

**Abdominal Injury at Mbarara Regional Referral Hospital, Uganda**

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**Background:** Trauma poses a major public health challenge in Africa. This study was aimed at determining the prevalence, patterns and predisposing factors of abdominal injury in Mbarara Regional Referral Hospital (MRRH).

**Methods:** A standard questionnaire was used to record the patterns, type and predisposing factors of injuries. All patients admitted to Mbarara Regional Referral Hospital (MRRH) with a diagnosis of abdominal injury over the study period made the study population.

**Results:** Abdominal trauma accounted for 14.23% of the 836 trauma admissions seen over the study period. Fifty two percent of the injuries had been sustained on the road. Males were five times more than females and the age range was 3-88 years, with a mode of 27 years. Blunt trauma accounted for 85.71% of abdominal injury, the spleen was injured in 43.7% and fractures were associated in 27.7%. Most patients (68.9 %) were managed non-operatively.

**Conclusion:** Blunt abdominal injury was the commonest pattern of injury (85.7%). Abdominal trauma is a common emergency at Mbarara Regional Referral Hospital accounting for 14.23% of admissions due to injury. Most injuries are a result of road traffic crushes (47.1%) and assault. Alcohol consumption is a major predisposing factor. Peasants are more predisposed to abdominal injuries. Non-operative management of hemoperitoneum is safe in hemodynamically stable patients.

### Introduction

Injury accounts for 10% of all global deaths, according to world health organization (WHO) study on global burden of disease 1990.<sup>2,3</sup> For all age and sex groups, injuries are a major cause of emergency department visits.<sup>4</sup> Abdominal trauma is a leading cause of morbidity and mortality among all age groups<sup>1</sup>. While it has been stated that, motor vehicle crushes are the commonest cause of abdominal injuries<sup>5</sup> there is insufficient data that has been published on abdominal trauma in Uganda<sup>6</sup>. Mechanisms of injury often determine the severity of abdominal injury and the likely associated injuries. The associated injuries may divert the physician's attention from potentially life-threatening intra-abdominal pathology<sup>7</sup>. Accurate and timely recognition can be difficult, and delay in diagnosis is associated with significant morbidity and mortality<sup>8</sup>.

### Patients and Methods

A non-interventional, cross sectional study, of patients admitted with abdominal trauma to the department of surgery of Mbarara Regional Referral Hospital between 1<sup>st</sup> of August 2005 to 31<sup>st</sup> of March 2006 was undertaken. Mbarara Regional Referral Hospital (MRRH) is a government-owned referral and teaching Hospital. The Hospital is situated along the Kampala-Kabale highway. MRRH has an annual enrolment of 17,400 in-patients and 63,300 outpatients. The average in-patient annual enrolment for surgical wards is 2,497 (15%). An interviewer-administered pre-coded questionnaire was used for data collection. Where necessary, a review of patient's medical records (i.e. referral form, if he had been referred) was done. For the patients that underwent surgery for the injuries, details of the operation findings were obtained from the operation notes and through liaison with the surgical team.

Results

A total of 836 trauma patients were admitted during the study period of whom 119 (14.2%) patients had abdominal injury, and these made the study population. Seventy seven of the 119 (65%) were found to be non-intentional while 42(35%) were intentional injuries. The ages ranged from 3 to 88 years with a median of 27 and a mean of 30.3 years (Figure 1). There was a predominance (83.2%) of males, only 16.8% were females; giving a male to female ratio of 5:1. Children under 12 years were only 10 (8.4%) with a male to female ratio=1:1.

Fifty two percent of the injuries were sustained on the road with 30.2% occurring on village road, 13.4% on high way and 9.2% on urban road. Injuries sustained at home accounted for 15%, work place 13%, garden 6%, recreational places 8% and others 6%. Most home injuries were assaults (50.0%) followed by falls (22.2%). The spleen was the most commonly injured organ among the patients that had exploratory laparotomy while the liver was the least injured (Table 1).

