Abstract

Background and aims—Little is known about injuries resulting from accidents in premobile infants. We aimed to describe the pattern of minor accidents in infants and their resulting injuries.

Methods—The ALSPAC study collected data in successive postal questionnaires. At 6 months of age, parents were asked to describe any accident since birth. The type of fall, distance fallen, resulting injury, and help sought were independently coded. Burns were similarly coded.

Results—A total of 11,466 responses were available. In 2,554 children, 3,357 falls were reported; 53% fell from beds or settees and 12% fell from arms or while being carried. Only 14% reported visible injury, of which 56% were bruises; 97% of injuries specified involved the head. Only 21 falls (<1%) resulted in concussion or fracture. A burn or scald occurred in 172 cases (1.5%). The main causes of scalds were hot drinks and water, with contact burns caused by radiators, cookers, and hot food.

Conclusions—Falls in young infants are common while burns are rare. Injuries from falls are infrequent, predominantly trivial, and almost entirely confined to the head. Falls from beds and settees did not result in skull fractures. Serious injury was the result of complex accidents.

Keywords: accident; burn; fall; injury

Unintentional injury in childhood is a major public health problem, but little is known about patterns of accidental injury in infancy. The UK government proposed to reduce the death rate for accidents among children aged under 15 years by at least 33% by 2005. The annual National Health Service cost of unintentional injury to children in England and Wales has been estimated at £200 million per annum. Serious injuries represent only the tip of the iceberg of accidental injury. Any strategy to reduce the injuries caused by accidents is limited by the lack of information about the pattern of trivial and moderate injuries, many of which do not present to medical attention.

There is little information about the pattern of injury to infants associated with domestic accidents with which to compare possible non-accidental injury, particularly in infants of less than 6 months, who are not mobile. There is only one study on accidents and their associated injuries in infants under 6 months of age, but as this was a hospital based study, it excluded minor injuries or accidents that did not result in an injury. In the 1–4 year old age group, burns are the leading cause of death in the home environment, but most epidemiological studies on burns and scalds refer to the population as a whole although some do break down children into under and over 5 year olds.

Non-accidental injury is a rare but important cause of morbidity and death in infancy. The understanding of the normal pattern of accidental injury may be important when questioning whether injuries are consistent with accidental causation or whether non-accidental injury needs to be considered. Suspicions may be aroused if an injury seems out of proportion to the alleged cause. As both non-accidental and accidental head injury may produce similar types of injuries, distinguishing between them is not easy. Features such as retinal haemorrhages, depressed or complex fractures, and associated findings such as failure to thrive and metaphyseal fractures, may make the diagnosis of abuse more obvious. In the absence of these findings, however, the diagnosis rests on recognising discrepancies between the history given and the injury incurred. Similarly, non-accidental injuries may be a cause of burns.

This paper draws on a large infancy dataset, which included questions about accidents at 6 months of age. The aims of this study were to define the frequency and severity of accidental injuries from burns and falls, and to describe the accidents which caused them in a premobile age group.

Methods

ALSPAC (the Avon Longitudinal Study of Parents and Children, formerly the Avon Longitudinal Study of Pregnancy and Childhood) is a major epidemiological study of over 14,000 babies which recruited subjects from an early stage of pregnancy. The population studied was geographically defined as resident in the three Bristol based health districts of Avon, born between April 1991 and December 1992. The number of pregnancies enrolled in the study was 14,541, an estimated 85–90% of the eligible population. In all, 13,822 mothers are still being followed, together with their 14,009 children.

Information in the ALSPAC study was linked from questionnaires, medical records, and biological samples to enable studies of the way in which different aspects of the environment affect the health, development, and well-being of children and their parents. A series of postal questionnaires at different ages (4 weeks, 6 months, 15 months, 18 months) were used to gather data about a wide range of variables. The questionnaire administered at 6
Accidents and resulting injuries in premobile infants

Details of questions asked for falls, burns, and scalds

1. Place where accident happened
2. What did baby fall or drop from, or what was baby burnt with?
3. Date of fall or accident
4. Injuries caused
5. Who was with the baby?
6. Action taken by person with baby
7. Treatment given to the baby
8. Description of how accident happened

Results

FALLS

Data were available for analysis on 11,466 infants, 81% of the total study cohort. A total of 3,357 falls were reported for 2,554 children (22% of the total); 78% of infants sustained no falls. Of the mothers reporting falls, 76% reported one fall, and only 5% had three or more falls.

