Pediatric Submersion Events in Portable Above-Ground Pools in the United States, 2001–2009

AUTHORS: Brenda J. Shields, MS,[a] Carol Pollack-Nelson, PhD,[b] and Gary A. Smith, MD, DrPH[a,c]

[a]Center for Injury Research and Policy, The Research Institute at Nationwide Children's Hospital, Columbus, Ohio; [b]Independent Safety Consulting, Rockville, Maryland; and [c]Department of Pediatrics, The Ohio State University, College of Medicine, Columbus, Ohio

KEY WORDS
drowning, near drowning, child, submersion, submersion event, swimming pools, portable pools, inflatable pools

ABBREVIATIONS
CPSC—US Consumer Product Safety Commission
CPR—cardiopulmonary resuscitation

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Address correspondence to Gary A. Smith, MD, DrPH, Center for Injury Research and Policy, The Research Institute at Nationwide Children's Hospital, 700 Children's Dr, Columbus, OH 43205. E-mail: gary.smith@nationwidechildrens.org

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WHAT'S KNOWN ON THIS SUBJECT: Previous studies on child drownings in swimming pools have focused on in-ground pools. However, portable pools for residential use have become increasingly popular in recent years. Male children younger than 5 years are at greatest risk for drowning in in-ground pools.

WHAT THIS STUDY ADDS: This is the first study to describe the epidemiology of pediatric submersion events occurring in portable pools in the United States. Portable pools used in residential settings pose a significant risk of submersion-related morbidity and mortality to US children.

abstract

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OBJECTIVE: The goal of this study was to describe the epidemiology of pediatric submersion events occurring in portable pools in the United States.

METHODS: A retrospective analysis of fatal and nonfatal submersion events involving children younger than 12 years in portable pools was conducted using injury and fatality data compiled by the US Consumer Product Safety Commission from 2001 through 2009.

RESULTS: There were 209 fatal and 35 nonfatal submersion cases reported to the commission from 2001 through 2009. The majority (94%) involved children younger than 5 years, 56% involved boys, 73% occurred in the child's own yard, and 81% occurred during the summer months. The number of submersion events increased rapidly from 2001 to 2005 and then leveled off from 2005 to 2009.

CONCLUSIONS: The use of portable pools in residential settings poses a significant risk of submersion-related morbidity and mortality to children, especially in the <5-year-old age group. No single strategy will prevent all submersion deaths and injuries; therefore, layers of protection are recommended. Industry is advised to engage in development of protective devices that are effective and affordable for portable pools, including isolation fencing, pool alarms, and safety covers. A strong and pervasive consumer education campaign is needed to make consumers aware of the dangers of portable pools, because these small, inexpensive, consumer-installed pools may not generate the same sense of risk as an in-ground pool. *Pediatrics* 2011;128:45–52

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Drowning was the second leading cause of death resulting from unintentional injuries among children 1 to 15 years of age in the United States during 2006, accounting for 756 of 4434 deaths (17%).[1] Children younger than 5 years,[2–11] especially boys,[2,4–6,9,12,13] are at greatest risk for drowning in swimming pools. An estimated 3000 children in this age group were treated annually in US hospital emergency departments for injuries associated with pool submersion from 2006 through 2008.[14] Private pools have been found to be the most frequent site of submersion injury for US children,[2,5,6,9,11–14,15–17] and 54% of fatalities associated with pools reported to the US Consumer Product Safety Commission (CPSC) for children younger than 5 years during the period 2005 through 2007 occurred at the child's home.[18] Despite these statistics, many pool owners do not perceive their pool as a hazard for young children.[19]

In recent years, portable pools for residential use have become increasingly popular. A portable pool is defined as any movable structure intended for swimming or other water recreation. Examples include wading pools, inflatable pools, and "soft-sided, self-rising" pools. These pools are available for purchase at toy stores, home improvement stores, variety stores, online, and even in grocery stores. Prices range from $6 to $60 for wading pools, and $60 to ~$1000 or more for larger pools.[20] Although the characteristics of portable and above-ground pools (eg, water depth, ease of access, number of gallons of water the pool can hold) overlap, portable pools differ from above-ground pools in that they are designed to be assembled and disassembled to facilitate portability. Portable pools were associated with 11% of pool submersion fatalities reported to the CPSC for children younger than 5 years from 2005 through 2007.[18]

To the best of our knowledge, this is the first study to describe the epidemiology of pediatric submersion events occurring in portable pools in the United States. It describes the epidemiology of submersion events occurring in portable pools among children younger than 12 years in the United States that were reported to the CPSC from 2001 through 2009. Injury prevention strategies are identified to help keep children safe while using portable pools in residential settings.

