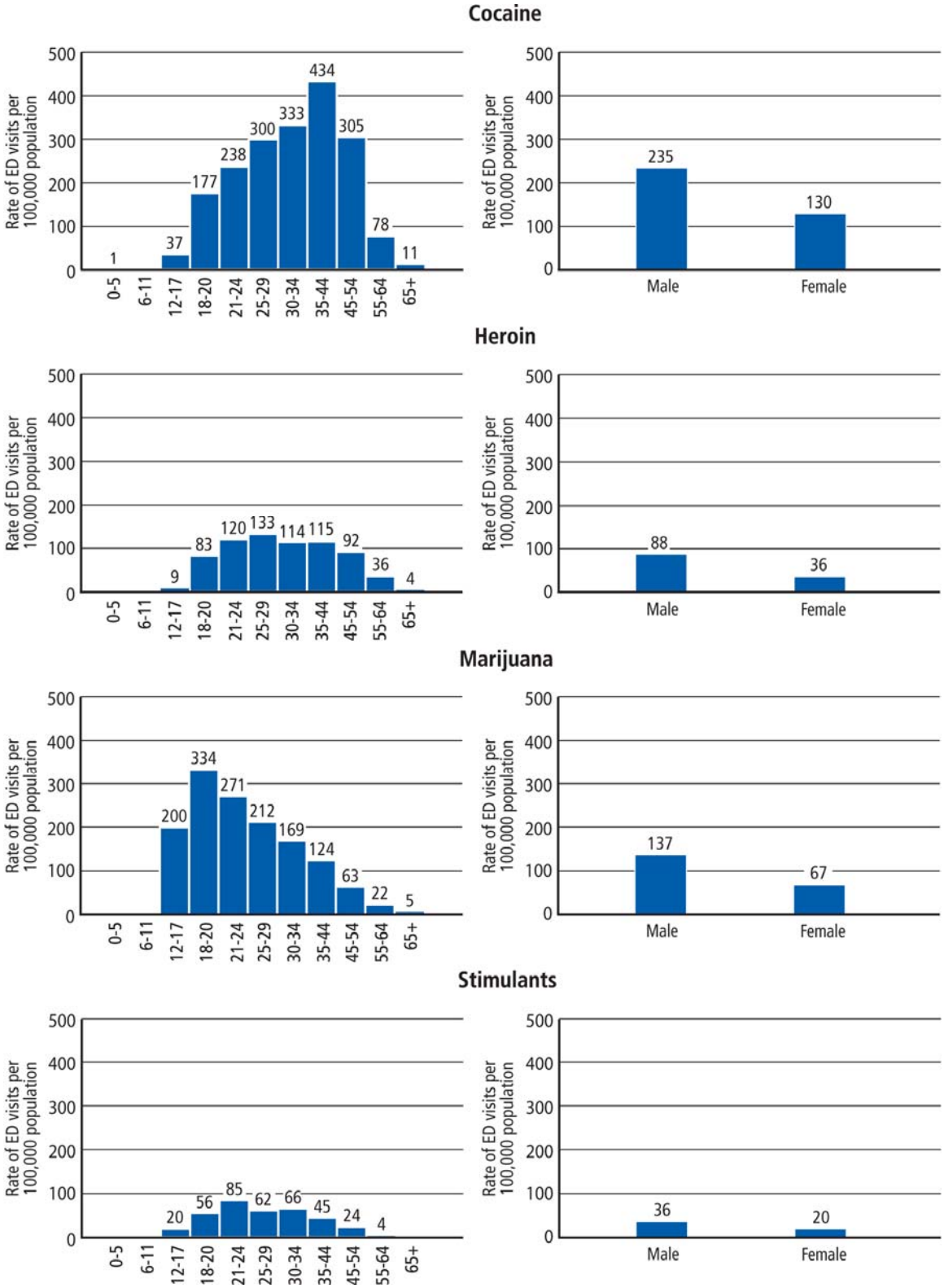
(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 2. Rates of ED visits per 100,000 population involving illicit drugs, by selected drugs, age, and gender, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 7. ED visits and rates involving illicit drugs, by patient disposition, 2007

Patient disposition	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, illicit drugs	974,272	100.0	320.0
Treated and released	560,065	57.5	183.9
Discharged home	426,581	43.8	140.1
Released to police/jail	55,670	5.7	18.3
Referred to detox/treatment	77,814	8.0	25.6
Admitted to this hospital	253,388	26.0	83.2
ICU/critical care	35,165	3.6	11.5
Surgery	2,534	0.3	0.8
Chemical dependency/detox	32,720	3.4	10.7
Psychiatric unit	65,534	6.7	21.5
Other inpatient unit	117,435	12.1	38.6
Other follow-up	160,818	16.5	52.8
Transferred	105,428	10.8	34.6
Left against medical advice	22,518	2.3	7.4
Died	1,658	0.2	0.5
Other	22,710	2.3	7.5
Not documented	8,505	0.9	2.8

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

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 8. Trends in ED visits involving illicit drugs, by selected drugs, 2004–2007

Drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Total ED visits, drug misuse/abuse	1,619,054	1,616,311	1,742,887	1,883,272	—	—	—
ED visits, illicit drugs	991,363	921,127	958,164	974,272	—	—	—
Cocaine	475,425	483,865	548,608	553,530	—	—	—
Heroin	214,432	187,493	189,780	188,162	—	—	—
Marijuana	281,619	279,664	290,563	308,547	—	—	—
Stimulants	162,435	137,650	107,575	85,043	—	-38	-21
Amphetamines	34,085	34,928	32,240	21,545	—	-38	-33
Methamphetamine	132,576	109,655	79,924	67,954	—	-38	-15
MDMA (Ecstasy)	10,220	11,287	16,749	12,748	—	—	-24
GHB	1,789	1,036	1,084	2,207	—	—	—
Flunitrazepam (Rohypnol)	*	*	*	*	—	—	—
Ketamine	*	303	270	291	—	—	—
LSD	2,146	2,001	4,002	3,561	—	—	—
PCP	31,342	14,825	21,960	28,035	—	—	28
Miscellaneous hallucinogens	3,150	3,194	3,898	4,839	—	—	—
Inhalants	9,523	5,156	5,643	7,920	—	—	—
Combinations not tabulated above	*	3,201	2,055	3,989	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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). Thus, the sum of visits or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

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

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update)

ALCOHOL

In 2007, almost a half-million ED visits involved drugs combined with alcohol (Table 9). This represented more than a quarter (26%) of all the ED visits involving drug misuse/abuse that year. The combination of drugs and alcohol is of particular concern because many illicit drugs and pharmaceuticals have additive or interactive effects with alcohol that can result in acute intoxication and impairment. According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA), more than 150 medications interact harmfully with alcohol. These interactions may result in increased risk of illness, injury, and even death. Alcohol's effects are heightened by drugs that depress the central nervous system, such as heroin, opiate pain medications, benzodiazepines, antihistamines, and antidepressants. Medications for certain disorders, including diabetes, high blood pressure, and heart disease, also can have harmful interactions with alcohol.[10]

Table 9. ED visits involving alcohol, 2007

Alcohol use category (1)	ED visits (2)	Percent of ED visits	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Alcohol with drugs (all ages)	497,283	26.4	9.3	406,698	587,868
Alcohol alone (patients < 21)	137,369	7.3	8.4	114,635	160,103

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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: CI = confidence interval. RSE = relative standard error.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

The use of alcohol alone by those under age 21 is also of substantial concern. Underage drinking has many immediate adverse consequences, and it also can lead to higher levels and dangerous patterns of drinking in later years. As an indicator of the prevalence and severity of underage drinking, its consequences, and its trends through the teen years, DAWN reports on ED visits for underage drinking separately for adolescents aged 12 to 17 and 18 to 20.

ED visits involving drugs and alcohol taken together

The types of drugs that accompany alcohol use are displayed in Table 10. Illicit drugs were involved in well over half (62%) of ED visits involving alcohol and other drugs. One or more pharmaceuticals were involved in 52 percent of the visits. Psychotherapeutic agents such as antidepressants and benzodiazepines (sedatives used to treat anxiety and sleeplessness) were involved in about a quarter of such visits (26%). Drugs acting on the central nervous system were involved in 23 percent of the visits, with the most frequent type being opioid/opiate pain medications, which were involved in 14 percent of the total alcohol/drug combination visits.

[10] National Institute on Alcohol Abuse and Alcoholism (NIAAA). *Frequently asked questions for the general public*. Retrieved November 18, 2009, from http://www.niaaa.nih.gov/FAQs/General-English/default.htm#taking_medications

Table 10. ED visits involving drugs and alcohol taken together, by most frequent combinations, 2007

Drugs reported with alcohol (1)	ED visits (2,3)	Percent of ED visits (3)	Rate of ED visits per 100,000 population (3,4)
Total ED visits, drugs with alcohol	497,283	100.0	163.3
Illicit drugs	307,839	61.9	101.1
Cocaine	194,277	39.1	63.8
Marijuana	117,249	23.6	38.5
Heroin	37,318	7.5	12.3
Stimulants	17,956	3.6	5.9
Pharmaceuticals	259,347	52.2	85.2
Psychotherapeutic agents	131,164	26.4	43.1
Antidepressants	29,116	5.9	9.6
Benzodiazepines	84,849	17.1	27.9
Alprazolam	31,867	6.4	10.5
Clonazepam	14,977	3.0	4.9
Central nervous system agents	114,477	23.0	37.6
Opioid/opiate pain medications	71,108	14.3	23.4
Hydrocodone	21,749	4.4	7.1
Oxycodone	20,734	4.2	6.8
Miscellaneous pain medications (5)	21,313	4.3	7.0
Muscle relaxants	11,323	2.3	3.7

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(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

(4) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

(5) Miscellaneous pain medications include acetaminophen, tramadol, and pain medications that were not specified by name. It does not include nonsteroidal anti-inflammatory drugs (such as ibuprofen) or salicylates (such as aspirin).

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

The rate of ED visits per 100,000 population for males (207.3) was higher than that for females (120.5) (Table 11 and Figure 3). Rates by age group showed a general pattern of being lower for those younger than 18 or older than 54, and higher for those aged 18 to 54.

Table 11. ED visits involving drugs and alcohol taken together, by patient demographics, 2007

Patient demographics	ED visits (1)	Percent of ED visits	Rates of ED visits per 100,000 population (2)
Total ED visits, drugs with alcohol	497,283	100.0	163.3
Gender	—	—	—
Male	311,221	62.6	207.3
Female	186,010	37.4	120.5
Unknown	*	*	*
Age	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	26,403	5.3	105.3
18–20 years	32,308	6.5	249.5
21–24 years	49,294	9.9	291.4
25–29 years	60,108	12.1	280.0
30–34 years	51,930	10.4	263.4
35–44 years	135,872	27.3	318.8
45–54 years	105,927	21.3	238.6
55–64 years	25,979	5.2	77.2
65 years and older	9,169	1.8	23.7
Unknown	*	*	*
Race/ethnicity	—	—	—
White	285,865	57.5	—
Black	112,015	22.5	—
Hispanic	53,642	10.8	—
Other or two or more race/ethnicities	5,532	1.1	—
Unknown	40,230	8.1	—

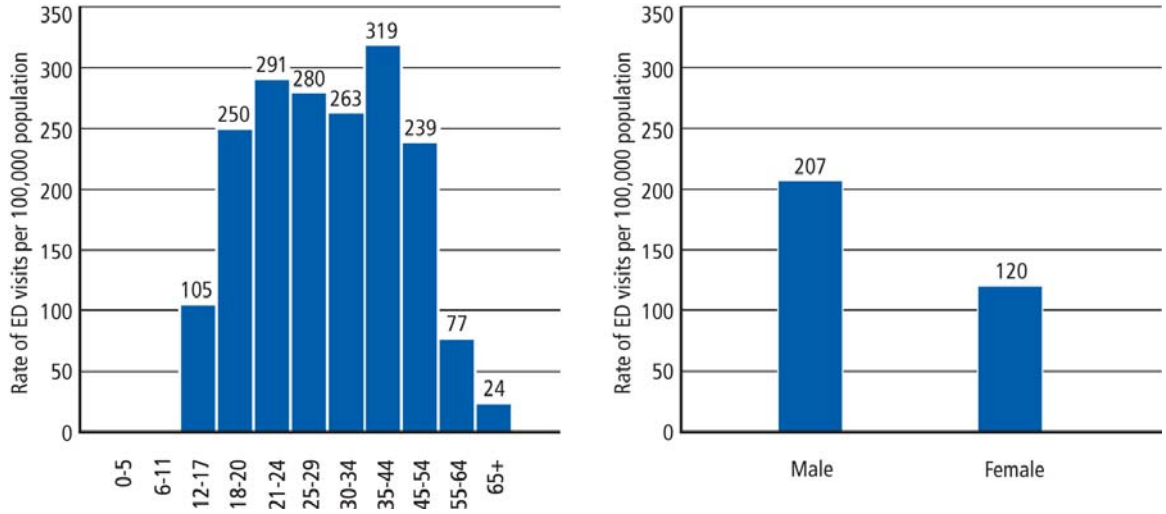
(1) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 3. Rates of ED visits per 100,000 population involving alcohol, by age and gender, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Considering race/ethnicity, 57 percent of patients were white, 23 percent were black, 11 percent were Hispanic, 1 percent were of other or multiple race/ethnic groups, and 8 percent were of unknown race/ethnicity. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. By necessity, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

The disposition of the drug/alcohol combination ED visits (i.e., where the patient went after discharge from the ED) is shown in Table 12. The majority (53%) were treated and released, and slightly more than a quarter (28%) of patients were admitted to the hospital. Of the remaining patients (19%), most were transferred to another health care facility.

Nearly half of all patients received some type of follow-up treatment after their ED visit, whether it was specifically a referral to a drug detox/dependency program, admission to the hospital, or transfer to another health care facility.

Table 12. ED visits involving drugs and alcohol taken together, by patient disposition, 2007

Patient disposition	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, drugs with alcohol	497,283	100.0	163.3
Treated and released	262,548	52.8	86.2
Discharged home	210,273	42.3	69.1
Released to police/jail	15,167	3.0	5.0
Referred to detox/treatment	37,108	7.5	12.2
Admitted to this hospital	140,569	28.3	46.2
ICU/critical care	31,524	6.3	10.4
Surgery	1,039	0.2	0.3
Chemical dependency/detox	17,151	3.4	5.6
Psychiatric unit	39,474	7.9	13.0
Other inpatient unit	51,381	10.3	16.9
Other disposition	94,167	18.9	30.9
Transferred	67,907	13.7	22.3
Left against medical advice	8,299	1.7	2.7
Died	572	0.1	0.2
Other	*	*	*
Not documented	4,887	1.0	1.6

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

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

NOTE: 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

ED visits involving alcohol use by patients aged 12 to 17 and 18 to 20

In 2007, for patients aged 12 to 20, almost 59,000 ED visits involved alcohol use with other drugs, and more than 136,000 involved alcohol alone. More than two thirds (70%) of the ED visits involving any type of alcohol use for this age group were associated with alcohol alone and no other drugs. Comparing patients aged 12 to 17 with those aged 18 to 20, the rates for use of alcohol alone were 223.2 and 619.9, respectively (Table 13 and Figure 4), whereas the rates for use of alcohol with other drugs were 105.3 and 249.5, respectively. Within age groups, the rate of ED visits involving the use of alcohol alone is more than double that of alcohol plus drugs, and between age groups, the rate for those aged 18 to 20 is more than double that of younger patients aged 12 to 17.

Table 13. ED visits involving alcohol, by presence of other drugs, by age groups 12 to 17 and 18 to 20, 2007

Alcohol use category (1)	ED visits (2)	Rate of ED visits per 100,000 population (3)	RSE (%)	95% CI: Lower bound (ED visits)	95% CI: Upper bound (ED visits)
Alcohol with drugs, patients aged 12 to 17	26,403	105.3	13.0	19,651	33,156
Alcohol with drugs, patients aged 18 to 20	32,308	249.5	10.3	25,773	38,843
Alcohol alone, patients aged 12 to 17	55,960	223.2	10.7	44,214	67,707
Alcohol alone, patients aged 18 to 20	80,255	619.9	8.4	66,992	93,518

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

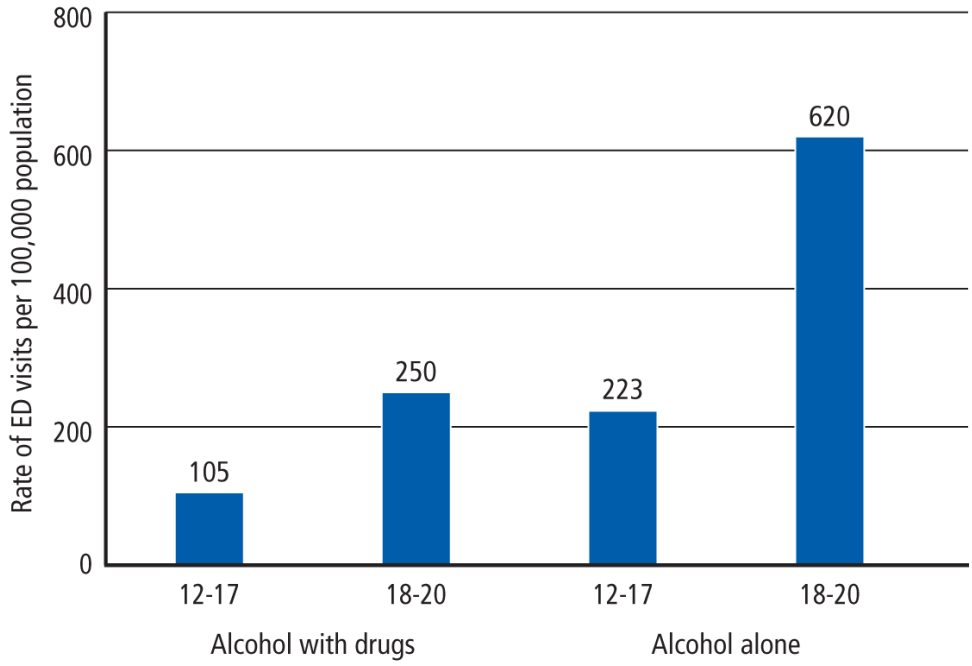
(2) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

(3) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 4. Rates of ED visits per 100,000 population involving alcohol in combination and alcohol alone, by age groups 12 to 17 and 18 to 20, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Trends in ED visits involving alcohol, 2004–2007

This section presents the trends in the estimates of ED visits involving alcohol for the period 2004 through 2007 (Table 14). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the table.

