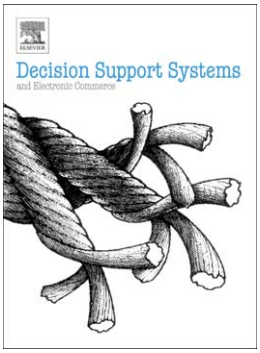

A preoperative recipient-donor heart transplant survival score

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A Preoperative Recipient-Donor Heart Transplant Survival Score

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Recent research has shown that data mining models can accurately predict the outcome of a heart transplant based on predictors that include patient and donor's health/demographics. These models have not been adopted in practice, however, since they did not: a) consider the interactions between the explanatory variables; b) provide a patient's specific risk of survival (reported results have been primarily deterministic); and c) offer an automated decision tool that can provide some data-driven insights to practitioners. In this study, we attempt to overcome these three limitations through the use of Bayesian Belief Networks (BBN). The proposed BBN framework is comprised of four phases. In the first two phases, the data is preprocessed, and a candidate set of predictors is generated based on employing several variable selection methods. The third phase involves the addition of medically relevant variables to the list. In phase four, the BBN model is applied. The results show that the proposed BBN method provides similar predictive performance to the best approaches in the literature. More importantly, our method provides novel information on the interactions among the predictors and the conditional probability of survival for a given set of relevant donor-recipient characteristics. We offer U.S. practitioners a decision support tool that presents an individualized survival score based on our BBN model (and the UNOS dataset).

Keywords: Artificial neural networks; Bayesian belief networks; classification and regression trees; data science; genetic algorithms; United Network for Organ Sharing (UNOS).

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