The commonest types of falls were from beds or settees (Table 2). Falls from tables, chairs, and worktops represented a similar type of fall but from a greater height. These include accidents when the infant was placed in a baby chair on the surface and both the chair and the baby then fell off. In nearly 12% of falls the baby was dropped out of arms or a person fell carrying the baby but did not drop the baby. Older siblings carrying an infant was a common cause of falls from arms. Falls from bouncers often occurred when the poppers came undone or the baby was dropped while being put into or taken out of the bouncer. There was no detail of the type of fall in less than 1% of falls.

The incidence of accidents rose with age up to 6 months. Over half the accidents reported occurred between 5 and 7 months, with less than a quarter in children under 4 months.

Information about injury received was available from mothers in 3,202 (95%) falls, and injury type was unspecified in 156 cases. An injury was sustained in only 437 cases, and 244 (56%) of these were bruises. Serious injury, defined as concussion or fracture, occurred in only 21 cases, less than 1% of all falls. In 206 cases the actual site of injury was not specified.

The commonest site of injury was the head in 375 cases (97%), with the remaining injuries being to the leg (five cases), arm (four cases), neck, collarbone, and bottom (one case each).

Following their fall, 162 children were taken to hospital and 18 were admitted. The explanations given by the parent for the injury ranged from a detailed description of a fall causing a long bone injury to one case where the parents simply stated that the baby fell out of arms sustaining a skull fracture, with no other explanation given. Three children apparently had skull fractures and were not admitted to hospital.

Table 1 Details of questions asked for falls, burns, and scalds

<table>
<thead>
<tr>
<th>Question</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Place where accident happened</td>
<td></td>
</tr>
<tr>
<td>2. What did baby fall or drop from, or what was baby burnt with?</td>
<td></td>
</tr>
<tr>
<td>3. Date of fall or accident</td>
<td></td>
</tr>
<tr>
<td>4. Injuries caused</td>
<td></td>
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<td>7. Treatment given to the baby</td>
<td></td>
</tr>
<tr>
<td>8. Description of how accident happened</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 Commonest causes of falls

<table>
<thead>
<tr>
<th>Fall from</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed</td>
<td>1,117</td>
<td>(33.0)</td>
</tr>
<tr>
<td>Settee</td>
<td>665</td>
<td>(19.7)</td>
</tr>
<tr>
<td>Arms</td>
<td>203</td>
<td>(6.0)</td>
</tr>
<tr>
<td>Arms of child</td>
<td>133</td>
<td>(3.9)</td>
</tr>
<tr>
<td>Arms on stairs</td>
<td>56</td>
<td>(1.7)</td>
</tr>
<tr>
<td>Fell over</td>
<td>190</td>
<td>(5.6)</td>
</tr>
<tr>
<td>Baby chair</td>
<td>170</td>
<td>(5.0)</td>
</tr>
<tr>
<td>Chair</td>
<td>117</td>
<td>(3.5)</td>
</tr>
<tr>
<td>Table</td>
<td>93</td>
<td>(2.8)</td>
</tr>
<tr>
<td>Work top</td>
<td>48</td>
<td>(1.4)</td>
</tr>
<tr>
<td>Changing unit</td>
<td>43</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Pram</td>
<td>77</td>
<td>(2.3)</td>
</tr>
<tr>
<td>Bouncer</td>
<td>70</td>
<td>(2.1)</td>
</tr>
<tr>
<td>Baby walker</td>
<td>50</td>
<td>(1.5)</td>
</tr>
<tr>
<td>Pushchair</td>
<td>49</td>
<td>(1.4)</td>
</tr>
<tr>
<td>Lap</td>
<td>48</td>
<td>(1.4)</td>
</tr>
</tbody>
</table>
BURNS
A total of 11 446 mothers replied to a direct question about burns or scalds, of which only 166 infants (1.5%) sustained a burn or scald (172 events). Scalds accounted for 84 events, and contact burns for 70 events (table 3). The commonest hazards were hot drinks, hot water, and radiators. Insufficient data were given about the injuries to separate reliably significant from trivial injuries. However, only one child required skin grafting and one other child required dressings for two weeks. Sixteen other children had a dressing or bandage applied to the burn, though some of these were applied at home. Fifteen children attended hospital, but the treatment received is not always clear.