METHODS

Data Source

Data for nonfatal and fatal submersion events that involved children younger than 12 years and occurred in portable pools in the United States from January 2001 through December 2009 were included in the study. Because debris covers for portable pools have anecdotally been associated with fatal submersions among older children, this study included children through age 11 years. Data were obtained from the CPSC's 4 databanks: (1) the Death Certificate File; (2) the Injury/Potential Injury Incident File; (3) the In-Depth Investigation File; and (4) the National Electronic Injury Surveillance System. The Death Certificate File contains fatality reports that mention involvement of consumer products. Death certificates are provided by health departments from all 50 states and 2 municipal health jurisdictions (the District of Columbia and New York City). The Injury/Potential Injury Incident File is a computerized databank that includes product-related incidents reported through consumer complaints, newspaper articles, and from participants in the CPSC's Medical Examiners and Coroners Alert Project. The In-Depth Investigation File contains in-depth investigations of product-related injuries and fatalities conducted by the CPSC. The National Electronic Injury Surveillance System obtains emergency department data from a stratified probability sample of 100 hospitals, which were selected from the population of all hospitals with 24-hour emergency departments with at least 6 beds in the United States and its territories.[21] Data regarding injuries associated with consumer products and recreational activities are collected on a daily basis via computer from each of the 100 participating hospitals. Duplicate incident reports in the databases were eliminated after sorting the data according to year, city, state, age of subject, and circumstances involved in the submersion event. Because of a lag time of up to 3 years in reporting data to the CPSC, data for 2008 and 2009 were not complete. We were unable to determine the percentage of missing cases for these years.

Variables

Variables coded from the narrative for each case described the event outcome (fatal/nonfatal), locale, type of pool, height of pool, water depth, circumstances of the submersion event, supervision present, safety practices/devices in use, cardiopulmonary resuscitation (CPR) administered before arrival of emergency medical services, and how the subject gained access to the pool. Wading pools in this study were defined as a pool ≤18 in deep or a pool identified in the narrative as "wading pool." Other variables included subject age, gender, and date of the submersion event. The maximum submersion duration was defined as the amount of time that elapsed between the time the child was last seen and the time the child was found in the pool.

Data Analysis

Data were analyzed using SPSS 17.0 (SPSS Inc, Chicago, IL) and Epi Info 6.04d (Centers for Disease Control and

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Prevention, Atlanta, GA). Statistical analyses included χ^2 with Yates' correction, Levene's test for equal variances, Student's *t* test, linear regression analysis, calculation of odds ratios with 95% confidence intervals, and Mantel-Haenszel weighted odds ratios with Cornfield 95% confidence intervals. The level of significance for all statistical tests was $\alpha = .05$. The small sample size for nonfatal submersion cases precluded subanalyses. All results presented combine fatal and nonfatal submersion cases unless otherwise specified.

Injury Rates

Because the number of children exposed to portable pools in the United States during the study period was unknown, injury rates were calculated using US resident population data from the US Census Bureau[22] as the denominator. The census data were matched to the age range of subjects included in our data set (younger than 12 years) and were estimates for July 1 during intercensal years. This study was approved by the institutional review board at the Research Institute at Nationwide Children's Hospital.

RESULTS

Sample Description, Injury Rates, and Trends

A total of 244 portable pool submersion cases (209 [86%] fatal; 35 [14%] nonfatal) involving children younger than 12 years from 2001 through 2009 were identified from the CPSC data (mean [SD] cases: 27 [14] cases per year). Subjects ranged in age from 1 month to 11 years (mean [SD]: 2.2 [1.6] years; median: 2 years); 42% (102 of 244) were 1-year-olds; and 56% (138 of 244) were male (Table 1). There were an average of 6.2 submersion events per 100 000 000 population 11 years old or younger per year from 2001 through 2009 (fatal: 5.3; nonfatal: 0.9).

