

New definitions for sepsis and septic shock

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The European Society of Intensive Care Medicine and the Society of Critical Care Medicine recently published the Third International Consensus Definitions for Sepsis and Septic Shock.^{1,2} Critical efforts in this process included a discussion of the concept of sepsis, identification of criteria which will alert clinicians to the possibility that the patient is at risk to develop sepsis, and the development of the criteria to identify septic shock. This document defined sepsis as infection with an aberrant or dysregulated host response which results in organ dysfunction and an increased risk for mortality. This definition separates infection with an acute inflammatory response from an infection with organ dysfunction. Infections with organ dysfunction have a mortality risk of approximately 10%; septic shock has a mortality risk of approximately 40%.

Clinicians use clinical information and laboratory testing to establish the diagnosis of infection. This information will likely identify patients with organ dysfunction, and, therefore, patients who have sepsis. However, early identification of patients who are at risk to develop sepsis requires screening protocols to expedite testing and initiate treatment. The authors of the Third International Consensus Definitions used a very large electronic database to identify patients with suspected infection to evaluate criteria which might identify sepsis.³ The criteria evaluated included the SOFA (Sequential Organ Failure Assessment) score, the SIRS (systemic inflammatory response syndrome) criteria, the Logistic Organ Dysfunction System score, and a new score derived using multivariable logistic regression analysis of their database. This new score, called the quick (q) SOFA score, included three elements: an altered mental status (a Glasgow Coma Scale score ≤ 13), a respiratory rate ≥ 22 , and a systolic blood pressure ≤ 100 mmHg. The outcomes used to assess these criteria did not

involve the diagnosis of infection with sepsis but rather poor outcomes, including mortality and length of stay for more than three days in the ICU. The performance of these criteria depended on the location of the patient encounter at the time of initial evaluation. In patients evaluated in non-ICU settings, the qSOFA score predicted outcomes better than the SOFA score and the SIRS criteria, and a qSOFA score of ≥ 2 had a 3-14 fold increase in hospital mortality across all baseline risk deciles. In patients initially evaluated in the ICU, the SOFA score predicted outcomes better than the SIRS criteria and the qSOFA score, and a SOFA score ≥ 2 had a 2-25 fold increased risk of hospital mortality. Consequently, this task force recommended the use of the qSOFA score in patients in emergency departments and on hospital wards and the SOFA score in patients in ICUs. The diagnosis of septic shock included persistent hypotension following adequate volume resuscitation, the use of vasopressors, and a lactate level ≥ 2 mmol/L.⁴ Patients in this group had a mortality rate of approximately 42%. Lactate had a significant effect on outcomes, and increasing levels were associated with increasing hospital mortality rates.

Some experts have criticized the use of SIRS criteria to identify patients with possible sepsis because these criteria focus on inflammatory markers and lack sensitivity and specificity. However, elements of SOFA (PaO₂/FiO₂, platelet counts, bilirubin levels, MAP, GCS, creatinine levels, and urine output) score can also be nonspecific. For example, ICU patients with acute kidney or liver injury secondary to any acute illness complicated with respiratory failure can develop hypotension following intubation or as a consequence of disease severity. If we develop an electronic alert for a SOFA score ≥ 2 , many patients without sepsis will have this alert, and this might mislead clinicians, increase costs from unnecessary

tests, and delay the diagnosis and treatment of other medical conditions. In addition, use of the SOFA score assumes that patients have a baseline SOFA score of zero when, in fact, many patients have SOFA scores ≥ 2 at baseline. The qSOFA score reflects organ system involvement and can be related to sepsis. But these signs indicate relatively severe disease with hypoperfusion, and waiting for these signs to develop might delay early interventions.

Not all commentators support these changes in definition. An editorial in CHEST written by Stephen Simpson notes that the new definition eliminates the use of the SIRS criteria.⁵ He suggests that the SIRS criteria are sensitive to the early detection of patients with possible sepsis and that early intervention improves outcomes. He also notes that many physicians and hospitals are not familiar with the use of the SOFA score and its use would require more education and adjustments in medical record support systems. His greatest concern is that the use of these new criteria would identify patients at a later point in their clinical course and reduce opportunity for early intervention. Consequently, clinicians and hospitals will have to decide what works best to help them identify patients with suspected infection who have either have or might develop organ dysfunction.

In summary, these new definitions emphasize that patients with sepsis have organ dysfunction which increases mortality and that patients with septic shock can be identified using three clinical parameters. These definitions do not focus on diagnosis or treatment. The qSOFA score needs to be used in patients in the emergency department and on general inpatient services. However, the SIRS criteria still provide rapid and objective assessments of patients, can supplement information in the qSOFA, and should not be discarded yet. Electronic medical record systems need to develop automatic alerts based on SIRS criteria, the qSOFA score, the SOFA score, and the septic shock definition. Prospective studies are needed to calculate the sensitivity and specificity of these scoring tools in patients with suspected infection to identify poor outcomes.

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