Acute kidney injury and postoperative infection are important predictors of 30-day mortality among patients undergoing elective cardiac surgery

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Objective: Predictors of mortality after cardiac surgery such as those based on The European System for Cardiac Operative Risk Evaluation (EuroSCORE)¹ were based on a Western population. However, it is known that the South East Asian cardiac surgical population differs not only in terms of their age of presentation but also associated risk factors such as the high prevalence of diabetes mellitus.²⁻⁴ The current study aims to assess risk factors for mortality after elective cardiac surgery in a South-East Asian population.

Methods: 3008 patients underwent elective cardiac surgery in Singapore's two major heart centers were recruited. Data were collected for 36 preoperative and 6 intraoperative risk factors that might influence 30 day mortality. The relationship between risk factors and outcome was assessed by univariate and modified Poisson regression analysis.

Results: The mean age was 59.3 (SD 10.5) and 589 (19.6%) were female. 1393 (46.3%) were diabetic and 2267 (75.4%) were hypertensive. The mean EuroSCORE was 2.57. The 30-day mortality was 2.1%. The following preoperative risk factors were associated with increased 30 day mortality: neurological dysfunction disease, previous cardiac surgery, serum creatinine >200 µmol/L, left ventricular ejection fraction < 50%, low estimated blood volume, Malay and use of angiotensin-converting-enzyme inhibitors or intra-aortic balloon pumps. Postoperative complications that contributed significantly were infection, AKI and AF. However, AKI had the highest population attributable risk (PAR 21.5%, 95%CI 10.97-27.79) whereas postoperative infection had the lowest PAR (0.9%, 95%CI 0.39-1.36).

Conclusions: A number of risk factors including postoperative AKI contribute to 30 day cardiac surgical mortality in a South-East Asian population. This information is useful in developing a risk stratification system unique for our population and focus on complications that significantly impact mortality

Modified Poisson regression for predicting 30-day mortality of patients underwent cardiac surgery

Perioperative variables	Risk Ratio (95% CI)	p	Population Attributable Risk (95% CI)
Preoperative variables			
Ethnicity of Malay	1.95 (1.15-3.29)	0.013	7.4% (0.86-12.05)
Neurological dysfunction disease	4.41 (2.84-6.86)	0.001	1.1% (0.37-1.75)
Previous cardiac surgery	2.44 (1.02-5.83)	0.045	1.5% (0-2.78)
Serum creatinine (>200 µmol/L)	2.88 (2.02-4.11)	0.003	2.8% (0.81-4.38)
LVEF < 30%	2.54 (1.16-5.56)	0.019	5.1% (0.27-8.02)
Estimated blood volume (L)	0.48 (0.34-0.69)	< 0.001	-
Use of ACE inhibitors	1.77 (1.10-2.84)	0.032	21.2% (0-34.91)
Use of IABP	3.92 (2.18-7.04)	< 0.001	7.5% (4.40-9.77)
Intraoperative variable			
Higher nadir hematocrit during CPB	0.89 (0.84-0.95)	< 0.001	-
Postoperative variables			
Acute kidney injury	3.37 (1.78-6.39)	< 0.001	21.5% (10.97-27.79)
Postoperative infection	6.27 (2.92-13.45)	< 0.001	0.9% (0.39-1.36)
Atrial fibrillation	2.67 (1.67-4.29)	< 0.001	10.3% (5.36-14.04)
Highest serum glucose level within first 24h (mmol/L)	1.11 (1.02-1.21)	0.011	-

Ln = natural logarithm; 95% CI = 95% confidence interval; IABP = intra-aortic balloon pump; LVEF = left ventricular ejection fraction; CPB = cardiopulmonary bypass; CT-ICU = cardiothoracic intensive care unit. * results were similar if replacing the components of EuroSCORE with logistic EuroSCORE.

References:

1 Eur. J. Cardio-thoracic Surg 1999, 16: 9–13
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