Author’s response to reviews

Title: Risk scores for predicting dysphagia in critically ill patients after cardiac surgery

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Re: Revision for “Risk scores for predicting dysphagia in critically ill patients after cardiac surgery” (BMC Anesthesiology - BANE-D-18-00188)

Dear Editor in Chief Guangde Tu,

We thank you and the reviewers for giving us the opportunity to revise our manuscript. We have carefully studied the comments raised by the reviewers and editors, and revised the paper accordingly. The following are point-by-point responses to the editors’ and reviewers’ comments.

Should you have any questions, please contact us without any hesitation.

We look forward to your favorable decision.
Reviewer 1

Thank you for the opportunity to review this article. In this prospective cohort study of 303 patients at cardiac care unit after cardiac surgery, the authors developed and validated a scoring model for risk stratification of dysphagia. Although the paper contains an interesting and important topic, there are a number of problems with this study that need to be addressed.

Answer: Thank you for your positive comments. We have revised the manuscript to the best of our ability according to your advice.

Minor comments:

Comment 1: The name of the institution/local ethics board that gave approval is not stated.

Answer: Thank you for your suggestion. The study was approved by the ethical committee of the First Affiliated Hospital of Wenzhou Medical University Ethical Committee. The presentation of the ethical committee have been stated in Page 6, Line 5-6.

Comment 2: The primary outcome (i.e. dysphagia) needs to be described more clearly (when / how was dysphagia diagnosed?).
Answer: Thank you for your advice. For this study, patient required swallowing assessment by the Gugging Swallowing Screen (GUSS) when the following criteria were satisfied: 1. conscious after admission; 2. without endotracheal intubation; 3. endotracheal intubation were evaluated at $>4$ hours post-extubation. Dysphagia was defined as GUSS score of 19 points or less. The detailed presentation has been added in the part of study design (Page 6, Line 10-14).

Comment 3: There is no sample size calculation provided and no power calculation. This is vital to the interpretation of the analysis. How did the authors calculate their sample size? Please clarify.

Answer: Thank you for your advice. The prevalence of dysphagia in critically ill patients after cardiac surgery is still lacking of thorough reports. For the purpose of sample-size calculation, we estimated a 30-40% incidence of postoperative dysphagia on the basis of preliminary data and reported prevalence. In addition, the odds ratio of candidate variables such as stroke as a predictive model of dysphagia was greater than 2 using preliminary data obtained in our study. We estimated that 25 patients were required to provide 90% power to detect an increase in the incidence of dysphagia from 30% to 60% with a type I error probability of 0.05. Finally, the number of participants included in our study rather than the number of evaluations.

Comment 4: Did the authors check for the distribution of all continuous variables? Non-normally distributed variables should be presented as median and interquartile range.

Answer: Thank you for your valuable advice. We have rechecked all continuous variables in Table 1 such as Age, BMI, LVEF, LAD and LVDD etc. Kolmogorov-Smirnov test was performed for the assessment of normal distribution.

In our study, endotracheal intubation, gastric intubation and sedative drug use duration, as non-normally distributed variables, have been revised and presented as median and interquartile range in Page 8, Line 3-5.

Comment 5: Authors need to describe the construction of multivariable logistic regression model more detailed, since it may be important to really convince the reader.

Answer: Thank you for your suggestions. The detailed procedures of the generation and selection have been added in the statistical analysis (Page 6, Line 20-23; Page 7, Line 1-9). Univariate logistic analyses were performed for determining the unadjusted association of dysphagia and clinical parameters. Variables that were found to be different between patients with different outcomes and the parameters that were important clinically but not statistically significant all
were included as candidate variables in a forward-conditional stepwise logistic regression analysis to identify independent predictors for the prognosis of dysphagia. The detailed information between dysphagia and non-dysphagia groups were added into Table 1. Then, endotracheal duration, gastric intubation, sedative drug use duration and stroke that were associated with dysphagia (p < 0.10) were included as candidate variables for multivariate logistic regression and to calculate odds ratio for relative risk of dysphagia. Endotracheal intubation was not significantly correlated with dysphagia in multivariate logistic regression and then was unselected. Finally, the survival nomogram was developed on the basis of a multivariable model, which allowed us to obtain survival probability estimations.

Comment 6: Page 5, line 42: "congestive, heart failure" (remove ",")

Answer: Thank you for your comments. We have revised the manuscript to the best of our ability in accordance with your comments. Moreover, Professor Sven Van Poucke, from Ziekenhuis Oost-Limburg is invited to proof-read the manuscript to minimize grammatical and bibliographical errors.

Comment 7: line 1: "multivariate logistic regression and to calculate hazard ratios (HRs) for relative risk of dysphagia" (Is "hazard ratios" right?)

Answer: Thank you for your suggestions. The word “odds ratio” should be used to present relative risk of dysphagia. We have revised the manuscript according your advice.

Comment 8: Page 8, line 45: "Mean left ventricle ejection fraction (LVEF) at admission" (Is "at admission" meaning 'preoperative' or 'CCU'? Please clarify)

Answer: Thank you for your comments. In our study, "at admission" is meaning preoperative. The detailed presentation had been added in the Page 6, Line 20-23.

Comment 9: It is unclear what "gastric intubation" means. Please clarify.

Answer: Thank you for your positive comments. Gastric intubation (nasogastric tube) is usually used to provide enteral nutrition and administer medicines on patients who are sedated or anaesthetised. It is a seemingly simple procedure but prolong gastric intubation can sometimes result in dysphagia. Duration of gastric intubation was consider as a risk factor for dysphagia in our study. The detailed presentation have been added in the Page 10, Line 19-22 and Page 11, Line 1.
Reviewer 2

Comment 1: The study is well conceived and has been rigorously executed. The manuscript is well written. The study is worthy of publication on these grounds alone, although the strength of the association with stroke and weakness of the association with the other factors identified might diminish the impact of the study. There are no problems with the paper - it is well written and clear. It is technically sound. The sections flow logically. It is well referenced. The tables and figures are clear.

Answer: Thank you for your positive comments. We have revised the manuscript to the best of our ability according to your advice.

Comment 3: The problem with the study is the strength of the association with stroke compared with the other factors. Some reviewers might state that essentially the findings could be summarized as showing that if you have a stroke after cardiac surgery you will be at risk of dysphagia, and that this is well known and does not require a scoring system. If the authors could make a slightly stronger case for the scoring system, this might help with publication.

Answer: Thank you for your constructive suggestion. Patients with a stroke after cardiac surgery got a high score and would be at high risk of dysphagia. However, it is important to note that patients with no a history of stroke shouldn't be dismissed. In our study, a majority of patients developed dysphagia (N=58, 63.0%) have no a history of stroke. Our scoring system still performed a predictive value in these patients. For example, 25 patients with gastric intubation more than 72 hours would be evaluated a high risk of dysphagia by SSG-OD scores. Although these patients have no history of stroke, 88% of patients (N=22) still have occurred dysphagia.