Clinical Pediatrics
1–9

DOI: 10.1177/0009922815589912
cpj.sagepub.com
SAGE

Marijuana Exposure Among Children Younger Than Six Years in the United States

Bridget Onders, BS[1,2], Marcel J. Casavant, MD[3,4], Henry A. Spiller, MS, D.ABAT[3,4], Thiphalak Chounthirath, MS[1], and Gary A. Smith, MD, DrPH[1,4,5]

Abstract

This study investigates marijuana exposures among children <6 years old in the United States using data from the National Poison Data System. From 2000 through 2013, there were 1969 marijuana exposures among children <6 years old and an exposure rate of 5.90 per million children. The mean age of an exposed child was 1.81 years (median = 1.58 years). The majority of the children were exposed through ingestion (75.0%), and 18.5% of exposures required admission to a health care facility. The rate of marijuana exposure was significantly (2.82 times) higher in states where its use was legalized prior to 2000 compared with states where its use is not legal. Because more states are likely to pass legislation legalizing medical and recreational use of marijuana, increased efforts to establish child-focused safety requirements regarding packaging of commercially sold marijuana products are needed to help prevent more children from being exposed to this schedule I substance.

Keywords

marijuana, ingestion, National Poison Data System (NPDS), poisoning, poison control center

Introduction

As of January 2015, almost half of the states and the District of Columbia in the United States have legalized marijuana for medical use, and 4 states (Alaska, Colorado, Oregon, and Washington) and Washington, DC, have also voted to legalize marijuana for recreational use. Legalization of marijuana, especially medical marijuana, has been an ongoing debate that often revolves around the medical benefits verses the potential harm of the drug to those who use it.[1,2] However, a population frequently overlooked in this debate is young children, who experience unintentional exposures due to the increasing availability of marijuana in users' households.

There have been case reports of pediatric marijuana exposures in the United States and other countries.[3-9] These case reports usually involved unintended marijuana ingestions, which can result in clinical effects ranging from intoxication and ataxia to seizure, coma, and respiratory depression.

In recent years, studies have brought to light the increasing potential harm associated with unintentional marijuana exposures among young children in the United States. One study identified increases in emergency department visits for marijuana exposures in Colorado.[10] Another study found a large increase in exposures in states where medical marijuana had been legalized prior to 2005.[11] With more states likely to legalize marijuana, this study aims to provide additional information about pediatric exposures to marijuana to help raise awareness of the potential harm associated with marijuana exposure among young children.

Methods

Design of Study and Study Population

This study retrospectively analyzes data from the National Poison Data System (NPDS) to describe the epidemiology of marijuana exposures among US children <6 years

[1]Center for Injury Research and Policy at Nationwide Children's Hospital, Columbus, OH, USA
[2]University of Toledo College of Medicine, Toledo, OH, USA
[3]Central Ohio Poison Center, Columbus, OH, USA
[4]The Ohio State University College of Medicine, Columbus, OH, USA
[5]Child Injury Prevention Alliance, Columbus, OH, USA

Corresponding Author:
Gary A. Smith, Center for Injury Research and Policy, The Research Institute at Nationwide Children's Hospital, 700 Children's Drive, Columbus, OH 43205, USA.
Email: gary.smith@nationwidechildrens.org

old and to assess the influence of legalization of medical marijuana on the rate of exposure in the United States from 2000 through 2013. The American Association of Poison Control Centers (AAPCC) maintains the NPDS, which is the data warehouse for all the poison control centers (PCCs) in the United States. These PCCs receive calls for potentially toxic exposures, provide medical advice and document the occurrences in the database. The NPDS serves as a comprehensive toxic exposure surveillance database with extensive quality control measures to ensure data completeness and accuracy.[12]

Case Selection Criteria

The generic code for marijuana, 0083000, was used to query the NPDS for all single substance marijuana exposures involving children <6 years old from 2000 through 2013.[13] Cases that occurred in the United States or in an unknown state were included in this study. Cases of confirmed nonexposure and cases with a bite/sting exposure route were excluded. Because this study was limited to children <6 years old, the following were considered as miscoded cases and were excluded from the study: cases with an intentional or malicious reason for the exposure and cases that resulted in admission to a psychiatric facility.

