

Preliminary Data from the Drug Abuse Warning Network – April 2019-October 2020



SAMHSA
Substance Abuse and Mental Health
Services Administration

**U.S. Department of Health and Human Services
Substance Abuse and Mental Health Services Administration
Center for Behavioral Health Statistics and Quality**

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Introduction

The Drug Abuse Warning Network (DAWN) is a nationwide public health surveillance system administered by the Substance Abuse and Mental Health Services Administration's (SAMHSA's) Center for Behavioral Health Statistics and Quality (CBHSQ). In 2018, SAMHSA reinstated DAWN after a 7-year hiatus. As of October 15, 2020, data are being abstracted from 49 hospitals; ultimately, the system will include at least 50 non-Federal general hospitals with 24 hour emergency departments (EDs), consisting of 10 sentinel hospitals and 40 probability-sampled hospitals. Data are abstracted directly from hospital electronic health records. DAWN captures data on ED visits related to recent substance use and misuse, such as alcohol use, illicit drug use, suicide attempts, and nonmedical use of pharmaceuticals. DAWN data will be used to monitor trends, demographic and geographic characteristics, and outcomes of ED visits. DAWN's design will yield surveillance data on an ongoing basis and has the potential to produce national estimates. This initiative will serve as an early warning system for the emergence of new and novel psychoactive substances.

Background

SAMHSA administered the former DAWN data system ("legacy" DAWN) from 1992 through 2011. This system required collection of emergency department (ED) data on substance use (42 U.S.C. 290aa-4(c)). It also provided demographic and visit-level information on ED visits resulting from substance use and overdose. Data were collected from more than 200 hospitals between 2004-2011, and to account for the relatively small sample size, were weighted, thus enabling generation of national estimates.

SAMHSA re-established DAWN as a nationwide public health surveillance system to monitor emergency department visits related to recent substance use, including those related to opioids. Authorized by the 21st Century Cures Act in December 2016, this program is necessary to respond effectively to the opioid and addiction crisis in the United States and to better inform public health, clinicians, policymakers, and other stakeholders to respond to emerging substance use trends. The new DAWN contract was awarded on September 28, 2018. An important feature of the new DAWN with potential positive impact to public health is the more rapid processing and much earlier release of the data than was previously possible in the legacy DAWN. DAWN has several objectives:

- Identify increases in ED visits involving specific substances in its hospitals and monitor the geographic, temporal and demographic characteristics of these visits
- Provide a warning system for the emergence of new and novel psychoactive substances and combinations of substances

- Provide capacity for national estimates of substance use-related ED visits

Methods

Design

DAWN is a hybrid of sentinel hospital-based surveillance and probability sample-based surveillance. Its sampling strategy uses 10 sentinel hospitals and 40 probability-sampled hospitals. This strategy is a unique, novel approach for public health surveillance. This overall design is needed to assess the unique epidemiology of substance use, since these utilization patterns do not necessarily follow the pattern of some physical health diseases.

Study sample

The target and inference population for DAWN is all drug-related emergency department (ED) visits at hospitals located in the U.S. (50 states and DC) that are:

- non-Federal,
- short-stay,
- general surgical and medical hospitals,
- with at least one 24-hour ED.
- at least 100 ED visits in 2016

Hospitals that met these criteria were selected from the 2016 American Hospital Association (AHA) file. The final number of DAWN-eligible hospitals was 4,310. Of these, 50 hospitals were selected. This group is divided into two parts, as follows.

Ten hospitals were selected to be part of a sentinel surveillance group. Sentinel surveillance is an early warning system; the goal is to select the sites that are most likely to yield the type of cases of concern, gather data and analyze/interpret it quickly so that a plan of action can be developed. Producing a representative estimate is usually not the goal of a sentinel surveillance system. High priority sentinel areas were defined as counties with high potential DAWN case volume and severity specific to opioid, cocaine, and stimulant-related mortality (based on drug overdose death reported from CDC data) and morbidity (ED visits using Healthcare Cost and Utilization Project (HCUP) data from the Agency for Healthcare Research & Quality (AHRQ)), geographic considerations such as areas known for characteristics of interest (e.g., Atlanta is a known East Coast distribution point for methamphetamine).

