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Preliminary Results of Injury Surveillance at Viet Duc Hospital

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Abstract

Purpose: **Injury surveillance, a key to injury prevention, is the systematic collection, analysis, interpretation and dissemination of data on injury-related events for use in public health action to reduce morbidity and mortality and to improve health. The first injury surveillance was successfully implemented in a few pilot hospitals in Vietnam. Viet Duc Hospital, one of the leading centers of surgery and trauma in Vietnam, was one of these and has implemented an injury surveillance program.**

Materials and Methods: **Data were collected from all cases of injuries treated and admitted to Viet Duc Hospital, including death data. The surveillance was conducted during the period from 26 March 2006 to 26 October 2006.**

Results: **Data collected over 7 months in 2006 at Viet Duc Hospital showed 17,643 cases of injury treated in the emergency department, representing 70% of all emergencies. 989 patients died due to injury within 7 days, representing 5.6% of all injuries. Surveillance was conducted on 5,468 cases, in which men outnumbered women by a ratio of 3:1 and the highest proportion of patients were between 20 to 50 years of age. Patients referred from provinces accounted for 73% of cases. The highest categories of morbidity were among students and farmers who accounted for 22% and 25%. The largest numbers of injuries were to the head and face at 40%, second were to the extremities at 38%. Critical injuries accounted for only 2.6% of cases and serious injuries for only 3% based on Abbreviated Injury Scale (AIS) scaling. 30% received first aid at provincial hospitals and 23% at district hospitals. 38% of victims were transported by ambulance, 32% were accompanied by health workers. Traffic-related accidents accounted for 63% of all injuries, among which 74% of cases were from motorbike accidents. Motorbike drivers were injured in 70% of traffic cases. Only 5% of drivers were wearing helmets.**

Conclusions: **In order to prevent injury as well as to reduce the mortality rate, data on injuries should be collected accurately and completely. Despite the challenges of implementing the first surveillance of injury in a hospital, the results are successful and informative in determining the epidemiology of injury, and providing accurate morbidity and mortality data. The value of hospital trauma registry as a major research tool is increasingly recognized because of its role in improving care of trauma patients and bringing about better resource utilization.**

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Introduction

Injuries are responsible worldwide for more than 16,000 deaths daily. For every death, many others live with varying degrees and durations of disability and pain. In Vietnam alone, over ten thousand people are killed by traffic accidents per year. The mortality rate from injury is 10.7% of all deaths.[1,2] The estimated cost of road traffic injuries is US$ 885,000 while Vietnam's per capita GDP is estimated at US$ 439.[3,4] Injury surveillance plays a key role through the systematic collection, analysis, interpretation and dissemination of data on injury-related events for use in public health action to reduce morbidity and mortality and to improve health.[2,5]

Currently in Vietnam there are two sources of trauma data. One is community based and the other is hospital based. Data from the community include information collected from police, government officials, relatives, acquaintances, and witnesses of the injury. Hospital acquired data consist of those collected from trauma patients who require hospitalization or emergency room treatment. This data can be linked to medical examiner data. Data are collected from the community when a patient's injury resulted in at least one day off work or if the patient sought medical care for the injury. The data from hospitals is very important because, not surprisingly, it is more inclusive and accurate. The data collected together from both sources provide a more complete picture of serious trauma in Vietnam. Moreover, the simplicity of data collection in Vietnam is due in major part to the role of the government in providing and organizing the medical care of Vietnam through health care center at all levels.

Viet Duc Hospital, one of the leading surgical referral centers in the northern part of Vietnam, receives many injury-related cases annually. The first pilot study of injury surveillance was successfully conducted at Viet Duc Hospital providing the epidemiology of trauma, response capability to emergency medical services (EMS) at varying levels, and Emergency Center 115 (transport center for emergencies in Vietnam). This pilot study can analyze and forecast the trauma trends. Also, it can help develop a trauma control and prevention program and propose realistic solutions for the improvement of trauma care in Vietnam

Materials and Methods

Data were collected from all cases of injury treated and admitted to Viet Duc Hospital during a 7-month period from March 26th to October 26th of 2006. The surveillance data included outpatients treated for trauma in the emergency room such as simple fracture pinning and minor surgery, but excluded patients discharged without treatment. 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 Preventive Medicine. The statistical analysis of the data was done by the Preventive Medicine Department.

The hospital registry form included the following patient data: name, age, sex, address, time accident occurred, cause of accident etc. Information from primary care included: time reaching first health care station and first treatment. Classification of trauma as RTS (Revised Trauma Score), AIS (Abbreviated Injury Scale),[6-10] coding the injuries according to ICD10, outcome results, complications and mortality, cost effectiveness during hospitalization, combined with hospital data used to assess operations in emergency, autopsy reports and patient records were also included.

