

ORIGINAL ARTICLE

REVISED TRAUMA SCORE AS A PREDICTOR OF OUTCOME IN TRAUMA CASES: EXPERIENCES AT A TERTIARY CARE HOSPITAL IN KARACHI, PAKISTAN

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Background: Trauma scores help classify trauma patients, and assist in clinical decision-making. The Revised Trauma Score (RTS) is widely used internationally but its effectiveness as a tool for predicting outcome in paediatric trauma patients in our setting, has yet to be established, mainly owing to lack of use. The aim of this study was to determine the effectiveness of RTS as a predictor of outcome in paediatric trauma patients in Pakistan. **Methods:** We conducted a retrospective review of patient medical records at Aga Khan University Hospital, Karachi, from October 2006 to October 2009 and all patients aged less than 14 years, presenting with trauma were selected. Information was collected regarding demographics, vital signs at the time of presentation, length of stay (LOS) in the ward, ICU and the hospital, complications during hospital stay and mortality. Data was analysed in SPSS-17.0. **Results:** The sample was 501 patients with a mean age of 5.3 years. Two third (66%) were males and 34% were females. Using available data, RTS was calculated for 394 patients, who were then divided into two groups based on the RTS. For 32 patients with a RTS less than 10, the length of stay in the ward, ICU and the hospital were all shorter than the 363 patients with a RTS greater than 10 (p -value <0.001). **Conclusion:** In our setting, RTS is a good predictor of outcome in paediatric trauma patients. It can aid in the assessment of severity of injury in, and objective assessment and triaging of paediatric trauma patients.

Keywords: Revised trauma score, triage, paediatric trauma

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INTRODUCTION

Trauma is a significant source of mortality and morbidity in children throughout the world.¹ In Low and Middle Income Countries (LMIC) up to 13% of total morbidity in children aged 15 or younger is the result of injuries.² In Pakistan the problem is compounded by the fact that there is an absence of paediatric trauma registries and a dearth of injury surveillance mechanisms.³⁻⁵ Management and rehabilitation of trauma affected children serves to further waste the health-sector resources in a country where there is a lack of healthcare facilities.⁴

Trauma scoring helps in classifying trauma patients in a better way, enabling comparisons to be made, and assisting in decision making.⁶ Several of these scores exist such as the Trauma and Injury Severity Score (TRISS) and the Revised Trauma Score (RTS), the prognostic importance of which have been proven⁷ and their use in triaging is established⁸. Although the RTS is used frequently and is shown to have significant discriminatory power⁹, its use is limited by missing data, and by its failure to accurately relate vital signs to mortality⁹⁻¹¹. Furthermore it has not been widely used in developing countries¹², therefore it is important to evaluate and implement RTS in Pakistan and thus by

comparing two frequently used indicators of outcome, the length of stay at the hospital and mortality¹³⁻¹⁵ with the RTS. The aim of this study was to determine the effectiveness of RTS as a predictor of outcome in paediatric trauma patients in Pakistan.

MATERIAL AND METHODS

Located in Karachi, Pakistan's largest city (more than 15 million people), Aga Khan University Hospital is a tertiary care centre, with trauma management facilities where Advanced Trauma Life Support (ATLS) guidelines are followed. At the time of presentation, a trauma team, consisting of physicians and surgeons from different specialties, evaluates a trauma victim through primary and secondary surveys, and based on the nature of the management required specific consults are provided.

In this case series secondary data was collected by medical students at the Aga Khan University, Karachi, Pakistan. All cases of paediatric trauma that reported at the Aga Khan University in the period between October 2006 and October 2009 were reviewed. Prior to conducting the study, ethical approval was obtained from the Aga Khan University's Ethical Review Committee (ERC). An appropriate questionnaire was designed by members

of the research team and data was then gathered from the records.

The questionnaire aimed to gather data about: the demographics (gender and age), the vitals upon presentation to the ER (pulse, blood pressure, respiratory rate, temperature and GCS), the Revised Trauma Score (RTS), which was calculated using the respiratory rate, systolic blood pressure and the GCS at the time of presentation, the total length of stay (LOS) at the hospital, any endoscopic or operative procedure performed or any complication arising during the stay at the hospital, and the outcome.

Throughout the course of the study, confidentiality of the information was maintained, by keeping the questionnaires in the principal investigators office, and destroying them upon completion of the study.

The collected data was double-entered in SPSS-17.0 to ensure the elimination of any possible errors during data entry; and analysed. Appropriate descriptive statistics were gathered so that the relationship between RTS and the total length of stay in the hospital, length of stay in the ward and length of stay in the ICU could be assessed.

