

Spectrum of injuries in a tertiary care hospital of Karachi, Pakistan

Muazzam Nasrullah^{1,2}, Sana Muazzam³

¹Injury Control Research Center, West Virginia University, USA; ²Department of Community Medicine, West Virginia University School of Medicine, USA; ³Stanford Center for Professional Development, Stanford University, California, USA

Correspondence to: Muazzam Nasrullah, Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), 1095 Willowdale Road, Mailstop H-2800, Morgantown, WV 26505, USA. Email: snasrullah@cdc.gov; muazzam.nasrullah@yahoo.com

Abstract

Background: The burden of injuries and disabilities in Pakistan is significant. Our study attempted to describe the circumstances, risk groups, types and severity of injuries experienced by patients attending a tertiary care hospital in Karachi, Pakistan.

Methods: A retrospective study was conducted in the department of Emergency Medicine (ED) at Aga Khan University Hospital of Karachi, Pakistan. Past medical records from June 2006 till May 2007 of injured patients presented to ED were reviewed. Data were recorded regarding the basic epidemiological features, hospital stay, body parts injured and severity of injuries.

Results: A total of 631 patients with injuries were identified. The majority of them were males (80%; n=502), aged 21-40 years (63%). Road traffic injuries (RTIs) 65% (n=411) followed by gunshots (14%, n=85) were the most common types of injuries. Upon arrival to hospital 82% (491/598) of patients had a Glasgow Coma Scale (GCS) \geq 13. The mean hospital stay and Injury Severity Score (ISS) of patients were 3.5 days (SD \pm 6.4) and 4 (SD \pm 5.2) respectively. The head, neck and face were the most affected body parts (50%; n=276). Three percent (n=17) were pronounced dead on arrival to the ED. Among RTIs, multivariable logistic regression identified sex (aOR: 3.797; 95% CI: 1.066–13.528), and mode of travel (aOR: 2.883; 95%CI: 1.330–6.250) as independent predictors for severe GCS (GCS<8).

Conclusions: RTIs were the most common type of injuries, common among young males. In RTIs, children were mostly pedestrians, and females and motor vehicle occupants were more likely to have severe GCS. This study may assist local authorities in Karachi to prioritize interventions to address common injuries in those who are high at risk.

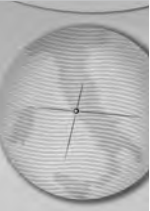
Key words: injuries, road traffic, gunshots, severity, Karachi, Pakistan

Introduction

Five million people worldwide lose their lives annually as a result of trauma and injury [1]. Low and middle income countries account for ninety percent of the total burden of injuries [2] with the Southeast Asia and Western Pacific regions having the highest number of injury deaths worldwide [3]. Injuries were the 2nd highest cause of loss of healthy life in South Africa with road traffic injuries (RTIs) having twice as much rate when compared to global rates [4]. A studies conducted in four cities and six rural counties in China showed that the incidence of injury was higher among males and in rural areas while youngsters suffered the most [5].

Like other low income countries, Pakistan has huge burden of injuries [6]. Injuries were among

the 2nd leading cause of disability and 11th leading cause of premature deaths in Pakistan [7]. In the first national injury survey of Pakistan in 1997, the yearly overall incidence of injury (any type of injury on any part of the body, in the last three months resulting in the seeking of treatment in a health care setting) was found to be 41.2 injuries for every 1000 persons in the civilian (non-institutional) population of Pakistan, with an incidence of 41.3 for rural, 46.3 for urban, and 35.2 per 1000 per year for the semi-urban strata [8]. The effects of injuries and trauma on premature mortality and long-term disability are often over shadowed by the overwhelming burden of infectious disease and malnutrition in low-income countries like Pakistan. As a result, the corresponding budgetary allocation for injury



prevention and safety promotion is low, and less research is conducted in this area.

Our study attempted to describe the circumstances, risk groups, types and severity of injuries in patients coming to the tertiary care hospital of Karachi, Pakistan.

