

Accidents in Hospitalised Children: A Retrospective Study in a Paediatric Research Hospital in Northern Italy

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ABSTRACT

Aim: The aim of our study was to assess accidents in hospitalised children and define the main features of paediatric patients at risk for accidents.

Methods: Data were collected using the medical reports of hospitalised children who experienced accidents provided by the Accident & Emergency Department (A&E) of the “G. Gaslini” Research Hospital in Genoa between 2003 and 2006 (in those years, the institutional procedure for hospitalized children who accidentally hurt themselves was to refer them to the A&E).

Results: Accidents involving hospitalised children, were estimated to be 814 out of the total number of admissions between 2003 and 2006 (1.1%). The rate of accidents in children was highest between 1.00 pm and 8.00 pm. (338 events, equal to 41.5%). This phenomenon mostly involved children between 1 and 3 years of age (338 cases, equal to 41.5%). Falling out of bed was found to be the most frequent accident (209 cases, equal to 25.7%).

Conclusions: We found elements that were useful for the risk assessment and management of accidental injuries in hospitalized children. Such elements allowed our research team to design a project that allowed to improve both the quality of care and patient safety.

Background

Accidents in hospitalised children have not yet been thoroughly investigated in literature, whereas in hospitalised adults falls are perhaps one of the most deeply and widely investigated phenomena in terms of predictability and their avoidance. Most of the studies focus on the population with the highest risk of falling, i.e. the elderly, but accidents also occur in children, as shown by a study that monitored all accidents occurring on hospital wards (Levene, Bonfield 1991).

Patients and visitors were studied for a period of 18 months: children between the age of 3 and 5 were those mostly subject to the risk of accidents and 41%

of the accidents occurred in the presence of parents.

Among the factors associated with the risk of falls in children are early ambulation and the ability to perceive height and depth. The risk of falls in children is higher when they crawl on all fours (Adolph 2000).

Falls can be divided into the following three categories:

1. **Accidental falls:** these occur when a patient falls unintentionally, usually after stumbling or slipping, equipment failure or other environmental factors; these patients cannot be classified “at risk” before the event occurs;

2. **Unexpected falls:** these occur when the cause cannot be considered among the patient's risks of falling and are therefore unforeseeable;
3. **Expected falls:** occur in patients who are assessed to be at risk of falling (Morse 2002).

In paediatric patients, falls are predictable for instance in a 13-month child who still has not fully developed the ability to walk much and has the typical unstable gait commonly found in children of this age.

This classification is for adults and it may be necessary to identify other categories for falls in children, in relation to their level of development and type of fall (Rasmus, Wilson 2006).

The guidelines aimed at preventing domestic accidents show some similarities between these and accidents in hospitalised children, especially in the areas where children spend most of their time (ward room and playroom), just like at home.

Guidelines to prevent and manage falls (Gioachin, Marilli 2004), charts to assess the risk of falls (Chiari et al 2002), retrospective analyses (Bari et al 2002), suggestions for clinical practice and surveillance projects for falls (AA.VV 2002a), regional programs for the prevention of falls in hospitals (like the one implemented in Tuscany in 2006) (AA.VV 2002b) were all for adults. The only literature available on falls in children mainly focuses on accidents at home. Literature on domestic accidents identifies as one of the most effective measures of prevention, educating parents on how to look after and guard their children, especially if they are very young, to prevent risk behaviours and make the room the child spends most the time safer (i.e. protections for sharp edges, stairs, windows, beds, furniture and toys suitable for their age, well-illuminated and tidy rooms).

In health care centres, preventing the risk of falls in patients and visitors, monitoring the phenomenon, identifying the causes and implementing corrective actions also contribute to reducing the number of lawsuits claiming for compensation and extra costs due to outcomes that often require a longer stay in hospital and resources to treat the patient.

The Quality Management System of the Research Hospital "G. Gaslini" in Genoa has the purpose of integrating Institutional Accreditation provided by the directives of the Liguria Region, the UNI EN 9000 certification (for healthcare and administration services) and the process of accreditation to excellence of the whole Hospital according to the Joint Commission International (JCI) methodology.

