Journal of Pediatric Orthopedics
7:184–186 © 1987 Raven Press, New York

The Likelihood of Injuries When Children Fall Out of Bed

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Summary: Between 1980 and 1985, 76 children from birth to 16 years of age were reported to have fallen out of a bed, crib, or chair while in our hospital; 75% of the incidents occurred in children from birth to 5 years of age. The height of falls ranged from 1 to 3 ft. Most of the injuries were minor (scalp hematoma and facial lacerations). Our data indicate that severe head, neck, spine, and extremity injuries are extremely rare when children fall out of hospital beds. Child abuse should be suspected and ruled out when a child is seen with severe injury from a reported "fall at home." **Key Words:** Child abuse—Children—Falls—Hospital accidents.

Accidents in children are a leading cause of morbidity and mortality in the United States. A national survey indicated that the average frequency of accidents in hospitals was higher than in most industries in this country (7).

One of every 12 children <6 years of age has been reported to require hospital treatment for a fall (3). Injuries accounted for 17% of pediatric hospitalizations versus 8% for the population >20 years of age (3). Falls are the most frequent cause of injury, bringing patients of all ages to the emergency department, and this is true for children as well (2). Falls rank fourth behind motor vehicle accidents, fires, and drowning as the cause of death in children (2).

A statewide childhood injury survey in Massachusetts in 1984 (1) showed that for every injury death, there are (a) 45 injuries severe enough to result in a hospital admission, (b) 1,300 injuries that require ambulatory care in the emergency room, and (c) 2,600 minor injuries not requiring treatment in the hospital.

The contact surfaces and height of falls are the variables determining the severity of injury. The composition of the contact surface was found to be more important than the height of the fall. Of the several contact surfaces, concrete and asphalt are the most unforgiving surfaces in falling injuries (8).

One report from Virginia showed a low rate of significant injury in children 1–5 years of age who are brought to the emergency room because of falls (2). Another report (5) concluded that severe head injuries and central nervous system damage or injury of any type are extremely rare when children, ≤5 years of age, fall out of beds or cribs (a height of ≤3 ft).

The purpose of this study was to determine the likelihood and severity of injuries when children, ≤16 years of age, fall out of a bed, crib, chair, wagon, etc., while hospitalized for other medical reasons.

SUBJECTS AND METHODS

The records from the safety office at the University of South Alabama Medical Center in Mobile between January 1980 and December 1985 were reviewed. Children ≤16 years of age who were reported to have fallen out of a bed, crib, couch, chair, or wagon, off a rocking horse in the playroom, or slipped and fell to the floor while walking or running were included in this study. Medical records and radiographs (if ordered) were reviewed for determination of the extent and consequence of injury. All patients were examined by the physicians on call for the service either right after or within a few hours after the incidents. Radiographs were ordered only when the physician thought that there was significant injury on the basis of physical examination.

RESULTS

There were 76 children, 31 girls and 45 boys (ratio, 1:1.45), reported to have fallen out of a bed, crib, chair, wagon, etc., while in the hospital during the 5-year period surveyed (Fig. 1).

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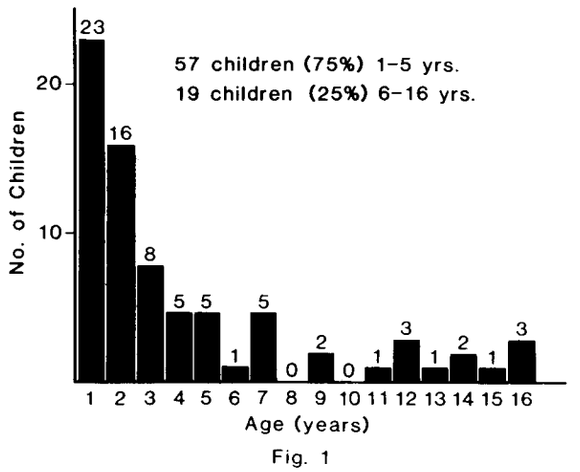

Fig. 1

FIG. 1. Age distribution for children reported to have fallen while in the hospital during a 5-year period.

