Outcomes From Television Sets Toppling Onto Toddlers

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Objective: To assess outcomes of trauma caused by television sets falling onto children.

Methods: Retrospective review of medical charts of 183 children aged 7 years and younger hospitalized for injuries caused by falling television sets. Descriptive statistics were applied.

Data Sources: Phase 2 (1988-1995) and phase 3 (1995-1999) of the National Pediatric Trauma Registry.

Outcome Measures: Demographics, injured body region, injury severity measured by the Injury Severity Score, length of hospital stay, admission to the intensive care unit, surgical intervention, in-hospital death rate, disability resulting from the injury, and disposition at discharge from the hospital.

Results: The sample population represented 0.5% of all National Pediatric Trauma Registry admissions in this age group. More than half (57.4%) of the children were boys, and more than three quarters (76.0%) were 1 to 4 years of age. In most cases (95.1%), the injury occurred at home. Most children (68.3%) sustained head injury, and 43.7% sustained injuries to multiple body regions. More than a quarter (28.4%) of the children had injuries of moderate to critical severity (Injury Severity Score, 10-75), about a third (31.1%) required admission to the intensive care unit, and 20.2% needed 1 or more surgical interventions. The average length of hospitalization was 3.3 days. Five children (2.7%) died, and 48 (26.2%) developed functional limitations, which required discharge to a rehabilitation facility in 5 cases. Most (94.0%) of the children returned to their home. The proportion of television set-related injuries increased more than 100% during the study period.

Conclusions: The injuries reported are not trivial. Not only did they require hospitalization, but they also resulted in an in-hospital death rate comparable to the 2.5% rate observed in children of the same age group injured by unintentional blunt trauma, inclusive of motor vehicle traffic-related injuries. Since virtually all American children are at risk for such injury, we suggest that television set designs be modified to reduce the incidence and severity of the problem.


Television (TV) sets are ubiquitous in American households. The Consumer Electronics Manufacturers Association reported in 1997 that 98% of the households in the United States own 1 or more TV sets.1 Recently, decreasing costs have led to the widespread popularity of large-screen TV sets, with screen dimensions of more than 25 inches. Contemporary TV sets are different from earlier models: they are heavier and, although the screen is larger (often up to 36 inches), the enclosure is smaller.2 These changes bring most of the weight to the front part of the set, making it difficult to find a stable and balanced placement. The physical characteristics of TV sets and the large amount of time young children spend watching TV (average, 4 h/d)3 can easily give occasion to injuries from falling TV sets.

Several physical properties increase the risk of injury from toppling TV sets. The heaviest portion of a standard cathode-ray tube TV set is the screen itself. Thus, weight increases dramatically with larger screen sizes, and the center of gravity of the sets moves forward toward the screen. According to manufacturers’ specifications, TV sets range from an average of 36 kg (80 lb) for a 27-in set to 80 kg (176 lb) for a 36-in set. Furthermore, the cabinets are not padded and usually feature sharp corners that may concentrate the force of impact onto a small surface area, increasing the risk of injury. Television stands and entertainment centers originally designed for smaller, lighter sets may be used for new larger sets and may

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METHODS

The NPTR is a database that contains information about many aspects of pediatric trauma, its causes, and its consequences. Data are voluntarily contributed to the NPTR by pediatric trauma centers or by children’s hospitals with pediatric trauma units.

The NPTR collects data on children and adolescents 19 years old and younger who are admitted to the hospital for an acute injury, including patients who are dead on arrival or who die in the emergency department. All injuries are included, except burns, poisoning, and near drowning. The operation, data management, and quality assurance of the NPTR have been described in detail elsewhere.

The injuries recorded in the NPTR represent a subset of all the injuries occurring to children because the NPTR includes only those injuries that led to hospitalization. Also, because the NPTR’s participating institutions are hospitals specialized in the treatment of pediatric trauma, the proportion of severe cases reported to the NPTR is higher than that observed in all hospitals. The NPTR is a voluntary database, not a population sample, and precise population-wide incidence estimates cannot be made from NPTR data.