Preventing accidents in patients and visitors within JCI standards of quality and patient safety (Joint Commission 2004) are required for JCI accreditation of a hospital.

One of these standards is: "managerial monitoring

should include surveillance, control and prevention of events that represent a risk for the safety of patients, family members and the staff".

Aims

The aims of this project were: a) to identify the various types of accidents experienced by hospitalised children; b) outline the profile of children potentially at risk of having an accident, which would allow to set up an institutional policy for the prevention and signalling of accidents, as well as an adequate information program for parents and health workers.

Materials and Methods

We collected data from a retrospective analysis of the clinical records belonging to all the children hospitalised between 2003 and 2006 in all the inpatient Departments of the *Istituto Pediatrico 'Giannina Gaslini'* in Genoa (Urgency-Emergency, Medical-Medical Specializations and Obstetrics-Maternity). Day Hospital and Day Surgery patients were excluded from the study.

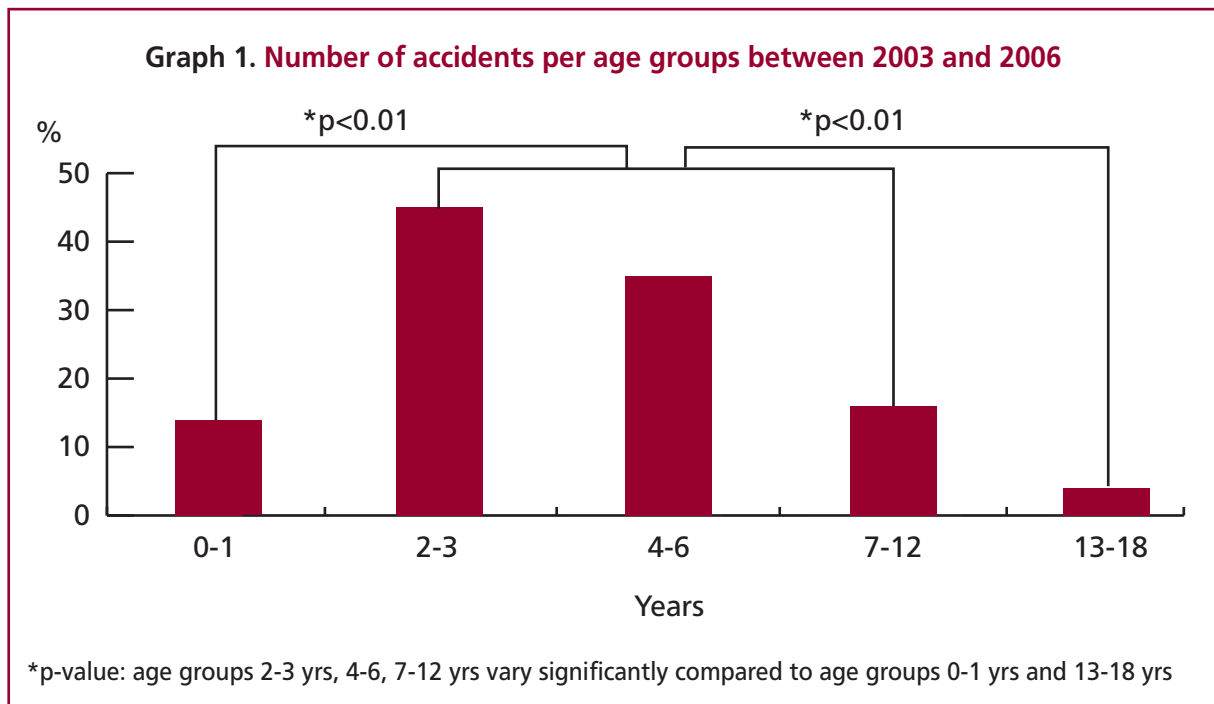
We examined the medical reports of children who experienced falls during their hospitalisation and were referred to the Accident and Emergency Department (A&E) of the same hospital (*Istituto Pediatrico 'Giannina Gaslini'*) between 2003-2006. The Institutional procedure in those years was to refer children who hurt themselves during their period of hospitalisation to the A&E to be seen by the physician on duty. From the medical reports we gathered information on the ward the child was hospitalised, the date and time the accident occurred, the child's age and gender, type of accident and how it occurred, the type of treatment provided and days of prognosis.