Results

During the 7-month period from 26th March to 26th October 2006, 74,762 patients visited the hospital, this included elective admission and emergency room (ER) visits. There were 25,165 ER visits, of these 7,522 were due to acute disease, representing 30% of all cases. The remaining 17,643 were due to trauma, accounting for 70% of cases.

One hundred and ninety-eight patients (198) died in the hospital. Seven hundred and ninety-one (791) were mortally injured and released to die at home. Mortality accounted for 989 cases, representing 5.6% of all trauma cases in emergency.

Surveillance was conducted on 5,468 cases, including 2,668 patients treated in the emergency room with minor surgery, simple fractures or sent to a specialist for care. 2,800 patients were admitted to the hospital for surgery or observation.

Among these 5,468 cases, there were 4026 men and 1,442 women. Men outnumbered women by a

ratio of 3:1. The average age was 33.90 years (max age: 95 years, min: 5 months). Ages between 20 to 29 years were most common.

Almost all patients were referred from the provinces. Only 26% of patients were from the Hanoi area (Hanoi is the capital of Vietnam).

Most of the injured were farmers (25%) and students (21%) (Table 1). Cases admitted to the hospital were mostly patients with moderate or minor injuries, representing 48% and 46% of cases, while only 3.18% were in serious condition (Table 2).

Patients were transported to Viet Duc Hospital within 1 to 2 hours of their injury in 53%, from 2 to 6 hours in 18%, and after 6 hours in the remaining.

Those who received outside treatment commonly received first aid at a health care center at the district or province levels (Table 3). Nearly 38% of victims were transported to the hospital by ambulance and 38% by car. Relatives accompanied the patients in nearly 63%, health care staff accompanied the patients in only 32% (Table 4). Causes of injury included accident in 92% and assault in 7% (Table 5). Common sites of accident included on the road in 67%, at home in 15% and at work place in 11% (Table 6). Most injuries occurred as a traffic accident in 64%, at leisure in 19% and during working in 14% (Table 7). The specific causes of injury included traffic accident in 62%, fall in 20% and sharp objects in 5.77% (Table 8).

Blunt injury was found in 53.7%, blunt with penetrating injury in 28% and penetrating injury in 17% (Table 9). Head was most commonly injured in 40%, followed by lower limb in 20% and upper limb in 15% (Table 10). Most accidents were road and traffic related. Most patients had moderate or minor injuries, representing 50% and 40% of cases, while about 9% were in severe condition (Table 11). Ninety-four percent of patients recovered and were discharged. The mortality was 5.32% (Table 12).

The cost of treatment during hospitalization were based on the type of treatment or surgery as follows: intramedullary pinning procedure using nail or implant in cases of femur fracture, including material and consumables cost 7 million Dong (US$ 450); spinal surgery, including implant cost 8 million to 14 million Dong (US$ 500-900); head injury, with or without surgery cost 2 million to 5 million Dong (US$130-300); abdominal operation cost 2 million to 6 million Dong (US$ 130-375).

Table 1 Occupation of victims

Professions	N	%
Student	1182	21.62
White collar worker	362	6.62
Blue collar worker	668	12.22
Soldier or police	76	1.39
Farmer	1383	25.29
Jobless	978	17.88
Children under 6 years	85	1.55
Retired	269	4.92
Others	251	4.59
Unspecified	84	1.54
Information missing	130	2.38
Total	**5468**	**100**

Table 2 Trauma Severity identified by RTS

Severity	N	%
Critical	143	2.62
Serious	174	3.18
Moderate	2626	48.02
Minor	2491	45.56
Information missing	34	0.62
Total	**5468**	**100**

Table 3 First point of care

First aid	N	%
No treatment	1649	30.16
Self-treated	71	1.3
115 (ambulance call center)	163	2.98
Private sector	68	1.24
Health care station	255	4.667
District hospital	1285	23.5
Province hospital	1644	30.07
Central hospital	173	3.16
Others	150	2.74
Information missing	10	0.18
Total	**5468**	**100**

Table 4 Transportation to the hospital

Transport	N	%
Ambulance	2053	37.55
Cars	2080	38.04
Motorbike driver	924	16.9
Taxi	346	6.34
Xich lo - three wheeled vehicle	5	0.09
Bike	9	0.16
On foot	10	0.18
Others	24	0.44
Unspecified	6	0.12
Information missing	11	0.19
Total	**5468**	**100**

Table 5 Causes of injury

Causes	N	%
Accident	5036	92.1
Assault	397	7.26
Suicide	10	0.18
Unknown	16	0.29
Information missing	9	0.16
Total	**5468**	**100**

Table 6 Scene of accident

Scene of accident	N	%
On road	3662	66.97
Work place	623	11.39
At home	805	14.72
Public area	221	4.05
School	66	1.21
Others	63	1.16
Unspecified	25	0.45
Information missing	3	0.05
Total	**5468**	**100**

