Injuries in children and adolescents seen during 2006 at the emergency department of the National District Hospital, Bloemfontein

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Abstract

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Background: Most children and adolescents recover fully from injuries. However, permanent disabilities may occur. The objective of the study was to investigate the prevalence and profile of injuries in children and adolescents five to 19 years of age seen at the emergency department of the National District Hospital in Bloemfontein.

Methods: A retrospective descriptive study was conducted. Demographic and injury-specific information obtained from hospital records of 2006 was entered into a data-capturing form. Data were analysed by using descriptive statistics.

Results: The prevalence of injuries in this age group was 20.3%. Two hundred and nine records were investigated. The majority of cases were male (68.3%). The median age was 15 years, and 43.5% of injuries occurred in the age group 15 to 19 years. Approximately half (51.7%) were Afrikaans-speaking and resided in suburban areas (50%). Most injuries occurred at home (40.2%) between 12h00 and 17h00 (38.7%). Falls (33.7%) were the most common cause of injury. Soft tissue injuries (35.9%) occurred most commonly, fol lowed by lacerations (33.0%) and fractures (16.7%). Upper limb injuries (42.1%) were seen more than lower limb injuries (27.8%). Facial injuries occurred in 12% of cases. X-rays were performed in 57.9% of cases. Most patients (93.3%) received medication, while 22% were referred for specialist treatment. All cases except one were discharged from the emergency department. Parents accompanied patients in 65.6% of cases.

Conclusions: Optimal treatment should be given to the injured child or adolescent to avoid possible long-term injury-related sequelae. Preventive strategies should be formulated, enforced and evaluated.

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Introduction

Injuries, sustained in numerous ways, are common in childhood. Depending on the type of injury and its severity, transient or permanent and sometimes devastating consequences may develop.[1] Most children make an uneventful recovery from minor physically traumatic events, while some will remain permanently disabled or scarred, irrespective of the cause and part of the body affected by the injury.[2] The consequences of the injury affect not only the child or adolescent, but the family unit and, indirectly, society at large.[3,4] Furthermore, contrary to the belief that a child's emotional response to traumatic events is short-lived and has little or no permanent sequelae, it is now recognised that children who have experienced trauma are at risk for behavioural, developmental, functional and psychiatric complications.[1]

The World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and several other partners have set out to elevate child injury to a priority for the international public health and development communities.[4] On a global scale, injuries continue to be a major cause of mortality in children and adolescents.[3] Apart from mortality, injuries also cause significant morbidity among these age groups, as may be reflected by information from hospitalisation records and emergency rooms in many countries.[3] In a study conducted in the Western Cape,[5] trauma was by far the most common cause of death in children aged five to 14 years and, along with low birth weight and perinatal causes, the most important cause of fatalities among children aged 0 to four years. This means that, more than any other disease, injuries kill children and teenagers who are yet to develop their abilities and contribute to the society in which they live, and therefore injuries in childhood can be regarded as a public health problem.[4,5]

Several factors influence childhood injuries, e.g. age, gender, behaviour and environment, of which age is the most important factor influencing the pattern of injury in

childhood.[6] In children younger than 18 years of age, higher mortality rates are found among boys, possibly due to their more aggressive behaviour and exposure to contact sports.[3,5]

The use of injury severity scores (ISS) and disability ratings, which classify disabilities into short-term (< six weeks) and long-term temporary disability (≥ six weeks) and permanent disability, is a useful method of classifying and documenting the impact of injuries.[4] The impact and outcome of childhood injuries depend upon the severity or mode of injury. For example, injuries sustained in a motor vehicle accident are likely to result in multiple organ involvement, which may lead to severe short-term as well as long-term disabilities.[5] Children who sustain injuries other than head injuries have a greater degree of disability and limitation of activities in the short term than those with head injuries.[3] On the other hand, in the long term, children with head injuries suffer more limitations in their daily activities and school performance, and may even develop an extent of mental retardation, depending on the severity of the head injury sustained.[1,3]

Injuries in childhood can also have an economic impact, as may be demonstrated by absenteeism of parents from work in caring for the injured child, as well as hospitalisation and rehabilitation costs.[3] It is therefore important to approach childhood injury as a "preventable disease". Injuries need to be viewed collectively as a single "disease", with broadly similar approaches to prevent them.[4] Proper identification of the types of injuries and their mechanisms can lead to the development of prevention and education programmes that may help to reduce the prevalence of childhood injuries. The quality of treatment and care given to the injured child and adolescent should be optimal from the first contact.[6]

The aim of the current study was to determine the prevalence and characteristics of injuries in children and adolescents five to 19 years of age, seen at the emergency department of the National District Hospital in Bloemfontein over a period of one year (1 January 2006 to 31 December 2006).

