

# INJURY UPDATE

*A Report to Oklahoma Injury Surveillance Participants\**

July 25, 2008

## A Comparison of Bathtub and Swimming Pool Submersion Injuries Among Children 0-4 Years of Age, Oklahoma 1988-2006

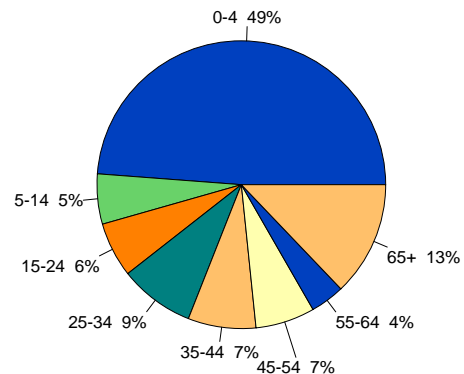
### INTRODUCTION

Children less than five years old are vulnerable to submersion (drowning and near drowning) injuries, in part because they have not developed the knowledge, reasoning, understanding, physical strength, and coordination to recognize the risks and how to handle themselves in water. The majority of children under 5 years of age cannot swim and, if they have had swimming lessons, it cannot be assumed they would be able to navigate waters to save themselves. They are dependent upon adults who know how to maintain a safe environment and how to rescue and resuscitate a child. Children suffer submersion injuries in natural and recreational waters, and in any collection of liquid such as basins, buckets, and sinks; however, bathtubs and swimming pools pose the greatest risk for children under age 5 years in Oklahoma. This report describes the occurrence of submersion injuries in bathtubs and swimming pools among children 0-4 years old in Oklahoma during 1988-2006, and compares epidemiologic characteristics and risk factors associated with these injuries. Differences in drowning situations in the two locations are discussed. Specific recommendations are made based upon the data, case history briefs, and consideration of the effectiveness of strategies to prevent submersion injuries and their sequelae.

### DESCRIPTIVE EPIDEMIOLOGY

Statewide surveillance data on fatal and nonfatal submersion injuries have been reported to the Oklahoma State Department of Health since 1988. A total of 2153 Oklahomans suffered a fatal or hospitalized submersion injury from 1988 to 2006; 1518 persons (71%) died. The annual rate of injury was 3.5 per 100,000 population. Children 0-4 years accounted for 591 (28%) submersions, including 125 bathtub and 289 swimming pool submersion injuries (rate 2.7 and 6.3 per 100,000 population, respectively). Thirty-nine children (31%) did not survive bathtub submersions compared to 76 children (26%) who did not survive swimming pool events. The 0-4 year group accounted for the largest proportion of injuries in these two locations compared to all other age groups (Figures 1 and 2). Seven hot tub submersions occurred in the 0-4 age group (2 died); they are not included in the comparison because of differing circumstances.

Figure 1. Bathtub Submersion Injuries by Age Group, Oklahoma, 1988-2006



Data Source: Surveillance Data, Injury Prevention Service, OSDH

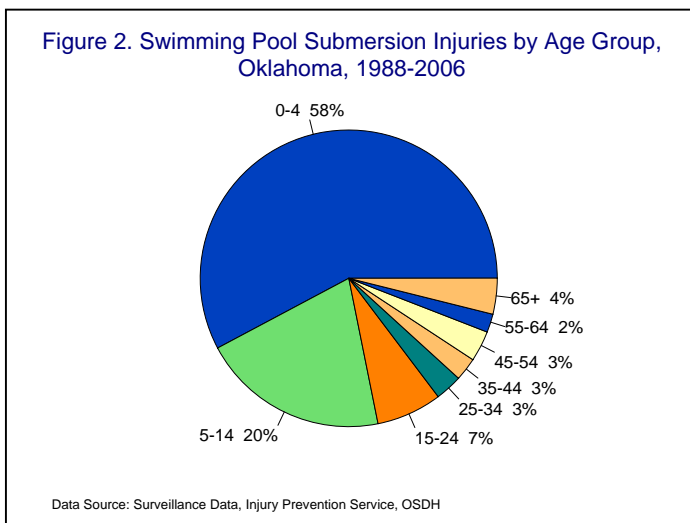
\*The INJURY UPDATE is a report produced by the Injury Prevention Service, Oklahoma State Department of Health. Other issues of the INJURY UPDATE may be obtained from the Injury Prevention Service, Oklahoma State Department of Health, 1000 N.E. 10<sup>th</sup> Street, Oklahoma City, Oklahoma 73117-1299, 405/271-3430 or 1-800-522-0204 (in Oklahoma). INJURY UPDATES and other IPS information are also available at [www.health.state.ok.us/program/injury](http://www.health.state.ok.us/program/injury).

