Title	**Injury Severity: Scales, Incidence, Hospitalization Rate, Mortality Risk, Economic Costs, Modeling Considerations, and Best Practices**
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Abstract	*Introduction*: Injury assessment and modeling present several challenges. Methods are needed for evaluating the severity of injury, for quantifying impacts along those gradations (e.g., economic costs), and for comparing injuries to each other and to fatalities. While a variety of methods exist, there is limited comprehensive, direct, and collated information and models available for comparing them along various dimensions or to assess their fitness for a particular purpose. *Method*: Three common and widely applicable injury severity scales are reviewed: hospitalized/non-hospitalized dichotomy; Abbreviated Injury Scale (AIS); and Injury Severity Score (ISS). Their advantages, limitations, caveats, and risks are discussed, and data for each are summarized (incidence, hospitalization, mortality, and economic costs). Operations research and econometrics methods are used to enumerate the theoretical range of AIS levels at each ISS value, subset these to AIS-ISS pairs that can actually occur, develop a probabilistic AIS-ISS map, transfer AIS-based cost data onto the ISS scale, and cluster ranges of severity levels according to various data features. *Results*: Each ISS value links to at most two valid AIS levels. The cluster assignments are remarkably consistent, and invariant across data features (for a given number of clusters fit). When viewed over the entire ISS range, both the average AIS (power function) and mapped ISS costs are reasonably linear, and reduced-form ISS cost and AIS-ISS linkage models are presented. *Conclusions*: The methodology can be applied to any injury quantity (not just costs), and represents a new development in the understanding of the AIS-ISS relationship. *Practical Applications*: This improves the comparability of the scales, allows seeming disparate AIS/ISS values to be better and more directly compared, facilitates the pooling of mixed AIS/ISS data in meta-analyses, and allows costs for the ISS scale to be quantified.
Keywords	• Abbreviated Injury Scale (AIS) • Injury Severity Score (ISS) • Econometrics • Logistic regression • K-means clustering