SUBJECTS

We extracted from the NPTR phase 2 (October 1988 to October 1995, N = 53,113) and phase 3 (October 1995 to December 1999, N = 33,835) all cases with an assigned “E” code for external cause of injury of E916 (struck accidentally by a falling object) or E917.9 (struck accidentally by objects) that identified in the injury description the TV set as the object striking the patient. The injury description is a 50-character string in the NPTR that contains pertinent information about the injury event and can be searched for keywords, such as TV or television in this case. After excluding 5 cases of children aged 8, 9, 12, and 13 years, we identified a set of 183 cases (73 from phase 2 and 110 from phase 3) for analysis. The data were contributed by 68 hospitals, inclusive of 32 children’s hospitals.

MEASURES

Variables analyzed included age, sex, place of occurrence, severity of injury, injured body region, and use of resources during hospitalization, including admission to the intensive care unit, surgical intervention (operating room), length of hospital stay, and clinical outcome.

Severity of injury was measured by the Injury Severity Score. In conformance with the computation of the Injury Severity Score, body regions considered in the analysis were head and neck, face, thorax, abdomen, extremities, and skin. Outcome was measured by in-hospital death rate, the number of functional limitations, and disposition at discharge from acute care.

Functional status was assessed at the time of discharge by rating the child’s ability in 9 or 10 functional domains: vision, hearing, speech, self-feeding, bathing, dressing, walking, bowel/bladder control (from 1995 onward), cognition, and behavior. Using performance and neurologic tests, a clinician rated the performance of the child in each functional area as either age appropriate, impaired, or unable. In our analyses, the categories of impaired and unable were combined to reflect any degree of functional limitation. In addition, for each functional limitation, the clinician indicated whether it existed before the current trauma event and, if so, whether it was worsened by the current injury.

DATA MANAGEMENT AND ANALYSIS

Data analyses were performed using BMDP® statistical software. Descriptive statistics were applied.

RESULTS

More than half (57.4%) of the children were boys, and more than three quarters (76.0%) were 1 to 4 years of age (Table 1). Most injuries occurred at the child’s or another private home (95.1%); only 2 (1.1%) took place at day care centers or schools. Most children (68.3%) sustained injuries to the head, and 43.7% sustained injuries to multiple body regions (Table 2). Only 2 children sustained injuries to the thoracic cavity. Most (69.4%) of the children had injuries of mild severity (Injury Severity Score, 1-9), but 28.4% sustained injuries of moderate to critical severity (Injury Severity Score, 10-75) (Table 2). The average length of hospitalization was 3.3 days (median, 2.0 days), approximately one third (31.1%) of the children were admitted to the intensive care unit, and one fifth (20.2%) required 1 or more sur
Injury is a major cause of death and disability during childhood. Pediatricians and injury professionals have led successful campaigns to reduce the frequency and severity of motor vehicle and bicycle injuries through the promotion of car seats and bicycle helmets. Most states now have statutory requirements for the use of safety devices by children.

Being accidentally struck by an object is also a relatively frequent cause of pediatric trauma requiring hospitalization. In the NPTR, among the 36,705 children younger than 8 years who sustained unintentional blunt injuries and were reported to the NPTR between October 1985 and December 1999, 2242 children (6.1%) required hospitalization for injuries resulting from being struck by an object. Among these, 183 children were injured by a TV set that fell while the child was trying to reach it, was climbing on the TV stand, or was engaged in similar activities likely to cause the fall of the equipment from its place of support. In several instances, the TV set was reported to be as large as 36 inches.

Being injured by a falling TV set is not a new problem. The National Safety Council reported that in 1988 overturned TV sets caused 31,754 injuries to people of all ages, requiring treatment in the emergency department.10 The CPSC estimates that 2300 children require treatment annually in the emergency department for injuries associated with toppling of TV sets.4 In addition to recalling TV cabinets, carts, and guards,11-13 the CPSC issued a consumer product safety alert in 1988 that included the following warning: “Young children can be killed when furniture tips over. Place TVs on lower furniture, as far back as possible. Use angle-braces or anchors to secure furniture to the wall.”

Although small TV screens have been replaced by much larger screens, no alterations in design appear to have been made that would result in making the device less prone to toppling. Our search for standards of design in the documents library of the American Association for Testing and Materials, US Department of Commerce, did not reveal any specific recommendations that dealt with non–power-related safety.

