Prognostic scoring systems for mortality in intensive care units — the APACHE model

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The first paper describing the APACHE score was published more than 30 years ago, yet its use in Polish intensive care units (ICUs) is still very limited. The publication by Niewiński et al. entitled “Prognostic scoring systems for mortality in intensive care units — the APACHE model” [1] is a valuable reminder of what is the most widely-used scale to evaluate the severity of critically ill patients worldwide. The two main applications of the APACHE score in ICUs are to disease severity of diseases of patients admitted to ICUs, and to predict the risk of hospital mortality.

Prediction of hospital mortality risk should be used for groups of patients and it depends on many time-variable factors, e.g. the population studied. Therefore, prognostication of mortality using the APACHE II scale can be associated with a substantial error and its usefulness is somewhat limited.

On the other hand, the APACHE II score is successfully applied to assess the severity of illness of ICU patients. Based on the description of the APACHE II score presented in the paper by Niewiński concerning chronic diseases and surgical procedures, readers could mistakenly gain the impression that patients receive additional 2 or 5 points when undergoing scheduled (elective) or emergency surgical procedures before the ICU admission, irrespective of the presence of chronic diseases. This misconception needs to be addressed, especially because in everyday practice proper scoring according to APACHE II encounters numerous difficulties, and the addition of 2 or 5 points for postoperative patients who were not diagnosed with chronic diseases is not so rare.

According to the APACHE system, patients with chronic diseases (i.e. liver, circulatory, respiratory, kidney failure or immunocompromised) are normally given 2 points when they have undergone scheduled procedures directly before ICU admission, or 5 points when they have undergone emergency surgery or have not been operated on. Thus, it covers only patients who have a pre-admission diagnosis of one of the chronic diseases mentioned above and fulfilling certain criteria, e.g. NYHA class IV heart failure (but not NYHA class II or III). Patients admitted to ICUs after emergency or scheduled surgery do not receive points solely because they have undergone surgical procedures.

When the APACHE score is used to prognosticate hospital mortality, separating all the patients into surgical or non-surgical is essential since in the equation to calculate the risk of death (p):

$$\ln(p/1-p) = -3.517 + (\text{APACHE II} \times 0.146) + (0.603 \text{ for patients who underwent emergency surgery}) + (\text{admission diagnosis coefficient}),$$

the APACHE II score additionally includes coefficient for of patients after emergency surgery coefficient for admission diagnosis [2].

The latitude in APACHE II score interpretation causes discrepancies in results. This reduces its usefulness and means that the efforts put into time-consuming calculations are in vain. In clinical practice, physicians calculating APACHE scores are faced with many conundrums they have to resolve themselves (e.g. whether to consider body temperature while using therapeutic hypothermia, or short-time arterial pressure changes during intubation). The solutions adopted in other countries, e.g. Great Britain and Sweden, are exemplary. The Intensive Care National Audit and Research Centre (ICNARC) in Great Britain and the Svenska Intensivvårdsregistret in Sweden provide guidelines with detailed instructions regarding the APACHE II score [3, 4]. The above organisations collect data from intensive care units and analyse it statistically, which is a source of extremely valuable knowledge about the functioning of these units.

The acceptance of a similar solution in Poland is likely to result in interesting findings, as evidenced by the results obtained by the national registry of patients with severe sepsis. Until that time arrives, Polish recommendations concerning the APACHE II score elaborated and published by the Polish Society of Anaesthesiology and Intensive Therapy would be of great assistance to practicing physicians.
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References:


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