Study Variables

Study variables include child age and gender, year and route of exposure, level of health care received, medical outcome, exposure site, management site, reason for exposure, state where exposure occurred, and clinical effects. Only clinical effects coded as "related" to the marijuana exposure by PCC specialists were included in analyses. Medical outcome (minor, moderate, and major effects) was classified by PCC specialists according to the following standard NPDS definitions. In a minor effect,

> the patient developed some signs or symptoms as a result of the exposure, but they were minimally bothersome and generally resolved rapidly with no residual disability or disfigurement. A minor effect is often limited to the skin or mucus membranes.[12]

In a moderate effect,

> the patient exhibited signs or symptoms as a result of the exposure that were more pronounced, more prolonged, or more systemic in nature than minor symptoms. Usually, some form of treatment is indicated. Symptoms were not life-threatening, and the patient had no residual disability or disfigurement.[12]

In a major effect,

> the patient exhibited signs or symptoms as a result of the exposure that were life-threatening or resulted in significant residual disability or disfigurement.[12]

Variable Groupings

For subanalyses, the 50 states and District of Columbia were classified into 3 groups: states with laws legalizing the medical use of marijuana that went into effect prior to 2000, transitional states (states with laws legalizing the medical use of marijuana that went into effect in 2000 through 2013), and states where marijuana use is not legal (states that did not have laws that went into effect prior to the end of 2013 legalizing the medical use of marijuana; see the appendix).[14]

Statistical Analysis and Ethical Statement

The statistical software, SPSS 21.0 (IBM Corp, Armonk, NY) and SAS 9.3 (SAS Institute Inc, Cary, NC), were used to analyze data and perform descriptive statistics. The rates for individual states and the national rates were calculated using denominators based on US Census Bureau July 1 intercensal and postcensal population estimates for children <6 years old from 2000 through 2013.[13] Poisson regression models were used to evaluate trends in exposure rates and to compare exposure rates between states that legalized the medical use of marijuana prior to 2000 and states where marijuana use is not legal. The Pearson method was used to estimate a scale parameter when there was evidence of overdispersion (the expected mean is greater than the variance). Similar analyses were performed for the rates associated with transitional states. Statistical significance was established at $\alpha = .05$.

To investigate the trend in the rate of marijuana exposures with respect to the number of years prior to or following the year of legalization of marijuana for medical use, data from the transitional states were used. For each transitional state, the number of exposures for each year, 2000 through 2013, was classified by the number of years from the year of legalization by subtracting the year of legalization from the data year (negative differences indicate the number of years prior to legalization, zero indicates the year of legalization, and positive differences indicate the number of years after legalization). The average rate of exposure for the year of legalization was calculated by pooling all of the exposures from transitional states during the year of legalization and dividing by the pooled number of children <6 years old in each transitional state during the legalization year. This same method was used to calculate average rates for each year prior to and after legalization.

This study was reviewed by the institution review board of The Research Institute at Nationwide Children's Hospital and judged to be exempt.

Results

General Characteristics

From 2000 through 2013, there were 1969 children <6 years old reported to US PCCs for marijuana exposures, averaging 140.6 exposures per year or 5.90 exposures per 1 million children <6 years old. The majority (92.2%, N = 1816) of the exposures were unintentional, 2.4% were due to adverse reactions or other reasons, and 5.4% were unknown. Most exposures occurred at the child's own residence (83.0%) or at another person's residence (9.7%). The mean age of exposed children was 1.81 years (95% CI = 1.76-1.86) with a median age of 1.58 years (interquartile range: 1.00-2.00 years). More than three-quarters (77.7%) of the exposed children were <3 years old (Table 1). Male children accounted for 50.7% of exposures. Ingestion was the most common route of exposure accounting for 75.0%, followed by inhalation/nasal (14.5%). More than two-fifths of children (41.1%) were already in or en route to a health care facility (HCF) at the time the call was made to the PCC, and only 28.7% of exposed children were managed on site (not at a HCF).

Level of Care and Medical Outcomes

Almost half (47.6%) of children exposed to marijuana were managed at a HCF, including 29.1% who were treated and released, 11.6% admitted to a noncritical care unit, and 6.9% admitted to a critical care unit (Table 1). The annual proportion of children admitted to a HCF increased from 12.8% (12/94) in 2000 to 30.8% (77/250) in 2013. Children <2 years old had the highest proportion of HCF admission at 20.9%. The most common medical outcome was a minor effect accounting for 24.5% of exposures. Moderate and major effects accounted for 10.8% and 1.1% of exposures, respectively. No clinical effects were observed in 17.2% of exposures. The annual proportion of major or moderate medical outcomes increased from 6.4% (6/94) in 2000 to 16.4% (41/250) in 2013.

