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Sepsis 3.0 in the Rivers, ProCESS, ARISE and ProMISe Studies

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EDITORIAL

The three multicenter studies (ProCESS, ARISE and ProMISe studies [1-3] reported no benefit for EGDT which was different from the result of Rivers' study [4]. The reason of different results between the three studies and Rivers' study is considered as Rivers's trial is a single centre study and many aspects of initial sepsis management have changed during the past 15 years.

However, we considered that the different proportions of involved population might also be the reason that leaded to different results between the three studies and Rivers' study. The inclusion criteria were similar among the four studies it was that patients had suspected or confirmed infection, two or more systemic inflammatory response criteria, and who had refractory hypotension (systolic blood pressure, <90 mm Hg; or mean arterial pressure, <65 mm Hg, despite resuscitation with adequate fluids resuscitation) or a serum lactate level of 4 mmol per liter or higher. So, according to the inclusion criteria, we could conclude that there were three types of patients involved in these four studies: refractory hypotension without hyperlactatemia, hyperlactatemia without refractory hypotension, and both refractory hypotension and hyperlactatemia. However, according to the new criteria of sepsis 3.0 [5] patients with septic shock were clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL), so those patients involved in the four studies who exhibited refractory hypotension without hyperlactatemia or only hyperlactatemia without refractory hypotension were not septic shock at all in this extence (though the cutoff value of serum lactate level in the new criteria was lower than that in the four studies). And according to the reports of sepsis 3.0 [5] the three types of patients had significantly different mortality, mortality was highest in those patients with both refractory hypotension and hyperlactatemia, and lowest in those patients with hyperlactatemia alone. Hence variable proportions of patients with the three types may lead to significant heterogeneity and variability in outcomes. As we know, patients involved in Rivers' study existed more comorbidities, [6] it might be that Rivers' study involved more patients who met the new criteria of septic shock and were really septic shock patients. And as a matter of fact, some controversial therapies may only show efficacy in more critically ill patients.

Notably, these proportions have varied greatly among the three multicenter studies (ProCESS, ARISE and ProMISe studies) and lead to significantly different mortality among the three studies (Table S21 in the Supplementary Appendix of ProMISe study) [3]. Hence a secondary analysis or subgroup analysis of the four studies according to the new criteria of septic shock is anticipated.

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