Figure 1. Distribution of Trauma by Age and Sex (n=119)

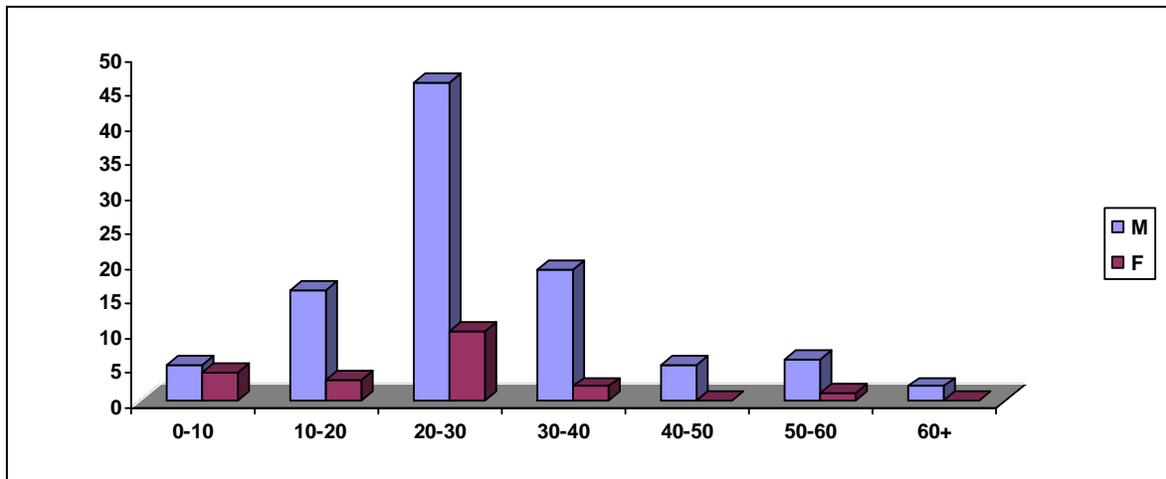
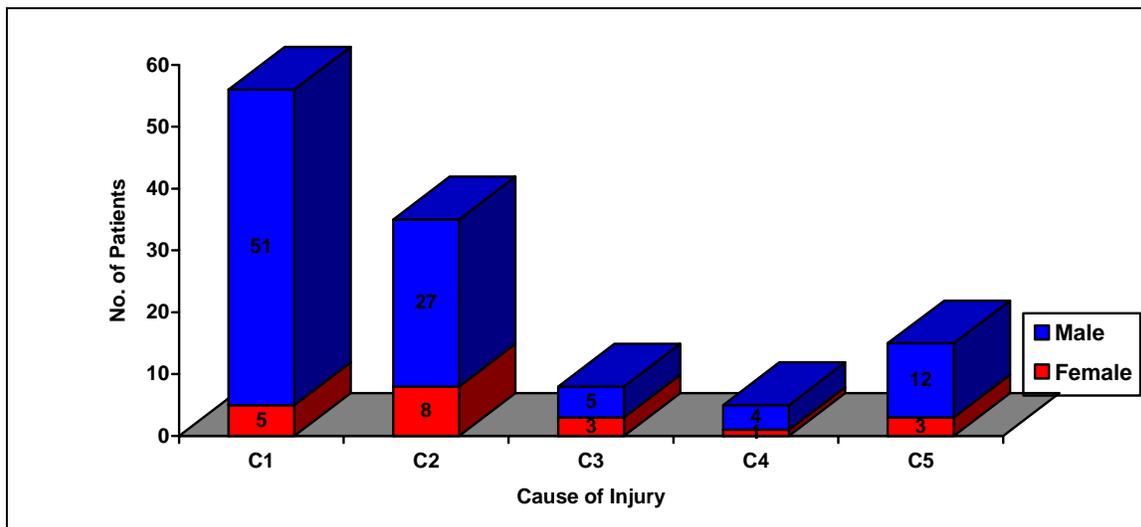
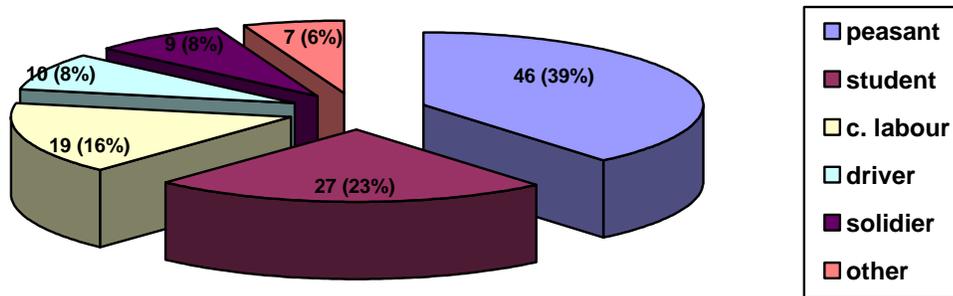


Figure 2. Causes of Abdominal Injury by Sex Distribution in 119 Patients.



