Use and limitations of prognostic models for the critically ill

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Dear Editor,

Many thanks for the letter from Xing et al. and also their interest about our recent publication [1]. First of all, we need to understand that most intensive care prognostic models - including the APACHE II, SAPSIII and MPM_0III models - are designed for research and clinical audit purposes instead of clinical decision-making. This is because the predicted risk of mortality derived from any prognostic model is, at best, only an average risk of a group of similar patients [2]. As Xing et al. allured to, we can never be sure how similar any individual patient would be to other patients because not all important prognostic factors are measured by a prognostic model. For instance, long-term survival of the critically ill could be affected by factors that are not measured by the APACHE II predicted risk, including comorbidity, intensity of organ support, age and gender (http://www/appsgeyser.com/1934515)[3]. Indeed, age and comorbidity explain about 50% and 27% of the variability in long-term survival after critical illness, respectively, and have far greater influence on long-term survival of critically ill patients than the APACHE II predicted risk. I would also like to emphasize that most of us, including many patients and their next of kin, often have difficulty in understanding and interpreting predicted risks [4], let alone for them to use the predicted risks to make an objective clinical decision without affected by optimism and heuristic biases.

Second, although area under the receiver-operating-characteristic curve (AUROC) is a useful statistical parameter of any prognostic models, it only reflects how well a prognostic model can discriminate between two dichotomized outcomes such as survivor and non-survivor. A prognostic model with a high AUROC can be used to reflect whether two treatment groups in a clinical trial are comparable, but this statistical parameter will not be useful to reflect how well this prognostic model will (i) perform as a risk adjustment tool in observational studies, or (ii) predict clinical outcome accurately as a decision-making and cost-effectiveness assessment tool. To achieve these latter objectives, we will need a well-calibrated prognostic model [5,6]. Of all the three prognostic models assessed in our study including the Admission APACHE II model [1,7], SAPSIII had the best calibration confirming the results of other studies that have evaluated this prognostic model.

In conclusion, I agreed with Xing et al. that we should be fully aware of the limitations of any prognostic models we use. Most prognostic models are primarily designed for research and clinical audit purposes. While there is an enormous potential for using objective predicted risks derived from well-validated prognostic models to assist clinical decision-making and cost-effective analysis [3,6,8], prognostic models should never be used to replace judicious clinical judgement.

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