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We are grateful to Grant et al. for highlighting the importance of discrimination, calibration and clinical validity in any risk prediction model and for their external validation of the pre-operative AAA SCORE. They demonstrated that this model provides excellent discrimination, even when arbitrary single value imputation is used for the pre-operative blood pressure, and only elective patients are included. We disagree with the conclusion that the AUC achieved by the AAA SCORE was inferior to the BAR score, as the confidence intervals reported for the two models are statistically indistinguishable.

However they raise an important point, mentioned several times in our paper, that multiple imputation methodology requires that data be 'missing at random' for it to provide unbiased estimates. The approach to missing data is important when dealing with large clinical data sets, as missing data plagues this field. We went to great lengths to use the most rigorous approach possible. Our approach is supported by recent guidelines<sup>1</sup> and provably superior to the single value imputation methodology used in the development of the BAR<sup>2</sup>.

We would also like to highlight that the AAA SCORE is designed to be used in both the elective and emergent setting. Therefore it is unsurprising that a measure of haemodynamic stability such as the lowest systolic blood pressure is a useful predictor of mortality. It is logical that a patient with a contained rupture and normal blood pressure is likely to have a better outcome than a patient presenting with haemodynamic compromise, and this is borne out by the results of case series<sup>3</sup>. We consider it a strength of the AAA SCORE model that it provides excellent discrimination in both the elective and emergent settings. An AUC of 0.89 was demonstrated when applied to our validation subset, which contained both elective and emergency patients in roughly a 2:1 ratio. This compares to an AUC of 0.79 (95% CI: 0.76-0.82) on this data set for the BAR score. A web-based calculator as well as iOS (Figure 1) and Android apps are available from the author's web site<sup>4</sup>, making the AAA SCORE straightforward to use both in the clinic and the emergency room.

The excellent discrimination, good calibration and enhanced clinical validity furnished by its utility for both elective and emergent; open and endovascular repair of abdominal aortic aneurysms makes the AAA SCORE an ideal tool in risk prediction.

## References

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