

Using the power of AI and interoperability to reduce sepsis mortality

BY DR. PENNY COOPER

Augusta Health is a community hospital nestled in Virginia's beautiful Shenandoah Valley focused on improving the health and well-being of our community. The statewide sepsis mortality rate in Virginia is 12.7%, while at Augusta Health it is 4.76%.

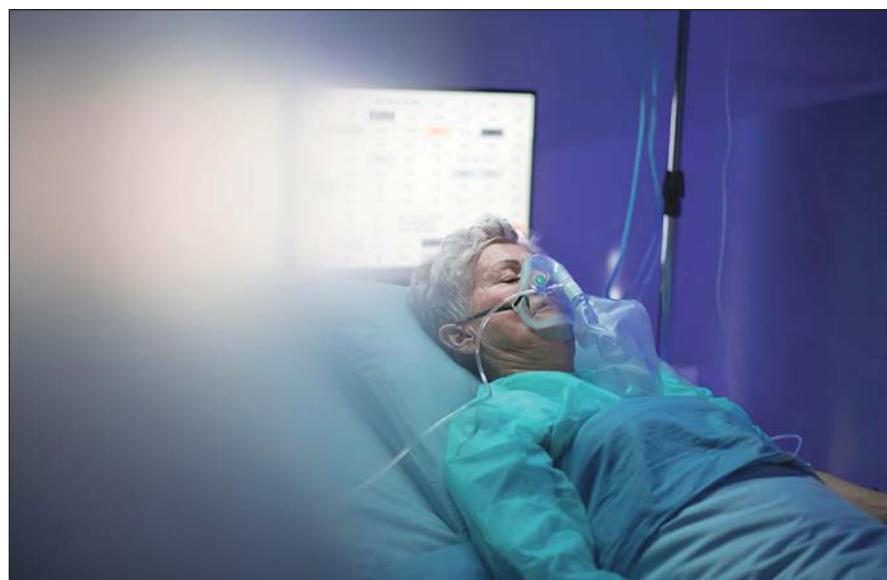
We have been able to achieve a significantly lower sepsis mortality rate by employing the power of artificial intelligence (AI) and communication technology. So far, we have saved over 350 lives that could have been lost to sepsis.

Mortality from sepsis increases by as much as 8% for every hour that treatment is delayed. Our nurses are highly trained and are skilled at detecting early symptoms of sepsis based on standard indicators. They are also very busy.

Aware of how many patients our nurses care for and the many tasks nurses juggle at once, our leadership team wanted to provide our nurses with additional support. Among the resources provided was a program to identify symptoms of sepsis sooner.

We formed a Sepsis Team and Taskforce in 2016 to take advantage of AI and communication capabilities and give our nurses an extra set of eyes to automatically review patient data and alert them as soon as a patient shows signs of being septic. Our goal was to detect and treat sepsis as early as possible and save lives.

We began by using the four traditional criteria to identify sepsis – a temperature greater than 38°C, heart rate greater than



90, respiratory rate greater than 20, and an abnormal white blood cell count.

In addition, we monitored mean arterial pressure and shock index. Our Sepsis Team and Taskforce then began a retrospective study of the data to determine which variables had the highest correlation to Sepsis.

We used the results of that study as a benchmark for developing an automated process that analyzes and compiles real-time data from medical systems each hour and assigns each patient a score. If the score is above a specific threshold, a sepsis alert is sent automatically to team members caring for that patient.

Team members receive the alert with contextual information on their mobile

communication device, which might be a hands-free Vocera Badge or a smartphone running a Vocera app.

The automated process involves interoperability among three systems:

- Our electronic medical record, MEDITECH
- Our predictive analytics tool, which scours critical data in a patient's record
- The Vocera clinical workflow and communication system

We considered other sepsis alert tools that flagged potential sepsis cases within patients' EMRs. However, those tools provide clinicians with sepsis alert flags only when they open the patient's medical record.

