Automated early warning system for septic shock: the new way to achieve intensive care unit quality improvement?

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Sepsis, especially septic shock, is a major cause of death affecting millions of individuals around the world (1). As example, one study from two independent cohorts found that nearly 50 percent of all hospital deaths in the United States (US) are related to sepsis (2). Another important study in the US confirmed that sepsis has become the top-ranked diagnosis related to intensive care units (ICUs) admissions among older patients, and this is an impressive fact, considering the US and worldwide population aging (3). Furthermore, an international database analysis showed a global mortality for severe sepsis of 270 per 100,000 person-years between the years 1995 and 2015, with 5.3 million potentially preventable deaths annually (4). Nevertheless, it is important to point out that the term severe sepsis should not be used, since the 2016 definitions of sepsis and septic shock originated from the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) were established (5).

The early implementation of evidence-based therapies, such as fluid resuscitation, source control and appropriate antibiotic therapy, is the cornerstone of sepsis care (1). Therefore, reducing the time to the diagnosis of sepsis and early identification of patients at higher risk of developing septic shock and organ dysfunction are thought to be a critical component to reduce sepsis-related mortality (1,6,7). However, the routinely available tools do not accurately predict who will develop sepsis or, especially, septic shock. Therefore, researchers recently have been searching for tools based on health information technology, such as automated systems of real-time computerized alerts, with promising results (8-10).

Thus, Henry *et al*. proposed a new algorithm for predicting patients at risk of septic shock, called "Targeted Real-time Early Warning Score" (TREWScore) (11). This score was derived from the analysis of the Multiparameter Intelligent Monitoring in Intensive Care-II Clinical Database (MIMIC-II Clinical Database), containing electronic health records of 16,234 adult patients admitted to medical, surgical or cardiac ICU (12). The TREWScore showed a sensitivity of 85% and specificity of 67% and identified patients with a median lead time of 28.2 hours before septic shock onset, which is enough time for health professionals to implement appropriate therapies and probably improve patient outcome (11,13). It is necessary to emphasize that this score can be programmed into the hospital electronic health records systems, automatically alerting doctors and nurses about ICU patients with high risk for septic shock onset (11).

However, it should be highlighted that having an early warning system and using it to alter clinical practice are two different things. In this aspect, the TREWscore has only been validated as a warning system (11) and, consequently, the researchers will need to determine if it has an impact on clinical care and patient outcome. Another important aspect of this score is that it was built using an electronic health record of patients admitted to the ICU (11); therefore,

its clinical use in non-ICU patients (ward or emergency department) also needs to be evaluated.

In summary, the TREWScore can become a very useful tool to alert health professionals about ICU patients at high risk of developing septic shock with an advance of 28 hours before septic shock onset. Thus, health professionals will have enough time to reevaluate patients and their exams to intensify or readdress treatment, very probably improving outcome.

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Footnote

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