Reviewer’s report

Title: Predicting COPD one year mortality using prognostic predictors routinely measured in primary care

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Reviewer: Matthew Maddocks

Reviewer’s report:

Bloom and colleagues report on the development and testing of a prognostic index for one-year mortality in patients with COPD. They derive a ‘BARC’ index comprising blood biomarkers, age, respiratory parameters, and comorbidities, which performed well in predicting mortality (and superior to other variables derived for longer-term risk prediction).

The study represents an important step at the intersection between respiratory and palliative care. To date shared working and especially referral to palliative care is compromised in part by the lack of prognostic tools that perform sufficiently well to inform practice. The BARC index lacks the simplicity of some current mainstream respiratory indices, e.g. ADO, but here is derived from UK general practice databases, demonstrating 'real-world' utility.

My concerns are mainly minor, with the exception of the current presentation of data in Table 1, where I think there is some error - probably in the % values. As I read it, the sample (54990) has been divided by training and test set in columns 1 and 2, then died and not died in columns 3 and 4. Please check especially Pneumococcal vaccination (% columns 1 and 2), comorbidities asthma and hypertension (% columns 3 and 4), and palliative care received (% columns 3 and 4). I am hereafter assuming the errors do not alter the subsequent modelling.

I did wonder about the added value of the blood biomarkers given they were problematic with regards to missing data and were accepted within 18 months of the annual review. Were they collected around an exacerbation or symptomatic period for example? I appreciate this could be inherent to the prediction of one-year mortality, but then why the long time scale? Some detail on the additional information they provided, possibility a sensitivity analysis, and discussion this aspect of the BARC index would be welcomed.

Palliative care was I think operationalised differently here and in the group's previous ERJ paper (reference #7), so much so around 1% of the sample received it here compared to 20% before using the broader range of Read codes. I cannot see it specified in the prognostic predictors section in the method. Perhaps state in the introduction palliative care of any type.

Introduction, line 20: suggest reasonable level of physical function.

Method, Validation of the risk model, line 48: suggest time to death, as opposed to 'failure times'.

I do not see an ethics statement in the manuscript.
For the comparison of observed and predicted mortality, I would be interested to see absolute numbers to understand the number of false positive and false negative predictions at the individual level. For the reporting and in Figure 1, consider swapping the order so the prediction precedes the observation. Are the observation proportions rather than probabilities?

Discussion, line 44: I do not fully understand the sentence concerning 20% of the cohort not having an annual review due to a shortened follow-up period. Is this study-follow up i.e. death or a clinical follow-up visit?

Figure 2 - BODEx not BODE in legend.

Supplementary Figure 2 - would benefit from a legend and the colour for the dataset third from the top displayed very light.

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

Yes

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

Not applicable

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?
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