

## Early Prediction of Sepsis From Clinical Data



Sepsis continues to be a leading cause of death in hospitalised patients. Approximately 1.7 million individuals develop sepsis each year in the US and of these, around 270,000 die from the infection. Sepsis affects nearly 30 million patients worldwide and nearly 6 million die from sepsis each year. Billions of dollars are required to manage sepsis, far exceeding the cost of most other healthcare disorders.

Sepsis is treatable provided it is recognised early. However, despite exhaustive investigations, there are no specific markers of sepsis. Several studies have shown that delays in diagnosis and treatment of sepsis can lead to high mortality rates.

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Every few years, professional critical care societies come up with new clinical criteria/algorithms that may help make an early diagnosis of sepsis, but none of these criteria are absolute and false-negative results are not uncommon, leading to delayed treatment of patients.

A major problem with developing algorithms for early sepsis detection is that there is significant variability in the patient population with variable co-morbidities. Even the metrics used to identify sepsis vary from centre to centre. Some researchers have turned to computer models to improve the early detection of sepsis. The PhysioNet/Computing in Cardiology Challenge is an international competition that offers an opportunity to explore the limits of computational approaches for detecting sepsis.

In the most recent challenge, all participants submitted containerised algorithms to a cloud-based testing system, where the entries were graded for their binary classification performance using a novel clinical utility-based evaluation metric. The scoring function was designed especially for the challenge to read algorithms which had early predictors.

The setting for the challenge included ICUs in three separate hospital systems. Data were shared from two systems publicly and were sequestered from all three systems for scoring. There were over 60,000 ICU patients enrolled with up to 40 clinical variables for each hour of the patient's ICU stay. The sepsis 3 clinical criteria was applied for the onset of sepsis. 104 groups from the industry and academia participated with 853 submissions. In addition, 90 abstracts based on the challenge series were also accepted for presentation at Computing in Cardiology.

These entries to the competition and the algorithms that were developed suggest that diverse computing approaches can predict the early onset of sepsis before the patient even has clinical signs and symptoms. However, the biggest problem of using computers to analyse medical data is that there are many hospital systems and making generalisations may be difficult. In addition, the problem with computational data is that it may increase the risk of false positives, which could lead to over treatment of patients, again leading to higher healthcare costs and potential complications of therapy.

Source: [Critical Care Medicine](#)

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