

New model for predicting ECMO outcome in ARDS



Extracorporeal membrane oxygenation (ECMO) is a life-saving therapy in acute respiratory distress syndrome (ARDS) patients but is associated with complications and costs. Researchers in Germany have developed a new, simple model that also incorporates extrapulmonary variables to predict mortality in ECMO-treated ARDS patients. The PRESET-Score (PREdiction of Survival on ECMO Therapy-Score) predicts mortality much better than previous scores and therefore is a more precise choice for decision support in ARDS patients to be placed on ECMO, says a new study published in the journal *Critical Care*.

ARDS is frequently fatal and ECMO is currently considered over a wide range of indications from a last therapeutic resort to a protective and perhaps even "prophylactic" therapy. Accordingly, there is much discussion and controversy about the indications/contraindications of ECMO and the time of initiation. In any case, prognostic systems should enable outcome prediction of such a therapy and the ECMOnet-Score, developed for risk stratification in H1N1 pneumonia, the RESP-Score including data from more than 2,000 patients, the Predicting Death for Severe ARDS on VV-ECMO (PRESERVE)-Score, and ROCH-Score have all served to improve such a prediction.

However, limitations of these previous scores include usage of different ECMO technologies and procedures, patient heterogeneity, and also statistical methods which did not always take into account optimum validation of results. Moreover, "external validation of published scores is mandatory before any scoring system can generally be accepted," according to the researchers.

In this study, investigators conduct an independent validation of the aforementioned risk scores to evaluate their usefulness in predicting survival in a single ECMO centre. Furthermore, they developed a new easy-to-use categorical score based on pre-ECMO clinical data, the PRESET-Score, to be used to facilitate decision-making and validated this score in two independent validation cohorts.

In a derivation cohort, 108 ARDS patients (2010–2015) on veno-venous ECMO were retrospectively analysed to assess four established risk scores (ECMOnet-Score, RESP-Score, PRESERVE-Score, Roch-Score) for mortality prediction (receiver operating characteristic analysis) and to identify by multivariable logistic regression analysis independent variables for mortality to yield the new PRESET-Score. This new score was then validated both in independent internal ($n = 82$) and external ($n = 59$) cohorts.

Based on the results, the median (25%; 75% quartile) Sequential Organ Failure Assessment score was 14 (12; 16), Simplified Acute Physiology Score II was 62.5 (57; 72.8), median intensive care unit stay was 17 days (range 1–124), and mortality was 62%. Only the ECMOnet-Score (area under curve (AUC) 0.69) and the RESP-Score (AUC 0.64) discriminated survivors and non-survivors. Admission pHa, mean arterial pressure, lactate, platelet concentrations, and pre-ECMO hospital stay were independent predictors of death and were used to build the PRESET-Score. The score's internal (AUC 0.845; 95% CI 0.76–0.93; $p < 0.001$) and external (AUC 0.70; 95% CI 0.56–0.84; $p = 0.008$) validation revealed excellent discrimination.

"The timing of ECMO initiation was and is a matter of debate. In a joint study by a French hospital and two Australian hospitals the time from ICU admission to ECMO initiation was an independent predictor of death, and this was confirmed by a Swiss study," the researchers note. "In our study, each additional hospital day before ECMO initiation was associated with a 10% increase in mortality. One possible explanation might be that any ventilator day before ECMO may increase lung trauma and promotes multiple organ failure."

The study has important limitations, including its retrospective design and the study was conducted at a single medical centre. Therefore, the results and the prognostic relevance of the PRESET-Score may not be directly applicable to other institutions harbouring patients with different ARDS aetiologies.

"Furthermore, although the PRESET-Score is a useful prediction model, it should only supplement individual judgement based on history, condition, prognosis, and the assumed living will of any specific patient. Beyond scores, weighing treatment options requires experienced physicians but our score serves as an additional block to build and facilitate decision-making," the researchers add.

Source: [Critical Care](#)

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Published on : Tue, 19 Dec 2017