Non-fatal injuries of interpersonal violence at the Leratong Provincial Hospital, South Africa

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Background: Interpersonal violence is a global health issue. More than 1.6 million people die annually as a result of violence. Injured survivors suffer from a range of physical, sexual, reproductive and mental health problems. The aim of this study is to describe the trends and profile of violence-related injuries from hospital records of an urban emergency department and crisis centre in South Africa.

Methods: A descriptive study was conducted by reviewing patient files at Leratong Hospital. Relevant clinical information such as victim’s age and gender; time, day of hospital attendance; nature of injury; presence/absence of alcohol; and nature of weapon was extracted.

Results: Leratong Hospital manages many patients with injuries due to interpersonal violence throughout the year, with an increase in May, November and December. Higher numbers of patients present in the last week of the month, and on Saturdays and Sundays. Victims were predominantly male (64%), except for sexual assault where the victims were females. Females also suffered more blunt injuries than penetrating injuries. Blunt injuries were the most frequent type of injury although over the weekend males sustained more penetrating injuries than blunt injuries. Young males were the main victims of interpersonal violence.

Conclusion: This study highlights a trend where young adults, especially males, are noted to be significantly affected by interpersonal violence.

Keywords: emergency unit, glass bottle injuries, interpersonal violence, non-fatal, sexual assault

Introduction

Interpersonal violence is a major health issue, and the injuries are potentially avoidable via intervention strategies.1 Interpersonal violence is defined by the World Health Organisation (WHO) as the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in, or has a likelihood of resulting in injury, death, sexual health problems, psychological harm, mal-development or deprivation.2,3 From this definition it can be seen that the effects are far reaching. More than 1.6 million people die each year as a result of interpersonal violence.4 Interpersonal violence has cost South Africa (SA) around 1.0 million (6.5%) of all disability life years.5 The costs of health care due to these injuries negatively affect economic growth.6

Being a young male has been identified as a risk factor for violence7 with male homicide rates being about three times that of females.8 For every young person killed by violence an estimated further 20% to 40% of victims sustain injuries that require treatment in a hospital.9

There is an increase in violence-related injuries over weekends, with a decrease towards midweek.10 Some studies indicate a seasonal variation explained by the increase in social interaction during the warmer periods, thus resulting in more violence-related injuries.6 However, a study in the United Kingdom found no seasonal pattern in interpersonal violence.11 Particular points in the year, public holidays, pay dates and sports events have an increased number of interpersonal violence incidents.7

During intimate partner violence and sexual assault, feet, objects and fists are most frequently used, while in the case of individual violence weapons such as knives and firearms are used.7 Male and female victims present with different types of injuries.10,11 Contusions are more common in females because women are subjected to blunt trauma, strangulation or being physically forced against a wall or floor.12 Fractures sustained during an assault are commonly nasal (29%), dental (27%), mandibular (6%) and zygoma bones (3%).11 Wounds of the upper limbs have been described as being probable defensive wounds; studies have shown that predominantly females incurred injuries on the upper limbs.10,11

Burn injuries due to interpersonal violence are common in developing countries.12,13 Alcohol is a risk factor for violent behaviour.14 SA has been described as having the highest rates of interpersonal violence-related burden in the world.15 Audits of injuries in SA showed a male predominance of patients presenting to the emergency department with violence-related injuries.15 In Gauteng injuries from violence predominantly occurred on Saturdays and Sundays.16,17 Violent behaviour was also noted to be frequent during festive periods and often occurred in public places.18 Violent deaths in SA were found to occur chiefly between 20h00 and 01h00 (27.2%), or between 01h00 and 03h00 (10.6%).16,19,18 Recent studies on deaths due to interpersonal violence in Gauteng show an increase in violent deaths over the months of August, September and December.16,20,21 South Africa’s homicide rates peak in males aged

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15 to 29 years, at 184 per 100 000, nine times the global rate.15,22,23 Physical violence has been described as a manner in which gender hierarchy is maintained and reinforced.24

Sexual assault affects more than 1.5 million South Africans each year, which has been described as one of the highest rates in the world.24 In the Transkei over a five-year period (2000–2004), 831 cases of sexual assaults (rape) were reported, with 53.3% below the age of 15 years.25

