

Modeling The Risk Of Post-Liver Transplant Cardiac Death Using Pre-Transplant Risk Factors In Patients With Nonalcoholic Steatohepatitis: Analysis Of UNOS Database

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Background and Aims

Patients with nonalcoholic steatohepatitis (NASH) are known to have higher risk of adverse cardiac events. We use the UNOS registry to identify the deterministic variables and to derive a prediction model to prognosticate the cardiac causes of death in NASH patients following liver transplant (LT).

Methods

2005-2019 UNOS-STAR registry was used to isolate NASH patients undergoing LT. Those under 18 or received multi-organ/living transplants were excluded. The cohort was stratified using 90-day cardiac death as the primary endpoint. Using univariate and multivariate Cox regression analyses, the contributory factors were identified and combined to develop a predictive model. The model performance was measured via iterative constructions of standard and bootstrapping-enhanced (BE) receiver operating characteristic (ROC) and area-under-ROC (AUC). The specificity, positive predictive value (PPV), and negative predictive value (NPV) were derived at a true positivity rate (TPR) of 0.8. With the model cutoff, the cohort was stratified into high and low-risk groups in order to measure survival.

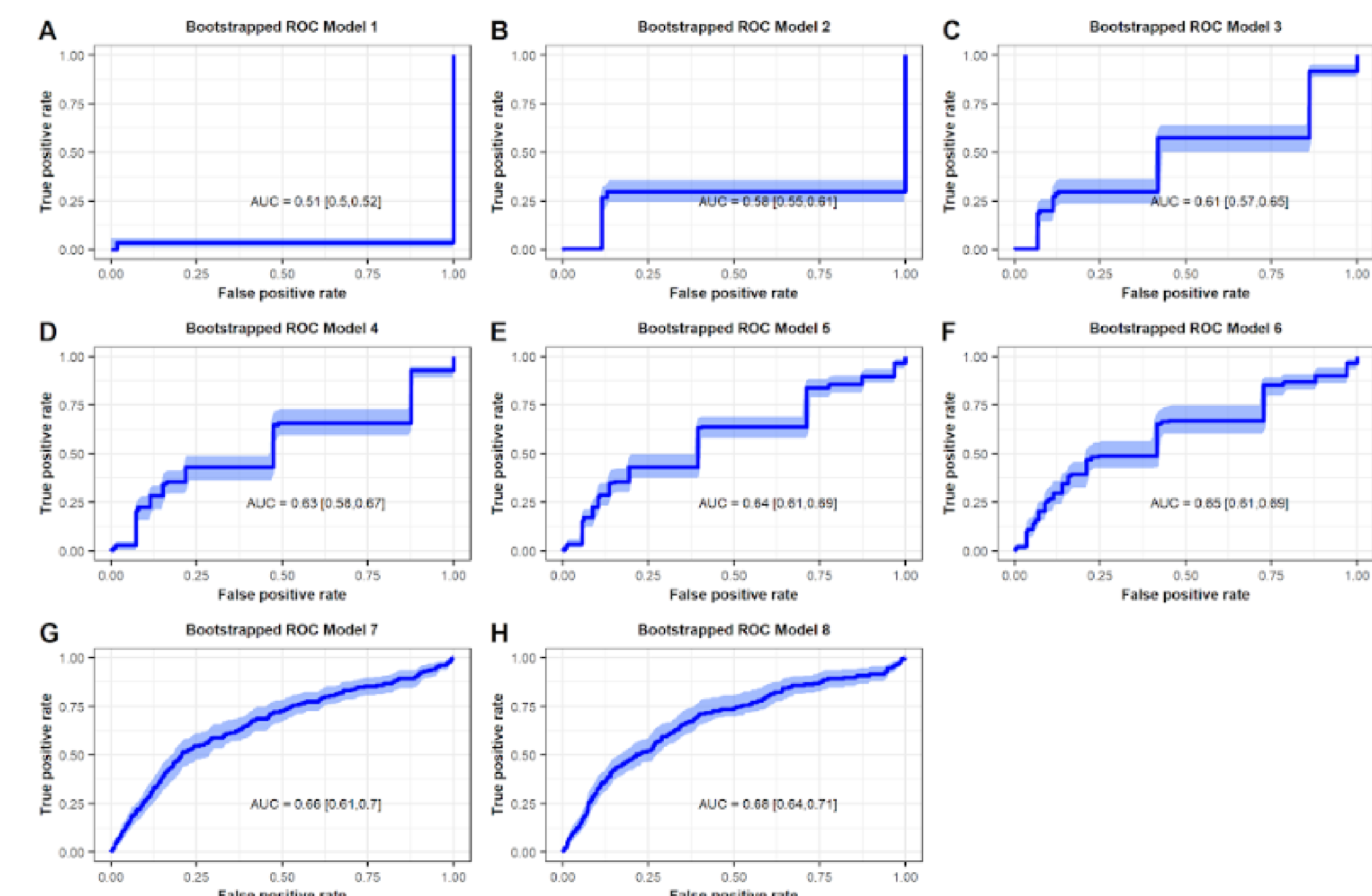
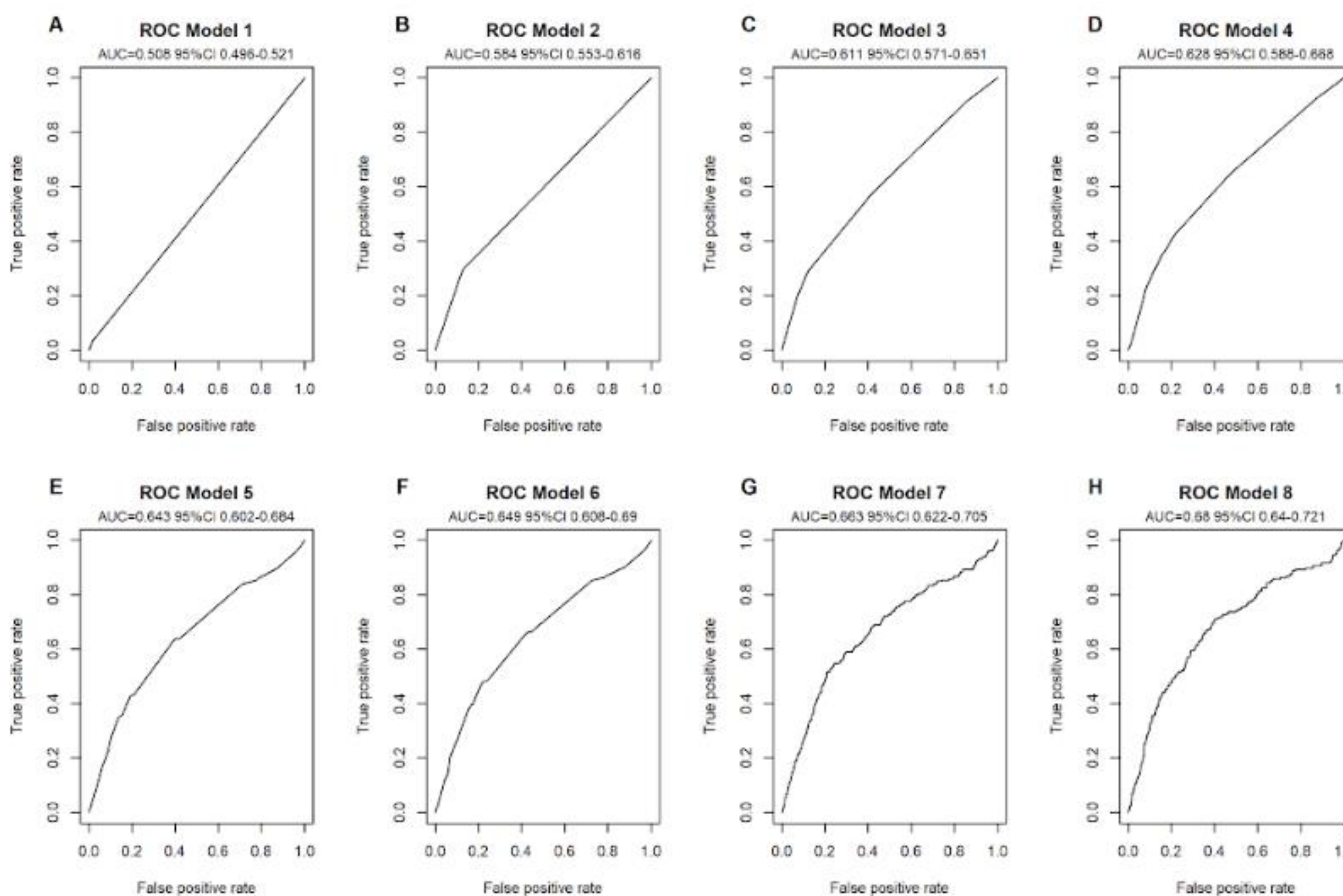
Results

11585 patients were included. Median follow-up time was 3.04 years. The following variables were identified: recipients use of epinephrine during LT admission (adjusted hazard ratio [aHR] 2.01 95% confidence interval [CI] 0.95-4.28), history of dialysis in recipients (aHR 2.83 95%CI 2.08-3.86), grade of ascites (moderate: aHR 2.11 95%CI 1.29-3.44; slight: aHR 1.40 95%CI 0.86-2.31), TIPS insertion during LT admission (aHR 1.60 95%CI 1.12-2.28), history of donor steroids use (aHR 1.48 95%CI 1.04-2.11), history of recipient ICU stay (aHR 2.46 95%CI 1.79-3.37), cold ischemia time of the graft (aHR 1.06 95%CI 1.02-1.10), and recipient age (aHR 1.02 95%CI 1.00-1.04). The final standard and BE-ROC model showed AUC of 0.68 [0.64-0.72] and 0.68 [0.64-0.71]. At a TPR of 0.8, the parameters included specificity of 0.401, PPV of 0.025, and NPV of 0.991. The cohort was stratified into high and low-risk subgroups using the model threshold at 0.8 TPR in order to compare the risks along different follow-up periods: 30-day ($p=0.004$), 90-day ($p<0.001$), 1-year ($p<0.001$), and 5-year ($p<0.001$).

