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CAT title: The use of the Injury Severity Score and Shock Index in the field of paramedicine

Word Count: 1308 (excluding reference list)

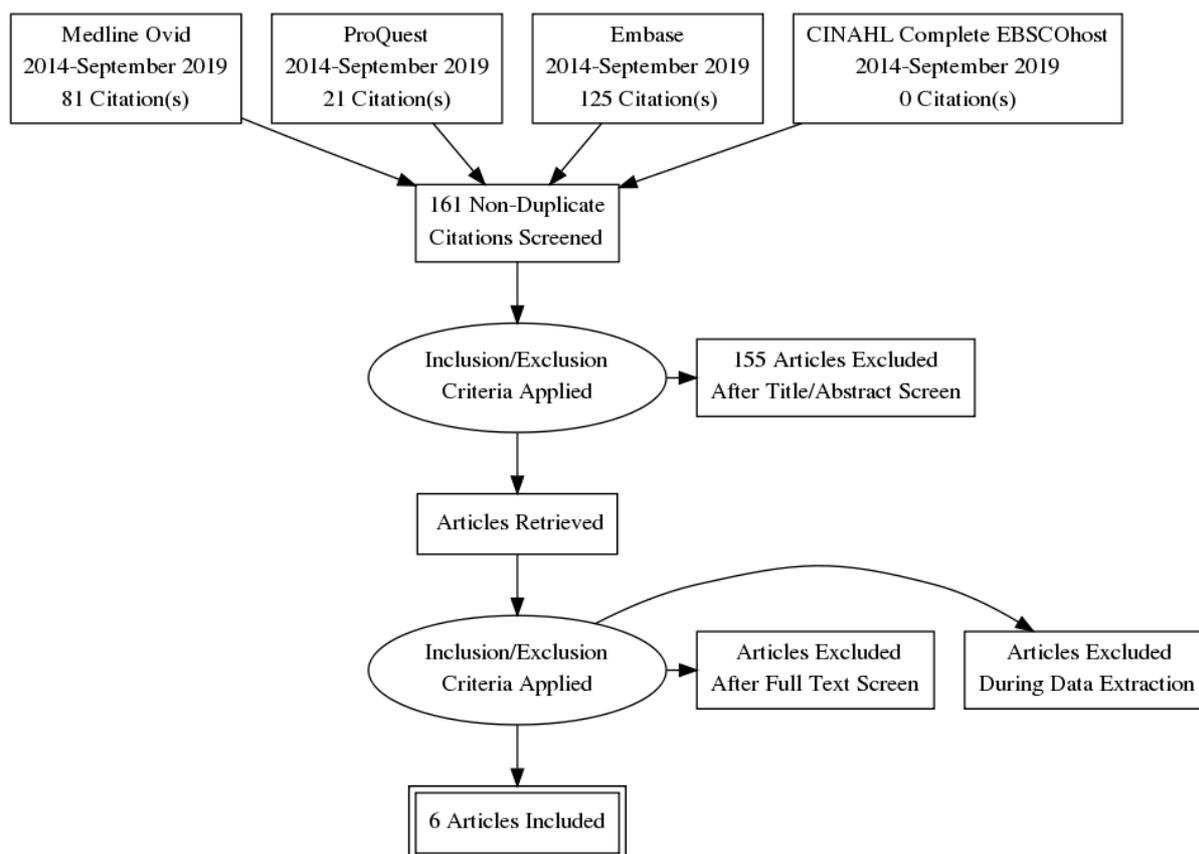**Title:** The use of the Injury Severity Score and Shock Index in the field of paramedicine

Reported by: Cameron Carey

Clinical Scenario: Paramedics often use a range of scores to determine the severity of a patient's condition. The severity of an injury is important in predicting mortality within a patient and therefore a need for a greater extent of medical intervention. Two paramedics have been called to a multi system trauma patient. One paramedic uses the Injury Severity Score (ISS) rating and the other uses the Shock Index (SI) score to determine the severity of this patients injuries. Both paramedics however disagree on what score is the most accurate at predicting mortality.

PICO (Population – Intervention – Comparison – Outcome) Question: In a patient with a traumatic injuries, is Shock Index better than Injury Severity Score in predicting mortality in trauma

Search Strategy: (Shock Index OR SI OR Injury Severity Score OR ISS) AND (trauma OR traumatic injuries) AND (mortality OR mortality rates) AND (pre hospital OR pre-hospital OR out of hospital OR out-of-hospital)

Search Outcome: ProQuest – 21, Medline Ovid – 81, Embase – 125, CINAHL Complete EBSCOhost – 0. Total of 161 articles after removal of duplicates

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│   Medline Ovid      │  │     ProQuest        │  │      Embase         │  │ CINAHL Complete EBSCOhost│
│ 2014-September 2019 │  │ 2014-September 2019 │  │ 2014-September 2019 │  │   2014-September 2019    │
│    81 Citation(s)   │  │    21 Citation(s)   │  │   125 Citation(s)   │  │      0 Citation(s)       │
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161 Non-Duplicate Citations Screened

Inclusion/Exclusion Criteria Applied → 155 Articles Excluded After Title/Abstract Screen

Articles Retrieved

Inclusion/Exclusion Criteria Applied → Articles Excluded After Full Text Screen → Articles Excluded During Data Extraction

