International Journal of Research in Medical Sciences
Zargar OU et al. Int J Res Med Sci. 2022 Nov;10(11):2461-2466
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20222842

Original Research Article

An audit of trauma related mortality in Government Medical College, Jammu

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Received: 03 September 2022
Revised: 01 October 2022
Accepted: 07 October 2022

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ABSTRACT

Background: Surgical audit is defined as a systematic, critical analysis of the quality of surgical care that is reviewed by peers against explicit criteria or recognized standards, and then used to further inform and improve surgical practice with the ultimate goal of improving the quality of care for patients. Aims and objectives were to study the profile of patients who died due to trauma and to identify factors involved in both pre-hospital and hospital care.
Methods: This study was conducted in the department of surgery, GMC Jammu during over a period of one year. The profile of all traumatic deaths was studied to evaluate the various causes of trauma related mortality, age and sex relationship, mortality rate, prognostic indicators and also to identify factors involved in both pre-hospital and hospital care.
Results: A total of 414 deaths occurred due to trauma. Out of these 317 patients were males and 97 patients were females comprising male to female ratio of 3.3:1. Road traffic accidents accounted for majority of the deaths (57%) followed by falls (35.5%), assaults (5.07%) and miscellaneous causes (2.43%). In children less than 15 years of age, traumatic deaths were more due to falls, whereas in adults it was more due to road traffic accidents. In our study there was steady rise of fatalities during weekend days with a peak on Saturday. Cranio-cerebral injuries were responsible for majority of the traumatic deaths (85.9%) followed by limb injuries including fractures (38.4%), thoracic injuries (27.7%), abdominal injuries (24.6%), pelvic injuries (20.7%) and spine injuries (14.2%).
Conclusions: This study can be the impetus to motivate committed professionals in the trauma specialty to help in the organization of available facilities and to upgrade existing facilities for a better response to injury, which should not be different from other public health responses.

Keywords: Audit, Critical, Mortality, Systematic, Trauma, Vulnerable

INTRODUCTION

Surgical audit is an educational exercise that is thoroughly grounded in everyday practice. Research shows that audit and feedback is an effective educational strategy and helps participants analyse their performance and plan effective responses to improve their performance.[1] The purpose of audit is to examine whether what one thinks is happening really is, and whether current performance meets existing standards. The key feature of audit is that it involves reviewing actual surgical performance, including outcomes.[2] This clinical experience is compared with accepted standards of what that performance should be. As such, it should be a stimulus and source of material for learning and quality improvement.[3]

Mortality in serious injuries is 6 times worse in a developing country such as India as compared to a developed country. In addition to excess mortality, there

is tremendous burden of disability in developing nations. India loses approximately 2-2.5% of its GDP to only road traffic injuries.[4] In modern times, with increasing industrialization and introduction of more rapid methods of transport, the incidence and severity of road traffic accidents have increased**.** To appreciate the medical and social magnitude of this problem, it needs only to be recognized that almost 10 million Americans have head injuries every year and about 20% of these are serious enough to cause brain damage.[5,6]

India is no exception to the world scenario. The vastness of its land, difficult terrain, varying climate, faulty roads, non-observance and poor enforcement of traffic rules and poor education of the people makes the picture look even grim. Road traffic accidents has already acquired the status of a major health hazard in most urban areas of this country. Statistics from most big cities testify to this fact. It appears as if children and young adults are particularly prone to road traffic accidents.[7] Road traffic accidents form the largest group in most of the series and falls form a close second. In a growing town like Jammu with its congested roads and far from satisfactory traffic arrangements, the incidence of traffic accidents is on the rise. The increase is also due to negligent driving, driving without helmets, over speeding and driving under the influence of alcohol. The other frequent cause of trauma especially in children is fall. Generally fall from the roof top is common during the kite flying season. Because of the serious immediate and delayed consequences of trauma, it is imperative to manage such patients urgently and systematically. This not only includes proper evaluation of the patients at the time of presentation, so as to separate more serious from the less serious cases, but also urgent resuscitation and support of the latter group.

Aims and objectives

To study the profile of patients who died due to trauma and to identify factors involved in both pre-hospital and hospital care.