The second group is a probability sample-based surveillance group. It was developed so that we could provide a population-based estimate should we be called upon to do so. Hospitals were selected from across the country in urban, suburban, and rural areas. The probability sampling strategy was to use two stage stratification. In the first stage, the 3,143 U.S. counties were classified into two groups (strata).

- 15 high risk suburban and rural counties (Part B)
- 3,128 all other urban, suburban and rural counties (Part C)

In the second stage we stratified by census regions. We used systematic random sampling methods within a stratum in order to account for small sample size and best representativeness.

Recruitment

Recruitment began with contacting selected DAWN Hospitals and working with them to complete a Hospital Data Access Agreement (DAA), Business Associate Agreement (BAA), and Institutional Review Board (IRB) approvals (as required).

Hospitals are paid \$100,000 annually (per hospital) to cover their data-related access costs. DAWN hospitals are able to participate in DAWN and comply fully with the HIPAA Privacy Rule. DAWN is committed by law and by practice to preserving patient privacy and safety by following the Health Insurance Portability and Accountability Act (HIPAA) (PL 104-191) and the HIPAA Privacy Rule (45 CFR Part 160 and Part 164 subparts A and E).

As of October 15, 2020, 49 hospitals have signed a DAA for participating in DAWN. Data abstraction is ongoing at 49 hospitals. Table 1 below shows the status of abstraction by community type.

Table 1. DAWN Abstraction

Geography	U.S.	Urban	Suburban	Rural
Abstracting	49	22	11	16
Sentinel (Part A)	10	7	2	1
Parts B+C	39	15	9	15

Data abstraction

Hospitals provide access to their electronic health record systems. Each ED record is reviewed by a trained abstractor with medical background (DAWN contractor). When DAWN cases are identified, information is abstracted into secure online data collection systems. The abstractor types in the names of substances, the DAWN system auto-matches them to a drugs of interest list. This direct review method is better at identifying all substance-related visits than other search methods, including diagnosis code screening.

The following data elements are abstracted:

- Date of Visit
- Time of Visit

- Age of Patient
- Patient’s County of Residence
- Sex of Patient
- Race/Ethnicity of Patient
- Substance(s) Involved
- Route of Administration
- Diagnoses
- Case Type
- Medication-Assisted Treatment Administered in ED
- Disposition, including Referral Information

DAWN captures all ED visits related to recent substance use. DAWN focuses on major substances with abuse liability, including alcohol, marijuana, illicit stimulants such as cocaine and methamphetamine, illicit opioids such as heroin and fentanyl, several classes of prescription and over the counter (OTC) medications, and a targeted list of inhalants and supplements. DAWN is not limited to substance abuse and misuse, but includes *any* reason that a substance was used:

- Illegal substance use, alcohol use, nonmedical use of prescription and over-the-counter medications
- Suicide attempts and overdoses

Substance use must have been implicated in the reason for the ED visit, either as the direct cause (e.g., overdose) or as a contributing factor (e.g., injury, infection, organ damage). “Current medications” are not included unless they contributed to the visit. A person having recently taken drugs is not necessarily a DAWN case—the information is only included in DAWN if the drugs taken were related to the reason for the ED visit.

Statistical Analysis

Descriptive statistics including frequencies and percentages of certain DAWN data elements were run for this report using SAS. DAWN cases are ED visits involving recent use of illegal and legal substances, including prescription drugs. The information given below summarizes *unweighted* data abstracted from 4/1/2019 to 10/15/2020. The sample of DAWN hospitals is not complete as not all hospitals started data abstraction at the same time during the April 2019-October 2020 period. For this reason, and because the data are unweighted, this report provides only preliminary results that are not generalizable to the US; caution must therefore be exercised in interpreting the data presented here.

Preliminary Data

Substance Use-Related ED visits, by Community Type

We define substance use-related ED visit as an ED visit precipitated by the use of any chemical, whether licit or illicit, including alcohol, illicit drugs, and pharmaceuticals with abuse potential, such as benzodiazepines and pain killers. Table 2 below shows that as of October 2020, 58,807 or 4.6% of the 1,275,925 ED visits in the 49 participating hospitals were related to recent substance use. This proportion ranged from 2.0% to 5.3% at rural and urban hospitals, respectively.