Methods

A retrospective descriptive study was conducted by reviewing the records of all patients presenting with physical injuries at the emergency department of the National District Hospital, Bloemfontein, for a one-year period, i.e. 1 January to 31 December 2006. The National District Hospital is situated in close proximity to most of the Bloemfontein suburbs. As a district hospital, it serves as referral facility for most of the clinics in the municipal area and other nearby towns outside the Motheo district. The hospital in turn refers the majority of the patients to Pelonomi Regional Hospital or, in some cases, directly to Universitas Tertiary Hospital, depending on the nature and severity of the patient's condition. Most trauma patients (children and adults) with severe injuries requiring specialist care are either taken straight to the trauma unit at Pelonomi Hospital, or referred there from the emergency department at National Hospital.

Children and adolescents with other forms of trauma, e.g. sexual assault and psychological trauma, were not included in the study, since they required a more complex form of management.

A pilot study was conducted on 10 files. Although some files were incomplete, the majority of the files contained the essential information required for the investigation. The data collection form was found to be appropriate for the study. The results of the pilot study were not included in the main study findings.

The emergency department registers were obtained from hospital administration. A systematic sampling method was used and every fifth name appearing in the register of the predetermined study population was recorded. A list with the patients' dates of birth and hospital numbers was then compiled for each month of the year. The list was submitted to the hospital records department for retrieval of the files. Each file was audited and the information entered into the data collection form designed for the study.

The data collection form was compiled with the assistance of the Department of Biostatistics at the University of the Free State (UFS). After completion of the forms, statistical analysis of data was performed by the same department. Descriptive statistics, namely means and standard deviations or medians and percentiles, were calculated for continuous data. Frequencies and percentages were calculated for categorical data.

Approval to conduct the study was obtained from the Ethics Committee of the Faculty of Health Sciences, UFS. Consent to access patients' hospital records was obtained from the clinical head of National Hospital.

Results

A total of 6 576 children and adolescents, with and without injuries, were seen at the hospital's emergency department over the one-year period 1 January to 31 December 2006. The number of children and adolescents in the age group five to 19 years presenting with injuries was 1 337 for the year, giving a 20.3% prevalence of injuries in this age group.

Based on the systematic sampling, 267 files were requested, of which 209 were suitable to be included in the study. Fifty-eight files were deemed not suitable for inclusion for various reasons. Some files were missing from the records department, while others either lacked essential information

or contained information from other visits. Some of the patients were seen more than once with repeat injuries, while others consulted the emergency department more than once for the same injury.

The majority of patients were male (n = 142; 68.3%). No information regarding gender was available for one child. The patients' ages ranged from five to 19 years, with a median of 15 years. Age was categorised into three groups. More than 50% of injuries occurred in adolescents in the age group 15 to 19 years, while most injuries were seen in 17- and 18-year-old patients, namely 15.3% and 13.4% respectively. The frequency of injuries per age group is presented in Table I.

Table I: Frequency of injuries in children and adolescents aged five to 19 years per age group

Age group	Frequency (n = 209)	Percentage of total group
5–9 years	42	20.1
10–14 years	62	29.7
15–19 years	105	50.2

Further analysis was performed to determine the distribution of gender per age group. These results are presented in Table II. In both male and female patients, the majority of injuries occurred in the age group 15 to 19 years.

Table II: Comparison of the frequency of injuries between male and female patients in different age groups

Age group	Gender			
	Male (n = 142)		Female (n = 66)	
	n	%	n	%
5–9 years	24	16.9	18	27.3
10–14 years	42	29.6	20	30.3
15–19 years	76	53.5	28	42.4

With regard to the specific month of the year, a fairly equal distribution of injuries was observed. The lowest percentage (n = 14; 6.7%) of injuries in this age group occurred in May and July, while June had the most injuries (n = 20; 9.6%).

Afrikaans (51.7%) was the most common home language spoken by the children and adolescents in this study, followed by Sesotho (22.0%) and Setswana (16.1%). Other languages included isiXhosa (8.8%), English (1.0%) and isiZulu (0.5%). Data were missing for three children/adolescents.

