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Hospital Surveillance for Child Injury in Hanoi, Vietnam

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Abstract

Objective: **To estimate the burden of child injury based on presentations at Viet Duc Hospital, the leading trauma hospital in Vietnam, between March and October 2006.**

Methods: **Standardised injury surveillance data were collected on all children aged less than 19 years who presented and were treated at Viet Duc Hospital. Injuries were classified by ICD-10 and severity was determined by RTS and AIS.**

Results: **74,762 patients were examined in the hospital during the seven-month duration of the study. Patients included 25,165 emergencies, of which 30% were due to non-trauma. The remaining 17,643 were due to trauma, accounting for 70% of cases. Among these cases, there were 2,536 injured children aged 18 and under, accounting for 14.37% of all cases.**

Conclusion: **Injury is a leading cause of death and disability in Viet Nam, especially in children. The results of this surveillance indicate the need for ongoing injury surveillance.**

Introduction

Injuries constitute a major public health problem, killing more than 5 million people worldwide each year, including nearly one million deaths of children 18 years of age and under, and causing many more cases of disability[1]. Injuries are a leading cause of death and disability in Vietnam. Official statistics from the Ministry of Health report a mortality rate of more than 46 per 100,000 populations in 2006[2]. Injuries are also a leading cause of death of children in low and middle income countries. The Vietnam Multicenter Injury Survey (VMIS) in 2001 estimated that 75% of all deaths in children were caused by injury[3]. These injuries have enormous financial, emotional and social effects on not only the patient's family, but also the community and society as a whole[1-4].

Viet Duc Hospital, a premier surgical and referral

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center in the north of Vietnam, located in the center of Hanoi, receives over 32,000 injury-related cases annually, including childhood injuries[5]. The first pilot study of injury surveillance was successfully conducted at Viet Duc Hospital in 2006 providing extensive data including the epidemiology of childhood injuries, response capacity of emergency medical services at varying levels. These data can help develop a childhood trauma control and prevention program and form the basis of realistic solutions for the improvement of trauma care in Vietnam.

Materials and Methods

The data were collected from all cases of child-related injury in ages 18 and under which were treated and admitted to Viet Duc Hospital during a 7 month-period from 26th March to 26th October 2006. The surveillance data include outpatients who sustained an injury severe enough to require medical treatment in the emergency room (such as a fracture or minor surgery), but exclude patients discharged without treatment. The data were also collected from all the death records, including pre-hospital deaths.

The form used to collect the data was standardized by the Vietnam Ministry of Health, Department of Vietnamese Administration of Preventive Medicine. The form included questions on name, age, sex, address, time of accident and cause of accident. Information from primary care included arrival time at first health care station and time of first treatment. Classification of trauma is based on Revised Trauma Score (RTS), Abbreviated Injury Scale (AIS)[6-8], coding the injuries according to ICD-10, outcome results, complications and mortality, combined with hospital data used to assess operations in emergency, autopsy reports and patient records.

These data were then analysed and coded according to the Department of Vietnamese Administration of Preventive Medicine software. Secondary analysis of the data was performed using the Statistical Package for Social Sciences (SPSS) 11 and Stata.

Results

74,762 patients presented at Viet Duc Hospital during the seven-month period of the pilot (26th March to 26th October 2006). These patients included 25,165 emergencies, of which 7,522 cases were due to causes other than injury, representing 30% of all cases. The remaining 17,643 were due to trauma, accounting for 70% of cases. Among these cases, there were 2,536 injured children under aged 18 and under, accounting for 14.37% of all cases.

Of these 2,536, eighty six died in the hospital or were released to die at home, representing 3.39 %. Thirty seven were children aged up to 15 years, accounting for 43% compared to all deaths in children (Table 1).

Surveillance was conducted in 974 cases, including 697 boys and 277 girls. Boys outnumbered girls by a ratio of 2.5:1 compared to the population structure ratio of Hanoi of 112:100 (Table 2).