Results

In the four-year period mentioned above, 814 hospitalised children were referred to the A&E of the same hospital due to accidents (1.1% of 75510 hospitalised children). The number of accidents was constant across the four years and their frequency was found to be higher in October and May (95 accidents, 11.7%) and lowest in August (41 accidents, 5%). Accidents were found to occur mainly in the afternoons, between 1.00pm and 8.00pm (338 accidents, 41.5%). Instead in the morning, between 7.00am and 1.00pm, and at night between 8.00pm and 7am the number of accidents were respectively 194 (23.9%) and 192 (23.6%).

The highest number of accidents occurred in children aged between 1 and 3 years (338 cases, 41.5%), whereas in other age groups, especially between the age of 0 and 1 years and between the age of 12 and 18 years were much less, even considering the number of hospitalized children according to the age groups.

The number of accidents per age groups are shown in Graph 1.



Head traumas were found to be the most frequent type of accident, in particular cranial traumas (215 cases = 26.4%), forehead trauma (206 cases = 25.3%) and facial trauma (26 cases = 15.5%).

During the four years of observation, we found that accidents occurred similarly to the way they occur at home, such as bumping against doors, windows and furniture (182 cases = 22.4%), falls while playing (86 cases = 10.6%), falling off chairs,

sofas and changing-tables (60 cases = 7.3%), falling off pushchairs (17 cases = 2.1%), from tricycles (8 cases = 1%), from the arms of an adult (5 cases = 0.6%) and 3 cases of burns caused by liquids.

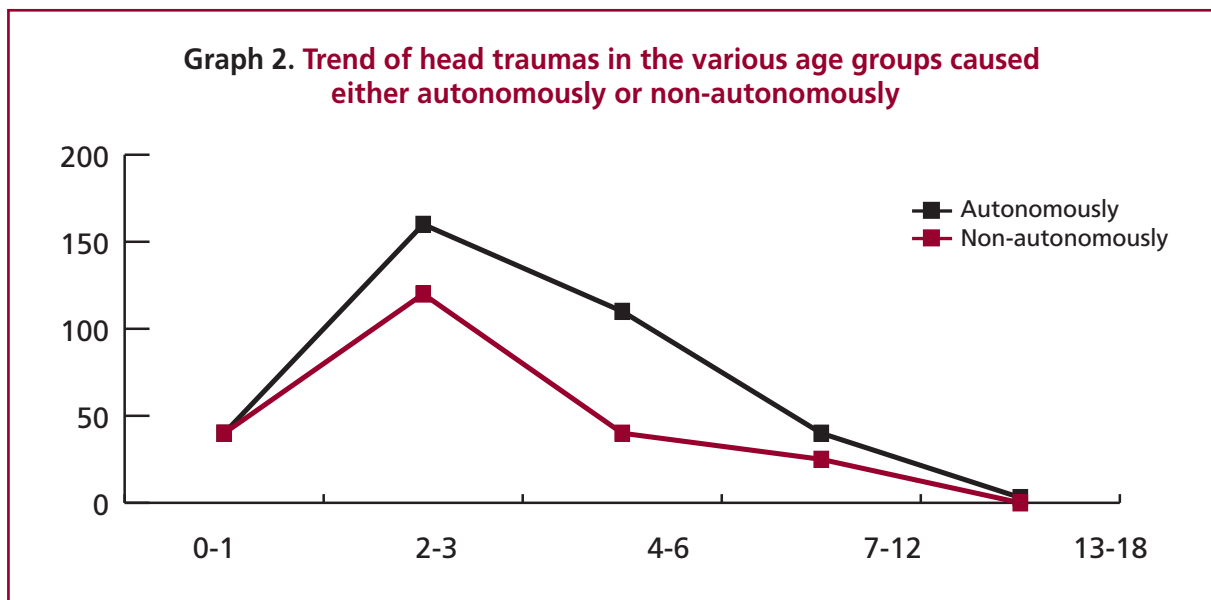
In these cases, accidents in children were probably due to their parent's distraction or reduced level of attention.

