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Letter to Editor re: "Comparison of Mortality Prediction Models after Open Abdominal Aortic Aneurysm Repair". Hadjianastassiou VG, Tekkis PP, Athanasiou T, Muktadir A, Young JD, Hands LJ. *Eur J Vasc Endovasc Surg* 2007;33(5):536–543.

Dear Sir,

We read with interest the article by Hadjianastassiou *et al*. comparing the accuracy of contemporary mortality prediction models after open abdominal aortic aneurysm (AAA) surgery but have several concerns.

The authors make great play of multi-level modelling, which allows the model to adjust for the local hospital-related effects, which include implementation of pathways of care, admission and discharge policies and staffing levels. We would like to ask whether the authors feel this is appropriate if the same model describes all surgical units? Multi-level modelling could be used to hide differences that should be exposed. Given that some units and surgeons are necessarily better than others; would comparative audit be better served by using the same ruler for everyone and not one adjusted to fit local performance? Furthermore, 90 per cent of patients are from one unit (Oxford). One must assume this single unit dominated the results. Why was the second unit included?

It is also important to point out that the authors' APACHE-AAA methodology requires post-operative data. The POSSUM and VBHOM equations used in comparison require pre-operative data but post-operative data seems to have been used to feed these models. It is not surprising that their APACHE-AAA model performed the best.

The authors find it difficult to reconcile why using post-operative physiological data, which are temporally closer to the outcome event (in-patient mortality), may produce worse predictions than pre-operative physiological data. We would have thought this to be obvious – the various POSSUM and VBHOM models were built using pre-operative physiological data. One would expect these to be worse after open AAA surgery. The various models would then over-predict, resulting in poor calibration – which is exactly what is seen. A proper comparison of models would have required appropriate use of pre- and post-operative data in the respective equations.

Yours faithfully,

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Letter re: Relation Between Hospital Volume and Outcome of Elective Surgery for Abdominal Aortic Aneurysm: A Systematic Review

This paper[1] was a systematic review of the relationship between volume and outcome for elective abdominal aortic aneurysm (AAA) repairs. The authors used a body of literature consistent with recent studies.[2,3] They performed a detailed assessment of the literature, including an assessment of bias. A paucity of raw data and an unacceptable variability in the risk-adjustment of the data between studies were noted.

In the results, the linear relationship between the hospital surgical volume and mortality was not statistically significant, but a linear model was inappropriate, as the relationship between volume and mortality is parabolic in nature.[4–6] Despite this, the authors used the results to draw conclusions, finding a non-significant trend towards improved outcomes at higher volume hospitals.

The actual reduction in mortality was 2% over 821 810 cases, a relative risk reduction of 33%, which was a significant finding in terms of the number of potentially avoidable deaths for elective surgery.[3] The conclusion was that there was weak evidence of a relationship between annual volume and outcome for AAA surgery, favouring high volume hospitals.

Henebiens *et al.* commented that the relevance of these data to European practice was unclear due to the higher volumes of surgery undertaken in North America. This issue was highlighted by the difference in critical volume threshold found between two recent studies,[3,4] which concluded that, in the UK, a minimum annual volume of 32 elective AAA repairs per annum should be achieved. This was somewhat lower

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