

## ORIGINAL ARTICLE

# Accident and emergency attendances by children under the age of 1 year as a result of injury

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**Objectives:** To examine all accident and emergency (A&E) department attendances by children under the age of 1 year over a period of 12 months. Also to try to identify the prevalence and severity of accident types in small children and to suggest ways to reduce such accidents.

**Methods:** The A&E department of the Royal Aberdeen Children's Hospital (RACH) serves a population of over half a million. All children under 1 year of age attending this department in the year 2000 had their case notes reviewed by the author and the cause, type, and severity of the illness or injury noted.

**Results:** During the 12 month audit period 1416 new cases under the age of 1 year presented to RACH, 790 of which presented directly to A&E. Six hundred and eighteen (78%) were self referred and 116 children attended A&E on more than one occasion during the year. Four hundred and thirty four (55%) of the A&E attendances were classed as "accidents", the remainder were mainly for medical conditions such as respiratory distress. Two hundred and sixty four (61%) were caused by falls and 38% were admitted for inpatient management. Two hundred and twenty nine (29%) required radiographs, which revealed 30 fractures. Thirty seven children sustained scalds/burns and there were 33 accidental ingestions. Six cases were judged to be non-accidental.

**Conclusions:** There is a surprisingly high rate of "accidental" injury in this age group, bringing into question the effectiveness of current accident prevention strategies. Perhaps specific prevention advice should be targeted at parents and carers of young children. There should always be a high index of suspicion for non-accidental injury.

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Children under the age of 1 year are usually closely supervised at all times and as they are relatively immobile until the age of 10–12 months, the incidence of "accidental" injuries should be low. There is often suspicion that injuries in young children are non-accidental/intentional. With the increasing emphasis on accident prevention over the past decade, the incidence of accidental injuries and deaths should be decreasing. Based on clinical encounters it became obvious that there was a surprisingly high presentation rate of significant injury in children in this age group in our department. These injuries were presented by the parent or carer as being accidental.

## METHODS

A retrospective search of data over the 12 months of the year 2000 in the accident and emergency (A&E) department of the

Royal Aberdeen Children's Hospital (RACH). This department has the only paediatric A&E department in the north east of Scotland, and serves a population of over half a million, of whom about 6000 are children under the age of 1 year. Over 22 000 new cases under the age of 14 years are seen annually. The attendance card of each child under 1 year of age was systematically reviewed and the cause, type, and severity of illness or injury noted. The possibility of non-accidental/intentional injury was considered in each of the presentations.

## RESULTS

During the 12 months of the year 2000, 790 new cases under the age of 1 year presented directly to the A&E department of RACH. Four hundred and forty five (56%) were boys and 345

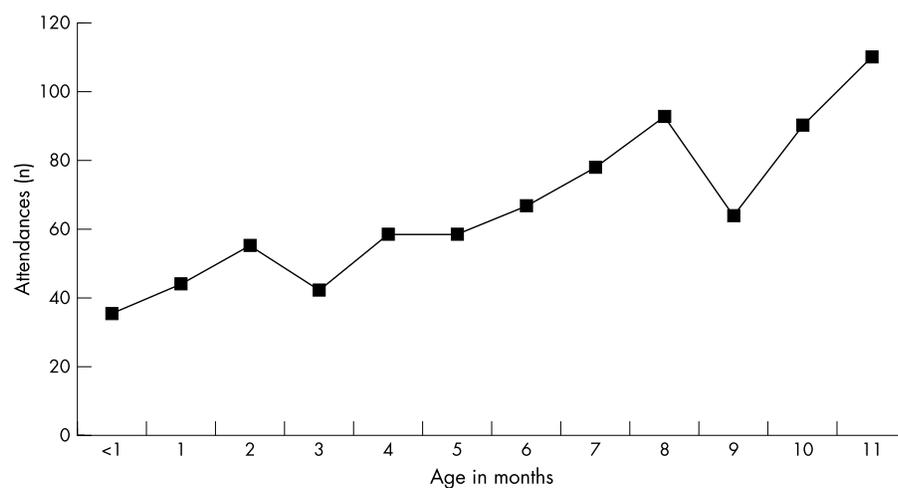


Figure 1 Attendances by age.