TABLE 1 Characteristics of Fatal and Nonfatal Submersion Events in the United States (2001–2009) for Children Younger Than 12 Years

	Fatal ($n = 209$)[a]	Nonfatal ($n = 35$)[a]	Overall ($N = 244$)[a]
Age, y			
Mean (SD)	2.3 (1.6)	2.1 (1.4)	2.2 (1.6)
Minimum, median, maximum	0.1, 2.0, 11.0	0.7, 2.0, 8.0	0.1, 2.0, 11.0
Mode	1.0	1.0, 2.0	1.0
Gender, *n* (%)			
Male	122 (58)	16 (46)	138 (56)
Female	87 (42)	19 (54)	106 (44)
Submersion location, *n* (%)			
Subject's home	129 (72)	19 (86)	148 (73)
Relative's home	30 (16)	1 (5)	31 (15)
Friend's home	6 (3)	0 (0)	6 (3)
Neighbor's home	12 (7)	2 (9)	14 (7)
Babysitter's home/day care center	4 (2)	0 (0)	4 (2)
Total	181 (100)	22 (100)	203 (100)
Unknown	28 (NA)	13 (NA)	41 (NA)
Pool height, *n* (%)			
≤18 in	25 (37)	7 (70)	32 (41)
19–36 in	25 (37)	2 (20)	27 (35)
>36 in	18 (26)	1 (10)	19 (24)
Total	68 (100)	10 (100)	78 (100)
Unknown	141 (NA)	25 (NA)	166 (NA)
Water depth, ft			
n	39	5	44
Mean (SD)	2.1 (1.2)	1.5 (1.5)	2.0 (1.2)
Minimum, median, maximum	0.2, 2.0, 4.0	0.2, 1.0, 4.0	0.2, 2.0, 4.0
Mode	4.0	0.2, 0.7, 1.0, 1.5, 4.0	4.0
Supervision, *n* (%)			
Adult, ≥18 y	35 (24)	7 (50)	42 (26)
Adult, ≥18 y, documented lapse in supervision	24 (16)	3 (22)	27 (17)
Child, <18 y	22 (15)	0 (0)	22 (13)
Child, <18 y, documented lapse in supervision	1 (1)	0 (0)	1 (1)
Babysitter/day care provider	4 (3)	1 (7)	5 (3)
Babysitter/day care provider, documented lapse in supervision	1 (1)	0 (0)	1 (1)
Unsupervised	59 (40)	3 (21)	62 (39)
Total	146 (100)	14 (100)	160 (100)
Unknown	63 (NA)	21 (NA)	84 (NA)
Submersion duration, *n* (%)[b]			
<1 min	0 (0)	2 (50)	2 (4)
1–5 min	14 (32)	2 (50)	16 (33)
6–10 min	11 (24)	0 (0)	11 (22)
11–20 min	17 (38)	0 (0)	17 (35)
30 min	1 (2)	0 (0)	1 (2)
2 h	1 (2)	0 (0)	1 (2)
>2 h	1 (2)	0 (0)	1 (2)
Total	45 (100)	4 (100)	49 (100)
Unknown	164 (NA)	31 (NA)	195 (NA)

NA indicates not applicable.

[a] Unknowns were not included in percentage calculations.

[b] Defined as the amount of time elapsed between the time the subject was last seen until the subject was discovered in the pool.

The number of submersion cases per year increased 500%, from 7 in 2001 to 42 in 2005 ($P = .02$; slope = 8.8), and the injury rate for submersion events increased 504%, from 14.5 per 100 000 000 population in 2001 to 87.6 per 100 000 000 population in 2005 ($P = .02$; slope = 18.4). However, the annual number of cases and injury rates did not change significantly from 2005 through 2009 (Fig 1). The majority of cases occurred during the summer