KEY: C1=Road traffic crush, C2=Assault, C3=Fall, C4=Fire arm /blast injury, C5= Others (Collapsing walls 1, Animal attack 1, Sports injury 2, and other 15 patients)

**Figure 3.** Distribution of Patients by Occupation (n=119)



‘Other’= civil servant 2, house wife 2, unemployed 1, and self employed 2.

**Table 1.** Injuries of Patients Operated

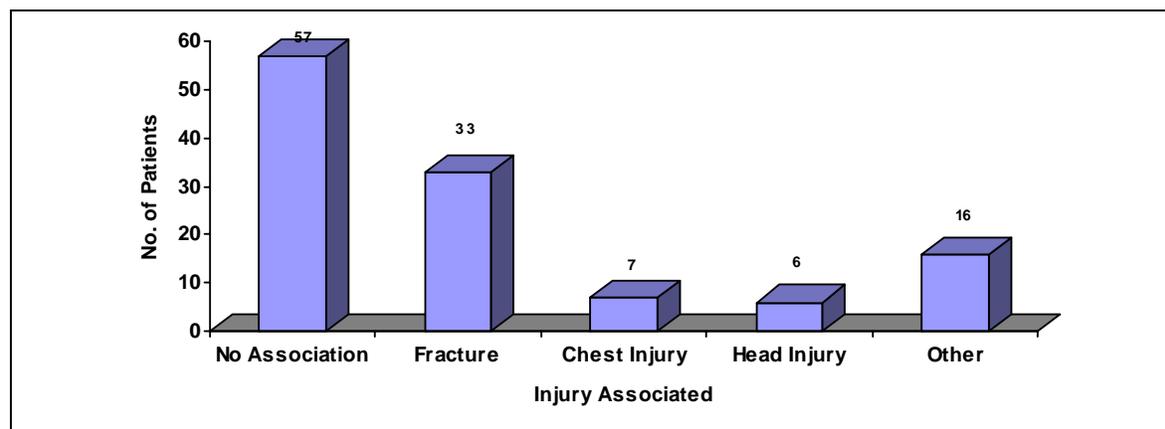
Organ Injured	Blunt Abdominal Injury	Penetrating Abdominal Injury	Total
Spleen	8 (33.3%)	---	8
urinary bladder	4 (16.7%)	2 (14.3%)	6
Ileum	3 (12.5%)	1 (7.14%)	4
Liver	2 (8.3%)	1 (7.14%)	3
Stomach	1 (4.2%)	---	1
Diaphragm	1 (4.2%)	---	1
Colon	1 (4.2%)	3 (21.4%)	4
no organ injured	---	2 (14.3%)	2
other organ injured	4 (16.7%)	5 (35.7%)	9
<b>Total</b>	<b>24 (100%)</b>	<b>14 (100%)</b>	<b>38</b>

