Reviewer's report

Title: A simple clinical model for planning transfusion quantities in heart surgery

Version: 3 Date: 14 January 2011

Reviewer: Hosam Fawzy

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Transfusion rates in cardiac surgery remain high despite major advances in perioperative blood conservation and institutions continue to vary significantly in their transfusion practices. Readily available patient variables can predict patients at risk for transfusion. The use of predictors of allogeneic transfusion in cardiac surgery patients allows for preoperative risk stratification and may allow for more rational resource allocation of costly blood conservation strategies.

Title:
The title covers the content of the study.

Abstract:
The abstract indicates the purpose of the study, patients and methods, most important results and conclusions. However, it does not convey the conclusion reported in the text. In the abstract it is mentioned that "model output highlighted some important aspects of perioperative risk of blood-transfusion related complications" but nothing was mentioned about the blood transfusion complications in the text.

Background:
This study is a well conducted observational retrospective study. The purpose of the study and the possible effect of the intervention are clearly stated in the introduction.

Methods:
Inclusion and exclusion criteria and study location are well described. Sufficient information is provided regarding the methods used to generate the study.
The number of study participants in this study is large.

Precise details of the used methods for each group are provided as well. The methods used are appropriate. However, for model design, it is preferable to use prospective randomized-controlled studies rather than using retrospective observational ones. Multi-centers studies also play a major role in setting up protocols and guidelines for clinical practice.

The authors should address the following issues:
- The name of the institution was repeated twice in the patient set section (lines 6 and 10 page 5).
- There is a controversy in the patient's consent as it was stated that "Due to the retrospective nature of the study, the need for informed consent was waived." line 14 page 5 while it was mentioned that "Written informed consent was obtained from all patients." lines 19 & 20 page 5.

Statistical review:
It is important that this manuscript to be seen by an expert Statistician

Results:
- Results are presented twice both in the text (paragraph 5, lines 25-30, page 9) and in table 3.
- Definitions of group I, II and III are confusing (paragraph number 1 page number 10):
  - Group I (303 patients, 9.1%) : appreciably fewer transfusions (more than 2 packs) than estimated by the model ("less transfused" patients);
  - Group II (2574 patients, 77.7%) : absolute difference between number of packs transfused and number estimated by model not more than 2 packs ("well transfused" patients);
  - Group III (438 patients, 13.2%) : appreciably more transfusions (more than 2 packs) than estimated by model ("over transfused" patients).
- In lines 19, 20 & 21 page 10: "Percentage morbidity was about 28% in patients for whom the model fitted the actual data exactly, while the highest differences were associated with very high morbidities."
It is not clear if blood transfusion causing morbidities or it is given when there are post-operative morbidities.

- The sentence: "When patients managed by transfusion therapy contrary to our blood conservation strategy and those with unpredictable adverse events were removed from the sample, the percentage of cases with a difference of more than two packs between the model estimate and the actual number transfused decreased to only 7%.
In the second paragraph page number 11, needs to be better presented to avoid confusion.

- Table 4, page 25, lines 2 &3: " actual numbers of packs or red blood cells (PRBC): >2 PRBC = less transfused patients; <2 PRBC = over transfused patients;"
It is different from what has been mentioned in the first paragraph, page 10.

Discussion:
- The discussion is well balanced.

Conclusions:
- In page 15, the first three paragraphs are summarizing the study and are not conclusions. The last three lines are the conclusions.

Key messages:
- In the first message it was mentioned that: "Unnecessary blood transfusions in heart surgery increase healthcare costs and risks." No estimated numbers of blood transfusion costs were presented in the study.

References:
References are properly selected and cited. They are reasonably current.

Quality of written English:
English language needs to be edited.

Level of interest:
The article is of importance in its field.
Declaration of competing interests:
I declare that I have no competing interests.

What next?
I would recommend publication after the authors respond to the revisions.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:
I declare that I have no competing interests.