Reviewer’s report

Title: Cardiac Surgical Outcome Prediction by Blood Pressure Variability Indices Poincaré plot and Coefficient of Variation: an Observational Study

Version: 0 Date: 20 Oct 2019

Reviewer: Larissa Neumann

Reviewer's report:

Review Report "Cardiac Surgical Outcome Prediction by Blood Pressure Variability Indices Poincaré plot and Coefficient of Variation: an Observational Study"

Manuscript Draft, BANE-D-19-00666

Summary

In the manuscript "Cardiac Surgical Outcome Prediction by Blood Pressure Variability Indices Poincaré plot and Coefficient of Variation: an Observational Study", Senthil Packiasabapathy K and colleagues retrospectively analyzed data from 3687 adult patients, who received cardiac surgery, which required a cardio-pulmonary bypass, between January 2008 and June 2013 (or June 2014) at Beth Israel Deaconess Medical Centre.

Intraoperative invasive arterial blood pressure data and other data was derived by the institutional Anesthesia Information Management Systems (AIMS) and/or the Society of Thoracic Surgery (STS) database.

The aim of the study was to predict postoperative 30-day mortality and renal failure by performing analyses with blood pressure variability variables like the Coefficient of Variation and two values of Poincaré plots (SD1, SD2).

Conclusion

I recommend rejecting the manuscript, as there has been a recent study of Jinadasa and colleagues, published in the Journal of Anesthesia and Analgesia 2018, in which a part of the results of this manuscript have already been reported. In addition, the Poincaré analysis did not perform well in the prediction of 30-day mortality or renal failure, and thus the manuscript does not add new information to the research field.

While reading the manuscript, it was not completely clear, that a part of the analyzed data has already been published, and that this analysis was a sub analysis. Except the Poincaré analysis, exact the same study protocol was followed by Jindasa et al. Content of patient cohort, perioperative management, measurement and data collection, statistical analysis, power analysis and a part of the results are absolute identical. Even results presented in the tables (table 1 and 2) and figure 1 are equal to those in the article of Jindasa et al.
The authors of the manuscript mentioned this comment: "Our previous work, showed a significant association between BP variability (defined as Coefficient of Variation, CV) and postoperative outcomes [6]. In this study, we took the next step …" (chapter Background, page 4, line 56ff). However, even by reading the chapter methods, the reader cannot conclude, that the exact study protocol was used as in a recent study. In addition, the authors of the manuscript mentioned the previous study not as their own anymore in the last chapter Discussion by saying: "In a recent retrospective analysis of intraoperative BP variability, it was found that …. [6]. Nonetheless, the authors concluded …".

Recommendation

It if would have been declared in the beginning of the manuscript, that the authors performed a sub analysis of a previous study, the reader would have been informed well.

I recommend the manuscript for rejection, but there are other recommendations listed below.

MAJOR FLAWS

1. Study design
   Comment: please see above.
   Recommendation:

   a. Please inform the reader at the very beginning of your manuscript that you are performing a sub analysis.

   b. Please do not present results as their own results, if they have been already been published in another article (table 1, table2, figure 1, abstract line 48, chapter Results line 11-43).

   c. Did you include data from January 2008 to June 2013 or to June 2014 (Page 6, line 27)? This information differs from the previous study of Jinadasa and colleagues.

   d. Why does some data of age and male gender in table 1 differ from the previous study of Jinadasa and colleagues, when all the following data in table 1 and table 2 is identical?

2. Importance of this study

   a. As there has been a previous study, please describe why performing another sub analysis was important. Why did you "took the next step"?

   b. Why did you choose to use the Poincaré plot?

   c. Page 13, Line 55ff: An explanation on the Poincaré plot should rather be provided in the chapter background or methods than in the chapter discussion (page 13, line55ff - page 14 16).
3. Methods

a. Do you know anything about how missing data was handled? Did every patient had blood pressure data for the whole procedure (pre-bypass, bypass, post-bypass)?

b. Why did you (as well as the previous study) describe the type of anesthesia induction? What should this information tell the reader?

c. You include the STS risk scores in your analyses. How were these scores calculated?

d. Why do you include the STS risk score in the unadjusted multivariable model?

e. How did you choose which variables were included in the multivariate analysis? Please describe the process.

f. How is renal failure as an outcome variable defined? Did you get time stamps of ICD9 coding? Did you use laboratory values? What was your cut off? How did you know if a patient had renal failure or renal replacement therapy pre-operative?

g. How was the outcome data mortality gathered?

h. How many groups did you use to calculate the Hosmer-Lemeshow test statistic?

i. How long where the intraoperative periods pre-bypass, bypass and post-bypass? Did you calculate the mean, standard deviation and/or the confidence interval?

4. Results

a. Page 9, Line 11ff: "Some of them did not require CBP." Please describe how many patients where excluded --&gt; n=671." AIMS data was not available for a few others." --&gt; n=11

b. Page 9, Line 11-43: Please do not present results as their own results, if they have been already been published in another article.

c. Page 9, 42f: How many patients had other surgeries than CABG? i.e. CABG + valve: 19.66%, …

d. Page 10, Line 33ff: It is quite difficult to read your results. You could re-order or visualize your results.

e. Page 10, Line 35: For what was CV for MAP during the bypass phase significant? Mortality or renal failure?

f. What is your suggestion, why did not SD1 show a statistical significance?
5. Discussion

a. Why did you use the Poincaré plot for blood pressure variability when it was introduced to report heart rate variability?

b. Page 12, Line 15/16: what are conventional models?

c. Page 12, Line 45f: What is the Shannon index? What does this finding add to your findings? Are they controversially? Why do you suggest is that?

d. Page 12, Line 51ff: What is entropy? And why do you think was there an inverse correlation with risk prediction scores?

e. Page 13, Line 4-24: Please contextualize these other findings with your findings.

MINOR FLAWS

1. Abstract
The abstract mainly follows the checklist of the STROBE Statement. Please provide more detailed information in the abstract to completely fulfill the STROBE Statement.

1.1 Abstract Methods

1.1.1 Setting:

a. From which hospital was the data acquired? --&gt; Beth Israel Deaconess Medical Center

b. What databases were the major sources? --&gt; STS, AIMS

1.1.2 Study Population:

a. What were the methods of selection of the participants?

b. What were the exact eligibility criteria (age, special cardiac surgeries requiring cardio-pulmonary bypass)?

1.1.3 Variables:

a. Which variables were included? --&gt; The Coefficient of Variation and variables of Poincaré plots were SD1, SD2.

As the reader may not know Poincare plots and the abbreviations SD1, SD2, SV, please do not use abbreviations without explaining them (i.e. "SD1, SD2" -page2, line 50; "BP" -page 2, line 31)

b. Primary outcome renal failure: how was it classified (ICD-diagnosis, lab values, renal replacement therapy)?
Recommendation: Variables should be clearly defined and explained in the abstract.

1.2 Abstract Results:

a. It is reported that the predictive modeling was poor. What were results of odds, p-values, confidence intervals, AUCs?

b. Did you get other results than your main results? 
Recommendation: Please list more details about your main results. You report other results as well.

1.3 Keywords:

Why did you use the keywords 'short-term variability' and 'long-term variability' while these keywords are only mentioned in the chapter discussion (page 14, line 24f)? If these are keywords of your study these keywords could be uses more often in the manuscript.

2. Tables, Figures

a. Please do not present results as their own results, if they have been already been published in another article (table 1, table2, figure 1).

b. Please use the correct heading of table 5.

REFERENCES

Previous study:


STROBE Statement:

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

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5. Do you have any other financial competing interests?

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If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.
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