Looking across patients of all ages, no significant changes were found from 2004 to 2007 in the number of ED visits related to drinking alcohol, irrespective of whether other drugs were involved (Table 14).

Table 14. ED visits involving alcohol, by presence of other drugs, 2004–2007

Alcohol use category (1)	ED visits, 2004 (2)	ED visits, 2005 (2)	ED visits, 2006 (2)	ED visits, 2007 (2)	Percent change 2004, 2007 (3)	Percent change 2005, 2007 (3)	Percent change 2006, 2007 (3)
Total ED visits, alcohol	674,914	527,198	577,521	634,652	—	—	—
Alcohol in combination	523,926	416,599	450,817	497,283	—	—	—
Alcohol alone	150,988	110,599	126,704	137,369	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

However, when the data are broken down by age groups, from 2005 to 2007 ED visits involving alcohol in patients aged 12 to 17 rose significantly (32%; Table 15). The 2007 total was more than 80,000 visits (82,364) by patients aged 12 to 17. A large part of that increase reflects the jump of 31 percent in alcohol-alone visits for patients aged 12 to 17. This suggests that alcohol use is starting at an earlier age, with incumbent morbidity as evidenced in the rise in ED visits. NIAAA cautions that persons who start drinking at an early age—for example, at age 14 or younger—are at much higher risk of developing alcohol problems at some point in their lives than those who start drinking at age 21 or after.

Table 15. ED visits involving alcohol, by presence of other drugs, by age groups 12 to 17 and 18 to 20, 2004–2007

Alcohol use category (1)	ED visits, 2004 (2)	ED visits, 2005 (2)	ED visits, 2006 (2)	ED visits, 2007 (2)	Percent change 2004, 2007 (3)	Percent change 2005, 2007 (3)	Percent change 2006, 2007 (3)
Total ED visits, alcohol, aged 12 to 17	67,589	62,459	76,760	82,364	—	32	—
Total ED visits, alcohol, aged 18 to 20	135,313	95,166	105,675	112,563	—	—	—
Alcohol with drugs, aged 12 to 17	21,555	19,720	24,418	26,403	—	—	—
Alcohol with drugs, aged 18 to 20	31,926	27,784	31,702	32,308	—	—	—
Alcohol alone, aged 12 to 17	46,034	42,739	52,342	55,960	—	31	—
Alcohol alone, aged 18 to 20	103,387	67,382	73,973	80,255	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

NONMEDICAL USE OF PHARMACEUTICALS

ED visits involving nonmedical use of pharmaceuticals, 2007

As used by DAWN, 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. DAWN reporters are careful to distinguish appropriate medical use from nonmedical, or inappropriate, use, and only the latter is included in this grouping.

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.

For 2007, DAWN estimates that 855,838 (CI: 719,765 to 991,910) ED visits involved nonmedical use of prescription medicines, over-the-counter drugs, or other type of pharmaceutical (Table 16). Multiple drug involvement occurred in 52 percent of visits, and alcohol was involved in 19 percent.

At 49 percent, central nervous system agents were the most common type of drugs reported in the nonmedical-use category of ED visits. Specific drugs seen at high levels were methadone and single-ingredient and combination forms of oxycodone and hydrocodone, all narcotic painkillers.[11] Once the margin of error is taken into account, ED visits involving nonmedical use of oxycodone, hydrocodone, and methadone appeared at similar levels:

- oxycodone/combinations in 76,587 (CI: 58,015 to 95,160) ED visits, or 9 percent;
- hydrocodone/combinations in 65,734 (CI: 48,584 to 82,883) ED visits, or 8 percent; and
- methadone in 53,950 (CI: 38,278 to 69,621) ED visits, or 6 percent.

The nonopioid pain medication acetaminophen and muscle relaxants each showed up as being involved in about 5 percent of nonmedical-use visits. The most common muscle relaxant was carisoprodol (3%). Anticonvulsants and nonsteroidal anti-inflammatory agents (e.g., ibuprofen, naproxen) each showed up in about 4 percent of visits.

[11] DAWN focuses on ED visits related to recent drug use and excludes medications taken on a regular basis that are not related to the ED visit. 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.

Table 16. ED visits involving nonmedical use of pharmaceuticals, 2007

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, nonmedical use	855,838	100.0	8.1	719,765	991,910
Visits involving a single drug	415,196	48.5	11.8	318,906	511,485
Visits involving multiple drugs	440,642	51.5	6.9	381,404	499,880
Visits involving alcohol	162,072	18.9	8.6	134,625	189,519
PSYCHOTHERAPEUTIC AGENTS	353,931	41.4	6.4	309,284	398,579
Antidepressants	82,009	9.6	6.9	70,856	93,163
MAO inhibitors	*	*	*	*	*
SSRI antidepressants	37,446	4.4	9.6	30,397	44,496
Tricyclic antidepressants	16,600	1.9	16.7	11,182	22,019
Miscellaneous antidepressants	9,687	1.1	13.7	7,076	12,297
Antipsychotics	52,752	6.2	9.9	42,522	62,982
Anxiolytics, sedatives, and hypnotics	259,983	30.4	8.0	219,443	300,523
Barbiturates	9,877	1.2	19.8	6,044	13,710
Benzodiazepines	218,640	25.5	9.1	179,649	257,632
Alprazolam	80,313	9.4	12.2	61,101	99,525
Clonazepam	40,920	4.8	10.8	32,249	49,591
Diazepam	19,674	2.3	11.9	15,103	24,245
Lorazepam	26,213	3.1	12.1	20,006	32,419
Benzodiazepines NOS	55,346	6.5	23.9	29,419	81,274
Misc. anxiolytics, sedatives, and hypnotics	43,960	5.1	10.8	34,660	53,260
Diphenhydramine	12,539	1.5	13.1	9,307	15,770
Hydroxyzine	2,447	0.3	21.5	1,417	3,478
Zolpidem	18,464	2.2	13.0	13,756	23,173
Anxiolytics, sedatives, and hypnotics NOS	3,364	0.4	18.6	2,135	4,593
CNS stimulants	18,561	2.2	9.6	15,069	22,052
Amphetamine-dextroamphetamine	6,372	0.7	16.7	4,292	8,452
Caffeine	2,165	0.3	27.4	1,002	3,329
Dextroamphetamine	*	*	*	*	*
Methylphenidate	4,782	0.6	19.8	2,925	6,640
CENTRAL NERVOUS SYSTEM AGENTS	415,354	48.5	7.6	353,459	477,248
Pain medications	363,621	42.5	8.0	306,503	420,740
Antimigraine agents	2,284	0.3	28.9	991	3,577
Cox-2 inhibitors	635	0.1	41.3	121	1,148
Opiates/opioids	286,521	33.5	9.2	235,089	337,954
Opiates/opioids, unspecified	52,997	6.2	12.6	39,943	66,050
Narcotic pain medications	237,143	27.7	10.4	188,610	285,676
Buprenorphine/combinations	7,136	0.8	31.1	2,786	11,486
Codeine/combinations	5,648	0.7	16.1	3,862	7,433
Fentanyl/combinations	15,947	1.9	22.0	9,080	22,813
Hydrocodone/combinations	65,734	7.7	13.3	48,584	82,883
Hydromorphone/combinations	9,497	1.1	25.7	4,709	14,285
Meperidine/combinations	997	0.1	32.2	369	1,626

Table 16. ED visits involving nonmedical use of pharmaceuticals, 2007 (continued)

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Methadone	53,950	6.3	14.8	38,278	69,621
Morphine/combinations	29,591	3.5	37.0	8,118	51,065
Oxycodone/combinations	76,587	8.9	12.4	58,015	95,160
Propoxyphene/combinations	7,401	0.9	16.9	4,946	9,856
Nonsteroidal anti-inflammatory agents	30,822	3.6	10.4	24,568	37,076
Ibuprofen	20,892	2.4	10.1	16,752	25,032
Naproxen	7,208	0.8	17.8	4,695	9,720
Salicylates/combinations	9,724	1.1	12.9	7,269	12,178
Miscellaneous pain medications/ combinations	56,534	6.6	10.7	44,645	68,424
Acetaminophen/combinations	43,872	5.1	12.9	32,801	54,942
Tramadol/combinations	8,039	0.9	20.0	4,895	11,184
Tramadol	7,662	0.9	20.1	4,647	10,678
Acetaminophen-tramadol	*	*	*	*	*
Pain medication combinations NTA	2,120	0.2	21.5	1,228	3,013
Anorexiants	758	0.1	30.7	302	1,213
Anticonvulsants	35,403	4.1	8.8	29,298	41,507
Antiemetic/antivertigo agents	1,646	0.2	30.8	651	2,640
Anti-Parkinson agents	3,764	0.4	18.2	2,425	5,104
General anesthetics	*	*	*	*	*
Muscle relaxants	40,769	4.8	19.3	25,371	56,166
Carisoprodol	27,128	3.2	27.3	12,600	41,656
Cyclobenzaprine	6,197	0.7	16.2	4,228	8,166
Miscellaneous CNS agents	924	0.1	40.2	195	1,652
RESPIRATORY AGENTS	31,008	3.6	12.4	23,469	38,547
Antihistamines	5,096	0.6	18.2	3,273	6,918
Bronchodilators	3,043	0.4	20.0	1,849	4,238
Decongestants	1,758	0.2	35.8	525	2,991
Expectorants	2,293	0.3	19.7	1,406	3,180
Upper respiratory combinations	16,677	1.9	13.7	12,200	21,155
Respiratory agents NTA	4,655	0.5	19.3	2,897	6,414
CARDIOVASCULAR AGENTS	35,608	4.2	11.2	27,807	43,408
Antiadrenergic agents, centrally acting	4,751	0.6	16.5	3,213	6,289
Beta-adrenergic blocking agents	11,668	1.4	16.8	7,831	15,505
Calcium channel blocking agents	4,493	0.5	18.9	2,833	6,154

Table 16. ED visits involving nonmedical use of pharmaceuticals, 2007 (continued)

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Diuretics	5,467	0.6	23.1	2,988	7,946
Cardiovascular agents NTA	17,879	2.1	13.0	13,319	22,440

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

NOTE: CI = confidence interval. CNS = central nervous system. NOS = not otherwise specified. NTA = not tabulated above. 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

At 41 percent, psychotherapeutic agents were the second most frequent type of drug reported in the nonmedical-use category of ED visits. Anxiolytics accounted for the largest part of that, followed by antidepressants and antipsychotics (e.g., quetiapine).

Benzodiazepines, an anxiolytic prescribed for a wide range of conditions but predominately anxiety and insomnia, were involved in 26 percent of all ED visits related to nonmedical use. DAWN estimates that 218,640 (CI: 179,649 to 257,632) ED visits were associated with nonmedical use of benzodiazepines. The specific types of benzodiazepines found were

- alprazolam in 80,313 (CI: 61,101 to 99,525) ED visits, or 9 percent;
- clonazepam in 40,920 (CI: 32,249 to 49,591) ED visits, or 5 percent;
- lorazepam in 26,213 (CI: 20,006 to 32,419) ED visits, or 3 percent; and
- diazepam in 19,674 (CI: 15,103 to 24,245) ED visits, or 2 percent.

Benzodiazepines, without a specific ingredient named, appeared in an additional 55,346 (CI: 29,419 to 81,274) ED visits, or 6 percent.

Other types of anxiolytics, sedatives, and hypnotics found at notable levels included

- zolpidem in 18,464 (CI: 13,756 to 23,173) ED visits, or 2 percent;
- diphenhydramine[12] in 12,539 (CI: 9,307 to 15,770) ED visits, or 1 percent; and
- barbiturates, which are primarily unnamed, in 9,877 (CI: 6,044 to 13,710) ED visits, or 1 percent.

[12] This includes only single-ingredient formulations. Many multi-ingredient pharmaceuticals containing diphenhydramine are classified elsewhere (e.g., as respiratory agents).

The two other major categories of pharmaceuticals are respiratory agents and cardiovascular agents, and each was involved in about 4 percent of nonmedical-use ED visits.

Of the total number of ED visits involving the nonmedical use of pharmaceuticals, the majority of these visits (52%) involved multiple drugs. Specifically,

- 162,072 visits (19%) involved nonmedical use of pharmaceuticals and alcohol;
- 159,930 visits (19%) involved nonmedical use of pharmaceuticals and illicit drugs;
- 48,351 visits (6%) involved pharmaceuticals, alcohol, and illicit drugs; and
- 166,991 visits (19%) involved multiple types of pharmaceuticals.

When population size and the margin of error are taken into account, visits for nonmedical use of pharmaceuticals did not differ between females (286 visits per 100,000 population) and males (275 visits per 100,000 population; Table 17 and Figure 5). ED visit rates for patients aged 18 to 44 were all more than 400 visits per 100,000 population.

In terms of race and ethnicity, 70 percent of visits related to nonmedical use of pharmaceuticals involved patients who were white. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. By necessity, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

Patient disposition after ED visits associated with nonmedical use of pharmaceuticals appears in Table 18. The majority of patients (59%) were treated and released, more than a quarter (27%) were admitted to the hospital, and the balance (14%) had other outcomes.

Table 17. ED visits and rates involving nonmedical use of pharmaceuticals, by patient demographics, 2007

Patient demographics	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, nonmedical use	855,838	100.0	281.1
Gender	—	—	—
Male	413,581	48.3	275.4
Female	441,763	51.6	286.3
Unknown	*	*	*
Age	—	—	—
0–5 years	4,986	0.6	19.9
6–11 years	4,450	0.5	18.6
12–17 years	68,586	8.0	273.6
18–20 years	57,558	6.7	444.6
21–24 years	77,132	9.0	456.0
25–29 years	95,234	11.1	443.7
30–34 years	81,131	9.5	411.6
35–44 years	172,012	20.1	403.6
45–54 years	162,884	19.0	367.0
55–64 years	69,085	8.1	205.2
65 years and older	62,670	7.3	161.6
Unknown	*	*	*
Race/ethnicity	—	—	—
White	599,668	70.1	—
Black	105,901	12.4	—
Hispanic	74,789	8.7	—
Other or two or more race/ethnicities	12,043	1.4	—
Unknown	63,436	7.4	—

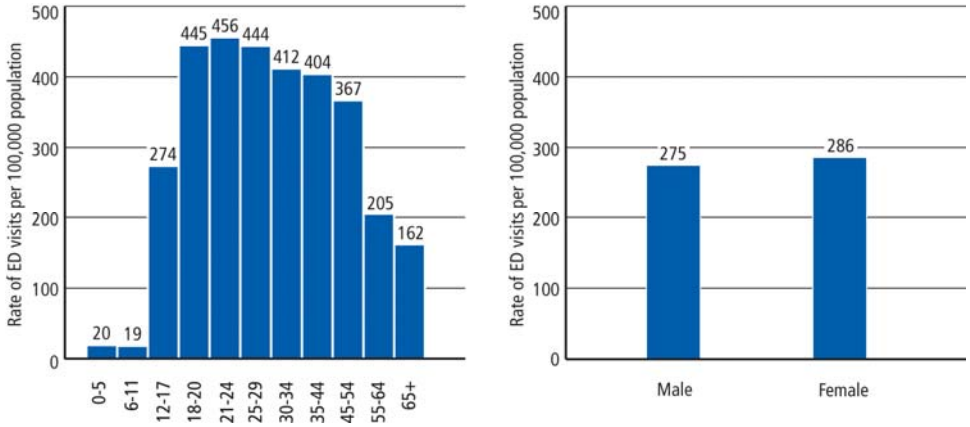
(1) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 5. Rates of ED visits per 100,000 population involving nonmedical use of pharmaceuticals, by age and gender, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 18. ED visits and rates involving nonmedical use of pharmaceuticals, by patient disposition, 2007

Patient disposition	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, nonmedical use	855,838	100.0	281.1
Treated and released	502,761	58.7	165.1
Discharged home	456,385	53.3	149.9
Released to police/jail	16,791	2.0	5.5
Referred to detox/treatment	29,585	3.5	9.7
Admitted to this hospital	233,300	27.3	76.6
ICU/critical care	71,730	8.4	23.6
Surgery	*	0.2	*
Chemical dependency/detox	3,064	0.4	1.0
Psychiatric unit	50,013	5.8	16.4
Other inpatient unit	106,880	12.5	35.1
Other follow-up	119,777	14.0	39.3
Transferred	83,547	9.8	27.4
Left against medical advice	18,559	2.2	6.1
Died	1,379	0.2	0.5
Other	10,584	1.2	3.5
Not documented	5,707	0.7	1.9

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

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

NOTE: 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Trends in ED visits involving nonmedical use of pharmaceuticals, 2004–2007

This section presents the trends in the estimates of ED visits involving nonmedical use of pharmaceuticals for the period 2004 through 2007 (Table 19). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the table.

