

The DAWN Report

October 28, 2010

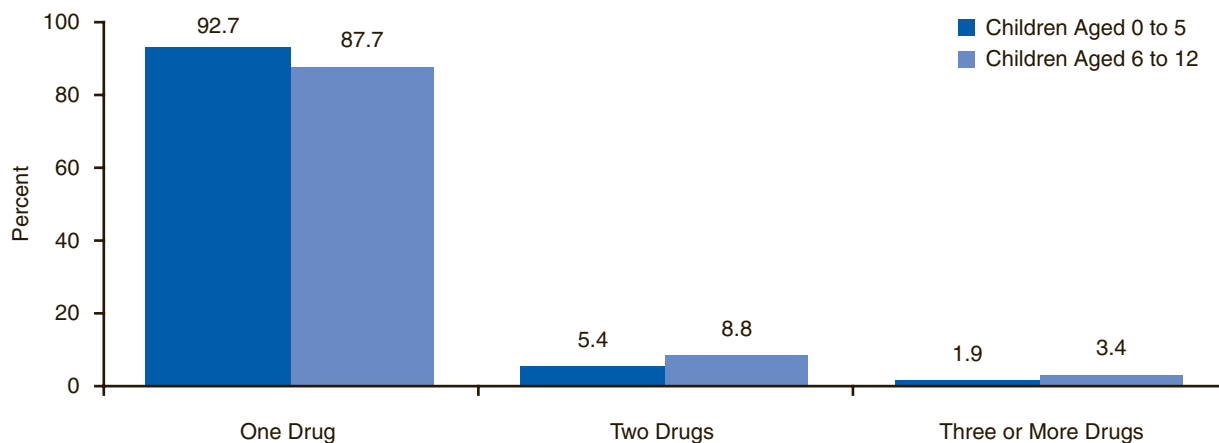
Emergency Department Visits Involving Adverse Reactions to Medications among Children Aged 12 or Younger

In Brief

- In 2008, an estimated 211,209 emergency department (ED) visits for adverse reactions to pharmaceuticals or other types of medications were made by children aged 12 or younger
- A little more than three fourths (76.8 percent) of these visits were made by children aged 5 or younger
- Anti-infection medications (e.g., penicillin, amoxicillin) accounted for the largest proportion of substances involved in ED visits for adverse reactions among children, accounting for a little more than half (55.4 percent) of visits among children aged 5 or younger and more than two fifths (43.3 percent) of visits among children aged 6 to 12
- Most (93.5 percent) of the children aged 12 or younger who were taken to the ED for adverse reactions were treated and released

Parents and caregivers give medications to children for preventive care and when children are sick. Although these medications—which can often include immunizations, prescription drugs, or over-the-counter (OTC) medications—are given to prevent or cure illnesses or conditions, sometimes adverse drug reactions (e.g., skin rashes, nausea, vomiting) occur, typically resulting from allergic reactions.^{1,2,3} Because of physiological differences and smaller size, young children are at a higher risk for adverse drug reactions than most adults.⁴ Further, caretakers may not know whether young children are experiencing an adverse reaction because children may not be able to verbalize how they feel. This difficulty is exacerbated because health care professionals may not be able to provide caregivers with complete information about potential adverse reactions because fewer than 10 percent of such reactions are reported to

Figure 1. Number of Drugs* Involved in Emergency Department (ED) Visits for Adverse Reactions to Drugs among Children Aged 12 or Younger, by Age Group: 2008



* Percentages may not sum to 100 percent due to rounding.
 Source: 2008 SAMHSA Drug Abuse Warning Network (DAWN).

MedWatch, the Food and Drug Administration’s voluntary safety information and adverse event reporting program.⁵

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that monitors drug-related emergency department (ED) visits in the United States.⁶ To be included in DAWN, an ED visit must have involved a drug, either as the direct cause of the visit or as a contributing factor. DAWN includes ED visits involving adverse reactions to pharmaceuticals or other types of medications (hereafter referred to as “drugs”). Within DAWN, adverse reactions are defined as ED visits in which an adverse health consequence results from taking prescription drugs, OTC medications, or dietary supplements as prescribed or recommended. A visit is not included in this category if an illicit drug is involved. This issue of *The DAWN Report* focuses on ED visits involving adverse reactions to drugs among patients aged 12 or younger using 2008 data.⁷

Overview

In 2008, an estimated 211,209 ED visits were made by children aged 12 or younger for adverse reactions to drugs. A little more than three fourths (76.8 percent) were made by children aged 5 or younger, while almost one fourth (23.2 percent) were made by children aged 6 to 12. Males accounted for a little more than half (54.5 percent) of the ED visits for adverse reaction to drugs among children. White children accounted for almost two thirds (63.3 percent) of these visits, Hispanic children for nearly one quarter (23.3 percent), and black children for about one tenth (10.8 percent).

