

10004

Machine Learning for Risk Prediction of Future Clinical Events in Patients with Acute Coronary Syndrome

Background: Dual antiplatelet therapy (DAPT) is mainstay in acute coronary syndrome (ACS) patients treated with percutaneous coronary intervention (PCI). Machine learning (ML) might be useful to predict clinical events compared to conventional statistical methods.

Methods: Study population was enrolled from SMART-DATE trial. Efficacy endpoint was MACCE, which consisted with composite of all-cause death, recurrent myocardial infarction, any revascularization and stroke. Safety endpoint was bleeding. Risk prediction for statistical methods was calculated risk using Cox regression. Machine learning (ML) was done with one of cloud base machine learning platform.

Results: Overall 2230 patient excluding missing values was used to construct statistical model for risk prediction. Feature selection was done using AIC stepwise method, 8 variables were selected to calculate risk. Risk prediction was calculated using Cox regression, which showed higher area under curve (AUC) value 0.714 for MACCE and 0.777 for bleeding. All patient data was used for ML modelling. After numerous algorithms and cross-validation was used for building model, 4 models with different algorithm were finally chosen under guidance of AUC. After fusion model was made, validation showed that AUC was 0.945 for MACCE, 0.944 for bleeding. Average recall and precision rate were 96.8% and 98% for MACCE, 80.2% and 75.6% for bleeding. Compared to statistical methods, ML could provide higher AUC value.

Conclusion: In over 2700 ACS patients treated with PCI, ML was effective and clinical useful methods for prediction of MACCE and bleeding compared to statistical methods.