In SA 40% to 50% of women report physical abuse from an intimate partner. The WHO reports that 65% of women in SA experienced intimate partner violence when their partners consumed alcohol.25,26 Sexual assault also affects South African males; one study revealed that 3.4% of young men have been raped. Men who engaged in violent behaviour were shown to be more likely to have been raped and had committed rape themselves.27

The use of a weapon in interpersonal violence increases the severity of a victim’s injury, which results in an increased use of health services.27,28 Injuries inflicted without a weapon often cause multiple superficial injuries and most patients are discharged after a period of observation.29 South Africa has one of the highest firearm death rates worldwide. One-third of all South African female homicides and 39% of male homicides are due to firearms.16,29 South Africans have easy access to illegal firearms.29 The National Injury Mortality Surveillance System (NIMSS) of South Africa indicated that 37% of fatal injuries in Gauteng during 2009 were due to firearms, 29.3% to sharp instruments and 26.5% to blunt force.30 In a Johannesburg hospital between 1985 and 2001, the most common weapons used were firearms (17.8%), bottles (15.1%) and knives (14.1%).31 Another weapon indigenous to SA is the sjambok, a traditional whip. Samboks are commonly used during community violence or mob justice; 4% to 6% of all crimes in South Africa are dealt with in this manner.32

In SA, information on the trend and profile of injuries due to non-fatal cases of interpersonal violence is limited. Most of the literature on interpersonal violence centres on injuries sustained during previous political violence.4 Hospital emergency departments and crisis centres worldwide have direct contact with victims of interpersonal violence, thus these facilities can provide information on these violence-related injuries.

Methods
The aim of the study was to describe the trend and profile of interpersonal violence-related injuries in an emergency department and crisis centre at the Leratong Provincial Hospital.

This was a descriptive study conducted by reviewing patient information from the hospital files. Clinical information such as the victim’s age, gender; the time, date and day of hospital attendance; the nature of injury; the presence or absence of alcohol; and the type of weapon (if any) was extracted. Each patient record was given a unique study number, and patient anonymity was maintained.

Leratong Provincial Hospital is a Level II/regional hospital situated in Gauteng, South Africa. Leratong Hospital provides medical services to the population in the West Rand, which is estimated at 1.5 million people, of whom 82% of the population have no health insurance. The population is described as being in the lower socio-economic spectrum. The hospital also serves as a referral centre to two district hospitals, one psychiatric hospital, 44 fixed clinics, 4 satellite clinics and 10 mobile clinics. The emergency department provides treatment for physical violence; the crisis centre provides services for sexual assault.

The subjects included all patients presenting to the emergency department and crisis centre with a history of assault from 1 January 2009 to 31 December 2009. A systematic sampling of the records was undertaken by selecting 1 in 10 files from the register. If a file was not found the next file number was selected.

Patients’ injuries were classified according to penetrating, blunt/non-penetrating, gunshot, sjambok, sexual assault or burn. Stata 11® software (StataCorp LP, USA) was used for data analyses. All categorical variables, such as gender and age group, were summarised using frequencies or percentages, and continuous variables were summarised by mean and standard deviation (SD). Possible associations between age and gender of the patient with the type of injury inflicted and the weapon used were investigated by the use of chi-square tests of independence. Ethics clearance for this study was obtained by the Human Research Ethics Committee (Medical), University of the Witwatersrand, certificate No. M10513.

Results
The study population was 7 145 injuries and there were 1 568 alleged sexual assaults. We enrolled 740 patients.

Age and gender distribution
Of the 740 cases, 236 (32%) of the victims were female (Table 1). The mean age was 28 years (SD 9.7). The youngest victim was 11 and the oldest 61 years. Males had a statistically significantly higher mean age.

Trend in interpersonal violence non-fatal injuries
Age group
There was a significant difference (p-value < 0.01) in the different age groups. Among females there was a peak in the age groups 10–19 years (74/236; 31.4%) and 20–29 years (81/236; 34.3%). A decline in interpersonal violence-related injuries was noted after the age of 29 years among both sexes. Among males a peak was noted in the age group 20–29 years, representing 252/504 (50%) of all male victims.