6 Articles Included

Relevant Papers: 6

Title (Author)	Design	Population	Intervention / Comparison	Outcomes Measured	Results	Strengths/ Weaknesses
Arslan et al., 2016	Retrospective observational study	157 patients were analysed and charts were reviewed for demographic data	Packed red blood cells vs SI and ISS	Mortality of patients that received packed red blood cells and the SI and ISS before death	ISS was a better predictor of mortality when compared to SI. Administration of packed red blood cells was however the best predictor of mortality	Weaknesses: Small sample size, only one trauma centre analysed, most injuries analysed were penetrating injuries and therefore may not be applicable to blunt trauma, results may be altered by unknown confounding variables,

						may be prone to selection and information bias. Strengths: This study showed a direct comparison between SI and ISS and their ability to predict mortality
Miller, Nazir, McDonald, & Cannon, 2017	Retrospective analysis study	A database of 3680 patients treated over a 4 year period at a level one trauma centre	MREMS vs RTS vs ISS vs MGAP vs SI	This study identified the sensitivity and specificity of each trauma score and its ability	ISS was found to be a better predictor of mortality than SI for all types of trauma however the MREMS score was the most accurate	Weaknesses: results may be altered by unknown confounding variables such as different treatment for a same

				to predict mortality	predictor of mortality	scored patient as well as the possibility of selection and information bias Strengths: Large sample size, direct comparison between SI and ISS
Barnes et al., 2018	Retrospective analysis study	7623 patients health records were analysed from 2012 to 2015 in Pietermaritzb urg, South Africa.	SBP vs MAP vs SI vs MSI vs SIA	This study analysed the accuracy of the prediction of mortality, need for ICU prediction and need	Multiple forms of SI were found to be a poor predictor of mortality as well as the prediction for the need of ICU and the prediction for need for blood transfusion	Weaknesses: This study did not compare SI with ISS. This study was also prone to unknown confounding variables and information

| | | | | for blood transfusion prediction | | and selection bias

Strengths: This study provided specific information on the accuracy of SI as well as all modified versions of the SI. This study also had a large sample size |
|---|---|---|---|---|---|---|
| Mitra, Fitzgerald, & Chan, 2014 | Retrospective study | 1149 trauma patients were analysed in The Alfred Trauma Registry that had received at least one litre of pre- | SI vs mortality and blood transfusion | This study analysed the association between SI and the administration of | This study found that SI can be useful in trauma patients as it is an easily calculated variable and is a good indicator for | Limitations: This study only compared SI with mortality as all patients reviewed had an ISS |

| | | hospital crystalloid and spent over 30 minutes in transit | | blood products | blood transfusion requirement due to the its use as a mortality predictor | greater than 15. This study was also prone to unknown confounding variables and information and selection bias

Strengths: This study has a large sample size and database managers who extracted the information were blinded to the objective of the study to reduce the risk of |
| --- | --- | --- | --- | --- | --- | --- |
| | | hospital crystalloid | | blood products | blood transfusion | |

						information and selection bias
Odom et al., 2016	Retrospective evaluation study	10,420 patients data was collected from a trauma registry of Beth Israel Deaconess Medical Center from 2000 to 2012	SI vs mortality	This study examined both low and high SI scores and its ability to predict mortality	This study found that increasing age and ISS were associated with increased mortality. High SI values were found to be associated with mortality in isolated head injured patients. Both low and high SI were associated with mortality in patients with torso injuries and no head injuries.	Weaknesses: This study is prone to unknown confounding variables and information and selection bias. This study only used an initial value of SI therefore values may not be accurate Strengths: This study used univariate analysis

						providing more reliable results. This study also used a large sample size
Moore, 2012	Secondary data analysis	516,156 patients analysed from a 2009 national trauma data bank	SI vs ISS	This study analysed pre-hospital SI, emergency departmen t SI and ISS and the ability of all scores to predict mortality	This study found that emergency department SI was the strongest predictor of mortality within 48 hours of admission. This is possibly due to the ease of calculation of SI	Weaknesses: This study is prone to information and selection bias. This data may also not be specific to this specific question Strengths: This study provided data specifically comparing SI and ISS

Comments:

The purpose of this CAT was to determine whether SI was better than ISS at predicting mortality in trauma. The existing research based on this topic comprised of many retrospective studies and no high quality randomized control trials. The information found may therefore not be accurate and requires more research. From the literature gathered ISS is suggested to be the better predictor of mortality. SI however may still prove useful as its ease of calculation may prove beneficial to paramedics attending trauma patients. SI was also found to be unreliable with different injuries in different anatomical areas. ISS however proved to be useful with all types of trauma and anatomical regions. This data therefore suggests that the ISS is better at predicting mortality than SI.

Consider: *Why would you NOT change practice based on this article?*

As stated above the information found in the literature reviewed was not of a high quality study. The information therefore may not be as accurate as a study such as a randomised control trial. There was also a lack of literature found specifically comparing SI and ISS. More high quality studies directly comparing SI and ISS should be performed before any final judgement is made.

Clinical Bottom Line:

ISS should be used when attempting to predict mortality in the pre hospital setting. SI can be used however as it can still be an accurate predictor of mortality and is an easier calculation to perform especially in stressful situations encountered in the pre hospital environment. Further research should be performed to gain a better understanding of what score is most beneficial when attempting to predict mortality.

References:

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