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Drug Abuse Warning Network

The DAWN Report

January 24, 2013

Emergency Department Visits Involving Attention Deficit/Hyperactivity Disorder Stimulant Medications

Attention deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder marked by excessive hyperactivity, impulsivity, or inattention.[1] Although these disorders are typically diagnosed in childhood, symptoms may persist into adulthood.[1] About two thirds (66 percent) of children aged 4 to 17 diagnosed with ADHD took medication for the disorder in 2007,[2] and stimulant medications remain the first-line treatment for these disorders in both children and adults.[3] When used as directed, ADHD stimulant medications can be effective treatment, but they can also have negative side effects, such as nervousness, insomnia, dizziness, and cardiovascular or psychiatric problems.[4,5] ADHD stimulant medications can also be misused to suppress appetite, enhance alertness, or cause feelings of euphoria.[6] Past year nonmedical use of Adderall®, a common ADHD stimulant medication, increased among adults from 2006 to 2010, particularly among young adults aged 18 to 25.[7] Whether ADHD stimulant medications are misused or adverse reactions occur when the medication is taken as prescribed, monitoring dangerous health effects that require immediate medical attention can help guide intervention efforts.

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that monitors drug-related emergency department (ED) visits in the United States and can be used to track ED visits related to ADHD stimulant medications. To be a DAWN case, an ED visit must have involved a drug, either as the direct cause of the visit or as a contributing factor. This issue of *The DAWN Report* examines trends in ED visits involving ADHD stimulant medications, including methylphenidate (e.g., Ritalin®, Concerta®), amphetamine-dextroamphetamine (e.g., Adderall®), dexmethylphenidate (e.g., Focalin®), and dextroamphetamine (e.g., Dexedrine®).

IN BRIEF

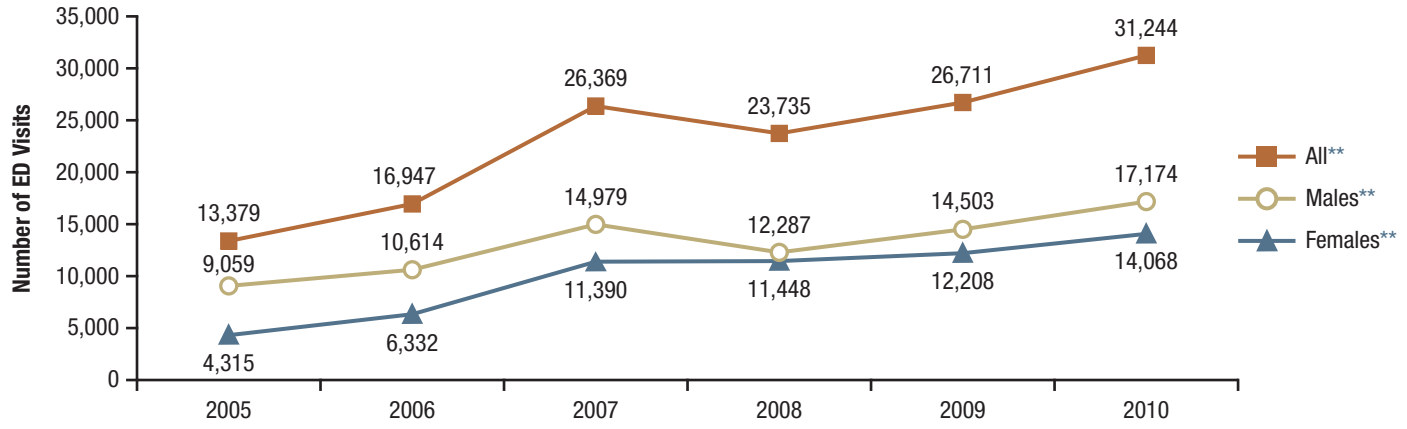
- Between 2005 and 2010, the number of emergency department (ED) visits involving attention deficit/hyperactivity disorder (ADHD) stimulant medications increased from 13,379 to 31,244 visits
- The number of ED visits involving ADHD stimulant medications increased significantly for adults aged 18 or older between 2005 and 2010, but no significant increases were seen among children younger than 18
- Between 2005 and 2010, the number of ED visits related to ADHD stimulant medications that involved nonmedical use increased from 5,212 to 15,585 visits; those involving adverse reactions increased from 5,085 to 9,181 visits
- Other pharmaceutical drugs were involved in nearly half (45 percent) of ED visits involving ADHD stimulant medications and about one fifth involved illicit drugs (21 percent) or alcohol (19 percent)

Overview and Demographic Characteristics

The number of ED visits involving ADHD stimulant medications increased between 2005 and 2010 from 13,379 to 31,244 visits (Figure 1). The number of ED visits involving ADHD stimulant medications increased among both males and females: visits among females increased between 2005 and 2010 from 4,315 to 14,068 visits, and visits among males nearly doubled from 9,059 to 17,174 visits.