Number and Types of Drugs Involved in ED Visits

Overall, most ED visits for adverse reactions among children involved one drug (91.6 percent) with a small percentage involving multiple drugs (8.4 percent). By age group, there were differences in the number of drugs involved with these visits.

Table 1. Selected Drugs Involved in Emergency Department (ED) Visits for Adverse Reactions among Children Aged 12 or Younger, by Age Group: 2008

Drug Category	Estimated Number of ED Visits, Children Aged 0 to 5	Percentage of ED Visits, Children Aged 0 to 5	Estimated Number of ED Visits, Children Aged 6 to 12	Percentage of ED Visits, Children Aged 6 to 12
Total ED Visits	162,261	100.0	48,948	100.0
Anti-infection Medications	89,968	55.4	21,190	43.3
Cephalosporin Antibiotics	13,296	8.2	2,868	5.9
Macrolides	9,723	6.0	2,694	5.5
Penicillins	55,894	34.4	9,861	20.1
Sulfonamides	5,132	3.2	3,194	6.5
Immunologic Drugs	33,541	20.7	4,176	8.5
Nutritional Products	12,927	8.0	*	*
Central Nervous System Drugs (e.g., Pain Relievers, Drugs Used to Treat Anxiety and Insomnia)	8,673	5.3	10,842	22.2
Respiratory System Medications	8,292	5.1	4,617	9.4
Topical Agents (e.g., Germicides, Skin Cream)	6,207	3.8	2,131	4.4
Gastrointestinal System Medications	1,814	1.1	1,136	2.3
Hormones	1,287	0.8	1,490	3.0
Drugs for Metabolic Disorders	748	0.5	703	1.4
Psychotherapeutic Drugs (e.g., Antidepressants)	*	*	3,006	6.1
Cardiovascular System Medications	*	*	474	1.0
Drug Unknown	1,945	1.2	1,111	2.3

* Estimates are suppressed due to low statistical precision.

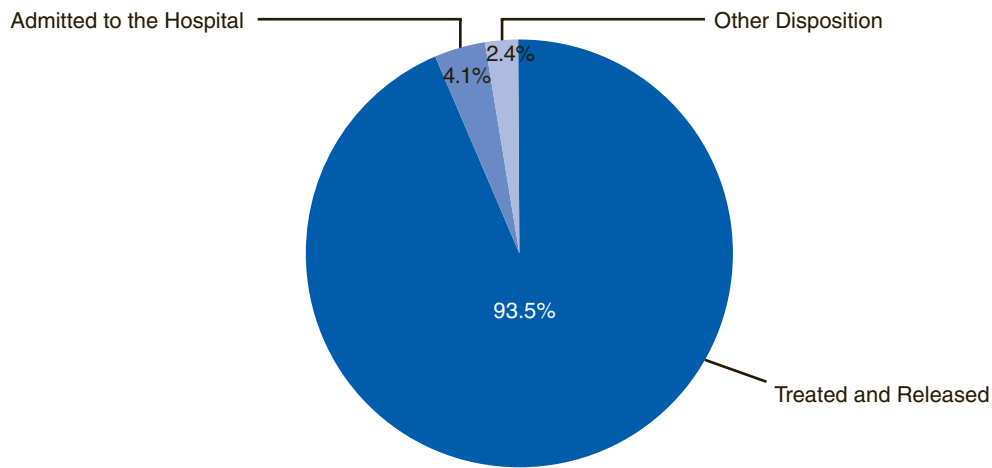
Source: 2008 SAMHSA Drug Abuse Warning Network (DAWN).

