Developing a model for predicting in-hospital death in patients with the use of extracorporeal membrane oxygenation

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Background: The objective of this study was to develop a predicting model for estimating the odds of in-hospital death in the patients who receive extracorporeal membrane oxygenation (ECMO).

Methods: Adult patients who received ECMO for a variety of etiologies in our National University Hospital from 2005 and 2016 were included. The demographic, anthropometric, hemodynamic, and laboratory data when ECMO was instituted were recorded for each individual. A logistic regression model was applied to find the risk variables that were independently associated with in-hospital mortality. The predicted probability derived from the model was used to plot a receiver-operating-characteristic (ROC) curve, and area under curve (AUC) was found to represent the differentiating capacity of this approach.

Results: A total of 919 patients (659 men and 260 women) were included in the analysis. The mean age was 53.7[SD 15.9] years. The analysis showed that age (odds ratio [OR]: 1.018, 95% confidence interval [CI]: 1.008-1.028 per year), blood urea nitrogen (1.008 [1.001-1.014] per mg/dL), use of inotropic agent in terms of inotropic equivalent (1.007 [1.002-1.013]), the presence of cardiogenic shock (1.910 [1.097-3.327]), and the need of hemodialysis (2.262 [1.304-3.926]) were positively associated with mortality. In addition, body surface area (OR: 0.414 [0.204-0.840] per square meter), systolic blood pressure (0.995 [0.990-0.999] per mmHg), Glasgow Coma Scale (0.928 [0.899-0.957] per unit), pH value (0.395 [0.158-0.988] for each unit), and urine output (OR: 0.974 [0.964-0.985] per dL) were negatively associated with the probability of in-hospital death. The AUC in ROC analysis was 0.754 (95% CI: 0.722-0.787).

Conclusion: The predicting model that used a simple set of physiological parameters could substantially discriminate whether the patients receiving ECMO could survive the in-hospital course. Further studies are needed to examine why false positive and false negative predictions took place.

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