RESULTS

In the period between October 2006 and October 2009, 859 patients under the age of 14 reported to the AKU-ER with trauma. However because of administrative difficulties, only 501 files were obtained. The mean age for these 501 patients was 5.3 ± 3.2 (Range 0–13). Of the total, 329 (65.7%) were male and 172 (34.3%) female. Out of 501, 448 patients (89.4%) presented with isolated trauma and 53 (10.6%) with poly-trauma, while the trauma was categorized as minor and major in 456 cases (91.0%) and 45 cases (9.0%), respectively. Upon presentation to the ER, Systolic Blood Pressure (SBP) values could be found for 403 patients, GCS for 484 and respiratory rate for 476. The value of the mean SBP obtained was 106.7 ± 14.8 mmHg, the value of the mean respiratory rate was found to be 27.1 ± 15.7 per minute. The mean value for GCS was 14.4 ± 2.1 . Using these three measurements, the RTS was calculated in 394 patients. The mean RTS value was then calculated and found to be 11.5 ± 0.9 .

On the basis of RTS scores, the study population was divided into two groups. The first group included patients with an RTS value less than or equal to 10 (31 patients), while the second group included patients with an RTS value greater than 10 (363 patients). The mean LOS in hospital for the first group was 6.9 ± 5.3 days, whereas that for the second group was 2.1 ± 2.8 days ($p < 0.001$). The mean LOS in the ICU for the first group was 2.1 ± 2.9 days, while that for the second group was 0.13 ± 0.64 days

($p < 0.001$). The mean LOS in the ward for the first group was 4.7 ± 3.6 days whereas that for the second group it was 1.9 ± 2.7 days ($p < 0.001$). Of all the records reviewed, there were only 3 mortalities, all belonging to the first group.

DISCUSSION

The main purpose of our study is to show that using a trauma scoring system we can successfully evaluate our patients and effectively predict outcome in Pakistan. Injury scoring systems can be physiologic, anatomic or combined anatomic/physiologic. The new injury severity score (NISS) since its introduction in 1997 has been cited as the gold standard by some authors.¹⁶ Using scoring systems that apply to industrialized settings are complex and require extensive retrospective review of the patient's records. Such a system is difficult to apply in a resource poor setting hence using a much simpler system. The scoring system we used was the RTS which hasn't been used widely in developing countries.¹² The RTS is a better and more reliable predictor of outcome in trauma patients as compared to the previously used Trauma Score (TS).¹⁷ The RTS is also a proven tool in establishing outcome in paediatric patients and its use in triaging has been established.^{7,8} The RTS comprises taking three major vitals of the patient: GCS, SBP and respiratory rate. RTS excludes capillary refill and respiratory rate which are difficult to examine and assess on the field.¹⁷

In our study, RTS scores were successfully calculated for 394 patients and they were then further divided into two groups. Group 1 consisted of patients with an RTS score of 10 or less than 10; 31 patients made up this group and their mean length of stay at the hospital was calculated to be 6.9 days. This is comparable with group 2 where RTS score was greater than 10 and consisted of 363 patients. Group 2's length of stay at the hospital was significantly lower at 2.1 days. Group 2 also had a significantly lower mean stay at the ICU at 0.13 days compared to 2.1 days with Group 1. Length of stay at the wards also shows a marked difference with Group 1 having a mean of 4.7 days in comparison with group 2's 1.9 days. These results are consistent with our hypothesis that by using a scoring system, the RTS, we can effectively predict outcome in trauma patients.

In Pakistan a number of studies have been carried out. The RTS has been found to be a reliable prognosis in poly-traumatized patients and can be used in both emergency room triage as well as on the field.¹⁸ In this study 30 adult patients who were victims of RTA's were managed according to ATLS (advanced trauma life support) and their RTS was

calculated. Subsequently their RTS score was compared to the final outcome at time of discharge from the hospital. The results concluded that higher the RTS the better the prognosis.¹⁸ RTS<8 was an indicator of severe injury with high mortality and an RTS=6 was associated with a 50% mortality. However to the best of our knowledge, our study is the first from Pakistan that utilizes RTS for a paediatric population. Although there are numerous limitations of our study such as a small sample size, and data only from a single hospital, our study shows that in a resource poor setting, RTS can effectively be used for triaging paediatric patients.

CONCLUSION

In conclusion it is stated that in our local setting, RTS is a good predictor of outcome in paediatric trauma patients. It can aid in the assessment of severity of injury in, and objective assessment and triaging of, paediatric trauma patients. Although doubts of its effectiveness have been raised in international studies, in our local setting RTS has proven to be an effective predictor of outcome.

AUTHOR'S CONTRIBUTION

AH: Conception of idea, GRM, ZA, UZM: Data collection, GRM, OS: Manuscript writing, AH: Guarantor of manuscript.

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