There were 9,019 admissions of patients ≤16 years of age during that period, for an incidence of one fall for every 118 pediatric admissions.

The height from which children fell ranged from 1 to 3 ft in the majority of cases (cribs, 38 inches; beds, 34 inches maximum height and 23 inches minimum height; wagons, 12 inches (Table 1).

Radiographs were taken of nine children and included seven skull series and one chest and one tibial radiograph each.

Most of the injuries sustained were minor; two-thirds of children sustained minor bruises or were noted to have no observable injury. One-third sustained bumps, lumps about the scalp and face, and minor lacerations (Table 2).

A questionable occipital skull fracture occurred in a 1-year-old girl with no evidence of intracranial damage and required no specific treatment. A nondisplaced tibial fracture occurred when a patient with osteogenesis imperfecta fell in the physical therapy department.

We found essentially no extremity or spine injuries associated with falls in the hospital from a height of ~1–3 ft.

Most injuries occurred to the head and face region. In climbing out of bed or crib, the child is likely to fall "head first," perhaps because there is a greater weight in the upper half of the body, especially the head.

Skull radiographs were taken for only seven children in this series. It has been pointed out that in head trauma, routine skull radiographs are not necessary, because treatment is not changed owing to the detection of a skull fracture (6). Clinical evaluation, the level of sensorium, and objective neurological findings correlate better with significant intracranial damage (4).

DISCUSSION

In falling injuries, the importance of the contact surface should be emphasized. A study at the Franklin Institute Research Laboratories (Philadelphia, PA) on the relationships of contact surface, drop height, and gravity force (g) showed the maximal acceptable impact to be 50 g; beyond this, a serious injury can occur to a child's head (8). A direct fall of a child's head onto a concrete surface from a height as low as 1 ft can produce an impact force of 160 g, which could be fatal. A 3-ft fall onto packed earth has the same impact force. Shredded rubber or a 10-inch depth of sand proved to be capable of absorbing the impact of a 10-ft fall.

As the hospital floor is covered with hard vinyl tile, it would be of interest to study the impact of a fall on this surface. It appears obvious that a carpeted floor or a thick rug can help soften the impact of a fall. Some studies have been done comparing various types of playground surfaces and their safety. However, to the best of our knowledge, no study has been published comparing vinyl floors and the usual type of hospital carpeting (8).

In conclusion, our data agrees with previous reports in the literature (2,5) and indicate that severe head, neck, extremity, and spine injuries are ex-

TABLE 1. *The number of children in different types and heights of falls*

Objects from which children fell	Approximate height	No. of children	Percentage
Bed, crib, stretcher	3 ft	36	47.4
Chair, couch, wagon, rocking horse	1–2 ft	17	22.4
Slipped and fell to floor while walking or running		17	22.4
Miscellaneous (fell in physical therapy, fell out of mother's arm during feeding)		6	7.8
Total		76	100.0

TABLE 2. *The type of injury and number of children injured*

Type of injury	No. of children	Percentage
Scalp and facial hematoma (bumps, lumps)	14	18.0
Lacerations (scalp, eyelids, lip) ≤2 cm[a]	9	12.0
Fracture skull (nondisplaced)	1	1.3
Fracture tibia (osteogenesis imperfecta patient)	1	1.3
Loose front teeth	1	1.3
Nosebleed	1	1.3
Toenail avulsion	1	1.3
Minor bruises or no observable injury	48	63.5
Total	76	100.0

[a] Four required stitches.

tremely rare when children ≤16 years of age fall out of a bed, crib, chair, etc., while in the hospital.

When a child is seen in the emergency room with a significant head, neck, extremity, or spine injury from a reported "fall out of bed" or "fall at home," child abuse should be suspected and ruled out.

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