Half (49.8%) of the injured children and adolescents seen at the emergency department lived in suburban areas, while 22.1% came from the townships surrounding Bloemfontein. A small number (3.4%) of children and adolescents lived in the city centre, while 51 (24.4%) came from farms in the Bloemfontein district, other towns in the Free State, and areas outside the province. The area of residence was not indicated in the record of one child.

Information was lacking in 15 cases with regard to the time of day that injuries were sustained. For those cases with information regarding time of injury available, it was found that injuries occurred most commonly in the afternoon between 12h00 and 17h00 (38.7%). A similar occurrence of injuries sustained during the morning between 07h00 and 12h00 (30.4%) and through the course of the evening/night between 17h00 and 07h00 (30.9%) was noted. No clear indication that injuries were more likely to occur at a certain time of day could be established.

In 72 patients' files, no information with regard to the place where the injury was sustained was recorded . It was found, however, that the majority (40.2%) of injuries occurred at home, while 20.4% and 18.3% of children and adolescents were injured at school and in the streets, respectively. Injuries occurring at home were most commonly seen in children in the age group five to nine years (42.3%). Twenty-one (15.3%) injured children and adolescents were brought to the emergency department from a sporting event or practice. The place of injury with regard to age group is shown in Table III.

Table III: Places where injuries occurred for three age groups (n = 137)

Place of injury	Age group					
	5–9 years (n = 26)		10–14 years (n = 43)		15–19 years (n = 68)	
	n	%	n	%	n	%
Home	11	42.3	16	37.2	28	41.2
School	7	26.9	11	25.6	10	14.7
Street	7	26.9	6	14.0	12	17.6
Sports field	1	3.9	10	23.2	10	14.7
Other	0	0	0	0	8	11.8

The mode of injury, or how the injury was sustained, is shown in Table IV. Twenty-eight patients' records did not give an indication of the mode of injury. It was found that most injuries were related to falls (33.7%).

Table IV: Mode of injuries sustained by children and adolescents five to 19 years of age

Mode	Number of cases (n = 181)	Percentage
Assault	41	22.7
Motor vehicle accident	9	5.0
Bicycle accident	8	4.4
Sport	30	16.6
Falling	61	33.7
Other (n = 32)		
Occupational	3	1.7
Self-inflicted	15	8.3
Foreign body	3	1.7
Burns	6	3.3
Animal bites	5	2.8

Further analysis of injuries per age group revealed that falls were the predominant mode of injury among children and adolescents in the age groups five to nine years (47.3%) and 10 to 14 years (38.2%). Assault was the most common mode of injury in the age group 15 to 19 years, representing 36.7% of injuries sustained in this age group. The distribution of mode of injury per age group is shown in Table V.

Table V: Mode of injury per age group (n = 181)

Mode of injury	Age group					
	5–9 years (n = 36)		10–14 years (n = 55)		15–19 years (n = 90)	
	n	%	n	%	n	%
Assault	2	5.6	6	10.9	33	36.7
Motor vehicle accident	3	8.3	2	3.6	4	4.4
Bicycle accident	3	8.3	3	5.5	2	2.2
Sport	4	11.1	13	23.6	13	14.4
Falling	17	47.3	21	38.2	23	25.6
Other	7	19.4	10	18.2	15	16.7

Soft tissue injuries (35.9%) were the most common type of injury seen at the emergency department in children and adolescents aged five to 19 years, followed by lacerations (33.0%) and fractures (16.8%). Abrasions occurred in 8.1% of cases, while a small minority of children and adolescents presented with burns (3.3%) and animal bites (2.8%). Only one (0.5%) child was seen with concussion, and 6.2% of children and adolescents sustained injuries typed as "other".

The limbs were most commonly affected by injuries, with 42.1% of injuries involving the upper limb and 27.8% the lower limb. Head and face injuries were seen in 10.5% and 12.0% of cases, respectively, while chest and abdominal injuries occurred in 6.2% and 4.3% of cases, respectively. Spinal injuries were reported in 4.8% of cases, of which 1% involved the cervical spine.

X-rays were performed in 57.9% of injured children and adolescents. Blood analyses (specific investigations were not specified on the data capturing form) were requested in two cases, while 80 (38.3%) children and adolescents did not require any special investigations. With regard to the management of injured children and adolescents, medication was prescribed in 93.3% of cases, while 24.4% required suturing for lacerations. Referral for specialist attention was necessary in 22.0% of cases, and 80.4% of the referred cases required orthopaedic evaluation or treatment.

