

# AUDIT OF SURGICAL TRAUMA IN A TERTIARY CARE HOSPITAL OF SOUTHERN PUNJAB

Mohammed Zulfiqar Ali<sup>1</sup>, Sadia Aslam<sup>1</sup>, Mohammed Idrees Anwar<sup>1</sup>

## ABSTRACT

**Background:** Incidence of major trauma is high in this part of the country with an equally high mortality. Trauma care has improved globally after introduction of trauma audit in various centers of the world. Trauma-Injury Severity Score (TRISS) is used for determining survival probability and evaluation of trauma care based on Injury Severity Score, Revised Trauma Score and focused on trauma outcome (deaths & survivors). **Objective:** Present study was designed to improve and document the care of trauma patients by adopting TRISS methodology for charting and audit. **Patients and Methods:** This prospective study was conducted at Sheikh Zayed Hospital, Rahim Yar Khan, from 1st December 2009 to 31st May 2010. All trauma patients received in the accident and emergency department were included in this study, according to criteria of Major Trauma Outcome Study (MTOS). **Results:** A total of 528 patients were included in this study, with mean age of  $28.43 \pm 9.2$  years. Male to female ratio was 4.5:1. It was noted that 278 patients had multiple injuries involving more than one body region. Mortality rate in our series was 11.17% (which is high) and all these patients had major trauma score ( $>16$ ). Among total deaths (59), 26 patients died unexpectedly, in spite of their survival probability was greater than 0.5. **Conclusion:** Trauma chart is a reliable tool to judge the effectiveness of medical care in a hospital & to reduce the number of missed injuries. We identified almost 44 % unexpected deaths in our series.

**Key words:** Major Trauma, TRISS methodology, Surgical audit, MTOS, AIS.

## INTRODUCTION

Trauma is the leading cause of death in persons less than 45 years of age, accounting for more lost years of life than atherosclerotic disease and cancer combined.<sup>1</sup> Southern Punjab is a densely populated area but the exact figures for trauma are not available. The primary and secondary level of care is poor in this part of province. The trauma care has improved globally after introduction of trauma audit in various centers of the world.<sup>2</sup> Anatomical injuries diagnosed by good clinical examination, radiograph, scans, surgery were scaled according to severity using Abbreviated Injury Scale (AIS).<sup>3</sup> In AIS, injuries are scaled from 1 (Minor) to 6 (Unsurvivable). The Injury Severity Score (ISS), published by Baker in 1974, was then calculated, which is an anatomic scoring system that takes into consideration the three major injuries in different body regions but uses only the highest AIS value in specific region.<sup>4</sup> It identifies all anatomical injuries on six body regions. Calculating formula: Injury Severity

Score (ISS) =  $(AIS_1)^2 + (AIS_2)^2 + (AIS_3)^2$ . The Injury Severity Score (ISS) value goes from 0-75. If in any organ we have Abbreviated Injury Scale (AIS) = 6 (Unsurvivable) then we have a value of Injury Severity Score (ISS) = 75. The higher the Injury Severity Score (ISS) value, the more serious the trauma. The physiological derangements due to trauma are evaluated with the Revised Trauma Score (RTS)<sup>5</sup> when a patient arrives in emergency department. Injury Severity Score (ISS) and Revised Trauma Score (RTS) are the main components of TRISS methodology of trauma to predict probability of survival.<sup>6</sup> Survival probability value range from 0 to 1. American style trauma centers showed better outcome in survival and less missed injuries.<sup>7</sup> The protocol for trauma care is not followed in most of the public sector hospitals in Pakistan. So present study was designed to improve and document the care of trauma patients by adopting TRISS methodology for charting and audit.