Graph 2 shows a significant difference between autonomously and non-autonomously caused traumas.

TABLE 1

Type of Accident	# Cases	%
Cranial traumas	215	26.4
Forehead traumas	206	25.3
Occipital traumas	99	12.2
Parietal /temporal traumas	28	3.4
Facial traumas	126	15.5
Traumas in other parts of the body	95	11.7
Dislocations in upper/lower limbs	6	0.7
Fractures in upper/lower limbs	5	0.6
Injuries, excoriations, bruises in other parts of the body	12	15
Burns	3	0.4
Multiple traumas	14	1.7
Other	2	0.2
Total	811	99.6
Missing data	3	0.4
Total	814	100

Main types of Falls



Accidents occurred more frequently in males than in females (509 cases, 62.5% vs. 305 cases, 37.5%), also in proportion to the number of admissions for each gender group during the 4-year period, i.e. 37,604 males and 37,906 females, equal to 1.35% and 0.8% respectively (see Graph 3).

No statistically significant differences emerged between males and females in relation to the total proportions, however accidents occurred more frequently in males.

Most of the accidents (463 cases, 56.9%) were dealt by a surgeon at the A&E and the most frequent prognosis was 48 hours (445 cases, 57.7%).

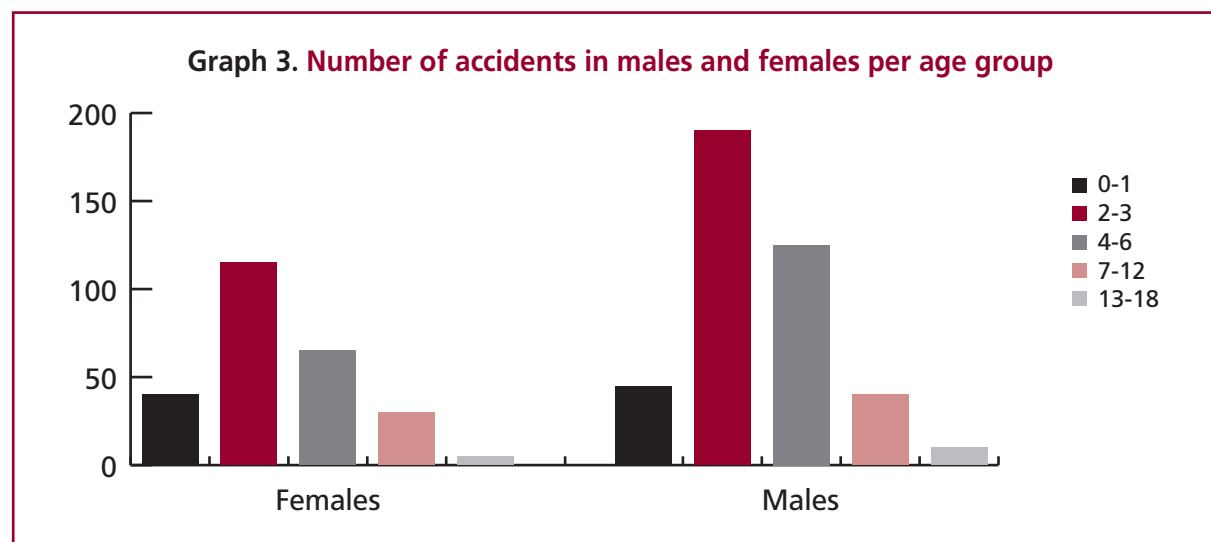
Most of the accidents were not serious, although they did increase hospital costs due to extra diagnostic

tests (1.25 extra tests per each child with an accident), due to possible complications that required a longer stay in hospital and more work for the staff dealing with these cases.

