Mathematical Modelling and Trauma Survival

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Trauma is the most frequent cause of death among young individuals: mathematical modeling may help mitigate the consequences of penetrating and blunt trauma in humans, particularly in the area of civil defense and military operations. This is made possible when model-based decision support systems are employed in the field, in order to predict the physiological state of multiple victims. Clearly, an in-depth, quantitative, mechanistic understanding of the compensation mechanisms at play would be generally desirable, but can currently be meaningfully proposed only for circulatory compensation. In the present work we describe a practical asynchronous Bayesian approach for updating the probability distribution of the Expected Time to Death, based upon the collection from the field of observations relevant to 10 physiological dimensions. Further, recent mathematical models of the dynamical response to hemorrhage are compared and their applicability to real-life situations is examined. New types of representation are explored and conclusions are drawn as to the most promising feasible approaches to a formalization of this problem.