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Emergency Department Visits by Pediatric Patients for Poisoning by Prescription Opioids

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Abstract

Background—Prescription medication abuse is an increasingly recognized problem in the United States. As more opioids are being prescribed and abused by adults, there is an increased risk of both accidental and intentional exposure to children and adolescents. The impact of pediatric exposures to prescription pain pills has not been well studied.

Objectives—We sought to evaluate emergency department (ED) visits for poisoning by prescription opioids in pediatric patients.

Methods—This retrospective study looked at clinical and demographic data from the Nationwide Emergency Department Sample (NEDS) from 2006 – 2012.

Results—There were 21,928 pediatric ED visits for prescription opioid poisonings and more than half were unintentional. There was a bimodal age distribution of patients with slightly more than half occurring in females. The majority of patients were discharged from the ED. More visits in the younger age group (0–5 years) were unintentional while the majority of visits in the adolescent age group (15–17 years) were intentional. Mean charge per discharge was \$1,840 and \$14,235 for admissions and surmounted to over \$81 million in total charges.

Conclusion—Poisonings by prescription opioids largely impact both young children and adolescents. These findings can be used to help target this population for future preventive efforts.

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Keywords

Emergency visits; pediatrics; poisonings; over-the-counter medications

Introduction

Prescription opioid abuse and misuse has dramatically increased over the past decade.^{1–2} Increases in the number of opioid prescriptions have resulted in alarmingly high rates of opioid addiction, diversion and overdose.³ From 2009 – 2013, the death rate from prescription opioids rose from 6.1 to 13.8 per 100,000 population.⁴ This inappropriate use of prescription opioids results in significant emergency department (ED) visits and costs. According to the Drug Abuse Warning Network (DAWN), there were 1,428,145 ED visits in 2011 secondary to abuse and misuse of pharmaceuticals.⁵ Furthermore, adults are not the only individuals at risk. The number of opioid prescriptions filled in a geographic area has been found to correlate with the number of calls to poison control center calls for exposure by children to that drug.⁶

Of all of the ED visits related to drugs in 2011, 19% involved pediatric patients.⁷ A study of national US data in 2008 investigating ED visits for all types of poisoning in pediatric patients found that 56% were under the age of four.⁸ A prior study examining data from children presenting to EDs due the ingestion of various adult prescription medications from 2000 – 2009 found that opioids lead to the most significant injuries and the highest number of admissions.³

In 2012, DAWN released a short report concerning ED visits by adolescents for opioid abuse.⁹ The report indicated that 44% of the 70,000 visits in 2009 constituted the use of oxycodone, followed by 39% hydrocodone, 9% methadone, and 7% codeine products.⁹

To our knowledge, this is the first study to quantify and describe the characteristics of ED visits to emergency departments by pediatric patients in the US for poisoning by prescription opioids using the Nationwide Emergency Department Sample.

Methods

This was a retrospective study looking at data from the years 2006 – 2012 from the Nationwide Emergency Department Sample (NEDS), which is part of the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (HCUP). The NEDS is the largest all-payer US ED database and is a stratified, multi-stage sample designed to produce national, weighted estimates of US ED visits each year. Hospital-based EDs are selected by HCUP based on the census to contribute their billing data to the NEDS. This large database represents over 26 million visits from over 950 EDs in 30 states.¹⁰ More information is available about data abstraction on the NEDS website.¹⁰

We selected patients within the NEDS that were under 18 years old and who were diagnosed with the following ICD-9-CM codes for prescription opioids: 965.02 (methadone) and 965.09 (other narcotics including codeine, meperidine, and morphine); An External Cause of

Injury Code (e-code) in the E850–E858 range was used to determine intentionality (accidental poisonings by drugs, medicinal substances, and biologicals).

