ORIGINAL ARTICLE

Predictive value of injury severity score in relation to morbidity and mortality following road traffic accident

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Abstract

Background: Patients who land up in the emergency department with trauma do form an integral component of emergency care and hence their evaluation becomes all the more important. The Injury Severity Score (ISS) is a well-designed anatomical scoring system and is a standard approach for evaluating trauma patients following road traffic accidents (RTA). Using the anatomic, physiologic and age characteristics this scale does help to quantify the probability of survival as far as severity of injury is concerned. The objective of this study was to assess the predictive value of injury severity score in relation to morbidity; mortality and hospital stay of patients following road traffic accidents.

Material and Methods: This retro-spective cohort study was conducted upon a total of 72 trauma patients (chosen via non-probability – consecutive sampling) of either gender, aged 18 years and above who presented to the emergency department of Ziauddin University Hospital (North Nazimabad campus) with road traffic accidents from 1st September 2019 till 30th October 2020. After taking a full written informed consent, the patients were inspected upon arrival using the injury severity score and the score recorded. Additionally, basic bio data, socio-demographic details and particulars of the road traffic accidents and resultant trauma were noted onto a self-structured questionnaire.

Results: Among the 72 road traffic accidents patients enrolled into the study, predominantly males (87.5%). The mean age stood at 27 years (SD± 5). The commonest injuries included limb fractures (legs; 30.55% and arms; 23.61%). Head trauma was the second most common injury (skull fracture; 9.72% and others such as concussions, hematoma and diffuse axonal injury with a cumulative incidence of 19.4%). The mean injury severity score obtained was 46.3 (SD±7). The mean hospital stay was 2 days (SD±0.5). The mortality rate stood at 20.83%.

Conclusion: The outcome was stratified to match with three different score ranges of injury severity score and it yielded significant associated, solidifying injury severity score as a predictive tool for mortality.

Keywords: Road traffic accident, mortality, morbidity, triage, injury severity score

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Introduction:

At the turn of the new millennium, injuries are becoming a major public health problem. They are also predicted to be the one of the most formidable challenges and generally the health care systems are not well prepared to respond to this challenge. Injuries kill main earning person, destroys the entire family structure and devastate communities in the process. Many patients suffer life-long challenges and physical disabilities in addition to the financial burden.[1]

A global estimate on motor vehicle injuries reveals that annually around ten million people are affected. Injuries due to road traffic accidents (RTAs) happen to be the commonest cause of precious lives lost and are the leading cause of death in adolescents and young adults.[2]

On a daily basis more than 3,000 lives are lost

and these amounts to an annual death rate of almost 1.28 million, the tragedy does not stop here as again millions sustain non-fatal injuries which lead to disabilities. A major chunk (90%) of accident related deaths occur in the developing countries.[3]

Interesting to note is that pedestrians, two-wheelers (cyclists and motorized) and their pillion riders account for around 45% accidental deaths worldwide and these are the ones who are the 'most at risk' and most vulnerable commuters.[4]

This clearly indicates that effective management of road traffic accidents in the developing world has been hindered by limitations of knowledge, meager resources, non-availability of reliable estimates of the current level of injuries and the traditional myopic views on healthcare and diseases.[2,5]

There has always been a requirement for quantitative computations of the severity of injury in order to assess the social expenses incurred by accidents, the relative successes of devices that are applied for prevention of injury and gauging the benefits of various kinds of treatment.[5]

A very close variable akin to what is needed is already available for burns patients. Since these are injuries on the surface they offer easy access to direct measurement. Area of burn as "Dose of Injury" which in other words would imply to the severity correlates well with mortality.[6]

The regular use of a similar quantifying tool for road traffic accidents is a definite requirement. The Injury Severity Score serves this requirement. Injury Severity Score assesses the combined effects of polytrauma in patients and is based on an anatomical injury severity classification, the Abbreviated Injury Scale (AIS).[7]

The Injury Severity Score is a globally accepted and well recognized scoring system that correlates well with mortality, morbidity and different measures of severity.[8]

Our research hopes to employ the injury severity score as a predictive measure in relation to mortality, morbidity and hospital stay amongst patients involved in road traffic accidents.

Material and Methods:

This retrospective cohort was conducted upon a total number of 72 trauma patients (chosen via non-probability – consecutive sampling) of either gender; aged 18 years and above, who presented to the emergency department of Ziauddin University Hospital with road traffic accidents 1st September 2019 till 30th October 2020. Injury severity score is an important tool for measuring and calculating the severity of trauma and it helps to record the injuries with accurate precision and completeness.[9]

The purpose of our study was to determine the predictive value of injury severity scores and its relationship to morbidity, mortality and hospital stay in patients who were victims of trauma.

After taking written informed consent, the patients were inspected upon arrival using the injury severity scores and the score recorded. All patients had the freedom of withdrawing themselves from this study at any stage without assigning any reason.

Additionally, basic bio data, socio-demographic details, and particulars of the road traffic accident and resultant trauma were noted onto a self-structured questionnaire. Data was analyzed using SPSS version 22.0.

The injury severity score was calculated as the sum of the squares of the highest abbreviated injury scale code in each of the three most severely injured injury severity score body regions. These body regions are the

(i) Head or Neck (ii) Face (iii) Chest (iv) Abdominal / Pelvic contents (v) Extremities / Pelvic Girdle and (vi) External.

