Author's response to reviews

Title: An evaluation of POSSUM and P-POSSUM scoring in predicting post-operative mortality in a level 1 critical care setting

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An evaluation of POSSUM and P-POSSUM scoring in predicting post-operative mortality in a level 1 critical care setting.

Thank you for your and the reviewers comments on our manuscript. Responses to the reviewers' specific comments are given below.

Reviewer 1:

1. "I feel the authors should discuss the caution of using any scoring systems to predict patient outcome, especially if they are to validate S-POSSUM score."

We have amended the discussion section to include discussion of the problems in applying results from risk prediction models to individual patients.

Reviewer 2:

1. "The number of enrolled cases should appear also in the Abstract, where presently only the study time span is reported."

We have added these data to the abstract.

2. "In addressing the limitations of their study, the Authors state that "... individuals may have left the region prior to death within 30 days of surgery and therefore failed to be collected as mortality statistics; we believe this to be unlikely.". On the other hand, mortality was obtained from hospital mortality records. This raises a question: were patients discharged from hospital before 30 days excluded from the study? If this was the case, how many were they? If not, how was mortality assessed for them?"

As stated in the manuscript text, we have only sought to assess in-hospital mortality. This is consistent with the approach taken by previous authors, for example Prytherch et al, who devised the Portsmouth modification of the POSSUM score (P-POSSUM). They state, "as in the initial study, hospital mortality was used as the endpoint rather than 30-day mortality because the extra work involved was not feasible given the small number of deaths that might have been involved [1]." We have taken a similarly pragmatic approach to defining mortality in an attempt to assess the adequacy of POSSUM and P-POSSUM scoring. We have highlighted the rationale for this approach within the manuscript text.
3. “Another limitation of the study that the Authors discuss is that "... patients admitted to the level one care ward, discharged, and then readmitted to level 1 care following a second surgery represent two data entries; we believe this group to be small and statistically insignificant." A quantification of this group of patients is needed to justify the Authors belief.”

The requested quantification is difficult to extract from the data as it has been anonymised and therefore we do not have hospital numbers for each admission to refer to. Looking at dates of birth, over each calendar year consistently around 6-7% of admissions have repeated dates of birth. However, these are not within 30 days of discharge. If the same approach is taken looking at a 3 month period from admittance, consistently only around 1% of individuals appear to have been admitted more than once. We therefore feel that we are justified in our claim that that this group of patients are statistically insignificant.

Reviewer 3:

1. “The various limitations of a single-institution study should be pointed out.”

We have added a discussion of these limitations to the discussion section.

2. “You need to explain how this regression model was developed and where the coefficients come from – and present the coefficients in a table. Did you split into the usual training and testing data set portions, for instance?”

Details of the development of the logistic regression model have been added to the manuscript. Table 4 presents the variables used in the equation; please advise how you would like this table presented.

3. “I suspect that a modest sample size (just 88 deaths) at a single institution will yield estimates with a fair amount of sampling error. You cannot propose the scores in your formula for use elsewhere. You make a lot of the ‘large’ size of the data set. It may be large compared with some other studies, but in fact 88 deaths aren’t many, and it’s the number of deaths that really drives the power, not the denominator.”

We have added text to the discussion section to highlight this as a potential limitation of the study.

4. “In the Intro, it would be good to say why people felt the need to develop P-POSSUM.

We feel that this has already been mentioned in the introduction section.

5. “How many level 1 patients were excluded due to missing data? Might they differ in some important ways from those included?”

The number of patients excluded from the analysis was already detailed at the beginning of the results section. Further analysis of the excluded patients reveals that the mean age is identical (65 in both groups), as is the sex distribution (~53% of patients were male in both groups) and median length of stay (2 days in both groups). The incomplete data of the excluded patients make any further comparisons difficult. We have added a comment to this effect within the discussion section.

6. “ROC curves don’t necessarily “compare the test against a gold standard” – in studies like yours they compare against the actual outcome (death).”

We have amended the text accordingly.

7. “Tables 2 and 3: I think columns 4 and 5 could go to save space. With Fig 2, you don’t really need these tables at all. Table 4 could probably go entirely – just comment in the text on the fact that the results are essentially the same as with the usual H-L bands.”
Tables 2 and 3 have been amended as suggested and table 4 has been removed.

8. "In our analysis however the lowest bands of risk showed as good, if not better, model fit as higher risk bands, an important observation given that 92% of individuals within this study had P-POSSUM predicted mortalities of 20% or less." This may be true, but I don’t think it’s at all important given that the whole model needs recalibrating anyway as it’s not currently fit for level 1 use."

We have removed this comment from the manuscript.

9. “Secondly, although data was collected prospectively by the admitting doctor it was analyzed retrospectively." This isn’t a limitation. Analysis has to be retrospective."

This line has been removed from the manuscript.

10. “Punctuation needs work throughout, esp around 'however'”.

The punctuation has been reviewed and amended were required.

Sincerely,

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