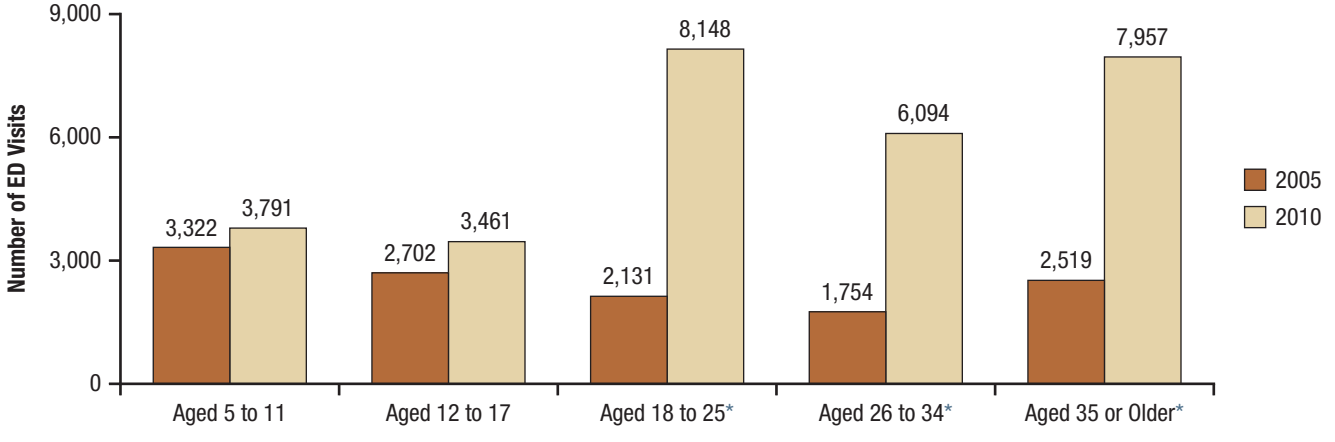
Although the number of ED visits involving ADHD stimulant medications did not increase significantly for children younger than 18 between 2005 and 2010, increases were seen among multiple age groups for persons aged 18 or older (Figure 2). Specifically, visits increased from 2,131 to 8,148 visits among persons aged 18 to 25, from 1,754 to 6,094 visits among persons aged 26 to 34, and from 2,519 to 7,957 visits among adults aged 35 or older.

Figure 1. Emergency Department (ED) Visits Related to Attention Deficit/Hyperactivity Disorder (ADHD) Stimulant Medications, by Gender*: 2005 to 2010



* Because gender is unknown in a small number of visits, estimates for males and females do not add to the total.
** The change from 2005 to 2010 is statistically significant at the .05 level.
Source: 2005 to 2010 SAMHSA Drug Abuse Warning Network (DAWN).

Figure 2. Emergency Department (ED) Visits Related to Attention Deficit/Hyperactivity Disorder (ADHD) Stimulant Medications, by Age Group: 2005 and 2010



* The change from 2005 to 2010 is statistically significant at the .05 level.
Source: 2005 and 2010 SAMHSA Drug Abuse Warning Network (DAWN).

Reasons for ED Visits

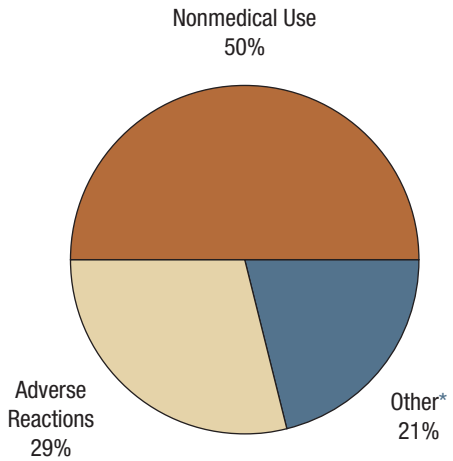
In 2010, half of ADHD stimulant medication-related ED visits involved nonmedical use of pharmaceuticals[8] (50 percent), and nearly one third involved adverse reactions[9] (29 percent) (Figure 3). The number of ED visits related to ADHD stimulant medications involving nonmedical use of pharmaceuticals increased significantly from 5,212 visits in 2005 to 15,585 visits in 2010 (Table 1). Among demographic subgroups, ED visits involving nonmedical use of pharmaceuticals increased significantly among males, females, and adults aged 18 or older.