Clinical Effects

Among the children exposed to marijuana, 40.7% had one or more clinical effects related to the exposure. The most common clinical effects were neurological effects, which included drowsiness or lethargy (29.5%), ataxia (5.4%), agitation or irritability (3.3%), and confusion (2.5%) (Table 2). Serious effects were less common and included coma (n = 17), respiratory depression (n = 14), and single (n = 6) or multiple (n = 4) seizures. All the coma cases involved children <4 years old.

Among the 643 children exposed to marijuana with documentation of known duration of clinical effects, 83.4% (536/643) experienced clinical effects that lasted from more than 2 hours up to 1 day (Table 1).

Trend in Exposures

From 2000 through 2006, there was no significant change (0.6% per year; 95% CI: -2.0% to 3.3%) in the annual rate of marijuana exposure per 1 million children <6 years old, but the rate increased significantly by 147.5% (15.0% per year; 95% CI = 12.2% to 17.8%) from 2006 (4.21) through 2013 (10.42) (Figure 1). Most of this increase was attributable to increases in the rate of exposure among states that had legalized marijuana for medical use prior to 2000 (Figure 2).

For the period 2000 through 2013, the rate of marijuana exposure for states that had legalized marijuana for medical use prior to 2000 (11.79) was estimated to be 2.82 (95% CI = 2.00-3.97) times higher than that among states where marijuana use is not legal (4.11) (Figure 2). Among states where marijuana use is not legal, there was a significant 63.3% (3.3% per year; 95% CI = 1.6% to 5.0%) increase in the exposure rate from 2000 through 2013. Among states permitting medical use of marijuana prior to 2000, there was a significant decrease in the exposure rate of 34.1% (−9.1% per year; 95% CI = −15.9% to −1.8%) from 2000 through 2006 followed by a significant 609.6% (26.5% per year; 95% CI = 21.2% to 32.0%) increase from 2006 through 2013.

Among the transitional states, the marijuana exposure rate per 1 million children <6 years old after legalization of medical marijuana use was 2.25 (95% CI = 1.45-3.51) times higher than prior to legalization. There was no significant change in the exposure rate with respect to the number of years prior to the year of legalization, but the rate increased significantly by 15.9% (95% CI = 11.8% to 20.1%) per year after legalization. There was a spike in the rate of exposure during the year of legalization compared with several years prior to and several years after legalization (Figure 3).

Discussion

Although marijuana exposures among children <6 years old are rare, occurring at an overall rate of 5.90 per 1 million children, the annual rate of marijuana exposure is increasing. From 2000 through 2006, there was no significant change in the annual rate of marijuana exposure

Table 1. Characteristics of Marijuana Exposures Among Children Younger Than 6 Years (NPDS 2000-2013).

Characteristics	No. of Exposures (%[a])
Age, y	
<1	451 (22.9)
1	637 (32.4)
2	442 (22.4)
3	230 (11.7)
4	113 (5.7)
5	81 (4.1)
<6[b]	15 (0.8)
Gender	
Female	913 (46.4)
Male	999 (50.7)
Unknown	57 (2.9)
Management site	
Patient already in (en route to) HCF when PCC called	809 (41.1)
Managed on site (non-HCF)	566 (28.7)
Patient was referred by PCC to a HCF	535 (27.2)
Other	26 (1.3)
Unknown	33 (1.7)
Route of exposure	
Ingestion	1477 (75.0)
Inhalation/nasal	286 (14.5)
Other+[c]	38 (1.9)
Ingestion+[d]	22 (1.1)
Unknown	146 (7.4)
HCF level of care	
No HCF treatment received	625 (31.7)
Treated/evaluated and released	572 (29.1)
Patient lost to follow-up/left against medical advice	271 (13.8)
Admitted to noncritical care unit	229 (11.6)
Admitted to critical care unit	136 (6.9)
Patient refused referral/did not arrive at HCF	136 (6.9)
Medical outcome	
Major effect	21 (1.1)
Moderate effect	213 (10.8)
Minor effect	482 (24.5)
Not followed, minimal clinical effects possible	451 (22.9)
Unable to follow, judged as a potentially toxic exposure	342 (17.4)
Not followed, judged as nontoxic exposure	59 (3.0)
Unrelated effect	62 (3.1)
No effect	339 (17.2)
Duration of clinical effects	
≤2 h	45 (2.3)
>2 h to ≤8 h	242 (12.3)
>8 h to ≤24 h	294 (14.9)
>24 h to ≤3 d	57 (2.9)
>3 d to ≤1 wk	5 (0.3)
Unknown/missing	1326 (67.3)
Total	1969 (100.0)

Abbreviations: HCF, health care facility; PCC, poison control center; NPDS, National Poison Data System.
[a]Percentages may not sum to 100.0% because of rounding error.
[b]PCCs were unable to obtain the exact age for these cases, but it was known that the child was <6 years old.
[c]Other+ includes the NPDS categories of "ocular," "ocular + inhalation/nasal," "inhalation/nasal + dermal," "parenteral," and "other."
[d]Ingestion+ includes the NPDS category of ingestion combined with one or more of the following: dermal, inhalation/nasal, dermal, other, and unknown.

