

Toppled Television Sets Cause Significant Pediatric Morbidity and Mortality

Philip A. Bernard, MD*‡; Carden Johnston, MD*§; Scott E. Curtis, MD*‡; and William D. King, RPh, MPH, DrPH*||

ABSTRACT. *Objective.* To quantify pediatric injuries and deaths that result from toppled television sets.

Design. Retrospective analysis of incident files compiled by the US Consumer Product Safety Commission (CPSC) data systems and The Children's Hospital of Alabama (TCHA) inpatient medical records.

Setting. United States, January 1990–June 1997. TCHA, May 1995–October 1997.

Main Outcome Measures. Morbidity or mortality as a result of a television set falling onto a child.

Results. Over the 7-year period from January 1990 to June 1997, 73 cases that involved falling television sets were reported to the CPSC, including 28 deaths. The mean age of all victims was 36 months (SD \pm 25.4 months). The mean age of those who died was 31 months (SD \pm 22 months). Females accounted for 42 incidents (58%) and 19 deaths (68%). The most common anatomic site of injury was the head, which accounted for 72% of cases investigated by CPSC personnel. Of the 14 deaths further investigated by the CPSC, head injury was responsible for 13, with a generalized crushing injury accounting for the other. Of the 45 cases in which data were available, dressers or stands were identified as the television support 76% of the time. The TCHA database yielded five additional cases, including one death, with demographics similar to the CPSC data.

Conclusion. Serious injury and death can occur as a result of children toppling television sets from elevated locations in the home. The furniture on which a television set is situated is of fundamental importance. An estimate of overall risk to the population is impossible to determine from these data. In light of 73 reported cases with 28 deaths; however, injury prevention counseling and other strategies supporting in-home safety should include a secure and child-safe location for television sets. Attention should be paid to safer design and placement of this ubiquitous product. *Pediatrics* 1998;102(3). URL: <http://www.pediatrics.org/cgi/content/full/102/3/e32>; television, wounds and injuries, accidents, human, infants, children.

ABBREVIATIONS. TCHA, The Children's Hospital of Alabama; CPSC (US) Consumer Product Safety Commission; NIC, National Injury Information Clearinghouse; NEISS, National Electronic Injury Surveillance System; MECAP, Medical Examiner's and

Coroner's Alert Program; NPTR-2, National Pediatric Trauma Registry.

During a 2-year period at The Children's Hospital of Alabama (TCHA), we noted five trauma admissions secondary to falling televisions. This stimulated us to examine the scope and pertinent factors related to this problem. Televisions are certainly a ubiquitous appliance in US households. As of 1993, the United States was estimated to have 215 million television sets.¹ In fact, US Census population surveys reveal that 95% of households have at least one television. With television a focus in many children's lives (over 20 hours/week on average is spent watching television), there is ample opportunity for injuries to occur.²

With advances in technology, television screens are becoming substantially larger, yet their encasements are increasingly smaller.³ The modern television is much more like a monitor than a piece of furniture as it was originally designed. Televisions are now supported in a variety of ways that vary widely in design and function. There has been one consumer recall relating to a dangerous television support. In 1995, a television cabinet was recalled in cooperation with the US Consumer Product Safety Commission (CPSC) for five incidents of large (31" to 35") television sets causing collapse.⁴ The combination of large television sets on inadequate supports may present a real danger for children, especially toddlers, to be injured from this top-heavy arrangement.

Numerous studies have documented television's psychological and social effects on children,^{5,6} but we are not aware of any published data on physical injuries or death that resulted from television set falls. We have reviewed all incidents reported to the CPSC that involved toppled television sets during the past 7 years. We found an alarming number of cases; these highlight the need for primary caregivers to inform families about this safety issue.

MATERIALS AND METHODS

Data were obtained from the National Injury Information Clearinghouse (NIC) division of the US CPSC on child injuries involving television sets throughout the United States. The NIC compiles data from a number of sources including: a consumer complaint hotline developed by the CPSC, an emergency room-based injury surveillance system (National Electronic Injury Surveillance System [NEISS]); the Medical Examiner's and Coroner's Alert Program (MECAP), which reports deaths associated with products; newspapers; and the National Pediatric Trauma Registry

From the *Department of Pediatrics, the ‡Divisions of Pediatric Critical Care and §Pediatric Emergency Medicine, and the ||Southeast Child Safety Institute, The Children's Hospital of Alabama, University of Alabama at Birmingham, Birmingham, Alabama.

