Editorial

Organ dysfunction and children sepsis: building a concept

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Comment on: Schlapbach LJ, Straney L, Bellomo R. Prognostic accuracy of age-adapted SOFA, SIRS, PELOD-2, and qSOFA for in-hospital mortality among children with suspected infection admitted to the intensive care unit. Intensive Care Med 2018;44:179-88.

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In the February 2018 in an issue of *Intensive Care Medicine*, Schlapbach *et al.* published a prospective multicentric binational cohort study on the following organ dysfunction scores: sequential organ failure assessment (SOFA), quick SOFA (qSOFA) and Pediatric Logistic Organ Dysfunction-2 (PELOD-2) in a large pediatric cohort admitted to the ICU with infection. These scores were compared to systemic inflammatory response syndrome (SIRS) criteria for the ability to discriminate hospital mortality or ICU length of stay. SOFA and qSOFA scores were adapted according to age-specific cut-offs, and the SOFA definitions for cardiovascular and renal dysfunction were based on the PELOD-2 cut-offs, a validated score for children (1).

The incidence of sepsis in pediatric population is 0.56 per 1,000 and has increased in the last two decades. The hospital mortality is around 10%, varying little with age and is higher in children with some co-morbidity. Despite all efforts, sepsis persists as the major cause of death in children (2,3). The SPROUT study, a global collaborative cross-sectional analyze, showed that hospital mortality can be as high as 25% for severe sepsis, reinforcing the importance of accurate diagnostic definitions (4). However, disagreement between clinical judgment and consensus criteria can be observed in up to one-third of cases (5).

In the study of Schlapbach *et al.*, SIRS criteria showed reduced accuracy to identify infected children with high risk of death, when compared to SOFA and PELOD-2. There were no relevant differences in primary and secondary outcomes in patients with ≤2 criteria of SIRS. The most common SIRS criteria were abnormal heart rate and increased respiratory rate. These two variables show low specificity for critical illness and may be related to a variety of causes that frequently do not require hospitalization (6). Churpek *et al.* reported that nearly half of the patients admitted to the hospital presented two or more SIRS criteria at least once during their hospitalization (7). Considering that the Pediatric Sepsis Consensus uses ≥2 SIRS criteria for sepsis diagnosis, in order to differentiate the patients with simple infections from those with increased risk of death, this seems to be a relevant pitfall (8). Kaukonen *et al.* also showed that one in each eight SIRS-negative patients presented infection, positive organ failure scores and higher risk of death. The SIRS criteria failed to define a transition point in the risk of death (9).

SOFA and PELOD-2 were significant more accurate in predicting hospital mortality than SIRS and qSOFA. It is always important to emphasize that the qSOFA is only a screening score for sepsis, not a diagnostic one. Seymour *et al.* demonstrated, in adults, similar results supporting the use of SOFA in clinical criteria diagnosis of sepsis (10).

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) in adult patients was published in 2016 (11). The anterior version focused on inflammation and presented inadequate sensitivity and specificity. There were discrepancies in definitions of sepsis, severe sepsis, and septic shock, leading to reports with

great variability in mortality rates. Sepsis-3 is based on life-threatening organ dysfunction caused by a dysregulated host response to infection and is defined by the increase in SOFA score ≥2, which correlates with an increase of 10% in hospital mortality. This consensus was not designed for the use in the pediatric population, what reinforces the importance of studies to validate these new sepsis criteria for the pediatric population. SOFA and qSOFA scores have not yet been validated for children, but Cvetkovic *et al.* used a pediatric adaptation of the SOFA to evaluate retrospectively a septic population of children and adolescents admitted to the ICU over seven years (2009–2016) (12).

The criteria of organic dysfunction used by Sepsis-3 definition should not be merely transposed to the pediatric population, but supported by studies that ratify the changes. The study of Schlapbach *et al.* consistently demonstrates that aged-adapted SOFA, qSOFA and PELOD-2 scores are more accurate and more sensitive than SIRS criteria to predict hospital mortality in children with suspected infection admitted to the ICU. These results are encouraging, and may represent an important step in the discussion of changes in sepsis definitions for children.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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