### Comparison of Bathtub and Swimming Pool Injuries Among Children Under 5 Years

**Bathtub.** The highest percentage (51%) of bathtub submersions in the 0-4 age group occurred in children under one year old and declined with each year of age (Table 1). Injuries occurred 1.5 times more often among males than females. African Americans incurred the highest rate of injury followed by whites and Native Americans (5.5, 5.4 and 1.1 per 100,000 population respectively); the rate among persons of Hispanic ethnicity was 3.0. Forty percent of injuries occurred on Sunday or Wednesday (Table 2). Thirty-eight percent of injuries occurred between 6 p.m. and midnight. Two-thirds of the children were submerged 1-4 minutes; of these, 14% did not survive. Resuscitation was attempted in 94% of cases, principally by parents, family or friends (66%) or medical providers (24%). One submersion was a reported homicide. There were no seasonal differences with bathtub injuries.

**Swimming Pool.** One to two year olds experienced 62% of swimming pool submersions in the 0-4 year age group. The ratio of males to females was nearly 2:1. Whites had the highest rate of injury followed by African Americans and Native Americans (6.3, 4.7, and 2.0 per 100,000 population respectively); the rate among persons of Hispanic ethnicity was 2.3. The majority of injuries occurred on the weekend (39%). The peak time of injury was from 12 noon to 6 p.m. (48%) followed by the evening hours (33%). Fifty-three percent of children were submerged 1-4 minutes (86% of these survived); thirty (52%) of the 58 children submerged 5-9 minutes survived. Eight children (3%) were reported to be swimmers. Fifty-two children (18%) were reportedly

swimming when they experienced the submersion injury; 69% were playing, and 4% were wading or walking. Nearly half of injuries occurred at the child’s home (47%); other locations included someone else’s home (27%), public place (12%) and apartment complex (9%). Resuscitation was attempted for 93% of children, principally by parents/family (54%) or medical providers (29%). The highest incidence of submersions (67%) occurred from June to August.



Characteristic	Bathtub (N=125) Number (Percent)	Swimming Pool (N=289) Number (Percent)
<b>Age</b>		
< 1 year	64 (51%)	13 ( 5%)
1 year	34 (27%)	91 (32%)
2 years	16 (13%)	86 (30%)
3 years	9 ( 7%)	60 (21%)
4 years	2 ( 2%)	39 (14%)
<b>Gender</b>		
Male	75 (60%)	190 (66%)
Female	50 (40%)	99 (34%)
<b>Race</b>		
White	99 (79%)	242 (84%)
African American	19 (15%)	27 ( 9%)
Native American	3 ( 2%)	11 ( 4%)
Other	4 ( 3%)	9 ( 3%)
<b>Ethnicity</b>		
Hispanic	10 ( 8%)	13 ( 5%)
Non-Hispanic	115 (92%)	276 (96%)

**DISCUSSION**

Immersion in water even less than a minute may quickly lead to anoxia of the brain or death and must be avoided. According to the case histories, leaving a child (children) in a bathtub in even a small amount of water, or unsupervised in a swimming pool were the principal factors leading to submersion injury. Other common risk factors included very young age, lack of equipment to hold on to, difficulty exiting, and possible distraction of siblings or friends. Potential factors involved with bathtub injuries include a tub’s shape, surface, and depth that may lead to entrapment, falls, and other hazards leading to submersion injury. Swimming pool risk factors for the 0-4 year age group include inability to swim or float, lack of visibility when present with many children in the pool, and the natural curiosity and activity of children that leads them into deeper water or to other parts of the swimming area.

Children less than one year of age should be continuously monitored and held by an adult in a tub or swimming pool because of their limited stage of development and dependency. Each year a child becomes more curious and daring,

increasing their risk of injury as they either climb in and out of the bathtub, jump in and try to swim beyond their ability in the pool, or play games that increase the risk for submersion injury. Other dangers in both locations are the child acting on his own either to turn on the faucet in the tub or jumping in the pool unseen, or having other children present who may deliberately put the young child underwater or make it difficult for adults to see a child.

