A positive fluid balance is an independent risk factor for intensive care unit mortality in patients with acute-on-chronic liver failure

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Introduction:
Patients with acute-on-chronic liver failure (ACLF) have high mortality rates. We sought to evaluate the impact of fluid balance in ICU mortality for these patients.

Methods:
Retrospective analysis from a prospective database including 84 consecutive patients with ACLF admitted to the Curry Cabral Hospital (Lisbon, Portugal) ICU from 04/2013 to 03/2017. The association of fluid balance during ICU stay (until discharge, liver transplant (LT), or death) with ICU mortality was studied using logistic regression following bootstrapping (1000 samples).

Results:
Median (IQR) age was 59 years and 71 (85%) patients were male. Most frequent precipitant events were infection and bleeding, in 43 (51%) and 23 (27%) patients, respectively. Ascites was present in 71 (85%) patients. On ICU admission, 64 (76%) patients had at least 2 organ failures (based on CLIF-SOFA score). Median (IQR) APACHEII and MELD scores were 21 (17:24) and 27 (20:33), respectively. Invasive mechanical ventilation, vasopressors, and renal replacement therapy (RRT) were required for 32 (38%), 45 (54%), and 17 (20%) patients, respectively. During ICU stay 42 (50%) patients died (5 following LT). Median (IQR) fluid balance per day in ICU was +0.5 (-0.2:+1.1) liters. This was significantly associated with ICU mortality (adjusted OR = 1.61 per each liter increment), following adjustment for INR and need for vasopressors and RRT (AUC = 0.78).

Conclusion:
For patients with ACLF, positive fluid balance was associated with worse ICU mortality. Frequent bedside hemodynamic assessment and a judicious use of intravenous fluids might help to improve these patients’ outcomes.

Table 1:

<table>
<thead>
<tr>
<th>Fluid balance per day in ICU (liter)</th>
<th>OR (95%CI)</th>
<th>P</th>
<th>Adjusted OR (95%CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid balance per day in ICU (liter)</td>
<td>1.52 (1.03-2.26)</td>
<td>0.037</td>
<td>1.61 (1.06-2.44)</td>
<td>0.030</td>
</tr>
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<td>INR</td>
<td>2.60 (1.20-5.62)</td>
<td>0.016</td>
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<tr>
<td>Vasopressors</td>
<td>0.97 (0.36-2.63)</td>
<td>0.96</td>
<td></td>
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<tr>
<td>Renal replacement therapy</td>
<td>5.16 (1.38-19.3)</td>
<td>0.008</td>
<td></td>
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</tr>
</tbody>
</table>

Model: n = 84; AUC (95%CI) = 0.78 (0.67-0.88)

Unadjusted and adjusted analysis of the association of fluid balance per day in the intensive care unit (liter) with intensive care unit mortality

Image 1:
Unadjusted predicted probability of intensive care unit mortality based on fluid balance per day in the intensive care unit (liter)