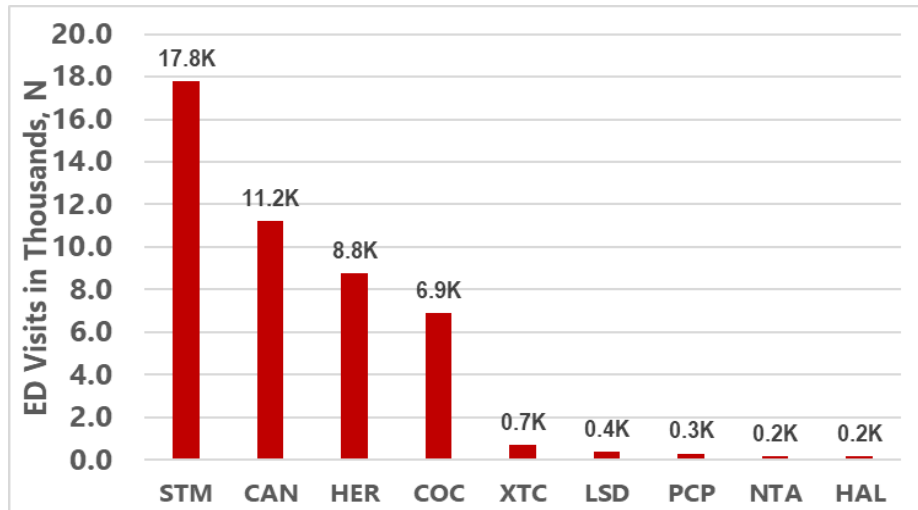
Table 2. Substance Use-Related ED visits, by Community Type

Community Type	All	Urban	Suburban	Rural
Hospitals (N)	49	22	11	16
ED visits reviewed (N)	1,275,925	783,940	313,749	178,236
Substance use-related ED visits N (%)	58,807 (4.6%)	41,642 (5.3%)	13,521 (4.3%)	3,644 (2.0%)

ED Visits Involving Top Illicit Substances

Most commonly associated with ED visits are illicit substances (37,320 ED visits) and central nervous system (CNS) agents (13,111 ED visits). Among illicit drugs, stimulants (including methamphetamine and illicit amphetamine) are the most common (17,769 ED visits or 47.6% of the illicit substance-related ED visits) followed by cannabinoids (including marijuana and synthetic cannabinoids; 11,223 ED visits or 30% of the illicit substance-related ED visits).

Figure 1. ED Visits Involving Top Illicit Substances



STM: stimulants; CAN: cannabinoids; HER: heroin; COC: cocaine; XTC: ecstasy; LSD: Lysergic acid diethylamide; PCP: Phencyclidine; NTA: combos Not Tabulated Above¹; HAL: misc. hallucinogens.

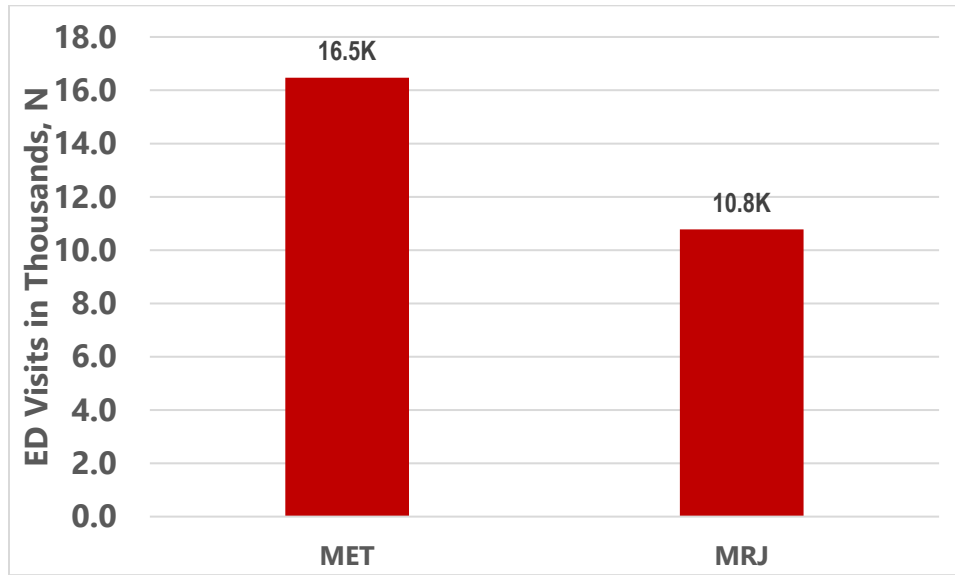
Figure 2 below shows the two most common drugs within the illicit stimulants and cannabinoids categories. Methamphetamine is the most common drug in the illicit stimulants category (16,473 ED visits or 93% of the stimulant use-related visits) and marijuana is the most common drug in the cannabinoids category (10,780 ED visits or 96% of the cannabinoid use related visits). Increases in stimulants related to DAWN cases may be associated with increasing use of illicit methamphetamine which has been observed in recent years as the opioids crisis has evolved as well as over treatment of attention-deficit/hyperactivity disorder, as more adults are now seeking diagnosis and treatment.² Increases in marijuana use may be a result of changing norms that legalize use of this drug.³

