ACCIDENTS IN CHILDHOOD

BY

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During the past years the ever-increasing problem of accidents has engaged the interest of the medical profession in this country. In the early 1920's the Viennese orthopaedic surgeon, Lorenz Böhler, started to organize a comprehensive accident service covering Austria (*Brit. J. Surg.*, 1934), which has become the prototype of similar services in other European countries.

In this country the British Orthopaedic Association discussed setting up an accident service a couple of years ago (Memorandum on Accident Services, 1959), and subsequently the British Medical Association appointed an accident committee, under the chairmanship of Mr. Osmond-Clark (1961), with representation of the Royal Colleges and the interested specialist associations.

Although it is generally acknowledged that accidents in childhood are common, many paediatricians do not seem to be clear in their own minds about the numerical importance of accidents in childhood, the unsatisfactory nature of treatment of accidentally injured children in adult specialist wards and the role the paediatrician should play in the treatment of accidents in childhood.

Accidents in childhood is such a large problem that it is surprising that very little detailed information is available on the subject. The larger surveys on young children and families (Douglas and Blomfield, 1958; Spence, Walton, Miller and Court, 1954) include some information on the subject, but the only detailed comprehensive study of the frequency and nature of accidents in childhood, discovered in the literature, was carried out by Ehrenpreis and his co-workers, for the year 1955, in Stockholm (Berfenstam, Ehrenpreis, Ekström, Garsten and Myrin, 1957; Ehrenpreis, 1957). This study extended over one year and it needed an army of investigators to extract the relevant information. Perhaps the most interesting fact emerging from this study was that one in 10 children between the ages of 0 and 14 years was accidentally injured during the year.

Of course, only a minority of children suffer accidents of such severity that they must be admitted to hospital. Most of them will be treated by the family doctor at home or in the Hospital Casualty Departments. Paediatricians and paediatric surgeons will be most interested in those accident cases requiring admission to hospital, and it is only these cases which will be surveyed in this paper.

The City of Liverpool is very suitable for such a survey, as nearly all children's beds are concentrated in two children's hospitals, and practitioners, police and ambulance drivers tend automatically to direct children who have suffered accidents to these two hospitals. The large majority of children involved in accidents which are not of a minor character or which are so severe that the patient dies during transport or on admission to hospital are, therefore, admitted to Alder Hey Children's Hospital and the Royal Liverpool Children's Hospital.

It was thought advisable that the study should cover a period of several years and the four-year period 1957 to 1960 was selected. During this period the population of Liverpool fluctuated around 760,000, and the number of children between 1 and 15 years of age was around 180,000. During the four-year period, 8,345 accidentally injured children were admitted to the two children's hospitals, an average of 2,086 children per year. In Table 1 these figures are compared with the figures collected by Ehrenpreis for Stockholm and somewhat incomplete figures for Edinburgh, which Kirkland collected in 1960 (I. Kirkland, personal communication). It will be seen that although the figures are not strictly comparable, as the ages

TABLE 1

	Liverpool	Edinburgh	Stockholm
Population	760,000	500,000	726,000
Child population ..	180,000 (0-14 years)	80,900 (0-12 years)	227,000 (0-14 years)
Total accidents in childhood			24,466
Admitted to hospital ..	2,086	982	1,539

TABLE 2

ACCIDENT ADMISSIONS TO LIVERPOOL CHILDREN'S HOSPITALS, 1957 TO 1960

	No.	Per cent.
Total admissions	56,993	
Total general surgical admissions	17,951	31·5
Accident cases to general surgical wards	4,996	27·8 of surgical admissions
Accident cases to medical wards	631	
Accident cases to orthopaedic wards	2,550 (approx.)	
Accident cases to facio-maxillary beds	168	
Total accident cases	8,345	14·6 of all admissions

TABLE 3

ANALYSIS OF SURGICAL AND MEDICAL ACCIDENT CASES, 1957 TO 1960

Injury	Number
Surgical	
Head	2,567
Burns and scalds	1,037
Soft tissue	559
Foreign bodies	268
Genito-urinary	91
Abdominal	35
Chest	21
Other	418
Total	4,996
Medical	
Poisoning	619
Drowning	12
Total	631

covered are not quite the same, the findings appeared to be very similar.

During the four years 1957 to 1960, 56,993 children were admitted to the two Liverpool children's hospitals, of whom 17,951 or 31·5% went to the general surgical wards (Table 2). Nearly one-third of the general surgical admissions over this period, 27·8% or 4,996 children, were admitted because they had suffered accidents. Accidents form, therefore, a very large and important part of paediatric surgical practice. Six hundred and thirty-one cases were admitted to the medical wards and 168 to the beds of the facio-maxillary unit. As the orthopaedic departments do not use the same record system as the rest of the hospitals, it is difficult to get absolutely accurate figures about accident cases admitted to the orthopaedic wards, but approximately 2,550 or nearly half of all admissions to the paediatric orthopaedic wards were accidentally injured children.

