Reviewer’s report

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

Version: 0 Date: 20 Dec 2018

Reviewer: Stephen Bourke

Reviewer’s report:

This study addresses a major unmet need in a large population, and is highly relevant to current clinical challenges and practice. Compared to inoperable lung cancer, patients with severe COPD have a greater symptom burden but much lower access to palliative care and advance care planning. As the authors highlight, this largely reflects the uncertainty of prognosis in COPD. Consequently improved prognostication should support selection for, and use of, these services.

The manuscript is very clearly presented.

1) I strongly recommend excluding conditions that in isolation would commonly trigger consideration of palliative care and advance care planning from the primary analysis, notably lung cancer and pulmonary fibrosis.

2) The large cohort available is a particular strength. However randomised split into training and test sets is likely to favour the derived tool in the test set. The TRIPOD Statement, Ann Intern Med 2015, would not consider the current approach external validation. Non-random selection of a geographically and, if possible, temporally distinct cohort is a better approach; can this be achieved? This would allow robust external validation and unbiased comparison of the performance of BARC with other tools. The terminology (training and test sets) may be unfamiliar to most clinicians, but is clearly explained.

3) Tools consistently performed better within their derivation cohort than an external validation cohort. The latter is closer to expected performance in clinical practice and therefore should be the headline result reported (this can be alongside performance in the training/derivation cohort). Table 4 test cohort AUROC BARC = 0.757; abstract BARC = 0.81.

4) Other investigators have estimated the Charlson Index from CPRD data: if possible, include CODEX in the comparison of tool performance.

5) Generalisability:

The CPRD dataset covers 11 million, only 54,990 patients with COPD could be included and 21% died during follow up (median follow up period = 2.7 years). The mortality rate seems high for a general practice COPD cohort. What was the COPD-specific and all-cause mortality rate within this cohort (54,990) compared to the wider UK population diagnosed with COPD?
The tool includes FEV1 and MRCD; values for both are frequently not recorded on our local GP databases; missing data rates were <5% and 20% respectively in this study. Has data completeness in the CPRD been compared to other routine clinical GP systems? Exacerbations of COPD are not accurately coded, some require only antibiotics or only steroids, and self-management presents challenges. I appreciate an algorithm has been developed to identify exacerbations.

**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.

Yes

**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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I am able to assess the statistics

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Please indicate the quality of language in the manuscript:

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