Editorial

On risk scores and human factors: Operative risk goes beyond numbers!

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The surgeon's dilemma "*To operate or not to operate?*" should rely on the favorable balance between the estimated operative risk, the likelihood of success, and the long-term sustainability of the immediate results.

With this aim, predictive models have been developed to help surgeons in the decision making process. A predictive score is a statistical algorithm that allows the individual risk of an event to occur to be assessed before a specific intervention is performed. Risk models are useful for counseling, decision-making and research purposes.

As far as abdominal aneurysm repair is concerned, several models were proposed in the early 90s, such as the Glasgow Aneurysm Score (GAS), the Leiden Score, the Hardman Index, the Physiological and Operative Severity Score for enUmeration of Mortality (POSSUM) predictor equation and the Vascular Biochemistry and Haematology Outcome Model (VBHOM) and the Revised Cardiac Risk Index [1]. As expected, prospective validation studies demonstrated that some of them were predictive of mortality but not of morbidity, probably as a consequence of the evolution of the techniques and the increasing complexity of patients treated.

Recently, Eslami and coworkers developed a score [2], that has been endorsed by the Vascular Quality Initiative of the Society of Vascular Surgeons, and appropriately considered in the recent published Guidelines [3].

In the article published by Ferrante and coworkers, in the current issue of the Journal, the authors estimated the Revised Cardiac Risk Index (RCRI) in a retrospective series of 899 patients undergoing open repair for thoraco-abdominal aortic aneurysm [4]. Although general agreement exists in literature on the low predictive performance of RCRI, especially when applied to open aortic abdominal repair, as stated also by the authors, the model is still used in the daily practice due to its simplicity of scoring [5].

The rational of the study by Ferrante and coworkers was to verify the adequacy of RCRI in predicting major adverse cardiac events (MACE) after open abdominal aortic surgery and to assess the potential impact of clamp-site on the predictive value of RCRI in a highly selected cohort of patients (exclusion criteria were emergency interventions, infective aneurysms, anastomotic pseudoaneurysms, and endovascular procedures) [4].

The ideal risk score should have both good discrimination and calibration. Discrimination is the ability to differentiate between high- and low-risk patients. Calibration is the result of the comparison between observed and predicted outcome. From a methodological standpoint, predictive models are traditionally tested with the use of the C-statistics for their discriminant ability and with the Hosmer and Lemeshow test or the Brier score for calibration. More complex tests, such as net reclassification improvement (NRI) and integrated discrimination improvement (IDI) have been recently proposed and applied to clinical series [6–8].

In the study by Ferrante and coworkers, the score is included in a univariate analysis in the overall cohort and in two different subgroup of patients, divided according to the clam-psite (infrarenal and suprarenal). Noteworthy, RCRI was not an independent predictor of MACE at multivariate analysis, whatever cohort is analyzed. As aforementioned before, univariate/multivariate analysis probably is not the most appropriate method to ascertain performance and reliability of a predictive model. Furthermore, dividing patients into two subgroups should not be the appropriate method to test if clamp-site might be an independent predictor of MACE.

As the authors properly conclude, "[…] *in open abdominal aortic surgery RCRI should be revised adding procedure-specific assessment that allows proper assignment of surgical strategy and perioperative care in the individual patient*" [4].

Unfortunately, "predictive knowledge" is still utopic and the estimate of a surgical risk can only be applied to the general population, and not to the individual patients.

Furthermore, every physician, whatever her or his specialty is, must bear in mind that risk of care is not comparable with the quality of care. A brilliant example was provided in the field of cardiac surgery by the working group of the Papworth Hospital. In a first pivotal paper, 4294 patients with an estimated low surgical risk (EuroSCORE 0–2) were included and causes of death for 16 patients (operative mortality 0.37%)

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were investigated. Of note, 7 deaths were considered preventable, due to technical reasons but, most intriguing, 4 out of 7 were attributed also to system errors such as lack in the chain of responsibility between the resident and the consultant. Potentially modifiable human factors (e.g. communication protocols) were identified as responsible for operative deaths [9].

This study prompted the authors to reassess their internal protocols, and finally came out with the so-called FIASCO II analysis. Again, cause of mortality for 7 out of 2549 patients (operative mortality 0.27%) with EuroSCORE 0–2 were investigated but they were ascribed only to technical errors. Reassessment of internal practice ended up in the elimination of system errors, that is limitation of the human factor [10].

In clinical practice, the key for success should not be considered dependent on risk scores, but rather the result of a synergistic interplay between accurate preoperative planning, operative approach and postoperative care. Therefore, our Hamlet's dilemma should be: "*To operate or not to operate? When? With which technique? Can I forsee the occurrence of intraoperative complications? And how could I manage them?*" However, experience and expertise, at any level (from residents to consultants) are variables never included in any risk factors, and represent the most evident impact of human factors in our daily practice.

Finally, Ferrante and coworkers should be complimented for their analysis and for stimulating the research on the design of more reliable risk models in the field of aortic abdominal surgery.

Conflict of interests

The author report no relationships that could be construed as a conflict of interest.

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