Table 2. Clinical Effects Associated With Marijuana Exposures Among Children Younger than 6 Years (NPDS 2000-2013).

Clinical Effect[a]	No. of Exposure (%[b])
Neurological	896 (45.5)
Drowsiness/lethargy	580 (29.5)
Ataxia	107 (5.4)
Agitated/irritable	64 (3.3)
Confusion	50 (2.5)
Coma	17 (0.9)
Tremor	15 (0.8)
Dizziness/vertigo	14 (0.7)
Muscle weakness	13 (0.7)
Hallucinations/delusions	12 (0.6)
Seizure (single)	6 (0.3)
Slurred speech	6 (0.3)
Muscle rigidity	5 (0.3)
Seizures (multi/discrete)	4 (0.2)
Miscellaneous	180 (9.1)
Other	159 (8.1)
Fever/hyperthermia	6 (0.3)
Adverse drug reaction to treatment	4 (0.2)
Ocular	116 (5.9)
Mydriasis	67 (3.4)
Red eye/conjunctivitis	23 (1.2)
Nystagmus	13 (0.7)
Miosis	6 (0.3)
Cardiovascular	80 (4.1)
Tachycardia	61 (3.1)
Bradycardia	7 (0.4)
Hypertension	6 (0.3)
Hypotension	6 (0.3)
Gastrointestinal	65 (3.3)
Vomiting	51 (2.6)
Nausea	6 (0.3)
Abdominal pain	4 (0.2)
Respiratory	23 (1.2)
Respiratory depression	14 (0.7)
Dermal	12 (0.6)
Erythema/flushed	5 (0.3)
Pallor	4 (0.2)

[a]Only clinical effects with more than 3 exposures are included in this table.
[b]Percentages are of the 1969 total number of exposures and will not sum to 100.0% because some exposures resulted in no or more than one clinical effect.

calls to PCCs; however, the rate increased significantly by 147.5% from 2006 through 2013. The trend in the rate of marijuana exposure calls in this study parallels the trend in the number of marijuana users in the United States. According to the National Survey on Drug Use and Health conducted by the Substance Abuse and Mental Health Services Administration, the percentage of US civilians ≥12 years of age who used marijuana in the past month decreased from 6.2% in 2002 to 5.8% in 2007 before increasing to 7.5% in 2013.[15] This suggests that the rate of marijuana exposure among children is associated with the number of marijuana users.

In this study, the majority of children were exposed through ingestion, as has been noted elsewhere.[3,7-11] It is likely that many of these ingestions resulted from exploratory behavior because more than three-fourths of exposed children were <3 years old. In addition, the high percentage of ingestion exposures may be associated with the increasing popularity of marijuana food products, such as candy, cookies, and brownies, among marijuana users. These marijuana food products look and taste similar to their nonmarijuana containing counterparts, thus making them attractive to young children. Although NPDS data do not distinguish between smoking marijuana and marijuana food products, a report of a series of children treated for marijuana exposure in a Colorado children's emergency department found that many of the exposures were ingestions of marijuana food products.[10] Ingestions of marijuana-containing cookies were also documented in several case reports.[7-9]

It is unclear why the rate of HCF utilization is much higher among marijuana exposures in this study (18.5% admitted to HCF) compared with all exposures (1.4% admitted to HCF) among children <6 years old reported to the NPDS in 2012.[12] The amount of the main psychoactive ingredient of marijuana, Δ^9-tetrahydrocannabinol (THC), can be especially high in marijuana food products, which may have contributed to the high rate of health care utilization and some of the severe adverse effects observed in this study. Seizures, coma, and respiratory depression associated with marijuana exposures in this study have also been described in previous case reports and studies.[7,8,10,11] The greater proportion of admissions to a HCF for marijuana exposures also may be related to social indications in addition to medical reasons. A child may be admitted to allow social workers or child protective services time to evaluate the circumstances of exposure before discharging the child home.