The number of ED visits related to ADHD stimulant medications involving adverse reactions increased significantly from 5,085 visits in 2005 to 9,181 visits in 2010 (Table 1). Among demographic subgroups, ED visits for adverse reactions increased significantly among females and adults aged 18 or older.

Drug Combinations with ADHD Stimulant Medications

Of the 31,244 ED visits involving ADHD stimulant medications in 2010, one quarter (25 percent) involved one other drug, and nearly two fifths (38 percent) involved two or more other drugs (Table 2). Other pharmaceutical drugs were involved in nearly half (45 percent) of visits; one quarter (26 percent) involved anti-anxiety and insomnia medications, and about one sixth (16 percent) involved narcotic pain relievers.[10]

Figure 3. Emergency Department (ED) Visits Related to Attention Deficit/Hyperactivity Disorder (ADHD) Stimulant Medications, by Reason for Visit: 2010



* Includes accidental ingestions and suicide attempts.
Source: 2010 SAMHSA Drug Abuse Warning Network (DAWN).

Table 1. Reason for Emergency Department (ED) Visits Related to Attention Deficit/Hyperactivity Disorder (ADHD) Stimulant Medications, by Gender and Age Group*: 2005 and 2010

Demographic Characteristic	Nonmedical Use in 2005: Number of ED Visits	Nonmedical Use in 2010: Number of ED Visits
Total ED Visits	**5,212**	**15,585****
Male	3,770	8,650**
Female	1,439	6,932**
Aged 5 to 11	***	***
Aged 12 to 17	1,578	1,830
Aged 12 to 14	429	534
Aged 15 to 17	1,149	1,296
Aged 18 or Older	3,175	13,570**
Aged 18 to 25	1,310	5,766**
Aged 26 to 34	851	3,556**
Aged 35 or Older	1,014	4,248**

Demographic Characteristic	Adverse Reactions in 2005: Number of ED Visits	Adverse Reactions in 2010: Number of ED Visits
Total ED Visits	**5,085**	**9,181****
Male	3,500	5,234
Female	1,584	3,947**
Aged 5 to 11	2,630	3,513
Aged 12 to 17	647	685
Aged 12 to 14	***	459
Aged 15 to 17	436	226
Aged 18 or Older	1,637	4,983**
Aged 18 to 25	539	1,264
Aged 26 to 34	***	1,122
Aged 35 or Older	790	2,597**

* Because gender or age is unknown in a small number of visits, estimates do not add to the total.
** The change from 2005 to 2010 is statistically significant at the .05 level.
*** Estimate not reported due to low precision.
Source: 2005 and 2010 SAMHSA Drug Abuse Warning Network (DAWN).

About one fifth involved illicit drugs (21 percent), and 14 percent involved marijuana. Nearly one fifth involved alcohol (19 percent).

Drug combinations involved in ED visits related to ADHD stimulant medications varied across age groups. Marijuana was the most common drug combined with ADHD stimulant medications among adolescents aged 15 to 17 (32 percent), and alcohol was the most common drug combined with ADHD stimulant medications among young adults aged 18 to 25 (30 percent) (data not shown). Anti-anxiety and insomnia medications were the most common drug combined with ADHD stimulant medications among adults aged 26 to 34 (44 percent) and those aged 35 or older (31 percent). Visits for children aged 14 or younger did not yield statistically reliable estimates for drug combinations with ADHD stimulant medications.

