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The use of machine learning algorithms for the identification of stable obstructive coronary artery disease

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Abstract

Background: Machine learning (ML) might be useful to analysis various clinical information to make more accurate predictions. The purpose of this study is to develop prediction models using ML algorithms for identification of stable obstructive coronary artery disease (CAD).

Methods: We retrospectively analyzed 2012 patients who visited outpatient department for stable angina or angina equivalent symptom and underwent coronary angiography from August 2014 to January 2016. We analyzed dataset using the most predictive algorithm among five ML algorithms, determine the most significant predictors in 10 variables. We compared between ML algorithm based model and established prediction model (CAD consortium model). Predictive accuracy was assessed by area under the 'receiver operating curve' (AUC). The entire data were randomly split into a training (80%) and a validation set (20%).

Result: Of the 1312 enrolled patients, 861 were patients with obstructive CAD on coronary angiography. The XGBoost algorithm model showed the best performance compared to the other four algorithms (AUC 0.805 95% Confidence interval [CI] 0.744-0.866). The XGBoost algorithm model improved risk prediction compared to CAD consortium clinical model (AUC 0.740 95% CI 0.712-0.768). The accuracy of ML based model was 80.2%. Age, troponin T, and HbA1c were important variables.

Conclusion: ML based models provide high accuracy for the prediction of stable obstructive CAD and find out new association among variables. ML based models improve identification of stable obstructive CAD over established CAD consortium clinical model.

Keywords

machine learning algorithm; coronary artery disease, stable angina pectoris