Legalizing the medical or recreational use of marijuana may have economic or other benefits,[16] but lawmakers also need to be aware of the potential hazard associated with unintentional exposure of young children to marijuana products when considering legalization. Over the study period, states where marijuana use had been legalized prior to 2000 had a rate of exposure that was almost 3 times higher than that among states where its use is not legal. Similarly, among transitional states, the rate of exposure after legalization of marijuana for medical use was more than 2 times higher than before legalization. From

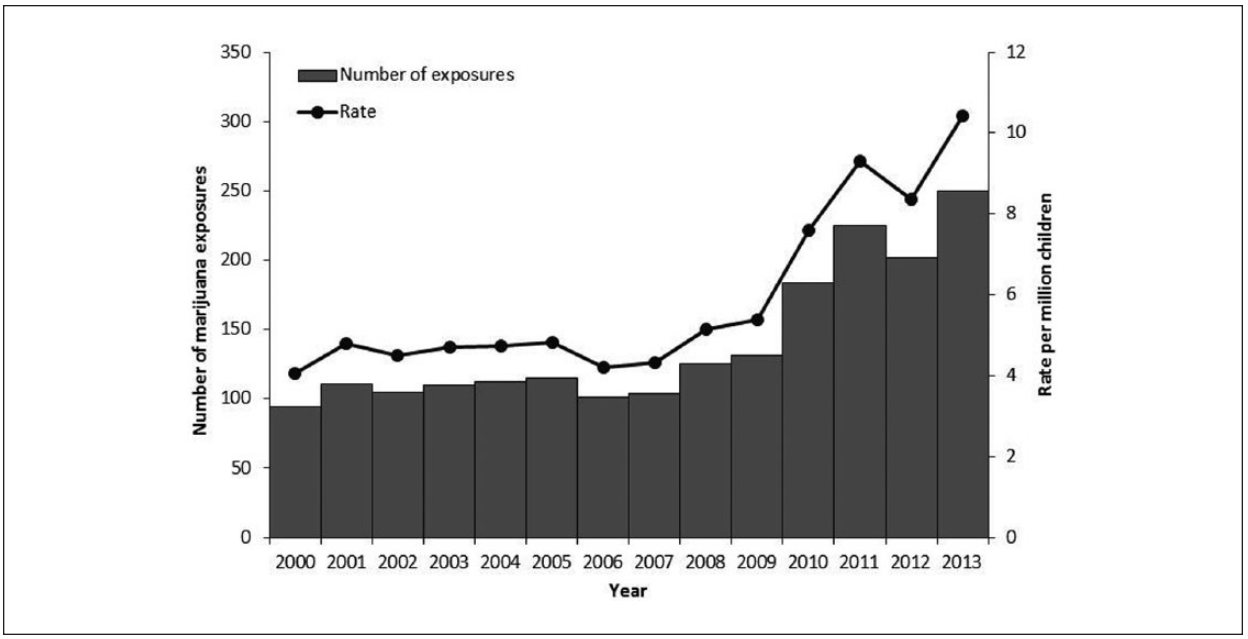

Figure 1. Annual number and rate of marijuana exposures among children younger than 6 years (National Poison Data System 2000-2013).