Days of the week
The greatest number of victims was on Saturdays (187/740; 25.3%) and Sundays (175/740; 23.7%). Friday, Saturday and Sunday accounted for 462/740 (62.5%) of interpersonal violence injuries. A significant difference (p-value < 0.01) was found between gender and day of the week. Most female victims with injuries presented on Mondays (49/236; 20.8%) and Fridays (46/236; 19.5%), while male victims attended during Saturdays (156/504; 31%) and Sundays (135/504; 26.8%).

Weeks of the month
The highest proportion (233; 31.5%) of injuries was in the last week of the month. There was a steady decline in attendance from the first week to the third week.
Over the 12 months

Peaks in hospital attendance were noted for the months of November (89/740; 12%) and December (79/740; 10.7%). The lowest number of injuries was during February (42/740; 5.7%). There were more male than female injuries in every month. Male admissions were nearly four times those of females during August (males n = 41/53 vs. females n = 12/53) and November (males n = 70/89 vs. females n = 19/89).

Time of day

Information from 733 files was analysed. A significant difference (p-value < 0.01) was noted according to the time of the day. A peak in attendance was recorded at 10h00. The times for victims of assault to attend the hospital were between 08h01 and 16h00 (n = 260, 35.5%); 16h01 to 00h00 (n = 242, 33%) and 00h01 to 08h00 (n = 231, 31.5%). Female victims were predominant between 08h01 and 16h00 (n = 124/232, 53.4%). Male victims had a peak in attendance after 16h00 with a total of n = 365/501, 72.9% male victims.

Hospital attendance of victims in the age group 20–29 years was the highest of all age groups with a peak in attendance after midnight (119; 51.5%) (Figure 1).

Trends in the type of injury

Blunt injuries were the most frequently occurring injuries accounting for 44.5% of all injuries. Dentition injuries and injuries that could not be otherwise categorised accounted for 10 (1.4%) of the total injuries. Gunshot and sjambok injuries were combined with ‘penetrating injuries’ and ‘blunt injuries’ respectively. The type of injury sustained and victim gender was found to be statistically significant (p-value < 0.01). Penetrating injuries showed a male predominance (249/279; 89.2%), while sexual assault was limited to females (107; 100%) (Table 2). When sexual assault was excluded, females were found to be more affected by blunt injuries (98/235; 41.7%) than penetrating injuries (30/235; 12.8%).

Injury trends of the days of the week

A statistically significant difference (p-value < 0.01) was noted. The number of blunt injuries peaked on Wednesdays (n = 29/51; 56.9%), while penetrating injuries peaked on Saturdays (54.6%). Sexual assault injuries presented mainly on Mondays (n = 30/107, 28%) and Fridays (n = 27/107, 27.3%).

Injury trends of the weeks of the month

The injury type in different weeks of the month showed no statistically significant differences (p-value = 0.492). The most common type of injury for all four weeks of the month was blunt injury (n = 343; 47.1%), followed by penetrating injury (n = 279; 38.3%) and sexual assault (n = 107; 14.7%). Penetrating injuries showed a peak during the fourth week of the month (n = 97; 42.2%).

Injury trend in relation to month

A significant difference (p-value = 0.017) was seen with injuries over different months. Peaks in penetrating injuries were noted over May (n = 35; 51.5%) and November (n = 45; 51.1%), while blunt injuries peaked in February (n = 24; 57.1%) and October (n = 36; 59%).

Victims of sexual assault presented predominantly during December (n = 12; 15.8%), March (n = 12; 21.1%), January (n = 10; 14.5%), February (n = 10; 23.8%) and October (n = 10; 16.4%).

Injury trend during times of day

A significant difference (p-value < 0.01) was in the types of injuries and time of presentation. Penetrating injuries peaked between 03h00 and 05h00. Victims of sexual assault most often presented at 11h00. Penetrating injuries were common after 16h01 (n = 116; 50.7%) with a peak between 00h01 and 08h00. Blunt injuries increased from 16h01 to midnight (n = 125; 52.7%). Sexual assault cases showed an increase during normal working hours 08h01 to 16h00 (n = 82; 32%), with a decline after 16h01 (n = 24).