ED visits related to nonmedical use of pharmaceuticals increased 60 percent in the period from 2004 to 2007. Among the drugs most frequently implicated in nonmedical use, the following changes from 2004 to 2007 are notable:

- ED visits related to psychotherapeutic drugs, as an overarching category, increased 43 percent, a jump of more than 100,000 ED visits.
  - Most types of psychotherapeutics—except antidepressants—saw significant increases.
  - Anxiolytics, sedatives, and hypnotics increased 47 percent overall—more than 82,000 visits, with benzodiazepines rising 52 percent and accounting for about 75,000 of the visit increase.
  - Specific types of benzodiazepines of note were alprazolam (33,787 visits), clonazepam (12,742 visits), and lorazepam (8,539 visits).
  - Central nervous system stimulants (e.g., amphetamine-dextroamphetamine, methylphenidate, Adderal®, Ritalin®) saw an 89 percent increase, the equivalent of almost 9,000 ED visits.
- ED visits related to central nervous system agents, as an overarching category, increased 47 percent, a jump of more than 130,000 ED visits.
  - Most of those visits were related to the 66 percent increase in opiates/opioid painkillers (113,795 visits).
  - Specific types of opiates/opioids that rose significantly were oxycodone (34,886 visits), hydrocodone (25,890 visits), methadone (17,144 visits), and unspecified opiates (21,151 visits).

Table 19. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2007

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Total ED visits, nonmedical use	536,247	669,214	741,425	855,838	60	—	15
PSYCHOTHERAPEUTIC AGENTS	247,324	308,655	323,999	353,931	43	—	—
Antidepressants	66,917	67,051	79,682	82,009	—	—	—
MAO inhibitors	*	*	*	*	—	—	—
SSRI antidepressants	32,285	30,374	35,370	37,446	—	—	—
Tricyclic antidepressants	12,412	14,515	16,564	16,600	—	—	—
Miscellaneous antidepressants	9,414	7,452	7,561	9,687	—	—	—
Antipsychotics	35,198	44,393	44,733	52,752	50	—	—
Anxiolytics, sedatives, and hypnotics	177,394	227,486	233,875	259,983	47	—	—
Barbiturates	11,721	14,693	10,991	9,877	—	-33	—
Benzodiazepines	143,546	189,704	195,625	218,640	52	—	—
Alprazolam	46,526	57,419	65,236	80,313	73	40	23
Clonazepam	28,178	30,648	33,557	40,920	45	34	—
Diazepam	15,619	18,433	19,936	19,674	—	—	—
Lorazepam	17,674	23,210	23,720	26,213	48	—	—
Benzodiazepines NOS	36,039	61,486	58,347	55,346	—	—	—
Misc. anxiolytics, sedatives, and hypnotics	31,554	35,561	40,626	43,960	39	—	—
Diphenhydramine	10,452	10,294	12,291	12,539	—	—	—
Hydroxyzine	2,363	2,179	2,678	2,447	—	—	—
Zolpidem	12,792	14,730	17,257	18,464	44	—	—
Anxiolytics, sedatives, and hypnotics NOS	2,657	4,421	3,629	3,364	—	—	—
CNS stimulants	9,801	10,965	13,892	18,561	89	69	—
Amphetamine-dextroamphetamine	2,303	2,669	5,027	6,372	177	139	—
Caffeine	2,736	4,567	4,407	2,165	—	-53	-51
Dextroamphetamine	*	*	*	*	—	—	—
Methylphenidate	2,446	2,519	2,192	4,782	—	90	118
CENTRAL NERVOUS SYSTEM AGENTS	282,296	336,900	373,138	415,354	47	23	—
Pain medications	241,578	294,251	323,579	363,621	51	24	—
Antimigraine agents	868	1,018	1,191	2,284	—	124	—
Cox-2 inhibitors	1,935	765	*	635	—	—	—

Table 19. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2007 (continued)

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Opiates/opioids	172,726	217,594	247,669	286,521	66	32	16
Opiates/opioids, unspecified	31,846	52,670	50,978	52,997	66	—	—
Narcotic pain medications	144,644	168,376	201,280	237,143	64	41	—
Buprenorphine/combinations	*	*	4,440	7,136	—	224	—
Codeine/combinations	7,171	6,180	6,928	5,648	—	—	—
Fentanyl/combinations	9,823	11,211	16,012	15,947	62	42	—
Hydrocodone/combinations	39,844	47,192	57,550	65,734	65	39	—
Hydromorphone/combinations	3,385	4,714	6,780	9,497	181	101	—
Meperidine/combinations	782	383	1,440	997	—	—	—
Methadone	36,806	42,684	45,130	53,950	47	—	—
Morphine/combinations	13,966	15,762	20,416	29,591	—	—	—
Oxycodone/combinations	41,701	52,943	64,888	76,587	84	45	—
Propoxyphene/combinations	6,744	7,648	6,220	7,401	—	—	—
Nonsteroidal anti-inflammatory agents	27,362	28,837	27,662	30,822	—	—	—
Ibuprofen	22,127	22,268	20,541	20,892	—	—	—
Naproxen	4,715	5,190	6,651	7,208	—	—	—
Salicylates/combinations	9,580	12,123	10,399	9,724	—	—	—
Miscellaneous pain medications/ combinations	44,857	51,881	54,313	56,534	—	—	—
Acetaminophen/combinations	39,167	43,558	44,314	43,872	—	—	—
Tramadol/combinations	4,849	5,918	6,048	8,039	—	—	—
Tramadol	3,948	5,427	5,961	7,662	—	—	—
Acetaminophen-tramadol	909	*	*	*	—	—	—
Pain medication combinations NTA	977	653	898	2,120	117	225	—
Anorexiants	*	1,757	1,168	758	—	-57	—
Anticonvulsants	28,652	27,641	31,169	35,403	—	—	—
Antiemetic/antivertigo agents	1,678	1,771	1,360	1,646	—	—	—
Anti-Parkinson agents	2,472	1,692	3,816	3,764	—	123	—
General anesthetics	*	*	*	*	—	—	—
Muscle relaxants	25,934	33,695	38,918	40,769	—	—	—
Carisoprodol	14,736	20,082	24,505	27,128	—	—	—
Cyclobenzaprine	6,183	7,629	7,142	6,197	—	—	—
Miscellaneous CNS agents	869	900	999	924	—	—	—
RESPIRATORY AGENTS	22,286	28,017	28,867	31,008	—	—	—
Antihistamines	5,761	4,429	4,130	5,096	—	—	—
Bronchodilators	2,294	3,043	2,920	3,043	—	—	—
Decongestants	1,864	1,309	1,511	1,758	—	—	—

Table 19. Trends in ED visits involving nonmedical use of pharmaceuticals, by selected drugs, 2004–2007 (continued)

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Expectorants	832	1,960	2,125	2,293	176	—	—
Upper respiratory combinations	10,314	15,837	15,115	16,677	62	—	—
Respiratory agents NTA	2,903	3,692	4,296	4,655	—	—	—
CARDIOVASCULAR AGENTS	27,396	37,095	36,343	35,608	—	—	—
Antiadrenergic agents, centrally acting	3,616	5,125	4,810	4,751	—	—	—
Beta-adrenergic blocking agents	7,094	9,824	11,729	11,668	—	—	—
Calcium channel blocking agents	3,115	5,434	5,227	4,493	—	—	—
Diuretics	3,625	5,332	5,102	5,467	—	—	—
Cardiovascular agents NTA	14,930	18,881	17,338	17,879	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

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

NOTE: CNS = central nervous system. NOS = not otherwise specified. NTA = not tabulated above. 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. A dash (—) indicates a blank cell.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

DRUG-RELATED SUICIDE ATTEMPTS

ED visits involving drug-related suicide attempts, 2007

DAWN collects information on ED visits after suicide attempts that involve drugs. These attempts are not limited to drug overdoses. Suicide attempts involving firearms, for example, are included as DAWN cases if drugs were involved at all at the time of the suicide attempt.[13]

DAWN estimates 197,053 (CI: 164,564 to 229,542) ED visits for drug-related suicide attempts in 2007 (Table 20). Almost all (94%) involved a prescription drug or over-the-counter medication. More than half (57%) involved psychotherapeutic agents, nearly half (48%) involved central nervous system agents, just under a third (29%) involved alcohol, and about a fifth (19%) involved illicit drugs.[14] Nearly two thirds (63%) of ED visits for drug-related suicide attempts involved multiple drugs.

The more common drugs involved in suicide attempts include the following:

- Among psychotherapeutic agents, the more common drugs involved in the ED visits related to suicide attempts were benzodiazepines (27%) and antidepressants (20%).
- Among central nervous system agents, the more common drugs were narcotic painkillers (15%) and acetaminophen (15%).
- Among illicit drugs, the more common drugs were cocaine (13%) and marijuana (6%).
- Alcohol, either in combination with other drugs or alcohol alone in patients under age 21, was involved in nearly one third (29%) of the ED visits for drug-related suicide attempts.

After population size and the margin of error are taken into account, the rate of drug-related suicide attempt visits for females (78 visits per 100,000 population) was higher than that for males (52 per 100,000; Table 21 and Figure 6). In respect to age, rates ranged from a low of 10 visits per 100,000 persons for those aged 65 or older to 152 visits for those aged 18 to 20. In general, the rates for patients aged 18 to 44 are higher than the rates for younger and older age groups. In terms of race/ethnicity, 63 percent of the suicide attempts involved patients who were white. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. By necessity, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

About half (51%) of the patients attempting suicide were admitted for inpatient hospital care (Table 22). A fifth (20%) were admitted to an ICU/critical care unit; others were admitted to psychiatric units (16%) or other inpatient units (15%). Another 27 percent were transferred to another health care facility; only 13 percent were discharged home. Very few died in the ED. However, DAWN does not record deaths for patients who died before arriving at the ED or patients who died after admission to inpatient units of the hospital.

[13] Excluded are suicide-related behaviors documented as something other than actual attempts (e.g., suicidal ideation, suicidal gesture, or suicidal thoughts).

[14] Percentages add to greater than 100 percent because visits often involve multiple drugs.

Table 20. ED visits involving drug-related suicide attempts, by selected drugs, 2007

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, suicide attempts	**197,053**	**100.0**	**8.4**	**164,564**	**229,542**
Visits involving a single drug	73,346	37.2	8.9	60,507	86,184
Visits involving multiple drugs	123,707	62.8	10.0	99,479	147,935
Visits involving illicit drugs	37,319	18.9	24.0	19,780	54,859
Visits involving alcohol	57,319	29.1	9.7	46,439	68,199
Visits involving pharmaceuticals	185,307	94.0	8.3	155,213	215,400
Alcohol	57,319	29.1	9.7	46,439	68,199
Alcohol in combination	56,434	28.6	10.0	45,334	67,533
Alcohol alone	*	*	58.6	*	*
Non-alcohol illicit	37,319	18.9	24.0	19,780	54,859
Cocaine	26,462	13.4	30.0	10,901	42,022
Heroin	4,444	2.3	33.2	1,556	7,332
Marijuana	12,115	6.1	24.1	6,404	17,826
Stimulants	2,665	1.4	29.4	1,130	4,201
Amphetamines	878	0.4	29.3	374	1,381
Methamphetamine	1,795	0.9	37.9	461	3,130
MDMA (Ecstasy)	481	0.2	47.7	32	931
GHB	*	*	*	*	*
Flunitrazepam (Rohypnol)	*	*	*	*	*
Ketamine	*	*	*	*	*
LSD	*	*	*	*	*
PCP	768	0.4	40.2	163	1,374
Miscellaneous hallucinogens	*	*	*	*	*
Inhalants	*	*	*	*	*
Combinations NTA	*	*	*	*	*
PSYCHOTHERAPEUTIC AGENTS	112,768	57.2	8.2	94,681	130,854
Antidepressants	38,870	19.7	11.1	30,418	47,322
MAO inhibitors	*	*	*	*	*
SSRI antidepressants	18,884	9.6	10.6	14,949	22,820
Tricyclic antidepressants	4,152	2.1	33.7	1,408	6,896
Miscellaneous antidepressants	3,939	2.0	17.2	2,610	5,267
Antipsychotics	25,479	12.9	18.5	16,239	34,720
Anxiolytics, sedatives, and hypnotics	72,637	36.9	6.7	63,037	82,236
Barbiturates	1,663	0.8	39.3	382	2,945
Benzodiazepines	53,509	27.2	7.3	45,860	61,157
Alprazolam	19,167	9.7	11.3	14,908	23,425
Clonazepam	14,455	7.3	9.4	11,787	17,122
Diazepam	6,912	3.5	19.4	4,287	9,537
Lorazepam	9,527	4.8	15.0	6,730	12,325
Benzodiazepines NOS	4,594	2.3	35.4	1,407	7,781

Table 20. ED visits involving drug-related suicide attempts, by selected drugs, 2007 (continued)

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Misc. anxiolytics, sedatives, and hypnotics	23,349	11.8	8.8	19,329	27,369
Diphenhydramine	7,618	3.9	16.1	5,221	10,015
Hydroxyzine	2,027	1.0	32.1	751	3,302
Zolpidem	7,403	3.8	14.2	5,349	9,458
Anxiolytics, sedatives, and hypnotics NOS	2,274	1.2	28.2	1,017	3,531
CNS stimulants	2,208	1.1	23.2	1,203	3,212
Amphetamine-dextroamphetamine	576	0.3	33.6	196	955
Caffeine	*	*	*	*	*
Dextroamphetamine	*	*	*	*	*
Methylphenidate	1,002	0.5	41.3	190	1,815
CNS AGENTS	94,644	48.0	8.9	78,077	111,210
Pain medications	78,948	40.1	10.3	62,958	94,938
Antimigraine agents	*	*	*	*	*
Cox-2 inhibitors	*	*	*	*	*
Opiates/opioids	31,476	16.0	10.4	25,078	37,874
Opiates/opioids, unspecified	1,893	1.0	23.2	1,032	2,754
Narcotic pain medications	29,886	15.2	10.1	23,945	35,827
Buprenorphine/combinations	*	*	*	*	*
Codeine/combinations	1,637	0.8	28.0	737	2,536
Fentanyl/combinations	*	*	54.4	*	*
Hydrocodone/combinations	13,238	6.7	12.5	9,989	16,488
Hydromorphone/combinations	796	0.4	26.1	389	1,202
Meperidine/combinations	*	*	*	*	*
Methadone	3,192	1.6	26.0	1,566	4,817
Morphine/combinations	1,690	0.9	41.9	303	3,076
Oxycodone/combinations	9,351	4.7	23.9	4,972	13,731
Propoxyphene/combinations	1,754	0.9	22.1	994	2,514
Ibuprofen	14,057	7.1	14.7	10,007	18,107
Salicylates/combinations	5,976	3.0	17.3	3,953	7,998
Miscellaneous pain medications/ combinations	32,968	16.7	11.7	25,426	40,510
Acetaminophen/combinations	29,861	15.2	12.1	22,783	36,940
Tramadol	2,669	1.4	23.1	1,458	3,880
Acetaminophen-tramadol	*	*	*	*	*
Pain medication combinations NTA	1,147	0.6	25.7	569	1,725
Anorexiants	*	*	*	*	*
Anticonvulsants	11,803	6.0	8.7	9,799	13,806
Antiemetic/antivertigo agents	343	0.2	41.1	66	620
Antiparkinson agents	755	0.4	38.3	188	1,321
General anesthetics	*	*	*	*	*

Table 20. ED visits involving drug-related suicide attempts, by selected drugs, 2007 (continued)

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Muscle relaxants	9,772	5.0	13.7	7,141	12,403
Carisoprodol	4,301	2.2	23.5	2,319	6,282
Cyclobenzaprine	3,839	1.9	22.2	2,169	5,510
Miscellaneous CNS agents	*	*	*	*	*
RESPIRATORY AGENTS	10,175	5.2	16.4	6,903	13,448
Antihistamines	3,813	1.9	23.5	2,058	5,568
Bronchodilators	*	*	*	*	*
Decongestants	805	0.4	49.0	32	1,578
Expectorants	649	0.3	36.2	188	1,110
Upper respiratory combinations	4,067	2.1	18.1	2,621	5,512
Respiratory agents NTA	1,114	0.6	24.5	579	1,648
CARDIOVASCULAR AGENTS	7,873	4.0	14.8	5,591	10,154
Antiadrenergic agents, centrally acting	790	0.4	27.2	368	1,211
Beta-adrenergic blocking agents	2,501	1.3	21.5	1,449	3,554
Calcium channel blocking agents	601	0.3	42.8	96	1,106
Diuretics	1,360	0.7	26.0	668	2,052
Cardiovascular agents NTA	4,344	2.2	21.0	2,559	6,128

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

NOTE: CI = confidence interval. CNS = central nervous system. NOS = not otherwise specified. NTA = not tabulated above. 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 21. ED visits involving drug-related suicide attempts, by patient demographics, 2007

Patient demographics	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, suicide attempts	197,053	100.0	64.7
Gender	—	—	—
Male	77,299	39.2	51.5
Female	119,745	60.8	77.6
Unknown	*	*	*
Age	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	21,093	10.7	84.1
18–20 years	19,706	10.0	152.2
21–24 years	18,384	9.3	108.7
25–29 years	26,041	13.2	121.3
30–34 years	20,780	10.5	105.4
35–44 years	45,254	23.0	106.2
45–54 years	31,765	16.1	71.6
55–64 years	10,166	5.2	30.2
65 years and older	3,826	1.9	9.9
Unknown	*	*	*
Race/ethnicity	—	—	—
White	123,762	62.8	—
Black	*	*	—
Hispanic	18,182	9.2	—
Other or two or more race/ethnicities	3,773	1.9	—
Unknown	14,882	7.6	—

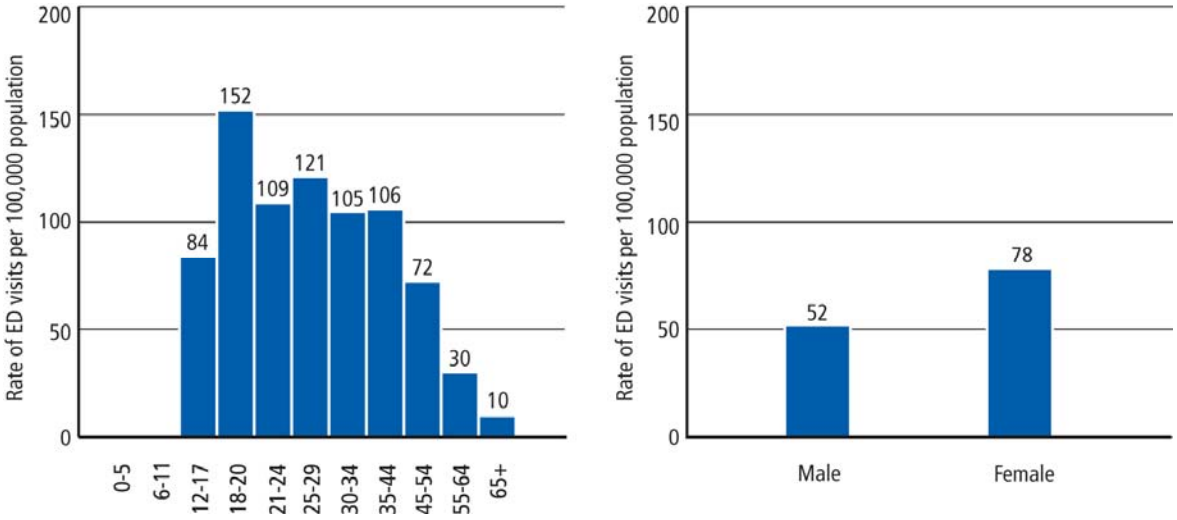
(1) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 6. Rates of ED visits per 100,000 population involving drug-related suicide attempts, by age and gender, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 22. ED visits involving drug-related suicide attempts, by patient disposition, 2007

Patient disposition	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, suicide attempts	197,053	100.0	64.7
Treated and released	34,714	17.6	11.4
Discharged home	26,049	13.2	8.6
Released to police/jail	3,401	1.7	1.1
Referred to detox/treatment	5,263	2.7	1.7
Admitted to this hospital	101,060	51.3	33.2
ICU/critical care	39,348	20.0	12.9
Surgery	*	*	*
Chemical dependency/detox	296	0.2	0.1
Psychiatric unit	31,045	15.8	10.2
Other inpatient unit	28,814	14.6	9.5
Other disposition	61,279	31.1	20.1
Transferred	53,121	27.0	17.4
Left against medical advice	337	0.2	0.1
Died	*	*	*
Other	*	*	*
Not documented	*	*	*

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

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

NOTE: 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Trends in ED visits involving drug-related suicide attempts, 2004–2007

This section presents the trends in the estimates of drug-related ED visits involving suicide attempts for the period 2004 through 2007 (Table 23 and Table 24). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the tables.

ED visits for drug-related suicide attempts were stable from 2004 to 2005, followed by an increase of 30 percent from 2005 to 2007. This increase brought the total number of drug-related ED visits involving suicide attempts to almost 200,000 (197,053 visits) in 2007. The rise in drug-related suicide-attempt ED visits appears to be associated with increases in visits related to psychotherapeutic and central nervous system agents. From 2005 to 2007, ED visits involving psychotherapeutic agents rose by about 30,000 visits, and visits involving central nervous system agents rose by about 28,000 visits.

Specific types of drugs appearing frequently in suicide attempts are listed in Table 23.

Table 23. Drug categories and drugs appearing more frequently in suicide attempts, 2005–2007

Drug category and selected drugs (1)	Increase in visits, 2005 to 2007 (2)	Percent increase in visits, 2005 to 2007 (3)
Benzodiazepines	17,833	50
Clonazepam	5,391	59
Lorazepam	4,345	84
Antidepressants	11,784	44
Opiates/opioid pain medications	11,117	55
Hydrocodone	6,203	88
Oxycodone	5,122	121
Muscle relaxants	3,987	69
Carisoprodol	2,263	111
Antihistamines	2,163	131
Miscellaneous pain medications	10,276	45
Tramadol	1,590	147

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 24. Trends in ED visits for drug-related suicide attempts, by selected drugs, 2004–2007

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Total ED visits, suicide attempts	161,586	151,568	182,805	197,053	—	30	—
Alcohol	48,726	47,891	54,820	57,319	—	—	—
Alcohol in combination	48,080	46,806	54,337	56,434	—	—	—
Alcohol alone	646	1,085	483	*	—	—	—
Non-alcohol illicits	34,763	33,784	42,148	37,319	—	—	—
Cocaine	19,520	19,628	26,510	26,462	—	—	—
Heroin	4,579	3,167	4,265	4,444	—	—	—
Marijuana	12,074	11,955	15,272	12,115	—	—	—
Stimulants	4,535	5,410	4,829	2,665	—	—	-45
Amphetamines	1,560	1,646	2,228	878	—	—	-61
Methamphetamine	3,136	3,853	2,877	1,795	—	—	—
MDMA (Ecstasy)	*	529	1,239	481	—	—	—
GHB	*	*	*	*	—	—	—
Flunitrazepam (Rohypnol)	*	*	*	*	—	—	—
Ketamine	*	*	*	*	—	—	—
LSD	*	*	*	*	—	—	—
PCP	*	*	*	768	—	—	—
Miscellaneous hallucinogens	*	*	*	*	—	—	—
Inhalants	*	794	*	*	—	—	—
Combinations NTA	*	*	*	*	—	—	—
PSYCHOTHERAPEUTIC AGENTS	88,034	82,144	106,128	112,768	28	37	—
Antidepressants	33,366	27,086	36,677	38,870	—	44	—
MAO inhibitors	*	*	*	*	—	—	—
SSRI antidepressants	18,513	13,377	16,973	18,884	—	—	—
Tricyclic antidepressants	3,555	3,008	4,681	4,152	—	—	—
Miscellaneous antidepressants	3,337	2,681	3,806	3,939	—	—	—
Antipsychotics	17,807	17,129	22,491	25,479	—	—	—
Anxiolytics, sedatives, and hypnotics	52,653	52,022	68,177	72,637	38	40	—
Barbiturates	1,949	1,219	2,031	1,663	—	—	—
Benzodiazepines	36,995	35,676	50,431	53,509	45	50	—
Alprazolam	11,354	14,530	15,633	19,167	69	—	—
Clonazepam	9,403	9,064	14,173	14,455	—	59	—
Diazepam	4,630	3,968	5,909	6,912	—	—	—
Lorazepam	6,065	5,182	6,682	9,527	—	84	—
Benzodiazepines NOS	4,426	3,343	7,080	4,594	—	—	—
Misc. anxiolytics, sedatives, and hypnotics	16,790	17,522	21,527	23,349	—	—	—
Diphenhydramine	7,458	6,583	7,756	7,618	—	—	—
Hydroxyzine	2,346	1,795	1,956	2,027	—	—	—
Zolpidem	4,355	4,972	6,674	7,403	70	—	—
Anxiolytics, sedatives, and hypnotics NOS	1,859	2,147	1,406	2,274	—	—	—

Table 24. Trends in ED visits for drug-related suicide attempts, by selected drugs, 2004–2007 (continued)

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
CNS stimulants	1,654	1,782	1,949	2,208	—	—	—
Amphetamine-dextroamphetamine	*	*	559	576	—	—	—
Caffeine	*	450	*	*	—	—	—
Dextroamphetamine	*	*	*	*	—	—	—
Methylphenidate	*	818	633	1,002	—	—	—
CENTRAL NERVOUS SYSTEM AGENTS	73,949	66,321	82,442	94,644	—	43	—
Pain medications	61,095	54,858	67,623	78,948	—	44	—
Antimigraine agents	*	*	*	*	—	—	—
Cox-2 inhibitors	807	514	*	*	—	—	—
Opiates/opioids	18,939	20,359	27,185	31,476	66	55	—
Opiates/opioids, unspecified	2,363	2,819	3,129	1,893	—	—	—
Narcotic pain medications	16,928	17,801	24,470	29,886	77	68	—
Buprenorphine/combinations	*	*	*	*	—	—	—
Codeine/combinations	1,750	2,656	2,349	1,637	—	—	—
Fentanyl/combinations	*	*	*	*	—	—	—
Hydrocodone/combinations	7,034	7,035	8,998	13,238	88	88	47
Hydromorphone/combinations	*	*	262	796	—	—	—
Meperidine/combinations	*	*	*	*	—	—	—
Methadone	1,287	1,596	1,772	3,192	—	—	—
Morphine/combinations	714	1,210	*	1,690	—	—	—
Oxycodone/combinations	5,340	4,229	7,842	9,351	—	121	—
Propoxyphene/combinations	1,888	2,129	2,811	1,754	—	—	—
Nonsteroidal anti-inflammatory agents	19,114	14,117	15,956	18,810	—	—	—
Ibuprofen	13,609	10,917	12,064	14,057	—	—	—
Naproxen	4,383	3,224	3,726	3,438	—	—	—
Salicylates/combinations	6,211	4,645	5,400	5,976	—	—	—
Miscellaneous pain medications/combinations	22,864	22,692	27,371	32,968	44	45	—
Acetaminophen/combinations	20,701	21,017	25,312	29,861	44	42	—
Tramadol/combinations	1,742	1,515	1,719	2,816	—	—	—
Tramadol	1,528	1,079	1,372	2,669		147	—
Acetaminophen-tramadol	*	*	*	*	—	—	—
Pain medication combinations NTA	*	*	*	*	—	—	—

Table 24. Trends in ED visits for drug-related suicide attempts, by selected drugs, 2004–2007 (continued)

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Anorexiants	*	*	654	*	—	—	—
Anticonvulsants	10,957	9,389	12,580	11,803	—	—	—
Antiemetic/antivertigo agents	*	*	*	343	—	—	—
Anti-Parkinson agents	80	543	*	755	—	—	—
General anesthetics	*	*	*	*	—	—	—
Muscle relaxants	5,921	5,785	7,072	9,772	65	69	38
Carisoprodol	1,864	2,038	3,811	4,301	131	111	—
Cyclobenzaprine	2,966	2,784	2,096	3,839	—	—	—
Miscellaneous CNS agents	*	*	*	*	—	—	—
RESPIRATORY AGENTS	8,361	7,662	8,415	10,175	—	—	—
Antihistamines	2,059	1,650	1,627	3,813	—	131	134
Bronchodilators	*	*	*	*	—	—	—
Decongestants	*	*	1,347	805	—	—	—
Expectorants	*	474	1,068	649	—	—	—
Upper respiratory combinations	4,818	4,207	3,982	4,067	—	—	—
Respiratory agents NTA	*	1,244	660	1,114	—	—	—
CARDIOVASCULAR AGENTS	7,667	5,814	7,965	7,873	—	—	—
Antiadrenergic agents, centrally acting	995	912	1,929	790	—	—	-59
Beta-adrenergic blocking agents	2,105	1,916	1,999	2,501	—	—	—
Calcium channel blocking agents	879	193	1,040	601	—	—	—
Diuretics	*	539	*	1,360	—	—	—
Cardiovascular agents NTA	3,661	3,024	3,298	4,344	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

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

NOTE: CNS = central nervous system. NOS = not otherwise specified. NTA = not tabulated above. 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. A dash (—) indicates a blank cell.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

SEEKING DETOX SERVICES

ED visits involving seeking detox services, 2007

The category of visits referred to as "seeking detox" includes various situations such as nonemergency requests for admission for detox, visits to obtain medical clearance before entry to a detox program,[15] and acute emergencies in which an individual is in distress (i.e., displaying active withdrawal symptoms) and seeking detox. As 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 139,908 (CI: 110,901 to 168,915) drug-related ED visits for patients seeking detoxification or substance abuse treatment services during 2007 (Table 25). Two thirds (66%) of the seeking detox ED visits involved multiple drugs, and more than one third (41%) of all seeking detox ED visits involved alcohol. However, 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.

Among the illicit drugs, cocaine was observed in 47 percent of visits, heroin in 30 percent, marijuana in 19 percent, and stimulants in 5 percent. Among central nervous system agents, narcotic pain medications were observed in 26 percent of visits, including oxycodone in 14 percent, hydrocodone in 8 percent, and methadone in 5 percent. Benzodiazepines were observed in 14 percent of visits.

When population size and the margin of error are taken into account, the rate of seeking detox visits for males (61 per 100,000 population) was higher than that for females (32 per 100,000 population) (Table 26, Figure 7). Rates of seeking detox visits peaked at 80 or more persons per 100,000 for those aged 18 to 44, with lower levels found for younger and older patients.

In terms of race/ethnicity, the majority (59%) of seeking detox visits involved patients who were white. Unfortunately, DAWN is unable to produce population-based rates for race/ethnicity categories. Race/ethnicity information in ED records is often missing or is very limited. By necessity, DAWN uses a simplified set of race/ethnicity categories that is incompatible with the categories used by the U.S. Census Bureau to report population by race/ethnicity. Therefore, the population denominators that would enable DAWN to produce rates are not available.

Patients' dispositions after ED visits involving seeking detox are displayed in Table 27. Nearly a third (30%) of patients were released with a referral to a detox or treatment program, about a quarter (22%) were admitted to the detox unit in the hospital, and a smaller portion (9%) were transferred to other facilities. Some type of follow-up care was received by nearly 7 out of 10 (69%) patients who entered the ED seeking detox services.

[15] 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).

Table 25. ED visits involving seeking detox services, by selected drugs, 2007

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Total ED visits, seeking detox	139,908	100.0	10.6	110,901	168,915
Visits involving a single drug	48,159	34.4	12.0	36,788	59,531
Visits involving multiple drugs	91,748	65.6	11.4	71,270	112,226
Alcohol	57,157	40.9	12.7	42,943	71,371
Alcohol in combination	56,574	40.4	12.8	42,360	70,788
Alcohol alone	*	*	51.6	*	*
Non-alcohol illicits	106,660	76.2	11.4	82,857	130,463
Cocaine	65,124	46.5	12.7	48,889	81,359
Heroin	42,242	30.2	11.5	32,701	51,782
Marijuana	25,970	18.6	17.2	17,212	34,728
Stimulants	7,161	5.1	34.1	2,376	11,947
Amphetamines	979	0.7	27.6	450	1,508
Methamphetamine	6,287	4.5	38.4	1,549	11,025
MDMA (Ecstasy)	654	0.5	29.6	275	1,033
GHB	*	*	*	*	*
Flunitrazepam (Rohypnol)	*	*	*	*	*
Ketamine	*	*	*	*	*
LSD	*	*	50.5	*	*
PCP	*	*	70.2	*	*
Miscellaneous hallucinogens	*	*	*	*	*
Inhalants	*	*	*	*	*
Combinations NTA	216	0.2	43.5	32	399
PSYCHOTHERAPEUTIC AGENTS	21,669	15.5	13.0	16,136	27,202
Antidepressants	1,314	0.9	33.8	444	2,184
SSRI antidepressants	360	0.3	34.8	114	606
Antipsychotics	536	0.4	27.8	244	827
Atypical antipsychotics	416	0.3	29.7	174	657
Anxiolytics, sedatives, and hypnotics	20,365	14.6	13.1	15,145	25,585
Barbiturates	722	0.5	31.4	278	1,166
Benzodiazepines	19,301	13.8	13.1	14,338	24,265
Alprazolam	9,138	6.5	17.7	5,967	12,308
Clonazepam	2,635	1.9	17.1	1,754	3,516
Diazepam	3,172	2.3	22.7	1,758	4,586
Lorazepam	1,980	1.4	29.9	821	3,140
Benzodiazepines NOS	4,736	3.4	20.6	2,827	6,646
Misc. anxiolytics, sedatives, and hypnotics	1,136	0.8	32.1	422	1,850
Zolpidem	574	0.4	46.6	50	1,099
CNS stimulants	1,049	0.7	47.5	73	2,025

Table 25. ED visits involving seeking detox services, by selected drugs, 2007 (continued)