In the Urgency/Emergency Area, the accidents were 247 (30.3%), 1 in the Obstetrics-Neonatal Area (0.1%) and 563 in the Medical / Medical Specialties Area (69.2%); in 3 cases (0.4%) the A&E medical record did not state from which internal unit the inpatient came from.

Accidents were more frequent in the Medical /Medical Specialties Area (1.8% out of 30,709 admissions) compared to the Urgency/Emergency and Obstetrics-Neonatal Areas (0.5% out of 44,801 admissions, of which only 1 case in the Obstetrics-Neonatal Area).

Of the medical units, the highest number of accidents



were reported in Paediatrics III-Gastroenterology (3,3%) and Neuropsychiatry (2.6%), of the surgical units, in Ophthalmology (1.6%) and in Otolaryngology (1.4%).

No accidents were reported in the three units of intensive therapy (Centre for Newborns at Risk, Bone Marrow Transplantation, Intensive Care).

Discussion

This phenomenon appears to follow the seasonal trend of admissions linked to the holiday periods (because in the Summer and in December it was reduced), and it also seems to be influenced by the activity program: in the morning children are in bed or undergoing treatments (examinations, therapies, diagnostic activities), whereas in the afternoon they have more free time to play and this may increase the risk of having an accident.

The greatest number of accidents occurred in the 1-3 year age group, because this is typically the time of the child's ambulatory and cognitive development, progressive increase of autonomy and of the awareness of danger (after their first year, children learn how to walk on their own and therefore gain more physical independence and the freedom to explore a world that rapidly becomes bigger and bigger).

Since in literature no parameters referred to accidents in hospitalised children are reported, we could only hypothesise that the higher rates of this event in given units could be linked to the disease, mean length of stay, which was shorter in the surgery units (4-5 days vs. 5-6 days in the medical units), to the therapy, and the child's and family's ability to adapt themselves to the hospital environment.

The absence of accidents in the intensive care units could be related to the serious clinical conditions and to the age of the patients (e.g. pre-term babies, or children in critical conditions admitted to the Centre for Newborns at Risk and Intensive Care).

Accidents involving the head were the most frequent ones, especially cranial traumas. This datum was confirmed by literature when describing accidents that occurred in homes (Kim et al 2007). Head traumas occur when children lose their balance and fall forward due to their head which is physiological disproportionate compared to the rest of their body.

Literature on domestic accidents identifies as one of the most effective measures of prevention, educating parents on how to look after and guard their children, especially if they are very young, to prevent risk behaviours and make the room the child spends most the time safer (i.e. protections for sharp edges, stairs, windows, beds, furniture and toys suitable for their age, well-illuminated and tidy rooms). It is thought that such measures could be included in a prevention program for children, along with tools that measure the risk of falls, since this

was the most frequently reported accident.

Considered that the mean frequency of accidents reported between 2003-2006 was equal to 1.1%, according to the Probability Scale of the Clinical Risk Technical Commission (www.azisanrovig.it), such probability can be defined as "occasional".

The scale measuring the severity of harm set up by the same Commission, allowed to classify the level of risk for each event:

- 1) 56.9% of the cases only required the examination of a surgeon and probably more monitoring (no harm);
- 2) 42.1%, as well as the examination of a surgeon, required further tests and/or care (x-rays, specialised examinations, sutures, medications), where harm was rated as "mild".
- 3) 0.9% produced temporary consequences (plaster cast), where harm was rated as "average".

In the light of these data, risk was estimated to be between "acceptable" and "low".

According to the matrix suggested by the Technical Commission, when the level of risk is between "acceptable" and "low", this requires monitoring and planning interventions aimed at managing and keeping under control the risk linked to accidental trauma events.