METHODS

This observational cross-sectional study was conducted in the Department of Surgery, Government Medical College Jammu during the time period from 1st November 2018 to 31st October 2019 after approval from the members of ethical committee. A sample size of 414 cases was taken to study the profile of all traumatic deaths for a period of one year to evaluate the various causes of trauma related mortality, age and sex relationship, mortality rate, prognostic indicators and also to identify factors involved in both pre-hospital and hospital care. The recorded data was compiled and entered in a spreadsheet on Microsoft Excel and the analysis was performed on SPSS (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean and standard deviation, while the categorical variables were presented as frequencies and percentages. Student's independent t-test was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing the categorical variables. Statistically significant data was considered when the p value was less than 0.05. All p values were two tailed.

Inclusion criteria

The study included all patients admitted, managed conservatively or surgically and who died within 4 weeks of trauma, all patients who were admitted but died before surgery and underwent postmortem examination (in medico-legal cases), all patients of trauma who were brought dead and underwent autopsy examination.

Exclusion criteria

Burn patients and electrocution patients were excluded.

RESULTS

A total of 15,049 patients were admitted in the department of surgery, Government Medical College, Jammu w.e.f. 1st November 2018 to 31st October 2019. Out of these 10,985 (73%) patients were admitted through the Emergency and 4,064 (27%) patients were admitted on an out patient basis. Total numbers of Trauma patients admitted were 4,032. Out of these 3,008 patients were males and 1,024 patients were females. A total of 414 deaths occurred due to trauma. Out of these 317 patients were males and 97 patients were females comprising male to female ratio of 3.3:1.

Table 1: Age and sex incidence of traumatic deaths.

Age (years)	Male	Female	Total	Percentage
0-15	13	13	26	6.3
16-30	99	29	128	31
31-45	97	16	113	27.3
46-60	67	17	84	20.3
61 and above	41	22	63	15.1
Total	317	97	414	100
Percentage	76.5	23.5	100	-

The analysis of 414 cases as depicted in Table 1 revealed that 317 (76.5%) cases were males and 97 (23.5%) were females. Thus, giving an overall male to female ratio of 3.3:1.

Table 2: Distribution of trauma related mortality.

Mode of traumatic deaths	Number of patients	Percentage of patients
Road traffic accident	236	57
Falls	147	35.5
Assaults	21	5.07
Miscellaneous	10	2.43
Total	414	100

The analysis of 414 patients as depicted in Table 2 revealed that 236 (57%) traumatic deaths occurred due to road traffic accidents (RTA's); 147 (35.5%) due to falls; 21 (5.07%) due to assaults and 10 (2.43%) deaths due to miscellaneous causes. Falls were responsible for 35.5% of all the deaths included in the study as shown in pie chart. A higher incidence of deaths due to fall was seen in children less than 15 years of age. Assaults were the cause of deaths in 5.07% cases and majority occurred in people between 30-60 years of age. Miscellaneous causes included deaths due to fire-arm injuries, blast injuries and deaths due to falling objects and accounted for 2.43% of all trauma related deaths.

Table 3: Mode of traumatic deaths sustained in various age groups.

Age (years)	Mode of traumatic deaths				
	Road traffic accidents	Falls	Assault	Miscellaneous	Total
0-15	9	17	-	-	26
16-30	84	36	4	4	129
31-45	67	34	8	4	113
46-60	38	38	6	2	84
61 and above	38	22	3	-	63
Total	236	147	21	10	414
Percentage	57	35.5	5.07	2.43	100

The analysis of Table 3 reveals that in children less than 15 years of age, traumatic deaths were more due to falls than road traffic accidents. Deaths due to road traffic accidents were more in the age group of 16-45 years of age as compared to falls and other causes.