The patients admitted for further observation or surgery accounted for 44% of cases. The mortality rate was 5.8%, including pre-hospital deaths, deaths at home after release due to serious trauma.

Injuries were most frequent between the ages of 6 and 18 years, and especially from 13 to 18 years (Figure 1, Table 3).

Injuries occurred mostly on the road and were traffic related. More than 90% were unintentional injuries. The main cause of leisure injury was falls, accounting for 34% (Table 4).

Table 1

Description	N	%
Non emergencies	49,597	66.3
Emergency cases - non trauma	7,522	10.1
Emergency cases - trauma	17,643	23.6
Children under 18	2,536	
Cases included in surveillance	974	
Cases declined to participate in surveillance	1,562	
Total	**74,762**	**100**

Table 2 Treatment received in emergency department

Treatment	N	%
Minor surgery/plaster	388	39.83
Pre-hospital death	5	0.51
Dead or released to die at home	61	5.32
Admitted	425	43.63
Other	95	9.77
Total	**974**	**100**

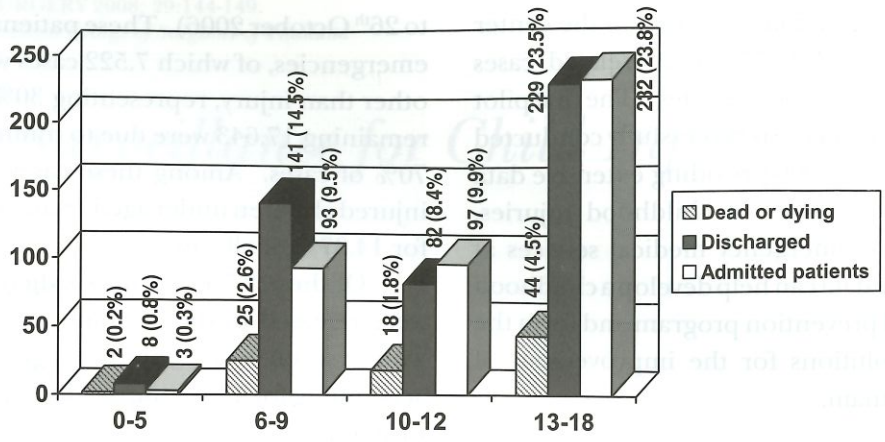

Figure 1 Proportion of ages

Table 3

	0-5 (%)	6-9 (%)	10-12 (%)	13-18 (%)	Total (%)
Dead or dying	2 (0.2)	25 (2.6)	18 (1.8)	44 (4.5)	89 (9.1)
Discharged	8 (0.8)	141	82 (8.4)	229 (23.5)	460 (47.2)
Admitted patients	3	93	97	232	

Table 4 Circumstance of accident

Circumstance	N	%
Traffic accident	528	54.21
Working	68	6.98
Leisure	332	34.09
Study	28	2.87
Sport	4	0.41
Other	14	1.44
Total	**974**	**100**

Table 5 Body part injured

Part injured	N	%
Head	473	39.25
Lower limb	224	18.59
Upper limb	272	22.57
Chest	46	3.82
Abdomen	63	5.23
Face	63	5.23
Multi-injuries	24	1.99
Spine	18	1.49
Neck	17	1.41
Drowning	1	0.08
Other	4	0.34
Total	**1,205**	**100**

The largest numbers of injuries were head injuries (39 %), and extremity injuries (40 %). Mortality due to head trauma was the higher proportion (Table 5).

Those who received treatment prior to arriving at Viet Duc Hospital commonly received first aid at a health care center at the district or province level. Only 31 % of victims were transported to the hospital by ambulance, 38% by car (Table 6).

Critical and serious cases were each classified at 4% while moderate and minor injuries were approximately 11 % and 80% respectively (Table 7).

This table shows that most patients had moderate or minor injuries, representing 50% and 40% of cases, while about 9% were in severe condition.

The statistics demonstrate that 95 % of patients recovered and were discharged, with the remaining 5% suffered fatal injuries. The mortality was nearly 5% (Table 8). The total deaths in both Table 2 and 8 were 86 cases, and the mortality rate was 3.4%. In the group with RTS scores under 9 and AIS scores above 3, a higher proportion of deaths was observed, compared to other groups.

Discussion

Injuries affect the daily lives of many Vietnamese and their families. Statistics from the Ministry of Health in Vietnam during one period between 2001

Table 6 Pre-hospital care situation

	N	%
First point of care		
First Care		
No treatment	331	33.98
Self treated	8	0.82
115 (ambulance call centre)	25	2.57
Private sector	11	1.13
Health care station	65	6.67
District hospital	240	24.65
Province hospital	263	27.00
Central hospital	16	1.64
Other	15	1.54
Total	**974**	**100**
Transportation to the hospital		
Transport		
Ambulance	305	31.31
Car	377	38.71
Motorbike	240	24.64
Taxi	41	4.21
Bike	2	0.21
Other	9	0.92
Total	**974**	**100**

Table 7 Trauma Severity identified by RTS and AIS

Severity degrees	Identification			
	by RTS		by AIS	
	N	%	N	%
Critical	38	3.90	7	1.64
Serious	48	4.93	26	6.12
Moderate	108	11.09	209	49.18
Minor	780	80.08	183	43.06
Total	**974**	**100**	**425**	**100**

and 2004 show that injury is a leading cause of death in children, accounting for 75% of all types of death in children. Death due to infection accounts for only 12% of deaths and those due to chronic disease is 13%. Childhood injury remains the single most important cause of mortality, representing from 17 to 22% of deaths. Injury is a main cause of death in children aged 5 to 19 years, accounting for 46.7% of cases[2,19]. It is apparent that children are more at risk from injury than other causes, for children from both developed and developing countries.

UNICEF has recently reported that 40% of deaths in children aged 1 to 14 years in developing countries are due to all types of injury, and in these countries,

Table 8 Results of treatment

Results	N	%
Discharged	405	95.29
Dead or dying	20	4.71
Total	**425**	**100**

every year only traffic accidents cause more 20,000 deaths in children which result in a major public health problem. It is estimated that in the case of traffic accidents, 10,000 children are killed each year in rich nations, whereas for the rest of world, the figure is close to 240,000 per year[9-12]. Each year, one out of every four children aged 14 and under in the United States sustains an injury serious enough to require medical treatment and approximately 6,000 children die from injuries every year and more than 92,000 are permanently disabled. More than 50% of all paediatric deaths result from trauma[10,12-15]. Injury is the major cause of death among Australian children aged 1-14 years and accounts for nearly half (45%) of all deaths in this age group[3,16-18].

This surveillance has demonstrated a general picture of childhood injuries in Viet Duc Hospital, one of the leading centers of surgical and trauma care in Vietnam. The database has also provided an opportunity to understand the level of health care for injury and the needs of the health care system of Vietnam.

Regarding the epidemiology of childhood injury, boys are 2.5 times more likely to suffer an injury than girls. The age at which injury was most common was 6 to 9 years (chart 1). These findings may reflect higher risk taking behaviours or activities of boys, especially those ages one to 10 years. This result is the same as reports from other countries which observe that the numbers and rates for males are always higher than for females. During the infant and toddler ages there is rapid growth so the accident and injury spectrum will naturally reflect the physical activity in which children are involved[17-20].

The mechanisms underlying these findings could include differences in environment such as less safe housing and congested traffic, and perhaps reduced use of safety measures in safe transportation. Traffic-related injury was most common at 55 %, mostly in the 13 to 18 years age group (chart 1), with a lower number of leisure injuries at 34 % (Table 3-4). Unintentional

injury accounted for more than 90% of cases since children from lower social-economic nations such as Vietnam tend to live in higher population density neighbourhoods with more traffic and fewer playgrounds. These risks are intensified by the presence of social conditions associated with poverty. Abdou Raouf[10] reported traffic-related injury in children accounted for 8.48% of pediatric emergencies, representing 89 % of all types of trauma in children in the central hospital of Libreville in Gabon. In the United States, among children ages 5 to 14, motor vehicle occupant injury is the leading cause of unintentional injury-related death, followed by pedestrian injury, drowning, fire and burns, and bicycle injury[13,14]. Therefore, it is not surprising that children from lower income countries are at greater risk for traffic-related injury than children in high income countries. In the developed countries, falls are listed among the main causes of childhood injuries[4,9,14,17,20,21].