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Reprint requests to (P.A.B.) Division of Pediatric Critical Care, Department of Pediatrics, ACC506, 1600 7th Ave South, Birmingham, AL 35233.

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(NPTR-2), a voluntary registry of 78 pediatric trauma centers. Once an injury or death has occurred involving the use of a television or other device, CPSC staff may make an in-depth investigation. These investigations strive to detail the mechanism of injury through reviews of medical and police records as well as interviews with medical professionals, caregivers and others.

Information from both reported incidents and in-depth investigations were obtained from the CPSC database from January 1990 to June 1997. The principal inclusion criterion was a toppled television set that resulted in injury or death. Duplicate entries from the CPSC database were specifically examined to ensure that each incident was only included once in our compilation. Details are provided for investigated incidents.

Incidents reported to the CPSC but which were not investigated provide independent variables of date of accident, city and state where the incident occurred, source of information, sex, age, extent of injury, and products associated with the incident. Investigated incidents also provide information about the location where the incident occurred, a diagnosis, and identification of the injured body part.

In addition, all inpatient medical records from TCHA from May 1995 to October 1997 with discharge diagnosis E-codes 916–918 were selected by one of the authors (P.A.B.). The E-code system, which codes for external cause of injury, defines E916–E918 as “Struck by Object.” Each chart that included a television set fall was then reviewed for the mechanism of injury. Data collected were date of accident, sex, age, extent of injury, diagnosis, and injured body part, and products associated with the incident. Data before May 1995 were not available secondary to the lack of E-codes.

Data were entered and analyzed using the Data Analysis module from Microsoft Excel 7.0 (Redmont, WA).

RESULTS

CPSC Data

A total of 73 incidents involving television falls, including 28 deaths, were reported to the CPSC over the 7-year period from 1990 to June 1997. Fourteen of the deaths and 11 of the injuries were further investigated by the CPSC. The child’s age at which an incident occurred ranged from 1 month to 11 years, with a mean of 36 months (SD ± 25.4 months) and a median age of 24 months (Fig 1). The 12 to 24 month age group made up almost 40% of the 73 cases, more than 2.5 fold that of any other group. The age of those who died ranged from 6 months to 8 years ($n = 28$), with a mean age of 31 months (SD ± 22 months) and a median age of 24 months (Fig 2). Although the

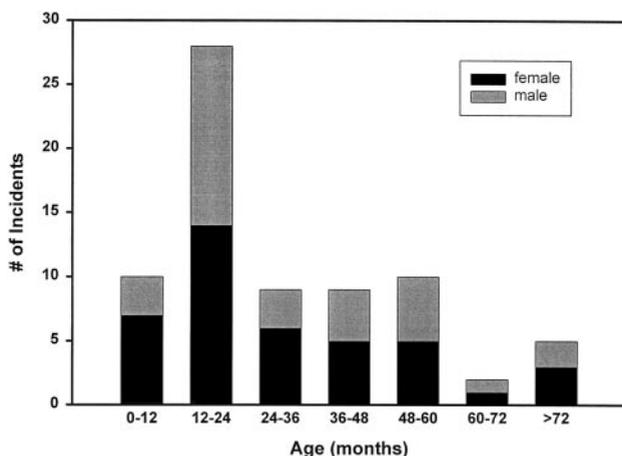


Fig 1. Age and gender distribution of all incidents reported to the CPSC from January 1990 to June 1997 in which a television set caused injury or death. The number of incidents in the 12 to 24 month age group more than doubled any other group.