In comparison with their older counterparts, visits made by children aged 5 or younger had a higher percentage of visits involving one drug (92.7 vs. 87.7 percent; Figure 1). Visits made by patients aged 6 to 12 had a higher percentage of ED visits that involved two drugs than their younger peers (8.8 vs. 5.4 percent).

Anti-infection medications (e.g., penicillins, sulfonamides) accounted for the largest proportion of substances involved in ED visits for adverse reactions among children, accounting for a little more than half (55.4 percent) of visits among children aged 5 or younger and more than two fifths (43.3 percent) of visits among children aged 6 to 12 (Table 1). The most common anti-infection medications involved in these visits were penicillin-based drugs.

Excluding anti-infection medications, the remainder of the drugs involved in ED visits for adverse drug reactions among children varied by age group. About one fifth (20.7 percent) of such visits among patients aged 5 or younger were for immunologic drugs (e.g., viral vaccines) compared with 8.5 percent of visits for patients aged 6 to 12. Almost 1 in 12 visits (8.0 percent) among patients aged 5 or younger involved nutritional products (e.g., oral nutritional supplements). In contrast, more than one fifth (22.2 percent) of visits made by patients aged 6 to 12 involved central nervous system (CNS) drugs (e.g., pain relievers and drugs used to treat anxiety and insomnia) compared with a small percentage (5.3 percent) of visits among patients aged 5 or younger.

Figure 2. Disposition of Emergency Department (ED) Visits Involving Adverse Reactions to Drugs among Children Aged 12 or Younger: 2008



Source: 2008 SAMHSA Drug Abuse Warning Network (DAWN).

Disposition of ED Visits

Most (93.5 percent) of the children aged 12 or younger who were taken to the ED for adverse reactions were treated and released, 4.1 percent were admitted to the hospital, and 2.4 percent had some other disposition (Figure 2). Of the visits that resulted in admission to the hospital, a little more than one third (35.7 percent) involved anti-infection medications, 10.3 percent involved nutritional products, and 7.9 percent involved CNS drugs (Figure 3).

Discussion

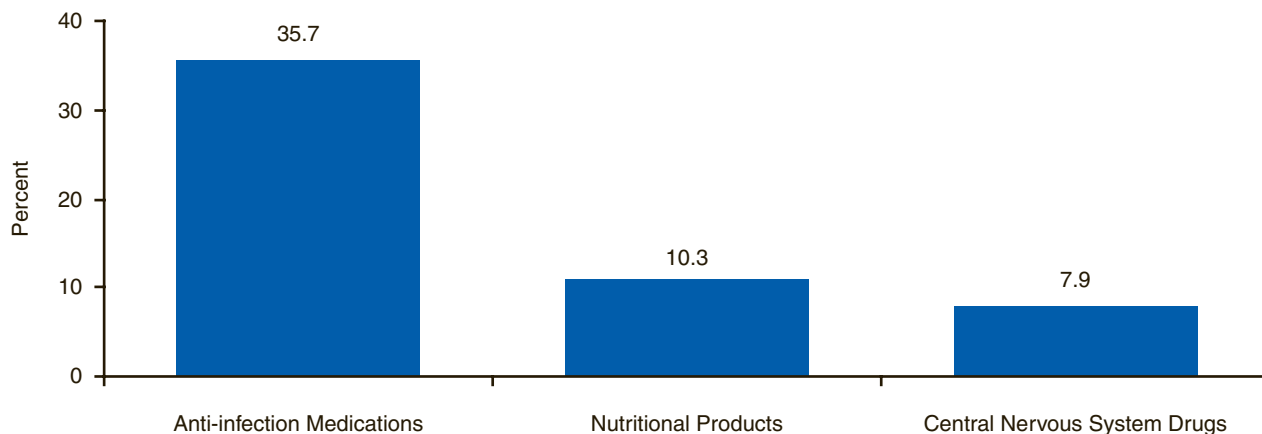
Thousands of children have an adverse reaction to drugs each year and, as a result, visit the ED. In 2008, the estimated number of ED visits for children aged 12 or younger exceeded 200,000; moreover, 3 in 4 of these visits were for children

aged 5 or younger. A variety of drugs, including pharmaceutical and nutritional products, caused these reactions.