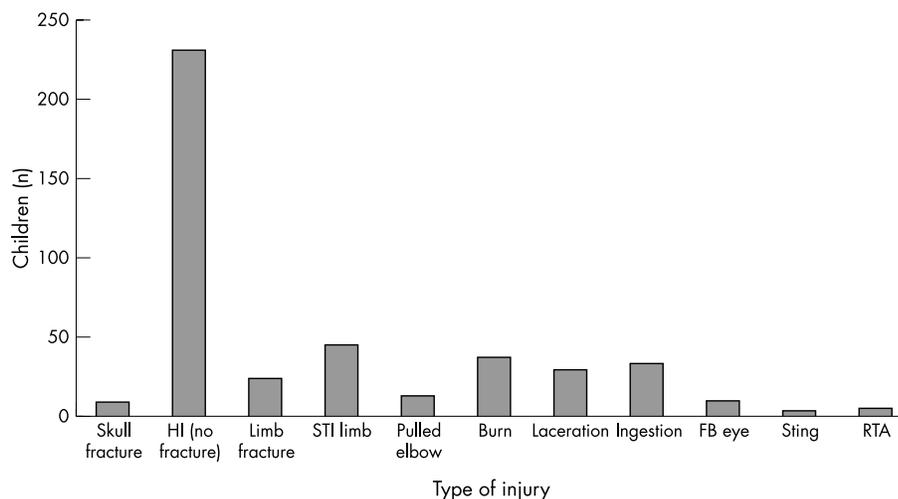


Figure 2 Injuries sustained.

Table 1 Cause of falls

Bed/cot	36
Stairs	30
Chair/sofa	30
Parent's arms	28
Work surface/changing station	21
Pram/buggy	18
Baby walker	17
Stationary car	9
Supermarket trolley	3
Swing	2

Table 2 Fractures sustained

Skull	8
Tibia/fibula	6
Clavicle	6
Femur	4
Radius/ulna	3
Supracondylar	2
Humerus	1
Neonatal clavicle (late)	2
NAI	2

(44%) were girls. This is less of a male predominance than previously reported.<sup>1</sup>

One hundred and sixteen children attended the A&E department on more than one occasion—85 attended twice within the year, 24 attended three times, six attended four times, and one child attended seven times. The incidence of attendance was lowest in children under 1 month of age and steadily rose with age, the most attendances being by children aged 11 months (fig 1).

Most children (78%) were self referred to the department by a parent or carer. Sixteen per cent were referred by a GP and 5% by the local out of hours primary care cooperative. Two children were transferred from another hospital. Ninety one per cent of attendances were between 09.00 and midnight.

Four hundred and thirty four (55%) of the attendances were classed as "accidents". The remaining 45% were mainly for medical conditions. Over half of the "accidents" were head injuries (fig 2). Several children had more than one injury.

Of these "accidents", 436 children were treated and sent home and 51 were treated and returned for at least one review at the A&E clinic. Three hundred and two (38%) children were admitted for in-hospital management.

Two hundred and sixty four (61%) of the "accidents" were caused by falls, 194 from a height (table 1). The remaining 69 falls resulted from the child simply falling over.

Two hundred and twenty nine (29%) of the attendances required radiography—133 skull radiographs, 41 chest radiographs, 49 radiographs of a limb, and six abdominal radiographs. Two children had CT head scans, one of which demonstrated an intracranial bleed. The radiographs revealed 30 fractures (table 2). This included one child who sustained both a skull and a clavicular fracture from a fall. Eighty seven per cent of the injuries resulting in fractures were as a result of a fall from a height.

Thirty seven children sustained scalds/burns, 22 (59%) being caused by hot tea/coffee/boiled water, eight (22%) were

as a result of touching a central heating radiator, and two were attributable to sunburn. This is a higher incidence of scalds than reported by Gaffney.<sup>2</sup> Four children sustained significant burns—over 5% of the body area. Seven children required admission for treatment of their scalds/burns. The remainder were treated in the department and discharged home, 24 requiring at least one follow up appointment at the A&E clinic.

There were 33 accidental ingestions, the more significant cases being three of paracetamol elixir, four of bleach/cleaning materials, three of Karvol capsules, and one each of prozac and ecstasy tablets. One child ingested an unidentified tablet. The remainder of the ingestions were of various substances and 18 of these were of solid objects such as coins. Seven children were admitted to the A&E ward for a period of observation—all made an uneventful recovery.

The possibility of non-accidental/intentional injury was considered in each of the presentations. Six cases were judged to be non-accidental and, after admission, each of these was referred to the local child protection consultant paediatrician for further investigation. One of these children had a parietal skull fracture, one had an intracranial bleed, and one had a fracture of the humerus. Three had minor head injuries. In all the other cases the history and circumstances of the "accident" was felt to be consistent with the injury presented to the A&E department.

Eight of the attendances with minor injuries were children already listed on the local social work "Child Protection Register". These injuries were all minor and were felt to be consistent with the history given by the accompanying parent. If there is any concern by A&E staff as to the nature of an injury or the circumstances of a child, then these children are notified to the hospital health visitor or social worker for follow up.

## DISCUSSION

In theory, children under the age of 1 year should not be at risk of accidental injuries as they are relatively immobile and should be under close supervision. In practice, our study shows that 55% of the direct A&E presentations in this age group were attributable to incidents classed as "accidents", two thirds of which were attributable to falls. This is substantially higher than the incidence of falls reported in 1989 by Sceats<sup>7</sup> who noted that 41% of accidents in children of less than 1 year of age were attributable to a fall.