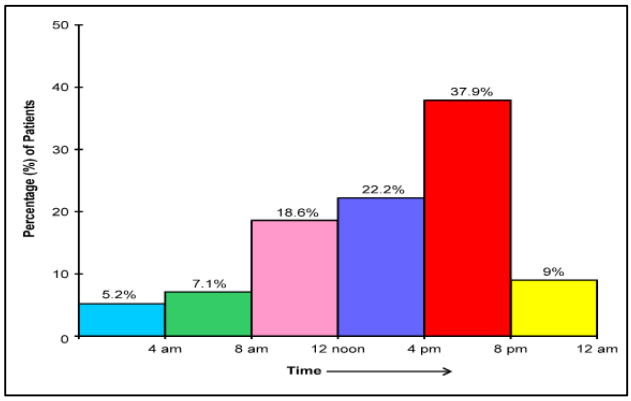

Figure 1: Time-wise distribution of traumatic deaths.

As shown in Figure 1 in our study majority of the deaths (37.9%) occurred between 4 pm and 8 pm of the day (peak time for accidents) i.e. during evening hours which can be attributed to the fact that these are the office-off hours of the day, recreational time of the young, evening walk time of most of the people especially elderly.

As depicted in Figure 2, in our study there was steady rise of fatalities during weekend days with a peak on Saturday.

As shown in Figure 3 cranio-cerebral injuries were responsible for majority of the traumatic deaths (85.9%) followed by limb injuries including fractures (38.4%), thoracic injuries (27.7%), abdominal injuries (24.6%), pelvic injuries (20.7%) and spine injuries (14.2%).

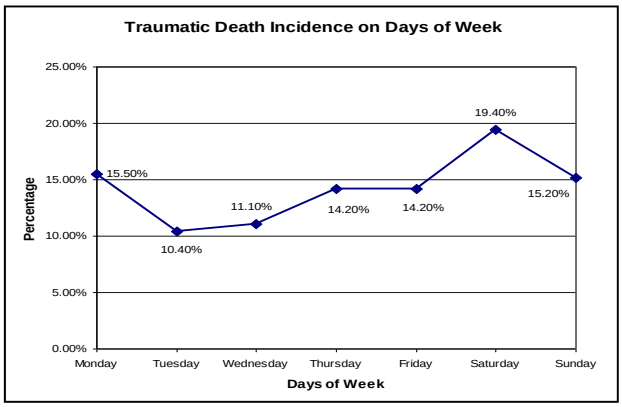

Figure 2: Day-wise distribution of traumatic deaths.

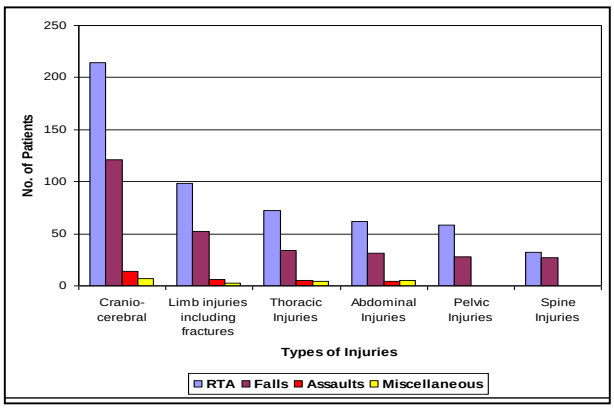

Figure 3: Distribution of types of injuries sustained in traumatic deaths.

As depicted in Figure 4, in this study 223 (53.9%) deaths occurred within 12 hours of trauma and 77 (18.6%) deaths took place between 12 to 24 hours, while 114 (27.5%) deaths occurred after 24 hours as shown in pie diagram.

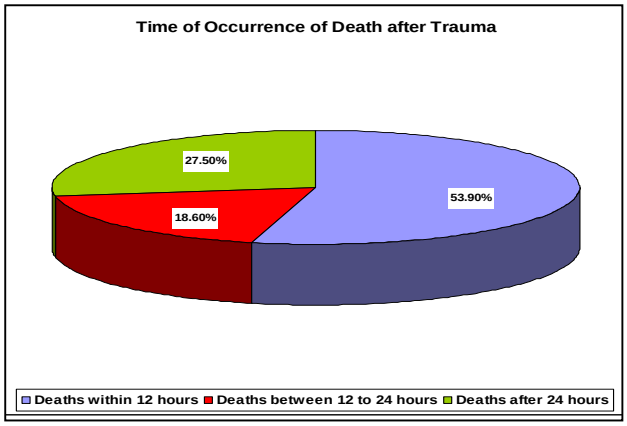

Figure 4: Time of occurrence of death after trauma.

