INJURY PROFILE IN KWAZULU-NATAL, SOUTH AFRICA: IMPLICATION FOR PREVENTION

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Summary

Background: Prevention and control of injuries require generating relevant information on the magnitude, characteristics and determinants of injuries.

Objective: The objective of this study was to describe the characteristics of injuries and predict the severity of injury with other variables.

Design: A cross – sectional descriptive study was conducted at the hospitals of KwaZulu – Natal. Information was gathered from a total of 428 injured patients randomly selected from hospital attendances. Multivariate logistic regression analysis was performed to identify the risk factors for severity of injury.

Results: Over 60% of injury victims were below the age of 30 years. The economically active group (21 – 60 years) also constituted about 60% of injury victims. Over half of the victims reported that the scene of incidence was private house, yard and road. One fifth was transport related injury whereas majority was violence (50%). Unintentional injury was 28.8%. Most of the injuries were minor (42.3%) to moderate (41.1%) in severity. Odds Ratio for alcohol related violence was 11.

Conclusion: In order to reduce injuries appropriate multisectoral interventions, broader policies and strategies, regulating transport and alcohol use, routine testing of alcohol to identify the problem-drinkers for rehabilitation. Interventions should also include health education and health promotion and law enforcement.

Keywords: *Injury, violence, transport, alcohol, severity.*

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INTRODUCTION

Injuries are considered major public health problems due to the high numbers of resultant deaths, (> 5 million each year) and causing many more disabilities[1]. It is estimated that by the year 2020, deaths due to injuries may reach 8.4 million annually; and with road traffic accidents could rank the third leading cause of disability worldwide[2]. People from all socio-economic groups are affected with injuries but death rates are higher in lower income groups and the poor being less likely to make a full recovery following an injury[1]. The problem is most acute in Sub-Saharan Africa and it has been described as a malignant epidemic in South Africa[2, 3].

A study conducted in KwaZulu-Natal (KZN) to establish injury related hospital admissions during the period 1998 – 2002 found that 18% of all hospital admissions (25% for men and 12% for women) were due to injuries[4]. The nature and extent of injuries obviously vary according to geographic, cultural, residential (urban or rural) and other factors. These different factors thus determine the choice of possible interventions. Consider for example road traffic injuries. These are man-made problems and can be controlled through the collective responsibilities of several actors including drivers, the vehicles, the roads, infrastructure, the law enforcement agencies and the public health and medical care agencies.

Prevention and control of injuries require generating relevant information on the magnitude, characteristics and determinants of the problems and potentially effective interventions for its prevention and control through public health action[5]. However, good quality morbidity and mortality data on injuries that are critical for public health decisions are fundamentally lacking. This study was therefore designed to fill this gap. Its aim is to describe the demography (age, sex and race), time, scene, causes, severity, activity at the time of injury, and placement after injury. It also attempts to predict the severity of the injury from the other variables.

MATERIAL AND METHODS

Setting and population

The setting for this study is KwaZulu-Natal, a province with a population of 9,070,457 persons in South Africa. The study was conducted between July and September 2004. It is a cross – sectional descriptive study conducted in 9 randomly selected hospitals out of the 64 hospitals of KwaZulu–Natal (using multistage sampling strategy). The KwaZulu-Natal Provincial Department of Health classifies hospitals according to the level of medical care it provides into District, Regional, Tertiary, Specialized and State Aided Hospitals. Eleven Specialized and 8 State Aided hospitals were excluded from the hospital selection because these hospitals do not treat injury cases.

