Drug Abuse Warning Network

The DAWN Report

October 27, 2011

ED Visits Involving the Muscle Relaxant Carisoprodol

In Brief

- The number of carisoprodol-related ED visits involving misuse or abuse doubled from 15,830 visits in 2004 to 31,763 visits in 2009
- The number of carisoprodol-related ED visits involving misuse or abuse by patients aged 50 or older tripled between 2004 and 2009 (from 2,070 to 7,115 visits)
- The majority of ED visits involving carisoprodol also involved other pharmaceuticals (77 percent); the most common combinations involved narcotic pain relievers (55 percent) and benzodiazepines (47 percent)
- Of all the carisoprodol visits classified as misuse or abuse, one third (35 percent) of the visits required hospitalization

Carisoprodol (i.e., Soma®, Soprodal®, Vanadom®) is a pharmaceutical typically prescribed to relieve symptoms of muscle pain or discomfort, but it can cause drowsiness and sedation in excess doses.[1] Carisoprodol is converted by the liver to meprobamate, a drug used to treat anxiety, that can result in physical and psychological dependence when used in excess. This conversion may account for some of the effects of carisoprodol and likely contributes to its potential for abuse.[2] The Food and Drug Administration (FDA) recommends using carisoprodol no longer than 2 to 3 weeks to avoid the risk for dependence, withdrawal, and abuse.[3]

When carisoprodol is combined with drugs such as narcotic pain relievers, benzodiazepines (used to treat anxiety and insomnia), or alcohol, its sedation effects can be dangerously enhanced.[3]

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Some users have combined carisoprodol with certain narcotic pain relievers and benzodiazepines to create an effect similar to that of heroin.[4]

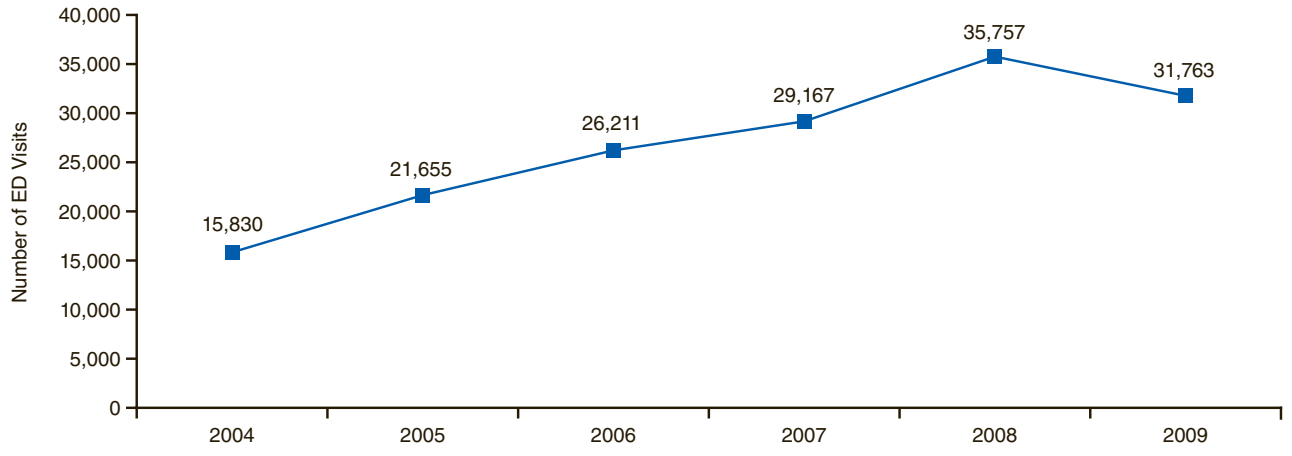
Carisoprodol is not federally classified as a controlled substance, and thus its prescribing and dispensing are not monitored by State-mandated Prescription Drug Monitoring Programs designed to prevent diversion and misuse of prescription drugs. Tracking emergency department (ED) visits involving carisoprodol can provide data to help policymakers and health professionals to understand emerging problems associated with the use of this drug and to consider appropriate safeguards.