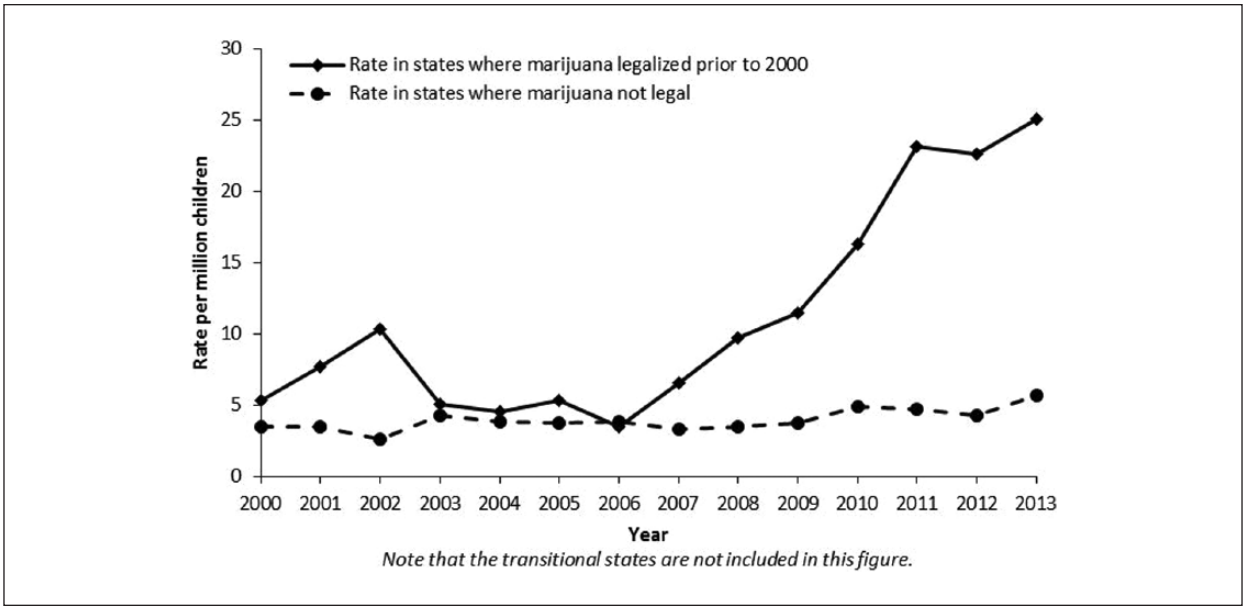

Figure 2. Annual rate of marijuana exposures among children younger than 6 years by marijuana legalization status of state (National Poison Data System 2000-2013).

2006 to 2013, states that legalized marijuana use prior to 2000 experienced a significant increase of more than 600% in the annual rate of marijuana exposures, with an acceleration in the increase observed after 2009 (Figure 2). This corresponds temporally to the release in October 2009 of a memo from the US Department of Justice to US attorneys in states that had authorized the medical use of marijuana. That memo acknowledged that discretion could be used when deciding whether to investigate or prosecute individuals whose actions were in compliance with the state's medical marijuana use law.[17] On the other hand, there was only a 63% increase in the annual rate of marijuana exposures among states where marijuana use was not legal during the study period. Some of these findings are similar to those previously reported.[11] Because more states are considering marijuana legalization,[18]

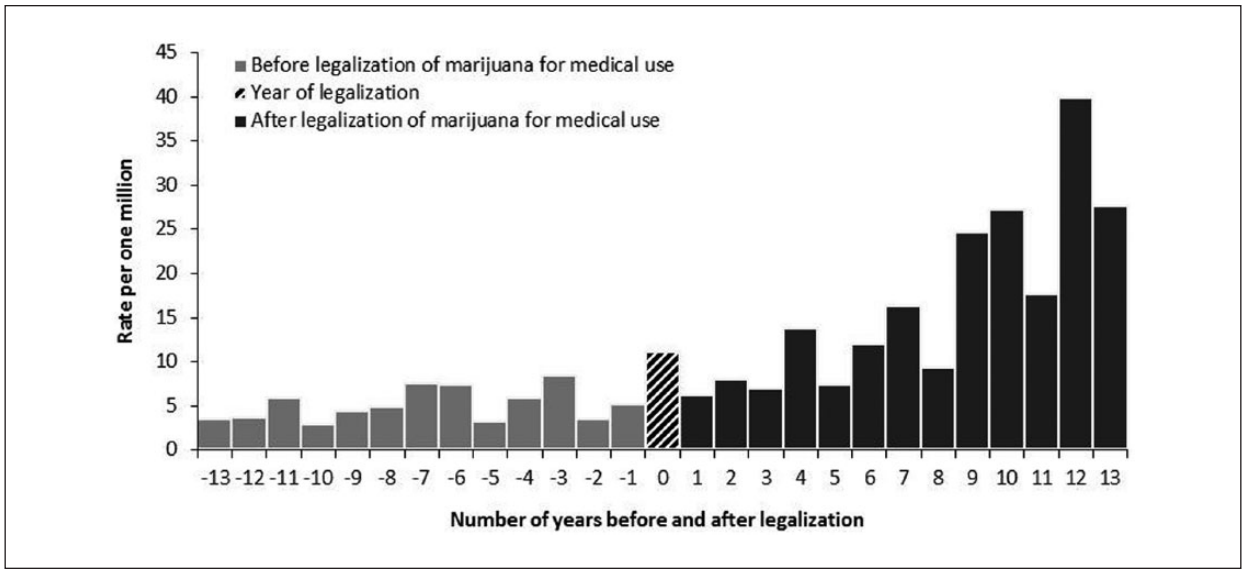

Figure 3. Rate of marijuana exposures among children younger than 6 years by number of years before and after legalization of marijuana for medical use in transitional states (National Poison Data System 2000-2013).

provisions should be incorporated into legislation to minimize the risk of child exposure to marijuana.

