

Trends in Teenagers' Nonopioid Substance Exposures Reported to Poison Control Centers, 2010-2015

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Objective To describe current trends in nonopioid substance exposures and associated outcomes among teenagers nationwide.

Study design In this cross-sectional study, we used 2010-2015 data from the American Association of Poison Control Centers' National Poison Data System and Poisson tests to document trends in the rate of calls to poison control centers involving adolescents stratified by sex, exposures by substance category, proportion of intentional exposures, and severity of exposures.

Results The number of calls per 1000 persons increased from 5.7 to 6.8 for teenage girls and decreased from 4.7 to 4.3 for boys. Reported exposures to prescription and over-the-counter medications and illicit street drugs increased between 24% and 73%, and reported opioid exposures decreased by 16%. Among teenage girls, intentional exposures increased from 57% to 68%, with cases increasingly managed in health care facilities and more likely to result in worse health outcomes.

Conclusions The increase in intentional nonopioid substance exposures among teenage girls, with serious and potentially life-threatening consequences, is a matter of serious concern. Similar trends were not observed among teenage boys. (*J Pediatr* 2017;■■■:■■■-■■■).

Amid the nation's opioid crisis,^{1,2} children are increasingly being hospitalized for opioid poisoning, with teenagers the most likely to overdose.³ Between 2005 and 2010, calls to poison control centers regarding teenage opioid abuse increased by 5.1% annually,⁴ with an 86% increase in opioid exposures from 2009 to 2010 alone.⁵ Moreover, 98.5% of these exposures occurred at a residence, and 71.5% of the exposures in adolescents were intentional.⁵ Far less is known about other substances to which teenagers may be exposed, however. Guidelines from the Centers for Disease Control and Prevention (CDC) that encourage physicians to treat chronic pain by prescribing antidepressants and anticonvulsants for neuropathic pain before resorting to opioids may increase teenagers' exposure to alternative prescription medications that still harbor the potential for abuse or misuse.⁶ Similarly, efforts to reduce access to prescription opioids may push teenagers to use a variety of readily available over-the-counter medications and/or illicit street drugs.

Although snapshots of the severity of teenage exposures have been described,⁷⁻¹⁰ the objective of the present study was to document trends in substance exposures—including instances of intentional use—and their severity among teenagers, using data obtained from poison control center call logs.

Methods

Our analysis used 6 years of National Poison Data System (NPDS) data (2010-2015) from the American Association of Poison Control Centers. These data contain records of all calls to poison control centers, which we used to document longitudinal trends in the prevalence of calls regarding teenagers categorized by sex, substance category, intentionality of exposure, management site, and outcome. First, we combined the NPDS data with intercensal population data from the US Census and generated descriptive statistics by calculating the rate of calls per 1000 persons among teenagers (defined as age 13-19). Next, we stratified the teenage population by sex into males and females. Then we calculated the absolute change in calls to poison control centers between 2010 and 2015, stratifying these calculations by substance category to identify which substances were associated with the greatest increases in call activity. Cases retrospectively coded as "confirmed nonexposure" were excluded.

Out of a total of 1037 total categories, 7 broad substance categories had much larger absolute increases in call volume compared with all of the others (in fact,

CDC	Centers for Disease Control and Prevention
ICU	Intensive care unit
LSD	Lysergic acid diethylamide
NPDS	National Poison Data System
THC	Tetrahydrocannabinol

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34 categories showed a decrease): antidepressants, analgesics, antihistamines, stimulants and street drugs, cardiovascular drugs, anticonvulsants, and dietary supplements/herbals/homeopathic. We selected 6 of these 7 categories for further analysis, excluding substances in the dietary supplements/herbals/homeopathic category because they are available without a prescription and are unlikely to have a high potential for misuse.