From the NEDS data, clinical and demographic features of this pediatric study sample were examined, including number of admissions, disposition, gender, age, expected payer, income, charges, and procedures performed. SAS-Callable SUDAAN software was used to create unbiased standard errors and produce weighted estimates. Data was determined to be significant if 95% confidence intervals did not overlap.¹¹

Results

Approximately 21,928 ED visits for poisoning by prescription opioids occurred from 2006 – 2012 by patients under the age of 18, with roughly 62% of this population representing unintentional overdoses (Tables 1 and 2). The number of visits were fairly consistent from year-to-year over the study period (Figure 1). Slightly more than half of patients were female (51.9% vs. 48.0%) and significantly more females were treated for intentional overdoses compared to males (31.2% vs 16.8%). In addition, Figure 2 shows the number of intentional and unintentional poisonings by age group, with majority of unintentional poisonings occurring among younger children (ages 0 – 5 years) and intentional overdoses among teenagers (15 – 17 years). Approximately 65.0% of patients with unintentional poisonings were treated and released from the ED, whereas patients who presented with intentional poisonings were significantly more likely to be admitted (Table 2). A total of 11 patients died and 39 required mechanical ventilation. Roughly equal numbers of these visits were by patients covered by private insurance (42.9%) and Medicaid (44.2%). The mean charge per visit was \$1,840 for those discharged from the ED and was \$14,235 for visits that resulted in admission. Total charges for all visits that resulted in discharge from 2006 to 2012 surmounted to \$30,067,561 and \$51,231,621 for those who were admitted.

Discussion

The purpose of this study was to present the final ED disposition, financial, and demographic characteristics of pediatric patients presenting to US EDs for prescription opioids from 2006 – 2012. The bimodal age distribution in this study was not surprising, with the preschool cohort likely representing accidental exposure to prescription opioids and the adolescent group more commonly intentionally abusing the medication, either for recreational purposes or self-harm. One recent survey revealed that 6% of all teens had used prescription opioids for non-medical purposes in the prior year.¹²

Parents are often mindful of keeping medications out of reach of younger children, but may not consider securing them once their child is older.¹³ According to a study by Friese et al. parents of adolescents often fail to properly store and limit accessibility of prescription drugs to their teenagers.¹³ One study found that a quarter of parents believed that prescription medications were much safer to abuse than street drugs.¹⁴ In one survey, over 50% of teens reported that they could easily obtain prescription drugs from their parents' medicine cabinet.¹⁵ In addition, pediatric patients are increasingly being prescribed opioids in the ED and outpatient clinics, further increasing the chance of exposure.^{16–17}

According to the DAWN report, adolescents may view opioid pain medications to be less dangerous than other drugs of abuse because they are legally produced and prescribed.⁹ This may be evidenced by the existence of “pharming” or “pill parties” in which teens put a mixture of over-the-counter and prescription pills into a bowl for anyone to sample.¹⁸ Because these patients may have ingested multiple medications, they could present to the ED with a polysubstance overdose, which can be more challenging to diagnose and treat.¹⁹ Further efforts are needed to raise awareness of the danger of this practice among adolescents and their parents.

Child-resistant packaging has been shown effective in reducing the ingestion of medications by young children.²⁰ However, in homes where adults are abusing drugs or preparing drugs for distribution, measures such as keeping drugs in original packaging and out of their reach of children may not be taken. And considering that 2014 had the highest death rate from drug overdoses in the United States of any prior year on record, the rate of abuse in adults has continued to climb, likely leading to increased chances of exposure in children.²¹

Several studies have looked specifically at buprenorphine exposures in young children, which unfortunately looks similar to candy.^{22–24} Estimated ED visits for exposures to buprenorphine increased dramatically in children under 6 between 2004 to 2011 (0 cases v/s 1500 cases).²⁵ A young child is more likely to suck or chew on a buprenorphine pill as opposed to swallowing it whole, which may lead to increased absorption due to buccal absorption.^{26–27} Since the clinical effects of this drug may be delayed can last for 24 hours in children, admission to the hospital is recommended for exposures.^{26,28}

As there are currently estimated to be 1.9 million people in the US experiencing prescription opioid abuse, the problem of pediatric exposures is likely to continue.²⁹ Educating parents and patients is paramount, as well as keeping a high index of suspicion for the possibility of opioid exposure in young children presenting with symptoms potentially related to this drug, such as lethargy and respiratory depression. Programs to specifically address drug prevention in youth, as well as opioid treatment programs for adolescents, are also of increasing importance. Healthcare providers prescribing opioids should educate their patients to keep their prescriptions locked up to not only avoid accidental exposure to younger children, but to also prevent intentional use by teens. Additionally, leftover medications should be discarded rather than saved for possible use in the future

Limitations

One of the limitations of using the NEDS database is that this is a retrospective study and data was not originally collected for the purposes of this particular study. Additionally, there is a possibility that the e-codes were underutilized or incorrectly coded for these patients. The de-identified nature of the data precluded us from examining the circumstances surrounding the toxic exposure which led to the ED visit. For example, we cannot determine from these data if an intentional poisoning represented a recreational mishap or an intentional attempt at self-harm. This information could be useful in further establishing a risk profile for teens who overdose from prescription opioids. Additionally, some cases were

classified as “undetermined intentionality” which could represent either visits that were not coded or had missing data.