There have been several papers noting the risks of falls from baby walkers,<sup>4,6</sup> beds,<sup>7</sup> and supermarket trolleys.<sup>8</sup> Pollack-Nelson<sup>9</sup> showed that a third of falls in infants were specifically attributed to a baby seat being placed on an elevated surface in the home and a recent paper<sup>10</sup> demonstrated that in 53% of falls from a pram or buggy a safety harness was not used—5.9% of these falls resulted in the child sustaining a skull fracture.

It is worrying that so many infants sustain fractures or injuries severe enough to warrant inpatient admission to hospital. Fifty five per cent of all the "accidents" in this study involved an injury to the head and it is particularly concerning that so many small children sustain head injuries as Claydon<sup>11</sup> pointed out that serious head injuries can result from apparently minor falls. (The audit was started before the implementation of the Scottish Intercollegiate Guideline Network for Head Injuries).

The high incidence of scalds and burns in small children also raises concern as a study in the USA<sup>12</sup> showed burns to be the fourth leading cause of death by injury in children. Ninety per cent of these occurred in the home and resulted from simple domestic accidents that were preventable. Child abuse and neglect account for a significant number of paediatric burn injuries but as Ho noted,<sup>13</sup> burn abuse is often under-recognised and under-reported because it is difficult to define as non-accidental.

Ingestion of small toys, coins, beads, etc, is almost impossible to prevent without constant supervision, however, the risk of asphyxia attributable to aspiration should not be underestimated—in 1996 Lifschultz<sup>14</sup> stated that this was the most probable cause of accidental fatality in children under 1 year of age.

Non-accidental/intentional injury must be considered in all A&E presentations. Six cases were identified in A&E during this audit, three of these resulting in serious injury. It is possible that more cases were identified in children who were admitted as inpatients but this information is not available. A high level of suspicion should always be maintained, particularly in view of Skellern's observation<sup>15</sup> that infants with non-accidental fractures have a high risk of further abuse even with intervention. He also noted that of 99% of infant fractures seen, more than a quarter were assessed as non-accidental and that infants aged under 4 months had a significantly greater risk of their fracture being non-accidental. However, it is important also to remember that children known to be "at risk" can also suffer the tumbles and falls of normal development. Claydon<sup>11</sup> noted that in patients of less than 1 year of age, accidental injury is 10–15 times more common than non-accidental injury.

In conclusion, the incidence of attendance in this age group with "accidental" injuries is surprisingly high. It would seem that accident prevention campaigns are failing to reach many parents of small children. Hjerm *et al*<sup>16</sup> demonstrated that children of young mothers (under 24 years) were more likely to have been admitted to hospital because of fall injuries and poisonings. It has also been noted that accidents involving baby walkers were inversely related to maternal level of education<sup>17</sup> and Barnes<sup>18</sup> showed a correlation between the condition of a baby at birth, as measured by a modified Apgar score, and a future history of accidental injury before the age

of 3 years. Anticipation and early preventative action could reduce such "accidents". Falls from a height, for instance, should be preventable with foresight and the use of stair gates, safety harnesses, and advice not to place small children on raised surfaces. Knowledge, attitude, and behaviour of mothers are the essentials needed for developing prevention programmes directed at reducing childhood injuries.<sup>19</sup> This paper suggests that such programmes should be directed at women in the post-partum period. Rousseau<sup>20</sup> has also advised that physicians should include anticipatory guidance on accident prevention in well baby clinics. Home safety advice emphasises the risks of trailing flexes, kettles, cookers, fires, and electric radiators. Childproof containers have been proved to be anything but childproof and ingestion of medicines, cleaning agents, and other toxic substances can only be avoided by keeping such substances under lock and key.

The results of this study bring into question the effectiveness of current accident prevention strategies. There is still room for improvement in child equipment, such as design alternatives to prevent baby seats and buggies from tipping over so easily and compulsory safety standards for baby furniture. It has been reported that more than 90% of injuries are both predictable and preventable<sup>21</sup> and although in 1986<sup>22</sup> the most successful approaches to accident prevention were identified as legislative, more recently educational endeavours have also been shown to have some impact.<sup>23, 24</sup> As has been suggested,<sup>24</sup> parents' information and education should be developed more fully with the emphasis being on knowledge of the normal psychological and motor development of small children. There should be more emphasis on the dangers of accidental injuries to small children despite their relative immobility, which could be highlighted with specific prevention advice targeted at parents and carers of children under 1 year of age. Such advice might be more effective if introduced at prenatal and postnatal clinics and promoted by all health professionals in contact with such families. It may be especially important to target young parents and to underline the use of safety harnesses, gates, etc.

It might be interesting to project this audit over 5 to 10 years to ascertain whether those with several A&E attendances as infants are subsequently found to be more likely to present frequently to A&E or to be at a higher risk of non-accidental injury. This could provide the basis for a future audit.

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