Discussion
This study reveals that falls in infants are common. Most falls occurred from beds or settees and had an increasing incidence around 6 months of age. Most falls resulted in no injury and serious injuries were very rare. Burns and scalds occurred rarely in young infants, the commonest hazards being hot drinks, hot water, and radiators.

The strengths of this study were its large numbers (over 14 000 subjects), its near complete population coverage, and its non-reliance on referral or use of medical services. However, the method of data collection had limitations. Most data had to be extracted from free text with variable amounts of detail provided by parents. This had the potential for events being misclassified, although oversubjective judgments were prevented by each item being classified independently of other variables. Because of reliance on parental recall, the time interval between the accident and completing the questionnaire may have influenced responses. A number of accidents occurred close to or even after the age at which the questionnaire was received, suggesting that mothers may preferentially report recent accidents. It has been shown that informants have considerable difficulty in remembering all “minor accidents” occurring in a four week reference period. An increased injury rate has been noted during the second six months of life, when infants begin crawling and walking. For more serious falls the parents may have an inaccurate understanding of injuries treated in hospital, and in some cases there could have been deliberate concealment of non-accidental injury.

However, our findings were consistent with the literature, where comparison was possible. Most previous studies had been hospital based, and as only a minority of accidents result in serious injury or hospital attendance, these studies will therefore have identified only the tip of the iceberg. One small community based study of 177 infants, found that the prevalence of bruising in babies aged 6–12 months was 12%, and over 75% were on the face and head. There was a highly significant increase in bruises with increasing mobility.

The mechanism of falling in this age group reflects their immobility and stage of development, with the commonest causes being rolling off surfaces or being dropped. The vast majority fell off beds and settees, and the damage was therefore limited as had been shown previously. It has been suggested that falls from less than 10 feet result in predominantly trivial injuries, although falls of 4–5 feet have resulted in skull fractures. Chadwick et al reported deaths following falls of 4 feet or less, but concluded these histories were falsified. Tarantino et al reported mainly minor injuries from short falls in infants. Most children who fell down staircases sustained minor injuries, involving mainly the head and neck. This is in keeping with our data where the majority of falls led to no serious injury, but some head injuries did not always seem consistent with the seriousness of the fall.

In a hospital study of accidents at all ages, Maddocks et al found that 43% of children with injuries had fallen, and most only needed minor treatment or reassurance. Those under 1 year of age were grouped together, giving a total of 38 infants with no injury and serious injuries were very rare. Burns and scalds occurred rarely in young infants, the commonest hazards being hot drinks, hot water, and radiators.

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resulting in skull fractures should be regarded as suspicious. When fractures occurred, they resulted predominantly from complex accidents, and therefore it is expected that a detailed circumstantial history would be available. There was one accidental death which was not included in this cohort. This resulted from a complex accident at the age of 4 months.

Burns and scalds occurred much less frequently than falls in infants. Previous studies of scald and burn injuries in children of all ages have found that children under the age of 1 year account for up to 20% of scalds and burn injuries; a study of children younger than 5 years hospitalised for a burn injury found children under 6 months forming just 5% of all cases. This highlights the important role of children under 6 months forming just 5% of all years hospitalised for a burn injury, found children under 6 months forming just 5% of all cases.27 This highlights the important role of development in determining risk as, before the age of 6 months, the infant's acquisition of motor skills makes them unlikely to encounter a hot object. Other studies have reported a higher burn rate in children under 2 years.28–30 These studies were burns unit based and are the more severe end of the spectrum.

In summary, accidents were surprisingly common in infants of 6 months and less. The majority of these accidents were falls, which occurred in 22% of infants. However, injuries were infrequent, generally trivial, and almost entirely confined to the head. Serious injuries (namely concussion and fractures) were seen in less than 1% of falls.

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Accidents and resulting injuries in premobile infants: data from the ALSPAC study

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