Injuries and age groups

The types of injuries sustained in relation to the age groups

| Gender | Number (percentage) | p-values |
|--------|---------------------|----------|
| Male   | 504 (68%)           |          |
| Female | 236 (32%)           |          |

| Age group | Number (percentage) |
|-----------|---------------------|
| 10–19     | 133 (18%)           |
| 20–29     | 333 (45%)           |
| 30–39     | 167 (22.6%)         |
| 40–49     | 83 (11.2%)          |
| 50–59     | 21 (2.8%)           |
| > 60      | 3 (0.4%)            |

| Gender | Mean age of females | p-values |
|--------|---------------------|----------|
| Female | 26.6 years          | 0.0055   |
| Male   | 28.7 years          |          |

Table 1: Demographic profile of interpersonal violence victims
Non-fatal injuries of interpersonal violence at the Leratong Provincial Hospital, South Africa

- Blunt objects caused $n = 31$, 17.4% (most) of the injuries during 08h01 to 16h00.
- Injuries occurring between 16h01 and midnight were often caused by knives ($n = 26$; 11.4%).
- Injuries due to bottles/glass were often seen after midnight ($n = 28$; 12.7%).

Injuries sustained due to the use of bottles/glass peaked at midnight. Firearm-related injuries peaked at 04h00. Injuries due to blunt objects were most frequent between 13h00 and 16h00. Injuries due to the use of the perpetrator’s body parts (e.g. hands) peaked at 09h00 and again at 18h00.

**Alcohol**
None of the files on alleged sexual assault included information on alcohol use. There was a significant difference ($p$-value < 0.01) in the presence of alcohol according to time of day. The presence of alcohol was noted predominantly with injuries between midnight and 08h00.

**Discussion**

**Time-related trends**
There were increased injuries during the months of November and December. This is similar to the United Kingdom where there is an increase in injuries over November and December.\(^7\) In Nigeria there is an increase in violence-related injuries over festive periods. A possible explanation for this is that holidays involve greater social interaction and usually increased alcohol consumption.\(^7\)

Male injuries increased during the months of May (10.5%), November (13.9%) and December (10.3%). Male penetrating injuries were frequent in the month of November. Male youth are prone to individual violence and the use of weapons is common.\(^16\) For females, the greatest attendance took place during the months of January (11.2%) and December (11.4%). A Johannesburg trauma unit showed a male predominance during midwinter. The National Injury Mortality Surveillance System (NIMSS) showed a similar increase in violence over the month of December (9.1%). The results also show an increase in blunt injuries during December, with comparatively more females.\(^16\)

**Days of the week**
There was an increase in interpersonal violence over the weekends. This finding is consistent with the United Kingdom experience.\(^7\) The greater social interaction over weekends could be a possible reason for this. This trend may also be attributed to violence-related injuries sustained during criminal activity. The South African Police annual report shows there are increased crimes over weekends.\(^32\)

There were more interpersonal violence injuries over the month ends, which correlates with pay day similar to the United Kingdom.\(^7\) Blunt injuries peaked on Wednesdays. Penetrating injuries were prevalent over the weekends with a peak on...
There were 14 incidents (1.9%) of sjambok-related injuries. The injuries sustained by victims are severe and they often require hospitalisation.31

Burn injuries in our study accounted for 0.1% of the injuries. The low prevalence of interpersonal violence injuries due to burns is similar to the United States (USA).6 This, however, differs from studies done in African countries, where acid burns have been notable.32 Possible reasons for the low number of burns could be under-reporting, failure to disclose the cause of the burn injury or emergency medical services transferring patients with burn injuries to hospitals with burn units.

Gender of victims
Penetrating injuries were more prevalent in males, similar to the Johannesburg trauma unit.33 Females suffered more blunt injuries, which is similar to other studies done in South Africa 17 and in Denmark.10

Globally interpersonal violence in female victims is predominantly due to intimate partner violence (IPV). In the USA, the most common mechanism for intentional injury in IPV is blunt trauma (38.9%) followed by stab injuries (28.7%) and firearm injuries (24.4%). IPV in our study could be a possible explanation for the high number of blunt injuries among female victims.34 The emergency department is a potential area for intervention for IPV, as it is usually the first contact with the healthcare system.35 In Canada 44% of women who presented to the emergency department with IPV were murdered by their partner within the next 2 years.34

