

## Effectiveness of TRISS to Evaluate Trauma Care in a Developing Country

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### Abstract

**Introduction:** Trauma is a major health problem worldwide. Prediction of probability of survival in trauma patients is a basic requirement for evaluation of trauma care. Trauma and Injury Severity Score (TRISS) is used for scoring injury severity and have been suggested as a measure of the quality of trauma care.

**Objective:** The Objective of the study is to determine mortality, morbidity, hospital stay and other measures of severity using Trauma and Injury severity Score in penetrating and blunt patients.

**Study design:** Descriptive case study.

**Setting:** Surgical floor of Mayo Hospital Lahore for duration of 12 months from December 11, 2006 to December 10, 2007.

**Methods:** Data was collected from patients presenting in emergency fulfilling the inclusion criteria and were treated accordingly. Probability of survival was calculated for each patient using the TRISS. Patients were followed to evaluate morbidity and mortality. All the data calculated on specially designed proforma and evaluated using SPSS Software.

**Results:** Among 103 trauma patients, 89% of the patients were young males. Road traffic accidents (66%) and firearm injury (64%) were the main causes of blunt and penetrating trauma respectively. Probability of survival turned out of to be 0.9 whereas mortality rate was 7.4% and 9% for blunt and penetrating trauma patients respectively.

**Conclusion:** TRISS is quite helpful in determining probability of survival in trauma patients and should be used to evaluate the efficacy and quality assurance of emergency treatment in various hospitals of Pakistan and to identify various areas requiring improvement in trauma management.

**Keywords:** Trauma; Trauma severity index; Trauma score

### Introduction

Trauma is an ever increasing problem all over the world. It is the third most common cause of death for all ages [1], in population under age 30; trauma is responsible for more deaths than all diseases put together [2], with no significant difference in the spectrum of injuries among males and females [3].

Trauma is a major problem in the developed world. About 25,000 people are killed in the UK every year and for every patient killed approximately 20 are severely injured. The cost incurred, both in terms of patient care and loss of earnings are quite huge [4].

A report from the Royal College of Surgeons of England, "Management of patient with Serious Injury", highlighted in 1988 that there were many problems with trauma care in the UK. Recommendations included the increased use of standardized regimens for treatment such as Advanced Trauma Life Support (ATLS®) system and improvement in prehospital care [4].

Audit and research are vital components of any health care system. Trauma patients may present with various combinations of injuries of varying severities and these patients therefore present particular challenges. For comparisons between groups of patients reliable and valid ways of numerically summarizing a patient's injuries are required. These methods must also identify others factors that influence the subject's response to injury [4].

Trauma is a significant national health problem in Pakistan and one of the major causes of death. It is attributed to inadequate pre-hospital care, resuscitation and definitive care. However, very few objective data on Injury severity outcome and process of trauma care has been published in Pakistan [5].

The lack of trauma related data is a major impediment in recognition of deficiencies in care. Trauma database can provide

necessary information for monitoring and modifying trauma care and can be compared with the database of developed countries using trauma and injury severity score as a reliable trauma outcome tool.

### Materials and Methods

**Setting:** The study was carried out in the south surgical unit, Mayo Hospital, Lahore.

**Duration:** The duration of study was 12 months after the approval of synopsis from December 11, 2006 to December 10, 2007.

**Sample size:** A total number of 103 patients were included in study and divided into 2 groups. i.e.50 patients with penetrating trauma and 53 patients with blunt trauma.

**Sample technique:** Sampling selection was based on purposive non-probability sampling technique.

### Sample selection

**Inclusion criteria:** All patients coming under the definition of penetrating and blunt trauma over the age of 12 years.

#### Exclusion criteria:

- Patients having co-morbid medical illness at presentation.

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- Patients less than 12 years of age.
- Any missed injury requiring re-exploration.

**Study design:** It was a descriptive case series study.

### Data collection

The data was collected from the patients presenting in the emergency department with diagnosis of blunt or penetrating trauma. It was based on the history obtained from the patient himself, or in case of inability to speak, from the attendants or ht emergency services personnel who would have brought the patient to the A&E department and clinical features of the patients. Immediately the emergency resuscitation protocols were initiated taking care to note the vitals of the patient at presentation. These parameters included systolic blood pressure, pulse rate, respiratory rate and Glasgow coma scale. Immediately injuries were recorded. Each patient was investigated for routine complete blood examination and blood grouping cross match.

