Thai-ICU Score as Simplified Severity Score for Critically Ill Patients: Result from SEA-AKI Study Group

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Background: Intensive care unit (ICU) scoring system is commonly used worldwide to predict ICU outcomes. However, the two most popular severity scores, APACHE II and SOFA require some sophisticated laboratory parameters and software to calculate. In resource limited setting, these are major barriers to apply these severity scores in clinical practice.

Objective: Our study aimed to create a simplified ICU scoring system to predict mortality in critically ill patients.

Methods: This prospective multicenter website-based-data-collection cohort involved adult patients who admitted to ICU of 17 centers across Thailand during 2013 - 2015. A development cohort and a validation cohort were randomly selected from available enrollment data. Apart from descriptive analysis, multivariable logistic regression was used to perform estimated coefficients of predictive models. A predicting score was derived from the regression equation with Receiver-Operating Characteristic (ROC) analysis for evaluating diagnostic test and predictive models. The score was validated by comparing area under the ROC curve with the standard APACHE II and SOFA scores.

Results: In the development cohort, 3,458 cases were in analysis. Among those, 2,463 (71 %) and 1,012 (29 %) cases were alive and dead in hospital course, respectively. Adjusted odds ratios (95% CI) of predictors including low Glasgow coma score (GCS 10-14), very low GCS (<10), low blood pressure (Mean arterial pressure < 70 mm Hg or need vasopressor), over positive net fluid balance (>1,500 cc), tachypnea (respiratory rate > 24 per minute), and low platelet count (<150,000 / μL) were 4.32 (3.45-5.41), 14.92 (11.72-19.00), 2.28 (1.97-2.63), 1.44 (1.24-1.67), 1.54 (1.33-1.77), and 1.79 (1.55-2.08), respectively. In the simplified THAI-ICU score model, the scores (simple coefficient number) of those predictors were 4.5, 15.0, 2.5, 1.5, 1.5, and 2, respectively. In the validation cohort of THAI-ICU score model; 1,880 cases were analyzed. The AUC (95%CI) of THAI-ICU, APACHE II, and SOFA scores were 0.80 (0.78-0.88), 0.763 (0.74-0.79), and 0.774 (0.75-0.80), respectively. At the cutoff value equal to 8 of the THAI-ICU score, the sensitivity, specificity, and positive likelihood ratio were 71.0 %, 75.0 %, 2.79, respectively.

Conclusion: A simplified THAI-ICU score outperforms the standard severity score and it may be considered as a powerful tool to predict ICU outcome. The simplicity of THAI-ICU score can enhance the possibility to apply this score in resource limited settings.

Keywords: Intensive Care Unit (ICU), Scoring system, Mortality
Area Under ROC Curve for Mortality Prediction Ability of THAI-ICU Score, Comparing with APACHE II and SOFA