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StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-.

Revised Trauma Scale

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Last Update: November 14, 2021.

Definition/Introduction

Treating trauma patients require stringent planning and therapeutic resource allocation to provide optimal levels of care for injured patients.[1] A standardized rapid assessment model not only assists with triaging injured patients but also provides a standardized process that can be applied across different settings to ensure similar treatment decisions are made pertaining to a patient's level of care.[1] Multiple assessment tools exist and are available at this time, but the Trauma Score (TS) was initially developed to produce an accurate representation of an injured patient's injury severity.[1][2] The TS was designed to assist with field triage to reduce the risk of overtriage, which can contribute to the high cost of regional trauma care, or undertriage, which can put injured patients at higher risk for mortality. [1] Components of the TS include respiratory rate, respiratory effort, systolic blood pressure, capillary refill time, and the Glasgow Coma Scale (GCS).[1][3] Researchers found that by adding the respiratory rate and systolic blood pressure to the TS, it increased attending physicians' suitability of the tool to assist in triaging injured patients.[3] [1] Multiple studies have already verified the reliability, reproducibility, and effectiveness of the TS.

Application of the TS[1] demonstrated benefits in proper triage and mortality prediction.[1][4][2][5] Accurate triage was defined as severely injured patients (those with an injury severity score [ISS] of 16 or more) transported and treated at a trauma center and mildly injured patients (those with an ISS of 15 or less) transported and treated at a nearby hospital.[4][6] The TS was able to accurately triage 66% of patients who experienced blunt injuries with an overtriage rate of 8% and undertriage rate of 25.2% as determined by mildly injured patients transported to a trauma center and severely injured patients transported to the nearest hospital, respectively.[4] However, the in-depth analysis revealed that if the classification of mild injury was lower (an ISS of 14 or less), there was an increase in the overtriage rates (13.6%), but there was also an inverse reduction in the undertriage rates (16.7%).[4] Furthermore, researchers found the TS to be an accurate predictor of survival among such injured patients.[2][5] While the original TS demonstrated benefits regarding the ability to accurately triage patients and predict mortality,[5] limitations associated with the original TS provided ample room to further revise the scoring system.[1][4][7][2]

Multiple studies found few disadvantages associated with the inclusions of capillary refill and respiratory expansion within the scoring system.[7] First responders shared challenges observing the capillary refill and respiratory expansion during dark settings or at night. Another group coordinated through the American College of Surgeons Committee on Trauma found that the TS may underestimate head injury severity among such cohorts. These factors lead to the formulation of the Revised Trauma Scale (RTS), which removed the capillary refill and respiratory expansion. Additionally, there were two versions of the RTS created; one was developed specifically for triage (T-RTS) and the other for outcome evaluations and controlling for injury severity (RTS).[7] When providers utilize the RTS for triage, they use raw values, and when using the assessment tool for outcome evaluations, the coded values are weighted and summed.[7]

Numerous studies demonstrated the benefits of utilizing the RTS. Researchers found that after implementation of the RTS, there was no difference in the error rate for diagnosis and investigation compared to not utilizing the RTS; however, there was a statistically significant improvement concerned with the appropriateness of the formulated treatments.[7][8] Using the RTS as a triage tool assisted in reducing the treatment errors from 21 out of 36 patients (58%) to 14 out of 54 patients (26%).[8] Additionally, researchers found that the RTS was an effective measure of predicting mortality for patients with an RTS greater than seven.[9] Furthermore, the RTS was most useful in predicting the survival rates among patient with head injuries compared to patients with penetrating or blunt traumas. [9]

When using the RTS to predict geriatric trauma mortality, the recommended cutoff value was identified as 7.108 with a sensitivity of 97% and a specificity of 80%. [7][10] There were statistically significant differences regarding the receiving operator characteristics (ROC) curve between ISS,[6] New Injury Severity Score (NISS),[11], and the Trauma and Injury Severity Score (TRISS),[12] in predicting geriatric mortality.[10] The measurement tool that best predicted elderly mortality, based on the ROC, was the TRISS,[12] but the RTS was also an appropriate measurement tool to predict the same.[10] When patients transported via Helicopter Emergency Medical Services (HEMS) were assessed using the RTS,[7] the optimal cutoff score to predict trauma patients at risk for a major complication during a HEMS mission was 11.5. The researchers reported a sensitivity of 84% and a specificity of 90.5% thereby validating the usefulness of the RTS as an appropriate assessment tool regarding the same.[13]

Issues of Concern

While the merits of the RTS have been clearly demonstrated, other assessment tools may also be useful.[7] As previously shared, research showed the TRISS to be the best predictor of geriatric mortality.[10] After conducting a meta-analysis, researchers found the Kampala Trauma Score (KTS) had better sensitivity (0.88), which was higher than that of the RTS (0.82), in its ability to accurately predict mortality.[14][15] However, the RTS resulted in better specificity (0.91) and ROC (0.93) curve than the KTS during the same meta-analysis.[7][14][16] While researchers found the RTS to have acceptable psychometrics, there still may be room for future improvements and developments. [7][9]

Clinical Significance

According to the Centers for Disease Control and Prevention (CDC), unintentional injuries were the leading cause of death in people from birth through 44 years of age in the United States. With the prevalence rates of injuries being so high, a simple and standardized assessment tool to identify injury severity is critical for clinicians. There are various metrics to evaluate the severity of a patient's injuries. ISS, NISS, and TRISS have retrospectively measured indexes, whereas TS and RTS have their basis on patient characteristics at the time of initial evaluation.[11][6] [12] Furthermore, the TS based metrics can be re-evaluated in realtime to assess changes in patient status/for re-triage. Thus, TS and RTS can be used for triage, whereas the ISS-based metrics are used to evaluate the effectiveness of triage or to cohort patients for proper dichotomization.

Nursing, Allied Health, and Interprofessional Team Interventions

The RTS is an assessment tool that can be utilized by multiple medical professionals with a variety of experience levels to help triage patients or to predict mortalities. Junior residents can assess trauma patients, using the RTS, despite their inexperience making complex medical decisions, to identify severe injuries that may require additional support from a senior resident or attending physician.[8][17] Instances may exist where a medical professional's background or experience level may impact patient assessment. Comparing two two-person teams, a pair with dual licensure as registered nurses (RN) and paramedics (PM) vs. a single dual-licensed (RN/PM) plus a licensed paramedic, researchers found that there was a statistically significant difference between the teams with the team of two RN/PMs assessing trauma patients at a lower RTS than the one RN/PM plus one PM team.[15]

Nursing, Allied Health, and Interprofessional Team Monitoring

As previously discussed, the RTS is a tool for triaging patients.[7][8][17] While initial assessments are essential, there is a good level of evidence to support the use of the RTS[7] to re-assess trauma patients while they are in the Emergency Department, which demonstrates its versatility as an assessment tool for trauma patients.[17] Though the majority of the literature reviewed focused on physicians, but nursing staff and allied health professionals who may be responsible for re-assessing patients can also utilize the RTS.[15]

Review Questions

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Bookshelf ID: NBK556036 PMID: 32310496