Drug category and selected drugs (1)	ED visits (2,3)	Percent of ED visits (3)	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
CNS AGENTS	43,219	30.9	12.6	32,536	53,901
Pain medications	42,776	30.6	12.6	32,179	53,373
Opiates/opioids	41,241	29.5	12.7	30,967	51,514
Opiates/opioids, unspecified	4,746	3.4	23.3	2,581	6,912
Narcotic pain medications	37,040	26.5	12.9	27,707	46,372
Fentanyl/combinations	1,359	1.0	28.3	605	2,114
Hydrocodone/combinations	10,425	7.5	17.3	6,886	13,965
Methadone	6,886	4.9	21.5	3,979	9,793
Morphine/combinations	3,341	2.4	42.2	577	6,105
Oxycodone/combinations	18,880	13.5	15.9	12,989	24,771
Nonsteroidal anti-inflammatory agents	*	*	*	*	*
Miscellaneous pain medications/ combinations	2,128	1.5	23.8	1,136	3,121
Tramadol/combinations	858	0.6	33.6	293	1,422
Tramadol	858	0.6	33.6	293	1,422
Pain medications NOS	590	0.4	42.5	98	1,082
Anticonvulsants	263	0.2	43.3	40	486
Muscle relaxants	1,701	1.2	25.2	862	2,540
Skeletal muscle relaxants	1,521	1.1	25.3	766	2,275
Carisoprodol	1,108	0.8	27.4	512	1,704
CARDIOVASCULAR AGENTS	632	0.5	38.2	159	1,106
Antiadrenergic agents, centrally acting	251	0.2	49.6	7	495
Clonidine	251	0.2	49.6	7	495

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

NOTE: CI = confidence interval. CNS = central nervous system. NOS = not otherwise specified. NTA = not tabulated above. 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 26. ED visits involving seeking detox services, by patient demographics, 2007

Patient demographics	ED visits (1)	Percent of ED visits	Rates of ED visits per 100,000 population (2)
Total ED visits, seeking detox	139,908	100.0	45.9
Gender	—	—	—
Male	91,065	65.1	60.6
Female	48,748	34.8	31.6
Unknown	*	*	*
Age	—	—	—
0–5 years	*	*	*
6–11 years	*	*	*
12–17 years	3,369	2.4	13.4
18–20 years	10,431	7.5	80.6
21–24 years	15,180	10.8	89.7
25–29 years	21,065	15.1	98.1
30–34 years	16,370	11.7	83.0
35–44 years	39,086	27.9	91.7
45–54 years	26,622	19.0	60.0
55–64 years	6,468	4.6	19.2
65 years and older	1,293	0.9	3.3
Unknown	*	*	*
Race/ethnicity	—	—	—
White	82,105	58.7	—
Black	31,811	22.7	—
Hispanic	11,693	8.4	—
Other or two or more race/ethnicities	868	0.6	—
Unknown	13,431	9.6	—

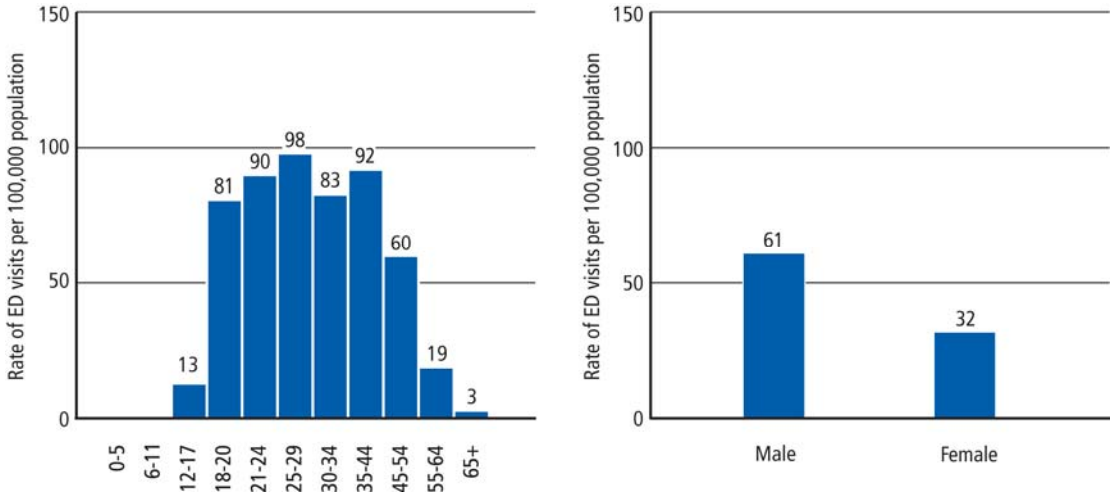
(1) Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States.

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Figure 7. Rates of ED visits per 100,000 population involving seeking detox services, by age and gender, 2007



SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table 27. ED visits involving seeking detox services, by patient disposition, 2007

Patient disposition	ED visits (1)	Percent of ED visits	Rate of ED visits per 100,000 population (2)
Total ED visits, seeking detox	139,908	100.0	45.9
Treated and released	76,880	55.0	25.2
Discharged home	34,785	24.9	11.4
Released to police/jail	*	*	*
Referred to detox/treatment	41,832	29.9	13.7
Admitted to this hospital	42,566	30.4	14.0
ICU/critical care	1,860	1.3	0.6
Surgery	*	*	*
Chemical dependency/detox	30,542	21.8	10.0
Psychiatric unit	5,240	3.7	1.7
Other inpatient unit	4,899	3.5	1.6
Other follow-up	20,461	14.6	6.7
Transferred	12,351	8.8	4.1
Left against medical advice	2,578	1.8	0.8
Died	*	*	*
Other	*	*	*
Not documented	739	0.5	0.2

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

(2) All rates are ED visits per 100,000 population. Estimates of ED visits are based on a representative sample of non-Federal, short-stay hospitals with 24-hour EDs in the United States. Population estimates are drawn from the 2007 U.S. Census Bureau Postcensal Resident Population National Population Dataset as of July 1, 2007.

NOTE: 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Trends in ED visits involving seeking detox services, 2004–2007

This section presents the trends in the estimates of ED visits involving seeking detox services for the period 2004 through 2007 (Table 28). Differences between years are presented in terms of the percentage increase or decrease in visits in 2007 compared with the estimates for the previous 3 years. Only statistically significant changes are discussed and displayed in the table.

Table 28. Trends in ED visits involving seeking detox services, by selected drugs, 2004–2007

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Total ED visits, seeking detox services	**141,867**	**126,226**	**118,355**	**139,908**	**—**	**—**	**18**
Alcohol	53,662	47,494	47,102	57,157	—	—	—
Alcohol in combination	51,831	47,154	46,769	56,574	—	—	—
Alcohol alone	*	*	*	*	—	—	—
Non-alcohol illicits	110,792	101,244	92,385	106,660	—	—	—
Cocaine	62,989	56,061	57,738	65,124	—	—	—
Heroin	47,035	40,895	34,462	42,242	—	—	—
Marijuana	25,965	22,486	22,104	25,970	—	—	—
Stimulants	11,760	15,402	8,128	7,161	—	—	—
Amphetamines	*	*	2,034	979	—	—	—
Methamphetamine	*	*	6,211	6,287	—	—	—
MDMA (Ecstasy)	882	511	483	654	—	—	—
GHB	*	*	*	*	—	—	—
Flunitrazepam (Rohypnol)	*	*	*	*	—	—	—
Ketamine	*	*	*	*	—	—	—
LSD	*	*	*	*	—	—	—
PCP	827	729	989	*	—	—	—
Miscellaneous hallucinogens	*	*	*	*	—	—	—
Inhalants	*	*	*	*	—	—	—
Combinations NTA	*	191	*	216	—	—	—
PSYCHOTHERAPEUTIC AGENTS	16,929	17,833	17,903	21,669	—	—	—
Antidepressants	1,024	1,195	1,141	1,314	—	—	—
SSRI antidepressants	716	*	365	360	—	—	—
Antipsychotics	459	259	457	536	—	—	—
Atypical antipsychotics	429	226	329	416	—	—	—
Anxiolytics, sedatives, and hypnotics	15,748	16,533	16,799	20,365	—	—	—
Barbiturates	852	684	530	722	—	—	—
Benzodiazepines	14,717	15,734	15,801	19,301	—	—	—
Alprazolam	6,061	6,253	7,063	9,138	—	—	—
Clonazepam	1,510	1,805	2,119	2,635	74	—	—
Diazepam	2,975	2,058	1,431	3,172	—	—	122

Table 28. Trends in ED visits involving seeking detox services, by selected drugs, 2004–2007 (continued)

Drug category and selected drugs (1)	ED visits, 2004 (2,3)	ED visits, 2005 (2,3)	ED visits, 2006 (2,3)	ED visits, 2007 (2,3)	Percent change 2004, 2007 (4)	Percent change 2005, 2007 (4)	Percent change 2006, 2007 (4)
Lorazepam	1,012	987	1,479	1,980	—	—	—
Misc. anxiolytics, sedatives, and hypnotics	818	751	783	1,136	—	—	—
CNS stimulants	*	829	589	1,049	—	—	—
CNS AGENTS	35,451	30,820	32,385	43,219	—	40	33
Pain medications	34,730	30,114	31,690	42,776	—	42	35
Opiates/opioids	33,296	29,330	30,786	41,241	—	41	34
Opiates/opioids, unspecified	4,507	4,246	4,467	4,746	—	—	—
Narcotic pain medications	29,894	25,550	26,880	37,040	—	45	38
Codeine/combinations	650	347	426	*	—	—	—
Fentanyl/combinations	704	1,265	1,054	1,359	—	—	—
Hydrocodone/combinations	8,114	8,929	8,092	10,425	—	—	—
Hydromorphone/combinations	962	617	*	*	—	—	—
Methadone	8,109	4,172	5,294	6,886	—	65	—
Morphine/combinations	1,638	2,399	3,002	3,341	—	—	—
Oxycodone/combinations	15,917	14,028	14,721	18,880	—	—	—
Propoxyphene/combinations	1,059	*	830	*	—	—	—
Miscellaneous pain medications/combinations	1,307	1,044	1,069	2,128	—	—	99
Acetaminophen/combinations	1,115	*	486	*	—	—	—
Tramadol/combinations	*	486	375	858	—	—	—
Anticonvulsants	455	97	*	263	—	—	—
Muscle relaxants	1,356	1,204	1,214	1,701	—	—	—

(1) The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

(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.

(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 or rates by drug will be greater than the total, and the sum of percentages by drug will be greater than 100.

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

NOTE: CNS = central nervous system. NTA = not tabulated above. 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. A dash (—) indicates a blank cell.

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

The number of patients seeking detox services through the ED was relatively stable from 2004 through 2007; the 18 percent increase from 2006 to 2007 simply brought the number of patients seeking detox back in line with its 2004 level. Although no change was observed in the involvement of illicit drugs (e.g., cocaine, heroin), significant changes

were observed in pharmaceuticals. Visits involving opiate/opioid painkillers jumped 41 percent from 2005 to 2007 and were involved in more than 40,000 patient visits seeking detox in 2007. Narcotic painkillers in general, and hydrocodone and oxycodone in particular, were a large part of that increase. Although they are implicated in far fewer visits than opiates and opioids, two types of benzodiazepines have increased significantly: clonazepam rose 74 percent from 2004 to 2007 (2,635 visits in 2007), and diazepam was up 122 percent from 2006 to 2007 (3,172 visits in 2007).

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APPENDIX B

GLOSSARY OF TERMS

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).

Accidental ingestion: This category of drug-related ED visits includes those involving the accidental use of a drug, for example, childhood drug poisonings and individuals who take the wrong medication by mistake.

Adverse reaction: This category of drug-related ED visits represents the consequences of using a prescription or over-the-counter pharmaceutical for therapeutic purposes and includes visits related to adverse drug reactions, side effects, drug-drug interactions, and drug-alcohol interactions. Adverse reactions that involve a pharmaceutical with an illicit drug are excluded from this category.

Alcohol use: Alcohol is reportable for all patients when present in combination with one or more other reportable substances. For patients under the age of 21, alcohol is also reportable if it is used alone with no other substance or reportable drug. (See Drug misuse and abuse and Underage drinking.)

Case description: A description of how the drug(s) was related to the patient's ED visit. The case description, in conjunction with other documentation in the ED medical record, is used to determine if 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 and abuse.

Confidence interval (CI): An interval estimate, that is, a range of values around a point estimate that takes sampling error into account. The accepted standard of confidence is 95 percent. Technically, 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 confidence interval 95 percent of the time. Practically, a 95 percent CI summarizes both the estimate and its margin of error in a straightforward way with a reasonable degree of confidence.

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

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

Treated and released includes three categories:

- *Discharged home*—Home is used as a broad category to mean the patient's residence. Home is generally used for persons who live locally; however, for students 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; and so on.
- *Released to police/jail*

- *Referred to detox/treatment*—The chart indicates that the patient was referred to a substance abuse treatment or detox program, facility, or provider.

Admitted to this hospital includes five categories of inpatient units:

- *ICU/critical care*
- *Surgery*
- *Chemical dependency/detox*
- *Psychiatric unit*
- *Other inpatient unit*—The inpatient unit was not specified or does not match one of the preceding units.

Other follow-up 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 arriving in the ED but before being discharged, admitted, or transferred.
- *Other*—The discharge status is documented in the chart but does not fit into any of the preceding categories.
- *Not documented*—The discharge status was not documented in the medical chart.

Drug: A substance that was recorded in a DAWN case report. Substances reportable to DAWN include alcohol, illicit drugs, prescription and over-the-counter pharmaceuticals, dietary supplements, and nonpharmaceutical inhalants. DAWN publications use the term drug to refer to any of these substances. Multiple substances (drugs) 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. (More information on the Multum system is available at http://www.multum.com/.) In general, the Multum categories reflect the therapeutic uses for prescription and over-the-counter pharmaceuticals.

Drug misuse and 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, a drug needs only to be implicated in the visit; the drug does not have to have caused the visit. 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 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) for the relevant time period.

Hospital emergency department (ED): To be eligible for DAWN, hospitals must be non-Federal, short-stay, general medical and surgical facilities that operate one or more EDs 24 hours a day, 7 days a week. They must be located in the United States. 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 AHA's Annual Survey Database. Participation in DAWN is limited to hospitals that meet the eligibility criteria for DAWN. (See also Universe.)

Illicit drug use: This category of drug-related ED visits includes all visits related to the use of illicit or illegal drugs. Additional clarification is provided for the following drug categories:

- *Alcohol alone*—DAWN collects data on alcohol when used alone only if the patient is under age 21. Alcohol is reportable to DAWN for adults 21 and older only if it was used with another substance.
- *Alcohol in combination*—Alcohol in combination is the category for alcohol present in combination with one or more other reportable substances. Alcohol in combination is reportable for all ages.
- *Stimulants*—This drug category includes amphetamines and methamphetamines and excludes central nervous system stimulants, such as caffeine or methylphenidate. Amphetamines and methamphetamines are combined for analysis because medical records and toxicology tests often generically refer to either drug as amphetamines.
- *Amphetamines*—This class of substances has been moved from the category of central nervous system stimulants to illicit drug use because it is considered a major substance of abuse. For purposes of classification, amphetamines (plural) includes a class of compounds derived from or related to the drug amphetamine. Although some designer drugs fall into the class of amphetamines, we chose to report some of them individually as major substances of abuse (e.g., methamphetamines).
- *Inhalants*—This category includes (1) anesthetic gases and (2) 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).

  Anesthetic gases are presumed to have been inhaled. Included in this category are, for example, nitrous oxide, ether, and chloroform. The route of administration for psychoactive nonpharmaceuticals is not assumed and must be documented in ED records specifically as inhalation. Psychoactive nonpharmaceuticals that, when inhaled, are included in this category 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).

Malicious poisoning: See Nonmedical use of pharmaceuticals.

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, metropolitan area analyses prepared by DAWN use the boundaries established by the Office of Management and Budget (OMB), as updated in 2003.

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*—nonmedical use, overuse, and misuse of prescription and over-the-counter medications that are not documented as drug abuse in the medical chart;
- *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); and
- *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 and abuse and Type of case.)

Not otherwise specified (NOS): The catch-all category for substances that are not specifically named but are qualified as a DAWN case. Terms are classified into an NOS category only when assignment to a more specific category is not possible on the basis of 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, Sampling frame, and Sampling unit.)

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 0.01, it means that there is a 1 percent probability that the difference observed could be due to chance alone.

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. Patients are never interviewed to obtain DAWN data. DAWN follows OMB protocol for collection of race/ethnicity when self-identification of race/ethnicity by the individual is not possible. This approach involves a single question listing six race/ethnicity groups (plus not documented) and allows for multiple responses.[1] For reporting, 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.

[1] 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).

Race/ethnicity is missing from ED patient records about 10 percent of the time. Detail about multiple races/ethnicities may be lacking as well. Rates of ED visits per 100,000 are not calculated for race/ethnicity categories because of these data limitations.

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 gender.

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.)

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 frame: A list of units from which the ED sample is drawn. 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 AHA's Annual Survey Database.

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 captures patients seeking substance abuse treatment, drug rehabilitation, or medical clearance for admission to a drug treatment or detoxification unit. Included are nonemergency requests for admission for detox as well as acute emergencies in which an individual is in distress (i.e., displaying active withdrawal symptoms) and seeking detox.

Single-drug case: An ED visit in which only one drug was involved. DAWN collects single-drug ED visits involving alcohol alone only if the patient was less 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 (1) two types of hospital ownership (public, private) and (2) up to four size categories (measured in terms of annual ED visits). 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 (e.g., attempted suicide, tried to kill self) 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.