Yet, the weight of the big TV sets, combined with the instability caused by the overloaded front, should surely cause concern. Our study confirms earlier work that falling TV sets can be lethal or cause lifelong disability to young children. The in-hospital death rate of 2.7% reported in this study is comparable to the 2.5% in-hospital death rate for the same age group from all causes of unintentional blunt trauma, inclusive of motor vehicle traffic–related injuries. In addition, 1 in 4 children had functional limitations at the time of discharge, which required admission to a rehabilitation facility in 5 cases. We do not know about

Table 1. Patient Characteristics of 183 Children*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>NA</th>
<th>Age, y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>105 (57.4)</td>
<td>76 (41.5)</td>
<td>2  (1.1)</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1-4</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>5-7</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage). Taken from National Pediatric Trauma Registry (1988-1999). NA indicates not available. Not all percentages sum to 100 because of rounding.

Table 2. Injury Characteristics of 183 Children*

<table>
<thead>
<tr>
<th>Injured body regions</th>
<th>Head only</th>
<th>Extremity only</th>
<th>Other</th>
<th>Multiple†</th>
<th>Total head‡</th>
<th>Injury Severity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>58 (31.7)</td>
<td>28 (15.3)</td>
<td>17 (9.3)</td>
<td>80 (43.7)</td>
<td>125 (68.3)</td>
<td>1-9 (mild) 127 (69.4)</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td>10-15 (moderate) 32 (17.5)</td>
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<td></td>
<td></td>
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<td></td>
<td>16-24 (severe) 13 (7.1)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>25-75 (critical) 7 (3.8)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage). Taken from National Pediatric Trauma Registry (1988-1999). NA indicates not available.
†Face/abdomen/skin.
‡Head/face/thorax/abdomen/extremity/skin, in any combination of 2 or more.
§Head, with and without injury to other body regions.

Table 3. Functional Limitations of 183 Children*

<table>
<thead>
<tr>
<th>Bathing</th>
<th>Dressing</th>
<th>Walking</th>
<th>Self-feeding</th>
<th>Cognition</th>
<th>Behavior</th>
<th>Speech</th>
<th>Vision</th>
<th>Hearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 (16.4)</td>
<td>29 (15.8)</td>
<td>27 (14.8)</td>
<td>13 (7.1)</td>
<td>9 (4.9)</td>
<td>8 (4.4)</td>
<td>6 (3.3)</td>
<td>7 (3.8)</td>
<td>2 (1.1)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage). Taken from National Pediatric Trauma Registry (1988-1999).
less obvious and subtler limitations that may have developed or become evident later.

The NPTR data suggest that this problem is worsening, as reflected in the increased proportion of children hospitalized and dying from being struck by a TV. Even if this proportion is relatively small (0.5% of all NPTR admissions in the age group of our study), the severity of the outcomes, the increased frequency of occurrence, and the lengthy exposure of children to TV viewing are reasons for alarm.

Approaches to prevention of this problem should take into consideration the need to reach beyond the consumers with access to adequate safety guidelines, such as those that may be provided by medical personnel or alerts from the CPSC. It may be more effective for the CPSC to require manufacturers to affix labels to TV sets warning about the instability of the equipment and specifying appropriate placement. It may also be possible that simple changes in the design of TV sets and stands could reduce the risk of this type of injury.

CONCLUSIONS

Clearly, being struck by a toppling TV set can cause serious injuries and death to young children. As reported by the NPTR, more than 40% of children younger than 8 years are injured at home. Many safety guidelines and educational programs, including TIPP, address the issue of home-related injuries, but none emphasize this hidden hazard. Because we can assume that almost all American children are exposed to TV sets in their home environment, warnings about toppling TV set–related trauma should be added to other injury prevention guidelines in the form of brochures available in hospitals and community clinics. In addition, since it appears from our data that the CPSC alert has done little to reduce the number of injuries or deaths resulting from toppling TV sets, we recommend, as a more effective approach to prevention, the introduction of regulatory action. Schools, day care centers, and health care facilities should also inspect their TV sets to ensure that they are properly secured.