

Standard sepsis-ID systems miss cases in trauma patients

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Commonly used systems to identify sepsis fail to detect many cases in patients initially admitted to hospital for severe traumatic injuries, researchers at the University of Washington School of Medicine in

Seattle have found.

"The failure of these systems to identify these cases likely mean we are underappreciating the importance of [sepsis](#) in [trauma patients](#)," said Dr. Grant O'Keefe, a professor of surgery in the Division of Trauma, Burn and Critical Care.

O'Keefe and colleagues reported their findings Jan. 18 in *JAMA Network Open*. Dr. Katherine Stern, a general surgery resident at the University of San Francisco, was the paper's lead author. Stern conducted the study while she was a training fellow in trauma and critical care at Harborview Medical Center in Seattle.

Sepsis is a life-threatening illness caused when the body overreacts to an [infection](#). Worldwide, it is estimated there are 40 million sepsis cases a year and 11 million sepsis-related deaths. In the United States, sepsis is the most common cause of death among hospitalized patients.

Early detection and treatment offer the best chance of cure, but sepsis is often hard to detect until the patient is seriously ill. As a result, great interest exists in designing systems that could automatically detect patients who might be at risk of developing the condition, so treatment, such as antibiotics, can be started. Additionally, sepsis is often diagnosed or documented incorrectly, making it difficult to assess quality of care or to perform high-quality research.

In this study, researchers compared results of two sepsis-detection systems with an automatic system designed by Stern and colleagues. The two standard systems, which scan medical documentation codes or review medical charts after hospital patients are discharged, are commonly used for research purposes and to assess the quality of care. The new automatic system is being designed to scour information from electronic medical records to more accurately detect and classify

whether severely injured trauma patients developed sepsis during their hospitalization.

One of the records-based systems is called the American College of Surgeons National Trauma Data Bank (NTDB). The NTDB primarily uses diagnosis codes found in medical records to identify cases. The other system identifies cases primarily by evaluating medical billing codes. Both are efficient ways to gather information from medical records.

The automated system designed by the UW Medicine researchers, on the other hand, used criteria derived from a guideline called the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3), which more accurately defines sepsis by identifying risk criteria such as elevated heart and respiratory rates, low blood oxygen levels and pressure, blood cultures and other lab results, and the initiation of certain treatments.

The researchers compared the three systems in reviewing hospital records of nearly 3,200 severely injured adults admitted to the intensive care units at Harborview Medical Center with blunt or penetrating trauma from 2012 through 2020. Each system was used to identify cases of apparent sepsis.

Of those 3,200 patients, 747 (23%) met the automated system's criteria for sepsis; only 118 (4%) met the NTDB criteria and 529 (17%) met the criteria based on medical billing codes. The findings suggested that not only did the standard identification methods miss sepsis cases, but they also incorrectly identified sepsis in cases where it was not present.

The findings do not indicate that these patients did not receive appropriate care, O'Keefe noted: The patients may have been diagnosed and treated appropriately, but that care was not being detected as often

by the criteria used by the standard classification systems.

One shortcoming of the standard systems is that they do not account for when, during the course of hospitalization, a patient met certain criteria, O'Keefe said.

For example, if a trauma patient came into the hospital in shock because of bleeding and later developed an infection, identification based on diagnosis or billing codes might classify this as septic shock due to infection, when in fact the low blood pressure and infection were unrelated. The automated system, on the other hand, accounted for the sequence of events, so it was more likely to accurately ascribe symptoms to sepsis, he said.

Using automatic approaches to scan medical record based on factors consistent with those of the Sepsis-3 criteria may improve understanding of the scope of septic complications in trauma patients, O'Keefe said. It might also inform the design of systems that follow patients during their hospitalizations in real time and spot signs of sepsis earlier.

More information: Katherine Stern et al, Defining Posttraumatic Sepsis for Population-Level Research, *JAMA Network Open* (2023). DOI: [10.1001/jamanetworkopen.2022.51445](https://doi.org/10.1001/jamanetworkopen.2022.51445)

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