The majority of interpersonal violence victims were young males, which correlates with findings from other studies.33 Young men in SA often use violence as a way of asserting their dominance,15,18 This correlates with other African countries and internationally.33 Male victims were also shown to be subjected to more violent types of injuries (i.e. penetrating injuries) than female victims. These types of injuries were caused predominantly by bottles or broken glass. In our study, 11% of males aged 10–19 presented at hospital with injuries. Gauteng fatality rates reveal that about 193 youths aged 10–19 years die from violence annually.16

In our study of 107 sexual assaults, all were female and the majority were in the age group 10–19 years. This result correlates with other studies in South Africa; one study showed that 40% of sexual assault victims were under the age of 18.30 This has been confirmed by the WHO, which showed that up to one-third of adolescent girls in SA suffer forced sexual initiation.3

The number of sexual assault cases is probably higher than our results as under-reporting is common.23 Many females are Saturdays and more commonly involving males. Possible explanations for this difference could be that more weapons and alcohol use occurs over the weekends. These findings are linked to the increase in male hospital attendance over the weekends.

Type of injury and weapon
The majority of injuries were due to blunt force. This is similar to Uganda where blunt force is the most common injury mechanism.29 In our study, penetrating injuries were caused primarily by bottles, broken glass or knives, in contrast to other studies, which showed a predominance of gunshot injuries.16,28 The emergency medical services (EMS) often triage injuries of greater severity to larger trauma units. This could be a possible reason for the difference in the findings.

A low number of firearm injuries is similarly reported in Denmark. This may be explained by legislation in Denmark, which restricts the carrying of firearms and knives in public. In the United States there are more firearm-related injuries.

Injuries due to bottles or broken glass rather than knives resulted in the majority of penetrating injuries in our study. Similar findings of bottles causing more penetrating injuries than knives have been documented in other studies.28 The use of bottles or glass in injuries can be attributed to these objects being used opportunistically at the moment of the physical assault. Nzaumvila et al. reported that men suffer from glass-bottle injuries, which are usually from beer bottles, during the weekends.8

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![Figure 2: Injuries in the different age groups.](image-url)
economically dependent on the perpetrator and find it difficult to report sexual assault.24

Alcohol

There was an increase after midnight in victims of interpersonal violence, with associated alcohol intoxication. An increase in penetrating injuries due to bottles/glass is also seen during this period. Thus, an association between alcohol consumption and an increase in penetrating injuries due to bottles/glass can be established from these results. It has been well documented elsewhere that alcohol is associated with assaults.8,36 Alcohol use has been linked to intimate partner violence, rape and homicides.18 The frequent association between alcohol and violent, aggressive behaviour has been demonstrated in various studies.36,37 The lack of accountability for acting violently when inebriated has been described as a possible reason for antisocial behaviour.28

Weapons

Blunt objects such as sticks and metal rods were the most common assault weapons. This trend can be partly attributed to the use of items that are opportunistically found at the scene. The use of broken bottles as weapons has been highlighted in this study as it has shown to be more prevalent than knives in causing penetrating injuries.4 The bottle/glass in which the alcohol is served can also become an opportunistic weapon during the assault. Similar trends are evident in Denmark.11

Firearm injuries comprised 3.8% of the injuries in our study. In the Johannesburg trauma unit study firearms were noted to be common weapons in interpersonal violence-related injuries. The NIMSS studies confirmed that the leading cause of death was firearm injury in major cities like Johannesburg.16 It can further be postulated that firearm-related injuries decrease away from the inner city and smaller hospitals as the EMS transports patients with gunshot wounds to the larger secondary and tertiary hospitals.

Limitations of the study

The time of the patient’s presentation at the emergency department may not represent the actual time that the assault occurred.

Conclusions

Interpersonal violence causes a large number of injuries. There were increased injuries over the holiday period of November and December. A majority of injured patients presented at hospital in the last week of the month, probably due to it being the time income is received and more alcohol is used. Most injuries were during Saturdays and Sundays. There was an overall predominance of male victims.

All sexual assault victims were female. Female victims of interpersonal violence were subjected to predominantly blunt injuries. A greater importance should be placed on further investigation of intimate partner violence for the population that Leratong Provincial Hospital serves. Services addressing the needs of victims of interpersonal violence should be implemented not only at Leratong Provincial Hospital but also in community clinics to ensure continuity of care.

Any future studies that are undertaken in this field should include data on the severity of injuries. This would reveal more information on the trends of interpersonal violence injuries.

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