Informed consent of the patient was taken before any kind of operative procedure. Time of arrival in the emergency, shifting to operation theatre suite, duration of the procedure and all important internal findings were noted after the procedure was over. Patients were kept overnight in the recovery room postoperatively and then shifted to Intensive Care Unit in the ward for at least 24 hours.

These findings were recorded in the proforma. Later the abbreviated injury score was determined for each injury recorded in each patient using the specific classifications by the scoring system. Final prediction of the mortality of each patient was calculated using the computer software available on the internet and recorded.

The patient was followed up in the ward until discharge and any complication or redo surgery was recorded and the cause of morbidity sought. Finally the rates were compared for different mode of presentation and age groups. All the data was put in a specially designed proforma (Table 1). The results were compiled on the SPSS software for final evaluation.

### Results

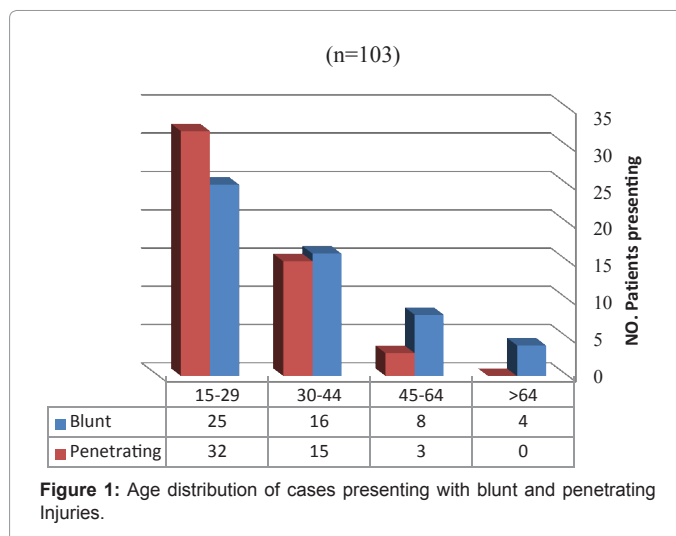
In the study, a sample size of 103 trauma patients was included. These were then divided into two groups (Figure 1) i.e. those presenting with blunt trauma 51.64% (n=53/103) or penetrating injuries 48.54% (n=50/103). Evaluation and comparison of both trauma patients was made by statistical analysis and results were presented into different tables (Table 1,2).

Interestingly, the count and percentage of abdominal injury was higher and of greater severity as compared to other body regions. 71% of patients presented with abdominal traumatic injuries. Maximum percentage of abdominal injuries was caused by blunt trauma with severity grade of “3” i.e. 37.7% (n=53). These injuries included solid

Mode of injury	Blunt N=53/103	Penetrating N=50/103	Total
Blast	0	7 (14%)	7 (6.8%)
Fire arm Injury	0	32 (64%)	32 (31%)
Fall Machine injury Road	18 (34%)	0	18 (17.5%)
Traffic Accident	0	1 (2%)	1 (1%)
Stab	35 (66%)	3 (6%)	38 (36.9%)
	0	7 (14%)	7 (6.8%)
	53 (100%)	50 (100%)	103 (100%)

(n=103)

**Table 1:** Mechanism of Injury.



**Figure 1:** Age distribution of cases presenting with blunt and penetrating Injuries.

Mode of injury	Mean Probable Survival	Observed Mortality
Blunt trauma (50/103)	92.5 + 12.859	7.47 + 12.86
Penetrating trauma (53/103)	90.5 + 12.927	9.4 + 12.9

**Table 2:** probability of survival and mortality rate.

viscus injuries to liver, spleen and kidney, gut perforations and vascular injuries.

Our study concluded that the incidence of abdominal, thoracic, extremity, face and head injury in trauma patients was 71%, 68%, 54%,14% and 6.8% respectively.

### Discussion

We found that trauma occurred more commonly in male population. (Ratio 6:1), with higher frequency in patients who are in their second or third decade of life. The mean age of blunt trauma patients was about 30 years while of penetrating trauma patients were about 26 years. There is male predominance in working class so they were more exposed to trauma hazards. Many studies show that trauma is more prevalent in young males [6-10].

Mode of injury has a significant effect on the outcome of trauma patients. Various modes of penetrating and blunt trauma injuries were studied in this study fire arm injury (64%) was the most common cause of penetrating injuries followed by stab (14%) and blast injuries. Bhatti et al. [11] & Khan et al. [12] also reported fire arm injuries as the most common cause of penetrating injury. Road traffic accidents are usually the main mechanism of injury in blunt trauma patients [13].