All patients, with the exception of one (0.5%) who required observation, were discharged from the emergency department. No information was available for two patients. It should be noted, however, that the patients discharged from the emergency department (n = 206) included those who were referred for specialist attention (n = 46; 22.3%). No follow-up on these patients was possible after referral, and therefore it could not be determined how many of them were admitted to hospital for further treatment, e.g. surgery, or discharged by the specialist who saw them.

Approximately two-thirds (65.6%) of children and adolescents coming to the emergency department with an injury were accompanied by one or both of their parents. Thirty-four (16.3%) children and adolescents came on their own, while 4.5% and 3.8% were brought in by friends or a relative/teacher, respectively. Five (2.4%) children and adolescents were brought to the emergency department by the police, while one (0.5%) child was brought in by a sibling.

Discussion

Certain limitations of the study need to be noted. The study period of one year and the sample of 209 injured children and adolescents might not have been sufficient to reveal the real trend with regard to injuries in children and adolescents seen at this particular emergency department. Some of the files were also incomplete. The study was conducted at the emergency department of the National District Hospital, and given that other injuries might have been seen in the surrounding clinics or might not have been taken to any health facility at all, could have had an impact on the findings. It should furthermore be kept in mind that patients with major injuries, such as injuries sustained in motor vehicle accidents, are usually taken directly to the trauma unit at Pelonomi Hospital by paramedics or an ambulance.

The study found that the prevalence of the childhood and adolescent injuries in the emergency department was 20.3%. According to Sanchez et al,[6] the rate of injuries in children 14 years of age and younger seen at emergency departments is between 15% and 18%. In the United States, 20% of injuries in children occur in the age group five to nine years, and 26% in the age group 10 to 14 years,[7] compared to rates of 20.1% and 29.7% for these age groups, respectively, in the current study. No significant variation in prevalence between the different months of the year was found, and therefore the anticipation that more injuries would occur during times of school holidays was refuted, although the WHO report[4] refers to the lack of adequate supervision as an important contributing factor to injuries in children.

The finding that the majority of injured cases were boys did not come as a surprise. In the USA, boys in the age group 15 to 19 years have a 1.5 times greater injury rate than girls in the same age group.[7] The WHO report on child injury prevention reports a similar trend.[4] Gofin et al[3] report that the incidence of hospitalisation due to injuries is nearly four times higher in boys than in girls. However, Polinder et

al[2] found that female children are more prone to long-term disability.[2]

In relation to age, injuries were more frequently observed in the older (15 to 19 years) age group (50.2%). The Centers for Disease Control and Prevention (CDC) report that 29% of non-fatal unintentional injuries in the United States occur in this age group.[7] A possible explanation could be that as children grow older they become more adventurous or irresponsible, leading to an increased exposure to injuries. Sanchez et al[6] also found that age was the most important factor affecting the patterns of injuries sustained during childhood. It could further be argued that parental influence and adult supervision decrease as children grow older.

With regard to injury-specific demographic data, most injuries were found to occur at home between 12h00 and 17h00. This observation corresponds with findings reported by Polinder et al[2] and Gofin et al,[3] who found, respectively, that 48.7% and 65% of injuries sustained by children occur at home. A possible argument in support of this observation could be that many parents are absent from home during the afternoon, i.e. after school hours, due to employment or other responsibilities. Consequently, children are unsupervised and might become involved in high-risk activities. Hyder et al[8] found that 34% of injuries occur between 06h00 and 12h00, and 21% between 12h00 and 14h30. A Canadian study reports that, in boys, 21.9% of injuries are sustained at home, 12.4% at school and 40.1% during sporting activities. For girls, these figures are 26.2%, 11.1% and 32.8%, respectively.[9]

The current study reflects age-related differences for the different sites. In the age group five to nine years, the second most common places of injury were both school and the streets (both 26.9%). In the age group 10 to 14 years, the second most common place of injury was at school (25.6%), followed by the sports field (23.2%). Second to home-based injuries, 17.6% of adolescents in the age group 15 to 19 years sustained injuries in the streets. Gofin et al[3] report that most injuries (39.0%) among 15- to 17-year-old children occur in the streets, while Hyder et al[8] found that 56% of injuries occur at home and 21% in the streets.

