Emergency Department Visits Attributed to Overmedication That Involved the Insomnia Medication Zolpidem

Zolpidem is a medication approved by the Food and Drug Administration (FDA) for short-term treatment of insomnia and is the active ingredient in the popular sleep aids Ambien®, Ambien CR®, Edluar®, and Zolpimist®. In 2010, approximately one third or 20,793 of the 64,175 emergency department (ED) visits involving zolpidem resulted from overmedication. This report examines zolpidem involvement in ED visits that are related to overmedication, which may occur when a patient takes too much of their own medications (i.e., exceeds the prescribed or recommended dose). Overmedication visits may involve multiple medications, but this analysis excludes visits that involved an illicit drug or prescription medications that were not prescribed for the patient or that were the result of a drug-related suicide attempt. All drugs involved in visits attributed to overmedication are documented; however, for visits involving multiple pharmaceuticals, it is not known which specific drug or drugs were taken in excess.

Even when taking the recommended dose of zolpidem, some patients find restful sleep difficult to achieve. When sleep does not come easily or is interrupted, patients may take more of their zolpidem medication than is prescribed. This may occur even though the medication guides for each zolpidem product mentioned above contain clear instructions to the patient to take the product exactly as prescribed.

Tracking ED visits involving zolpidem can help health professionals and patients understand the health consequences of overmedication associated with this drug and to consider appropriate safeguards and instructions to patients. 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 combined with other drugs and, for patients aged 20 or younger, alcohol when it is the only substance involved in the visit. A previous issue of The DAWN Report described zolpidem visits involving adverse reactions; this report describes visits involving overmedication. Overmedication, as defined in DAWN, includes only ED visits for patients who took medications prescribed or recommended for them and excludes patients who took a prescription drug not intended for them. Overmedication visits are those in which it was documented that more than the prescribed or recommended dose of an over-the-counter pharmaceutical, a dietary supplement, or a medication prescribed or recommended for that person had been taken. A visit is not included in this category if an illicit drug was involved or if the visit involved a suicide attempt.

To increase analytic capability and statistical power, this issue of The DAWN Report adds estimates together in two-year increments (i.e., 2005-2006, 2007-2008, and 2009-2010) within the Trends and Demographic Characteristics sections. The remaining two sections of the report (Drug Combinations and Disposition) present detailed findings from 2010 only.

**Trends in ED Visits**

In 2005 and 2006, there was an estimated total of 21,824 zolpidem-related ED visits involving overmedication (Figure 1). Later, visits in 2009 and 2010 summed to about twice that number of visits (42,274 visits).

**Demographic Characteristics**

The total estimated number of zolpidem-related ED visits involving overmedication increased for both males and females between 2005-2006 and 2009-2010 (Figure 2). Overall, visits increased 150 percent among males (from a total of 6,607 visits in 2005 and 2006 to a total of 16,523 visits in 2009 and 2010) and by 69 percent among females (from a total of 15,216 visits in 2005 and 2006 to a total of 25,749 visits in 2009 and 2010) (Figure 2).
The following sections of this report will focus on the estimated 20,793 zolpidem-related visits attributed to overmedication that occurred in 2010, two thirds of which were made by females (68 percent). Patients aged 45 to 54 represented nearly one in three of these visits (31 percent) (Figure 3), and about one in five were aged 34 years or younger (4,831 visits, or 23 percent). An additional one in five were aged 35 to 44 years (4,468 visits, or 21 percent), and the remainder were either aged 55 to 64 (14 percent) or 65 or older (11 percent).

**Drug Combinations Involved in ED Visits**

Among zolpidem-related ED visits involving overmedication in 2010, 37 percent involved zolpidem only, accounting for an estimated 7,760 visits (Table 1). More than half of visits (57 percent) involved other pharmaceuticals combined with zolpidem. These included visits involving other anti-anxiety and insomnia medications (including benzodiazepines), accounting for an estimated 6,018 visits (29 percent).

**Table 1. Selected Drug Combinations for Zolpidem-Related Emergency Department (ED) Visits Involving Overmedication, All Visits Compared with Visits Resulting in Admission or Transfer: 2010**