Table 7 Circumstance of accident

Circumstance	N	%
Traffic accident	3524	64.45
Working	756	13.83
Leisure	1044	19.09
Study	33	0.60
Sports	18	0.33
Others	85	1.55
Information missing	8	0.15
Total	**5468**	**100**

Table 8 Specific cause of injury

Specific Causes	N	%
Traffic accident	3405	62.27
Fall	1135	20.76
Sharp objects	316	5.77
Machinery	189	3.46
Electricity	8	0.15
Animal bite	7	0.13
Foreign body	4	0.07
Burn	1	0.02
Explosive weapon	6	0.11
Others	362	6.62
Unspecified	19	0.34
Information missing	12	0.22
Total	**5468**	**100**

Table 9 Type of injury

Type	N	%
Blunt injury	2936	53.69
Blunt injury associated with penetrating injury	1534	28.06
Penetrating injury	934	17.08
Others	23	0.43
Unknown	41	0.74
Total	**5468**	**100**

Table 10 Parts of body injured

Parts injured	N	%
Head	2750	39.55
Lower limb	1393	20.03
Upper limb	1086	15.62
Chest	380	5.47
Abdomen	301	4.33
Face	490	7.06
Multi-injuries	169	2.42
Spine	196	2.82
Neck	155	2.23
Drowning	5	0.07
Others	28	0.4
Total	**6953**	**100**

Table 11 Trauma Severity identified by AIS

Severity	N	%
Critical	60	2.16
Serious	203	7.3
Moderate	1412	50.81
Minor	1104	39.73
Total	**2779**	**100**

Table 12 Results of treatment

Results	N	%
Discharged	2639	94.35
Worsen	9	0.32
Dead or dying	149	5.32
Total	**2797**	**100**

Details on traffic-related injuries:

Mean of transportation in most accidents included motorbikes (74%), pedestrians (11.39%) and bikes (10%) (Table 13). The motorbike was also the most common cause of accidents in 50.84% (Table 14).

Drivers, pedestrians and passengers were involved in the accident in 70.54%, 9.25% and 7.58% respectively (Table 15). Helmet was used as safety equipment in only 5.23% (Table 16). Alcohol was found to be related to accident in 8.43% (Table 17)

Table 13 Means of transportation used by drivers involved in accident

Means of transportation	N	%
Motorbike	2517	73.92
Pedestrian	388	11.39
Bike	338	9.93
Motorized vehicle local made - Cong nong	16	0.47
Car	45	1.32
Bus	9	0.26
Truck	7	0.21
Train	1	0.03
Ship/Boat	1	0.03
Unknown	40	1.17
Others	24	0.07
Information missing	19	0.57
Total	**3405**	**100**

Table 14 Vehicle causing accident

Vehicle	N	%
Motorbike	1731	50.84
Bike	89	2.61
Motorized vehicle- Cong nong	57	1.67
Car	447	13.13
Bus	26	0.76
Truck	72	2.11
Train	11	0.33
Unknown	125	3.67
Others	802	23.56
Information missing	43	1.26
Total	**3405**	**100**

Table 15 Subjects involved by the traffic accident

Subjects	N	%
Driver	2402	70.54
Pedestrian	315	9.25
Passenger	258	7.58
Others	84	2.47
Unknown	261	7.67
Information missing	85	2.49
Total	**3405**	**100**

Table 16 Safety equipments used while driving

Safety equipments	N	%
None	2522	74.07
Helmet	178	5.23
Others	6	0.17
Unknown	537	15.77
Information missing	162	4.76
Total	**3405**	**100**

Table 17 Alcohol related while driving

Alcohol related	N	%
Drinking	287	8.43
No	2329	68.39
Unknown	621	18.24
Information missing	168	4.94
Total	**3405**	**100**

Discussion

Injury surveillance has been used to identify and assess the impact of injury prevention measures.[11,12] Hospital data, one of the most important sources, can be collected from emergency room records, records of discharged patients, autopsy reports, etc. It should be flexible, simple, sustainable, universally applicable and durable.[11,13,14]

The systematic collection and use of data on risk factors, incidence, severity, outcome, and cost both from community and hospital sources have assisted practitioners and researchers in identifying populations at risk, implementing and evaluating prevention programs, and formulating and evaluating policy on injury prevention.[5,12,13]

The first result of injury surveillance conducted at Viet Duc Hospital showed the following. During the 7-month period from 26th March to 26th October 2006, there were 17,643 injuries reporting to emergency facilities, accounting for 70% of all emergencies at Viet Duc Hospital. Dead and dying patients accounted for 989 cases, representing 5.6% of all emergencies.