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that monitors drug-related ED visits in the United States. 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. Data are collected on numerous illicit drugs, including cocaine, marijuana, heroin, and stimulants (e.g., amphetamines and methamphetamines), as well as pharmaceutical products such as prescribed and over-the-counter medications. Data are also collected for visits involving alcohol in combination with other drugs for persons aged 21 or older and for visits with any alcohol involvement for persons aged 20 or younger. This issue of *The DAWN Report* focuses on carisoprodol-related ED visits involving misuse or abuse in 2009 and trends between 2004 and 2009. Misuse or abuse cases are broadly defined to include all visits associated with illicit drugs, alcohol use in combination with other drugs, alcohol use alone among those younger than 21 years old, and nonmedical use of pharmaceuticals.

Trends in ED Visits

The number of carisoprodol-related ED visits involving misuse or abuse doubled from 15,830 visits in 2004 to 31,763 visits in 2009 (Figure 1). Similar trend patterns were found for both males and females during the same time period (Table 1). The number of carisoprodol-related ED visits involving misuse or abuse by patients aged 50 or older tripled between 2004 and 2009 (from 2,070 to 7,115 visits), and the number of visits by patients aged 35 to 49 nearly doubled (from 6,345

Figure 1. Carisoprodol-Related Emergency Department (ED) Visits Involving Misuse or Abuse, by Year: 2004 to 2009



Source: 2004 to 2009 estimates from the 2009 SAMHSA Drug Abuse Warning Network (DAWN).

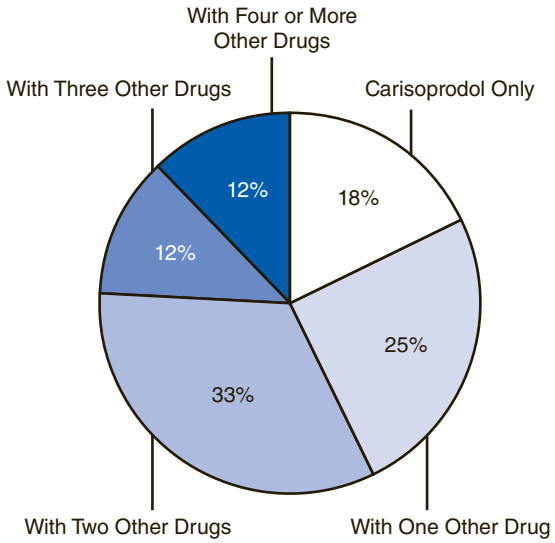
Table 1. Carisoprodol-Related Emergency Department (ED) Visits Involving Misuse or Abuse, by Gender and Age: 2004 and 2009

Gender/Age	ED Visits in 2004	ED Visits in 2009	Percent Change from 2004 to 2009
Total ED Visits	**15,830**	**31,763**	**101***
Male	6,618	14,772	123*
Female	9,211	16,991	84*
Aged 12 to 17	835	1,159	39
Aged 18 to 24	2,066	3,403	65
Aged 25 to 34	4,512	8,035	78
Aged 35 to 49	6,345	12,048	90*
Aged 50 or Older	2,070	7,115	244*

* The difference between 2004 and 2009 was statistically significant at the .05 level.

Source: 2004 and 2009 estimates from the 2009 SAMHSA Drug Abuse Warning Network (DAWN).

Figure 2. Number of Other Drugs among Carisoprodol-Related Emergency Department (ED) Visits Involving Misuse or Abuse: 2009



Source: 2009 SAMHSA Drug Abuse Warning Network (DAWN).

to 12,048 visits). Changes in the number of visits by younger patients (aged 12 to 17, aged 18 to 24, and aged 25 to 34) were not significantly different between 2004 and 2009.

Drug Combinations Involved in ED Visits

Approximately one in five of the carisoprodol-related ED visits involving misuse or abuse involved carisoprodol only (18 percent) (Figure 2). One quarter involved one other drug (25 percent), and one third involved two other drugs (33 percent). About 12 percent of visits involved three other drugs, and the remaining 12 percent involved four or more other drugs.

The majority of carisoprodol-related ED visits involving misuse or abuse also involved other pharmaceuticals (77 percent) (Table 2). Narcotic pain relievers were the most common type of pharmaceutical involved in combination with carisoprodol (55 percent); specific types of narcotic pain relievers frequently involved included hydrocodone (28 percent) and oxycodone (21 percent). Benzodiazepines were combined with carisoprodol in 47 percent of visits, and alprazolam (28 percent) was the most commonly involved benzodiazepine. Both narcotic pain relievers and benzodiazepines were involved in one third of carisoprodol-related ED visits involving misuse or abuse (32 percent). More than half (58 percent) of carisoprodol-related ED visits involved other pharmaceuticals only.

