Peer Review File

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Review Comments

Comment 1: The study is conducted at a single center, which may limit the generalizability of the results to other populations or healthcare settings. This could affect the model's performance in different demographic distributions or clinical environments.

Reply 1: In the "Limitations" subsection, further elaborate on the impact of single-center study design on the generalizability of findings by adding the following content:

"First, this study was conducted as a single-center investigation, inherently limited by the demographic characteristics of patients, medical resources, and clinical practice patterns specific to our center. Consequently, the research findings may not be directly generalizable to other centers. Variability exists among patient populations across different centers in terms of genetic backgrounds, comorbidity profiles, and surgical protocols, which may lead to fluctuations in the model's predictive performance when applied to diverse cohorts. To enhance the universality of our findings, subsequent studies will actively establish multi-center collaborations to incorporate broader patient datasets, re-evaluate the model's validity and stability, and strengthen the general applicability of the model."

Changes in the text: Line 294-303

Comment 2: The retrospective nature of the study might introduce biases, such as selection bias or information bias, which could impact the reliability of the findings. Prospective studies are generally more robust in establishing cause-and-effect relationships.

Reply 2: In the "Limitations" subsection, further emphasize the potential bias issues inherent in retrospective study designs by adding:

"Second, retrospective study designs inevitably carry risks of selection bias and information bias. In this study, despite implementing stringent inclusion and exclusion criteria for patient selection and meticulously verifying data to minimize information bias, these measures could not entirely eliminate the impact of residual biases. Therefore, we plan to conduct a prospective study to validate the models and findings from this research, enabling more precise evaluation of the associations between preoperative/intraoperative risk factors and postoperative AKI incidence."

Changes in the text: Line 304-310

Comment 3: The study excludes variables with more than 20% missing data, which could omit important predictors. While mean imputation is used for missing values, this method may not always accurately reflect the true data distribution, potentially affecting model performance.

Reply 3: Regarding missing data, in addition to the currently employed mean imputation

method, subsequent studies will explore more advanced processing techniques such as multiple imputation methods and machine learning-based imputation algorithms (e.g., K-Nearest Neighbors algorithm, Random Forest imputation algorithm) to optimize model performance. We will re-evaluate the impact of high-missingness variables previously excluded from the model to ensure that important predictive factors are not omitted.
Changes in the text: Line 314-316

Comment 4: Although the study uses a validation set, it does not report external validation. External validation in different datasets or settings is crucial to confirm the model's predictive ability in broader contexts.
Reply 4: In the "Limitations" subsection, add the following content regarding external validation:
"Third, this study only utilized an internal validation set for model evaluation without conducting external validation. We plan to actively seek appropriate external datasets for external validation. By comparing the model's performance metrics across diverse datasets, we aim to further refine the model evaluation framework."
Changes in the text: Line 310-314

Comment 5: While the study suggests potential clinical applications, it does not provide evidence of how the model would be integrated into clinical practice or its impact on patient outcomes. Future studies should focus on implementing the model in real-world settings to assess its effectiveness.
Reply 5: Although the model has clinical application potential, it lacks specific clinical application evidence. Our future research will focus on implementing this model in actual clinical settings to observe its impact on clinical decision-making. Discussion on the clinical significance of the model will be added in the discussion section, as follows:
Patients classified as low-risk would continue standard perioperative care regimen with routine monitoring. Moderate-risk patients should strengthen renal function monitoring, particularly to avoid the use of nephrotoxic drugs. High-risk cases would trigger multidisciplinary team consultations to develop individualized care plans. These plans would integrate preoperative surgical optimization, intraoperative renal protective strategies, and contingency plans for early postoperative renal replacement therapy, allowing for the earlier implementation of effective intervention strategies to reduce the incidence of AKI and postoperative mortality after CABG surgery.
Changes in the text: Line 285-293

Comment 6: The study employs a diverse range of machine learning algorithms, allowing for a comprehensive comparison of their predictive performances. This approach helps identify the most effective model for AKI prediction in the context of CABG surgery.

Reply 6: We appreciate your recognition of our comprehensive comparison of multiple machine learning algorithms. This approach enables the identification of the optimal model for predicting AKI following CABG, providing a robust support for subsequent research and clinical translation. We will continue to explore other emerging algorithms to further optimize model performance.

Comment 7: The Random Forest model shows the best predictive performance among the tested algorithms, with an AUC of 0.737. This suggests its potential utility in clinical settings for identifying high-risk patients.

Reply 7: The random forest model demonstrated strong performance in this study with an AUC of 0.737 and showed potential clinical value in identifying high-risk patients. Our subsequent research will further explore the model's strengths through optimized parameter configurations to enhance predictive accuracy. Additionally, we will integrate other clinical variables to investigate effective strategies for translating this model into actionable clinical applications.