
Objective
Identifying factors affecting heart transplant survival is crucial in improving post-transplant outcomes. In effort to augment patient-specific mortality probability estimation and elucidate covariate interaction, we employed a survival tree modeling approach to the UNOS transplant database.

Methods
The UNOS database (2000-2021) was queried for all isolated orthotopic heart transplants in patients ≥18 years old. Pre-operative variables (n = 138) were evaluated with stepwise logistic regression; 47 significant factors were used in survival tree modeling. Graft survival time less than 7 days and instances of graft failure were excluded. Data were split into training (70%) and testing (30%) sets for modeling and further validated with ten-fold cross validation. Survival tree pruning and model selection was determined using AIC and log-likelihood. Log-rank pairwise comparisons between subgroups and estimated survival probabilities were calculated.

Results
A total of 44,709 heart transplant patients were included for analysis. Logistic regression AUC = 0.768, F1 = 0.812; survival tree modeling returned 7 significant factors: recipient age, hospital length of stay, recipient diabetes, recipient education level, recipient primary payor source, prior cardiac surgery at transplant listing, and recipient functional status at time of transplant. Seventeen subgroups consisting of combinations of these factors were identified with distinct Kaplan-Meier survival curves (Figure 1) with five and ten-year estimated survival probability.

Conclusions
Survival tree modeling is an innovative and flexible approach to understand the complex interactions between covariates on heart transplant survival. Individualized estimated survival probability following cardiac transplant may be possible with this technique, allowing for more cogent medical decision making and coherent patient and family counseling.

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Additional Resources
- https://files.aievolution.com/prd/aat2101/abstracts/abs_4361/Figure1.pdf