To avoid selection bias proportional to population size (PPS) method was used such that each hospital type contributed subjects to the study proportional to its population size. A table of random numbers was therefore used to select 5hospitals from the 35 existing district hospitals, 2 hospitals from the 14 regional hospitals, 1 hospital from 3 tertiary hospitals and 1hospital from the 4 state aided hospitals. A similar PPS method was used to determine the number of subjects from each selected site (using the numbers of hospital authorized beds and total sample size of 428). Next a systematic random sampling method was used to recruit patients from each selected hospital. A standardized pre-tested questionnaire was administered to the selected patients by the medical practitioner as a routine procedure at out-patient department or emergency room. A medical practitioner working at each site who volunteered to participate in the study was trained on patient selection, obtaining consent, completing the questionnaire and scoring severity of injury. Injury severity score (ISS) was used to classify the injuries into minor (ISS 1-8), moderate (ISS 9-15) and severe (ISS 16-75)[6].

All injured patients who attended the selected hospitals were eligible for the study. If the patient was not in a condition to answer questions, the questionnaire was applied to a

friend or relative who brought the patient in. In cases where nobody was available to give information at the time of recruitment data was collected before the patient was discharged and in the case of death, a relative or a close friend was interviewed.

Inclusion and exclusion criteria

All physically injured persons who attended the selected hospitals to receive *first time* medical attention and gave consent to participate in the study were included in the study whereas those who came for follow–up, or were referred from other health facility, or had verbal and sexual abuses were excluded from the study.

Data analysis

Data were entered into and analyzed using SPSS 11.5 for Windows. Frequency tables, significance test using Chi-Square test, univariate and multivariate logistic regression analysis were performed to identify the risk factors for severity of injury.

The study was carried out with informed consent from all the participants. Prior permission was sought from the Head of the Provincial Department of Health, KwaZulu-Natal.

RESULTS

Table 1: Distribution of the respondents by age, gender, race and time of Injuries in KZN hospitals during July to September 2004.

Variables	Numbers	%
Age group		
0 – 10 years	41	9.9
11 – 20 years	104	25.1
21 – 30 years	104	25.1
31 – 40 years	65	15.7
41 – 50 years	42	10.1
51 – 60 years	35	8.5
61 – 70 years	13	3.1
71 + years	10	2.4
Mean Age	29.56 yrs (Sd = 17 yrs)	
Race		
White	9	2.1
Black	358	83.6
Asian	59	13.8
Coloured	2	0.5
Time of Injury (n = 239)		
06h00 – 12h00	9	3.8
12h00 – 18h00	92	38.5
18h00 – 24h00	108	45.2
24h00 – 06h00	30	12.6

Information were gathered and analyzed from a total of 428 injured patients. Most of the respondents (61.5%) were male. Table 1 show that blacks made up about 83.6%. About 60% of injury victims were less than 30 years old with a majority of them (50.2%) being in the 11 to 30 years group. The economically active group (21 – 60 years) constituted almost 60% of the injury victims. The mean age was 30 years. Nearly half of the injuries (45%) occurred between 18h00 to 24h00 and 38% between 12h00 to 18h00.

Table 2: Places and activities at the time of Injuries

Place of Injury (n = 426)	**%**
Residential area	39.9
Road/street/highway	28.2
School/educational area	8.0
Industrial and construction area	5.8
Farm	4.7
Recreational area	3.6
Bar, sheben, n'club, disco	2.3
Open land, countryside	1.6
Prison/ in custody	.5
Sea, lake, river, dam	.2
Other	5.2
Activity at the time of Injury (n = 418)	
Travelling	23.7
Playing sport or at leisure	19.9
Nothing in particular	16.7
Paid work	11.7
Unpaid work	5.3
Sleeping/eating/resting etc	3.8
Education	1.2
Unknown	2.2
Other	15.6

Table 2 reveal that most of the injuries occurred at residential areas (40%) and or the roads (28.2%). Commonly stated activity at the time of injury was travelling (23.7%) followed by playing sport/ spending leisure time (20%). A sizeable proportion of the injuries occurred while the victim was doing nothing of note (16.7%) while some individuals were injured while working (paid or unpaid) and at the time of education (18.2%).

As regards the use of alcohol, 18 patients had missing data, while 20% agreed or were suspected to have used alcohol before injury.

