

Rule Change

The fight against sepsis is ready for data science approach

BY RAY GUZMAN

Remember in “A Charlie Brown Christmas” when Lucy - folding her fingers and thumb into a fist - gives brother Linus five good reasons why he should go through with his role in the Christmas play?

For patients battling sepsis - and the physicians racing against time to cure them - the infection packs a far more devastating punch.

There has been no real change in the protocol for managing sepsis (a condition spurred by the body’s response to infection as it injures its own tissues and organs) during the last 40 years. So it’s time hospitals pick up new tools to combat the infection. We’ve come up with five good reasons why using a data science approach to combating sepsis can deliver the knockout punch needed to save lives.

Before we go into how data science (another term to explain the term is “machine learning”) relates to sepsis, we should discuss how it works. Rather than leveraging another piece of software or hardware to integrate into existing technology, this type of technology-based strategy relies on super computers that have the ability to learn. Instead of relying on software, the power is in the algorithms used to train the computer, which is focused exclusively on the problem of sepsis and in which the technology grows and improves over time when it’s fed with data from various sources.

That said, following are five good reasons to deploy a data science approach:

1. There isn’t a human expert - academic or otherwise - on the subject of sepsis. Many honorable and talented people are working very hard to understand sepsis. Yet it’s still unclear as to what triggers the body to develop this runaway response to infection. Untreated sepsis progresses so fast that clinicians struggle to get ahead of the curve, and often a diagnosis is confirmed very late, and sometimes too late.
2. The best clinicians cannot explain their expertise. Suppose you have two patients treated at the same time for the same illness with the same treatment protocol. One develops sepsis and the other doesn’t. Over time, many clinicians develop a “sixth sense” about who will be diagnosed. But it’s hard to quantify, much less instruct, on the basis of a “sixth sense.”
3. Sepsis definitions, protocols and staff change over time. Solid protocols are in place in many hospitals. But between nursing staff changes and the communication breakdown among hospital staff and physicians, additional time is added to a process for which every hour counts. With sepsis, the time between identification and treatment has major consequences in terms of lifelong chronic health conditions and, at worst, mortality.

4. There is no such thing as an average sepsis patient. Sepsis patients are like snowflakes - no two are alike. That’s why it’s hard to get ahead of the sepsis curve. Sepsis can be masked by more than 84 diagnostic codes from bacterial meningitis to bronchitis to a simple urinary tract infection. Clinical indicators, beginning with a rise in blood pressure, occur on average 15 hours into the 36-hour decline from infection to death. But electronic health records-based alert systems generally require additional validation, resulting in even more time before the initiation of an aggressive sepsis treatment protocol.

5. Much of the low-hanging fruit of process improvement for sepsis has already been put into play. The clinical indicators and protocols have been fine-tuned to the point that maximum benefit has been achieved. TREWScore (targeted real-time early warning), modified early warning scores and routine screening identify approximately 70 percent of patients who fall in the area under the curve but do not take into account the precious value of time in the sepsis treatment equation.

Every hour of delay in the application of effective antibiotics increases mortality by 7.6 percent. The combination of those patients missed by traditional screening coupled with the 24-to-26 hours wasted for clinical identification leaves a trail of lives lost and expenses that have risen precipitously. With more than 258,000 sepsis deaths annually in the U.S. - and at a staggering cost of more than \$32 billion per year - surely we can do better.

To put this in perspective, consider the fact that what is happening in America is tantamount to two jumbo jet crashes with no survivors - every single day. If that were happening, would the airline industry be looking for new approaches?

Taking the best of what data science can offer to develop a truly new approach for combating sepsis is the right thing to do. For providers who are committed to reducing in-hospital and post-discharge sepsis mortality without an additional cost burden, it’s time to look at new solutions to a vexing and all-too-devastating problem.



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