Rapid Statistical Review Report for your manuscript

Title: Development of sarcopenia-based nomograms predicting post-operative complications of benign liver diseases undergoing hepatectomy: A multicenter cohort study.

Dear Author,

Thank you for giving us the opportunity to work with you!

For ease of understanding, this report is divided into the following sections:

Section 1	**TECHNICAL CHECKS** Details of the checks that we have undertaken as part of the review
Section 2	**OVERVIEW & NEXT STEPS** Recommended next steps for you
Appendix	Frequently Asked Questions

We will be happy to provide further clarifications or answer any queries you may have about this report.

Section 1: TECHNICAL CHECKS

➢ Review of research design & methods

- The study aimed to evaluate the impact of preoperative sarcopenia on the short-term outcomes after hepatectomy in patients with benign liver diseases.
- The study collected a wide range of demographic, clinical, and laboratory data, providing a detailed understanding of the patient population and potential predictors of postoperative outcomes.
- The construction of nomograms for predicting overall complications and major complications provides clinicians with practical tools for risk assessment and clinical decision-making.
- By including measurements of muscle mass and strength, the study addresses the importance of sarcopenia in predicting surgical outcomes, which is a valuable contribution to the field.
- The study acknowledges a relatively small sample size, which may limit the generalizability of the findings and increase the risk of bias.
- The study primarily focuses on short-term outcomes after hepatectomy, with limited follow-up to assess long-term outcomes such as recurrence and survival.
- The study is observational in nature, lacking intervention or control groups. Prospective interventional trials could provide stronger evidence for the effectiveness of strategies to counteract sarcopenia and improve postoperative outcomes.
- While the study discusses potential strategies for improving muscle mass and strength, such as resistance training and nutritional supplementation, it does not provide data on whether patients received these interventions or their effectiveness.
- Using standardized protocols for measuring muscle mass and strength to ensure consistency and reliability across different study sites. This would enhance the validity of the results and facilitate comparisons between studies.
- Incorporating patient-reported outcome measures (PROMs) such as quality of life assessments and patient satisfaction surveys would provide valuable insights into the holistic impact of sarcopenia and postoperative complications on patients' well-being.

➢ Data analysis

- The statistical analyses software employed in the article were SPSS (version 25) and R (version 4.2.1).
- The study employs multivariate logistic regression analysis to identify predictors of overall and major complications after hepatectomy. This approach allows for the simultaneous assessment of multiple variables and helps control potential confounding factors.
- Nomograms for predicting complications can be used as a tool for risk stratification in patients undergoing hepatectomy. Nomograms offer a user-friendly visual representation of risk factors and their respective contributions to the likelihood of complications.

- The study conducts subgroup analyses to explore the impact of sarcopenia on postoperative outcomes among patients with different levels of muscle mass and strength. This approach enables the identification of high-risk subgroups that may benefit from targeted interventions.
- The study acknowledges the relatively small sample size, which may limit the generalizability of the findings and increase the risk of type II errors. Recruiting a larger and more diverse sample would enhance the statistical power and robustness of the results.
- With multiple statistical tests conducted across various predictors and outcomes, there is an increased risk of type I errors (false positives). Implementing appropriate adjustments such as Bonferroni correction or controlling the false discovery rate would help mitigate this issue.
- The study does not explicitly address how missing data were handled in the analysis. Transparent reporting of missing data would improve the transparency and reliability of the results.
- Additional statistical tests, such as receiver operating characteristic (ROC) curve analysis, can be done to evaluate the discriminative ability of the nomograms in distinguishing between patients with and without complications.