Conclusions

There were approximately 22,000 ED visits by pediatric patients for opioid poisoning from 2006–2012. Fortunately, very few of these patients died or required mechanical ventilation. Unsurprisingly, more visits in the younger age group were unintentional while the majority of visits in the adolescent age group were intentional. Future campaigns should educate parents on keeping medications safe from children of all ages as well as educate teens on the potential dangers of prescription pain pills.

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Figure 1.
ED Visits for Pediatric Opioid Poisonings from 2006 – 2012

Figure 2.
Prescription Poisonings by Intentionality and Age

Table 1

Demographic characteristics of pediatric patients (ages 0–17) presenting to U.S. EDs for prescription opioid poisonings from 2006 – 2012

Characteristic	N (%)	95% Confidence Interval	Effect Size (d) [±]
Total Number	21,928		
Age, years	0 – 17 yrs (<i>m</i> = 9)		
Gender			
Male	10,528 (48.0)	46.4 – 49.6	ref
Female	11,390 (51.9) [↑]	50.3 – 53.6	0.09
Payer			
Medicare	55 (0.25)	0.13 – 0.47	.
Medicaid	9,698 (44.2)	42.4 – 46.1	
Private insurance	9,406 (42.9)	41.2 – 44.6	
Self-pay	1,861 (8.5)	7.6 – 9.4	
No charge	45 (0.20)	0.10 – 0.42	
Other	815 (3.7)	3.2 – 4.4	
Income [‡]			
1 st quartile	5,815 (26.5)	24.7 – 28.5	ref
2 nd quartile	5,911 (27.0)	25.3 – 28.7	0.01
3 rd quartile	5,385 (24.6)	22.8 – 26.4	–0.05
4 th quartile	4,338 (19.8) [↓]	18.1 – 21.6	–0.21
Type of ED Event			
Treated and Released	16,340 (74.5) [↑]	72.8 – 76.2	ref
Admitted	3,599 (16.4)	14.8 – 18.2	–1.49

Estimates are weighted numbers of visits

Percentages are column percentages

Numbers may not add to 100% due to missing data

[↑] Significantly **higher** ($p < .05$) than all other categories

[‡] Estimated median household income of residents in the patient's ZIP Code; 1st quartile = \$38,999; 2nd quartile = \$39,000–\$47,999; 3rd quartile \$48,000–\$62,999; 4th quartile \$63,000.

[±] First level of each variable is the reference category.

Table 2

Demographic characteristics of pediatric patients by intentionality for prescription opioid poisonings from 2006 – 2012 (N = 21,928)

Characteristic	Unintentional n (%) [95% CI]	Intentional n (%) [95% CI]	Undetermined n (%) [95% CI]
Total	13,524 (61.7)[↑] [59.9 – 63.5]	5,316 (24.2) [22.9 – 25.6]	2,126 (9.7) [8.8 – 10.7]
Gender			
Male	7,063 (67.1)[↑] [64.7 – 69.4]	1,767 (16.8) [15.2 – 18.5]	1,202 (11.4) [10.1 – 12.9]
Female	6,451 (56.6) [54.4 – 58.9]	3,549 (31.2)[↑] [29.3 – 33.1]	924 (8.1) [7.0 – 9.3]
Type of ED Event			
Treated & Released	10,619 (65.0)[↑] [62.9 – 67.0]	3,391 (20.7) [19.3 – 22.2]	1,575 (9.6) [8.6 – 10.8]
Admitted	1,980 (55.0) [50.8 – 59.2]	1,179 (32.7)[↑] [29.1 – 36.7]	305 (8.5) [6.6 – 10.9]

Estimates are weighted numbers of visits

Percentages are row percentages

Numbers may not add to 100% due to missing data

Number in brackets indicate 95% Confidence Intervals

[↑] Significantly **higher** ($p < .05$) than all other categories