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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 patient’s 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 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
Relevant Papers: 6
<table>
<thead>
<tr>
<th>Title (Author)</th>
<th>Design</th>
<th>Population</th>
<th>Intervention / Comparison</th>
<th>Outcomes Measured</th>
<th>Results</th>
<th>Strengths/Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arslan et al., 2016</td>
<td>Retrospective observational study</td>
<td>157 patients were analysed and charts were reviewed for demographic data</td>
<td>Packed red blood cells vs SI and ISS</td>
<td>Mortality of patients that received packed red blood cells and the SI and ISS before death</td>
<td>ISS was a better predictor of mortality when compared to SI. Administration of packed red blood cells was however the best predictor of mortality</td>
<td>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,</td>
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<tr>
<td>Strengths</td>
<td>Weaknesses</td>
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<td>This study showed a direct comparison between SI and ISS and their ability to predict mortality</td>
<td>Results may be altered by unknown confounding variables such as different treatment for a same trauma.</td>
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<td>ISS was found to be a better predictor of mortality than SI for all types of trauma</td>
<td>May be prone to selection and information bias.</td>
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**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
<p>| Barnes et al., 2018 | Retrospective analysis study | 7623 patients health records were analysed from 2012 to 2015 in Pietermaritzburg, 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 | Strengths: Large sample size, direct comparison between SI and ISS | Weaknesses: This study did not compare SI with ISS. This study was also prone to unknown confounding variables and information bias |</p>
<table>
<thead>
<tr>
<th>Mitra, Fitzgerald, &amp; Chan, 2014</th>
<th>Retrospective study</th>
<th>1149 trauma patients were analysed in The Alfred Trauma Registry that had received at least one litre of pre-</th>
<th>This study analysed the association between SI and the administration of</th>
<th>This study found that SI can be useful in trauma patients as it is an easily calculated variable and is a good indicator for</th>
<th>Limitations: This study only compared SI with mortality as all patients reviewed had an ISS</th>
</tr>
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</table>

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.
hospital crystalloid and spent over 30 minutes in transit

| hospital crystalloid and spent over 30 minutes in transit | blood products | blood transfusion requirement due to 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
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>SI vs</th>
<th>Findings</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odom et al., 2016</td>
<td>Retrospective evaluation study</td>
<td>10,420 patients data was collected from a trauma registry of Beth Israel Deaconess Medical Center from 2000 to 2012</td>
<td>SI vs mortality</td>
<td>This study examined both low and high SI scores and its ability to predict mortality</td>
<td>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</td>
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<td>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.</td>
<td>Strengths: This study used univariate analysis</td>
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</table>
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 department 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:


