

Development of new equations predicting the mortality risk of patients with continuous renal replacement therapy

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Equation. Applying equations to individual patient

$$P = 1 - (1 - h(t))^{exp(f(x))}$$

$$f(x) = B_1(X_1 - \bar{X}_1) + \dots + B_p(X_p - \bar{X}_p)$$

P is probability of individual's mortality within time = t

$h(t)$ is baseline hazard at time = t

B_1, \dots, B_p are the regression coefficients

X_1, \dots, X_p are average values for the risk factors

$\bar{X}_1, \dots, \bar{X}_p$ are the individual's risk factors

Table S1. VENUS score equations for 7-day, 14-day, and 28-day mortality prediction

	Equation
7-day mortality	
4-variable	$1-0.6073222^{\exp\{0.006057*(\text{Age}-67.86)-0.137953*(\text{Creatinine}-3.471)-0.043863*(\text{Glasgow coma scale}-8.199)-1.460093*(\text{pH}-7.328)\}}$
7-variable	$1-0.6231771^{\exp\{0.012046*(\text{Age}-67.86)-0.100358*(\text{Creatinine}-3.471)+0.044601*(\text{Total bilirubin}-2.952)-0.051985*(\text{Glasgow coma scale}-8.199)-0.386389*(\text{Albumin}-2.757)-1.413126*(\text{pH}-7.328)+0.008726*(\text{Heart rate}-99.72)\}}$
11-variable	$1-0.6272894^{\exp\{0.0121640*(\text{Age}-67.86)+0.2785681*(\text{Malignancy}-0.2618)-0.0008758*(\text{Platelet}-134.7)-0.0845622*(\text{Creatinine}-3.471)+0.0419202*(\text{Total bilirubin}-2.952)-0.0501781*(\text{Glasgow coma scale}-8.199)-0.0046276*(\text{Mean arterial pressure}-79.86)-0.3399093*(\text{Albumin}-2.757)-1.1384702*(\text{pH}-7.328)+0.0068319*(\text{Heart rate}-99.72)+0.0205402*(\text{Respiratory rate}-22.11)\}}$
14-day mortality	
4-variable	$1-0.4671821^{\exp\{0.006057*(\text{Age}-67.86)-0.137953*(\text{Creatinine}-3.471)-0.043863*(\text{Glasgow coma scale}-8.199)-1.460093*(\text{pH}-7.328)\}}$
7-variable	$1-0.4832752^{\exp\{0.012046*(\text{Age}-67.86)-0.100358*(\text{Creatinine}-3.471)+0.044601*(\text{Total bilirubin}-2.952)-0.051985*(\text{Glasgow coma scale}-8.199)-0.386389*(\text{Albumin}-2.757)-1.413126*(\text{pH}-7.328)+0.008726*(\text{Heart rate}-99.72)\}}$
11-variable	$1-0.4871149^{\exp\{0.0121640*(\text{Age}-67.86)+0.2785681*(\text{Malignancy}-0.2618)-0.0008758*(\text{Platelet}-134.7)-0.0845622*(\text{Creatinine}-3.471)+0.0419202*(\text{Total bilirubin}-2.952)-0.0501781*(\text{Glasgow coma scale}-8.199)-0.0046276*(\text{Mean arterial pressure}-79.86)-0.3399093*(\text{Albumin}-2.757)-1.1384702*(\text{pH}-7.328)+0.0068319*(\text{Heart rate}-99.72)+0.0205402*(\text{Respiratory rate}-22.11)\}}$
28-day mortality	
4-variable	$1-0.3259828^{\exp\{0.006057*(\text{Age}-67.86)-0.137953*(\text{Creatinine}-3.471)-0.043863*(\text{Glasgow coma scale}-8.199)-1.460093*(\text{pH}-7.328)\}}$
7-variable	$1-0.3390453^{\exp\{0.012046*(\text{Age}-67.86)-0.100358*(\text{Creatinine}-3.471)+0.044601*(\text{Total bilirubin}-2.952)-0.051985*(\text{Glasgow coma scale}-8.199)-0.386389*(\text{Albumin}-2.757)-1.413126*(\text{pH}-7.328)+0.008726*(\text{Heart rate}-99.72)\}}$
11-variable	$1-0.3425727^{\exp\{0.0121640*(\text{Age}-67.86)+0.2785681*(\text{Malignancy}-0.2618)-0.0008758*(\text{Platelet}-134.7)-0.0845622*(\text{Creatinine}-3.471)+0.0419202*(\text{Total bilirubin}-2.952)-0.0501781*(\text{Glasgow coma scale}-8.199)-0.0046276*(\text{Mean arterial pressure}-79.86)-0.3399093*(\text{Albumin}-2.757)-1.1384702*(\text{pH}-7.328)+0.0068319*(\text{Heart rate}-99.72)+0.0205402*(\text{Respiratory rate}-22.11)\}}$

Abbreviations: VENUS, VolumE maNagement Under body composition monitoring in critically ill patientS on continuous renal replacement therapy

Table S2. The areas under the time-dependent receiver operating characteristic curve of conventional scoring systems and equations predicting 7-day, 14-day, and 28-day mortality in development cohort

Models	Outcomes								
	7-day Mortality	P*	P†	14-day Mortality	P*	P†	28-day Mortality	P*	P†
SOFA	0.593 (0.549-0.637)			0.576 (0.533-0.619)			0.593 (0.550-0.635)		
APACHE II	0.610 (0.565-0.654)			0.586 (0.543-0.630)			0.587 (0.544-0.630)		
4-variable	0.672 (0.630-0.714)	0.007	0.010	0.663 (0.622-0.704)	0.002	0.001	0.671 (0.631-0.712)	0.005	<0.001
7-variable	0.718 (0.678-0.757)	<0.001	<0.001	0.710 (0.671-0.748)	<0.001	<0.001	0.723 (0.685-0.762)	<0.001	<0.001
11-variable	0.728 (0.689-0.767)	<0.001	<0.001	0.729 (0.692-0.767)	<0.001	<0.001	0.739 (0.701-0.777)	<0.001	<0.001

*Compared with the SOFA II model

†Compared with the APACHE model

Abbreviations: SOFA, Sequential Organ Failure Assessment; APACHE, Acute Physiology and Chronic Health Evaluation

Figure S1. Time-dependent receiver operating characteristic curves of SOFA, APACHE II, 4-variable, 7-variable, 11-variable equations in development cohort. a. 7-day mortality prediction. b. 14-day mortality prediction. c. 21-day mortality prediction.

