Prediction of Postoperative Length of Stay in Hospital Following Mitral Valve Surgery by Machine Learning

Objective: Predicting postoperative length of stay may facilitate resource planning. There are many clinical, surgical, and logistical factors that influence postoperative length of stay in hospital. The purpose of this study was to develop a machine learning model to predict postoperative length of stay in hospital for patients undergoing mitral valve surgery.
Methods: Perioperative data from all patients who had undergone repair or replacement of the mitral valve between 2006 and 2019 with complete data in the National Surgical Quality Improvement Program database with length of stay less than or equal to 14 days was used to develop this predictive model. The model included 22 perioperative variables and used the AdaBoost Regressor technique in machine learning. A training set of 2132 patients and a test set of 915 patients were used in development of the model. The performance of the model was evaluated using root mean squared error (RMSE).
Results: The final RMSE for the predictive model of postoperative length of stay in hospital for patients undergoing mitral valve surgery was 2.85. This reflects a margin of error of approximately three days.
Conclusions: In this study, machine learning methods were used to predict postoperative length of stay in hospital for patients undergoing mitral valve surgery. Unavailability of hospital beds limits the ability of hospitals to provide services including surgeries. Therefore, use of predictive models to accurately estimate postoperative length of stay will allow for optimal allocation of resources and minimal surgical cancellations.

Maria Currie (1), Matthew Leipzig (1), Reid R. G. Dale (2), (1) Stanford University, Stanford, CA, (2) University of California, Berkley, Berkley, CA