

## Sepsis-3 can help predict community-acquired pneumonia mortality



The Sepsis-3 Task Force updated the clinical criteria for sepsis, excluding the need for systemic inflammatory response syndrome (SIRS) criteria and introducing a flowchart that comprises the quick Sequential (Sepsis-related) Organ Failure Assessment (qSOFA) and SOFA scores. A new study suggests that the Sepsis-3 flowchart leads to better identification of patients with community-acquired pneumonia (CAP) at high risk of mortality.

"For the comprehensive assessment of CAP, PSI [Pneumonia Severity Index] had the best predictive performance and net benefit for mortality, while mSOFA [modified SOFA] seemed more suitable when considering ICU admission. Finally, the Sepsis-3 flowchart provided an improved, feasible approach for identifying patients with CAP at higher risk of death," the study's authors write. "Further studies, including other CAP cohorts and other sources of infection, should be conducted to corroborate our findings."

CAP represents a significant infection burden worldwide, and it is often complicated by sepsis. Early recognition of sepsis is fundamental to guide treatment, improve outcomes and decrease costs. In contrast, in patients with uncomplicated infection, overtreatment should be avoided to prevent unnecessary harm. In 2016, the Sepsis-3 Task Force updated previous recommendations primarily aiming to accurately differentiate between sepsis and uncomplicated infection.

Sepsis-3 will change clinical practice and influence medical decisions. However, clinical decision-making cannot rely on risk stratification scores, because a decision-aid tool must account for the benefits and harms of clinicians incorporating that tool into clinical practice. To date, no clinical decision-making analysis of Sepsis-3 is available.

The current study aimed to evaluate three tools for initial assessment – SIRS, qSOFA and the Confusion, Respiratory Rate and Blood Pressure (CRB) score – and three tools for a comprehensive assessment – mSOFA, the Confusion, Urea, Respiratory Rate, Blood Pressure and Age (CURB-65) score, and PSI – as decision-aid prognostic tools in CAP. Additionally, the Sepsis-3 flowchart was also applied in this population. In this cohort study including adult patients with community-acquired pneumonia from two Spanish university hospitals, the six scores were calculated with data from the emergency department. Researchers used decision-curve analysis to evaluate the clinical usefulness of each score and the primary outcome was in-hospital mortality.

Of 6,874 patients included in the study, 442 (6.4%) died in-hospital. SIRS presented the worst discrimination, followed by qSOFA, CRB, mSOFA, CURB-65, and PSI. Overall, overestimation of in-hospital mortality and miscalibration was more evident for qSOFA and mSOFA. SIRS had lower net benefit than qSOFA and CRB, significantly increasing the risk of overtreatment and being comparable with the "treat-all" strategy. PSI had higher net benefit than mSOFA and CURB-65 for mortality, whereas mSOFA seemed more applicable when considering mortality/ICU admission. Sepsis-3 flowchart resulted in better identification of patients at high risk of mortality.

Decision-curve analysis is a method that depicts the predicted net benefit ("NB = benefit x true-positive classifications minus harm/cost x false-positive classifications") of a prediction tool over a range of threshold probabilities. Threshold probabilities quantify how overtreatment is considered against treatment benefits. For instance, if a clinician weighs the harm/cost of overtreatment versus the benefit of appropriated treatment at 1:19, we have a threshold probability of 5% and a number willing to treat (NWT) of 20. At any given NWT, the score with the higher net benefit is the preferred one.

"Indeed, the decision-curve analysis showed that when different weights for true-positive and false-positive classifications were applied, SIRS did not provide any additional benefit for decision-making. In contrast, we found a positive NB if clinicians incorporated qSOFA or CRB for the initial assessment [of CAP], decreasing the number of unnecessary interventions while not missing any death. qSOFA and CRB were better than SIRS or a 'treat-all' strategy for NWT values below 40, which seems reasonable for use in the ED, where qSOFA and CRB can be easily assessed," the authors explain.

Considering that CRB and CRB-65 were specifically developed for CAP patients, the authors note that these tools had better calibration and discrimination than qSOFA, as well as higher specificity. "Thus, rather than qSOFA, physicians could consider CRB or CRB-65 for the initial risk stratification of CAP patients," the authors add.

Source: [American Journal of Respiratory and Critical Care Medicine](#)

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