It is generally assumed that the majority of major accidents fall into the province of the orthopaedic surgeons. In childhood this is quite incorrect. Twice as many accidents were admitted to the general surgical wards as to the orthopaedic wards. It is, of course, true that a large number of fractures in childhood are not severe enough to call for admission to hospital and are treated in the out-patient department, and if out-patient attendances were included in this survey the proportion of orthopaedic cases would undoubtedly increase considerably. As stated before, this paper is solely concerned with accident cases necessitating hospital admission. Accidents formed 14·6% of all children's hospitals admissions during the four-year period. One out of every seven children in paediatric hospital practice will, therefore, be admitted because of an accident.

When analysing the accident cases admitted to general surgical and medical wards, we obtain the following figures (Table 3).

Of the nearly 5,000 general surgical admissions, half were due to head injuries. This enormous number which is continuously increasing is a reflection on the unsatisfactory state of our traffic system. A detailed consideration of these cases which have been analysed elsewhere (Rickham, 1961) is out of place here, and it suffices to state that simple lacerations of the scalp are not included and that all these cases were admitted because there was evidence of concussion. It follows that the large majority of head injuries is admitted for a few days' observation only, and that the proportion of serious injuries is small. Nevertheless, these cases must be admitted for observation, if serious complications are to be recognized promptly and occupy a large proportion of paediatric surgical beds.

Burns and scalds are the next largest group. Undoubtedly this number will decrease in the future as central heating is slowly introduced into this country. On the other hand there is an ever-increasing number of petrol burns, electrical burns and burns due to highly-inflammable artificial material used for dresses and undergarments.

The long stay of burns in hospital, the unsatisfactory nursing of severe burns in general wards and the extremely high rate of cross-infection in burns are all well known and need not be discussed here.

All the other groups of injuries are numerically of much less importance. The 268 injuries caused by foreign bodies should be noted. This is a type of injury mainly confined to childhood.

The majority of accident cases admitted to the medical wards were cases of poisoning, and amongst

TABLE 4

DEATHS IN ENGLAND AND WALES, 1959, OF CHILDREN 1 TO 15 YEARS OF AGE

Total deaths	5,035
Accidental deaths	*1,437* (28·5% of total)
Respiratory diseases	871
Neoplasms	746
Congenital malformations	569
Infective and parasitic diseases	353
Diseases of the digestive tract	337
Diseases of the nervous system	329
Genito-urinary diseases	102
Endocrine and metabolic diseases	85
Others	206

TABLE 5

CAUSES OF FATAL ACCIDENTAL INJURIES—PATIENTS ADMITTED ALIVE TO LIVERPOOL CHILDREN'S HOSPITALS, 1957 TO 1960

Cause of Death	Number
Head injuries	9
Chest injuries	1
Abdominal injuries	6
Multiple injuries	3
Burns	21
Poisons	2
Total	42 (0·5% of all accident cases)

the poisons, salicylates are by far the most common.

The figures for deaths in childhood in England and Wales (excluding infant deaths) issued by the Registrar-General (Registrar-General's Statistical Review of England and Wales for 1959) can be seen in Table 4. It will be noticed that accidents are by far the commonest cause of death of children between 1 and 15 years of age, constituting 28·5% of the total and being numerically much more important than deaths due to all those conditions which occupy most of the time of paediatric physicians and surgeons.

When studying the mortality rate of accidentally injured children admitted alive to the Liverpool Children's Hospitals, it becomes apparent how few children die following accidents. In the four years under review only 42 children died, a mortality rate of 0·5% (Table 5).

The majority of deaths due to head injuries occurred within a few hours of admission. Surgery had nothing to offer in these cases and no operation was carried out. Three of the six children who died following abdominal injuries had multiple tears of viscera and large vessels. Laparotomy was performed in the ward without an anaesthetic when it became obvious that massive blood transfusions were not improving the shock of the patients.

Death due to burns occurred mainly in those patients where the injury affected more than 50% of body surface. In other words, the majority of deaths were due to trauma of severity beyond the scope of present-day surgery. It appears, therefore, that children are either injured so severely that they die very quickly or that they survive provided adequate treatment is promptly available. This is confirmed by the fact that the number of children brought in dead to hospital following an accident is much larger than the number of children who died after admission to the wards.

There were 148 accidental deaths amongst Liverpool children between 1 and 15 years of age during this four-year period (Table 6). An analysis revealed

TABLE 6

CORONER OF LIVERPOOL'S FIGURES FOR FATAL ACCIDENTS IN CHILDREN AGED 1 TO 15 YEARS, 1957 TO 1960

Cause of Death	Number	Brought in Dead	Treated in Other Hospitals
Surgical deaths			
Head injuries	61	50	2
Chest injuries	8	6	1
Abdominal injuries	15	9	
Multiple injuries	8	5	
Burns	26	5	
Total	118	75	3
Medical deaths			
Drowning	10	10	
Asphyxia	14	14	
Poisoning	5	2	1
Total	29	26	1
Orthopaedic injury	1		1
Total	148	101 (68·2% brought in dead)	5

TABLE 7
CHILD ACCIDENT MORTALITY IN LIVERPOOL, 1957 TO 1960

Population of Liverpool	760,000
Children under 15 years	180,000
Total number of accidental deaths of all ages	1,249
Total number of deaths in children under 15 years	387 (about 0·5 per 1,000)
Deaths due to accidents in children	148 (38·2% of all child deaths)

that the large majority did not reach hospital alive. Five cases were admitted and treated at other hospitals.

In Liverpool the mortality from accidents in childhood is considerably lower than that in adults. Nearly a quarter of the population of Liverpool are under 16 years of age, but less than one-eighth of fatal accidents occurred in children under 16 (Table 7). The figures become even more striking when it is remembered that children are supposed to be especially liable to accidents.

It must not be overlooked that, in general, children between 1 and 15 years of age are extraordinarily fit and that deaths due to natural causes are very uncommon. In the three years under discussion only 387 children died in Liverpool, a mortality rate approaching 0·5 per 1,000. Accidents caused, therefore, 38·2% of all deaths in children between the ages of 1 and 15 years.

This survey shows that in childhood the treatment of about two-thirds of the accident cases is carried out in the general surgical wards. About one-third are admitted to orthopaedic beds and a relatively small number to medical and facio-maxillary beds. Accidents endangering life are practically confined to the general surgical admissions. The low mortality rate of accident cases admitted to the Liverpool Children's Hospitals is very gratifying and may be mainly due to the fact that surgeons and physicians, anaesthetists and radiologists, pathologists and biochemists and, especially, nurses experienced in the management of children, work as a team.

It is realized that this rather specialized personnel will only be found in the larger children's hospitals in the major cities of this country. Children injured outside these few restricted areas will have to be admitted to the local general hospitals. Fortunately, most of the bigger hospitals throughout the country have children's wards in the charge of a paediatrician and staffed by trained children's nurses.

The Platt Report (*Welfare of Children in Hospital*, 1958) has revealed that medical opinion in this country is strongly in favour of nursing children in children's wards. The special skill and technical knowledge necessary in the diagnosis, resuscitation and nursing of injured children will only be found amongst the personnel working in these wards. The paediatricians in the outlying hospitals will obviously work in close contact with their specialist colleagues, especially the general and orthopaedic surgeons.

There are many important differences in the diagnostic techniques and methods of treatment between injured children and injured adults. Even more important is the fact that the child is a growing organism with special physiological and psychological needs. In adult medicine, therapy is principally directed towards the treatment of the pathological condition; in paediatrics the child must be treated as a whole. It will be of little avail if we repair the physical injury of the child and leave him as a psychological wreck. The dangers of admitting children to hospital are well known. The dangers of psychological repercussions should be even greater if the child is admitted to hospital after a frightening and painful accident. It is a sobering thought that even in such a well-known specialized hospital as the Birmingham Accident Hospital, 81% of the children admitted for burns suffer from prolonged psychological disturbances (Woodward, 1959).

These complications can only be minimized by treating children in children's wards staffed by nurses trained and accustomed to look after them and supervised by medical men who realize first and foremost that treatment of the injury is only part of their obligation.

Present medical opinion is divided about the importance of providing separate accident services for children. In cities with large children's hospitals the provision of a children's accident service does not constitute any great problem. The crucial question is what type of accident service should be provided for children in the outlying centres and the country at large. The solution of this problem depends first and foremost on the attitude of the paediatrician towards the injured child and his willingness to accept responsibility for him.

Summary

A survey was undertaken to analyse admission of accidentally injured children to the two Liverpool

Children's Hospitals during the four-year period 1957 to 1960. The mortality rate in children due to accidents was ascertained and the various causes of death tabulated.

The conclusions drawn from this series may have some bearing on the future organization of accident services for children in this country.

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