Total number of brought dead patients were 102.

Total number of patients who were managed conservatively and then expired were 312.

Total number of patients who went surgical intervention and then expired were 14.

In our study most common solid organ involved in blunt trauma abdomen was liver accounting for 23% cases followed by spleen in 18% cases, small bowel in 9% cases, kidneys in 7.8% cases, vascular injury in 7% cases, diaphragm in 2.5% cases whereas in 32.7% cases there was no organ involvement among the blunt trauma abdomen cases.

Under the influence of alcohol

Although reluctance was shown in giving history of alcohol intake in this study 54 (13%) cases were found to have consumed alcohol before the injury.

DISCUSSION

In India, trauma is one of the leading causes of death and disability with 400,000 road crashes, 85,000 deaths, and 1.2 million seriously injured cases every year in India. The fatality rate is expected to escalate by 5-fold by the year 2020 as projected by the World Bank. India and China that bear the maximum onslaught of this scourge have published research of only 0.9% and 0.7%, respectively on road traffic accidents. Epidemiology of traumatic deaths is an important tool to assess the existing trauma care system.

In the present study, profile of 414 traumatic deaths was analysed to evaluate the age and sex relationship, mortality rate, prognostic indicants and outcome, and also to identify various preventable causes predisposing to such fatalities. Most of the patients in our study were males constituting 76.5% cases while females accounted for the remaining 23.5% cases, thus giving the male to female ratio of 3.3:1. In the experience of most of the authors males were affected more than the females. In a series of 532 cases reviewed by Barr and Ralston, there were 79.1% males and male to female ratio was 3.8:1.[8] Similar observations were made by Rowbotham et al.[9] Higher death rate in males as compared to females was also observed by Nestvold et al.[10]

In our study the commonest mode of traumatic death was road traffic accidents accounting for 57% cases followed by falls and assaults causing 35.5% and 5.07% deaths respectively. Mode of injury depended to some extent upon the age of the patient. In children below 15 years of age majority of the deaths were due to falls, whereas in adults, majority of the deaths occurred due to road traffic accidents. In a study of 2000 cases, Kalyanaraman et al found that road traffic accidents contributed 42% of the cases while falls were responsible for 38.7% cases.[11] He also found that falls were the cause of death in 53.6% deaths in children below 12 years of age. In a survey conducted in United States, Anderson et al observed that motor vehicle accidents were responsible for 49% deaths and falls caused 28% of them.[12] Swan et al, reported that of all the road traffic accident cases 19% were pedestrians while vehicle occupants were involved 69.5% times.[13] In the present series of 236 road traffic accident deaths, 42.8% (101) were pedestrians, 39.4% (93) cases drivers while in 17.8% (42) cases it was the passenger who was involved.

After surveying the problems of head injuries in India, Sambasivan concluded that in road traffic accidents, pedestrians suffer the most. The reasons attributed were poor engineering of roads and inadequate facilities for pedestrians in addition to non-observance of traffic rules and poor education of people.[14]

In our study road traffic accidents accounted for 57% of total deaths in this series, the reason being non observance of traffic rules, over speeding and improperly engineered roads and inadequate pathways provided for pedestrians. This view has also been reflected in the study conducted by Devadiga and Jain while surveying the problem of trauma in India.[15] Another factor responsible for trauma related mortality in road traffic accidents was use of helmets by two wheelers. In this study 69 of 93 drivers were found to be driving two wheelers and 48 were without helmets compared to 21 who were wearing helmets. Lewin and Kennedy suggested that the use of helmet reduced the risk of head injury by 30% and the risk of death by 50%.[16] It has been proved that mandatory use of helmets by motorcyclists can lead to two-third reduction in road trauma mortality, but has no consistent acceptance or enforcement in India. Hence, helmet use needs more emphasis in the education and enforcement aspect of trauma prevention.