Tamim H et al. reported about 15% trauma patients present with facial injuries, 7.6% and 6.4% had thorax and abdomen, 71% extremities, and 1.5% external injuries in trauma patients [14]. Chen et al. reported the incidence of head, face, chest, abdomen, and extremity injury in patients was 26%, 32%, 15% 12% and 63% respectively [15].

Our study concluded that about 40% of the patients with blunt trauma had post-operative complications where as only 16% of patients with penetrating injuries developed complications postoperatively. The rate of post operative infection and morbidity was high in blunt trauma patients. Khan et al. also reported higher complication rate in blunt trauma patients (28%) [12]. Husum et al. reported post operative complication rate 9.5% in trauma patients. Saidi et al. reported

complication rate of 15% this indicates high complication are rate in our set up.

The most common complications included wound infection (9.1%), ARDS (7%) and renal failure (4.9%). Ali AA et al. reported that wound infection and respiratory complications were the most common (18%) in blunt trauma patients. Bhatti et al. reported postoperative complications in trauma patients in frequency of wound infection (24%), chest infections (13.34%) and renal failure (1.34%).

There was positive association between length of hospital stay and trauma. The mean hospital stay in blunt patient was about 11 days while in penetrating trauma it was about 6 days. Dula et al. reported hospital stay of 5.6 days in blunt trauma patients. Christenson M.C. et al. reported mean hospital stay of 9 days in blunt trauma patients indicating that patients with blunt trauma have on the average, longer hospital stay than penetrating trauma.

Length of hospital stay was significantly higher in our study as compared to other countries due to poor prehospital triage and emergency services, delayed presentation of blunt trauma patients, excessive blood loss, non availability of diagnostic & ancillary facilities and poor general health condition of patients.

The average duration of surgery of blunt trauma patients was about 2 hours with standard deviation 1.1024. Similarly mean duration of surgery for penetrating trauma was found about 3 hours with S.D of 1.317 hour. This indicated that mean surgery time was higher in penetrating injury.

Overall mean surgery time was 2.5728 hours with S.D of 1.3106 from literature a study showed that the average surgery time was about 5 hours with S.D. of 1.2 hours.

The mean mortality rate was 8.4 with SD± 12.8; higher than predicted by other studies done in developed countries. Padalino et al. (2006) reported mortality rate of 4% in trauma patients in Italy, while Rabbai A et al.'s (2007) 6% in Iran. Howard R.Champion in 1990 showed that survival mortality rate was 9% with sample size 80,544 patients MTOS database. Contributing factors to high mortality rate in our setup might include poor infrastructures on ground, inadequate transportation to hospital, delay in presentation and inadequate clinical exposure by the first line physicians in the accident and emergency department.

The average mortality rate in blunt trauma patients was 7.474 with S.D of 12.859 as compared to Khan et al. 14% & Ghazanfar et al. 11% after blunt trauma. Similarly mean M.R for penetrating trauma with S.D was found as 1.492±12.9.6. This suggests that mortality rate is higher in penetrating trauma patients.

It was found that mean probability of survival (Ps) was higher in blunt trauma patient compared to penetrating trauma. If Ps of 0.9 is taken to be a demarcating point then those with Ps value above 0.9 were predicted to live and those below are predicted to die. Kumar et al. reported similar results in his study.

The outcomes generated in our study may differ from the predicted outcome as TRISS is basically based on data from developed countries where trauma care delivery is established which is very different from Pakistan.

Our study was carried out at Mayo Hospital, Lahore (1871) which is the oldest and biggest hospital in the Province of Punjab with a population of 90 million. The patients come here from all over the

province and may or may not have received any primary care before reaching the hospital.

To improve the trauma care delivery we need to have trained physicians at the primary care facility with a proper referral pathway. We need to establish and follow baseline norms of trauma care as elsewhere in the developed world.

## Conclusion

Based on our study, TRISS is an effective method for predicting survival of injury victims and hence the trauma care received. Our study documents some potential benefits of using Trauma Scoring systems however with a caution as we used a relatively small sample size from one hospital over a short time interval. General recommendations cannot be made until further results from other emergency units are available.

Present injury severity instruments accurately predict death, but do not predict survival of trauma patients satisfactorily. Another limitation of these scoring systems is its focus on mortality as the primary means of assessing the quality of trauma care and prediction of mortality as the only outcome measure in the care of an injured patient. Its application has to be extended to measure the morbidity, disability, cost & length of stay in hospital. There is also an absolute necessity of Trauma Registries to be maintained in segments of Pakistan to keep in pace with emerging trends as Trauma Registry is the first tool to evaluate trauma care in modern emergency services.

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