Reviewer's report

Title: Synthesis of clinical prediction models under different sets of covariates

Version: 6  Date: 21 August 2015

Reviewer: Ian R White

Reviewer's report:

You have responded nicely to my comments.

In particular, thank you for your thoughtful reply to my point 3. I had not realised that the Debray method takes the estimated intercept from the smaller model and pretends it estimates the intercept from the larger model: this is clearly a very bad thing to do (unless the covariates have mean zero). I do think the Debray method could be improved by omitting the intercepts from the pooling and only computing the intercept at the end.

Minor Essential Revisions

My point 1: the insertion in the first paragraph of the discussion is not quite right. You write that your methods require "studies in the meta-analysis have similar distributions of covariates and outcomes", but in fact it's the regression models (i.e. for outcome given covariates) that must be the same (not just similar) across studies.

Following from this, I don't think there is anything in the methods which requires the covariate distributions to be equal or even similar (though I agree that very heterogeneous covariate distributions might make us less happy about other assumptions). So I disagree with the point on page 11 ("Another potential limitation...").

My point 10: you should report what fraction of simulated data sets suffered from non-convergence.

My point 14: you have inserted "the omitted variables from the true models (full models) are correlated with the included variables", but it should be "may be correlated!"

Some of the references are incomplete (e.g. books lacking publishers), and the author of ref 11 should be "The Fibrinogen Studies Collaboration".

The "Discussions" section should be titled "Discussion".

Discretionary Revisions

You write "the Fibrinogen Studies Collaboration … assume that both full and partial models are applied in each cohort by using its cohort IPD". Yes, that is what our paper assumed, but the method is clearly applicable when the partial
models are only reported in the literature, since "full"-"partial" correlations are only required for studies with full data. In fact I think the FSC method could easily be applied to the situation being considered by the authors, and would also have the advantage of generalising easily to allow for heterogeneity. This would be an interesting topic for future work.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I declare that I have no competing interests