## PATIENTS AND METHODS

This study was carried out at Sheikh Zayed Hospital, Rahim Yar Khan, a tertiary care hospital in southern Punjab, of approximately 750 beds. This hospital provides health care to southern Punjab, upper Sindh and adjoining areas of Balochistan province. The accident and emergency department of Sheikh Zayed Hospital treats around 40,000 patients per year of which major contribution of about 70% comes from trauma victims. This study is a prospective study of

1. Department of Surgery, Unit 1,  
Sheikh Zayed hospital Rahim Yar Khan

**Correspondence:** Dr. Mohammed Zulfiqar Ali  
Senior Registrar, Surgery, Unit 1

Email: doc.zulfiqar@hotmail.com

**Figure I:**
**Image of TRISS Calculator**

six months duration that started in 1st December 2009 and formulated in 31st May 2010. It is an ongoing project and data is still being collected on a standardized trauma chart. All patients received in emergency who fulfilled the criteria of Major Trauma Outcome Study (MTOS)<sup>8</sup> were included in the study, irrespective of their nature, site or etiology, as shown.

Hospital Trauma registry inclusion criteria (USA)

1. All Trauma deaths including dead on arrival.
2. All patient admitted for 72 hours or more due to injury.
3. All inter hospital transfer for treatment of acute injury.

All the demographic variables were recorded on a proforma. Unexpected deaths were those in whom survival probability was greater than 0.5 and unexpected survivors were patients with a probability of survival of less than 0.5 who lived. All the patients were categorized as having minor, moderate, moderate to severe and severe/ critical injury with trauma score 1-9, 10-15, 16-24 and = 25 respectively. Additionally, patients having trauma score more than 16 were labeled as major trauma victims. The probability of survival was calculated by the TRISS calculator. (Figure I) This calculator determines the probability of survival from the ISS, RTS and patient's age.

**RESULTS**

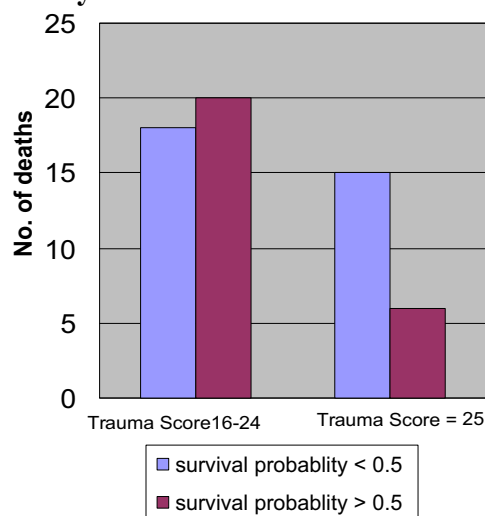
Our study included a total of 528 trauma patients. The mean age of patients was  $28.43 \pm 9.2$  years. There were 432 (82%) male and 96 female trauma victims (18%). Male to female ratio is 4.5:1.278 (52.65%). Patients had multiple injuries involving more than one region. Penetrating trauma victims

were 25 (4.73%) and blunt trauma occurred in 503 (95.26%) patients. In most cases, combination of injuries including head, chest and limb occurred. Skeletal injuries occurred in 177 (32.52%) patients and combined orthopedic and neurosurgical trauma occurred in 18 (3.40%) patients. Region wise distribution of injuries in the body is shown in Table-I.

**Table I: Distribution of injuries in patients**

Injury Site	Number
Head	122(23.10%)
Chest	10(1.89%)
Abdomen	88(16.66%)
Limb/Pelvis	177(33.52%)
Orthopedic + Neuro Surgery	18(3.40%)
Miscellaneous	113(21.40%)

The mortality rate in our series was 11.17%, and all patients who died had trauma score >16. In score range less than 15, we were lucky to have lost no patient. 19(3.2%) out of 59 patients died in accident and emergency department. Among 59 deaths, 38 (35.6%) had TRISS score between 16-24 and 21 (64.4%) had scores above 25. (Figure II)

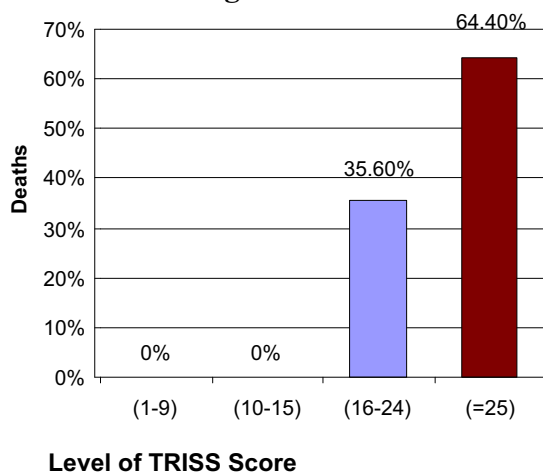
**Fig II: Number of deaths according to survival probability and trauma score**

