

ORIGINAL ARTICLE

A Novel Nomogram Incorporating Clinical and Thromboelastographic Variables for Predicting Mortality in ICU Sepsis Patients

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SUMMARY

Background: Sepsis is a life-threatening multi-organ dysfunction syndrome. Accurate prediction of sepsis prognosis is a significant challenge. This study aimed to construct and validate a nomogram for predicting 28-day mortality in sepsis patients in the intensive care unit.

Methods: In this retrospective study, we analyzed data from sepsis patients admitted to the intensive care unit from January 2018 through December 2023. Clinical and laboratory data, including thromboelastographic results, were collected. Significant variables identified through univariate and multivariate logistic regression analyses were used to develop a 28-day mortality prediction nomogram. We assessed the nomogram's performance using the area under the receiver operating characteristic (ROC) curve, calibration plots, and the Hosmer-Lemeshow test. Decision curve analysis was employed to evaluate the nomogram's clinical utility.

Results: The study included 1,188 patients assigned to training (736) and validation (452) cohorts. Multivariate logistic regression identified age, presence of solid tumors, recent surgery, coagulation index, and lactic acid level as predictors of 28-day mortality. The resulting nomogram demonstrated an area under the ROC curve of 0.84 (95% CI: 0.76 - 0.91) in the training cohort and 0.81 (95% CI: 0.69 - 0.94) in the validation cohort. Both the Hosmer-Lemeshow test and calibration plots confirmed the nomogram's robust performance in mortality prediction. Additionally, decision curve analysis indicated high clinical practicability.

Conclusions: This newly developed robust nomogram, incorporating age, solid tumor status, surgical history, coagulation index, and lactic acid level, could accurately predict 28-day mortality in sepsis patients in the intensive care unit, offering valuable prognostic insights for clinical decision-making.

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Supplementary Data

Table S1. Variables with missing values.

Variables with missing values	Missing value, n (%)
CRP	7 (6.20%)
PCT	13 (10.85%)
CK-MB	2 (1.55%)
pro BNP	5 (3.88%)
Troponin	3 (2.33%)
APTT	2 (1.55%)

APTT - activated partial thromboplastin time, CK-MB - creatine kinase-MB, CRP - hypersensitive C-reactive protein, PCT – procalcitonin, pro BNP - B-type Natriuretic Peptide.

Table S2. Examinations of variable variance inflation factor in the multivariable logistic regression analysis.

Variables	VIF
Age	1.06
Lactic acid	1.41
CI	1.51
K	1.11
Troponin	1.00
Albumin	1.07
APTT	2.72
PT	137.69
INR	135.99
FBG	1.53
α	8.18
MA	4.89
PCT	1.43
Myoglobin	1.74
CK-MB	1.96
Creatinine	1.23

α - Angle, APTT - Activated partial thromboplastin time, CI - Coagulation index, CK-MB - Creatine kinase-MB, FBG - Fibrinogen, INR - International normalized ratio, K - Kinetic time, MA - Maximal amplitude, PCT - Procalcitonin, PT - Prothrombin time, VIF - Variance inflation factor.