Methods

Study design and setting

A retrospective study was conducted at the Aga Khan University Hospital (AKUH) Karachi, Pakistan. The AKUH is a 500-bedded private, fee-for-service, urban tertiary care teaching hospital located in Karachi. Karachi, a city of fourteen million people is the largest and most populous city of Pakistan accounting for 10% of total population and 30% of the urban population of Pakistan. It is the hub for economic activity in Pakistan.

The Emergency Department (ED) at AKUH has an annual census of approximately 47,000 patients including both adults and pediatrics. The hospital is not a designated government trauma centre however it still receives trauma patients, usually referred from other hospitals. Most people present to the ED through private transport because of the lack of established pre-hospital care infrastructure [9].

Data Collection and Subjects

Log books containing the information of all patients who presented at the ED of AKUH were accessed. Those who were injured, in all age groups and gender who presented to the ED during one year period (June 2006 till May 2007) were selected. Patients with both intentional and non-intentional intent of injury were included. Medical records of the all patients were reviewed and the data were recorded for the basic epidemiological features, date and time of arrival, hospital stay, circumstances surrounding injuries, mode of travel (pedestrians vs non-pedestrians), and type of vehicle involved in RTIs. Glasgow Coma Scale (GCS) was recorded at patient's arrival to the hospital. Severity of injury was measured using the Injury Severity Score (ISS) [10]. Injured body regions were defined as those associated with the computation of the ISS: head and neck, face, thorax, abdomen, extremities, and skin. The additional category of "multiple body regions" indicates injuries to >1 of the above regions.

Data Analysis

All the data was manually checked, entered into the database then coded and analysed using SPSS

version 15 software. The descriptive statistics for epidemiological features, hospital stay, body parts injured and the outcome were calculated. The differences between groups were compared using Student's t-test and Chi-square test. Children (1-15 years) and adults (≥ 16 years) were also compared for each injury type. We considered two-tailed p-value of ≤ 0.05 to be statistically significant. For the univariate and multivariate analysis, the primary outcome, GCS was dichotomized as severe (≤ 8) versus less severe (≥ 9). To assess univariate associations between the outcomes and potential predictors, odds ratios (ORs) and their 95% confidence intervals (CIs) were computed by logistic regression analysis. All significant factors in univariate analysis were considered for inclusion in the multivariable logistic model. The significance level was set at $p < 0.05$ for all statistical analysis.

Results

A total of 631 patients presented to AKUH with injuries during one year. Males outnumbered female by 4:1 accounting for 80% ($n=502$) of injured. Half of the patients (50%; $n=313$) were in the age group of 12-30 years followed by ≥ 31 years (41%; $n=258$). Overall, 65% ($n=411$) were RTIs followed by gunshots (14%, $n=85$), poisoning (10%, $n=64$) and falls (5%, $n=29$). The different types of injuries, according to gender, are shown in Table 1. RTIs (66.3%) and gunshot (15.5%) were the most common causes of injuries among males. Among all injured females, RTIs (60.5%) and poisoning (21.7%) were the main types of injuries. There were significant differences between males and females according to the type and site of injury (Table 1).

Upon arrival to hospital, for the injured patients whose GCS was known, 82% (491/598) had a GCS ≥ 13 (minor) while 11% (63/598) had a GCS ≤ 8 (severe) and only 7% (44/598) had a GCS 9-12 (moderate). The mean hospital stay and ISS of patients were 3.5 days (SD ± 6.4) and 4 (SD ± 5.2) respectively.

Of 547 (87%) known injury sites, the head, neck and face were the most affected body parts (50%; $n=276$) followed by upper limb (17%; $n=92$), lower limb (17%; $n=91$), thorax/chest (9%; $n=47$), abdomen (6%; $n=30$) and pelvis (2%; $n=11$). Multiple injuries (more than one body part effected) were present in 59% ($n=320$) of cases. Three percent ($n=17$) were declared to be "deceased on arrival" to the hospital.

Of 613 (97%) known locations where injuries were reported to have occurred, the majority of them occur outside the house (84.5%; $n=518$)

Table 1. Comparison of type and place of injury by sex.

