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Accepted 20 March 2007

Available online 5 July 2007

doi:10.1016/j.ejvs.2007.05.027, available online at
<http://www.sciencedirect.com> on  ScienceDirect

“On the subject of multilevel modelling in vascular surgery”

We would like to thank Tang *et al.* for their comments. We advocate the idea that patient outcome is not only a function of the patient case-mix but instead predictive models should also adjust for the individual hospital-related factors (structure and process of care). This methodology is essential when there is “clustering” of patients (i.e. patients’ results from the same hospital are more likely to be correlated) such as in a national setting. Multilevel models have already been used extensively in comparison studies focusing: on the Bristol enquiry (Aylin P. *Lancet* 2001); in colorectal cancer survival (Kee F. *BMJ* 1999, Tekkis PP. *BMJ* 2003); in gastro-oesophageal surgery (McCulloch P. *BMJ* 2003).

Multi-level methodology in our study, was able to rank the 24 ICUs from the development study (Hadjianastassiou VG. *Br J Surg* 2005) and the 2 ICUs used in the current study (the data from the smaller unit were collected prospectively and could not simply be discarded), according to the level of adjustment that needed to take place for each hospital, and it certainly did not hide differences. On the contrary, contemporary models in vascular surgery only take into account the patient case-mix and ignore this “hospital effect”. We agree with Tang *et al.* that models should only be used for the purpose they were designed for which is why we provided the evidence to warn investigators not to use POSSUM/VBHOM models in the post-operative AAA setting.

A predictive model attempts to summate into a single value (“predicted risk”) the “case-mix” or the patient-related variables which have a clinical influence on outcome. Physiological data temporally closer (post-operative data) to this outcome more accurately reflect the state of the patient than data before a therapeutic intervention. Otherwise, prediction modelling would be more akin to “guessing” future events.

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Accepted 25 May 2007

Available online 3 August 2007

DOI of original article: 10.1016/j.ejvs.2006.11.016, 10.1016/j.ejvs.2007.04.017.

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