Out of the total deaths, 26 (44.06%) patients died unexpectedly, although their survival probability was greater than 0.5. There were also unexpected survivors whose survival probability was less than 0.5 i.e. 5 (8.4%). Triage of patients with trauma death is shown in table II & Figure III.

**Table II:**  
**Triage of patients with trauma death**

Trauma Score	No. of Patients	%age of Death	No of deaths with probability less than 0.5	No of deaths with probability More than 0.5	Survivors With probability Less than 0.5
Minor (1-9)	202(38.25%)	0(0%)	0	0	0
Moderate (10-15)	160(30.30%)	0(0%)	0	0	0
Moderate to severe (16-24)	107(20.26%)	38(35.6%)	18	20	3
Severe/Critical $\geq$ 25	59(11.17%)	21(64.4%)	15	6	2

**Fig III:**  
**Deaths according to TRISS Score**



## DISCUSSION

This study is an audit of all trauma patients regardless of survival and also highlights the importance of ISS (Injury Severity Score). This scoring system is important for assessing the effectiveness of medical care in reducing morbidity and mortality. A continuous process of trauma centre evaluation is essential to ensure the development and progression of trauma care at regional, national and international levels.<sup>9</sup> Most of our trauma patients were of adult age and mean age of patients was 28.43. Other studies also show that in people less than 30 years of age, trauma is the leading cause of death in high economic countries.<sup>10</sup> Male deaths predominate in our study that is noted in other studies as well.<sup>11</sup> Majority of patients who died in trauma have ISS greater than the median lethal dose of injury ( $LD_{50}$ )<sup>12</sup> i.e. mean ISS of trauma deaths was 47.1. Bull (1975) found an age dependent relationship and determined that

$LD_{50}$  (Lethal dose for 50% Patients) was an ISS of 40 for ages 15-44, 29 for 45-64, and 20 for ages 65 and older. In our series, we had a very high mortality 26 (44.06%) among patients in whom survival probability was greater than 0.5. This means that care of trauma victims is sub optimal and we need to improve our trauma facilities. Although this is very high mortality, all of these deaths had TRISS trauma score  $>16$ , which is moderate and severe injury. In our study, the outcome after major trauma was far below the expectations, assessed by TRISS methodology. Although, it may not be fair to compare trauma in an underdeveloped district of Punjab, having a recently established teaching hospital, with that one of North America having established trauma setup. This comparison was done because we do not have established trauma outcome norms generally in our country, hence we adopted North American outcome norms as a standard. North America is a developed country with better organized ambulance services, well developed Advanced Trauma Life Support system and better means of communication. These factors result in shorter extrication time and better care. North America has specialized trauma centers with excellent resuscitation, investigation, monitoring and treatment facilities. On the other hand, we lack many of these facilities. Generally, major trauma outcome is worse in developing world compared to developed countries. This has been documented before among others, by Bonne<sup>13</sup> in Lusaka-Zambia and Mock et al<sup>14, 15</sup> in Ghana. Similarly there were 5 unexpected survivors. This may be attributed to miscalculation in score or error in reporting of age by patients. In our study, rate of preventable deaths (44%) is very high as compared with studies in the West.<sup>16</sup> The rate of preventable trauma deaths in the literature is 30% in non trauma hospitals, and 1 – 5% in trauma centers.<sup>17</sup> Factors involved in preventable deaths was mainly delayed or inadequate treatment as noted in other studies. In our study, cause of preventable death could not be established as routine autopsy is not carried out.

## CONCLUSION

Trauma chart is a very valuable tool in order to reduce the number of missed injuries. This is helpful to document and to reduce morbidity and mortality in trauma patients<sup>18</sup>. Improvement in trauma care depends on the establishment of functioning trauma

care systems, of which a trauma registry is a crucial component.<sup>19</sup> We recommend that a Major Trauma Outcome Study be carried out in this region to establish the major trauma outcome norms.