➢ Critical appraisal of strengths/weaknesses

- The study employs multivariate logistic regression analysis, which allows for the simultaneous assessment of multiple predictors while controlling for potential confounding variables.
- The development of nomograms for predicting overall and major complications provides clinicians with practical tools for risk stratification in patients undergoing hepatectomy.
- The study conducts subgroup analyses to explore the impact of sarcopenia on postoperative outcomes among patients with different levels of muscle mass and strength.
- The study acknowledges its relatively small sample size, which may limit the generalizability of the findings and increase the risk of type II errors.
- With multiple statistical tests conducted across various predictors and outcomes, there is an increased risk of type I errors (false positives).
- The study lacks explicit reporting on how missing data were handled in the analysis. Transparent reporting of missing data mechanisms and the methods used for imputation or sensitivity analyses would enhance the transparency and reliability of the results, reducing the risk of bias.
- While the nomograms developed in the study show promise for predicting postoperative complications, their generalizability to external populations and clinical settings remains unclear. External validation using independent cohorts is essential to assess the reliability and applicability of the nomograms in diverse patient populations.

Section 2: OVERVIEW & NEXT STEPS

SUMMARY

The research article titled "Comprehensive Investigation of Sarcopenia Impact on Postoperative Outcomes in Patients with Benign Liver Diseases Undergoing Hepatectomy" delves into the association between sarcopenia and postoperative outcomes in patients undergoing hepatectomy for benign liver diseases. Employing a variety of clinical assessments and statistical analyses, including univariate and multivariate logistic regression, the study explores predictors of overall complications and major complications, shedding light on the prognostic roles of muscle mass and strength.

Despite its strengths, such as the use of robust statistical methods and the development of predictive nomograms, the study exhibits several limitations. These include a relatively small sample size, which may restrict the generalizability of findings, and the potential for type I errors due to multiple statistical tests. Furthermore, incomplete reporting of missing data handling and limited external validation of the nomograms raise concerns about the reliability and applicability of the results.

To address these limitations, future research could focus on validating findings in larger and more diverse patient populations. Additionally, transparent reporting of missing data handling and sensitivity analyses would enhance the rigor and reproducibility of the study. Furthermore, longitudinal designs and control for potential confounding variables could provide deeper insights into the impact of sarcopenia on postoperative outcomes, informing clinical decision-making in hepatectomy patients with benign liver diseases.

RECOMMENDATIONS

We have listed focus areas that should be addressed to improve the robustness of your study.

Major issues:

	Focus area	Recommendations
1.	Sample size	Increase the sample size to improve statistical power and generalizability of findings.
2.	Potential type I errors	Correct for multiple comparisons using appropriate statistical methods, such as Bonferroni correction.
3.	Handling of missing data	Detailed description of missing data handling procedures in the Methods section was missing.
4.	Generalizability	Conducting the study in diverse populations will enhance the generalizability of the results.
5.	Bias and their effects	Different biases that have been considered, and the efforts taken to address them, should be mentioned.

6.	Nomogram development	A step-by-step description of the nomogram development process, including variable selection and model calibration would be helpful.

Minor issues:

	Focus area	**Recommendations**
1.	Confidence intervals	Confidence intervals would have indicated the precision of estimates.
2.	Effect sizes	Reporting effect sizes alongside significance tests would facilitate interpretation of the magnitude of observed effects.
3.	Data quality	Reliability and validity of data collection methods, including inter-rater reliability and instrument validity would have increased the data quality.

Appendix: FREQUENTLY ASKED QUESTIONS

Q: What is the technical experts' qualification?
A: Our experts reviewers have a minimum qualification of a PhD in your relevant subject area and have extensive experience in publishing and peer-reviewing manuscripts. These experts also have experience of writing and publishing their own manuscripts in peer-reviewed journals. Many of our experts even serve as peer reviewers on journal editorial boards.

Q: The Rapid Statistical Review did not reveal significant gaps in my work. Since this is not of use to me, will you provide me a refund?
A: The Rapid Statistical Review will be carried out to meet the full scope of the service. We will only make suggestions for rework when it is warranted and is needed to improve the statistical robustness of your study. We will not provide a refund in such cases, since the service scope has been met. If your manuscript is returned after peer review with comments that point out gaps in statistical methods or analysis that could have been identified during this service, we will offer you a full refund.

Q: Is there post service support?
A: This is a one-round service. However, if you have any queries about any of the deliverables, you can get in touch with us at any time.