¹ Combinations Not Tabulated Above includes illicit drug combinations such as marijuana mixed with other illicit drugs like cocaine or heroin.

² <https://www.nature.com/articles/453586a>

³ <https://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>

Figure 2. ED visits involving Methamphetamine and Marijuana

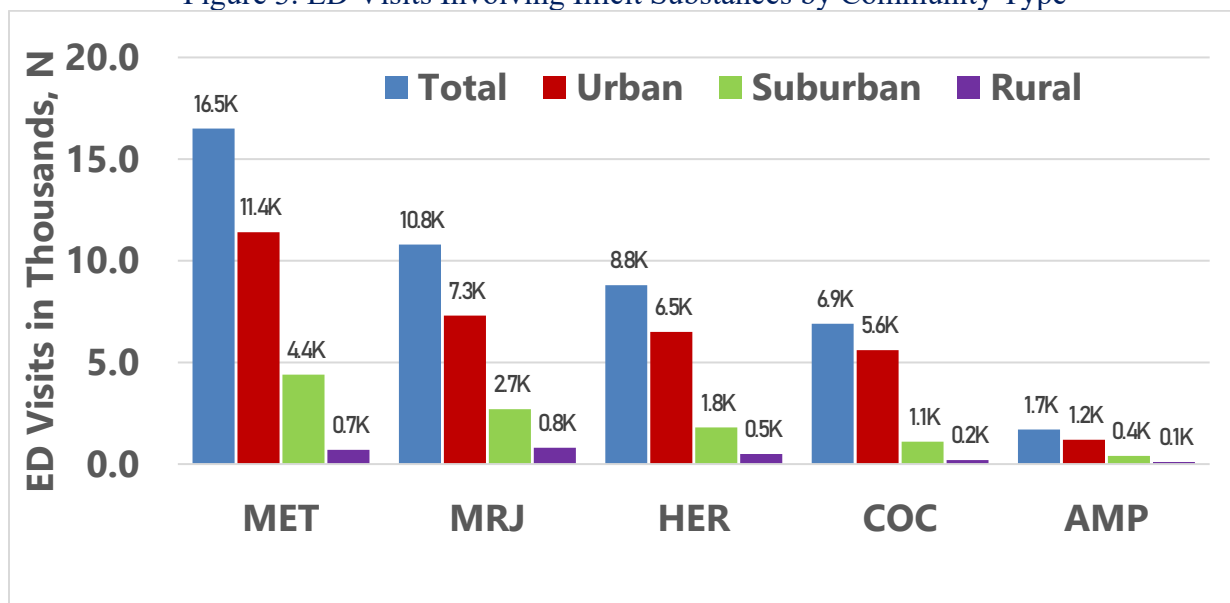


MET: methamphetamine; MRJ: marijuana

ED Visits Involving Illicit Substances by Community Type

Shown below in Figure 3 are the number of ED visits in DAWN-reporting hospitals related to commonly used illicit substances. Most of these visits involved methamphetamine, and these cases were most commonly seen in urban areas (11,410 ED visits or 69% of all ED visits related to methamphetamine).