**Table 2.** Injuries of patients not operated<sup>#</sup>

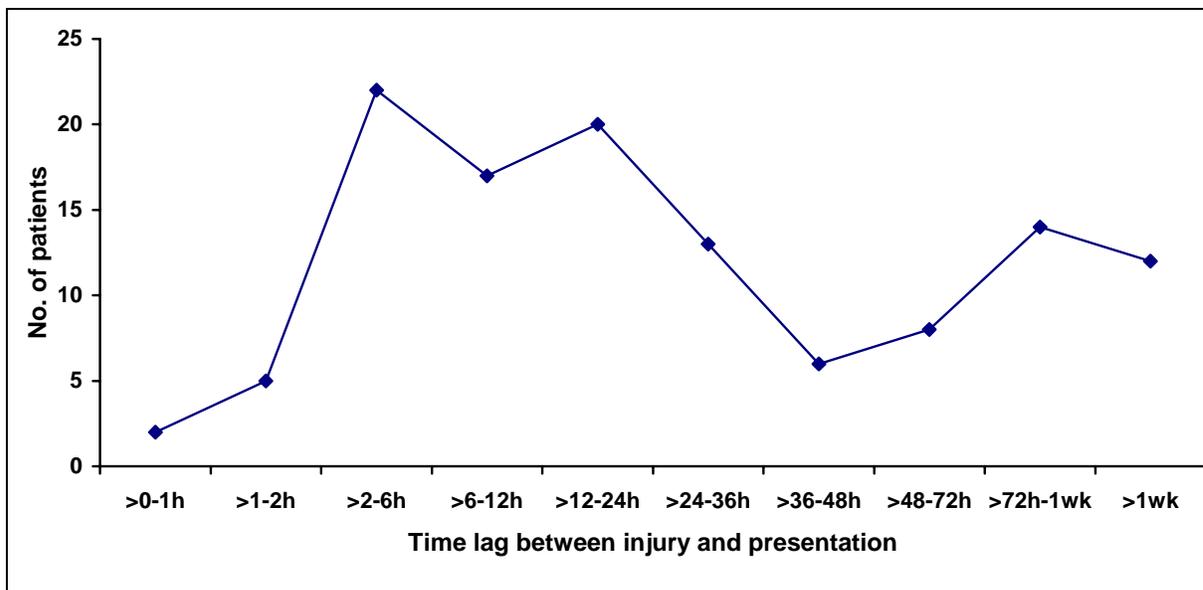
Organ Injured	Blunt abdominal injury	Penetrating abdominal injury	Total
Spleen	40 (51.3%)	---	40
Urethra	21 (26.9%)	1 (33.3%)	22
Liver	5 (6.4%)	---	3
Kidney	3 (3.8%)	---	3
Other	9 (11.5%)	2 (66.7%)	11
<b>Total</b>	<b>78 (100.0%)</b>	<b>3 (100.0%)</b>	<b>81</b>

<sup>#</sup>Diagnosis made on clinical examination and imaging.

**Figure 4.** Distribution of Associated Injury.



\*\*Other’ included; bruise=9, cuts=6, abrasions=1

**Figure 5.** Time Lag between Injury and Presentation.**Table 3.** Predisposing factors to Abdominal Trauma

Variables Cause	Odds Ratios	95% CI	p-value
Assault	1.8	1.1	<b>0.02**</b>
Motor vehicle crush	0.8	0.5	<b>0.43</b>
Fall	0.9	0.4	<b>0.95</b>
<b>Circumstances</b>			
Alcohol	2.3	1.1	<b>0.03**</b>
Overloading/Over speeding	1.1	0.7	<b>0.75</b>
Motorcycle involvement	0.5	0.3	<b>0.03**§</b>
Robbery	1.4	0.7	<b>0.49</b>
<b>Occupation</b>			
Peasant	1.6	1.1	<b>0.03**</b>
Student	0.9	0.6	<b>0.71</b>
Casual labourer	1.0	0.6	<b>0.97</b>
Driver/Motorcyclist	<b>1.1</b>	<b>0.5</b>	<b>0.86</b>

\*\* Statistically significant, § Odds ratio with negative association.

Blunt Abdominal injury accounted for 85.7% [95% CI=78.1%-91.5%] and penetrating abdominal injury for 14.3% [95% CI=8.5-21.9%]. The majority (70.6%), of penetrating abdominal injury resulted from stab injuries and 29.4% from fire arms. Four (40%) children under 12 years were operated, one was a negative laparotomy. Abdominal injury in 52% was more prevalent among patients injured in motor vehicle crushes (than any other cause of injury (p-value =0.17). Other injuries followed closely (Figure 2). Peasants and students accounted for 39% and 23% of cases respectively (Figure 3)

Table 3 shows the factors considered to have contributed to occurrence of the trauma. The risk factors for abdominal injury included assault, use of alcohol, use of motorcycle as a means of transport and being a peasant. Associated injuries included fractures, chest and head injuries (figure 4). Sixty five percent of patients arrived to hospital in private cars; only 17% used formal ambulances, 3% used police vehicles, 12% arrived on motorcycles and the rest either on foot or other improvised mode of transport. The majority of patients presented more than six hours after the injury, as shown in Figure 5.