Within these broad substance categories, we also examined particularly notable cases of specific substances (based on the change in exposure volume and the potential for misuse). In addition, we stratified analgesics into opioid and nonopioid categories. We classified analgesic compounds containing an opioid as opioids; however, we excluded the category of cold and cough preparations from our analyses. Although some of these do contain substances of interest (eg, acetaminophen, diphenhydramine, codeine), it is difficult to isolate a particular substance in such compounds, and calls to poison control centers regarding this category of medications declined over the study period. We generated Poisson rates for each category, which yield the average rate of calls per person per year, and used a Poisson test to determine whether the observed counts for the substance categories of interest were significantly different in 2010 versus 2015.

Finally, we determined changes in the severity of teenage exposures over time by stratifying the proportion of total exposures by intentionality of exposure, management site, and outcome. Management sites included managed onsite, treated and released, admitted to ICU, admitted to non-ICU, admitted to psychiatry, lost to follow-up, other, and unknown. Outcomes included: no effect, minor effect, moderate effect, major effect, death, unable to follow, not followed, and unrelated effect. Institutional Review Board approval was obtained before the start of the study.

Results

Between 2010 and 2015, the US population grew from 310.4 to 322.3 million. However, the teenage population (ages 13-19) actually decreased over this period from 30.1 to 29.4 million. Similarly, the total number of exposure calls to US poison control centers decreased from 2.38 million in 2010 to 2.17 million in 2015. However, the number of exposure calls regarding teenagers actually increased over that period, from 156 164 in 2010 to 165 796 in 2015. Interestingly, a sharp uptick in calls about teenage girls explains the entirety of this increase. In 2010, teenage boys accounted for 72 506 calls, compared with 83 122 for girls (in 536 calls the sex was unknown). In 2015, teenage boys accounted for just 63 929 calls (an 11.8% decrease), and teenage girls accounted for 101 262 calls (a 21.8% increase), and in 605 calls the sex was unknown. By creating an annual rate of poison center exposure calls per 1000 persons (Figure 1), we were able to document changes in call volume and account for changes in the size of the population. From this, we see an increase in the rate of calls about teenage girls, compared with a decrease in calls about teenage boys.

To provide an overall sense of the magnitude of the trends under study, Figure 2 shows the absolute change in exposure calls made to poison control centers about teenagers between 2010 and 2015 by substance category. Of note, the largest increases were for antidepressants, nonopioid analgesics, and antihistamines, and calls related to opioid analgesics actually decreased over the time period.

The Table presents the rate ratios and confidence intervals of calls per person in 2010 to calls per person in 2015 for the substance categories that showed the greatest absolute increases over the 6 years, as well as opioid analgesics. The absolute volumes of calls by sex and substance category in 2010 and 2015 are also provided for those wishing to assess sex-

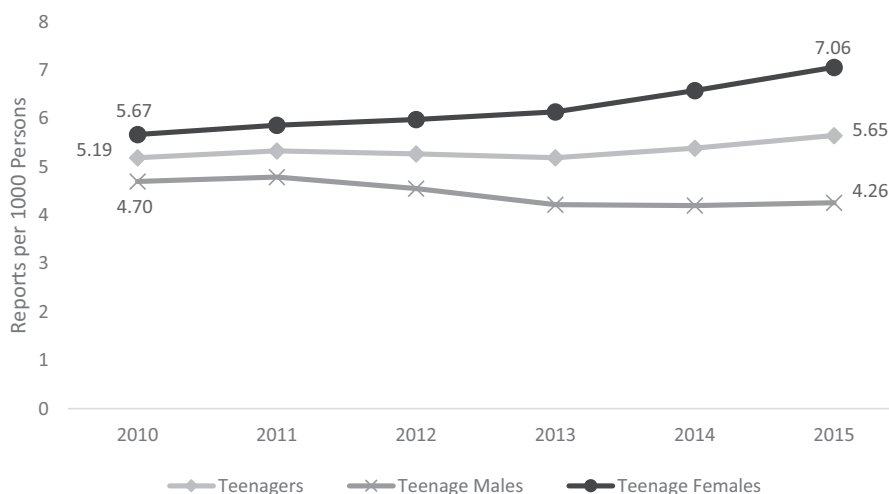


Figure 1. Poison control center calls per 1000 persons by year.

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