**Case Briefs**

- A ten-month old baby was left unattended in the bathtub. He had been playing with the water coming out of the spout. His mother found him under water and attempted resuscitation but he did not survive.
- A nine-month old baby was left in the bathtub with her 3-year old sister while her father stepped out for some time and returned to find her face down underwater. The sister had turned the water on after the father left. The child did not survive.

Characteristic	Bathtub (N=125) Number (Percent)	Swimming Pool (N=289) Number (Percent)
<b>Day of Injury</b>		
Sunday	24 (19%)	51 (18%)
Monday	15 (12%)	37 (13%)
Tuesday	20 (16%)	35 (12%)
Wednesday	26 (21%)	35 (12%)
Thursday	13 (10%)	36 (12%)
Friday	19 (15%)	34 (12%)
Saturday	8 (6%)	61 (21%)
<b>Time of Injury</b>		
6:00 a.m. – 11:59 a.m.	23 (18%)	27 (9%)
12:00 p.m. – 5:59 p.m.	41 (33%)	140 (48%)
6:00 p.m. – 11:59 p.m.	48 (38%)	94 (33%)
12:00 a.m. – 5:59 a.m.	1 ( 1%)	0 (0%)
Unknown time	12 (10%)	28 (10%)
<b>Time submerged</b>		
1-4 minutes	81 (65%)	153 (53%)
5-9 minutes	15 (12%)	58 (21%)
10-14 minutes	5 (4%)	14 (5%)
15-30 minutes	2 (2%)	11 (4%)
Over 30 minutes	--	3 (1%)
Unknown	22 (18%)	50 (16%)
<b>Swimmer</b>	--	8 (3%)
<b>Resuscitation attempted</b>	117 (94%)	268 (93%)
<b>Person who attempted resuscitation</b>		
Parent/Family, Friend	82 (66%)	156 (54%)
Medical provider	30 (24%)	85 (29%)
Stranger	3 (2%)	18 ( 6%)
Unknown	10 (8%)	30 (10%)

- A mother put her 1-year old child in the bathtub with a 3-year old sibling and went to play a computer game. She heard the sibling yelling for child to wake up and found he had slipped off of the 8 inch bathtub seat into the water. He was resuscitated by emergency personnel and taken to the hospital.
- A mother was running a bath and closed the bathroom door. Her 11-month old baby got into the bathroom and bathtub after the door was opened by a 2-year old sibling. The baby was found by the mother and the child survived.
- A 1-year old was playing in a pool at a party. The parents did not notice she had fallen in, but some adults saw the child floating face down and pulled her out. She was given rescue breaths and regained consciousness. She was discharged after a one-day stay in the hospital
- A nine-month old baby was in a pool with his mother when she turned her back to stop the other children from fighting. When she turned around, the baby had slipped from the “floating toy” and was underwater. Resuscitation was given and he was discharged from the hospital with no apparent problems.
- A 3-year old child was found face down in a pool at an amusement park after being missed 5 minutes. He was given resuscitation and began breathing spontaneously after 30 seconds.
- A 1-year old child followed another child outside while the family was eating. Neighboring adults found him in the pool and attempted rescue breathing without success. He was taken to the emergency room by private vehicle without further resuscitation and did not survive.

## **RECOMMENDED PREVENTIVE MEASURES**

- Babies should be held while they are being bathed and should never be left alone with young siblings.
- Caretakers should not rely on bathtub devices to hold infants and young children above water; these devices may overturn or the child may slip out.
- Parents and other caretakers should give complete attention to children in a bathtub or swimming pool. If there is a distraction, it is best to take the child or children out of the water and keep them with you or in a safe place.
- Keep young children away from the bathroom, close the door, and know their whereabouts.
- Avoid using inflatable toys, floats, or arm bands to keep young children afloat in a pool. Supervise children at all times and keep them close.
- Caretakers who feel ill or suffer from seizures should not be alone supervising children in water.
- Pools should have 4-sided fences, self-closing and self-latching gates, and a life preserver and shepherd’s hook on hand for emergencies.
- Parents and caretakers should know CPR and how to get emergency help; emergency telephone numbers should be kept handy.

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