In our study most common organ involved in abdominal trauma was liver accounting for 23% cases followed by spleen in 18 % cases, kidneys in 9% cases, small bowel in 7.8% cases, vascular injury in 7% cases and

diaphragm in 2.5% cases. Smith et al conducted a study on 1224 blunt trauma abdomen patients in Liverpool hospital in New South Wales, Australia and found that liver was the most common solid organ involved accounting for 17.5 % cases, followed by spleen in 15.9 % cases, small bowel in 13.8% cases, vascular injury in 13.7% cases, pancreas in 13.2% cases, kidneys in 11.7% cases, colon in 8.7% cases and retroperitoneum in 4.8% cases.[17]

Alcohol consumption was found to have a significant association with trauma related mortality. In our study history of alcohol was positive in 54 cases accounting for 13% cases. This is almost similar to a study by Galbraith et al in Pondicherry who found an incidence of 16%.[18] This fact again calls for more education and enforcement of laws regarding drinking and driving.

Measures to be taken

The issue of the inadequacy of the pre-hospital service needs to be addressed urgently. An effective trauma system must ensure that patients are taken to the appropriate facility to treat their level of trauma. This does not appear to be happening, and needs to be addressed. Poorly defined and executed referral protocols result in a significant number of potentially preventable second-phase deaths as severely injured trauma patients are taken to inappropriate facilities. The place of first medical encounter is decided more often by the relatives, bystanders, and vehicle crew. It is only natural, that in this chaos, the patient is taken to the closest medical facility, which may be grossly inadequate to deal with serious trauma. The golden hour is thus spent without appropriate resuscitation. The trauma victim is sent from center to center with no specific medical command until he finds a place that will accept him, where, either the service is available/affordable or in an overstretched government hospital where the patient must be treated. There is no standardized protocol for the transfer of injured patients in India, a process that is well known to be potentially hazardous. This only emphasizes the fact that pre-hospital care is in a nascent stage of development in India in urban areas and grossly inadequate in smaller towns and rural areas. In India, proper coordination between the trauma receiving facility and ambulance services is present in as low as 4 percent of the pre-hospital network. It has been clearly proved that minimizing pre-hospital time greatly helps in reducing trauma mortality and morbidity.

There are few “stand alone” trauma centers in the major cities of India. In other parts of India this concept will not be financially sustainable especially at the expense of other national health programs. Since the rate of accidents is rapidly rising, the need of the hour is to start customized trauma care programs. Pilot trauma care programs have to be integrated into the existing facilities of the public health system, especially in high accidents rate areas of the country, at least for the time being, to jumpstart the development of systems. These concepts once executed should be adequately monitored, evaluated and validated for maximum efficacy. There is need for improvements in scene care at the site of accident and provision of adequate resuscitation prior to transfer from the scene site or from the primary medical center. Inter-hospital communication should be made prior to transfer of patient either on telephone or by sending a summary of initial medical conditions. It should be ensured that mode of transportation is adequately equipped to transfer the patient.

To date, several countries, such as the United States, Canada, the United Kingdom, and Australia, have attempted to improve the care of severely injured patients by implementing designated (certified) trauma centers and trauma systems. Similar centers need to be established and courses like advanced trauma life support. Systems should be included in resident training so that an adequate workforce is generated. We need to put emphasis on development of trauma centers, and staff should be designated for the same in order to decrease heavy pressure on emergency staff.

The limitations of our study included various systems or process errors which included delay from admission to surgery, delay in recognizing complications, and delay in transfer to a surgical unit. The lack of effective accident prevention strategies in our social setup leads to a higher number of trauma victims. Traffic accidents were the most frequent mechanisms of injury. The typical trauma victim was a young healthy adult male affecting productive years of life. This is the result of a total disregard of safety precautions Also, lack of facilities like shortage of high dependency units, shortage of beds in the intensive care units, nonavailability of blood or blood-related products at times, and shortage of paramedical and nursing staff were some of the system-related shortcomings. Availability and appropriate use of intensive care unit facilities will reduce cardiovascular, renal, and respiratory complications and reduce the risk of death. We need to strengthen our infrastructure including high-dependency units, and increase the number of beds in intensive care units.