Two of the major categories of injury, head injuries and extremity injuries at 39% and 40% respectively (Table 5), demonstrated a dramatic rise in incidence around the age of one. Head injury at critical and serious levels at 7% (Table 5 and 7) resulted in high mortality. Brudvik[16] shows that the head and arms were injured in 80% of cases and traffic accidents caused the most serious injuries, and occurred in 0.9% and 1.8%, respectively in the younger and older age groups, and Adesunkanmi[9] found that head injuries were the most common specific injury and affected 25% of all injured children. Among 974 injured children, 425 children (44%), were admitted to the hospital for further observation or interventions. In total, there were 86 deaths (Table 2 and 8), including those who died in the hospital or released to die at home. Many have religious and cultural aversions to autopsies and wish to care for their dying loved ones at home, which have significant implications for research and safety and quality of care in Vietnam. In addition, children admitted with head injury may be at risk of poor outcomes or disability[5,9,22].

The mortality rate was 3.4%. In the group with a RTS score fewer than 9 and AIS score above 3, a higher proportion of deaths was observed, compared to other groups. One of the reasons for some of the deaths was they did not get the proper pre-hospital care. The findings from this surveillance shows that 34% have not received any first aid, up to 27% received treatment in a district or provincial hospital and only 31% of patients were transported to the hospital by ambulance. This reflects the status of primary trauma care in Vietnam. Most statistics on the trauma care system in Vietnam, including pre-hospital and ambulance care, and at lower level have found that it still does not respond properly to medical emergencies. For example Nguyen Thi Hong Tu et al.[24] found that the ambulance center in Hanoi can respond up to 60 % of emergency calls, but only 10 % were trauma case calls, and Nguyen Duc Chinh et al.[6] demonstrated that only 37% of trauma patients were transported to the hospital by ambulance. In the central hospital of Libreville in Gabon[10] 15% died on arrival, and 7% died within 24 hours of admission due to not getting proper first aid at the scene or safe transportation. In Ghana[9], 25% of patients received only first aid in a health center; none received treatment en route to hospital - a situation typical of rural and indeed many urban third world countries. Improvements in pre-hospital care with rapid transportation and good resuscitation facilities at the receiving hospital would further reduce the morbidity and mortality in childhood injuries. In addition, injury prevention is well recognised as an important component of the approach to trauma in children. Potentially preventable mechanisms of injury are remarkably similar between developed and developing countries. Health education directed at parents and children at school and in public areas might have prevented accidents in high number[10,23,24].

Conclusions and Recommendations

Childhood injuries are a significant cause of morbidity and mortality in both developed and developing countries. In Vietnam injury prevention is the most important public health issue, especially for children. Data from the first survey have proven useful for identifying and highlighting childhood injury issues. Traffic-related injuries were most common. Age and gender were also major influences on the rates of childhood injury. In addition, surveillance could provide a picture of the trauma care system in Vietnam. Trauma severity as well as EMS quality can influence the mortality rate. The results of this survey support efforts to implement programs aimed at the whole population to prevent childhood injuries, and interventions targeting young children may be more

effective in the context of simultaneous interventions such as establish regulations which mandate safety standards such as the recent requirement for motorbike helmets, consider age restrictions for riding motorbikes and develop special licensing and vehicle registration. Injury registration which is also an important tool for initiating the right preventive action and development of an injury surveillance system for all hospitals in Vietnam should be considered. On the other hand, implement trauma severity scaling to identify quality of trauma care could help to improve the trauma management and research.

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