The findings reported here could indicate that, despite the fact that parents are usually relieved when their children are at home, they still need to be strict regarding safety measures and supervision at home. Some parents work and leave their children unsupervised or with older children, who may then go to play and leave the younger children alone. Injuries at school and during sporting events or practice sessions might not be easy to avoid, although emphasis on adequate safety measures, including close supervision, should be enforced. Certain types of sports may be more prone to injuries and should be identified and prioritised with regard to safety precautions.

The finding of this study, that falls were the most common mode by which injuries were sustained, was consistent with the report by Gofin et al,[3] who noted that falls were the most frequent cause of injured children being hospitalised. Sanchez et al[6] and Van As et al[10] report, respectively, that falls represent 30% and 43% of non-fatal injuries in children. A Canadian study reports that falls represent 34.8% and 42.9% of hospital visits for injuries in boys and girls, respectively.[9] In the USA, falls represent 37% of injuries in the age group five to nine years, 28% in the age group 10 to 14 years, and 17% in the age group 15 to 19 years,[7] compared to the current study, in which falls represent 47.3%, 38.2% and 25.6% of injuries for the respective age groups. These findings, according to Sanchez et al,[6] could be explained by the different age-related developmental stages of children. For example, in children six to 12 years of age, motor skills are well developed but they lack the cognitive skills to realise the potential consequences of their bravado. They therefore usually sustain injuries reflecting their curious and competitive nature. Bicycle- and sports-related injuries are common in children six to 15 years of age.[6] In the current study, however, injuries sustained due to bicycle and motor vehicle accidents were not among the common modes of injury, possibly due to the limitations referred to earlier. According to the WHO Global Burden of Disease report, falls are the 12th leading cause of death in the age groups five to nine years and 15 to 19 years.[4]

Due to peer pressure and friends' contribution to taking risks, adolescents often start experimenting with drugs and alcohol.[11,12] This behaviour could explain the finding that assaults were the most common mode of injury (i.e. 36.7%) in the age group 15 to 19 years. Violence is the third leading cause of death in the age group 15 to 19 years.[4] Further research should focus on the reasons for assault-related injuries in this age group to investigate preventive strategies, the availability of recreational activities, and social as well as educational development and support.

Medication (93.3%) was the most common type of treatment given to injured children and adolescents. Twenty-seven (77.1%) of 35 children and adolescents presenting with fractures were referred to orthopaedics. It could be recommended that one of the senior doctors in the emergency department should receive further training in orthopaedics to minimise the number of referrals. Polinder et al[2] found that 75% of children with lasting disabilities were treated for their injuries at the emergency department only and not referred for specialist attention.

Hyder et al[8] report that 46% of fathers and 39% of mothers accompanied their injured children to hospital. In our study, however, 65.6% of injured children were accompanied to

the emergency department by parents. This observation was similar to findings by Gofin et al,[3] who reported that 79.2% of working mothers and 60.9% of fathers were absent from work at least one day due to a child being injured.[3] The economic impact of parents' absenteeism from work might be severe and depends on the duration and severity of the child's injury. Dowd et al[13] point out that injuries are the leading cause of medical expenditure for children five to 14 years of age. They further argue that the economic impact of injuries might be as imposing as the impact they have in terms of deaths, hospitalisations and emergency department visits.[7]

Each year, approximately 9% of all injury-related deaths reported in South Africa occur in children, while an estimated 20 children are hospitalised per annum due to injury for each case with a fatal outcome.[14] Regardless of the extent of the problem, the availability of evaluated child injury prevention programmes is insufficient.[15] Currently, the Unintentional Injury Prevention theme of the joint UNISA-MRC Crime, Violence and Injury Lead Programme (CVILP) puts emphasis on childhood injury. The proposed objectives are to investigate the epidemiology of leading childhood injuries, and to identify, develop, evaluate and document good practices and standards for activities focusing on childhood injury prevention, particularly in low-income communities.[16] The CVILP has developed and implemented a home visitation programme to promote the awareness of childhood injuries and to disseminate information on the prevention and management of injuries in children.[15] The Department of Social Work at Pelonomi Regional Hospital has previously been involved in an awareness campaign on the prevention of burn injuries.[17] It is therefore strongly recommended that the involvement of local health and child care organisations in childhood injury prevention programmes be assessed and adapted or improved accordingly, should the need be identified.

Finally, a holistic approach to caring for the injured child cannot be overemphasised. In the event of severe or multiple injuries, such as those sustained in motor vehicle accidents or assaults, psychological support for both the child and his/her relatives should seriously be considered as part of the patient's management plan.

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