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; for example, a patient 34 years of age with hives who took aspirin and no other drug would be classified into the adverse reaction group because the case did not qualify as a suicide attempt, seeking detox, or alcohol only (age younger than 21) case.

Underage drinking: This category of drug-related ED visits includes those in which alcohol was the only drug involved and the patient was younger than 21 years old.

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 Services are excluded. The universe of EDs is identified from the AHA's Annual Survey Database.

APPENDIX C

DAWN DATA COLLECTION AND STATISTICAL METHODS

Introduction

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that has monitored drug-related emergency department (ED) visits to hospitals since the early 1970s. DAWN was initially established by the Drug Enforcement Administration. Then DAWN was transferred to the U.S. Department of Health and Human Services (HHS), where the National Institute on Drug Abuse (NIDA) conducted DAWN from 1980 to 1992. Since 1992, the Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA), HHS, has been responsible for DAWN operations and reporting.

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. By that time, major population shifts and changes in the hospital industry over the preceding two decades made apparent the need for a redesign of the sample of hospitals, which was undertaken as part of a wholesale redesign of most major features of DAWN.

Currently, the DAWN survey 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 ED. This current approach was first implemented in the 2004 data collection year.

DAWN uses the data from the visits classified as DAWN cases in the selected hospitals to calculate various estimates of drug-related ED visits for the Nation as a whole, as well as for specific metropolitan areas. To calculate these estimates and measure their precision requires the application of sampling and weighting methodologies to the DAWN survey.

This appendix documents the data collection methods and the sampling, weighting, and variance estimation methodologies used to develop estimates for the DAWN data collected for 2007. Additional detail on data collection methodology is available in the *ED Reference Guide*.[1]

Target population

The target population is drug-related ED visits in non-Federal, short-stay, general surgical and medical hospitals with 24-hour EDs in the United States.

[1] The *ED Reference Guide* is available for download from the DAWN Web site, https://dawninfo.samhsa.gov/collect/. The link for the document is https://dawninfo.samhsa.gov/files/collect_2009-2011/ed_reference_guide_2009-2011.pdf.

Hospital sample frame

DAWN uses the American Hospital Association (AHA) Annual Survey Database as the basis for its sampling frame. The AHA maintains an updated national registry of U.S. hospitals that is estimated to have a coverage rate of 99 percent.[2] A health care facility must meet several criteria to be classified as a hospital by the AHA. These criteria include the provision of patient services, diagnostic or therapeutic, for general or specific medical conditions; licensed medical staff; and accreditation by organizations such as the Joint Commission on Accreditation of Health Care Organizations. A hospital is considered to be eligible for inclusion in the DAWN sampling frame if it is a non-Federal, short-stay, general surgical and medical hospital in the United States that operates at least one 24-hour ED. Many DAWN hospitals operate multiple EDs.

Determination of DAWN eligibility

A hospital is considered ineligible if any one of the key criteria that define eligibility (non-Federal, short-stay, general surgical and medical hospital, located in the United States, 24-hour ED) is not met. Only those hospitals that meet all the criteria are considered eligible. If information for any criterion is missing (and a hospital is otherwise eligible considering the nonmissing criteria information), other variables in the AHA Annual Survey Database are used to determine eligibility. If the hospital's eligibility remains unknown, additional data sources are consulted to determine eligibility.

DAWN data collection

DAWN ED 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.

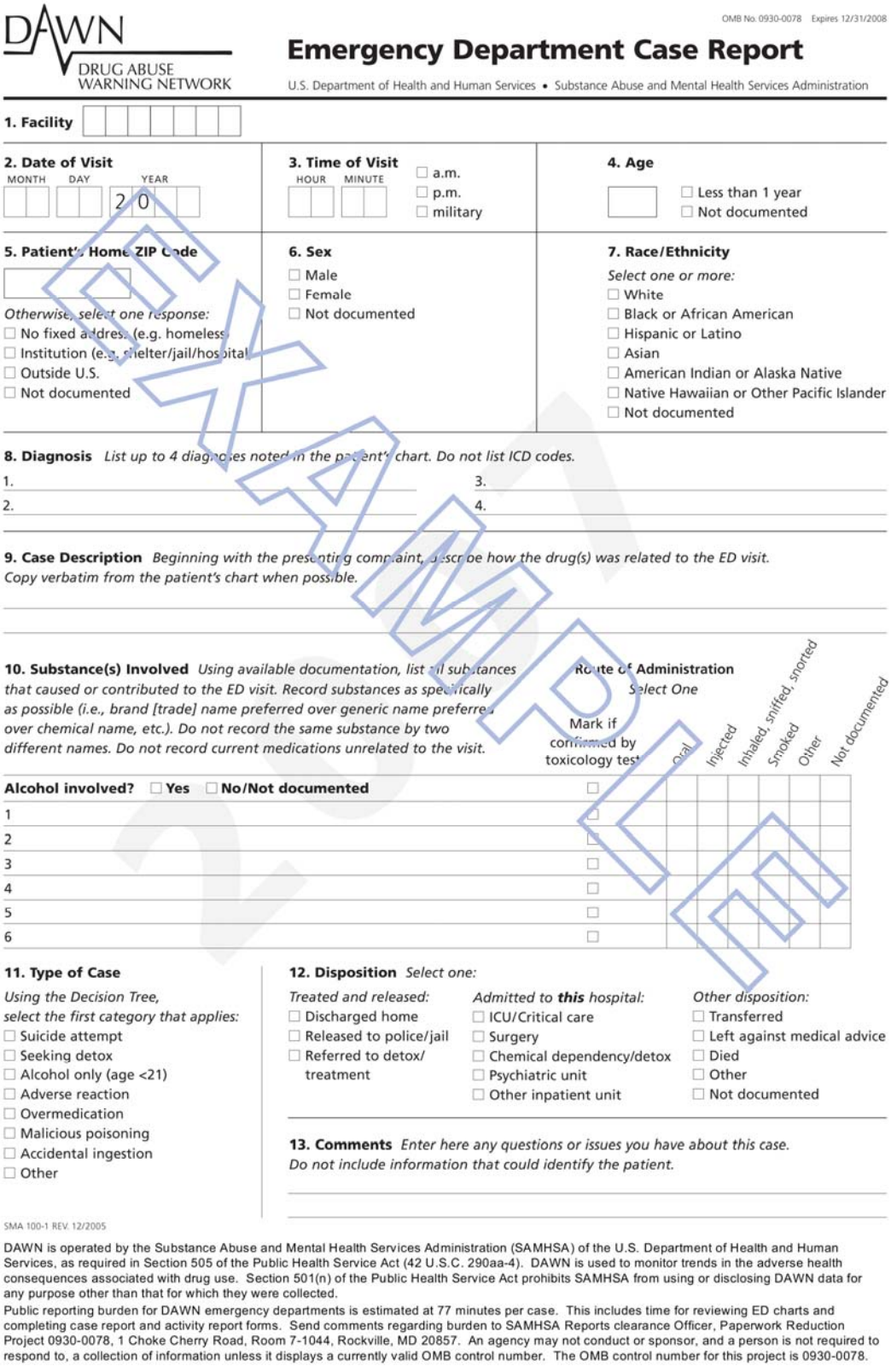
Because of the volume in some EDs, a sample of medical records is obtained rather than reviewing all charts. This subsampling introduces another component of variance that is accounted for in the weighting and estimation process.

Data items collected by DAWN

The case report form showing all the collected DAWN data items is provided in Figure C1.

[2] AHA Annual Survey Database, Fiscal year 2001. Health Forum LLC. Copyright 2003, One North Franklin Street, Chicago, IL 60606.

Figure C1. 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

1. Facility

2. Date of Visit MONTH DAY YEAR 2 0

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.*

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.*

	Mark if confirmed by toxicology test	Route of Administration *Select One*					
		Oral	Injected	Inhaled, sniffed, snorted	Smoked	Other	Not documented
Alcohol involved? ☐ Yes ☐ No/Not documented	☐						
1	☐						
2	☐						
3	☐						
4	☐						
5	☐						
6	☐						

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:*

Treated and released:
☐ Discharged home
☐ Released to police/jail
☐ Referred to detox/ treatment

*Admitted to **this** hospital:*
☐ ICU/Critical care
☐ Surgery
☐ Chemical dependency/detox
☐ Psychiatric unit
☐ Other inpatient unit

Other disposition:
☐ Transferred
☐ Left against medical advice
☐ Died
☐ Other
☐ Not documented

13. Comments *Enter here any questions or issues you have about this case. Do not include information that could identify the patient.*

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.

DAWN features that enhance data quality and reliability

Several methods are used to improve the quality and reliability of DAWN data, including the following:

- retrospective review of ED medical records for every patient treated in participating EDs;
- electronic reporting with automated prompts and data validation;
- inclusion of data items on the health effects of drug use and additional detail on patient disposition;
- elimination of incidental drug reporting;
- accurate, specific, and nonredundant drug reporting;
- inclusion of data items to identify drugs confirmed by laboratory testing;
- rigorous training and certification of DAWN Reporters; and
- in-house review and cleaning of DAWN case reports (see later section, Reduction of bias, for more details).

ED visits eligible for DAWN

A DAWN case is any ED visit related to recent drug use. DAWN includes ED visits associated with substance abuse and misuse, both intentional and accidental. DAWN also includes ED visits related to the use of drugs for legitimate therapeutic purposes. To be a DAWN case, the relation between the ED visit and the drug need not be causal; the drug needs only to be implicated in the visit.

The case criteria are intended to be broad and inclusive and to have few exceptions. Broad criteria take into account the fact that documentation in medical records varies in clarity and comprehensiveness across hospitals and among clinicians within hospitals. Broad criteria minimize the potential for judgments that could cause data to vary systematically and unexpectedly across reporters and hospitals. In addition, broad criteria are designed to capture a very 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. In DAWN, only recent drug use is included, the reason a patient used a drug is irrelevant, and the criteria are broad enough to encompass all types of drug-related events, including but not limited to explicit drug abuse.

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);
- 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).

Types of cases 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, each visit is assigned to one of eight types, which may be analyzed separately or in purposeful combinations. The eight types of visits are

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

DAWN Reporters assign each DAWN case to one, and only one, of the eight types of cases, on the basis of a series of questions and decision rules. The questions and rules are organized into the DAWN ED Decision Tree (Figure C2). Starting at the top, each case is assigned to the first type of case that applies, even if the case might also meet the rules for a subsequent category. The eight types of case were ordered with this process in mind.

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. By design, 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, ED physicians may be unlikely to label those types of patients as drug abusers. Third, in many States, insurers may legally deny payment for ED visits related to substance abuse. Thus, financial incentives may be a powerful factor to influence documentation practices.

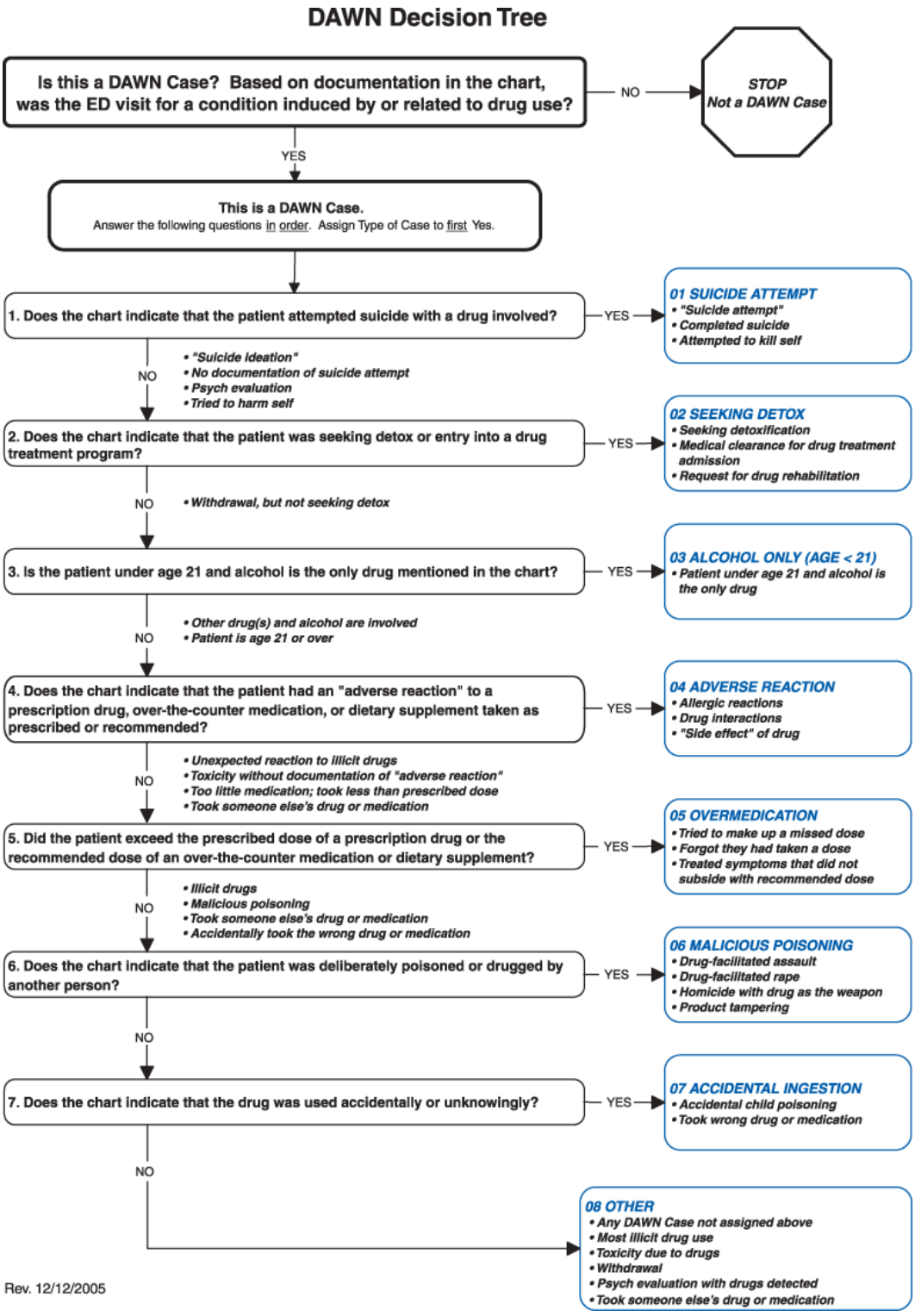
Drugs included in DAWN

DAWN includes all types of drugs:[3]

- illegal drugs, such as heroin, cocaine, marijuana, and Ecstasy;
- prescription drugs, such as Prozac®, Vicodin®, OxyContin®, alprazolam, and methylphenidate;
- over-the-counter medications, including aspirin, acetaminophen, ibuprofen, and multi-ingredient cough and cold remedies;
- dietary supplements, including vitamins, herbal remedies, and nutritional products;
- psychoactive, nonpharmaceutical inhalants;
- alcohol in combination with other drugs; and
- alcohol alone, in patients younger than 21 years of age.

[3] The classification of drugs used in DAWN is derived from the Multum *Lexicon*, © 2008, Multum Information Services, Inc. The classification was modified to meet DAWN's unique requirements (2008). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix A and can be found on the Internet at http://www.multum.com.

Figure C2. Type of case decision tree



To be reportable, a nonpharmaceutical substance must be consumed by inhalation, sniffing, or snorting, and it must have a psychoactive effect when inhaled. An ED visit involving inhalation of a nonpharmaceutical, psychoactive substance and no other drug qualifies as a DAWN case. Carbon monoxide is excluded from the inhalants. Since 2004, cases involving accidental exposures (e.g., exposure to paint fumes while one is painting a closet) have been excluded as well.

Hospital participation

For 2007, 207 hospitals submitted data on 300,983 drug-related ED visits that were used for estimation (Tables C1 and C2). The overall weighted response rate was 29.6 percent. For the 12 oversampled metropolitan areas and divisions, individual response rates ranged from 30.7 percent in the Houston-Baytown-Sugar Land, TX, Metropolitan Statistical Area to 76.3 percent in the Detroit-Warren-Livonia, MI, Metropolitan Statistical Area.

Charts reviewed for drug-related ED visits

DAWN cases are found through a retrospective review of medical records in participating hospitals. Across all participating hospitals in 2007, 10,413,928 charts were reviewed to find the drug-related ED visits that met the DAWN case criteria. On the basis of the review of charts, 375,030 drug-related visits were found and submitted to the DAWN database, a case rate of 3.6 percent.[4] On average, a DAWN member hospital submitted 1,183 DAWN cases. However, the number of submitted cases varied widely across hospitals, from 3 cases to 6,532 cases (median 953) in a single hospital during 2007.

[4] For 2007, more hospitals participated in DAWN than were used in estimation. Therefore, the number of drug-related ED visits from all participating hospitals exceeded the number used for estimation.

