Author’s response to reviews

Title: The impact of adverse events in the intensive care unit on hospital mortality and length of stay

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Author’s response to reviews: see over
To Editor,
BMC-series journals

To whom it may concern:

Re: MS: 1293938114202998 - The impact of adverse events in the intensive care unit on hospital mortality and length of stay

Thank you for reviewing our manuscript and allowing us to respond to your criticisms. We have addressed all of the reviewers’ concerns. We describe the modifications made in the manuscript in the sections that follow. For each issue brought forward by a reviewer, we have reproduced the suggestion and inserted our comments and how we modified the manuscript

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Reviewer: Ryan Lennon

So the COVARIATES data set used in the baseline statement would be the AE group with their covariates unaltered, but AE would be set to zero. From the 40 resulting estimated survival curves, the overall survival curve is obtained by taking the mean survival at each time point. This curve can then be compared to the raw LOS curve for the 40 patients with an AE.

2) Figure 1 then I think is not so useful, again because it represents the distributions for a very specific patient profile. It would be better to show the unadjusted LOS distributions for patients with and without an AE, and then the adjusted LOS distribution for patients with an AE (assuming they did not have one as in the paragraph above) could be added. Either way, (a) Figure 1 needs a legend and (b) a summary of the raw LOS data needs to be reported somewhere (in a plot or table or the text).

Response
We have estimated the impact of adverse events on length of stay as suggested by the reviewer. We have modified the manuscript as follows:

1. Methods section, statistical analysis subsection
   To identify the impact of AEs on hospital length of stay, we generated and compared three survival curves. Using the Kaplan Meier method, we first plotted unadjusted survival curves of the proportion of patients remaining in hospital alive versus days in hospital for patients with and without adverse events. Then, using the BASELINE STATEMENT in PROC PHREG, we generated an adjusted survival function using our Cox model for adverse event patients under the condition that an adverse event never occurred. Finally, to calculate the impact of adverse events on length of stay, we compared the median length of stay for each of these curves.

2. Results section (page 11, paragraph 4)
   Figure 1 illustrates the impact of AEs on length of stay. The unadjusted median lengths-of-stay for patients with and without AEs were 19 and 52 days, respectively. Our
model based estimate of the median length of stay in AE patients under the condition that they did not have an AE was 21 days. Thus, experiencing an AE in the ICU appears to translate to an average increase in the length of hospital stay of 31 days.

3. We have changed Figure 1, provided a legend and described the results in the Results section (as above).

Figure 1 Impact of ICU based adverse events on hospital length of stay

We have plotted three survival functions: an unadjusted survival function for patients with an adverse event (red dotted line); an unadjusted survival function for patients without an adverse event (black dotted line); and, the expected survival function for patients with an adverse event in the event they actually did not have an adverse event (blue solid line). The expected survival function was calculated with the values of model covariates for all cases. This Cox model included the following covariates: age, probability of death as measured by the new Simplified Acute Physiology Score, length of stay prior to ICU admission, and Charlson score. The median lengths of stay are indicated on the curve by black vertical lines. The differences in length of stay are presented.

In addition to the above changes we have made some minor modifications in the presentation of the manuscript to confirm to your editorial requirements.

We hope that our efforts satisfy yours and your reviewers concerns. We are happy with the final submission and feel that it represents a significantly improved product as a result of the suggestions.

Yours truly,

Alan J. Forster