Original Article

Access this article online
Website: www.afrjpaedsurg.org
DOI: 10.4103/0189-6725.120909
Quick Response Code:

Epidemiology of paediatric injury in low income environment: Value of hospital based data prior to the institution of a formal registration system

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ABSTRACT

Background: Little attention is generally paid to paediatric injuries, especially in low income settings. The aim of this study is to provide an overview of the epidemiology of hospital-based paediatric injuries in a semi-urban area in Cameroon prior to the initiation of a formal registration system. **Patients and Methods:** A sixteen items data collection sheet derived from a newly instituted trauma registry is used to retrospectively gather hospital-based basic information about epidemiology of injuries in patients aged 15 years or below in a low income setting. **Results:** Two hundred and seventy seven cases representing 16% of all injury cases could be analysed. The frequency of injuries significantly increased with age with a peak between 11 and 15 years ($P < 0.001$). Children in school playgrounds carried a significantly higher risk of sustaining an injury ($P < 0.001$). Falls and interpersonal violence were the most frequent mechanisms. The face and locomotor systems were the most commonly involved. More than 60% of patients were discharged back home. **Conclusions:** The data from the present registration system seem to indicate a higher injury rate in pre-adolescent children and in the school playground. The institution of a formal registration system is likely to improve the quality of data recording system.

Key words: Epidemiology, hospital-based, low income setting, paediatric injury, registration system

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INTRODUCTION

Injury is now a major cause of death and disability in low income countries. Sub-Saharan Africa seems to be disproportionately affected.[1,2] The management of injury cases in such an environment is a special challenge because of sub-standard technical capabilities and complex socio-cultural environment. The problem is more acute in paediatric populations as little or no special attention is usually paid to this particularly vulnerable group of the population.[3-7] It has been estimated that as many as 95% of all childhood injury-related deaths occur in low income settings.[8]

Basic data on the epidemiology and impact of injuries in paediatric population are available in very few African countries.[9-13] To our knowledge, no such information is available in Cameroon. In the absence of such data, no efficient policy of prevention and management of paediatric injuries can be implemented.

Community-based surveys are difficult to implement in our environment as police reports are usually not available and post-mortem investigation are made difficult by the hostile socio-cultural background. Hospital-based surveys, though not the best tool, remain a valuable source of collection of basic data on the epidemiology of paediatric injuries. Unfortunately, the data sources available in hospitals are usually administrative records with little relevant information which could help improve on the outcome of injuries. The best known approach for a more accurate collection of hospital data on injuries is the institution of formal trauma registries which have been shown to improve injury surveillance and to be a fundamental tool for trauma quality care improvement.[14-17]

We instituted a 16-item trauma registry in our hospital since September 2008, both for adults and children. We

hoped to compare of basic trauma data obtained from the previous registration system with the input of the new trauma registry in describing injury cases.

The aim of this study was to provide an overview of the epidemiology of paediatric injuries in the Emergency Department of a level III institution in a low income environment. We also intended to analyse the present registration system of paediatric injury cases prior to the institution of a formal trauma registration system. This will allow us estimate the utility of a trauma registry as an injury surveillance tool.

PATIENTS AND METHODS

This retrospective study was conducted over a period of 1 year (between July 1st 2007 and June 30th 2008) at the Regional Hospital, Limbe, a level III institution located in the South West region of Cameroon. This is a hospital with a capacity of 200 beds, an emergency department functioning 24 h/day and a surgical ward with 26 beds capacity. All emergencies arriving in Limbe Hospital are managed in the casualty department for a maximum period of 24 h. They are then either admitted in the surgical ward, discharged back home or referred to the major city of Douala where two large reference hospitals with all the specialized services are located. There is no pre-hospital care system in Limbe: Patients are usually rushed to the hospital by relatives or bystanders who witnessed the accident or injury.

Over the study period, registers of the Emergency Department and call duty reports were checked for all cases of patients aged 15 years or below admitted for initial treatment of an injury belonging to one of the following predefined categories: Road traffic accident, assault (defined as intentional inter-personal injuries, including family violence), unintentional interpersonal violence, falls, domestic accidents, burns, orificial foreign body, drowning or near drowning and self-inflicted injuries.