Table 2. Number and Percentage of Selected Drugs Involved in Emergency Department (ED) Visits Related to Attention Deficit/Hyperactivity Disorder (ADHD) Stimulant Medications: 2010

Drug Combination	Estimated Number of ED Visits	Percentage of Visits
Total ED Visits	**31,244**	**100%**
ADHD Stimulant Medication Only	11,644	37%
ADHD Stimulant Medication with One Other Drug	7,667	25%
ADHD Stimulant Medication with Two or More Other Drugs	11,933	38%
ADHD Stimulant Medication with Other Drugs		
Other Pharmaceutical Drugs	14,010	45%
Anti-anxiety and Insomnia Medications	8,083	26%
Narcotic Pain Relievers	5,140	16%
Antidepressants	3,199	10%
Antipsychotics	2,050	7%
Cardiovascular Agents	1,741	6%
Anticonvulsants	1,150	4%
Respiratory Agents	1,063	3%
Illicit Drugs	6,683	21%
Marijuana	4,228	14%
Stimulants	1,306	4%
Cocaine	1,277	4%
Heroin	770	3%
Alcohol	5,783	19%

Note: Because multiple drugs may be involved in each visit, estimates of visits by drug add to more than the total, and percentages add to more than 100 percent.

Source: 2010 SAMHSA Drug Abuse Warning Network (DAWN).

Discussion

Because ADHD stimulant medications have historically been prescribed for developmental disorders in children, nonmedical use among adolescents and young adults has received much attention.[11] This report shows that ED visits for nonmedical use have not increased among children and adolescents, but they have increased among adults aged 18 or older. This suggests a need for increased attention toward efforts to prevent diversion and misuse among adults.

Even when taken as directed, ADHD stimulant medications entail some risk,[4] and the data in this report show that the number of visits involving adverse reactions increased between 2005 and 2010, especially for adults aged 18 and older. As treatment for ADHD among adults becomes more widespread,[3] prescribing physicians (including psychiatrists and other mental health professionals) may carefully consider associated risks among those who have chronic health conditions and/or take other medications that may interact with ADHD stimulant medications. A variety of treatment options, both pharmaceutical and nonpharmaceutical, are available for adults with ADHD.[3,12]

End Notes

1. Centers for Disease Control and Prevention. (2010). *Attention-deficit/hyperactivity disorder (ADHD): Facts about ADHD*. Retrieved from http://www.cdc.gov/ncbddd/adhd/facts.html
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3. Antshel, K. M., Hargrave, T. M., Simonescu, M., Kaul, P., Hendricks, K., & Faraone, S. V. (2011). Advances in understanding and treating ADHD. *BMC Medicine, 9*, 72.
4. Food and Drug Administration Press Release. (2007). *FDA directs ADHD drug manufacturers to notify patients about cardiovascular adverse events and psychiatric adverse events*. Retrieved from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2007/ucm108849.htm

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7. Center for Behavioral Health Statistics and Quality. (2011). *Results from the 2010 National Survey on Drug Use and Health: Detailed tables*. Rockville, MD: Substance Abuse and Mental Health Services Administration. Retrieved from http://www.samhsa.gov/data/nsduh/2k10NSDUH/tabs/Cover.pdf
8. Nonmedical use includes taking more than the prescribed dose of a prescription medication or more than the recommended dose of an OTC medication or supplement; taking more than the prescribed dose of a prescription medication or more than the recommended dose of an OTC medication or supplement; taking a prescription medication prescribed for another individual; being deliberately poisoned with a pharmaceutical by another person; and misusing or abusing a prescription medication, an OTC medication, or a dietary supplement.
9. 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.
10. If a visit for nonmedical use of pharmaceuticals involves more than one pharmaceutical, DAWN does not specify which pharmaceutical was used nonmedically.
11. Wilens, T. E., Adler, L. A., Adams, J., Sgambati, S., Rotrosen, J., Sawtelle, R., Utzinger, L., & Fusillo, S. (2008). Misuse and diversion of stimulants prescribed for ADHD: A systematic review of the literature. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(1), 21-31.
12. National Institute of Mental Health. (2009). *Attention deficit hyperactivity disorder: Can adults have ADHD?* Retrieved from http://www.nimh.nih.gov/health/publications/attention-deficit-hyperactivity-disorder/can-adults-have-adhd.shtml

Suggested Citation

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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 involvement is documented for patients of all ages if it occurs with another drug. Alcohol is considered an illicit drug for minors and is documented even if no other drug is involved. The classification of drugs used in DAWN is derived from the Multum *Lexicon*, copyright 2010 Lexi-Comp, Inc., and/or Cerner Multum, Inc. The Multum Licensing Agreement governing use of the *Lexicon* can be found at http://www.samhsa.gov/data/DAWN.aspx.

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 CBHSQ surveys, go to http://www.samhsa.gov/data/. 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://www.samhsa.gov/data/DAWN.aspx.

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