Table C1. Data collection year 2007

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 (%)
Total United States (2)	4,575	542	207	38.2	25.5	29.6
Metropolitan Statistical Areas (3)	—	—	—	—	—	—
Boston-Cambridge-Quincy, MA-NH, MSA	41	29	18	62.1	62.2	64.0
Chicago-Naperville-Joliet, IL-IN-WI, MSA	89	73	30	41.1	41.8	39.0
Denver-Aurora, CO, MSA	16	15	9	60.0	60.0	65.0
Detroit-Warren-Livonia, MI, MSA	37	25	16	64.0	67.5	76.3
Houston-Baytown-Sugar Land, TX, MSA	50	42	13	31.0	32.6	30.7
Minneapolis-St. Paul-Bloomington, MN-WI, MSA	27	27	10	37.0	37.0	39.8
Phoenix-Mesa-Scottsdale, AZ, MSA	28	26	13	50.0	50.0	47.4
San Diego-Carlsbad-San Marcos, CA, MSA	16	16	7	43.8	43.8	43.1
Seattle-Tacoma-Bellevue, WA, MSA	23	23	8	34.8	34.8	44.7
Metropolitan Divisions and Subareas (3)	—	—	—	—	—	—
Miami-Fort Lauderdale-Miami Beach, FL, MSA—Dade County Division	22	16	9	56.3	51.7	59.6
New York-Newark-Edison, NY-NJ-PA, MSA—Five Boroughs Division	50	39	21	53.8	48.2	58.0
San Francisco-Oakland-Fremont, CA, MSA—San Francisco Division	18	18	8	44.4	44.4	57.5

(1) Non-Federal, short-stay hospitals with 24-hour EDs in the United States, as identified by 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) Metropolitan Statistical Areas (MSAs) and Metropolitan Divisions follow the standard definitions issued by the Office of Management and Budget in June 2003 (available at http://www.whitehouse.gov/omb/bulletins/b03-04.html), with one exception: for New York, geographic coverage is limited to the subarea comprising the five Boroughs of New York City.

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

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

Table C2. Drug-related ED visits and drugs, by type of case, 2007

Type of case (1)	Unweighted sample data	Weighted estimates	RSE (%)	95% CI: Lower bound	95% CI: Upper bound
Drug-related ED visits (2)	—	—	—	—	—
Suicide attempt	13,913	197,053	8.4	164,564	229,542
Seeking detox	22,253	139,908	10.6	110,901	168,915
Alcohol only (age < 21)	11,278	135,900	8.4	113,470	158,331
Adverse reaction	109,258	1,908,928	9.5	1,552,364	2,265,491
Overmedication	23,554	331,134	6.8	287,226	375,043
Malicious poisoning	863	12,563	16.0	8,616	16,510
Accidental ingestion	4,872	91,632	9.2	75,087	108,177
Other	114,992	1,181,110	13.7	864,972	1,497,248
Total drug-related ED visits	300,983	3,998,228	6.7	3,473,733	4,522,724
Total drug misuse or abuse ED visits	177,989	1,883,272	8.7	1,561,490	2,205,054
Total ED visits (all reasons)	9,486,510	116,486,292	0.0	—	—
Drugs (3)	—	—	—	—	—
Suicide attempt	30,532	428,570	9.4	349,861	507,279
Seeking detox	47,622	293,133	10.9	230,639	355,627
Alcohol only (age < 21)	11,278	135,900	8.4	113,470	158,331
Adverse reaction	143,599	2,604,412	11.6	2,014,658	3,194,166
Overmedication	41,754	597,284	6.7	518,286	676,283
Malicious poisoning	1,544	22,180	15.9	15,259	29,100
Accidental ingestion	6,548	128,042	12.0	98,002	158,083
Other	196,558	2,038,197	11.7	1,572,451	2,503,943
Drugs in all drug-related ED visits	479,435	6,247,718	7.3	5,355,391	7,140,045
Drugs in all misuse or abuse ED visits	314,911	3,335,487	7.8	2,828,492	3,842,482

(1) Refer to Figure C2 for a description of types of cases and to Table C3 for a description of the relationship between types of cases and categories of drug misuse and abuse.

(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.

(3) 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).

DAWN data in this publication

For analysis, five categories of ED visits related to drug misuse and abuse were defined. These categories were designed to parallel the approach of the National Survey on Drug Use and Health. These categories are

- all misuse or abuse,
- use of illicit drugs,
- use of alcohol in combination with other drugs,
- underage drinking (use of alcohol alone in patients younger than 21), and
- nonmedical use of pharmaceuticals (e.g., prescription or over-the-counter drugs).

Two additional categories were isolated for analysis: visits involving drug-related suicide attempts and visits for the purpose of seeking detox services. Such visits are considered to be misuse or abuse only if they involve illicit drug(s) or alcohol.

These categories are defined by drug and type of case as shown in Table C3. Because multiple drugs may be involved in a single visit, these categories are not mutually exclusive. A drug-related ED visit involves, on average, about 1.6 drugs.

Table C3. DAWN analytic groups

Analytic category	Drugs included	Types of cases included
All misuse or abuse	• All	This analytic group is the union of the following four analytic groups: use of illicit drugs, use of alcohol in combination, underage drinking, and nonmedical use of pharmaceuticals. See the definition provided for each of these groups for detail on the exact drugs and types of cases included in this overall category.
Use of illicit drugs	• Cocaine • Heroin • Marijuana • Stimulants (amphetamines and methamphetamine) • MDMA • GHB • Flunitrazepam (Rohypnol) • Ketamine • LSD • PCP • Other hallucinogens • Nonpharmaceutical inhalants • Combinations of illicit drugs	All types of cases
Use of alcohol in combination	Alcohol in combination with one or more other drugs	All types of cases
Underage drinking	Alcohol only, and no other drugs, in patients younger than 21	Cases with alcohol as the sole drug area are all categorized in one of the following three types of cases: • suicide attempts, • seeking detox, and • alcohol only (age < 21). The patient must be younger than 21 years of age.
Nonmedical use of pharmaceuticals	• Prescription drugs • Over-the-counter medications and pharmaceuticals • Dietary supplements	Combination of three types of cases (1): • overmedication (cases of nonmedical use, overuse, or misuse lacking explicit documentation of drug abuse), • malicious poisoning (cases in which the patient was administered a drug by another for a malicious purpose), and • type of case other (cases that could not be assigned to another type of case; includes documented drug abuse).
Drug-related suicide attempts (2)	All drugs	Must be categorized in the type of case Suicide Attempt (cases in which the records indicate the patient attempted suicide)
Visits for the purpose of seeking detox services (2)	All drugs	Must be categorized in the type of case Seeking Detox (cases in which the records indicate the patient was seeking detox)

(1) Nonmedical use of pharmaceuticals explicitly excludes ED visits for adverse reactions and accidental ingestions.

(2) Suicide attempts and seeking detox visits are not considered to be drug misuse or abuse unless they involve an illicit drug or alcohol.

Sampling and estimation

DAWN sample design

The redesign of the DAWN system that was introduced in 2003 altered most of the major features of DAWN data collection and included a new sample of hospitals that constituted DAWN. The new sampling plan, fully implemented for the first time for the 2004 estimates, formed a nationally representative panel of hospitals to be followed longitudinally for the indefinite future. The new design is a probability-based, stratified, one-stage sample. A complete and accurate list of all hospitals in the United States was drawn; from that list, all hospitals meeting the criteria for the target sample frame were identified. Samples were drawn to provide the capability to make estimates for the Nation as well as selected Metropolitan Statistical Areas (MSAs) and Metropolitan Divisions (Table C4).[5] Each year the sample frame is updated to account for new hospitals.

The stratified design called for drawing oversamples of hospitals in 48 MSAs; in 4 of those 48 MSAs, additional oversamples were drawn for a total of nine divisions. In effect, 53 nonoverlapping geographic areas (44 whole MSAs and 9 divisions) were in the sampling frame. (See Table C4 for list of MSAs and divisions where oversamples were drawn.) These areas are collectively referred to as oversample areas, or OS areas.

Metropolitan Statistical Areas and Divisions

To accommodate a planned expansion of the metropolitan areas covered by DAWN, a maximum set of metropolitan areas, based on the definitions issued by the Office of Management and Budget (OMB) in June 2003, was selected. Which metropolitan areas to include was a topic of the DAWN redesign.[6] Retention of the existing 21 metropolitan areas was important because significant demand existed for estimates for those areas, and addition of the five most populous metropolitan areas in each of the nine Census divisions was deemed important to improve DAWN's geographic and population coverage. This decision yielded a total of 48 metropolitan areas. For many of the 48 metropolitan areas, the June 2003 definitions resulted in larger metropolitan areas. In some cases, these larger areas represented a merger of previously separate metropolitan areas. However, users of DAWN statistics continued to be strongly interested in the areas covered by the original 21 metropolitan areas. To address the needs of these users, four of the merged areas were subdivided.[7] For each of these areas, there was a sample for the metropolitan area, as well as a sample for each division. This enables DAWN to produce estimates for the metropolitan areas and for the divisions. The final metropolitan-area sample included a total of 53 geographic units: 48 metropolitan areas, 2 divisions each for 3 of these metropolitan areas, and 3 divisions for one of these metropolitan areas.

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5 MSAs and Metropolitan Divisions follow the standard definitions issued by OMB in June 2003 (available at http://www.whitehouse.gov/omb/bulletins/b03-04.html and http://www.census.gov/population/www/estimates/metrodef.html), with one exception. The four MSAs where samples were drawn for divisions are Los Angeles, Miami, New York, and San Francisco. The division definitions follow OMB standards except in New York, where three submetropolitan areas were defined on the basis of local input.

6 Substance Abuse and Mental Health Services Administration, Office of Applied Studies. (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.

7 When metropolitan areas were redefined in June 2003, on the basis of data from the 2000 decennial Census, several legacy MSAs were merged with other MSAs to form new, much larger MSAs. However, a strong constituency of DAWN data users still needed estimates for the pre-merger areas. Because of this, 4 of the 48 metropolitan areas—Los Angeles, Miami, New York, and San Francisco—were subdivided into a total of nine divisions, corresponding to the constituents' areas of interest.

Table C4. Oversample areas in DAWN sample design

Atlanta-Sandy Springs-Marietta, GA (1)
Austin-Round Rock, TX
Baltimore-Towson, MD (1)
Birmingham-Hoover, AL
Boston-Cambridge-Quincy, MA-NH (1)
Bridgeport-Stamford-Norwalk, CT
Buffalo-Cheektowaga-Tonawanda, NY (1)
Chicago-Naperville-Joliet, IL-IN-WI (1)
Cincinnati-Middletown, OH-KY-IN
Cleveland-Elyria-Mentor, OH
Columbus, OH
Dallas-Fort Worth-Arlington, TX (1)
Denver-Aurora, CO (1)
Detroit-Warren-Livonia, MI (1)
Hartford-West Hartford-East Hartford, CT
Honolulu, HI
Houston-Baytown-Sugar Land, TX
Indianapolis, IN
Kansas City, MO-KS
Los Angeles-Long Beach-Santa Ana, CA (1)
Los Angeles-Long Beach-Santa Ana, CA—Los Angeles division (contains Los Angeles-Long Beach-Glendale, CA, Metropolitan Division)
Los Angeles-Long Beach-Santa Ana, CA—Orange County division (contains Santa Ana-Anaheim-Irvine, CA, Metropolitan Division)
Las Vegas-Paradise, NV
Louisville, KY-IN
Memphis, TN-MS-AR
Miami-Fort Lauderdale-Miami Beach, FL (1)
Miami-Fort Lauderdale-Miami Beach, FL—Fort Lauderdale division (contains Fort Lauderdale-Pompano Beach-Deerfield Beach, FL, and West Palm Beach-Boca Raton-Boynton Beach, FL, Metropolitan Divisions)
Miami-Fort Lauderdale-Miami Beach, FL—Miami-Dade County division (contains Miami-Miami Beach-Kendall, FL, Metropolitan Division)
Minneapolis-St. Paul-Bloomington, MN-WI (1)
Nashville-Davidson–Murfreesboro, TN
New Haven-Milford, CT
New Orleans-Metairie-Kenner, LA (1)
New York-Newark-Edison, NY-NJ-PA (1)
New York-Newark-Edison, NY-NJ-PA—New Jersey division (contains Middlesex, Monmouth, Ocean, Somerset, Essex, Hunterdon, Morris, Sussex, Union, Bergen, Hudson, Passaic Counties, NJ, and Pike County, PA)
New York-Newark-Edison, NY-NJ-PA—New York Suburban division (contains Nassau, Putnam, Rockland, Suffolk, Westchester Counties, NY)
New York-Newark-Edison, NY-NJ-PA—New York City, 5 Boroughs division (contains Bronx, Kings, New York, Queens, Richmond Counties, NY)
Omaha-Council Bluffs, NE-IA
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD (1)
Phoenix-Mesa-Scottsdale, AZ (1)
Pittsburgh, PA
Portland-Vancouver-Beaverton, OR-WA
Providence-New Bedford-Fall River, RI-MA

Table C4. Oversample areas in DAWN sample design (continued)

Riverside-San Bernardino-Ontario, CA
Rochester, NY
Sacramento-Arden-Arcade-Roseville, CA
Salt Lake City, UT
San Antonio, TX
San Diego-Carlsbad-San Marcos, CA (1)
San Francisco-Oakland-Fremont, CA (1)
San Francisco-Oakland-Fremont, CA—Oakland division (contains Oakland-Fremont-Hayward, CA, Metropolitan Division)
San Francisco-Oakland-Fremont, CA—San Francisco division (contains San Francisco-San Mateo-Redwood City, CA, Metropolitan Division)
Seattle-Tacoma-Bellevue, WA (1)
St. Louis, MO-IL (1)
Tampa-St. Petersburg-Clearwater, FL
Tucson, AZ
Washington-Arlington-Alexandria, DC-VA-MD-WV (1)
Wichita, KS

(1) Denotes a legacy area. Two separate legacy areas (New York and Newark) are contained in the New York-Newark-Edison, NY-NJ-PA, Metropolitan Statistical Area.

Sampled hospitals in each of the OS areas were stratified by hospital size (up to four categories on the basis of volume of ED visits) and ownership type (public and private). (Size categories were determined independently for each OS area.) The stratification plan included an additional geographic construct for the remainder of the United States outside the OS areas. Hospitals in the remainder area were stratified into 24 remainder strata on the basis of four regions (Northeast, South, Midwest, West), hospital size (three size categories by volume of ED visits), and ownership type (public and private).

To begin, a cross classification was created by categories of ownership type and geographic unit. Within each combination of geographic area and ownership type, the number of hospitals determined the number of unique size categories. If there were three or fewer hospitals, only one size category was defined. If there were four, five, six, or seven hospitals, two size categories were defined. If there were eight or more hospitals, four size categories were defined. In the remainder sample, within each combination of Census region and ownership, there were three size categories. This produced 24 unique strata from which to draw the hospitals for the remainder sample.[8]

The DAWN national estimates are the sum of the estimates for OS areas and the remainder area. Using a formula, the national estimate is depicted as

$$\left(\sum_{i=1}^{53} a_i\right) + b$$

where a_i is the estimate for OS area *i, 53* is the number of OS areas, and *b* is the remainder area estimate.

[8] Four Census regions times two ownership categories times three size categories equals 24 strata.

It was never expected that DAWN would be able to expand data collection into all 53 OS areas. Instead, the expectation was that DAWN would build up gradually to the number of OS areas its budget could support. The DAWN sample design was conceived to provide the flexibility to change gradually over time in terms of the number of OS areas where data were collected, while providing the statistical infrastructure to enable the production of reliable and representative estimates for the Nation and selected OS areas, regardless of their number.

To accomplish this objective, the DAWN design incorporates an approach whereby a subset of the hospitals within the OS areas was identified *a priori* as having a dual purpose in estimation. Referred to as dual-purpose hospitals, these designated hospitals can contribute to an estimate for the OS area in which they are located or they can contribute to the estimate for the remainder area. Dual-purpose hospitals carry two probabilities of selection (POS) and two stratum identifiers. One POS/stratum is associated with membership in an OS-area sample, and the other is associated with membership in the remainder-area sample.[9]

Figure C3 depicts the initial sample as it was drawn to provide

- individual samples from a series of OS areas,
- dual-purpose hospitals within those areas, and
- a remainder sample to represent the rest of the country.

For estimation for each data year, the first step is to determine which role each sampled hospital will play in that year's estimates. To make that determination, 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. All hospitals in stand-alone OS areas, including those originally designated as being in the dual-purpose subsample, are considered to be oversample hospitals in the OS areas, and they contribute to the OS-area estimate using their OS-area POS/stratum.

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. In this instance

- only those dual-purpose hospitals that are designated *a priori* to contribute to the remainder-area estimate are retained in the remainder-area subset,
- these hospitals contribute to the remainder-area estimate using their remainder-area POS/stratum, and
- data from any other hospitals in the OS area are excluded from the national estimates.

Figure C4 depicts the assignment of dual-purpose hospitals to either an OS area or the remainder area and the exclusion of OS hospitals outside of stand-alone OS areas that are not designated as dual purpose.

[9] In addition, a portion of hospitals in the nine oversampled divisions were identified *a priori* to serve in their MSA-level oversample and were assigned an OS area–level POS/stratum for that third purpose. Therefore, hospitals in the four MSAs with division-level oversampling can have up to three nonzero POS/strata: (1) a POS/stratum for membership in the MSA; (2) a POS/stratum for membership in the division; and (3) a POS/stratum for membership in the remainder area.

