
References


References


Reply to the Letter to the Editor

Reply to Kuss and Börgermann
Confidence intervals for the prediction of mortality in the logistic EuroSCORE

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The logistic EuroSCORE (European System for Cardiac Operative Risk Evaluation, [1]) has by now become an accepted system for predicting the risk of patients undergoing cardiac surgery. Despite its known deficiencies, the score is the most rigorously evaluated scoring system in cardiac surgery [2]. Just recently, an enhanced version—the logistic EuroSCORE—was designed. Based on a logistic regression model, this score can accurately predict 30-day mortality figures [3]. In our opinion, this model was carefully designed, fitted and described and we expect and hope the logistic EuroSCORE will soon become well established. Moreover, a convenient EXCEL template for the calculation of the prognoses is available on the EuroSCORE website (http://www.EuroSCORE.org/calc.html).

However, the prognoses from the model are still just estimates. In accordance with good statistical practice, the estimates should therefore be given together with their respective confidence intervals, reflecting the uncertainty of the prognoses. The lack of confidence intervals or other measures of uncertainty may lead to a false sense of predictive quality, a fact recently addressed with respect to epidemiological cardiovascular risk scores [4]. Let us illustrate the problem with a simple example: Assume two patients having predicted 30-day mortalities of 3 and 5%, respectively. On first sight, these patients are judged different in terms of mortality risks. However, if we would calculate and report confidence intervals and get a 95%-confidence interval of for example [1%;5%] for the first patient and of [3%;7%] for the second, the predicted difference in mortality risks is far less impressive, as there is a considerable probability that the true (compared to the estimated) risk of the first patient is even bigger than that of the second.

We do not want to delve into statistical details, but need to emphasize that the calculation of confidence intervals for predictions is not straightforward and requires an estimate of the covariance matrix of the parameter estimators [5, p. 194]. In principle, this matrix belongs to the standard output of the model fit, but, unfortunately, has not been reported in the original publication by Roques et al. [3]. We thus strongly encourage the authors to publish this matrix to permit adequate adjustments for uncertainties in the prognoses made with the logistic EuroSCORE. Because of the technical complexities, we do not insist on all prognoses based on this score be given with confidence intervals; but we would still like to see typical examples in order to derive some rules of thumb which could be used by all researchers who derive prognoses from the logistic EuroSCORE. We would also be willing to create such examples with our own data.

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