



If children are properly restrained in vehicles, helmeted when riding bicycles, supervised when playing near streets, and if their homes are secured properly with smoke alarms, swimming pool barriers, locked cabinets, etc., many injuries and deaths will be prevented.

# Causes of Pediatric Death

By Jason Mount, MD

Most shifts in the emergency department are filled with routine complaints like abdominal pain, minor trauma and non-threatening pediatric illnesses. Occasionally, however, you treat a patient whose presentation sticks in your mind. It is from these cases that I have gained some of the most important knowledge in my career thus far.

On a particularly hot summer day, I had two similar patients who really got me thinking about a certain topic. It was a typical day in the ED. Patients were beginning to arrive in greater numbers, and we were getting busy. As I dove into the growing stack of charts, I was informed by the charge nurse that paramedics were bringing in a child in cardiopulmonary arrest.

According to the paramedic on the radio, they were transporting a two-year-old female who was not breathing and had no pulse. I was told that the child had choked on a grape, and the mother called for help. We quickly set up the resuscitation suite for a child of this age. The friendly banter that usually precedes the arrival of a critical patient is always absent when that patient is a child, and this was no exception: The blanket of silence in the room was particularly uncomfortable.

The child arrived on a stretcher, intubated but cyanotic. The paramedics who were performing CPR looked grim as one of them told me the story. The child had been eating grapes when she began choking. Not knowing what to do, the mother called 9-1-1 for assistance. Apparently, she simply asked for help, then set the phone down to wait by her daughter, missing the opportunity to receive potentially lifesaving instructions from the operator. The paramedics arrived five minutes later to see a frantic mother holding her blue child. No attempts had been made to remove the obstructing grape, so the child had gone without air for more than five minutes. With obvious dismay, the paramedic told me that with one simple push on the abdomen, he was able to pop the grape out from the airway without any difficulty whatsoever—a maneuver we all now wished the child's mother had known about.

The little girl was deceased, and we could not bring her back. As I told the mother that her daughter was dead, all I could think about was how easily she could have dislodged that grape had she only known about the Heimlich maneuver.

This lack of knowledge and its devastating results stuck in my mind for the rest of the day. Near the end of my shift on the same day, I took care of another patient of the

same age. The difference between the two has left an indelible mark on me as an emergency caregiver and has changed the way I think about knowledge.

The second two-year-old girl was brought in by her mother with a chief complaint of “well check.” As I entered the room, I saw a mother with a perfectly healthy-appearing female child in her lap, playing with a small doll. The mother explained that her daughter had choked on a hard candy and then turned blue and limp. The mother then described a perfectly executed Heimlich maneuver, which dislodged the hard candy and resulted in the child's quick recovery. The mother wanted me to “check out” her daughter to make sure she was OK. The child was fine.

I exited that patient's room forever changed. The difference between the results of these two little girls is the difference between life and death. I began to think about my own children and how vulnerable they were. That night, I spent time with my wife going over the Heimlich maneuver and other things I thought she should know. Then I began to think about other ways in which children die and become injured, and how these could be prevented. Over the next few weeks, I researched the topic and learned much about the causes of pediatric death and how to prevent and respond to each one.

**Table I: Six Most Prevalent Causes of Death in Children**

Age Groups	< 1	1-4	5-9	10-14	15-24
<b>Rank</b>					
1	Birth defects	<b>Accidental</b>	<b>Accidental</b>	<b>Accidental</b>	<b>Accidental</b>
2	Short pregnancy	Birth defects	Cancer	Cancer	Homicide
3	SIDS	Cancer	Birth defects	Suicide	Suicide
4	Pregnancy complications	Homicide	Homicide	Homicide	Cancer
5	Placenta problems	Heart disease	Heart disease	Birth defects	Heart disease
6	Respiratory distress	Flu + pneumonia	Cancer	Heart disease	Birth defects

Compiled from data available from CDC National Center for Health Statistics (NCHS)

**Causes of Pediatric Death**

Table I outlines the top six causes of death in children. Incredibly, accidents kill more children aged one year and older than any other cause.

Table II outlines the causes of pediatric accidental death. What stands out is the fact that motor vehicle accidents are the No. 1 cause of death in children aged one year and higher, and No. 2 for those under one year. In the U.S. over the course of a year, nearly 8,000 children will die in car accidents. This accounts for nearly 50% of all accidental pediatric deaths. Sadly, nearly two-thirds of these children will be riding in a vehicle driven by a drinking driver. Alcohol is a significant cause of pediatric death.

Of course, the use of proper restraints for children can reduce death and injury. Eighty-five percent of children under one year old are restrained, but this drops to only 60% of children aged 1-4 years. However, it is estimated that 80% of parents who use restraints for their children use them incor-

rectly. So not only are many children not being restrained at all, most of those who are restrained are not being buckled in appropriately. Parents place smaller children in forward-facing seats when they should be rear-facing, use adult lap-shoulder belts for children who are too small for them, or restrain their children in other inappropriate ways. It is estimated that a child is 25 times more likely to die in any accident if they are not restrained properly. It is also estimated that 70% of those children who are killed each year would have survived had they been properly restrained.