Figure 3. ED Visits Involving Illicit Substances by Community Type



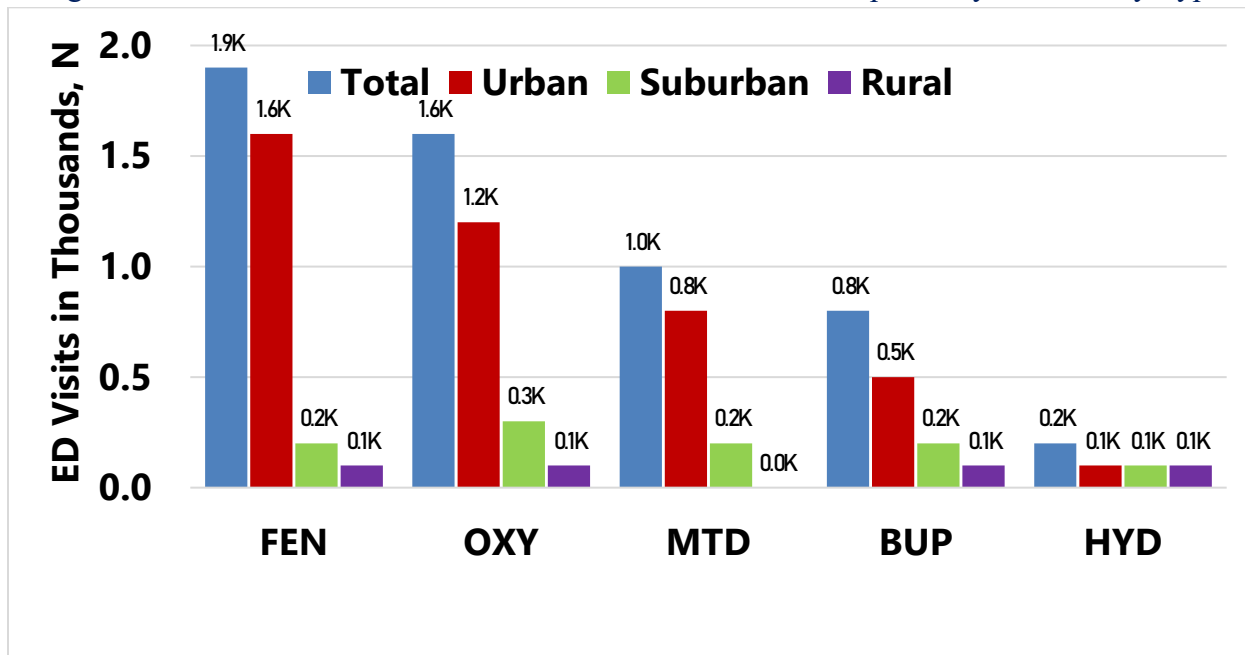
MET: methamphetamine; MRJ: marijuana; HER: heroin; COC: cocaine; AMP: amphetamine

Note - DAWN urbanization categories were created by collapsing 6-level NCHS 2013 urban-rural classification scheme into 3 categories: urban (large central and fringe metro), suburban (medium and small metro), and rural (micropolitan and noncore) counties.

ED Visits for Nonmedical Use of the Most Common Opioids by Community Type

ED visits related to nonmedical use of pharmaceuticals focused on opioids, which were responsible for 7,726 ED visits. The five opioids most commonly associated with ED visits were fentanyl, oxycodone, methadone, buprenorphine, and hydrocodone, as shown below.

Figure 4. ED Visits for Nonmedical Use of the Most Common Opioids by Community Type



FEN fentanyl; OXY: oxycodone; MTD: methadone; BUP: buprenorphine; HYD: hydrocodone.

Note - DAWN urbanization categories were created by collapsing 6-level NCHS 2013 urban-rural classification scheme into 3 categories: urban (large central and fringe metro), suburban (medium and small metro), and rural (micropolitan and noncore) counties.

Substance-use related ED Visits

Among the 58,673 substance-use related ED visits, 49,773 (85%) involved illicit drugs and/or alcohol (Table 3 below). The remaining 8,900 substance use-related ED visits involved substances that are commonly abused but are not illicit, such as prescription drugs (e.g., benzodiazepines). Most of the illicit drug-related visits (29,631 or 60%) were associated with use of a single illicit drug or of alcohol alone. The majority (25,527 ED visits or 51%) of patients seen in the ED for illicit drug and/or alcohol use were 26-45 year olds, who most commonly used methamphetamine, either by itself (5,109 or 20% of ED visits for illicit drug or alcohol use) or with other substances and/or alcohol (5,185⁴ or 46% of ED visits for polysubstance use). We define polysubstance use as the use of more than one substance, where at least one substance is an illicit drug or alcohol and may include pharmaceuticals. Polysubstance use may potentially be a noticeable proportion among all substance users.

