Evaluating operative mortality of cardiac surgery: first define operative mortality

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The European System for Cardiac Operative Risk Evaluation (EuroSCORE) and its American counterpart, the Society of Thoracic Surgeons (STS) score, are currently the most used risk scores to predict operative mortality of adult cardiac surgery.^{1,2} Both the EuroSCORE and STS score define operative mortality as mortality within 30 days from operation or later if the patient is still hospitalised.^{3,4} However, apart from the EuroSCORE and STS score, several other definitions of operative mortality exist, such as 30-day mortality or hospital mortality. Which of these definitions should be best used, is not clear. According to the latest guidelines of the Society of Thoracic Surgeons, the American Association for Thoracic Surgery and the European Association for Cardio-Thoracic Surgery for standardising definitions of prosthetic heart valve morbidity, early mortality should be reported as all-cause mortality at 30, 60, or 90 days.⁵ Many cardiac surgery centres report 30-day mortality. However, many of these centres also compare their observed 30-day mortality figures with the expected operative mortality calculated by the EuroSCORE or STS score. This is not correct, because it is likely that the number of deaths will be less in a time span of 30 postoperative days than in a time span of 30 postoperative days or longer if the patient is still hospitalised. In this manner, the EuroSCORE and STS score are always likely to overestimate operative mortality. In the current issue of the Netherlands Heart Journal, Van Straten et al. evaluated the EuroSCORE in 5249 patients who underwent isolated coronary artery bypass grafting (CABG) in their centre.⁶ The authors

compared the hospital mortality of their patients with the expected operative mortality calculated by the EuroSCORE. Hospital mortality was defined by Van Straten et al. as mortality during the same hospital stay as the operation. However, this definition is not identical to the definition of operative mortality according to the EuroSCORE (mortality within 30 days from operation or later if the patient is still hospitalised). A patient in the current study could have been discharged after a hospital stay of seven days while dying two weeks later outside of the hospital, which would still be within 30 days from CABG. According to the EuroSCORE definition of operative mortality, this patient would have been dead, but according to the definition of hospital mortality by Van Straten et al., he did not die. It is not to be expected that a large number of patients in the current study died within 30 days from operation after discharge from hospital. So, it is likely that the observed hospital mortality of 1.7% (89 patients) will be close to the observed operative mortality when the definition of the EuroSCORE would have been used. For example, ten extra deaths would have changed the 1.7% mortality figure into a 1.9% mortality figure. In case of smaller patient populations however (i.e. one-year surveys), a few extra deaths can make a difference. When different definitions of operative mortality are not the explanation for the discrepancy between the observed hospital mortality in the current study (1.7%) and the expected operative mortality calculated by the EuroSCORE (mean $3.5 \pm 2.5\%$ by the additive and $4.0 \pm 5.5\%$ by the logistic EuroSCORE), then either the EuroSCORE overestimated the operative mortality, or the hospital in the current study performed extraordinary well. Although both explanations are of course possible, it has recently been recognised that the logistic EuroSCORE 'overscores', especially in high-risk patients and in patients undergoing aortic valve replacement (AVR).⁷ Besides the fact that the EuroSCORE was not specifically developed for patients undergoing AVR, an important explanation for this observation may be that the EuroSCORE is per-

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haps already outdated, as it was developed almost two decades ago and the results of surgery have improved significantly since, especially in the elderly.⁸ While it is mandatory for an accurate comparison of observed versus predicted operative mortality for a single cardiac surgery centre to use the same definition of operative mortality as being used by the EuroSCORE or STS score, it is likewise crucial for a fair comparison of observed operative mortality between different cardiac surgery centres that all these centres use the same definition of observed operative mortality. Namely, because the observed operative mortality of cardiac surgery in many centres is nowadays (very) low, a few more or less deaths in a particular centre 'caused' by a different definition of observed operative mortality may influence the observed operative mortality of that centre significantly. And now that we have entered the age of Michelin-guide like comparisons of cardiac surgery centres, it is only fair that we apply uniform criteria. ■

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