Characteristics	Male N (%)	Female N (%)	Total N (%)
Type of Injury **			
Road Traffic Injuries	333 (66.3)	78 (60.5)	411 (65.1)
Gunshot	78 (15.5)	7 (5.4)	85 (13.5)
Poisoning	36 (7.2)	28 (21.7)	64 (10.2)
Falls	20 (4.0)	9 (7.0)	29 (4.6)
Blunt Object	15 (3.0)	3 (2.3)	18 (2.9)
Cuts	6 (1.2)	2 (1.6)	8 (1.3)
Crush injury	2 (0.4)	0	2 (0.3)
Electrocution	2 (0.4)	0	2 (0.3)
Hanging	1 (0.2)	0	1 (0.2)
Unknown	9 (1.8)	2 (1.6)	11 (1.7)
Place of injury **			
Inside house	53 (11.1)	42 (32.8)	95 (15.7)
Outside house	424 (88.9)	86 (67.2)	510 (84.3)
If outside *			
Road traffic **	333 (78.5)	78 (90.0)	411 (80.6)
Pedestrians	53 (16.1)	29 (38.2)	82 (20.2)†
Non-pedestrian	276 (83.9)	47 (61.8)	323 (79.8) †
Others	58 (13.7)	4 (4.7)	62 (12.2)
Work	23 (5.4)	1 (1.2)	24 (4.7)
Leisure	10 (2.4)	3 (3.5)	13 (2.5)
** p<0.01, * p= 0.03			
† Do not add to 411 because of missing information			

in both genders (male=89%; females=67%), RTIs were the leading cause accounting for 68% (n=419) of all outside injuries (Table 1). Twenty-one percent of RTIs occurred in pedestrians with a significant difference between males and females (17% vs 38%; p<0.01) (Table 1).

Road traffic injuries

In our study there were 65% (n=411) RTIs. Adult (≥16 years) males were injured more than females (71% vs 83%; p=0.03). Children (1-15 years) were mostly pedestrians (36% vs 18%; p=0.01) and mostly presented with severe GCS at the hospital as compare to adults (18% vs 9%; p=0.02). Head and neck were most affected body parts in both children and adults (56.9% vs 55.1%; p=0.31). ISS did not differ significantly between children and adults (p=0.80). Most RTIs were caused between two wheelers to four wheelers among adults (16% vs 19%; p=0.01). Characteristics comparing RTIs among children and adults are shown in Table 2.

There were no differences between children and adults in any of the remaining types of injuries (Data not shown).

Univariate logistic regression with GCS was performed and the results are shown in Table 3.

Sex and hospital stay were significantly associated with GCS. All other variables did not reach statistical significance. Though variables, age and mode of travel were not significantly associated with GCS in the univariate analysis they were kept in the multivariate analysis as they had shown to be associated with RTIs in previous studies [11]. Multivariable logistic regression identified sex [adjusted odds ratio (aOR): 3.797; 95% confidence interval (CI):1.066-13.528], and mode of travel (aOR: 2.779; 95% CI: 1.288-5.993) as independent predictors for severe GCS (GCS≤8). However, stay in hospital (aOR: 0.944; 95%CI: 0.908-0.980) was independently but negatively associated with severe GCS.

Discussion

Our study showed that individuals aged 16-30 years and male were the highest risk group. RTIs were the leading cause of injuries. Pedestrians accounted for 21% of all RTIs. The head, neck and face were the major body regions affected with majority of patients having multiple injuries upon presentation to the hospital. The majority of the patients were found to have GCS ≥ 13 on arrival to the hospital. The average length of stay

Table 2. Characteristics of road traffic injuries for children and adults.