## REFERENCES

1. CDC. Wide-Ranging Online Data for Epidemiologic Research (WONDER): compressed mortality file, 1979-1988. Atlanta: US Department of Health and Human Services, Public Health Service, 1990
2. David R Meddings: Trauma & Energy Care. An update on WHO's activities *Inj. Prev.* 2007 April; 13(2);143.
3. Engum SA, Mitchell MK, Schere LR, Gomez G, Jacobson L, Solotkin K, Grosfeld JL: Pre-hospital triage in the injured pediatric patient.; *J Ped Surg* 2000,35:82-87.
4. Baker SP, O'Neill B, Haddon W Jr, Long WB: The Injury Severity Score: A Method for Describing Patients with Multiple Injuries and Evaluating Emergency Care.; *J Trauma* 1974, 14:187-196.
5. Champion HRI, Sacco WJ, Cpoes WS, Gann DS, Gennarelli TA, Flanagan ME: A Revision of the Trauma Score; *J Trauma* 1989, 29:623-629.
6. Boyd CR, Tolson MA, Copes WS: Evaluating Trauma Care: the TRISS method Trauma Score and Injury Severity Score.; *J Trauma* 1987, 27(4):370-378.
7. Commission on the Provision of Surgical Services. Report of the Working Party on the Management of Patients with Major Injuries. London: Royal College of Surgeons of England, 1988.
8. Yates DW, Woodford M et al preliminary analysis of the care of injured patients in 33 British Hospitals: first report of the United Kingdom, Major outcome study; *British Medical Journal* 1992, 305: 737-740.
9. Budd HR, Almond LM, Oakley PA, McKenzie G, Danne P; A Benchmarking Study of Two Trauma centres Highlighting limitations when Standardising mortality for comorbidity. *World J Emerg Surg* 2008, 3:2
10. Peden M, McGeeK, Krug E, (eds): Injury a leading cause of the global burden of disease, 2000. Geneva: World Health Organization 2002.
11. Dodsarkar. Ytre arsaker I alt (vol-y 89). 2004 statistics Norway 2004; 2007.: Anil Aggrawals internet Journal of Forensic Medicine & Toxicology Volume 1, Number 2, July-December 2000. Akash /Thesis.
12. Anil Aggrawals Int. Journal of Forensic Med. & Toxicology Vol.1, No. 2, Jul-Dec 2000. Akash/Thesis
13. Howard R. C, Wayne S. Copes et al. The Major Trauma Outcome Study Establishing National Norms for trauma care. *J Trauma.* 1990; 30(11): 1356-1365.
14. Mock C N, K, Adzotor E et al Trauma outcomes in the developing world: comparison with an urban level I trauma centre. *Journal of Trauma* 1993; 35(4) 518523.
15. Mock C N; Jurkomec G J et al Trauma mortality patterns in three nations at different economic levels: Implications for global trauma system development. *Journal of Trauma* 1990; 44(5): 804-812.
16. Chiara O, Scott J, Cimbanassis, Marini A, Zoia R, Rodriguez A, Scalea T: Trauma deaths in an Italian Urban Area: and Audit of Prehospital and in Hospital Care. January 2002, 33:553-562
17. Sadik S L , Nexhmi Sh H , Cen I B and Sylejman K R ; Evaluation of trauma care using TRISS method: the role of adjusted misclassification rate and adjusted w-statistic.; *World Journal of Emergency Surgery* 2009, 4:2
18. Esposito, Thomas J.; Sanddal, Teri L.; Reynolds, Stuart A; Sanddal, Nels D Effect of a Voluntary Trauma System on Preventable Death and Inappropriate Care in a Rural State; *The Journal of Trauma.* 54(4):663-670, April 2003.
19. Shaban S, Ashour M, Bashir M, El-Ashaal Y, Branicki F, Abu-Zidan FM; The long term effects of early analysis of a trauma registry.; *World J Emerg Surg* 2009, 4:42.

