



Editorial

Prognostication by concomitant organ failure in mechanically ventilated patients in ICU: Important issue to face with



Acute Physiology And Chronic Health Evaluation-2 (APACHE II) and Simplified Acute Physiology Score II (SAPS2) have been developed to assess the risk stratification of patients admitted to the intensive care unit (ICU) and are most commonly used so far. More recently, other simplified scores were tested including the Model for End-Stage Liver Disease (MELD), primarily developed in patients affected by liver disease [1], but subsequently validated as a marker of liver and kidney failure in subjects with multi-organ failure [2].

MELD is calculated utilizing both serum creatinine, bilirubin and the International Normalized Ratio (INR) [1], therefore it cannot be determined in individuals on oral anticoagulants, who are commonly managed in a large proportion at the ICU level. The modified MELD-XI score, excluding the INR, was then validated, and showed a prediction mortality rate similar to MELD in patients suffering from liver cirrhosis [3]. The prognostic role of MELD-XI, both during hospital stay and in the long-term, was also positively examined in a broader and unselected population of critically ill patients treated in ICU [4].

The authors of the interesting paper published in this issue of the EJIM journal [5], report the results of a retrospective post-hoc analysis in a subgroup of 11,091 patients cared for ARDS and included in the international VENTILA trial [6]. Specifically, they examined characteristics and the prognostic role of MELD-XI at different cut-off point score (>12 or <12) in these individuals. Compared to lower scores, MELD-XI >12 score was associated with higher peak, plateau, positive-end-expiratory, and driving pressure, and with an increased hospital and 28-day mortality rate. This findings in a very large multicenter population confirm and extend previous results and conclusions of a preliminary single center study [4].

The main goals of risk stratification in patients with ARDS are both to predict their prognosis, possibly to improve management, and to optimize costs [7]. Although the most established APACHE-2 and SAPS-2 scores may succeed with these aims, they are complex to fill. Since the simpler MELD-XI score, by assessing renal and liver dysfunction, has been already shown to be a practical prognostic tool in patients with different clinical conditions, present study provides additional information regarding the practical use of MELD-XI. Indeed, MELD-XI is less sensitive and specific in predicting mortality compared to APACHE and SAPS2 score, which suggests that MELD-XI might be particularly useful at initial patient evaluation and risk stratification since it is much easier to calculate, nor it depends on the observer dependent clinical assessment (i.e. the level of consciousness by Glasgow Coma Scale). Moreover, it gets along without parameters (e.g. blood pressure, heart rate, oxygenation) typically influenced by initial intensive care

treatments, thus making MELD-XI score at least potentially more reproducible than both APACHE and SAPS2 [4]. By contrast, repetitive MELD-XI score calculation and investigation of MELD-XI clearance in patients treated in ICU over longer time periods did not show any valuable additional information on the clinical course of respiratory failure. While unfortunate, this result reinforces the usefulness of single initial measurement of MELD-XI with no need of repeated measurement.

Therefore, the easy-to-use MELD-XI would serve basically as an early and robust bedside tool for risk assessment especially in the emergency setting, to screen for patients who may benefit from more intensive and frequent clinical follow-up (theoretically those patients with MELD-XI >12).

Interestingly enough, in the present study [5] authors found a significant although weak correlation between MELD-XI score and airway pressures delivered by mechanical assistance. Those patients with >12 score and lower survival received higher ventilatory pressure regimens which might primarily reflect the need of higher pressures in sicker patients. With this condition, indeed, higher pressure in the airways might increase hepatic and renal venous blood pressure, which in turn might aggravate the impaired organ perfusion and hence contribute to increased bilirubin or creatinine concentration and release Fig. 1.

Literature reported that sepsis, a main cause for ARDS, is likely to decrease the renal blood flow in experimental setting [8], and mechanical ventilation per se was described as a factor which may independently promote damage at the kidney level [9]. In acute patients admitted to ICU several factors and therapeutic interventions other than mechanical ventilation are likely to produce alterations in normal organ blood distribution. However, cardiac output has a dominant effect on the renal blood flow during sepsis such that, in the presence of a decreased cardiac output, renal flow is typically decreased, whereas this latter increases or keeps maintained in the presence of a preserved/increased cardiac output. The acute reduction in systemic venous return and reduced cardiac output during the initiation of high positive pressure mechanical ventilation is one of the most commonly observed heart-to-lung interactions in the whole population of patients admitted to ICUs, even if delivered by mask interface in patients with chronic respiratory disease [10].

To conclude, it seems rather useful to have a bedside practical clinical score, such as MELD-XI, among those useful clinical tools available during early intensive cares. Since recognizing those patients at higher risk for multi-organ failure still remains a challenge, providing additional clinical means to answer the point would be very important

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Fig. 1. Clinical scenario in a typical intensive care unit

to address interventions able to minimize the negative effects of aggressive therapies of the acute phase, such as the regimens of positive pressure ventilation in hypoxic respiratory failure. Overall, findings in the present trial suggest further insight for future research in the area of prognostication for critically ill patients under mechanical ventilation.

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