

ORIGINAL ARTICLES

Children falling from a height in London

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Abstract

Objectives—To determine the frequency and geographical distribution of children falling from a height in London and to suggest possible causes and preventative measures.

Methods—All relevant cases attended by the Helicopter Emergency Medical Service (HEMS) in a three and a half year period were reviewed and the locations related to the boroughs. The rates, per 1000 resident children, were compared with socioeconomic indices for the boroughs concerned. In addition, a survey was undertaken of window fittings and maintenance in high rise flats close to one particular incident.

Results—A total of 90 incidents were attended involving 91 patients (64 male, 27 female) of whom five died. HEMS attends approximately one third of incidents involving serious trauma. In the study period the maximum frequency was 0.2 fallers per 1000 resident children, occurring in three boroughs. In three boroughs there were no fallers. There was no overlap in socioeconomic indices between the five boroughs with the highest fall rates and the five with the lowest. The building survey found a high incidence of faulty window catches, a slow response rate for repair, and a lack of safety advice for residents.

Conclusions—The frequency of falling is related to urban deprivation, poor maintenance, and lack of safety information. A combination of regulation and targeted education could substantially decrease deaths and injuries in children from this cause.

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Keywords: accidental falls, falls from heights.

Trauma is the major cause of death in children over 1 year of age in the UK,¹ and falls are a common cause of this trauma. Children fall from buildings, trees, horses, playground equipment, or trip on the same level. It is evident that the causes, patterns of injury, and preventative measures required are different within this spectrum. This paper is concerned only with fallers from a height of over five feet from stationary objects, buildings, or trees.

London's Helicopter Emergency Medical Service (HEMS) is tasked to potentially serious incidents of trauma in the Greater London area

in daylight hours. It is estimated that it attends up to one third of such incidents. This experience has led HEMS to recognize some characteristics of childhood falls and to suggest that this problem might be susceptible to preventative measures.

Methods

HEMS records for the period 1 January 1992 to 31 July 1995 were reviewed to identify all incidents where a child under 16 years of age had fallen or been pushed from a height of greater than five feet. Heights fallen were estimates made by the paramedic or doctor on scene.

The age and gender of the children were recorded as was the time of year. No attempt was made to investigate the diurnal variation in fall rates as the service does not cover the entire 24 hours.

The location of each fall was plotted using the Ordnance Survey grid. These plots were related to the boroughs of Greater London and compared with the Jarman indices² for the areas concerned. The Jarman index, designed to estimate the work load for general medical practitioners, includes factors for overcrowding, unsuitable housing, disproportionate numbers of children, and the incidence of one parent families. Population figures are taken from the 1991 census.

A proportion of the children were taken to the Royal London Hospital (RLH), the base hospital for HEMS, and for each of these children an injury severity score (ISS) was recorded.³

A small survey was carried out among residents of privately administered, high rise accommodation in an area of south east London to ascertain the provision, maintenance, and efficiency of window safety devices, and the extent to which information on window safety was supplied to the tenants. Twenty households known to have young children and living several floors (3–10) above ground level were interviewed; none refused to cooperate.

Results

During the study period 90 helicopter missions were identified that met the inclusion criteria, resulting in 91 children being treated. As far as could be ascertained, 89 children fell accidentally. Forty patients (44%) were admitted to RLH where falls represent 24% of injuries and 36% of deaths in children treated by HEMS.

In the study group there were no children under 1 year of age, 39 (42%) were under 5

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years old, 29 (32%) between 5 and 9 years, and 23 (25%) were 10 years and older. The overall sex ratio was 2.4:1 (males 64, females 27); the difference was most marked in the 5 to 9 year group, where the ratio was almost 4:1.

The mean estimated height fallen was 15 feet (range 6–100 ft) but 30 children fell more than 20 feet. In only 15 cases was the height fallen not recorded. Sixty eight children fell from buildings, the great majority from windows, but it was recorded that one fell from a balcony, three from roofs, two from drainpipes, and one jumped from a roof attempting to evade the police. Five fell from trees, four from playground equipment, four from other structures, and in nine cases the records were incomplete.

Five children admitted to RLH subsequently died of their injuries and one child was dead on scene — thus the death rate was at least 6.6%. It is not known for certain if any of the children taken to hospitals other than RLH subsequently died. The children who died had fallen 100, 50, 45, 35 and 15 feet, and their ISSs were calculated as 45, 54, 57, 35, and 34 respectively. The 40 patients admitted to RLH had a median ISS of 8 with an interquartile range of 1–25. Fourteen children had an ISS of 16 or greater.

Figure 1 shows the monthly distribution of falls and fig 2 shows the geographical distribution.