Causes of injuries

Half of the injuries were violence related (50.7%), road traffic accidents accounted for 28.8%, other types of injuries were 20.3% and attempted suicide was 0.2%. Other injuries were mostly unintentional such as fall, chemical or electric burn etc. Most of the injuries were classified as minor (42%), moderate (41%), severe (16%) and fatal injuries (1%). Most of the injured victims (63.6%) were discharged after initial assessment; 27.4% were admitted to hospital ward; 1.5% was admitted to hospital ICU; and 6.6% were referred to higher level of care.

Applying chi–square test of association, we found that age group of injury were significantly associated with gender ($p = 0.029$) and uses of alcohol ($p = 0.003$). Activity at the time of injury was also associated with gender ($p = 0.001$) and uses of alcohol ($p = 0.001$). Use of alcohol was furthermore associated with violence ($p = 0.000$), severity of injury ($p = 0.000$), scene of injury ($p = 0.000$), activity at the time of injury ($p = 0.001$) and placement after initial assessment ($p = 0.000$). Age group ($p = 0.017$), alcohol ($p = 0.000$), leisure ($p = 0.027$) and sport ($p = 0.028$) were significantly associated with the dependent variable severity of injury. We also found that place of injury (road/street); activity at the time of injury (paid work), public transport and doing nothing in particular were not significantly associated with severity of injury. Proportion of alcohol use between male and female were not significantly different in this study population.

It was furthermore, found that the Odds Ratio (OR) for alcohol use and violence was 11.241 ($p = 0.000$, 95% CI, 6.395 – 19.671).

Table 3: Multivariate logistic regression output for adequacy of model fitting for severity of injury

Steps	Omnibus test (Model Chi-Sq)	Sig	Nagelkerke R Square	Hosmer Lemeshow test	Classification Table (overall)
Step 1	186.169	0.000	0.790	0.992	93.5
Step 2	186.165	0.000	0.790	0.991	93.5
Step 3	186.109	0.000	0.790	0.987	93.5
Step 4	184.911	0.000	0.786	0.981	94.6
Step 5	183.414	0.000	0.781	0.972	94.6

Backward stepwise binary logistic regression method was used to fit a model for severity of injury. Initially we had included the variables in the model that had significant association with the dependant variable. In the final model-building step (step 4) we found that the model contained only three variables (age group, alcohol and sport). The final model chi-square was statistically significant ($p < 0.05$). Furthermore, Nagelkerke R square value for the model was 0.781 which was quite high and Hosmer and Lemeshow test ($p = 0.972 > 0.05$) suggested the model fitted well. The classification table showed that the model fitted adequately since the overall correct prediction was quite high 94.6% (table 3).

DISCUSSION

This study was limited to public hospitals of KZN, thus did not represent all injury cases in the province. Self reporting on the use of alcohol may have suffered under reporting. Although clinical assessment was done by the doctor, it still can not assess the actual use of alcohol due to delay in presenting at health facilities. Furthermore, the questionnaire was implemented in English, a nurse from the facility interpreted the questions to the

respondents and answers to the doctor may have some misinterpretation resulting in information bias although great care was observed during interpretation. The deaths due to injuries are not reflected in this study, as follow up of cases were not considered.

Injury cases were common to men (62%) and at the younger age group (≤30 years, 61%). The higher rate of injury-related behaviour among males has been attributed to biological determinants, a greater propensity for risk taking in general, and a tendency to act out violent attitudes owing to processes of socialization[7]. Such socialization processes do exist in South African society which stereotypes images of power and dominance in males[8].

A study conducted in Cape Town, found that 60% of trauma patients had positive alcohol levels on breath analysis and 28% of the patients were classified as problem-drinkers. It was also established that alcohol was associated with both accidental injury and interpersonal violence[9]. In South Africa, 76% of all deaths after interpersonal violence had been found to be alcohol related[10]. Earlier studies conducted at Addington hospital (1999) and King Edward hospital (KEH) (2000) in Durban found that in 20.6% and 24% respectively of all injury cases assessed, alcohol was consumed prior to injury. The alcohol consumption was assessed by a combination of self-report and the doctor's clinical judgment. Considering all public hospital attendance of injury victim in KZN, the prevalence of 20% alcohol is considered high but lower than other studies[9, 11, 12].