According to Table II, drowning is the next most frequent cause of death in children under 15 years of age. More than 1,000 children drown yearly—90% of them in swimming pools. The rest occur in lakes, ponds, oceans, rivers, bathtubs, toilets, barrels and other places. Adolescent deaths from drowning involve alcohol in nearly 50% of cases. An overwhelming majority of these deaths occur when adults are not present.

The next most common cause of pediatric

death is fires. Eighty percent of these deaths are due to house fires, the rest by electricity and scalding. It is estimated that more than 90% of these deaths could have been prevented if smoke alarms had been used properly. Roughly 94% of households report having smoke alarms, but nearly half of these are not functional one year after installation. Again, alcohol has a significant impact in these deaths: 40% of residential fires involve alcohol.

Another significant cause of accidental death is pedestrian accidents. Children enjoy playing on sidewalks, in the front yard and in surrounding areas, but these areas can be dangerous. Seventy percent of child pedestrian deaths are considered “dart-out” incidents: The child “darts out” into traffic, chasing a ball or crossing the street for one reason or another. Crowded parking lots and driveways are another source of hazard. One of the most tragic cases I have ever worked with involved a father who backed over his two-year-old son, who was playing in the driveway. The father simply could not see the

**Table II: Six Most Prevalent Causes of Accidental Death in Children & Young Adults**

Age Groups	< 1	1-4	5-9	10-14	15-24
<b>Rank</b>					
1	Suffocation	<b>Motor vehicle accident</b>	<b>Motor vehicle accident</b>	<b>Motor vehicle accident</b>	<b>Motor vehicle accident</b>
2	<b>Motor vehicle accident</b>	Drowning	Drowning	Drowning	Firearm suicide
3	Drowning	Fire burns	Fire burns	Firearm suicide	Accidental ingestion
4	Fire burns	Suffocation	Other causes	Suffocation, suicide	Drowning
5	Falls	Pedestrian	Suffocation	Fire burns	Other causes
6	Other causes	Falls	Pedestrian	Suffocation	Intentional ingestion

Compiled from data available from CDC National Center for Health Statistics (NCHS)

child in his mirrors and did not know he was out of the house.

Bicycle-related deaths are one of the most studied causes of pediatric mortality. It is estimated that 85% of children who died last year from bicycle accidents would have survived had they been wearing a helmet. In addition, 88% of brain injuries can be prevented if helmets are used properly.

Other causes of death include suffocation, poison ingestion (including medications), firearms, falls and suicide. A significant number of these deaths are preventable in their own ways, but discussing them is beyond the scope of this article. Nevertheless, common sense and a little forethought can elucidate how children around you can be protected from these and other potentially deadly events.

### **Injury, Disability and Financial Consequences**

The tragedy of a child's death is an immense burden on that child's family. Additionally, children who survive accidents often have injuries that also burden families and society. For every accidental death, there are about 18 hospitalizations, more than 200 emergency department visits and nearly 450 physician visits. Every \$1 spent on bicycle helmets and child vehicle restraints saves society about \$30.

Each year, more than 70,000 people are disabled by accidents; more than 30 million ED visits result from accidents. About \$224 billion is lost annually to lost wages, medical care and rehabilitation costs. This value has jumped over 40% in the last 10 years.

Clearly, accidents cause significant death, injury, disability and cost to individuals, families and society. However, as mentioned above, much of this is preventable. If children are properly restrained in vehicles, helmeted when riding bicycles, supervised when playing near streets, and if their homes are secured properly with smoke alarms, swimming pool barriers, locked cabinets, etc., many of the injuries and deaths outlined above will be prevented.

The two little girls I saw on that fateful shift were separated by only one fact: One of the mothers knew how to dislodge a foreign object in the airway and one didn't. This information saved one of the girls; the lack of it caused the death of the other. If more parents and adults understood what kills and injures children, not only could these tragedies be responded to in the proper way when they occur, many of them could be prevented in the first place. ■

### **Bibliography**

- CDC National Center for Health Statistics. Deaths resulting from residential fires and the prevalence of smoke alarms—United States, 1991–1995. *MMWR* 47(38):803–806, 1998.
- CDC National Center for Health Statistics. National Mortality Data, 1997. Hyattsville (MD): NCHS, 1998.
- CDC National Center for Health Statistics. Motor-vehicle occupant fatalities and restraint use among children aged 4–8 years—United States, 1994–1998. *MMWR* 49(7):135–137, 2000.
- CDC National Center for Health Statistics. National Child Passenger Safety Week, February 14–20, 1999. *MMWR* 48(4):83–84, 1999.
- Howland J, Hingson R. Alcohol as a risk factor for drowning: A review of the literature (1950–1985). *Accident Anal Prev* 20:19–25, 1988.
- Insurance Institute for Highway Safety. 1998 Fatality Facts: Teenagers. Arlington, VA. Sept. 1999.
- National Highway Traffic Safety Administration. National occupant protection use survey, 1996: Controlled intersection study.
- Quinlan KP, Brewer RD, Sleet DA, Dellinger AM. Characteristics of child passenger deaths and injuries involving drinking drivers. *JAMA* 283(17):2249–2252, 2000.
- Shults RA, Sacks JJ, Briske LA, et al. Evaluation of three smoke detector promotion programs. *AJ Prev Med* 15:165–171, 1998.
- Taft CH, Mickalide AD, Taft AR. Child passengers at risk in America: A national study of car seat misuse. Washington, DC: National Safe Kids Campaign, 1999.

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