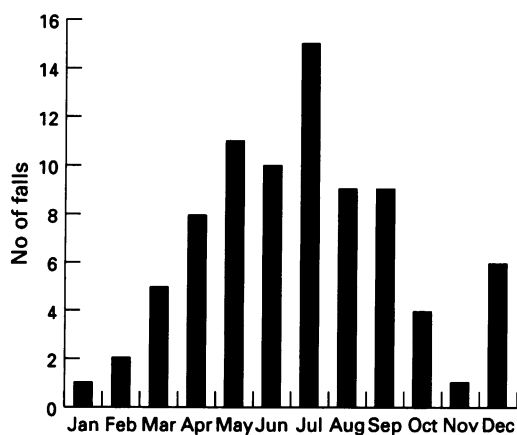


Figure 1 Frequency distribution of falls by month of falls in study period.

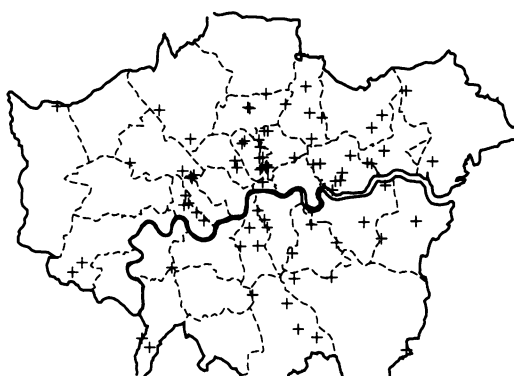


Figure 2 Distribution of incidents in Greater London.

The incidence of falling, expressed as falls per 1000 children resident in the borough, was plotted against the Jarman index for that borough. The five boroughs with the highest fall rates and the five with the lowest are shown in the table.

After one incident, a local resident with experience of safety engineering undertook a pilot survey of nearby high rise housing. This took the form of a questionnaire about the type and efficiency of window fittings and the incidence of defects, rapidity of repair, and provision of safety information. Of the 20 households questioned none had received instruction on the operation and maintenance of the safety catches. Five had reported defective windows (other than broken glass) to the owners. Of those reporting defects, one waited over a month for an inspection, one for eight months, one for 'nearly a year', and two for over a year. After inspection the defects were repaired in four cases after a further wait ranging from one day to one year; the fifth was not repaired. One tenant, having waited nearly a year for inspection and over six months more for repair, resorted to a solicitor to ensure that the necessary work was carried out. This family had two children, aged 5 and 7 at the time of the survey, and lived on the third floor.

Discussion

Spiegel and Lindaman reported on the success of their 'Children can't fly' programme in New York⁴ and Barlow *et al* in 1983 showed a complete absence of falls by children from windows where a guard was fitted.⁵ However, Musemeche's group showed that the incidence of falls from heights has remained high in urban areas of the US despite public education and building codes that required window guards and safety rails.⁶ Nielsen and coworkers revealed that 30% of Danish homes have 'dangerous' windows.⁷

In 1992 there were 10 deaths in children aged under 15 in Greater London from accidental falls (ICD-9 E codes 880-888).⁸ It is evident that the problem still exists and that preventative efforts, while not without some advantage, are still imperfect.

Building regulations in the UK are not explicit. Informal approaches to the Royal Society for the Prevention of Accidents, the Health and Safety Executive, Westminster Council, Her Majesty's Stationery Office, the

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Borough	Jarman index	Falls/1000 children
Hackney	62.4	0.2
Hammersmith and Fulham	35.3	0.2
Islington	49.3	0.2
Westminster	41.2	0.17
Newham	55.5	0.14
Ealing	25.5	0.02
Hillingdon	7.3	0.02
Kensington and Chelsea	27.7	0.0
Enfield	13.4	0.0
Harrow	1.8	0.0

British Standards Institute, and the Institute of Child Health were all fruitless in the search for information regarding suitable, enforceable safety standards in the UK, apart from a requirement in the Building Regulations 1991 Document K. Requirement K2 states that 'Stairs, ramps, floors, and balconies, and any roof to which people normally have access, shall be guarded with barriers where they are necessary to protect users from the risk of falling'.

A further factor affecting the incidence of childhood falls is the socioeconomic status of the families involved.⁹ This is not just true of falling, it applies across the spectrum of injuries in children.¹⁰ However this is based on information from the US and further studies are required to determine whether these findings apply to the UK.

Injuries to children are sometimes deliberately inflicted as appeared to be the case in two of the children in this study. As with all childhood injuries there is a need for careful investigation into the circumstances. The injuries should be compared with such factors as the height fallen, obstructions hit on the way down, aids to reaching windows and balconies, carer supervision, and the presence or absence of safety fittings. There is evidence that young children are relatively resistant to serious injury in free falls of less than 10 feet.¹¹

Figures from the Office of Population Censuses and Surveys for the period 1985–92 show a mean of 6.5 children killed in all accidental falls per year in Greater London. In a period of just over three and a half years, however, HEMS has attended six such deaths in children falling from buildings; it could perhaps be assumed that the service attends about one third of serious childhood falls in its area of operation. If this is so, then the annual number of falls could be roughly estimated at around 100. In addition, there are undoubtedly many falls not reported, for example where the child has escaped serious injury. To put the death rate into proportion; in the same period and area an average of 6.5 children were murdered and 32.4 were children killed in road traffic accidents.