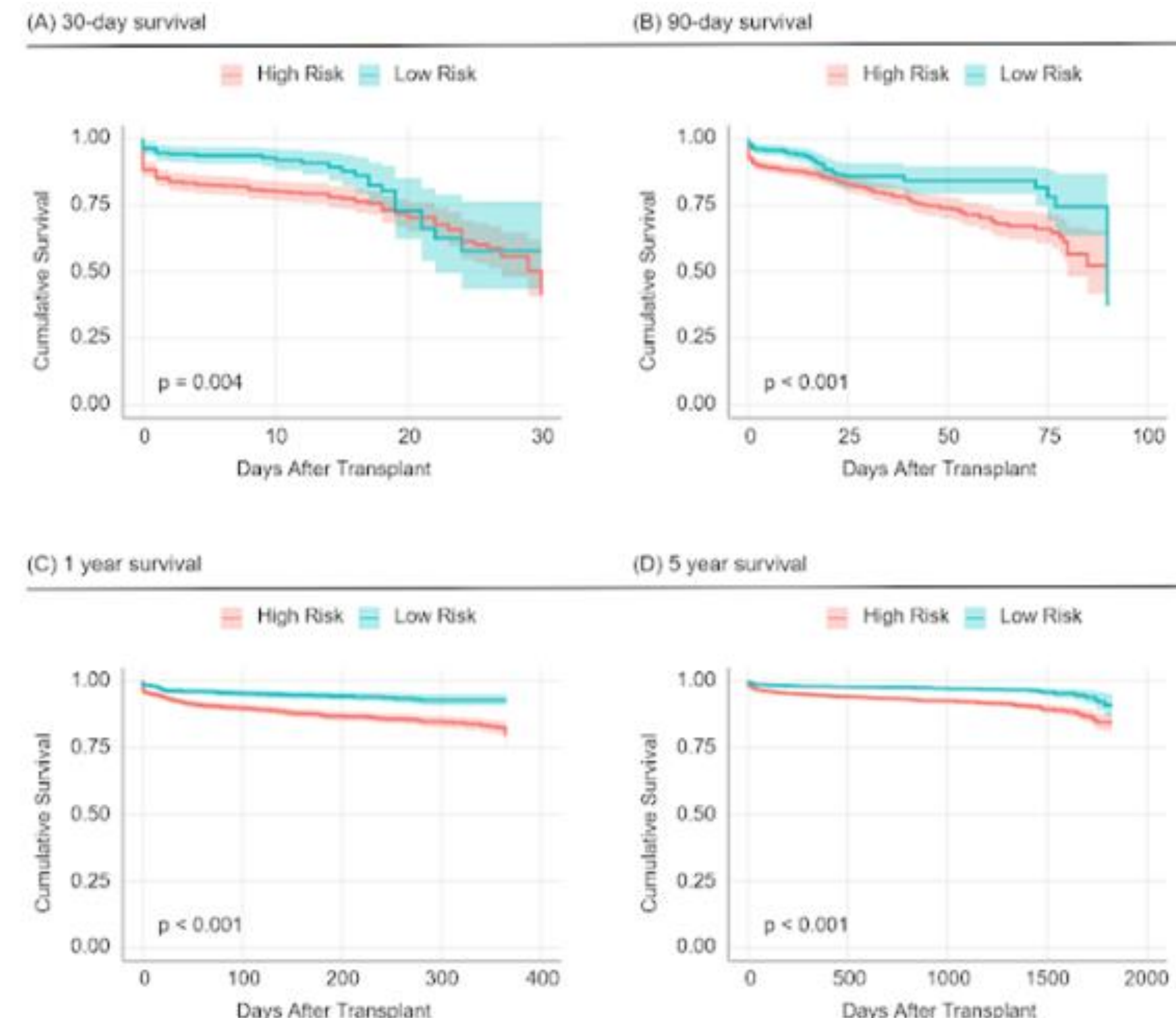
Conclusion

This model prognosticates the risk of 90-day cardiac death in NASH patients using pre-LT risk factors. The device may be clinically utilized to discern the high from the low risk candidates in order to ameliorate the modifiable risks and to optimize outcomes.

ROC Curves



Survival of Low and High-Risk Groups



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