Variables	1-15 years N (%)	≥16 years N (%)	P-value
Total	58 (14.1)	353 (85.9)	
Sex			
Male	41 (70.7)	292 (82.7)	0.030
Female	17 (29.3)	61 (17.3)	
Mode of travel			
Pedestrian	21 (36.2)	61 (17.6)	0.001
Non-pedestrian	37 (63.8)	286 (82.4)	
GCS			
Severe <8	10 (17.5)	30 (8.9)	0.019
Moderate 9-12	8 (14.0)	24 (7.1)	
Minor >13	39 (68.4)	283 (84.0)	
ISS[†]			
1-9	33 (56.9)	217 (61.5)	0.798
10-19	23 (39.7)	126 (35.7)	
20-75	2 (3.4)	10 (2.8)	
Body Parts Injured			
Lower Limb	14 (24.1)	55 (16.4)	0.305
Abdomen	3 (5.2)	12 (3.6)	
Pelvis	1 (1.7)	7 (2.1)	
Head & Neck	33 (56.9)	185 (55.1)	
Upper Limb	3 (5.2)	53 (15.8)	
Thorax/Chest	4 (6.9)	24 (7.1)	
Injuries-Multiple vs Single			
Multiple Injuries	37 (63.8)	217 (64.6)	1.000
Single injuries	21 (36.2)	119 (35.4)	
Hospital stay (days)	4.0 (SD ±6.6)	3.5 (SD ±6.4)	0.60
Mode of transport			
Two wheelers to two wheelers	4 (7.0)	21 (6.1)	0.001
Two wheelers to four wheelers	9 (15.8)	71 (20.5)	
Four wheelers to four wheelers	6 (10.5)	44 (12.7)	
Pedestrians to two wheelers	5 (8.8)	34 (9.8)	
Pedestrians to four wheelers	14 (24.6)	26 (7.5)	
Four wheelers with object	5 (8.8)	12 (3.5)	
Others ^{**}	14 (24.6)	139 (40.1)	

[†] ISS: Injury Severity Score
^{**} Others: Include cases which do not fall into any of the category "Mode of transport"

in hospital was 3.5 days.

According to the Pakistan National Health Survey 1990-1994, the highest annual incidence of unintentional injuries per 1000 per year among those aged ≥5 were due to falls, followed by poisoning and burns, with the majority of injuries occurring at home or on the roads [12]. Similarly, falls, cuts/bruises and burns had the highest annual incidence of unintentional injuries per 1000 per year among those <5 years

[13]. However, according to the national survey, road traffic injuries were more likely to result in disability among both age groups (≥5 years, <5 years) [12, 13]. In our study we found RTIs, gunshot and poisoning being the most common types of injuries. The distribution of types of injuries in our study is somewhat different than the Pakistan national health estimates. Population growth and rapid motorization in Karachi city [14] during the last 12 years may have resulted

Table 3. Univariate logistic regression analysis of the factors associated with the Glasgow Coma Scale (GCS) for road traffic injuries.

Variables	P-value	Odds Ratio (CI)
Hospital Stay (days)	0.005	0.945 (0.908-0.983)
Mode of travel		
Pedestrians		1.000
Non-pedestrians	0.789	1.317 (0.174-9.958)
Sex		
Male		1.000
Female	0.041	3.777 (1.054-13.535)
Age		
≤15 years		1.000
≥16 years	0.078	2.198 (0.916-5.272)
Mode of transport		
Two wheelers to two wheelers	0.479	2.143 (0.259-17.737)
Two wheelers to four wheelers	0.864	1.092 (0.398-2.993)
Four to four wheelers	0.714	1.283 (0.339-4.863)
Pedestrians to two wheelers	0.819	0.778 (0.091-6.625)
Pedestrians to four wheelers	0.430	0.424 (0.050-3.570)
Four wheelers with any object	0.785	1.351 (0.156-11.693)
Others		1.000

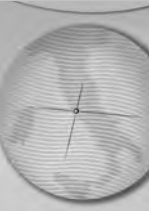
in a change in the pattern and types of injuries currently occurring in the city, however as our research is based on a single hospital the results may not be extrapolated.

In Pakistan, like most low-income countries, healthcare facilities are inadequately equipped to treat emergencies due to the lack of availability of critical supplies needed for emergency care [15]. The majority of healthcare facilities had no budget allocated for emergency care [15]. In addition, the number of formally trained pre-hospital providers such as medical technicians, are insufficient in Pakistan, and the police or fire department lack the training to provide emergency care to patients [9]. The existing ambulance system is mostly privately owned, fee-for-service with an emphasis on pre-hospital transport rather than pre-hospital care [9]. The communication amongst the different ambulance services and healthcare facilities is non-existent. These factors cumulatively play an important role in the rising burden of injuries and disabilities in Pakistan.

