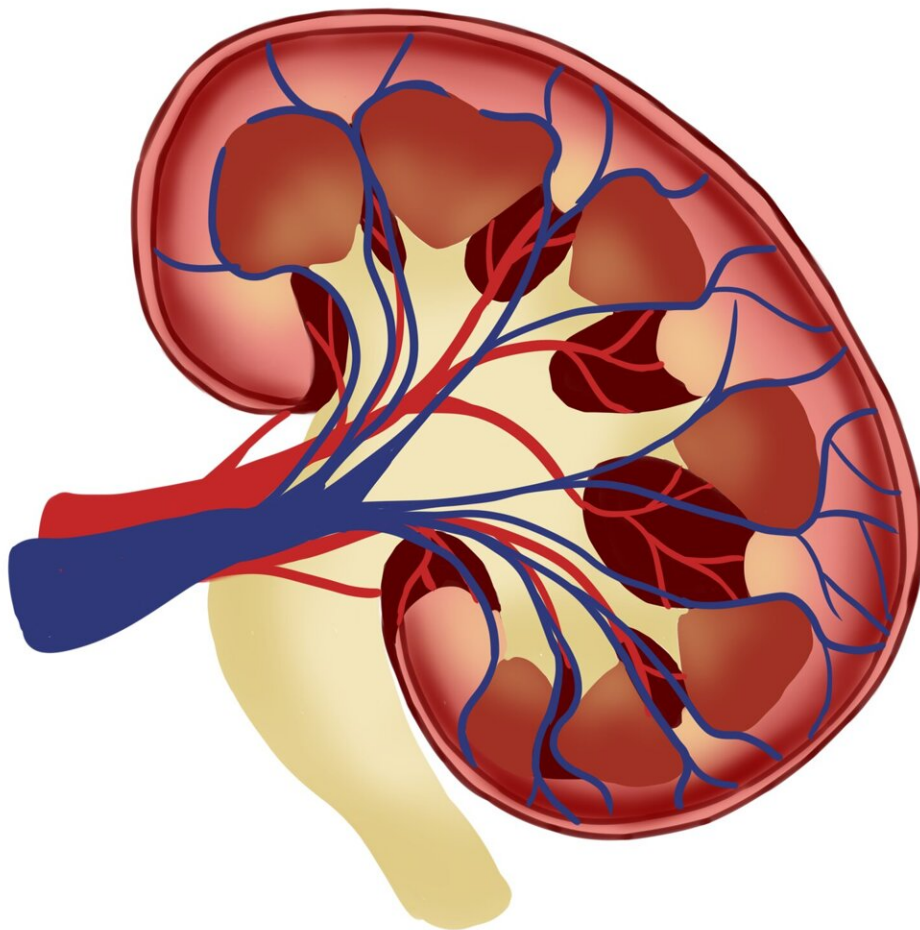# Researchers create an interpretable machine learning tool for predicting acute kidney injury requiring dialysis

March 28 2024

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Postoperative acute kidney injury requiring dialysis (PO-AKID) is a serious adverse event that not only affects acute morbidity and mortality but also long-term prognosis. Early diagnosis and perioperative risk management may help to reduce mortality. Previous risk prediction models for postoperative acute kidney injury (PO-AKI) following cardiac surgery have been developed using traditional regression analysis.

However, the traditional statistical methods are limited by overfitting and multicollinearity, preventing the analysis of many explanatory variables. Machine learning (ML) is capable of handling incomplete, complex data and providing insights to support clinical decision-making.

Regarding PO-AKI prediction, there is a growing amount of evidence that ML models can provide a more accurate outcome prediction when compared to traditional statistical analyses. Notwithstanding, the lack of explainability has hindered the application of ML models in clinical decision support. Prediction of a patient's individual risk for PO-AKID in a visual manner will help physicians understand how the ML models make the decision and embrace this new technology.

Recently, Dr. Qiuying Chen (Department of Radiology, the First Affiliated Hospital, Jinan University, Guangzhou, Guangdong, P.R. China) and Dr. Biao Fu (Guangdong Cardiovascular Institute, Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, Guangzhou, Guangdong, P.R. China) developed a practical and explainable web-based calculator (PO-AKID-teller) to detect patients who might experience PO-AKID after ATAAD surgery.

This retrospective study reviewed 549 patients undergoing ATAAD surgery from October 2016 to June 2021. The research is published in the journal *MedComm – Future Medicine*.

The initial dataset was split into an 80% training cohort (n=439) and a 20% test cohort (n=110). There were seven predictors that could indicate PO-AKID, including prior cardiovascular surgery, platelet, serum creatinine, the terminal site of dissection involvement, right coronary artery involvement, estimated blood loss, and urine output. Among six machine learning classifiers, they found the Random Forest model exhibited the best predictive performance, with an area under the curve of 0.863 in the training cohort and 0.763 in the test cohort.

They applied a Shapley Additive Explanations (SHAP) algorithm to explain the output of the prediction model by visualizing the contribution and driving direction of key variables to the outcome and further constructed an easy-to-use and explainable web-based calculator (i.e., PO-AKID-teller) to identify patients at high-risk of PO-AKID.

The PO-AKID-teller could accurately estimate an individual's risk for PO-AKID in an interpretable manner, which might aid in informed decision-making, patient counseling, perioperative optimization, and longer-term care provision.

Citation: Researchers create an interpretable machine learning tool for predicting acute kidney

injury requiring dialysis (2024, March 28) retrieved 28 April 2024 from