

<b>Code</b>	INJURY_COSTS.PY
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<b>Title</b>	Injury Severity Modeling: Scales, Incidence, Hospitalization Rate, Mortality Risk, Economic Costs, and Best Practice Recommendations
<b>Abstract</b>	<p>Injury severity assessment and modeling present several challenges for injury and safety investigators. Three of the most common and widely applicable injury severity scales are reviewed: hospitalized/non-hospitalized dichotomy; Abbreviated Injury Scale (AIS); and Injury Severity Score (ISS). Data related to these scales are summarized (incidence, hospitalization rate, mortality risk, and economic costs). Various types of cost data are included, encompassing medical and productivity costs, quality-of-life costs, and willingness-to-pay estimates. A clustering algorithm (k-means) is used to group ranges of severity levels (AIS/ISS) using these various data features. Operations research, machine learning, econometrics, and statistical classification methods are used to assess the range of possible AIS levels at each ISS value, to develop a probabilistic AIS-ISS map to allocate shares across these AIS levels (ordinal logistic regression, naïve Bayes classifier), and to map AIS-based injury costs onto the ISS scale. The method can be applied to any quantity (not just costs), facilitating better comparisons between the scales and the pooling of mixed AIS/ISS data in meta-analyses. Bounding analysis reveals each ISS value corresponds to one or a small number of AIS levels. For each scale (AIS/ISS), the cluster assignments are reasonably stable across data features. And when viewed over the entire ISS range, the mapped AIS costs are remarkably linear. Throughout, modeling considerations are discussed and best practice recommendations offered.</p>
<b>Keywords</b>	Injury severity; Abbreviated Injury Scale (AIS); Injury Severity Score (ISS); economic costs; logistic regression; naïve Bayes classifier; k-means clustering
<b>Highlights</b>	<ul style="list-style-type: none"> <li>- Bounding analysis reveals each ISS value links to one or a small range of AIS levels.</li> <li>- The clusters for each scale (AIS/ISS) are quite stable across data features.</li> <li>- The mapped AIS-based economic costs are remarkably linear in the ISS.</li> <li>- Probabilistic AIS-ISS map can transfer any value from one scale onto the other.</li> <li>- Facilitates better AIS/ISS comparisons and pooling of mixed data in meta-analyses.</li> </ul>