## Discussion

Trauma, in all its varieties continues to pose a significant public health challenge. This study has shown the prevalence of abdominal injury and uncovered important findings in patterns and predisposing factors in patients admitted to Mbarara Regional Referral Hospital.

### Social demography of abdominal injuries:

It is well known from other studies in the region, that there is a male predominance in injuries.<sup>11</sup> In this study, the male to female ratio was 5:1, lower than reported in other hospital based studies in Africa.<sup>11, 10, 11</sup> Males are the bread earners of most households, and are probably more involved in activities that predispose them to injury in the process of trying to earn a living. The mean age was 30.4 years and mode of 27 years. This represents the economically productive age group in Uganda. Peasants form a big number (29.9%) in this study followed by students/pupils (24.4%), (figure 4) which correlates well with other similar studies.<sup>11</sup> At both extremes of age the rates of abdominal injuries are low as expected. The study also shows that gender violence with more females assaulted at home is still rampant in our communities.

### Prevalence of abdominal injury:

Abdominal injuries in this study had a prevalence of 14.23% (CI=12.0% to 16.8%). In comparison with other injuries like fractures, with the highest prevalence at 29.2% (CI=21.0% to 38.5%) as shown in figure 5. Prevalence of 14.3% for penetrating abdominal injury in this study compares well with other studies.<sup>14</sup> Musau found the major cause of penetrating injuries to be stab wounds (64.2%), which is a similar result to what was found (64.3%).<sup>9</sup>

Studies from Nigeria show a higher prevalence of penetrating abdominal injury secondary to gun shot wounds, compared to this study where gun shot wounds were responsible for only 29.4%.<sup>11, 13</sup> However, judging from the conclusions of one of the authors, it is clear that armed violence was high in the community in which he conducted his study. On the other hand, MRRH where this study was conducted serves an area that is relatively peaceful with no war and violence is not common.

Prevalence of blunt abdominal trauma in this study was 85.7% which is about twice what was found by Edino, in Nigeria (46.3%).<sup>13</sup> The location of MRRH on a major highway could account for the high number of blunt abdominal injuries seen. In this study most injuries (52.0%) were sustained on the road (figure 3), which agrees with other studies which have shown that MVAs are the biggest cause of blunt abdominal injury.<sup>14,15</sup> While there is consistence that, the spleen is the most commonly injured organ in blunt abdominal injury, in penetrating injury there is no consensus.<sup>12, 14,17</sup>

### Cause and Circumstances of the injury:

Abdominal injury is more prevalent (52.0%) among patients injured in motor vehicle crashes (figure 2) than any other cause of injury (p-value=0.17). Other injuries follow closely (figure 2). Similar studies on injuries in this hospital and from other areas show a similar trend.<sup>12,18,19</sup> Road transport (cars, bicycles, motorcycles) is the commonest form of transport in Uganda, thus most injuries occur on the road (p-value=0.04).<sup>5</sup> Village roads accounted for 30.25%, while high way and urban roads account for fewer (figure 3). Similar findings have been observed by other researchers.<sup>12,14,23</sup> It is possible that vehicles in the more rural areas are in poor mechanical condition and are driven by learners and unlicensed drivers/riders on the village roads, since it is contrasted sharply by a low accident rate (9.24%) on the urban roads (figure 3). Further more, there is no effective policing on the roads in the more rural areas.

Alcohol drinking is a significant association as a predisposing factor in abdominal injury (OR=2.32, CI=1.14 - 4.74). This odds ratio shows an increased risk to abdominal injury in people who took alcohol (p-value=0.03) as shown in table 3. It has been shown that, there is significant association between blood alcohol levels and road traffic accidents.<sup>20</sup> A significant number of accidents (9.2%) happened in association with a motorcycle taxi, (p-value=0.03) however, it causes fewer abdominal injuries than those on the other parts of the body as has been observed by other researchers.<sup>19</sup>

Assault accounted for 29.4% of the abdominal injuries. Half occurred at home, the rest at the work place [OR=2.02 (95% CI=1.05 - 3.89), p-value=0.03] and the victims were more likely to be women, and this is echoed by other studies.<sup>23,24</sup> The reasons advanced were mostly domestic violence and punishments being administered to students, factory and farm workers.

### Patterns of Abdominal injury

Eighty one patients (68.1%) were not operated, this has become popular in some areas.<sup>24</sup> In the non-operated group, the spleen was the leading organ injured 40 (51.3%). Further more, a strong association was observed between urethral injury 21 (26.9%) and pelvic fracture, where 30% of pelvic fractures were associated with urethral injury. The liver and kidney accounted for the rest (6.4% and 3.8% respectively). Interestingly there was only 1 (33.3%) urethral injury and only 2 patients with minor injuries in the non-operated group.

Spleen was the most commonly injured organ (7.8%) in patients with blunt abdominal injury who were operated. Ruptures accounted for 36.8% (18) of the injured spleens in patients who were operated, followed by lacerations 14 (28.9%). The urinary bladder accounted for 3.9% and all were ruptures seen at operation. The rest were ileum and liver ruptures.

It is clear from the findings at operation that, the colon was the commonest organ (17.6%) injured in penetrating trauma followed by the urinary bladder (11.8%). Liver and ileum contributed 2.9% each. Two patients with penetrating abdominal injury were found to have normal findings at laparotomy. This differs from studies reviewed, whose analysis combined both blunt and penetrating trauma.<sup>12,13</sup> This could be because interpersonal violence with stub and gun shots is very prevalent in the geographical area where he carried out the study. Although we did not specifically examine missed injuries, it is recognized that this may be a concern in non operated patients. In this study, a patient with penetrating abdominal injury was more likely to be operated upon.

Penetrating injury was found to be less associated with other injuries (52.9%) than blunt injury (47.1%).<sup>25</sup> Head injuries were the second commonest association, and not the first, as was observed by Landau *et al.*, in Cape Town.<sup>25</sup> It is possible that in Mbarara town, with no pre-hospital care and ambulance system, not as many severely head injured patients would reach hospital as it would be in Cape Town, South Africa

The patterns of injury in children were similar to the adults. Only four children were operated and one was a negative laparotomy. None of the children is known to have died. Observations by some researchers do not correlate well with this current study especially on causes which were different.<sup>18,31</sup> MVAs caused fewer injuries (30%) which could be due to the small sample size that was captured. This was so because we not specifically look at abdominal injuries in children but in the general population, thus numbers are not easily comparable.

### Pre-hospital care

There is a bimodal presentation of patients to hospital at 2-6 hours and 72 hours to one week (figure 7). This is in sharp contrast with another study in Uganda which found that two-thirds of patients in Kampala arrive in hospital within thirty minutes.<sup>27</sup> This is possible since our study was conducted in an area where patients come from semi urban and rural areas where transport means from such areas is difficult to get, and there is no system in place (e.g. ambulance services) to bring the injured to hospital in time. The second peak represents patients that were referred from other health units. In studies reviewed (from UK and Australia), trauma patients reach a competent trauma centre in the shortest time possible, usually less than one hour.<sup>29,30</sup>

Most patients (65%) arrived at the hospital by public or private means of transport, some by the police 'pick-up' vehicle, and few referrals by ambulance. The delay in presentation to hospital, and the mode by which patients arrive, shows gaps in the referral system and is clear testimony that pre-hospital care is lacking.

### Conclusions

The common pattern of abdominal injury was blunt abdominal injury (85.7%) with prevalence of 14.23%. Young adults are the most affected, and MVAs cause the highest number of abdominal injuries. The major predisposing factors are assault and alcohol consumption.

The hallmark of trauma management is prevention, thus initiatives to minimize trauma must be geared towards it. This requires public education and enforced legislation. Injury control centre-Uganda in conjunction with the Uganda police in 2004 organized campaigns on road safety, but these need to be continued to see a valuable outcome.

### Acknowledgements

Thanks to the Government of the Kingdom of Belgium (and BTC – Uganda), for the financial support, members of staff in the Department of Surgery – MUST and to Dr. R. Twesigye for helping with the statistics. .

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