It may be mentioned here that symptoms are not scored if there is no demonstrable anatomical injury, like if a patient has neck pain but does not have any anatomical injury in the neck he/she will not be scored and hence the abbreviated

Table 1:

Age group (years)	Male	Female	Total
≤ 20	07	00	07
21 – 25	13	01	14
26 – 30	31	03	34
31 – 35	08	03	11
36 – 40	02	02	04
≥ 41	02	00	02

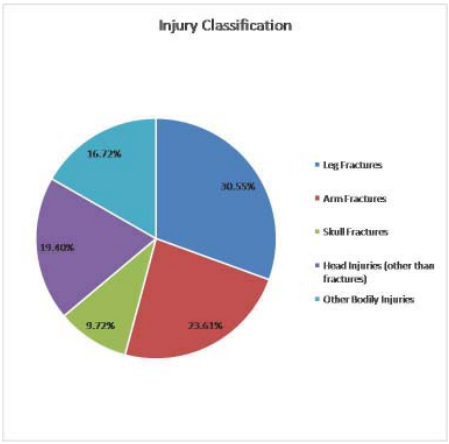

Table 2:

Score Stratum	Mortality n (%)	Hospital Stay (Days)
≤ 25 (n = 23)	02 (8.69%)	1 (SD ± 0.5)
26 – 50 (n = 28)	04 (14.29%)	3 (SD ± 0.5)
51 to 75 (n = 21)	09 (42.86%)	7 (SD ± 4)

injury scale in this case will be 0 (zero) as per the guidelines.[10]

Furthermore it would be appropriate to mention here as an example that if a patient had a fracture of the lower end of the radius, his abbreviated injury scale would be 2 if details are not specified, but if it was known to be displaced or open the abbreviated injury scale would be 3. If not specified the lower score is used.[11]

Injury Severity Scores range from 1 to 75. If an injury is identified as currently un-treatable injury, the injury severity score score is automatically assigned 75.

Results:

Among the 72 road traffic accidents patients enrolled into the study a male dominance was noted as 87.5% were males and 12.5% were females. The mean age of sample stood at 27 years (SD ± 5) All injuries mentioned include all anatomical areas involved.

The commonest injuries inflicted were fractures to the limbs (legs; 30.55% and arms; 23.61%), followed by head trauma which was the second most common injury (skull fracture; 9.72% and others such as concussions, hematoma and diffuse axonal injury with a cumulative incidence of 19.4%).

The mean injury severity score obtained was 46.3 (SD ± 7). The mean hospital stay was 2 days (SD ± 0.5). The mortality rate stood at 20.83%.

The outcome was segregated to match the three different score ranges of injury severity score and it gave very significant results hence providing conclusions and further solidifying injury severity score as a predictive tool for mortality.

Discussion:

The injury severity scores values of this series of road traffic accidents account for a very close relationship ranging from clinical severity to mortality, time to death and duration of hospital stay.[12] It would however be pertinent to mention here that the term severity needs to be highlighted in more detail. In our settings all patients with an anatomical description of injury severity score ≥ 16 are considered as being severely injured.[13]

The results of mortality seem to be of particular interest due to the fact that it corresponds closely to those already reported by Baker et al. and are thus practically more handy and valid through different emergency set-ups globally.[14]

Treatment times and disabilities also showed strong statistical relationship to the injury severity score values but it is clear that this addresses groups and not individuals in particular.[15] Hence the implication would be that the duration of treatment or the corresponding disability of a patient cannot be forecast with full confidence from this injury severity score rating.[16]

The expected average outcome for a group of cases with similar scores could well be estimated.[17] Possibilities however do exist where separate studies of treatment times would be required to estimate norms for different systems of medical care. If such forecasts are to be developed, consideration should be given to the use of logarithmic units of time as these seem to offer certain statistical advantages.[18]

Though the injury severity score index is evidently quite an efficient measure of severity, it may still be open to refinement.[19] A particular weakness is that a patient may perhaps only be injured in one "area" but this injury may be of overwhelming severity such asdecapitation or rupture of the heart and great vessels.[20]

For such injuries the maximum injury severity score rating is 25 and such a score would be exceeded by the combination of three moderate (A.I.S.^{3}) injuries in three separate areas giving an injury severity scores rating of 27.[21]

Such a combination would by all means exhibit a definite fatal outcome. Improvement can possibly be brought about by increasing the range so that the higher injury severity score values are sub-divided to provide a greater range for very severe injuries.[22]

Conclusion:

The outcome was stratified to match with three different score ranges of injury severity score and it yielded significant associated, solidifying injury severity score as a predictive tool for mortality.

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Role and contribution of authors:

Dr Abdul Samad, collected the data, references and did the initial writeup

Dr Inayat Ali Khan, collected the data and helped in introduction writing.

Dr Afreen Afazal, collected the references and helped in discussion writing

Dr Shua Nasir, collected the references, data and helped in interpretation of data and result writing.

Dr Lal Shehbaz, collected the data and references and helped in result writing

Dr Syed Jehanzeb Asim, critically review the article and made final changes

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