Injury surveillance recorded 5,468 cases, including cases treated in the emergency room for procedures such as pinning and minor surgery, those admitted to the hospital, and dead and dying patients.

2800 patients, accounting for 15.87% were admitted to the hospital. Male and female ratio was 3:1. The highest proportion of patients was between

the ages of 20 to 50 years. Patients referred from the provinces were most commonly from Hung Yen, Ha Tay, Nam Dinh, Nghe An, and Bac Giang. Only 26.52% of cases were from Hanoi.

The highest category of morbidity were farmers, students, and unemployed who accounted for from 18% to over 25%, blue collar workers and office workers accounted for 7% and 12% respectively.

Unintentional accidents accounted for 92% of injuries, intentional injury including physical violence and suicide accounted for 7.44%. Most injuries occurred on roads, accounted for 67% of cases, while occupational and at home injuries were 11% and 14% each (Table 6).

Traffic-related injury was most common at 64.45%, followed by occupational and leisure injuries at 13.83% and 19% each (Table 7). Injuries caused by falls were found in 21% (Table 8).

Thirty percent of patients received their first treatment at a provincial hospital, 23% at district hospital and 30% received no initial treatment. Thirty-eight percent of patients were transported to the hospital by ambulance and 38% by car. Health workers accompanied the patients to the hospital in 32% of cases, and by relatives in 62% of cases.

Regarding type of injury, internal injuries occurred in 54% of cases, with penetration in 17%. Cases with both internal injury and penetration occurred in 28% (Table 9). The largest number of injuries was to the head and face at 40%, second was to the extremities at 38%. Thoracic and abdominal injuries accounted for 10% of cases. Only 2.6% of cases were classified as critical, 3% were serious, while moderate and minor injuries were classified in approximately 48% and 45% respectively.

A good outcome was achieved in 94% of cases. Deaths and dying were found in 5%.

Data on traffic accident related injury

The most common form of transportation, the motorbikes, accounted for 74% of accidents, bikes for 10%, and pedestrian involvement was 11% (Table 13). The vehicle causing the accident included motorbikes in 50% of cases and cars in 13% (Table 14). The person injured was most commonly the driver in 70%, passenger in 7.6% and pedestrian in 9% (Table 15). Use of safety equipments while driving was reported in only 5.4% of cases. Helmets were worn in only 5% of cases; 74% used no safety equipments (Table 16). In about 8% of cases, alcohol was a factor (Table 17).

The data provides a general picture of trauma emergency cases at Viet Duc Hospital, one of the biggest trauma centers in the northern part of Vietnam. In fact, the data is important in formulating prevention policy. In the United States, unintentional injuries were the leading cause of death for persons under 40 years and the fourth leading cause of all deaths. While there have been substantial advances in injury surveillance in recent years, there are still limitations and their data sets still have limited relevant information. The cost for treating injuries, which is currently 117 billion dollars, can only be reduced if data are more complete and accurate for the policy maker. Additionally, as injury research and prevention programs have evolved, so has the need for surveillance to identify populations at risk, determine programmatic priorities, support prevention activities and evaluate prevention efforts.[5,11,12,15]

The first results of injury surveillance conducted at Viet Duc Hospital showed that the data provided information regarding injury epidemiology, level of health care for injury and needs of the health care system of Vietnam. Compared to the pilot surveillance conducted during 2 months in 2005, the current data were more accurate and informative. This was due to the form of collection which was revised and was more in detail. Injuries to farmers were 32% higher than in 2005 when it was only 19%, the mortality rate was 7.4% compared to 3.8% in 2005. Along with the hospital patient data, hospital monthly reports can provide more detailed and accurate information.[16,17] Much of the focus of health policy should be on prevention and control of population at risk such as youth, students and farmers, and all types of traffic involved. Fields such as primary care, first aid, improvement of the quality of the health care system at lower levels, strengthening the capacity of injury treatment at the central level should also be addressed.[16,18]

However, there are still many challenges to implementing the surveillance system. Through the experience of other countries which have implemented surveillance in the hospital, it is apparent that there is a need for a coordinated approach to an injury surveillance work group, surveillance place, computerized systems of records, software to collect and analyze the data and to report.[11,14,19,20] We are still facing challenges

such as lack of training on data collection, poor infrastructures and equipment, registry forms and unsuitable software and processing. Moreover, patient overload has resulted in incomplete data collection.

Conclusion

Data from the first survey have proven useful for identifying and highlighting injury issues. Together with the software report, baseline-data of operations in emergency and mortality reports, surveillance can provide accurate and complete information on injuries. However, there were still challenges in implementation such as infrastructures and equipments, staffing due to overload of injuries in emergency. The registry form, as well as the software, should be revised to be suitable for research and analysis of the data. Injury surveillance in the hospital is feasible and relevant.

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