
EHR-Integrated Automated SOFA Score Calculator



Researchers at Mayo Clinic have developed an algorithm for sepsis detection based on the new Sepsis-3 definition. Their near real-time automated Sequential Organ Failure Assessment (SOFA) scoring has strong agreement with manual score calculation and may be useful for the detection of sepsis utilising the new Sepsis-3 definition. The study will appear in *International Journal of Medical Informatics*.

In early 2016, the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) working group released a new operational definition of sepsis that included a change in SOFA score of at least two points compared to baseline SOFA score at admission (Δ SOFA). The updated definitions and clinical criteria were intended to "facilitate earlier recognition and more timely management of patients with sepsis or at risk of developing sepsis," a goal aligned with current Surviving Sepsis Campaign guidelines.

The Sepsis Definition Task Force also proposed a new score (qSOFA) to identify patients with sepsis at high risk for bad outcomes outside of the ICU. The primary advantage of qSOFA is that it can be calculated quickly and repeatedly at the bedside and without any laboratory tests.

Regardless of which score is used for sepsis screening, frequent re-scoring imposes a non-trivial time and cognitive burden on clinicians during the information retrieval and clerical tasks required for score calculation. Strategies to reduce clinician workload could both aid early sepsis detection and improve clinical guideline adherence. Computerised automation is one method to achieve this goal.

For this study, the Mayo team designed a fully automatic algorithm to calculate the SOFA score in near real-time, prospectively compared the algorithm performance with standard manual scoring, and developed an Electronic Health Record (EHR) integrated SOFA automatic score calculator module to track current and previous SOFA score calculations to assist critical care clinicians with early sepsis detection.

The team prospectively compared the accuracy of automated versus manual calculation for a sample of patients admitted to the medical intensive care unit at Mayo Clinic Hospitals in Rochester, Minnesota and Jacksonville, Florida. Random spot check comparisons were performed 134 times on 27 unique patients, and daily SOFA score comparisons were performed for 215 patients over a total of 1,206 patient days. Agreement between automatically scored and manually scored SOFA components for both random spot checks (696 pairs, $\kappa = 0.89$) and daily calculation (5,972 pairs, $\kappa = 0.89$) was high. 147 patients were at risk of developing sepsis after intensive care unit admission, 10 later developed sepsis confirmed by chart review. All were identified before onset of sepsis with the Δ SOFA ≥ 2 point criterion and 46 patients were false-positives.

"Our study is not the first attempt at SOFA score automation, but it is the first to adapt the score for repeated calculation in near real-time," the authors write. "Our automated SOFA calculator algorithm can also be utilised at the bedside without extra effort and may offer a more robust assessment through the inclusion of laboratory data and more sensitive respiratory information."

However, further studies are needed to prospectively evaluate the performance of SOFA and qSOFA in early sepsis detection, the authors said, adding that validated automated calculation methods could be used in these studies.

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Published on : Tue, 11 Apr 2017