



# 2024 INFORMS ANNUAL MEETING

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## Interpretable Mortality Simulation and Decision-Making Agent for Heart Transplantation

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### Please enter an abstract under 250 words

Decisions regarding acceptance of a donor's heart for a patient on the transplant waitlist is currently based on evaluation by a committee of doctors who review many factors but are still quite ad-hoc. Given the volume and range of data collected by the United Network for Organ Sharing (UNOS) on waitlisted patients, donors, clinicians and organs, there is increasing interest among all stakeholders, particularly clinicians, in leveraging model-based approaches that learn from the vast amount of historical data on organ acceptance/rejection to optimize the heart transplantation outcomes and assist human decision making. In response to this need, we benchmark and propose machine learning models to provide accurate and interpretable predictions regarding transplant mortality at both the individual and population levels. We train our model with more than 30,000 patient records and 350 variables. This robust training has enabled the best model to achieve a C-statistic of 0.9, significantly better than previous benchmarks which only attained a C-statistic between 0.62 and 0.75 with 20 to 30 variables. This level of accuracy provides a reliable foundation upon which clinicians can base their decisions with a greater degree of confidence. We have also identified the key features that drive the predictions and verified the clinical significance of these results through close collaboration with the domain experts.

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