Educating parents about the prevention of unintentional poisoning is an important component of a comprehensive prevention approach, but education alone is not sufficient. Child-resistant packaging is a more effective strategy and should be combined with education.[19] The Poison Prevention Packaging Act of 1970 required child resistant containers for select medications and has been highly successful in decreasing ingestions of those medications by young children.[20] It is imperative that commercially available marijuana products be sold in opaque, child-resistant packaging to mitigate the risk of child exposure.[21] However, marijuana does not fall under any existing federal legislation that mandates that it be sold in opaque or child-resistant packaging.[22] Although some states have enacted their own legislation to mandate opaque or child-resistant packaging, these laws vary from state to state and often come years after legalization, following recognition of the increased number of pediatric marijuana exposures.[11,22] We found that among transitional states, the exposure rate was higher during the year of legalization compared with several years before and several years following the legalization year. Therefore, child protections must be incorporated in legislation from the beginning to ensure that safety measures are in place when marijuana products first go legally on sale.

Because requirements for child safety packaging will not apply to homemade marijuana edible products, parents, child caregivers, and health care providers should take additional proactive measures to help prevent marijuana exposures among children. Health care providers should inform parents and caregivers of the emerging hazard associated with marijuana exposure among children and on the proper storage and use of marijuana products. Parents and child caregivers with marijuana users living in the household should ensure that marijuana products, especially marijuana edible products, are stored out of a child's sight and reach and in an opaque, sealed, child-resistant container. Marijuana products should not be used in the presence of a child to help minimize unintentional exposure,[21] such as second hand inhalation or unintentional ingestion, which accounted for 14.5% and 75.0% of the exposures in this study, respectively. One case report showed a child can have important clinical effects from passive exposure to marijuana smoke.[23]

Limitations

This study has a number of limitations. Information in the NPDS database is based on self-report, and reflects details provided by the public or health care professionals regarding an actual or potential exposure to a substance. Exposures do not necessarily represent a poisoning or overdose. The AAPCC is not able to completely verify the accuracy of every report made to member centers. Additional exposures may go unreported to PCCs, and data from the NPDS should not be construed to represent the complete national incidence of exposure to any substance. It also was not possible to determine if the exposure was to marijuana being used illegally, medically, or recreationally. Another limitation to this study is that some of the cases referred to a HCF may have been due to

a requirement to report cases of pediatric exposure to DEA schedule I drugs to the jurisdiction's child protective services for evaluation of whether the exposure constitutes abuse, neglect, or endangerment of the child. In these cases, PCCs often refer a child to a HCF for immediate evaluation and care, and have the HCF make the referral to child protective services. Despite these limitations, the NPDS is an important national database providing cumulative, comprehensive data collected in a standardized fashion for exposures to many substances. It is the most accurate database available for investigating marijuana exposures among young children at a national level in the United States.

Conclusions

The rate of exposure to marijuana among young children nationwide is rising. Young children in states where laws allow sale and use of marijuana face significantly elevated risks of exposure and poisoning.

Appendix

List of States That Enacted a Law Legalizing the Medical Use of Marijuana Prior to the End of 2013 by the Year the Law Took Effect.

State	Year Medical Marijuana Law Was Enacted
California	1996
Oregon	1998
Washington	1998
Alaska	1999
Maine	1999
Hawaii	2000
Colorado	2001
Nevada	2001
Montana	2004
Vermont	2004
Rhode Island	2006
New Mexico	2007
Michigan	2008
District of Columbia	2010
New Jersey	2010
Arizona	2011
Delaware	2011
Connecticut	2012
Massachusetts	2013
New Hampshire	2013

Author Contributions

BO conducted data analysis, drafted and revised the manuscript, and approved the final manuscript. TC assisted in data analysis, revised the manuscript, and approved the final manuscript. MJC contributed to conceptualization of the study, assisted in data analysis, critically reviewed the manuscript, and approved the final manuscript. HAS contributed to conceptualization of the study, assisted in data analysis, critically reviewed the manuscript, and approved the final manuscript. GAS contributed to the conceptualization of the study, assisted in data analysis, critically reviewed the manuscript, and approved the final manuscript.