Conclusions

Our study confirmed that accidents in hospitalised children constitute a real phenomenon, they can be objectively quantified, it is possible to specify which age group is mostly affected, describe the various types of accidents, how they occur, the healthcare services they require and the respective days of prognosis.

When the study was started, there were no institutional procedures, tools and standard actions to deal with and report accidents.

On the basis of the data we gathered, we developed an institutional improvement plan that responded to the need to have common procedures and tools to report, manage and monitor accidents. Such plan, moreover, allowed to set up informative initiatives for families, involve health workers in the designing of tools and procedures, create a computerised monitoring system of accidents to crosscheck the effectiveness of the changes determined by improvement actions over time.

Of all the accidents, falls were studied in relation to the prevention tools and the *Heinrich II Fall Risk Model* was identified and included in the nurses' assessment tools for children between the age of 3-6.

This study took into account only the events described in the chart filled in by the resident physician at the Accident and Emergency Department. This was a limit of our study because it did not include information – inferred from the medical record – regarding, for instance, the complications that produced various

types of outcomes in children and lengthened their stay in hospital. Moreover, there was no guarantee that every single child who had an accident was then actually referred to the A&E of the hospital (patients in serious conditions, immunodepressed or whose parents refused the examinations, etc.), thus the extent

of the phenomenon could be underestimated.

The risk assessment of accidents hereby hypothesised, in order to be confirmed, would require a specific study conducted by a multidisciplinary or multicentered team, as well as the comparison with other data available in literature regarding this phenomenon.

ΠΕΡΙΛΗΨΗ

ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

ΑΤΥΧΗΜΑΤΑ ΣΕ ΝΟΣΗΛΕΥΟΜΕΝΑ ΠΑΙΔΙΑ: ΜΙΑ ΑΝΑΔΡΟΜΙΚΗ ΜΕΛΕΤΗ ΣΕ ΕΝΑ ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΠΑΙΔΙΑΤΡΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΣΤΗ ΒΟΡΕΙΑ ΙΤΑΛΙΑ

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Σκοπός: Ο σκοπός της μελέτης μας ήταν η αξιολόγηση των ατυχημάτων σε νοσηλευόμενα παιδιά και να προσδιοριστούν τα κύρια χαρακτηριστικά των παιδιατρικών ασθενών που προδιαθέτουν για ατυχήματα.

Μέθοδοι: Τα στοιχεία συλλέχθηκαν με χρήση των ιατρικών εκθέσεων των νοσηλευόμενων παιδιών που εμφάνισαν τα ατυχήματα που παρέχονται από το Τμήμα Επειγόντων Περιστατικών (A & E) του "G. Gaslini " Πανεπιστημιακό Παιδιατρικό Νοσοκομείο στη Γένοβα το 2003 έως το 2006

Αποτελέσματα: Ατυχήματα στα παιδιά στο ανωτέρω νοσοκομείο, εκτιμήθηκαν ότι ήταν 814 από το συνολικό αριθμό των εισαγωγών μεταξύ 2003 και 2006 (1,1%). Το ποσοστό των ατυχημάτων στα παιδιά ήταν υψηλότερα 13:00 μμ - 20:00 μ.μ.. (338 εκδηλώσεις, ίση με 41,5%). Αυτό το φαινόμενο που εμπλέκονται ως επί το πλείστον τα παιδιά μεταξύ 1 και 3 ετών (338 περιπτώσεις, ίση με 41,5%). Η πτώση από το κρεβάτι βρέθηκε να είναι η πιο συχνή ατύχημα (209 περιπτώσεις, ίση με 25,7%).

Συμπεράσματα: Βρήκαμε στοιχεία που ήταν χρήσιμα για την αξιολόγηση του κινδύνου και της διαχείρισης των τραυματισμών από ατυχήματα στα νοσηλευόμενα παιδιά. Τα στοιχεία αυτά επιτρέπεται η ερευνητική μας ομάδα να σχεδιάσει ένα πρόγραμμα που μπορούν να βελτιώσουν τόσο την ποιότητα της περίθαλψης και την ασφάλεια των ασθενών.

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