

Button Batteries Send More Kids to EDs

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The tiny batteries that power home electronic devices pose an increasing risk to small children, with a near doubling of battery-related emergency department visits over the past two decades, a study found.

The number of trips to the emergency department following ingestion or other exposure to batteries increased from 4 per 100,000 children in 1990 to 7.4 per 100,000 in 2009 ($P=0.002$), according to Gary A. Smith, MD, DPH, of Nationwide Children's Hospital in Columbus, Ohio, and colleagues.

Moreover, for children 5 years and younger, the rate rose from 10 to 19.1 per 100,000 ($P=0.007$), the researchers reported online ahead of print in the June *Pediatrics*.

There have been numerous recent reports of children swallowing button batteries, with serious and even fatal outcomes -- within hours -- if the object becomes lodged in the esophagus.

"When placed in a conductive medium, a button battery gives rise to an external current, causing electrolysis of tissue fluids and the generation of hydroxide at the battery's negative pole," the researchers explained.

The types of injuries seen included perforation or stricture of the esophagus, damage to the laryngeal nerve and vocal cords, and bleeding fistulas.

Previous reports have been based on passive surveillance, with reports to hotlines and poison control centers, and are likely incomplete. To more clearly establish the scope of the problem, Smith's group analyzed data from a nationally representative sample of hospital emergency departments, and estimated a total of 65,788 battery-related visits over the 20-year period.

This translated to about one visit every three hours, they noted.

More than three-quarters of the children were ages 5 and under, and almost two-thirds were boys.

When the researchers broke their numbers down according to type of exposure, they found that oral ingestion was the most common, comprising 76.6% of cases, followed by insertion into the nose in 10.2%, the mouth in 7.5%, and the ear in 5.7%.

The rate for oral ingestion overall increased from 2.3 to 6.6 per 100,000 during the 20-year period, but reached 16.9 per 100,000 in children 5 years and under.

For button batteries specifically, the rate of ingestion in all children younger than 18 was 3.7 per 100,000, rising to 10.1 among those 5 and younger.

The rate of insertion into the mouth, which most often involved cylindrical batteries, was 0.35 per 100,000, while the rates for insertion into the ear and nose, almost exclusively button batteries, were 0.20 and 0.29 per 100,000.

In most cases involving nasal insertion, the child was younger than 5, while the ear was more common for older children.

Action Points

This study, using data from a nationally representative sample of U.S. emergency departments, found that approximately every 3 hours in the U.S., a child presents to the emergency department with a battery-related injury.

Note that button batteries were involved in many of the incidents, and that injuries most often occurred from ingestion.

Note also that both the number and rate of visits increased significantly during the 20-year study period, with substantial increases during the last 8 study years.

Injuries from traditional cylindrical batteries was much less common than from button batteries, and usually resulted from the child's chewing on the battery and experiencing burns to the oral mucosa from the contents.

The most hazardous type were 20-mm lithium batteries, "which do not contain an alkaline electrolyte and generate more current because they have twice the voltage and higher capacitance compared with other button batteries," Smith and colleagues wrote.

Radiographic evaluation of the child who may have swallowed a small, disk-shaped object should involve a close examination for battery features such as the double rim which would not be seen on a coin, for example.

The most common sources of the batteries were games and toys, remote controls, watches, and hearing aids. "Battery compartments of all household devices should be taped securely shut," the researchers cautioned.

Manufacturers also should consider childproofing these common devices, they suggested. "Primary prevention of battery exposures is critical because of the limited effectiveness of medical interventions once tissue damage has occurred."

A limitation of the study was its likely underestimation of the number of battery-related events because only emergency department visits were included.

In addition, little information was available regarding diagnostic techniques, treatment, and outcomes.

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Sharpe S, et al "Pediatric battery-related emergency department visits in the United States, 1990-2009" *Pediatrics* 2012; DOI: 10.1542/peds.2011-0012.

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