Authors' Note

The inferences and conclusions expressed by the authors of this study do not necessarily represent those of the AAPCC, its members, or those of the funding organizations.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Bridget Onders received a research stipend from the National Student Injury Research Training Program at Nationwide Children's Hospital, funded by the Centers for Disease Control and Prevention (Grant No. 1R49CE002106) and Child Injury Prevention Alliance, while she worked on this study.

References

1. Bostwick JM. Blurred boundaries: the therapeutics and politics of medical marijuana. *Mayo Clin Proc*. 2012;87:172-186.
2. Schwartz RH. Legalization of drugs of abuse and the pediatrician. *Am J Dis Child*. 1991;145:1153-1158.
3. Al-Shidhani TA, Arora V. Cannabis exposure in an Omani child: first case report from Oman. *Sultan Qaboos Univ Med J*. 2011;11:511-514.
4. Amirav I, Luder A, Viner Y, Finkel M. Decriminalization of cannabis: potential risks for children? *Acta Paediatr*. 2011;100:618-619.
5. Blackstone M, Callahan J. An unsteady walk in the park. *Pediatr Emerg Care*. 2008;24:193-195.
6. Bonkowsky JL, Sarco D, Pomeroy SL. Ataxia and shaking in a 2-year-old girl: acute marijuana intoxication presenting as seizure. *Pediatr Emerg Care*. 2005;21:527-528.
7. Boros CA, Parsons DW, Zoanetti GD, Ketteridge D, Kennedy D. Cannabis cookies: a cause of coma. *J Paediatr Child Health*. 1996;32:194-195.
8. Macnab A, Anderson E, Susak L. Ingestion of cannabis: a cause of coma in children. *Pediatr Emerg Care*. 1989;5:238-239.
9. Weinberg D, Lande A, Hilton N, Kerns DL. Intoxication from accidental marijuana ingestion. *Pediatrics*. 1983;71:848-850.

10. Wang GS, Roosevelt G, Heard K. Pediatric marijuana exposures in a medical marijuana state. *JAMA Pediatr*. 2013;167:630-633.
11. Wang GS, Roosevelt G, Le Lait MC, et al. Association of unintentional pediatric exposures with decriminalization of marijuana in the United States. *Ann Emerg Med*. 2014;63:684-689.
12. Mowry JB, Spyker DA, Cantilena LR Jr, Bailey JE, Ford M. 2012 Annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 30th annual report. *Clin Toxicol (Phila)*. 2013;51:949-1229.
13. US Census Bureau. Population estimates. http://www.census.gov/popest/index.html. Accessed January 7, 2015.
14. ProCon.org. 23 Legal medical marijuana states and DC: laws, fees, and possession limits. http://medicalmarijuana.procon.org/view.resource.php?resourceID=000881#details. Accessed January 7, 2015.
15. Substance Abuse and Mental Health Services Administration. *Results From the 2013 National Survey on Drug Use and Health: Summary of National Findings*. NSDUH Series H-48, HHS Publication No. (SMA) 14-4863. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2014. http://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf. Accessed January 7, 2015.
16. Gieringer D. Economics of cannabis legalization: detailed analysis of the benefits of ending cannabis prohibition. http://norml.org/pdf_files/NORML_Economics_Cannabis_Legalization.pdf. Accessed January 7, 2015.
17. Ogden DW. Memorandum for selected United States attorneys; 2009. http://www.justice.gov/sites/default/files/opa/legacy/2009/10/19/medical-marijuana.pdf. Accessed March 10, 2015.
18. Procon.org. 7 states with pending legislation to legalize medical marijuana. http://medicalmarijuana.procon.org/view.resource.php?resourceID=002481. Accessed January 7, 2015.
19. Scherz RG. Prevention of childhood aspirin poisoning: clinical trials with three child-resistant containers. *N Engl J Med*. 1971;285:1361-1362.
20. Walton WW. An evaluation of the Poison Prevention Packaging Act. *Pediatrics*. 1982;69:363-370.
21. Ammerman S, Ryan S, Adelman WP, The Committee on Substance Abuse, The Committee on Adolescence. The impact of marijuana policies on youth: clinical, research, and legal update. *Pediatrics*. 2015;135:e769-e785.
22. Connolly KB. Marijuana packaging: beyond the baggie. Packaging Digest. http://www.packagingdigest.com/packaging-design/marijuana-packaging-beyond-baggie. Accessed January 7, 2015.
23. Zarfin Y, Yefet E, Abozaid S, Nasser W, Mor T, Finkelstein Y. Infant with altered consciousness after cannabis passive inhalation. *Child Abuse Negl*. 2012;36:81-83.