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LETTER

Reflections on the Clinical Application and Optimization of the Pneumonia Risk Prediction Model Following Intracerebral Hemorrhage [Letter]

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Dear editor

We have carefully read the article "A Novel Nomogram for Predicting the Risk of Pneumonia After Intracerebral Hemorrhage" by Sun et al.[1] This study presents a valuable predictive tool designed to assess the risk of pneumonia in patients with cerebral hemorrhage (ICH), which has important implications for improving the management of stroke patients. However, after a careful reading, we would like to make a few comments on some of the potential limitations present in the article with a view to further improving the robustness and clinical applicability of the model.

First, in their study the authors focused only on hematoma volume and hematoma location and did not consider whether or not the patient received surgical treatment as a variable. This is an important consideration for neurosurgeons. In particular, surgical intervention is usually considered in patients with supratentorial hematomas exceeding 30 mL or infratentorial hematomas exceeding 10 mL. Surgically treated patients face a more complicated recovery process and are at higher risk for postoperative pneumonia due to surgery, mechanical ventilation, and prolonged bedrest.[2] Failure to include surgical treatment in the model may have led to an underestimation of the risk of pneumonia in this subset of patients.

Second, multicollinearity between variables is an important consideration when constructing predictive models (especially nomograms). We note that the authors created nomograms directly after selecting the nine independent predictors, without performing covariance or Spearman correlation analyses.[3] Multicollinearity occurs when there is a high degree of correlation between multiple predictors, which may lead to instability in the results of the regression analysis and affect the accuracy and interpretability of the model. If there is a strong correlation between the variables, the model may incorrectly assign too high a weight to some variables, which in turn affects the reliability of the predicted results.

Finally, although the authors use machine learning methods to validate predictive models, their evaluation metrics focus on simple and basic metrics such as sensitivity. While these metrics are helpful in assessing the basic performance of the model, they do not provide a comprehensive picture of the overall performance of the model. Especially when dealing with complex, data-imbalanced, or two-class classification problems, comprehensive evaluation is especially important. Therefore, it is recommended that authors add metrics such as precision, recall, F1 score, and Matthews correlation coefficient (MCC) when evaluating machine learning models, which provide a more comprehensive and balanced assessment.[4]

As a clinician, I am well aware of the importance of timely identification of the risk of pneumonia after cerebral hemorrhage for patient prognosis. Although this predictive tool has provided valuable assistance, there is still room for

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further refinement. Future research could further extend the applicability of the model to incorporate more personalized clinical data and explore the potential of AI technology in this area. Combining the strengths of clinical practice and AI could provide us with more accurate and effective decision support in busy working environments. Early implementation of individualized, targeted anti-infective therapy can significantly improve patient prognosis.

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