These findings point toward the need for increased education efforts focusing on parents, other family members, and temporary caregivers who may be in charge of administering medication. Pediatricians and pharmacists can play an important role in this effort by ensuring that parents and caregivers understand what symptoms and side effects to look for if they suspect an adverse reaction in their children. Moreover, it is critical that medical records are updated with any adverse reaction to prescription or OTC medications and that temporary caregivers are made aware of these known adverse reactions.

Finally, this report found that more than 9 in 10 ED visits resulted in these pediatric patients being treated and released. Trips to the ED can

Figure 3. Selected Drugs Involved in Emergency Department (ED) Visits Involving Adverse Reactions to Drugs among Children Aged 12 or Younger That Resulted in Inpatient Care: 2008



Source: 2008 SAMHSA Drug Abuse Warning Network (DAWN).

be a costly burden on the health care system. As Federal agencies seek ways to increase access to appropriate and high-quality health care while reducing costs, one potential avenue might be to enhance drug safety. To that end, the public health community can do its part by teaching parents and caregivers where and how to report adverse drug reactions through education and awareness campaigns. Health care providers also can ensure that adverse reactions are reported through appropriate channels. If reporting is bolstered, data quality on adverse reactions will be improved, leading to better health outcomes for children, families, and communities.

- ² Sikdar, K., Alaghebandan, R., MacDonald, D., Barrett, B., Collins, K., & Gadag, V. (2010). Adverse drug events among children presenting to a hospital emergency department in Newfoundland and Labrador, Canada. *Pharmacoepidemiology and Drug Safety*, 19, 132-140.
- ³ Kaushal, R., Goldmann, D., Keohane, C., Christino, M., Honour, M., Hale, A., Zigmont, K., Lehmann, L., Perrin, J., & Bates, D. (2007). Adverse drug events in pediatric outpatients. *Ambulatory Pediatrics*, 7(5), 383-389.
- ⁴ Impicciatore, P., Choonara, I., Clarkson, A., Provfasi, D., Pandolfini, C., & Bonati, M. (2001). Incidence of adverse drug reactions in paediatric in/out-patients: A systematic review and meta-analysis of prospective studies. *Journal of Clinical Pharmacology*, 52, 77-83.
- ⁵ Lasser, K., Allen, P., Woolhandler, S., Himmelstein, D., Wolfe, S., & Bor, D. (2010). Timing of new black box warnings and withdrawals for prescription medications. *Journal of the American Medical Association*, 287(17), 2215-2220.
- ⁶ To learn more about DAWN and other studies, please go to <http://oas.samhsa.gov/>.
- ⁷ It should be noted that although DAWN does collect data from pediatric emergency departments in general hospitals, DAWN excludes specialty hospitals, such as pediatric hospitals. Therefore, adverse reactions for this age group may be higher than what is reported to DAWN.

End Notes

¹ Budnitz, D., Pollock, D., Weidenback, K., Mendelsohn, A., Schroeder, T., & Annet, J. (2006). National surveillance of emergency department visits for outpatient adverse drug events. *Journal of the American Medical Association*, 296(15), 1858-1866.

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Findings from SAMHSA's 2008 Drug Abuse Warning Network (DAWN)

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The Drug Abuse Warning Network (DAWN) is a public health surveillance system that monitors drug-related morbidity and mortality. DAWN uses a probability sample of hospitals to produce estimates of drug-related emergency department (ED) visits for the United States and selected metropolitan areas annually. DAWN also produces annual profiles of drug-related deaths reviewed by medical examiners or coroners in selected metropolitan areas and States.

Any ED visit related to recent drug use is included in DAWN. All types of drugs—licit and illicit—are covered. Alcohol is included for adults when it occurs with another drug. Alcohol always is reported for minors even if no other drug is present. DAWN's method of classifying drugs was derived from the Multum *Lexicon*. Copyright 2008, Multum Information Services, Inc. The Multum Licensing Agreement can be found in DAWN annual publications.

DAWN is one of three major surveys conducted by the Substance Abuse and Mental Health Services Administration's Center for Behavioral Health Statistics and Quality (SAMHSA/CBHSQ). For more information on other surveys, go to <http://oas.samhsa.gov>. SAMHSA has contracts with Westat (Rockville, MD) and RTI International (Research Triangle Park, NC) to operate the DAWN system and produce publications.

For publications and additional information about DAWN, go to <http://DAWNinfo.samhsa.gov/>.



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