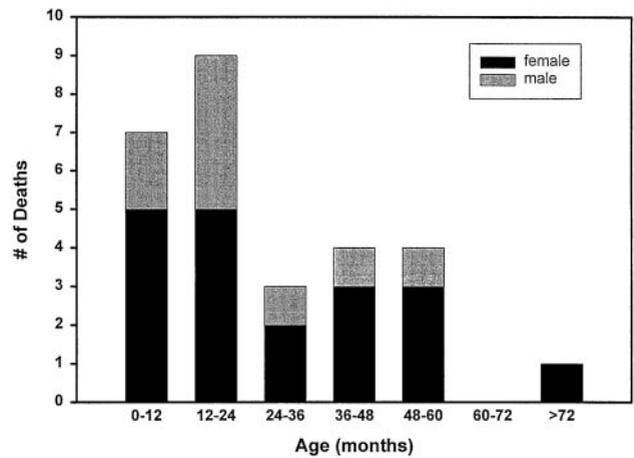


Fig 2. Age and gender distribution of all incidents reported to the CPSC from January 1990 to June 1997 in which a television set caused death. Range, 6 months to 8 years.

0 to 12 month age group made up only 14% of all incidents, they comprised 25% of all deaths. Females accounted for 42 of 73 (58%) overall incidents and 19 of 28 deaths (68%).

The most common injury was an isolated blow to the head. Of the investigated incidents, these accounted for 72% of the cases ($n = 25$). When the head was injured, death occurred 13 out of 18 times (72%). Of the 14 deaths that were investigated, the head was injured in 13, with a generalized crushing injury accounting for the other death. All investigated incidents took place in the victim’s home with the exception of one case at the victim’s daycare.

TCHA Data

A total of five injuries occurred that required admission to TCHA. None of these cases had been recorded in the CPSC database. Four of the five hospitalizations were for diagnoses of skull fracture and one for a femur fracture. One death occurred as a result of head injury. There was no apparent difference in occurrences between gender (3 female, 2 male). The mean age of those hospitalized was 20 months (SD ± 5.7 months).

Stand Type

Data on the type of television support used were available in 45 of the 73 (61%) cases. None of the sets could be identified as a self-standing piece of furniture such as a console. In the 28 reported deaths, 24 products were identified as contributing to the mechanism of injury. Television stands and dressers accounted for the vast majority of incidents reported. Television stands and dressers were involved in 42% and 38% of the deaths, respectively (Fig 3). In 13 of the 25 incidents investigated, CPSC investigators specifically state that the child was injured while climbing the furniture to manipulate the television controls.

Of the 5 cases admitted to TCHA, medical records showed that the television rested on a dresser in 3 cases, a shelf in 1 case, and was not mentioned in the remaining case.

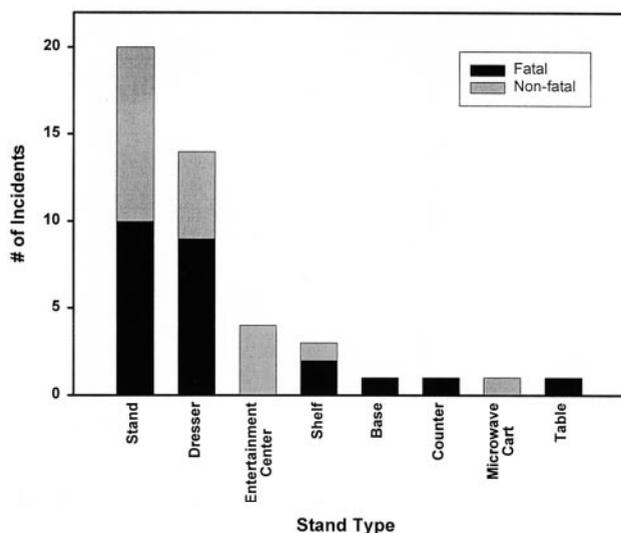


Fig 3. Distribution of various television supports associated with fatal (dark-shaded) and nonfatal (light-shaded) cases.

Comparative Yield of Databases

Although several sources furnished information for the compiled incidents, the reports of death associated with television falls were obtained primarily from MECAP ($n = 14$) and newsclips ($n = 13$). NPTR-2 reported 2 deaths. There were no incidents of death and only 5 injuries reported by NEISS.