The number of ED visits due to polysubstance abuse was not insignificant, accounting for 20,142 visits or 40% of the total illicit drug and/or alcohol-related visits, where the majority (11,175 ED

⁴ Calculated by subtracting the 5,109 ED visits associated with sole methamphetamine use among 26-45 year olds from the 10,294 ED visits associated with use of both methamphetamine and other substance(s) among the same age group.

visits or 55%) of patients were again 26-45 year olds. Different combinations of alcohol, benzodiazepines, cocaine, methamphetamine, and opioids can significantly increase chances of fatal overdose. A recent study also documented that positivity rates for un-prescribed fentanyl among the methamphetamine or cocaine positive results also increased significantly.⁵ The commonly used illicit drugs or alcohol among polysubstance users group in Table 3 represents ED visits involving alcohol or the particular illicit substance listed together with at least one other substance, which may be a prescription drug. Data abstraction for ED visits by adults 21 years old and older due to sole use of alcohol is underway. These data have been collected only for visits starting in 1/1/2020, and as of 10/15/20 at only 2.4% of DAWN hospitals. Since the data were obtained from such a small proportion of currently participating DAWN hospitals, we cannot draw conclusions about alcohol use, despite it being the most common cause for ED visits among both the monosubstance and polysubstance use groups (10,005 and 10,031 ED visits; Table 3).

⁵ Larue, L., Twillman, R. K., Dawson, E., Whitley, P., Frasco, M. A., Huskey, A., & Guevara, M. G. (2019). Rate of Fentanyl Positivity Among Urine Drug Test Results Positive for Cocaine or Methamphetamine. *JAMA Network Open*, 2(4). doi: 10.1001/jamanetworkopen.2019.2851

Table 3. Substance-use related ED Visits

Substance	Age Group, years				Total <i>N</i>
	<18 <i>N</i>	18-25 <i>N</i>	26-45 <i>N</i>	>45 <i>N</i>	
All substance use-related ED visits	1,946	8,947	29,362	18,418	58,673
Without illicit drug or alcohol	435	1,299	3,835	3,331	8,900
With illicit drug and/or alcohol [†]	1,511	7,648	25,527	15,087	49,773
One illicit drug or alcohol [†]	989	4,274	14,352	10,016	29,631
Methamphetamine only	22	890	5,109	2,282	8,303
Alcohol only [†]	360	1,172	3,613	4,860	10,005
Marijuana only	530	1,387	1,641	578	4,136
Heroin only	*	429	2,435	1,045	3,917
Cocaine only	*	157	838	965	1,966
Amphetamine only	*	51	280	143	479
Synthetic Cannabinoids only	*	29	135	62	228
Other single Illicit drug use	56	159	301	81	597
Polysubstance use [†]	522	3,374	11,175	5,071	20,142
Commonly Used Illicit Drugs or Alcohol among Polysubstance Users [§]					
Methamphetamine	58	1,111	5,185	1,789	8,143
Alcohol [†]	261	1,604	5,058	3,108	10,031
Marijuana	386	1,532	3,347	1,373	6,638
Heroin	17	650	3,152	1,001	4,820
Cocaine	54	679	2,567	1,607	4,907
Amphetamine (illicit)	18	165	755	260	1,198
Synthetic cannabinoids	*	58	170	61	294

Note—This table excludes ED visits missing age data.

[†]Data abstraction for alcohol only in adults 21 years & older is underway and as of 10/15/20 is complete at 2.4% of DAWN hospitals, and covers the period 1/1/20-10/15/20.

[‡]Polysubstance use involves the use of at least one illicit substance or alcohol and other substance(s)

[§]Visit involves this substance and any other substance (includes the one illicit drug or alcohol cases above)

*counts under 10 are suppressed

Sentinel Events

DAWN uses a sentinel surveillance system, because it helps identify high risk counties, enabling SAMHSA to focus attention at the local level in areas where need is the greatest. Hospitals selected to be sentinels are most likely to have substance use-related adverse events, and we can monitor the data for patterns such as geographical location, demographics of population served, and ED visit volume. Insights from local public health experts and epidemiologists who are familiar with substance use and misuse in their communities can help inform SAMHSA about onset of sentinel events and epidemic drug abuse.