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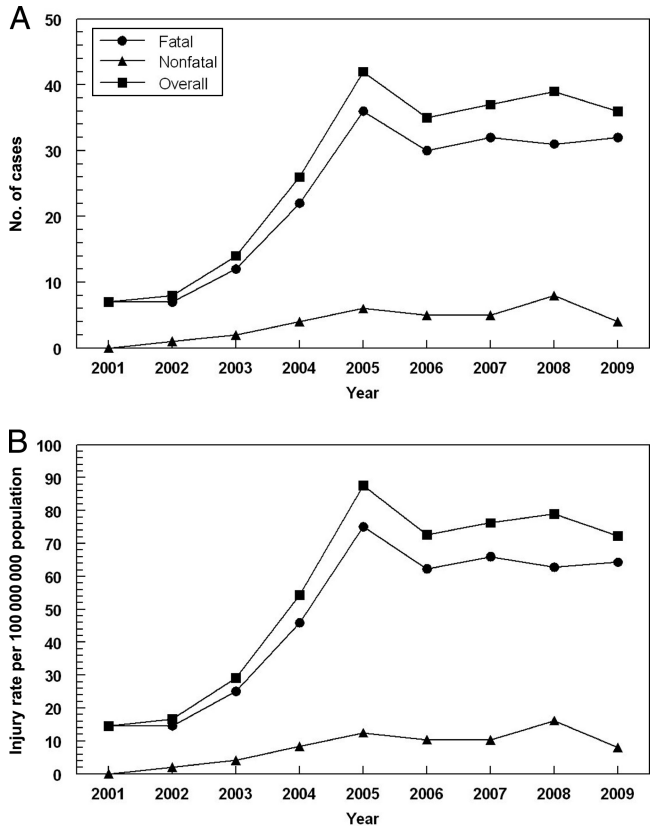

FIGURE 1
A, Number of submersion events for children younger than 12 years, according to year and type of event (fatal, nonfatal, and overall) in the United States in 2001–2009. B, Injury rate per 100 000 000 US resident population younger than 12 years, according to year and type of event (fatal, nonfatal, and overall) in the United States in 2001–2009.

months of June, July, and August (fatal: 80% [166 of 209]; nonfatal: 91% [31 of 35]; overall: 81% [197 of 244]). There was no statistically significant difference in the number of cases grouped according to day of the week.

Pool Description

Descriptions of the type of pool were provided in 32% (78 of 244) of cases (Table 1). In 41% (32 of 78) of these cases, the submersion occurred in a "wading" pool. Pool height was given for 32% (78 of 244) of cases, and 41% (32 of 78) of these pools were ≤18 in high. Water depth at the time of submersion ranged from 2 in to 4 ft (n = 44; mean [SD]: 2.0 [1.2] ft; median: 2 ft). There was no significant difference in water depth between fatal and nonfatal submersion events. The pool was located in the subject's own yard in 73% (148 of 203) of cases.

Supervision

Supervision at the time of the submersion event was documented in 66% (160 of 244) of cases. Of these cases, 43% (69 of 160) of the children were being supervised by an adult (aged 18 years or older), and 39% (62 of 160) of the children were unsupervised. A lapse in supervision was documented for 18% (29 of 160) of cases in which supervision was present. These lapses in supervision occurred when the supervisor was sleeping (n = 10), in the house doing chores (n = 8), answering the telephone (n = 5), outdoors doing chores (n = 4), asleep in the pool holding the subject (n = 1), or socializing with neighbors (n = 1).

Submersion Event

Most case narratives did not provide a detailed description of the submersion event. However, details regarding the subjects' methods of gaining access to the pool area before the submersion event are summarized in Table 2. Table 3 summarizes the subjects' means of entering the pool, and Table 4 summarizes the mechanisms of injury described in the case narratives. Objects were found floating or submerged in

TABLE 2 Subjects' Method of Gaining Access to the Pool Area Before the Submersion Event

	n	%
Method of exiting house		
Door		
Front, rear, side, or garage	28	58.3
Sliding glass	14	29.2
Pet	1	2.1
Window	1	2.1
Assisted by other person	3	6.2
Knocked down safety gate in bedroom doorway	1	2.1
Total	48	100.0
Factors associated with house door		
Door left open	9	36.0
Door left unlocked	7	28.0
Subject unlocked door	5	20.0
Broken lock	2	8.0
Missing door handle and lock	1	4.0
Broken door	1	4.0
Total	25	100.0
Factors associated with pool fencing		
Subject climbed on nearby object to climb over fence	2	28.6
Unlocked gate	2	28.6
Open gate	1	14.3
Missing section of fence	1	14.3
Subject removed section of fence	1	14.2
Total	7	100.0

