Author's response to reviews

Title: Developing model-based algorithms to identify screening colonoscopies using administrative health databases

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Adrian Aldcroft
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Re: MS: 9513963637854718
Developing model-based algorithms to identify screening colonoscopies using administrative health databases

Dear Dr. Aldcroft,

We appreciate the valuable feedback on our manuscript, and thank the Reviewers for their time and helpful suggestions. We have revised the manuscript accordingly in point form below, and believe these revisions have improved the quality of the manuscript. We are resubmitting the revised manuscript for your consideration.

Reviewer 1

1. Even if using a convenience sample in the development phase of predictive algorithms may be appropriate, the authors should give some additional information on the procedures adopted to recruit patients in the study. For example: how many patients were seen in the participating institutions during the study period?

   *This figure is not known.*

   How many endoscopy units were involved? How many patients refused interview?

We have added the following sentences to the revised manuscript on pages 4 and 7, respectively.

*Participating institutions were those where colonoscopy was performed and billed to the provincial health insurance plans (Montreal: McGill University Health Centre, Sir Mortimer B. Davis Jewish General Hospital, St. Mary’s Hospital Centre, Centre hospitalier de l’Université de Montréal, Fleury Hospital, Jean-Talon Hospital, Maisonneuve-Rosemont Hospital; Calgary: Foothills Medical Centre, Peter Lougheed Centre).*

*A total of 1,411 patients were approached, of which 1,230 (87.2%) were eligible and agreed to participate, 689 (56.0%) from Montreal and 541 (44.0%) from Calgary. In Montreal and Calgary, 52 and 0 eligible patients approached refused study participation, respectively.*
2. How could the endoscopist identify / derive the indication for the colonoscopy? Using information indicated on the medical prescription? By directly collecting patient's history?

We had no control over the way in which the endoscopist defined the indication. We have added the following to the revised manuscript (bottom of page 4):

‘Immediately after each colonoscopy, the endoscopist completed a questionnaire on the indication of colonoscopy; the screening indication was defined as ‘performed in asymptomatic people at average-risk for developing colorectal cancer, or in people with a family history of colorectal cancer’. It is unknown whether the endoscopist based the indication on the colonoscopy referral, communication with the patient, or something else.’

Reviewer 2

1. The approach taken is "in the absence of established gold standards". However this may be due to some lack of precision of the notion of "screening" per se, i.e. that there is no clear cut gold standard conceptual definition and hence no gold-standard procedure for discerning screening. Do the authors believe that the conceptual boundaries of the concept are or are not clear cut?

We believe that screening colonoscopy is clearly defined, however, the provincial health administrative databases do not contain this variable. Therefore, we used a latent class model to estimate the unknown screening status, which we believe is well-defined. In the revised manuscript, we have introduced the lack of indication codes early in the manuscript on Page 1:

Indications for medical procedures are particularly challenging to derive from administrative health data because of the lack of indication codes, and, therefore, require automated data algorithms.

2. The LCA is performed in a Bayesian way which seems like an excellent idea. However, what this should yield are posterior distributions for the latent class probabilities as well as the three indication-related conditionals. As such, the "predicted probabilities" which are then dichotomized to be used as outcomes in the logistic analyses, are presumably point estimates of some sort. Are they posterior means, posterior modes or something else? Also, these posterior distributions have some variation (presumably a good deal less than the priors). Can the authors tell us anything about the variability in the latent-class-predicted-probability posterior? How much could this uncertainty variability affect the stability of the dichotomization-based classifications and thus the results of the logistic analyses themselves?

Posterior medians were dichotomized to create the subject-specific input for the logistic regression models. We added this to the revised manuscript (page 6).
The predicted probabilities for screening from the latent class model, based on posterior medians, were dichotomized into screening and non-screening using a cut-off of 50% probability.

On page 9 we added:

The latent class predictions were quite accurate when the various tests all agreed on the indication, i.e. when all tests together indicated either positive or negative for screening. However, when one or more tests disagreed with the others, there was higher variability and less certainty about the inputs. Overall, the stability of the logistic regression model was very good, as evidenced by the robustness of our analyses (using a second latent class model that gave very similar predictions).

We trust the issues raised by the Reviewers have been satisfactorily addressed.

Sincerely,

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