CONCLUSION

It is concluded that in Jammu with rapid urbanization and industrialization and increasing number of automobiles, traumatic deaths have become a common occurrence. Majority of the patients affected being those belonging to the productive age group of life resulting in a considerable strain on the economy of the society and a continuous burden on the family. The death and disability caused by traumatic deaths need to be considered and emphasis be laid on the prevention of such mishaps. This study can be seen as one of the scenarios of trauma problems in rapidly urbanizing areas in India. Government hospitals ultimately bear the major burden of the seriously injured persons at least during the acute

and resuscitative phase of trauma. This study can be the impetus to motivate committed professionals in the trauma specialty to help in the organization of available facilities and to upgrade existing facilities for a better response to injury, which should not be different from other public health responses.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Gordon MW, Luke C, Robertson CE, Busuttil A. An audit of trauma deaths occurring in the accident and emergency department. Emerg Med J. 1989;6(2):107-15.
2. Moodley NB, Aldous C, Clarke DL. An Audit of trauma related mortality in a provincial capital in South Africa. S Afr J Surg. 2014;52(4):101-4.
3. Cales RH, Trunkey DD. Preventable trauma deaths: a review of trauma care systems development. J Am Med Assoc. 1993;254:1059-63.
4. Jennett B, Teasdale G, Galbraith S, Pickard J, Grant H, Braakman R, et al. Severe head injuries in three countries. J Neurol Neurosurg Psychiatr. 1977;40(3):291-8.
5. Mishra HB, Shadangi TN. Predictability of prognosis in head injury using Glasgow Coma Scale as an index. J Neurol India. 1990;38:177-82.
6. Ropper AH. Trauma of the head and spinal cord. In: Braunwald E, Petersdorf RG, Wilson JD, Martin JB, Root RT, Fauci AS, eds. Harrisons' Principles of Internal Medicine. International edition. McGraw Hill Inc.; 1991:1991-2002.
7. Bindroo S, Saraf R. Lessons learned in a developing nation. Int J Surg Surg Mortal Audit. 2015;100(6):1026-32.
8. Barr JB, Ralston GJ. Head Injuries in a peripheral hospital, a five-year survey. Lancet. 1964;2(1):519-22
9. Rowbotham GF, Maciver IN, Dickson J, Bousfield ME. Analysis of 1,400 cases of acute injury to the head. Br Med J. 1954;1(4864):726.
10. Nestvold K, Lundar T, Lonnum A. Head injuries during one year in a Central Hospital in Norway- a prospective study. J Neuroepidemiol. 1988;7:134-44.
11. Kalyanaraman S, Ramamoorthy K, Ramamurthi B. an analysis of 2000 cases of head injury. J Neurol India. 1970;18(4):3-11.
12. Anderson ID, Woodford M, De Dombal FT, Irving M. Retrospective study of 1000 deaths from injury in England and Wales. Br Med J. 1988;296(6632):1305-8.
13. Swann IJ, Millian R, Strong I. Head injuries at an inner city- accident and emergency department. Br J Accid Surg. 1981;12(4):174-8.
14. Sambasivan M. Survey of the problems of head injuries in India. J Neurol. 1977;25(2):51-9.
15. Devadiga KV, Jain SP. An analytical study of acute head injury. Indian J Surg. 1969;52(1):22-6.
16. Lewin W, Kennedy WFC. Motor cyclists, crash helmets and head injuries. Br Med J.1956;1:125-6.
17. Smith J, Caldwell E, D'Amours S, Jalaludin B, Sugrue M. Abdominal trauma: a disease in evolution. ANZ J Surg. 2005;75(9):790-4.
18. Galbraith S, Murray WR, Patel AR, Knill-Jones R. The relationship between alcohol and head injury and its effect on the conscious level. J Br Surg. 1976;63(2):128-30.

Cite this article as: Zargar OU, Ashraf N, Albina A, Iqbal J, Dhingra NC. An audit of trauma related mortality in Government Medical College, Jammu. Int J Res Med Sci 2022;10:2461-6.