For the purposes of exploring patterns of injury, patients who did not have age, sex, or mechanism of injury were excluded from the analysis. These exclusion criteria have been used previously in large surveys related to injuries.[18] Patients who attended another institution prior to consultation in the emergency department of our hospital and babies with birth injuries were excluded as well.

A 16-item one page data collection form derived from our registry of trauma was used to retrospectively collect data. These items included age, sex, profession, place of residence, mechanism of injury, type of collision and position of patient (either driver or rider, passenger or pedestrian) in cases of road traffic accident, delay before arrival to hospital, systolic blood pressure and respiratory rate on arrival, location of injury, Glasgow coma scale, description of lesions and outcome of patient's care in the Emergency Department. Whenever possible, the data were used to estimate the severity of injury using the paediatric trauma score (PTS) and the paediatric injury severity score (PISS).

Data were analysed using Epi-info 2003 and comparisons were made using the Chi-square tests with Yates correction for small samples. Results were considered significant for P values <0.05.

RESULTS

A total of 1713 injury cases were recorded over the 1 year study period, representing 27.26% of the total number of emergency consultations in our institution. Two hundred seventy nine (16%) of these patients were aged 15 years or below. Thirty eight (13%) were excluded for lack of one or more basic information. Fourteen (5%) had attended other institutions prior to consultation. A total of 227 patients could finally be analysed.

As shown on Figure 1, there was a peak of incidence towards the end of the year, especially in the month of September, the periodduring which children returned to school.

There were more males than females with a sex ratio of 1.25/1. For the purpose of age groups analysis, our patients were divided into three groups: Group 1 (aged 0-5 years), Group 2 (aged 6-10 years) and Group 3 (aged

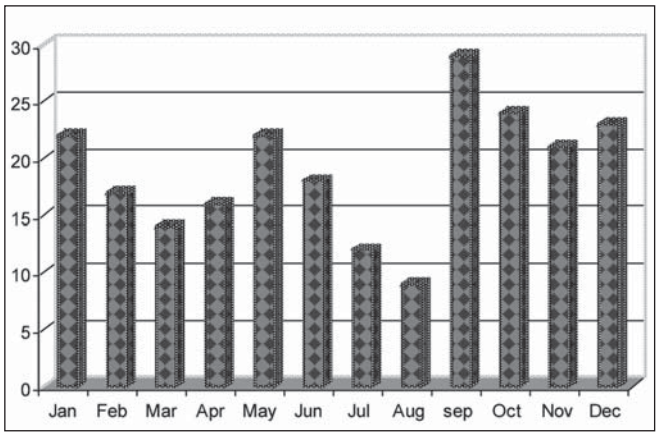


Figure 1: Monthly distribution of paediatric injury cases in Limbe, 2007

11-15 years). As shown on Figure 2, the frequency of injuries significantly increased with age groups ($P = 0.004$).

Table 1 reviewed the items of our trauma registry, which were available in the data recording system prior to the institution of our trauma registry. According to this table, basic data such as blood pressure and respiratory rate were not available for a large majority of patients. Glasgow Coma Scale was never available. In cases of road traffic injuries, the type of collision was rarely indicated. For 83% of cases there was an attempt to describe the lesions, but the description available did not usually permit estimation of the PISS. This score could be estimated only in 32 (14%) cases. PTS could never be estimated.

The place where the accident occurred was specified as part of description of the mechanism in 169 patients (74%). This indicated that a significantly higher rate of accidents (40%) occurred at school ($P = 0.0002$). Other frequent locations included road or street (26% of cases) and home (10% of cases).

Figure 3 displays the overall distribution of our patients according to the mechanism of injury. Falls appear to be the most frequent mechanism ($n = 52$), most often in school playground ($n = 29$). Violence included both intentional (9% of cases) and unintentional injuries (12% of cases). As shown in Table 2, age group analysis indicates that 11-15-year old patients were significantly more exposed to RTA and to unintentional interpersonal injuries ($P < 0.001$).

The location of injury was specified in 163 patients (72%) who all sustained a total of 265 injuries (mean of 1.63 injuries per patient). As shown on Table 3, the face, soft-tissue and the locomotor systems were the most frequently involved.