TABLE 3 Subjects' Method of Entering the Pool Before the Submersion Event

	n	%
Used pool ladder	52	67.5
Climbed on object next to pool	10	13.0
Placed in pool by another person	6	7.8
Climbed on stairs next to pool	2	2.6
Jumped onto pool cover	2	2.6
Dragged object next to pool to climb on	1	1.3
Climbed on pool pump, filter, or hoses	1	1.3
Climbed on pool frame	1	1.3
Climbed directly over side of pool	1	1.3
Climbed under pool cover	1	1.3
Total	77	100.0

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TABLE 4 Mechanism of Injury

	n	%
Pool cover		
Entangled in cover	6	23.1
Installing or removing cover	2	7.7
Flotation devices		
Slipped out of or tipped over in device	3	11.5
Subject removed life jacket	2	7.7
Subject found in pool wearing device	3	11.5
Other child		
Another child landed on subject in pool	2	7.7
Another child held subject's head underwater	1	3.8
Entrapment		
Entrapped by attached slide	1	3.8
Entrapped by attached ring toss game	1	3.8
Entrapped by attached play center	1	3.8
Pool collapsed	2	7.7
Retrieving object from pool	1	3.8
Possible seizure	1	3.8
Total	26	100.0

the pool at the time of the submersion event in 9 fatal submersion cases but were directly associated with the submersion in only 1 incident. There were 2 double drownings. In the first case, 2 unsupervised 9-year-old girls jumped into a covered, inflatable pool, became entangled in the cover, and drowned. In the second case, unsupervised 3-year-old twins unlocked the door of their home, exited the home, and entered a 4-foot-deep pool in their neighbor's yard.

Submersion duration was not documented for 80% (195 of 244) of cases. For documented cases, the maximum submersion duration ranged from <1 minute to >2 hours, with 59% (29 of 49) of the subjects being submerged for ≤10 minutes (Table 1). CPR was initiated by the child's parents or bystanders before the arrival of emergency medical personnel in 15% (32 of 209) of fatal and 17% (6 of 35) of nonfatal submersion cases.

Wading Pool Submersions

A wading pool was documented in 32 cases (29 fatal; 3 nonfatal), with a mean of 3.6 (SD: 1.6; range: 2–7) submersion events per year. As with other submersion events, the majority (78% [25 of 32]) occurred during the summer months. Most incidents (62% [18 of 29]) occurred at the subject's own home, 50% (16 of 32) involved males, and subjects ranged in age from 7 months to 5 years (mean [SD]: 1.8 [1.1] years); median: 1.5 years; mode: 2 years). The water depth in the pools ranged from 2.4 in to 2 ft ($n = 16$; mean [SD]: 1.1 [0.6] ft); median: 0.8 ft). At the time of the submersion event, the subject was being supervised by an adult (aged 18 years or older) in 64% (18 of 28) of cases, by a child (younger than 18 years) in 14% (4 of 28) of cases, and was unsupervised in 22% (6 of 28) of cases. The location of the supervisor was known for 18 cases: in the house doing chores (45% [8 of 18]), in the immediate vicinity (33% [6 of 18]), or asleep (22% [4 of 18]).

DISCUSSION

There were 209 fatal and 35 nonfatal submersion cases reported to the CPSC from 2001 through 2009. The majority (94%) of the submersion events involved children younger than 5 years, 56% were males, 73% occurred in the subject's own yard, and 81% occurred during summer months. These results agree with those reported in previous studies of in-ground pool submersions.[2–14,15–17,23] The number of submersion events increased rapidly from 2001 to 2005, and then leveled off from 2005 to 2009. Although the reasons for the observed trend are unknown, this pattern might be due to a slowing of sales of portable above-ground pools during the latter half of the decade. The plateau seen beginning in 2005 may also be due to initiation of media campaigns about the drowning risk associated with portable pools.