Male gender has been described as high risk group in other studies [8, 16, 17]. In Pakistan, for all injuries, the age group 15-49 years [18] was found to be most affected and in particular those aged 16-45 years for RTIs [8]. The reason for the increased proportion of male sufferers might be that they are more exposed to the outside environment than females, thus increasing their

risk of being injured. RTIs are the leading cause of injuries, every year 1.2 million people are killed on roads and as many as 50 million are injured [19]. Ninety percent of RTIs occurred in low and middle income countries [2]. In our study, more than half of all of the injuries were RTIs. Rapid motorization, lack of road infrastructure, and poor emergency medical systems may be contributing factors for the rising burden of RTIs in Karachi city [14, 20]. In our study, a significantly greater proportion of the injured pedestrians were children, which make us ponder whether there may be less parental supervision or more risky behavior among children thus making them more vulnerable to RTIs [21].

The head, neck and face were the primary body parts injured in our study. In South Asia, helmet wearing is the proven effective intervention in order to reduce bicycle and motorcycle related head and facial injuries, while the use of seat belts can reduce fatalities amongst car occupants by over thirty percent [22]. The low perceived efficacy of helmets, the lack of appropriate information on helmet use, high helmet cost, inconvenience, and vision and hearing disturbance may be some of the reasons for non-compliance of helmet wearing among motor vehicle riders [23]. Furthermore, in low income countries like Pakistan, motor vehicle safety laws are almost non-existent thus increasing the likelihood of



motor vehicle injuries.

Gunshot injuries were found to be the second most common injuries in our study. Robbery, quarrels, police encounters and self-harm are the subsequent reasons for firearm use in Karachi, although accidental deaths while mishandling the firearms and indiscriminate firing were also common [17]. In addition, disproportionate violence in certain areas of Karachi, citywide political and non-political strikes, and conflicts among different ethnic groups have recently increased the use of firearms in the city [24, 25].

Poisoning and falls are other types of injuries that were frequently documented, especially in females, in our study. In Pakistan, kerosene oil is one of the commonest hazardous substance ingested accidentally by children [26]. However, in adults, benzodiazepines, opioids, anti-epileptics and warfarin are the most common drugs reported for accidental overdose [27]. The easy accessibility of hazardous materials to children, lack of patient education about drug dose, timings and drug interactions for prescribing medications, improper labeling of medications, and easy availability of over the counter medications are some of the reasons for drug overdose and/or accidental ingestion. Similarly, according to National Injury Survey of Pakistan, falls are the most frequent cause of injuries in both genders and in rural and urban areas, with most injuries occurring at home [12].

In this study injury severity was assessed by

GCS, ISS and hospital stay. The less grievous nature of the reported injuries may be due to the fact that AKUH is a private tertiary care hospital. In many of the cases this hospital was a secondary site of referral from other government hospitals resulting in a reduced number of severe injuries and fatalities being presented.

As this is a single centre study it is difficult to generalize the results and to calculate the rate of injuries across the entire population. In terms of AKUH being the referral centre, there is a possibility of selection bias in terms of injury severity. Despite these limitations, this paper provides valuable information on the different kinds of injuries experienced in a low-income setting.

To conclude, road traffic and gunshots are the two major categories of injuries, common among young males. Overall, significant differences were found among males and females for the different types of injuries. In RTIs, multivariable logistic regression identified sex and mode of travel as independent predictors for severe GCS. However, stay in hospital was independently, but negatively, associated with severe GCS. The study provides insight to different types of injuries and may help researchers to conduct further focused studies on road traffic and gunshot injuries. In addition, our study may help local authorities in Karachi city to prioritize interventions in high risk groups and for the most common injuries.

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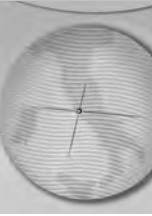
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