Machine learning for predicting long-term cardiovascular outcomes in kidney transplantation recipients.

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Background:

Clinical decision support tools to accurately predict cardiovascular (CV) events in kidney transplant recipients (KTR) are lacking. This study aims to develop machine learning (ML) models to predict the long-term outcomes in KTR.

Methods:

We included KTR from Saint University hospital between January 2015 and December 2023. 454 features were recorded including demographic, clinical, laboratory values as well as ischemic evaluation and revascularization data. We studied the following outcomes: all-cause mortality, CV death, hospitalization for heart failure (HFH), and non-fatal myocardial infarction (MI). We compared twelve different ML models for each outcome.

Results:

518 patients were included. The mean age was 57.0 +/- 13.8, 56.9% males, 46.9% white and 47.6% African Americans. The best model had Area Under Curve (AUC) of 79.2%, 65.4%, 86.5%, and 83.3% for all-cause mortality, CV death, HFH, and MI, respectively. The heatmaps below show the top nine most important features with their associated p-values.

Conclusion:

ML models can be developed to predict CV outcomes in KTR with reasonable accuracy.

Clinical Implications:

Machine learning models can accurately predict post kidney transplant cardiovascular outcomes aiming for better risk modification, organ allocation, and patient outcomes.

Figure 1: Heatmaps of Cardiovascular Outcomes