About one in seven carisoprodol-related ED visits involving misuse or abuse (15 percent) also involved illicit drugs. Alcohol was involved in 12 percent of carisoprodol-related ED visits.

Table 2. Selected Drug Combinations among Carisoprodol-Related Emergency Department (ED) Visits Involving Misuse or Abuse, by Drug Combination: 2009

Drug Combination	Number of ED Visits	Percentage of Visits*
Total ED Visits	**31,763**	**100**
Combinations with Other Pharmaceuticals	24,478	77
Narcotic Pain Relievers	17,478	55
Hydrocodone	8,851	28
Oxycodone	6,661	21
Benzodiazepines	15,032	47
Alprazolam	8,808	28
Antidepressants	2,749	9
Combinations with Both Narcotic Pain Relievers and Benzodiazepines	10,101	32
Combinations with Other Pharmaceuticals Only	18,468	58
Combinations with Illicit Drugs	4,761	15
Combinations with Alcohol	3,750	12

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

Source: 2009 SAMHSA Drug Abuse Warning Network (DAWN).

Disposition of ED Visits

Of the 31,763 carisoprodol-related ED visits classified as misuse or abuse, one third (35 percent) resulted in hospitalization. Among carisoprodol-related ED visits classified as involving abuse or misuse, 24,478 involved carisoprodol combined with other pharmaceuticals; of these, 38 percent required hospitalization. Of the 17,478 visits involving carisoprodol combined with narcotic pain relievers, 36 percent required hospitalization, and of the 15,032 visits involving carisoprodol combined with benzodiazepines, 42 percent required hospitalization.

Discussion

Misuse and abuse of carisoprodol is a small but growing problem in the United States and is worthy of public health attention. Although it is a useful medication for short-term (i.e., 2 to 3 weeks) treatment of acute muscle pain, carisoprodol can be dangerous when combined with other sedative medications or with alcohol; when used for extended periods of time and/or in higher doses; or when used by individuals who are at risk for developing addiction.[3]

Carisoprodol is widely prescribed for a broad array of problems that range from simple muscle sprains to more severe injuries such as those sustained in vehicle accidents, and it can be prescribed alone or in combination with other medications. However, patients may not be aware that carisoprodol can be dangerous in combination with other drugs or alcohol. Prescribers should be mindful that carisoprodol metabolizes to meprobamate, a powerful and potentially addictive depressant, and they should educate patients about the dangers of mixing it with other substances.

Physicians, pain specialists, hospitals, and EDs need to be aware of the potential for abuse or dependence for certain patients with chronic pain symptoms, especially for older adults who commonly take numerous pharmaceuticals daily. Patients may obtain multiple prescriptions without proper management by a primary care provider, depending on how they seek treatment for pain. Since only a very limited number of States have regulatory authority for monitoring unscheduled drugs, providers are in the best position to manage prescribing and dispensing unscheduled, but potentially risky, prescription drugs such as carisoprodol.[5] Screening for substance abuse problems or for history of addictive behaviors may be beneficial prior to prescribing carisoprodol. If ED staff identify carisoprodol abuse during an ED visit, a referral to a substance abuse treatment program should be considered.

End Notes

[1] Department of Justice, National Drug Intelligence Center. (2004). *Soma fast facts* (NDIC Product No. 2004-L0559-006). Retrieved from http://www.justice.gov/ndic/pubs10/10913/index.htm

[2] U.S. Drug Enforcement Administration. (n.d.). *Meprobamate*. Retrieved from http://www.justice.gov/dea/concern/laam.html#meprobamate

[3] Food and Drug Administration. (2009). *Highlights of prescribing information: Soma (carisoprodol)*. Retrieved from http://www.accessdata.fda.gov/drugsatfda_docs/label/2009/011792s043lbl.pdf

[4] Forrester, M. B. (2011). Ingestions of hydrocodone, carisoprodol, and alprazolam in combination reported to Texas Poison Centers. *Journal of Addictive Diseases*, *30*, 110–115.

[5] National Alliance for Model State Drug Laws. (2011). *Prescription drug monitoring programs: A brief overview*. Retrieved from http://www.namsdl.org/documents/BriefOverviewPMPLaws-6-3-11.pdf

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Findings from SAMHSA's 2004 to 2009 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 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://dawninfo.samhsa.gov/drug_vocab.

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

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