

Can We Predict the Death of Neurosurgical Patients in Intensive Care Units?

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The Glasgow Coma Scale (GCS) was developed in 1974 to provide information about the level of consciousness in patients with head injuries.¹ It has frequently served as an important predictor of admission and outcome after head injury.² Intensive care units (ICUs) throughout the world currently use several scoring systems in addition to the GCS. The most common systems are the revised Acute Physiology and Chronic Health Evaluation (APACHE II)³ and the Simplified Acute Physiology Score II (SAPS II).⁴ Both are physiologically-based systems administered during the first 24 hours after ICU admission. No consensus currently exists on which system best predicts the mortality of ICU patients.

In a recent issue of the *Journal of the Chinese Medical Association*, Ting and colleagues evaluated 154 neurosurgical patients in the ICU of a 600-bed general hospital in Taiwan, and established a linear regression model of GCS to predict mortality.⁵ They found no significant differences in the predictive powers of SAPS II, APACHE II and GCS, and observed that all 3 systems had high areas under the receiver operating characteristic curve values, which represented the discriminant abilities. The authors recommend the use of the GCS as a predictive mortality model because it is quick and convenient.⁵ The study findings also highlight the importance of both consciousness level and physiological derangement in the mortality of these neurosurgical patients.

Since the study participants were neurosurgical ICU patients, it is not surprising that GCS performed well in predicting death. Nevertheless, this model might not be suitable for other ICU patients. Clinicians and managers need a well-validated model to help them identify outliers and assess ICU quality. Some researchers have recommended the use of a mortality

prediction model for ICU benchmarking.⁶ Such studies, however, are still limited in Taiwan. Therefore, larger databases and calibration of the model are necessary before it can be used for ICU benchmarking in Taiwan.

A mortality prediction model should also be used cautiously at the individual level. Although the model has been demonstrated to have high discriminatory power, it is not suitable for triage or regulatory applications, sanctions against individual physicians, or cost containment.⁷ For family discussions of individual patient prognoses, doctors need to be aware that estimated probabilities of hospital mortality may differ among hospitals. Future research should explore whether or not this mortality prediction model can be reproduced in other ICUs, and whether or not modification of consciousness level and physiological derangement can improve prognoses for neurosurgical ICU patients.

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