

Editorial

## Mortality prediction of cirrhotic patients admitted to the Intensive Care Unit

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### Commentary

Chronic liver diseases are a major health issue worldwide.<sup>1</sup> In Mexico, cirrhosis mortality is among the highest of the world, being the third cause of death in the general population and the second in young adults (15-64 years) during 2005.<sup>2,3</sup> Furthermore, a steady rise in the number of cases is expected up to 2050.<sup>4</sup>

Acute deterioration of chronic liver disease due to variceal bleeding, infection/sepsis, grade III/IV hepatic encephalopathy, hepatorenal syndrome, overlapped alcoholic or viral hepatitis represents a critical situation that frequently requires management in an Intensive Care Unit (ICU) setting. Although the term acute-on-chronic liver failure has been proposed to cover these situations, no clear definition or consensus are available at the moment, mainly due to the heterogeneity of causes, modes of presentation and prognosis.<sup>5</sup>

The admittance of a cirrhotic patient to the ICU brings several questions. *First*, does the patient *really* require admittance to the ICU? In other words: how sick should an endstage liver disease patient be, to get admitted to the ICU? *Second*, how much «residual liver function» does the patient have? Is the patient a candidate for liver transplantation? *Third*, what outcome is expected if the patient recovers from this event?

Type 1 hepatorenal syndrome could serve as an example. Its mortality is high at mid-term; and although available therapies prolong survival, no resolution is ex-

pected with medical therapy alone, which acts as a bridge to liver transplantation. Therefore, if the patient is not a candidate for liver transplantation, probably he will not be a candidate for ICU admittance. Intermediate examples are plenty: hypovolemic shock secondary to variceal bleeding, septic shock, grade IV hepatic encephalopathy, severe alcoholic hepatitis. In all of these circumstances the decision to admit a patient to the ICU can be difficult.

Around the world, the costs generated in the ICUs alone ascend to 20–30% of total hospital costs in developed countries.<sup>6,7</sup> The use of sophisticated technology (MARS, bioartificial livers, etc.) and expensive medical care in critically-ill cirrhotics has produced an increased awareness of the need to optimize the use of resources available. In addition, liver transplantation currently offers proven long-term survival.<sup>8</sup> This scenario requires reliable prognostic factors to construct algorithms for critically-ill cirrhotics. Furthermore, it is mandatory to have scientific basis to assess when ICU admission will be futile for a patient's outcome and quality of life.

Scoring systems to predict mortality have been validated in cirrhotics admitted to ICU; and even if they show similar performance compared with established scoring systems<sup>9,10</sup> to the date no study has compared every single scale in the same cohort of patients, rising the question if any is superior to the others.

For the intention of this commentary, scoring systems can be grouped in two categories: first, «specific» scoring systems created specifically for cirrhotic patients, such as Child-Turcotte-Pugh Scale (CTP) and the Model for End-stage Liver Disease (MELD);<sup>11,12</sup> and second, «general» scoring systems designed for any patient admitted to the ICU; such as Organ System Failure (OSF) scale,<sup>13</sup> Acute Physiology and Chronic Health Evaluation (APACHE) I, II and III scale,<sup>14-16</sup> Sequential Organ Failure Assessment scale (SOFA)<sup>17</sup> and the Risk of renal failure, injury to the kidney, failure of kidney function, loss of kidney function and end-stage renal disease (RI-FLE).<sup>18</sup>

Scales for cirrhotic population were created for its application in a specific setting; CTP was originally developed and later modified to predict mortality in patients undergoing esophageal surgery and MELD was developed to predict mortality in patients undergoing trans-

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jugular intrahepatic portosystemic shunt.<sup>11,12</sup> Both scales has been validated in a number of circumstances and modifications has been proposed, such as MELD-Na and Creatinine-modified CTP.<sup>19,20</sup> However, the evidence of its performance predicting mortality for patients admitted to the ICU is scarce.

Five studies (three from Taiwan and two from Germany) have compared the differences between ROC curves of «general» over «specific» scoring systems;<sup>21-25</sup> showing that «general» scoring system had better discrimination compared with CTP. The area under the curve (AUC) for OSF and SOFA is > 0.80 and it seems to be better than APACHE II and III alone; however, Aggarwal *et al.*,<sup>26</sup> showed that APACHE III combined with the use of adrenergic support and the presence of acute renal failure, had superior prognostic accuracy (AUC 0.91). Cholongitas *et al.*,<sup>10</sup> found that MELD score (AUC 0.81) have the same discrimination efficiency as SOFA (AUC 0.83). MELD is better than APACHE II and CTP scores (AUC 0.78 and 0.72, respectively).

At the moment, validated scoring systems have an adjuvant role for admittance decision-making to the ICU. Despite some differences proposing «general» scoring systems to be better than «specific» systems, we believe it is necessary to follow a large cohort of patients admitted to the ICU to prospectively evaluate all these predictive strategies, and to design an *ad hoc* scoring system that allows optimal resource allocation for cirrhotic population in the ICUs. Definitively, prospective, large multicenter efforts will yield better results than current single center studies.

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