The causes of injuries are fundamental for implementing intervention programmes. It is found that half of all injury cases that presented at KZN hospitals are related to some kind of violence. Similar findings were reported from earlier studies in Durban as interpersonal violence contributed 49.8% and 44.4% of all injury related hospital attendances at Addington (1999) and KEH (2000) hospitals respectively[11, 12]. In these studies other common causes of injuries were road traffic accidents (28.8%). The high proportion of violence and road traffic injuries are likely in SA due to high rate of urbanization, unemployment and poverty at large. Urbanization alone is known to lead to mass unemployment, lack of adequate shelter and basic infrastructure and when combined with weak social services and obvious disparities between 'haves' and 'have-nots', it results in high degree of social exclusion leading to overall social dysfunction, crime and violence[13]. It is explained that school going children are at particular risk as they often live in areas with high traffic volumes and density and are found to play on street with inadequate parental supervision – thus leading to children being injured and high road traffic accidents[14].

Injuries are the second most common cause of death in South Africa and the most common cause in children (aged 5 – 14 years) and young adults (aged 14 – 35 years)[15]. Similar trends of injury cases had been reported from the USA and Europe[14, 16]. In our study the injury cases were commonly (> 50%) found among the younger groups between ages 10 to 30 years, similar to the findings of other studies[11].

The age distribution indicates that most victims were 30 years and below (60%). This was similar to other findings in South Africa[17]. The average age of trauma (injury) victim was found during 2001 in Johannesburg trauma unit to be 27.4years which is similar to our findings. Thus we had probably recruited the representative population in the study.

In a recent multi-centre study to explore injury related behaviour among high-school students, high rates of adolescent injury-related behaviour was found in both urban and rural settings and in both centers[7]. These behaviours included using the front seat in a vehicle without seat belts; passenger in the car with intoxicated driver; carrying a knife to the school; bullying others; being bullied; and trying to commit suicide.

The scenes of injuries were found to be everywhere but commonly at residential areas (40%) and on the roads (28.2%). Road is the second highest scene of injury: this could be due to road traffic accidents (RTA). It is

known that RTA is high in South Africa thus this postulation is likely.

Date and time of injuries are known to vary. In South Africa, it is evident that most of the injuries occur during weekends (Friday to Sunday) and day time between 08h00 to 18h00[11, 12, 17]. Although we did not include the day of injuries in our study, but the time of injuries were found to be similar to those findings.

Injury victims, who attended public health facilities, were found with injuries whose severity varied from minor to moderate. Nearly two-thirds of injured victims were treated and discharged while over a quarter were admitted to hospital wards and 1.5% required ICU beds. Furthermore, 6.6% required referral to higher level of hospital for management. These findings differ significantly from the other studies conducted in Addington hospital in Durban where they found only 14% required hospital admission. This could be due to urban bias[11].

Prevention implication

It is known that injury-related risk behaviours increase the probability of injury and should be targeted for effective interventions. In order to reduce or eliminate injuries, disabilities and deaths, accurate evaluation and documentation of all injuries are needed in hospital emergencies to assist with developing appropriate interventions. Routine testing of alcohol in emergency care can be implemented to identify the problem drinkers for rehabilitation. In addition, broader policies and strategies aimed at regulating alcohol and altering public attitudes to its use would have a significant impact on reducing the related morbidity and mortality as well as other psycho-social effects.

Interventions should also include health education and health promotion, law enforcement to prevent motor vehicles without seat belts from being allowed on the road and to apprehend people who engage in the risk behaviours such as drunken and driving, carrying weapons etc.

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