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Predictors of perioperative mortality in adults with congenital heart disease (ACHD): utility of the EuroSCORE and creation of an ACHD-specific score

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Topic(s):
Congenital Heart Disease – Epidemiology, Prognosis, Outcome

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Introduction: Adult patients with congenital heart disease (ACHD) are a heterogeneous population and a variety of procedures are performed in ACHD centers, which differ significantly from those performed in the general adult population. Therefore, ACHD patients have not been included in the development of risk stratification models, such as the EuroSCORE. We assessed the utility of the components of the EuroSCORE in predicting in-hospital mortality around surgery in a large cohort of ACHD patients and tested a modified risk score for the ACHD population.

Methods: Data were collected retrospectively on all consecutive patients >16 years who underwent congenital heart disease surgery in a large tertiary center in 2015–18. Preoperative characteristics and perioperative outcomes were collected from clinical records and databases. Wilcoxon rank sum test, Fisher's test and Logistic regression analysis were used to identify predictors of in-hospital death. Variables significant on univariate linear regression were used to create a risk score for each patient, either attributing 1 point for each risk factor (unweighted model), or weighing this by its log(Odds ratio) in the logistic regression model (weighted score). Receive operator characteristic (ROC) analysis with calculation of the areas under the curve (AUC) was used to assess the performance of each scoring system in predicting in-hospital mortality.

Results: A total of 476 operations occurred in 459 patients who underwent cardiac surgery during the study period. Age at surgery was 35.9±14.7 years, 258 (56.2%) were male, 231 (51.3%) patients had a previous sternotomy. There were 19 (4.1%) in-hospital deaths. Certain components of EuroSCORE were very rarely observed in our ACHD patients and were not included in the analysis. Of components of the EuroSCORE, female sex (OR 3.79, 95% CI: 1.42–11.89, p=0.01), functional NYHA class>2 (OR 7.65, 95% CI: 2.35–29.26, p=0.001), left ventricle dysfunction (OR 3.14, 95% CI: 1.22–8.01, p=0.02), previous surgery (OR 5.33, 95% CI: 1.41–34.68, p=0.03), emergency or urgent surgery (OR 7.96, 95% CI: 3.1–21.99, p=0.001), renal dysfunction (MDRD GFR<60 OR 6.56, 95% CI: 1.73–20.52, p=0.002), endocarditis (OR 7.71, 95% CI: 1.6–28.85, p=0.004), and a critical preoperative state (OR 28.65, 95% CI: 5.11–147.93, p<0.0001) were predictive of an adverse perioperative outcome. Moreover, the number of previous sternotomies was predictive of mortality (OR 2.45, 95% CI: 1.58–3.85, p<0.0001). Both the unweighted (AUC 0.78, 95% CI: 70.6–85.3), but especially the weighted risk score (AUC 0.82, 95% CI: 74.8–89) had an optimal discriminative power (Figure).

Conclusions: While several components of the EuroSCORE are relevant to ACHD patients, an ACHD-specific scoring system for predicting perioperative mortality is needed. In this analysis, we propose a simplified risk score for ACHD patients undergoing surgery, which performs well in this population.
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Score without weights

AUC 77.9
95%CI:70.6–85.3

Score with weights

AUC 81.9
95%CI:74.8–89

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Sensitivity (%)

Specificity (%)