DISCUSSION

Head injury is the leading cause of traumatic death in the pediatric population.⁸ This study reports incidences documented by the CPSC that resulted in morbidity or mortality as a result of a toppled television set. In the cases where the injured body part was identified, the majority involved the toddler population and were associated with head injury that resulted in death in almost three quarters (13 of 18) of those incidents. Importantly, the television sets were resting on a television stand or dresser in almost all of these cases.

These findings agree with intuitive reasoning. Televisions have increasingly become a part of the American lifestyle and are now found in almost all aspects of life. The manufacturing statistics are compelling. A 16-inch set was the largest available when commercial television was first introduced in the 1950s. By the 1970s, screen size had increased to 25 inches. Television sets 27 to 36 inches are now made in large numbers, with smaller screens becoming increasingly obsolete.⁹ Televisions are, by design, unstable appliances by virtue of the picture tube which is heavily weighted to the front of the set. Television stands vary greatly in design but in general offer access to controls that toddlers can reach. Dressers have drawers that are easily adapted to steps for the inquisitive toddler.

Current technology has not yet yielded significant overall weight reductions in television sets. The application of force to the brain is a central concept in the pathophysiology of head injury.¹⁰ Accelerations from even very short distances can cause severe head trauma. The dynamics of head injury have been elu-

cidated elsewhere, and depend on many factors including elasticity, compressibility, and viscosity of body tissues.¹¹ A 36-inch television set with a typical weight of 78 kg falling just 1 meter creates the momentum equivalent to a 1-year old weighing 10 kg falling from 10 stories (60 meters). Even a relatively light 19-inch television weighing 18 kg when dropped from a height of 1 meter has the momentum equal to a 1-year-old falling from 3.2 meters (10 feet).

Surprisingly, NEISS identified none of the deaths and only 5 of the 45 nonfatal injuries. NEISS obtains data from 91 hospital emergency departments in the United States, all of which have a 24-hour emergency room and at least 6 beds. Data from these hospitals are collected and then weighted for hospital size to provide a statistical representation of national injury estimates.¹² Two possibilities are suggested by these data: 1) that the incidence of injury from television falls is exceedingly small; or 2) that NEISS is not representative of this injury in this population. The experience at TCHA would argue against the first conclusion. In reports of other pediatric injuries, NEISS has been shown to make minimal contributions to the data obtained by the CPSC. For example, in an examination of pediatric window-cord strangulation by Rauchschalbe and Mann,¹³ NEISS contributed reports of just 2% of 183 deaths which were compiled. The compilation of reports of 28 deaths during a 7-year period obtained primarily by occasional newsclips and medical examiner's reports would suggest that the true incidence is underreported.

NPTR-2 is a voluntary registry of 78 pediatric trauma centers from 28 states. Nearly 200 items of information are entered for each injured child. TCHA is a member of NPTR-2. Because the information compiled for the registry must be done manually, it is subject to large unfunded manpower demands. In light of these demands, 40 of the 78 centers currently do not regularly contribute data (personal communications, NPTR, October 1997). None of the injuries admitted to TCHA were reported to the NPTR-2.

This study has several limitations. Because the databases used can not have 100% sensitivity for detecting this injury, it is difficult to estimate the true incidence of television falls resulting in morbidity and mortality. Also, retrospective review of hospital records is hampered by the lack of specific codes for this injury. E-code categories for injuries adapted from the Childhood Injury Prevention Resource Center at Harvard School of Public Health list codes E916–E918 as "Struck by Object." The true incidence of television set falls resulting in injury could be further defined by a specific code that identifies this injury. The current mechanisms for compiling data on pediatric injury appear to be insufficient. A unified approach must be taken to identify the true incidence and risk factors resulting in pediatric injury.

Despite extensive basic and applied science research in head injury, the most effective means of reducing morbidity and mortality from head injury continues to be prevention.¹⁴ Public education out-

lining the hazards of improperly secured television sets should be considered and safety alerts should be included with television sets outlining the risks to small children associated with accidental falls. Pediatricians and family physicians need to continue to stress the risks associated with toddlers climbing furniture. Educational interventions should be reinforced concerning the securing of large objects such as television sets around children. Television set and furniture design should continue to be modified to reduce overall weight and implement effective preventative measures against toppling.

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