<table>
<thead>
<tr>
<th>Drug Category/Combination</th>
<th>All ED Visits*: Number</th>
<th>All ED Visits*: Percent</th>
<th>ED Visits Resulting in Admission or Transfer*: Number</th>
<th>ED Visits Resulting in Admission or Transfer*: Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ED Visits</td>
<td>20,793</td>
<td>100</td>
<td>9,798</td>
<td>100</td>
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<tr>
<td>Zolpidem Only</td>
<td>7,760</td>
<td>37</td>
<td>2,901</td>
<td>30</td>
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<tr>
<td>Zolpidem in Combination with Other Pharmaceuticals</td>
<td>11,822</td>
<td>57</td>
<td>6,525</td>
<td>67</td>
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<tr>
<td>Pain Relievers</td>
<td>6,267</td>
<td>30</td>
<td>3,459</td>
<td>35</td>
</tr>
<tr>
<td>Narcotic Pain Relievers</td>
<td>5,217</td>
<td>25</td>
<td>2,694</td>
<td>28</td>
</tr>
<tr>
<td>Hydrocodone Combinations</td>
<td>1,930</td>
<td>9</td>
<td>863</td>
<td>9</td>
</tr>
<tr>
<td>Oxycodone Combinations</td>
<td>1,391</td>
<td>7</td>
<td>1,167</td>
<td>12</td>
</tr>
<tr>
<td>Other Anti-anxiety and Insomnia Medications</td>
<td>6,018</td>
<td>29</td>
<td>3,122</td>
<td>32</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>5,479</td>
<td>26</td>
<td>2,832</td>
<td>29</td>
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<tr>
<td>Antidepressants</td>
<td>3,877</td>
<td>19</td>
<td>2,810</td>
<td>29</td>
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<td>Antipsychotics</td>
<td>2,899</td>
<td>14</td>
<td>1,779</td>
<td>18</td>
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<tr>
<td>Muscle Relaxants</td>
<td>2,631</td>
<td>13</td>
<td>1,302</td>
<td>13</td>
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<tr>
<td>Anticonvulsants</td>
<td>1,479</td>
<td>7</td>
<td>1,227</td>
<td>13</td>
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<tr>
<td>Cardiovascular Medications</td>
<td>735</td>
<td>4</td>
<td>335</td>
<td>3</td>
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<tr>
<td>Zolpidem in Combination with Alcohol</td>
<td>2,851</td>
<td>14</td>
<td>1,267</td>
<td>13</td>
</tr>
</tbody>
</table>

*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: 2010 SAMHSA Drug Abuse Warning Network (DAWN).
and those involving narcotic pain relievers, accounting for an estimated 5,217 visits (25 percent). In addition, 14 percent of visits involved alcohol combined with zolpidem (2,851 visits).

**Disposition of ED Visits**

Nearly half (47 percent) of zolpidem-related ED visits involving overmedication resulted in either a hospital admission or transfer (9,798 visits). This number includes an estimated 2,501 visits (26 percent) that resulted in admission to a critical or intensive care unit (ICU), with 1,253 (50 percent) of these ICU admissions involving medications that are also central nervous system (CNS) depressants: pain relievers or anti-anxiety and insomnia medications (data not shown).

Among zolpidem-related ED visits involving overmedication that resulted in hospital admission or transfer, 30 percent involved zolpidem only, whereas 67 percent of visits involved zolpidem in combination with other pharmaceuticals (Table 1). Approximately one third of visits that resulted in hospital admission or transfer (32 percent) involved other anti-anxiety and insomnia medications (3,122 visits), and 28 percent of visits involved narcotic pain relievers (2,694 visits). About 13 percent involved alcohol combined with zolpidem (1,267 visits).

**Discussion**

An estimated 50 to 70 million Americans suffer from chronic sleep disorders, which can affect performance on daily tasks and lead to negative health consequences. Zolpidem is a widely prescribed medication approved by the FDA for the short-term treatment of insomnia, but doses in excess of prescribed amounts led to an increasing number of ED visits since 2005. In 2013, the FDA issued a safety announcement “warning that patients who take the sleep medication zolpidem extended-release (Ambien CR)—either 6.25 mg or 12.5 mg—should not drive or engage in other activities that require complete mental alertness the day after taking the drug because zolpidem levels can remain high enough the next day to impair these activities.”

The FDA also noted that “women appear to be more susceptible to this risk because they eliminate zolpidem from their bodies more slowly than men.” This FDA safety announcement required manufacturers to lower the recommended dose of most zolpidem-containing medications by half for females. Similar action was recommended, although not required, for males.

Researchers previously found that use of zolpidem in combination with other pharmaceuticals or alcohol was associated with increased likelihood of being admitted or transferred to the ICU. Findings in this report show that almost half of zolpidem-related ED visits involving overmedication resulted in hospital admission or transfer. More than two thirds of ED visits that resulted in hospital admission or transfer involved other pharmaceuticals, mostly other CNS depressant medications. CNS depression is the result of decreased brain activity, which may be caused by taking one or several CNS depressant medications and/or alcohol in combination that may then have cumulative depressant effects on the brain. These depressant effects include a decreased breathing rate, decreased heart rate, and loss of consciousness, possibly leading to coma or death.

The age distribution for zolpidem-related visits involving overmedication contrasts with the age distribution for those visits involving adverse reactions, as described in a previous issue of *The DAWN Report*. Although visits involving adverse reactions were more common among older age groups, visits involving overmedication were distributed more evenly across all age groups. Adults of all ages can help prevent overmedication by closely following the instructions for when and how to take all medications. If symptoms persist when the recommended amount of zolpidem is taken, patients should consult their prescribing physician. Health professionals can warn patients never to exceed the recommended dose unless told to do so by the prescriber.

These data, which focus on zolpidem overmedication ED visits and include only patients who were taking medications prescribed or recommended for them, underscore the importance of continued surveillance for overmedication of all drugs to evaluate drug safety. Enhancing drug safety is an important step toward improving public health and reducing health care costs. Pharmacists can serve as a source of safety information, especially for patients taking other prescription medications, including drugs that treat pain or anxiety, that may interact with zolpidem.
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End Notes


Suggested Citation