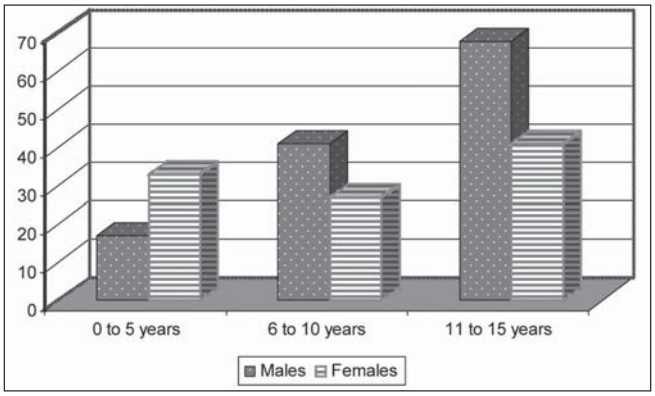


Figure 2: Age and sex distribution of our patients

The outcome and destination of patient after the emergency department was specified in 182 patients (80%): 112 patients (62%) were discharged back home, 11 (6%) were referred to another institution and 53 (29%) were admitted in the surgical ward. Six patients (3%) were reported dead in the Emergency Department. The specific cause of death could never be traced.

DISCUSSION

Injury has become a leading cause of death and long term disability, especially in low income settings.[1,2,8] Generally, little specific attention is paid to the problem of the injured child and adolescent.[3,7] Most data relating to the problem of paediatric injury are from Western countries. Few data has been recorded in low income environment, especially in Africa.[9-13]

Table 1: Components of the present trauma registration system

Item	Number of patients for whom it is available	Percentage
Patient's name	214	94
Age	227	100
Sex	227	100
Profession	137	60
Place of residence	114	50
Mechanism of injury	227	100
Type of collision (for road traffic injuries)	4	8
Position of patient (for road traffic injuries)	11	23
Delay before arrival	19	8
Location of injury	163	71
Glasgow coma scale	0	0
Respiratory rate	32	14
Systolic blood pressure	11	5
Description of lesions (useful)	189 (32)	83 (14)
Summary of para-clinical investigations	0	0
Outcome in emergency department	182	80

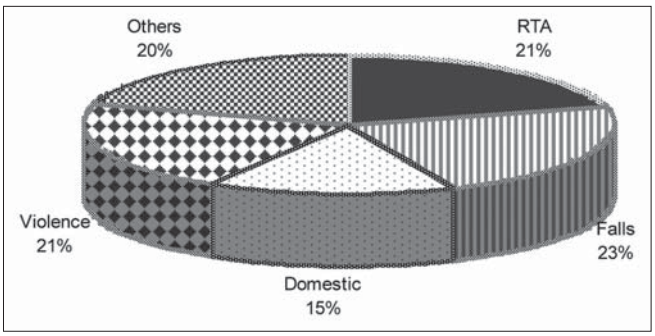


Figure 3: Frequency distribution of paediatric injuries according to the mechanism

Table 2: Differential analysis of mechanism of injury per age group

Mechanism	0-5 years	6-10 years	11-15 years	Total (%)
RTA	4	16	27	47 (21)
Domestic injuries	13	6	15	34 (15)
Intentional injuries	1	9	11	21 (9)
Burns	9	5	3	17 (7)
Unintentional interpersonal injury	2	7	18	27 (12)
Falls	12	19	21	52 (23)
Animal bite	3	3	3	9 (4)
Near drowning	1	0	5	6 (3)
Orificial foreign body	4	2	0	6 (3)
Others	1	1	6	8 (4)
Total	50	68	109	227

RTA: Road Traffic Accidents

Table 3: Distribution of paediatric injuries according to their location

Location of injury	Number of patients	% of patients involved
Head and neck	43	19
Chest	11	5
Abdomen	26	11
Spine	4	2
Genital organs	9	4
Locomotor system (bones)	54	24
Face and E.N.T.	62	27
Soft-tissue and skin	56	25