Preventing children from accessing the pool area is the first step in preventing submersion events in residential swimming pools. It is recommended that pool fencing be at least 4 ft high, nonclimbable, have no opening under the fence or between uprights that is >4 in wide, and have gates that open away from the pool and are self-closing and self-latching.[3,7,8,24–26] Isolation fencing of in-ground pools (4-sided fencing enclosing the pool only) has been shown to be superior to perimeter fencing (enclosing property and pool) in prevention of pediatric drowning.[3,5,7,8,10]

If isolation fencing had been in place, it may have prevented at least 48 of the fatal submersions in the present study in which the subject gained access to the pool area by exiting the house through a door or window or with assistance from another person. However, consumers may resist installing a fence around a portable pool because the cost of fencing may be much more than the price of the pool. Previous research has shown some resistance to pool fencing. One study found many pool owners perceive pool fencing as too costly, unattractive, inconvenient, and unnecessary.[6] Only 35% of respondents in an earlier study,[27] who endorsed a complete barrier requirement for all pools, had a fence surrounding their own pool.

In Western Australia, inspection of swimming pool fencing has been mandatory since 1992 for private swimming pools.[13] Only 45% of properties met compliance at first inspection, followed by 57% at second inspection, and 71% by third inspection (over an 8-year period). When compliance was not met, it took the owner an average of 1 month to comply.

In the United States, local jurisdictions are responsible for determining and enforcing codes for residential pools, including portable pools. This has resulted in wide variation in fencing regulations across jurisdictions, with only

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some requiring fencing for portable pools.[17] In addition, portable pools often fall outside of local building codes that require pool barriers.[7,8]

Children in the present study primarily entered the pool using the pool ladder (~68%) or by climbing on a nearby object (~20%). Although previous studies have addressed submersion events involving young children and above-ground pools, none has addressed the use of pool ladders by children to enter the pool.[2,5,6,11–13,15,23,28,29] The CPSC recommends that steps and ladders leading from the ground to the pool be secured to block access and locked, or removed when the pool is not in use.[24,25,30,31] Yet, ladders supplied with inexpensive, portable, above-ground pools ≥36 in deep[20] generally cannot be locked to block access and are cumbersome to remove from the pool. In addition, older children are capable of moving the ladder back to the pool and using it to enter the pool. Ladders that can be locked are available but may cost more than the pool itself and, therefore, may be undesirable or unaffordable to consumers.[20] Adding a warning label to pool ladders could serve as a reminder to lock or remove the ladder from the pool after use, but warning labels alone are not an effective injury prevention strategy.

Additional strategies for preventing pool submersion events that have been suggested include the use of door locks and alarms,[3,12,24] removing items that could be used by a child to gain entry to the pool or pool area,[5] keeping toys out of the pool when not in use,[30] public awareness and media campaigns,[3,5,23] adult supervision[3,5,7,8,12,28,30,32,33] and emptying wading pools immediately after use to prevent unsupervised access by children. In addition, CPR training[3,5,7,8,28,30,34]; swimming lessons[7–9,35,36]; water safety training[3,7,28,32]; posting warning signs, emergency telephone numbers, and CPR instructions by the pool[3,5,7,28,30]; having a telephone available by the pool[7,28,30]; and keeping life preservers, life jackets, and a shepherd's crook by the pool[7,30] are also recommended. Each strategy has pros and cons, and some are more practical than others. For example, bystander CPR can save a child's life and improve neurologic outcome, particularly if administered within the first 5 minutes after submersion. However, the complexity of CPR training may deter voluntary action,[27] and a person's ability to perform the correct sequence of events and avoid injurious CPR declines significantly in as little as 3 months after CPR training.[37] Safety covers are a drowning prevention tool used with in-ground pools[3,8,24]; however, there are no "safety" covers available on the market for portable pools, including wading pools. Other covers, such as solar and debris covers, have actually been associated with drowning incidents when children became entangled or entrapped underwater by the cover. Lacking the availability of safety covers for wading pools, the only solution for eliminating drowning risk is to empty the wading pool between uses. However, this is neither economical nor environmentally responsible. Lastly, pool alarms have been suggested as a preventive strategy for submersion events[3,8,30]; however, testing has demonstrated that these alarms are prone to false alarms.[38] Furthermore, pool alarms rely on someone remembering to activate them every time the pool is not in use,[38] and such active injury prevention strategies have been shown to be less effective than passive strategies, which require no action on the part of the caregiver or child for protection to occur.[39] Because no single strategy will prevent all submersion deaths and injuries, especially among toddlers who move quickly and lack a realistic sense of danger,[24] layers of protection are recommended.[3,8,30]

Industry is advised to develop effective tools for decreasing the drowning hazard associated with portable pools, including affordable isolation fencing and effective safety covers and pool alarms. In addition, a strong and pervasive consumer education campaign is needed to make consumers aware of the dangers of portable pools because these small, inexpensive, consumer-installed pools may not generate the same sense of risk as an in-ground pool.

