Reviewer’s report

Title: The Six Minute Walk Test Accurately Estimates Mean Peak Oxygen Uptake

Version: 4 Date: 11 May 2010

Reviewer: Alan M Batterham

Reviewer’s report:

I was invited by the journal Editor to scrutinise the statistical analysis strategy and results, specifically. As such, my brief comments focus on this aspect, though I am comfortable with the subject area also. (Our group is currently engaged in a range of studies examining the validity of surrogate tests of cardiopulmonary exercise function in patient groups.) The authors present a statistically sound and thorough analysis of the data. Linear mixed modelling is a powerful and sophisticated technique allowing the variability due to study or disease type – what the authors refer to collectively as the “inter-site effect” - to be teased out. No substantial heterogeneity was observed, such that a generalised prediction equation could be derived. (Indeed, the standard errors of prediction were remarkably similar for the fixed and random models.) A novel feature of the study is the use of the electronic scanning method to obtain individual data points from scatter plots presented in published studies. The validity of this method was demonstrated by the close correspondence of the means and SDs so derived to those published in the articles in question. For my own interest I would like more detail of this method; however, I do not believe this detail should be included in the Methods. For those interested, this information may be obtained by contacting the corresponding author directly.

One of the take-home-messages of the article – that the 6-min walk test distance is accurate at the group mean level but imprecise at the individual patient level – is consistent with our own data (interim analyses of ongoing studies in patients awaiting scheduled major non-cardiac surgery). In N>100 patients we observe an SEE of 3.3 ml/kg/min (23% of mean peak VO2). Applying the authors’ group mean prediction equation to our data gives an estimated mean peak VO2 of 15.3 ml/kg/min against an observed value of 14.6 ml/kg/min. I agree with the authors’ conclusions that this equation may be useful for inter-group comparisons without the need for CPET; the SEE of 1.1 ml/kg/min is acceptably low for this purpose. I agree also with the conclusion that the major source of prediction error is the inherent within-patient (test: retest) variability for both peak VO2 and 6-min walk test distance. In our hands, the within-subject coefficient of variation for 6-min walk distance in a variety of patient groups is around 4% - consistent with paragraph 3 of the authors’ Discussion. In summary, in my opinion the statistical analysis/modelling plan was sound and well-executed and presented.

Major compulsory revisions
I have identified no major revisions.

Minor essential revisions

Please check and confirm the SEE from the random effects model. It appears either as 3.66 or 3.68 ml/kg/min in text/tables – please ensure that it is consistent throughout. As you mention on several occasions a difference of 0.16 ml/kg/min between the LMM-II fixed SEE of 3.82 and the random effects SEE, I assume that the correct figure is 3.66 ml/kg/min. In Table 3 and paragraph 5 of the Discussion, however, the SEE is given as 3.68 ml/kg/min.

Discretionary revisions

None.

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.