As community-based studies are difficult to implement in low income countries, the option of obtaining hospital data, based mainly on the institution of formal trauma registries, though less accurate in providing an overview of the importance of trauma in a community, remains a reasonable approach.[14-17] Our choice for a 16-item register as compared to the 108 items used by Navascués *et al*.[15] or the 291 items registry of Van de Voorde *et al*.[19] is motivated by the fact that it is preferable in low income environment to use registers with the least possible number of items to make analysis possible. A similar model has been previously used and validated as an accurate predictor of outcome of injury in the adult.[20] There is an increasing concern about the need for developing separate registries for paediatric injuries to answer the specific concerns of this group of the population.[19,21]

The present registration system does not permit us to assess the severity of injuries. Most basic data such as blood pressure, respiratory rate and Glasgow Coma Scale are generally not available. We need to improve on this as Engum *et al*.[14] described these data to be amongst the most accurate in predicting outcome of injury.

However, a number of useful features of paediatric injuries are clearly outlined by this study. Children are involved in more than 16% of injury cases attending the ED, similar to what have been described previously.[22-24] This is influenced by the age cut-off which varies widely in different studies as some authors wish to include adolescents up to 19-21 years.[13,19,22,25-27] Many of the authors believe that differential age groups analysis is of interest as the incidence of injury-related death and disability has been shown to gradually increase with age.[7,22] The mechanisms seem to be correlated to age groups.[7,10,27,28]

It is also clear that males are usually more affected than females, sometimes at a greater rate than what we found.[10,13,15,21,26] Furthermore, it appears that schools in our city are not safe as a significantly higher number of injuries occur there as compared to the road or homes. This is different from other findings pointing mainly at homes or streets.[15,27,29] This finding will need to be confirmed by the formal registration system and could serve as a base for a strong recommendation towards security in schools.

Generally, falls, road traffic accidents and domestic accidents are predominant overall mechanisms of injuries in children.[9,10,13,15,17,26,29-32] Differential age groups analysis performed by other studies indicates little difference in the age-related incidence of falls while road traffic injuries and intentional violence seem to reach a peak towards adolescence.[22] This picture is confirmed by our study. If the age cut-off is increased to 19 years, the incidence of firearms injuries becomes a leading cause of injuries in older children in areas where these weapons can be reached by adolescents.[22]

The mean number of injuries per child in our study seems to indicate that many children are received in a situation of polytrauma. This is the only indicator of severity of injury that the present registration system could propose. The global incidence of severe injuries is usually less than four per cent.[15,19]

In most studies published so far, systems most frequently involved in paediatric include head, face, neck and locomotor systems, though their relative contributions vary widely from one study to another.[13,15,24,27,33,34] Differential analysis seems to indicate that head injuries, often isolated, seem to occur more frequently in infants.[34]

The analysis of outcome in our patients is very similar to those of Snodgrass and Ang.[27] who discharged 67.5 per cent of their cases. The majority of injured children who reach hospital usually survive.[32,35] The overall mortality seems to be positively influenced if management is done in a trauma centre specifically dedicated to paediatric cases.[4,36]

CONCLUSION

This study is the first to propose an overview of the epidemiology of paediatric injuries in Limbe and in Cameroon. According to the present data collection system, unintentional injuries (especially falls), traffic injuries and domestic accidents are the most prominent mechanisms of paediatric injury. Traffic injuries seem to represent a special threat towards adolescence. School playgrounds also seem to be significantly associated to a higher risk of sustaining an injury. This deserves the attention of decision makers in Limbe.

However, the current registration system displays a number of limitations. It is not possible to assess the overall severity of the injury in the present situation. Furthermore, the absence of information about the exact type of vehicle involved in road traffic related injuries and about the type of collision would make any analysis of this specific mechanism meaningless.

It is likely that the institution of a formal registration system will help improve on these weak points. It is also likely to improve the capture of paediatric injury cases and permit a better appraisal of the problem of paediatric injuries in Limbe Hospital.

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Cite this article as: Chichom-Mefire A, Fokou M. Epidemiology of paediatric injury in low income environment: Value of hospital based data prior to the institution of a formal registration system. Afr J Paediatr Surg 2013;10:265-70.

Source of Support: Nil. **Conflict of Interest:** Nil.