As in all other forms of trauma there is a considerable preponderance of males compared with females. The 'nature' versus 'nurture' debate continues, but it would seem that boys of all ages, once mobile, are more adventurous and accident prone.

Figure 1 shows a considerable variation in fall rates over the year. While the figures are slightly affected by the reduction of flying hours of the helicopter in the winter months, this does not account for the majority of the fluctuation. Indeed December, when flying hours are at their minimum, is one of the highest months. It is suggested that the summer peak is due to the summer holidays and unsecured windows in the warmer weather while the December peak corresponds to the Christmas holidays.

Although the actual number of fallers in this study is low, there is evidence (fig 2) of an unequal geographical distribution. The Jarman index was designed as a measure of relative

probable work load on general medical practitioners. It is not, therefore, a direct measure of deprivation or socioeconomic status of the area concerned. However, many of its constituent factors are measures of a reduced quality of life. Our figures show an association between high Jarman indices (increased 'deprivation') and high fall rates. (Our series does not include Tower Hamlets, however, this is another borough with a high Jarman index but the RLH is located in that borough and the helicopter would not be sent to incidents so near its base.) Of the 34 boroughs in London there is no overlap in Jarman indices between the top five boroughs and the bottom five (table).

The small survey of high rise accommodation near one of the incidents showed a high incidence of faulty window catches, a slow response rate for repair, and a lack of safety information being provided to residents. If the picture is repeated throughout the metropolis it is perhaps surprising that the fall rate is as low as it is. Coupled with the evidence from Denmark,⁶ it is likely that the survey is not unrealistic.

Egress from high places is made easier for children when furniture is placed under windows or deep freezers are located on balconies, as frequently noted by HEMS crews. On other occasions, for example fires, relatively easy escape is required. Any education programme or legislation needs to take account of these facts.

HEMS crews are fully occupied on scene with the treatment of the injured and therefore cannot be expected to investigate fully the circumstances of every incident. Likewise the service does not have the resources to follow up patients admitted to hospitals other than the RLH. This said, it is evident that falling from a height is a significant part of the injury mortality and morbidity in children and more investigation is required to identify both the actual incidence and the mechanisms involved.

Public education and properly enforced building regulations would help, although the efficacy of these methods has been variable.^{4,6,7} It is clear that, given limited resources, public awareness campaigns should be targeted at low income families¹⁰ and also, given the ages at which children fall, have regard to children's psychological and motor development.¹²

Conclusion

Deaths by falling from a height in children in Greater London average 6.5 per year and the total of serious falls is, perhaps, 100 per year. There are many reasons for such falls but the incidence appears to be strongly related to deprivation.

The actual incidence of falls from a height in Britain is unknown. This study demonstrates that a larger scale analysis of falls in childhood may reveal patterns useful in defining the areas and times of year in which a public health campaign could be most usefully undertaken. A larger study of maintenance practice, especially in high rise housing, is urgently required. A

combination of regulation and education has the potential to achieve a dramatic reduction in this cause of death and injury in children.

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ISCAIPNET — our very own listserv

Welcome, ISCAIPNET. This is the newest entry to the growing list of injury focused groups on the internet (actually this is not on the WWW but on a listserv, controlled but unmoderated and only available to members of ISCAIP). For members, send a message to LISTPROC@u.washington.edu saying 'subscribe iscaipnet'. So far, ISCAIPNET has featured lively discussions about scalds, falls from heights, etc. For readers who are not yet members of ISCAIP, this is one more reason for joining. Don't forget too that members receive the journal subscription at a substantially reduced rate.

Dangerous elk

'Elk are a very serious traffic problem in this country' says an official of the Finnish Transport Ministry. 'There are lots of them, they're very big, they're not very clever, and they don't take any notice of road signs'. Although that sounds funny, reading on I learned that wandering elk are the country's biggest non-alcoholic cause of road accidents, with hundreds of collisions every year and about a dozen deaths annually, including the loss of Finland's most celebrated tango singer. It seems the problem arises in part because the elk's legs are spindly so that when hit by a car they flip onto the roof and crush the car's occupants. So the government is spending 15 million pounds building elk underpasses (Associated Press, 23 September 1995, P and L Hayes).

Other animal stories

It appears that Tufty, the cartoon squirrel used in the UK to teach children about road safety is being put out to pasture after 35 years of devoted service. The Royal Society for the Prevention of Accidents (RoSPA) has decided Tufty is 'out of touch' and is to be replaced by Willy 'a mischievous baseball-capped boy' and a pet dragon 'Watchit'. The rationale is that 'the notion of teaching road safety through animals lacks credibility, especially when one of the leading characters is a hedgehog' (is nothing sacred?) (J Leake, *The Sunday Times*, 15 May 1996).