Figure C3. Original DAWN sample design

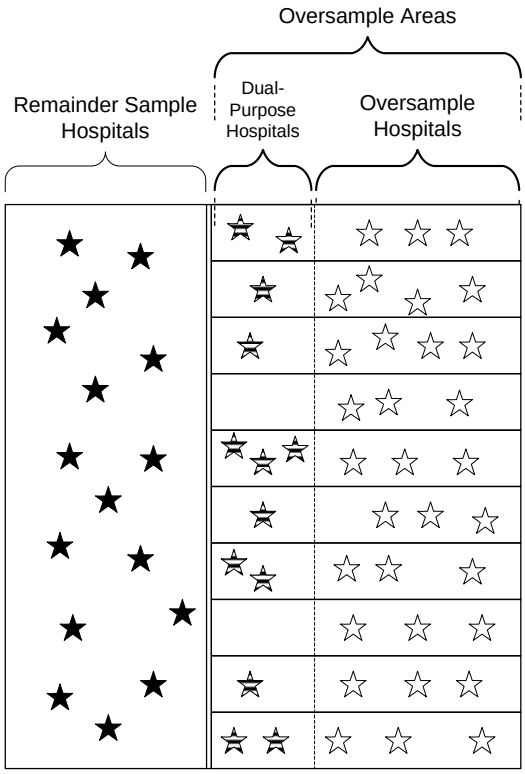
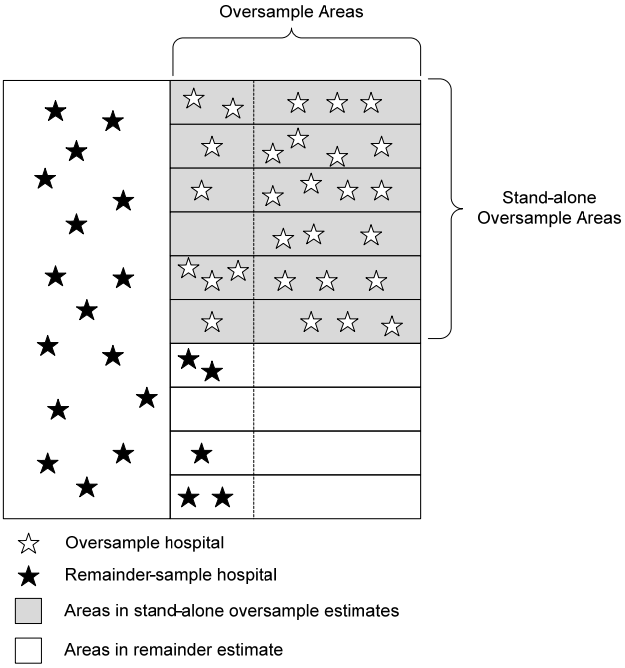


Figure C4. DAWN design in practice



After it is determined which OS areas will stand alone, the DAWN national estimates as reported in this publication are the sum of the estimates for stand-alone OS areas plus the remainder area. Using a formula, the national estimate is depicted as

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

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.

It is important to note that the definitions of the remainder area and the remainder sample of hospitals are designed to be fluid; hospital membership in the remainder sample changes from year to year depending on the response rates and data quality within the OS areas.

Sample maintenance

Because DAWN is a longitudinal survey that will be used to analyze trends in drug-related ED visits over time, annual updates to the sample are performed to ensure that the sample remains representative of the target population. The initial sample was selected in 2003 from a sampling frame created from the 2001 AHA Annual Survey Database. In every subsequent year, the sampling frame is updated to reflect new, closed, merged, and demerged hospitals, on the basis of updates to the AHA files. These updates include newly eligible hospitals, which are new hospitals or previously ineligible hospitals that are now eligible. Each year, the newly eligible hospitals are provided the opportunity to be selected into the sample, on the basis of the sampling fraction of the stratum in which the newly eligible hospital is located.

Reduction of bias

Survey error is the extent to which findings from the survey sample differ from those of the population of interest. The statistical methodologies described above are designed to minimize error. Additional sources of error, often referred to as bias, also contribute to overall error. Measuring bias is difficult because it requires accurate knowledge about corresponding population values. The DAWN survey methodology includes proven techniques, practices, and protocols that reduce the potential for introducing bias. For example, clearly defined criteria are used to construct the initial hospital sampling frame. Coverage bias is minimized because the sampling frame has virtually 100 percent coverage of the target population. To minimize measurement bias, the individuals who collect data for DAWN are provided with specialized and intensive training, automated methods for data entry are used, and the data are subject to quality reviews at several points in the data collection process. Additional details on the survey data collection methodologies used to enhance DAWN data quality and reduce bias are provided in an earlier DAWN publication.[10]

Sample size and sample allocation

DAWN defines precision in terms of the relative standard error (RSE) of an estimate. The RSE is the standard error of the estimate divided by the actual point estimate. DAWN is designed to have RSEs less than or equal to 10 percent for metropolitan-area estimates and RSEs less than or equal to 15 percent for national estimates

[10] Substance Abuse and Mental Health Services Administration, Office of Applied Studies. (2004). Appendix B: Technical notes: Changes to improve the quality of DAWN data. In *Drug Abuse Warning Network 2003: Interim national estimates of drug-related emergency department visits* (DAWN Series D-26, DHHS Publication No. SMA 04-3972). Rockville, MD: Author.

pertaining to total drug-related visits, cocaine visits, heroin visits, and marijuana visits. As discussed below, these desired precision levels are important drivers for setting sample size targets.

Sample sizes for each geographic area were determined by the area's targeted precision level in combination with the theory of optimal allocation for stratified samples. According to this approach, the variance of the sample estimates will be minimized when the sample size, n_h, in each sampling stratum is made proportional to the quantity:

$$\left(\frac{W_h S_h}{C_h} \right)$$

where W_h is the proportion of sampling units, S_h is the population standard deviation for the parameter being measured, and C_h represents the square root of the cost of sampling in stratum h.

Using these optimum allocation conditions, the minimum required sample sizes necessary to achieve the targeted levels of precision in each DAWN area were calculated using the following general considerations:

- geographic units for which estimates are desired,
- precision level desired,
- specific types of estimates for which minimum precision is desired (e.g., estimates of total, cocaine, heroin, and marijuana ED visits), and
- cost.

In addition to these considerations, sampling rates (i.e., the number of sampled hospitals divided by the number of eligible hospitals) were also subject to the following constraints:

- First, if fewer than four hospitals existed in the stratum population, then all hospitals in the stratum were selected into the sample.
- Second, if the sampling rate for a particular stratum was greater than 90 percent, then all units in the stratum were selected into the sample.
- Finally, if any calculations produced a sample size smaller than two hospitals, then the sample size was set to two hospitals.

Response rate calculations

In 2007, the initial DAWN sample included 1,287 hospitals divided among 53 OS areas (48 MSAs and 9 divisions) and one remainder area. Response rates and nonresponse bias analyses were assessed to determine which of these 53 OS areas could stand alone (Figure C3). Once this determination was made, hospitals that were neither dual purpose nor located in a stand-alone OS area were treated as if they were not sampled. For 2007, this treatment has the effect of reducing the sample from 1,287 hospitals to 542 hospitals, which is the number used for purposes of computing the unweighted response rates (Table C1).

Of the 53 original OS areas, a total of 12 areas (9 metropolitan areas and 3 submetropolitan areas) were determined to be able to stand alone in 2007.

Sampling weights

The DAWN hospitals are selected using stratified simple random sampling with oversampling in selected metropolitan areas. The stratum sample sizes were determined through an optimum allocation process. Sampling weights are first calculated as the inverse of the probability of selection and then adjusted for variable nonresponse and by a procedure known as poststratification, or benchmark adjustment.

Within-hospital weighting adjustment

Within-hospital nonresponse occurs when a hospital provides incomplete data. To minimize the impact of within-hospital nonresponse, the DAWN weighting plan includes nonresponse adjustment factors that were developed and applied for each month of data collection within each facility. The within-hospital nonresponse adjustment factor is calculated as the total number of ED visits within a month within a facility divided by the total number of reviewed charts for that same facility-month.

The within-hospital weights are applied to the case data by month and by facility. 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 any data. To minimize the impact of hospital nonresponse, the DAWN weighting plan includes nonresponse adjustment factors that were developed and applied within each weighting class. Weighting classes were 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 out of bounds (either too small or too large), adjacent weighting classes are collapsed and new nonresponse adjustment factors are calculated.

When the hospital-level nonresponse adjustment factors were considered final, a nonresponse-adjusted sampling weight was then calculated as the product of the nonresponse adjustment factor and the sampling weight. For each weighting class, a verification check was conducted to ensure that the sum of the nonresponse-adjusted sampling weights was 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 Annual Survey Database. DAWN used a ratio adjustment within strata to implement this adjustment.

Poststratification strata were formed on the basis of the aforementioned sampling stratification schemes. Within each stratum, the adjustment factor was calculated as the ratio of the AHA count of total visits to the weighted sum of total visits for responding hospitals. The factors were verified to ensure they were within reasonable bounds. If they were out of bounds (either too small or too large), adjacent poststratification strata were collapsed and new poststratification adjustment factors were calculated.

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

Total drug-related ED visits

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. Thus, for 2007, 300,983 submitted cases were extrapolated to an estimate of 3,998,228 drug-related ED visits. Considering the margin of error, this estimate may range from 3,473,733 to 4,522,724 drug-related ED visits, out of approximately 116 million total ED visits estimated for the United States (Table C2).

Calculation of estimates

All estimates produced for this publication were calculated using data that had been weighted according to the plan described above. Estimates for any variable of interest were 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.

Variance estimation

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 vary. 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.

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:

RSE = SE/Estimate
RSE = 500/10,000
RSE = 0.05, or 5% when multiplied by 100 for percentage RSE.

In this publication, confidence intervals (CIs) are included in many of the tables and are often cited in the text along with the estimates. The 95 percent CI is calculated as

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

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

$$10{,}000 \pm (1.96 \times 0.05 \times 10{,}000) = 10{,}000 \pm 980.0$$
Lower limit: 10,000 - 980 = 9,020
Upper limit: 10,000 + 980 = 10,980
95% CI: 9,020 to 10,980.

If repeated samples were drawn from the same population of hospitals, using the same sampling and data collection procedures, the true population values would fall within that interval 95 percent of the time.

Both between- and within-hospital variance components were accounted for. Within-hospital variance was estimated using a replication strategy by which two random replicates were created within each hospital and the variance between the two replicates represented the within-hospital contribution. Typically, this component was considerably smaller than the between-hospital variance, which was calculated as the variance between weighted hospital totals within each stratum.

Variance estimates reported in this publication were determined using Taylor Series Linearization. Variance estimates were calculated using SUDAAN® software.

Standardized rates

Standardized measures are needed to make valid comparisons of estimates across age and gender categories. For age in particular, the size of the underlying population differs considerably across 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 ED visits would be expected to occur naturally for the group that is larger in the population. In this example, assume that the RSE is 0.25 (25%).

To take the size of the underlying population into account, rates of ED visits per 100,000 population were calculated using population data from the U.S. Census Bureau.[11]

For each age and gender category, the estimate for a category was divided by the population for that category, which was then divided by 100,000. For example, consider an estimate of 1,000 visits for an age group of 1,000,000 persons, and an estimate of 1,000 visits for an age group of 500,000 persons. The rates would be calculated as

1,000 / (1,000,000/100,000) = 1,000/10
= 100 visits per 100,000 population

1,000 / (500,000/100,000) = 1,000/5
= 200 visits per 100,000 population.

[11] Population estimates for 2007 are, as of 7/29/2008, 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. Link: http://www.census.gov/popest/datasets.html. File: NC-EST2007-ALLDATA-R-File20.csv.

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

$$200 \pm (1.96 \text{ x.25 x } 200) = 200 \pm 98$$
Lower limit: 200 - 98 = 102
Upper limit: 200 + 98 = 298
95% CI for the rate: 102 to 298.

The RSE value is the same as the one used when calculating confidence interval surrounding the point estimate of ED visits.

Population estimates used to generate rates for 2007 are provided in Table C5.

Table C5. U.S. population by age and gender, 2007

Gender and age	Total United States (1)	Males	Females
Total	**304,482,526**	**150,164,126**	**154,318,400**
0–5 years	25,073,004	12,828,002	12,245,002
6–11 years	23,861,515	12,198,787	11,662,728
12–17 years	25,069,516	12,838,986	12,230,530
18–20 years	12,946,887	6,646,831	6,300,056
21–24 years	16,914,311	8,722,806	8,191,505
25–29 years	21,463,403	11,014,453	10,448,950
30–34 years	19,712,434	10,019,562	9,692,872
35–44 years	42,614,900	21,373,849	21,241,051
45–54 years	44,387,175	21,859,897	22,527,278
55–65 years	33,669,357	16,240,765	17,428,592
65 years and older	38,770,024	16,420,188	22,349,836

(1) Population estimates for 2007 are, as of 7/29/2008, 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. Link: http://www.census.gov/popest/datasets.html. File: NC-EST2007-ALLDATA-R-File20.csv.

Standardized rates were not calculated for race and ethnicity subgroups, because the race/ethnicity categories available to DAWN are much less detailed and contain considerably more missing data than the race and ethnicity categories in the census data. Appendix D describes the race and ethnicity data reported for DAWN.

Determination of significant differences between years

Comparisons in the estimates of ED visits between years are presented in the form of percentage differences, calculated as the 2007 estimate minus the 2004 estimate divided by the 2004 estimate. For shorter-term comparisons, these percentages are calculated as the 2007 estimate minus the 2005 estimate divided by the 2005 estimate or the 2007 estimate minus the 2006 estimate divided by the 2006 estimate. The result is presented as a percentage, which is shown only if the difference between the two years is statistically significant. Tests for the significance of differences between two years consider the variance of each year's estimate and the covariance between the two. Thus, hospitals that appear in both samples and provide data in both years contribute to the covariance and thus decrease the overall sampling variance beyond the combined contribution of the two samples.

The variance estimation process used to establish significance takes into account this overlap between the two annual samples.

Publication criteria

DAWN is based on a survey and collects detailed data using more than 17,000 drug codes. As a result, some estimates will be too imprecise, too small, or based on too little data to be reliable. In these situations, the estimate is replaced by an asterisk (*) in the published table. Estimates are suppressed according to the following rules:

- *RSE of 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.
- *Estimate is based on fewer than 30 ED visits*. Estimates this small constitute rare events, which are based on a small number of cases and have precision levels that are difficult to quantify. In many instances, such rare events have variances so large that the estimate would be suppressed because of its RSE alone. Estimates that do meet RSE criteria for publication but are based on fewer than 30 ED visits are deemed too unreliable for publication.

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.

APPENDIX D

RACE AND ETHNICITY IN DAWN

In October 1997, the Office of Management and Budget (OMB) issued a revised standard protocol for race and ethnicity categories used in Federal data collection systems.[1] The new protocol permitted separate reporting of race and Hispanic ethnicity, and it incorporated the ability to capture more than one race for an individual, a few modifications in nomenclature (e.g., black was changed to black or African American), division of certain categories (Asian or Pacific Islander was split into two categories, Asian and Native Hawaiian or Other Pacific Islander), and elimination of the other category. The OMB protocol also permitted a combined format, whereby race and Hispanic ethnicity would be recorded in a single data item, which could still record multiple entries for race and/or Hispanic ethnicity. The single data item for race and ethnicity is shown in the Drug Abuse Warning Network (DAWN) emergency department (ED) case form that has been used since 2003 (Appendix C, Figure C1).

Because DAWN retrospectively collects data from medical records, missing information about race/ethnicity cannot be obtained at a later time (patients are never interviewed). Race/ethnicity is missing in about 10 percent of DAWN cases. Although OMB protocol allows for a combined format, there is still limited information for the DAWN race/ethnicity categories of Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, two race/ethnicities, and three race/ethnicities. Because of these limitations, the number of ED visits per 100,000 population (rates) are not presented in this report by race/ethnicity.

For reference, estimates of drug-related ED visits by race/ethnicity are presented in Table D1. This analysis, which is based on the most detailed coding of race/ethnicity in DAWN case reports, shows that estimates for the following categories are too small to be meaningful:

- multiple (i.e., two or more) race/ethnicities (i.e., two or more race/ethnicities were documented in the source record for the same individual),
- Hispanic or Latino ethnicity with any specific race indicated,
- American Indian or Alaska Native,
- Asian, and
- Native Hawaiian or Other Pacific Islander.

Therefore, in the tables of estimates in this and other DAWN publications, we have retained a more limited set of categories: white, black, and Hispanic. A fourth category, called Race/ethnicity not tabulated above (NTA), is used to tabulate those categories that are too small to report independently.[2] All cases reported to DAWN as Hispanic or Latino ethnicity are tabulated as Hispanic race/ethnicity, regardless of race.

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1 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).

2 One exception is that, if two races are reported and the second is reported as unknown, the episode is coded for the known race.

Table D1. Drug-related ED visits, by detailed race/ethnicity, 2007

Race/ethnicity	ED visits (1)
Total drug-related ED visits	3,998,228
One race/ethnicity	3,974,737
White	2,511,973
Black or African American	680,913
Hispanic	367,261
Asian	6,406
American Indian or Alaska Native	39,463
Native Hawaiian or Other Pacific Islander	*
Race unknown	357,488
Two race/ethnicities	23,448
White + black or African American	848
White + Hispanic	*
White + Asian	90
White + American Indian or Alaska Native	*
Black or African American + Hispanic	1,332
Black or African American + Asian	*
Black or African American + American Indian or Alaska Native	*
Hispanic + Asian	*
Hispanic + American Indian or Alaska Native	*
Asian + American Indian or Alaska Native	*
Three race/ethnicities	*
White + black or African American + Hispanic	*
White + Hispanic + Asian	*
White + Asian + Native Hawaiian or Other Pacific Islander	*

(1) 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: 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: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2007 (08/2008 update).