LIMITATIONS

Our data were obtained from a convenience sample, as opposed to a probabilistic sample, and may not be representative of all pediatric submersion events in portable above-ground pools in the United States. Because this was a retrospective study, data for many of the variables of interest were missing for some of the cases. Because of a lag time of up to 3 years in reporting data to the CPSC, data for 2008 and 2009 were incomplete. Pool dimensions, water depth, and time intervals were reported on the basis of witness estimates and were not actually measured. Our data underestimate the actual number of submersion events occurring from 2001 through 2009 because not all cases reported to the CPSC included a description of the type of swimming pool involved, and cases may have been missed. Furthermore, reporting of submersion events involving portable, above-ground pools was not mandatory; thus, numerous cases may not have been reported. Despite these limitations, this study provides insight into the factors involved in portable pool submersions from 2001 through 2009 in the United States, and may be used to help guide the development and implementation of submersion injury prevention strategies for this type of pool.

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CONCLUSIONS

This is the first study to describe the epidemiology of pediatric submersion events occurring in portable pools in the United States. The use of portable pools in residential settings poses a significant risk of submersion-related morbidity and mortality to children, especially in the <5-year-old age group. No single strategy will prevent all submersion deaths and injuries; therefore, layers of protection are recommended.[4,8,11,23] Industry is advised to develop affordable and effective products to decrease this risk, including isolation fencing, safety covers, and alarms for portable pools. In addition, a widespread consumer education campaign should be undertaken to inform consumers that children can drown in portable pools. Furthermore, child caregivers should be educated on strategies for reducing the risk of drowning, including the need for close supervision, how to administer CPR, and strategies for preventing unsupervised access by children.

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ACAI: *The other day I was munching on a chocolate-covered blueberry when I noticed that one of the ingredients in the candy was açaí juice. While I had heard about the controversies associated with the sale of açaí juices, I did not know much about the fruit itself. As reported in* The New Yorker *(Dept. of Food: May 30, 2011), açaí is the fruit of a palm tree indigenous to the swamps and floodplains of Central and South America. About the size of a small grape, the fruit grows in large clusters. When ripe, the outer skin is purple. The pulp layer is quite thin, about 1 mm or so and has a yellow color. The rest of the fruit is made up of a hard pit. The skin and pulp can be mashed to make a creamy substance with earthy and unsweetened chocolate flavors. Açaí has been an essential part of the diet of the river people of the Amazonian basin for centuries. As these people began to move to the cities in northern Brazil, they took açaí with them. Even today, in these cities, one can readily purchase fresh pulped açaí fruit on most street corners. However, because açaí pulp degrades quickly, most açaí pulp sold outside the Amazonian area has been frozen. By the late 1980s, frozen açaí laced with sugar and caffeine from the guarana fruit had become popular in southern Brazil and by the 1990s juice bars serving açaí with granola and bananas became ubiquitous throughout the country. Part of the allure of açaí was that the fruit contained high levels of omega-6, omega-9, vitamin E, and anthocyanins (compounds that neutralize free radicals). Moreover, açaí was high in fiber and low in sugars. Açaí was almost unknown to American markets until about a decade ago. Now, it can be found in all sorts of products including juices, candies (like the one I was eating), skin emollients, ice cream, and even vodka. Exporting the fruit is big business in rural Amazonia. While the boom has led to a rise in personal income for the people in the area, one unforeseen consequence is that the fruit has become too expensive for the area urban poor to consume regularly. As for my chocolate candy, had it not been for the packaging, I would not have known it contained açaí. Maybe I'll convince my wife that a trip to Brazil is in order if only to taste açaí in its natural state.*

Noted by WVR, MD

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