DAWN is designed to assess two types of sentinel events. A *time-based* sentinel event is a significant aberration in signal size, location, demographic distribution, etc. of a drug-related ED visit or multiple visits over a short time that (1) cannot be attributed to data/quality control issues and (2) may reflect a potential public health problem requiring further action. An *event-based* sentinel event is the first and subsequent occurrence(s) of key substance-related ED visits (e.g., fentanyl, kratom) and/or case types (e.g., suicide attempts, neonates with withdrawal symptoms) that are of high priority to SAMHSA.

DAWN's sentinel event system is currently being implemented, using statistical process control (SPC), a surveillance statistical technique commonly used to detect events of interest/concern. All sentinel event-related software programs have been developed and successfully installed, with the production phase and testing using real data to be launched in the near future.

Summary

Among the 49 currently participating DAWN hospitals, the proportion of emergency department visits attributable to substance use, illicit or otherwise, was 4.6% during the period April 1, 2019 to October 15, 2020. This proportion was somewhat higher, at 5.3%, in the DAWN hospitals in urban areas. These preliminary results may have implications for health service delivery costs. According to a recent AHRQ Statistical Brief, service delivery costs connected with mental health/substance use-related ED visits was about \$5.6 billion in 2017.⁶ In particular, illicit drugs or alcohol use may be an important target for substance use prevention and treatment efforts. Such activities might include strengthening ED-based care for substance users, such as medication-assisted treatment initiation, as well as care coordination between the ED and

⁶ <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb257-ED-Costs-Mental-Substance-Use-Disorders-2017.jsp>

specialty behavioral health services in the community. In addition, in 2018 there were more than 67,300 deaths from drug-involved overdose. This figure represents a substantial increase from the 38,329 deaths that occurred in 2010. Approximately 85% of substance use-related ED visits were associated with illicit drugs and/or alcohol, while the remaining 15% of visits were precipitated by commonly abused licit pharmaceuticals. These preliminary results also suggest that public health interventions may need to focus on methamphetamine since it appears to be the illicit substance most commonly associated with substance use-related DAWN ED visits (16,446 of the 49,773 or 33.0% of ED visits involving illicit substances and/or alcohol). Whether by itself or as part of polysubstance use, methamphetamine use prompted proportionately the most ED visits to a DAWN hospital. Methamphetamine appears to be a growing worldwide problem.⁷ Given the opioid-use pandemic, only 7,726 (15.5%) of the ED visits for illicit substance/alcohol use, were associated with use of any prescribed opioids. Similarly, ED visits for heroin related adverse events was 8,800 with ED visits related to methamphetamine and marijuana substantially exceeding those for heroin. These findings underscore the benefit of concentrating resources in recent years to address prescription opioid misuse and to enhance prevention, treatment and community recovery supports in this area. A growing concern highlighted in the DAWN data is the relatively high rate of DAWN cases related to adverse events associated with marijuana use. With the increasing access to marijuana products which are largely unregulated by states that have approved marijuana for medical and personal use, it can be expected that toxicities related to marijuana product use will continue to increase and will exact a significant toll on Americans. In addition to the suggested focus on methamphetamine, preventionists and clinicians may wish to expand substance misuse prevention efforts to focus on adults ages 26-45 years old in particular. Individuals between the ages of 26 and 45 made up the majority of people seen in DAWN hospital EDs for substance use, irrespective of the illicit drug or alcohol responsible for their visit. Finally, the DAWN data underscore the ongoing role of alcohol use in adverse health effects and particularly its role in adverse events related to substance misuse. Efforts going forward need to include a larger focus on alcohol and its potential toxic interactions with other medications and illicit substances. These efforts should include prevention efforts across the lifespan that provide education to the public about risks associated with excessive alcohol use as well as the potential for severe and, in some, fatal drug-drug interactions when alcohol is used with other medications and/or illicit substances.

⁷ <https://www.unodc.org/wdr2018/>