By contrast, the system we built alerts

the care team immediately on their Vocera Badge or smartphone, without any manual intervention. Sepsis alerts are automatically sent to the right care team to initiate care quickly when early signs of infection are identified.

System interoperability has been key to ensuring the right data with situational information gets to the right clinicians at the right time. Upon receiving an alert, the assigned staff member immediately screens the patient for sepsis. If sepsis is identified, they begin early intervention.

In the United States, more than 1.7 million people develop sepsis each year, and approximately 270,000 of them die. To decrease mortality rates and increase the likelihood of reversing the damaging outcomes of sepsis, early detection is critical.

Hundreds of lives that could have been lost to sepsis have been saved because of our Early Sepsis Alert System; since April 2016, we have been able to save 355 lives.

The work done by our teams at Augusta Health to reduce mortality rates from sepsis has been a collaborative effort. Health Quality Innovators (HQI) named our hospital the Health Quality Innovator for Virginia in the category of Data-driven Care in 2018.

U.S. News & World Report recognized Augusta Health as a Best Hospital in the Shenandoah Valley for 2019-20.

We are very proud of these honors and are happy to have the opportunity to share our work with other facilities around the state so more lives can be saved.

Dr. Penny Cooper, DHSc, is a data scientist at Augusta Health.

Providing real-time patient data enables Early Warning Signs detection

BY SHELLY BOND

When Humber River Hospital in Toronto opened its doors in 2015, the facility was widely recognized as North America's first fully digital acute-care hospital. Built from the ground up to replace several aging campuses, the leadership had a vision and the community support to realize it – an enviable position in healthcare.

Prior to the pandemic, its leaders regularly showcased their infrastructure innovations to colleagues from around the globe who were keen to roll out similar innovations in their facilities.

But fast forward to today's environment, and fortunately Humber's investment in futuristic technologies and streamlined workflows proved crucial in helping to pivot and adapt to the severe stresses of the COVID-19 pandemic.

"At the time, we imagined in maybe a few years we'd be eclipsed by other facilities deploying similar leading-edge solutions to advance patient health," said Kevin Fernandes, chief technology officer at Humber River. "But in reality, that hasn't happened, and we've remained on the frontline serving our patients, community and empowering our staff

with technologies and clinical workflows."

Key to Humber River Hospital's success in navigating many complex deployments was the creation of its own customized technology ecosystem. By leveraging its partnership with Ascom, Humber River is providing real-time patient data that enables Early Warning Signs detection. These real-time notifications are sent directly to Ascom mobile devices, enabling clinicians to receive real-time alerts and alarms, thereby facilitating time savings when minutes are critical for life-saving interventions. These include:

- Code events: Ascom integration with nurse call provides real-time notification to caregivers of all hospital-wide code notifications (blue, pink, red and white) via their personal handset, reducing disruptive overhead paging significantly;
- Sepsis Advance Warning monitoring: solution retrieves sepsis information on a configurable polling interval by an Http request and communicates a sepsis event alert in real-time that is then delivered to an assigned caregiver in Ascom Unite Assign;
- Fetal Alert monitoring: delivers alerts directly to the clinician's Ascom mobile device in a solution that is currently unique and first of its kind worldwide;

• ECG and waveforms delivered in real-time directly to the clinician's Ascom mobile device;

• Nurse call integration provides real-time communication between caregivers and patients for improved clinical efficiency and a more positive patient experience;

- Humber Command Centre: Ascom integrates with the Command Centre to publish Unite staff assignment information and active code events; and
- RTLS integration: Ascom nurse call intelligent integration with Elpas RTLS automatically

turns on dome lights outside of the patient room as a caregiver enters, enabling co-workers to know at a glance that a patient is being attended to.

"Our patient-centric model gives us the line of sight to improve our operational efficiency," said Fernandes. "We can intervene quickly when there are signs of sepsis and critical early warning alert notifications."



Shelly Bond

Ascom's partnership with Humber River Hospital provided the foundation to jointly build a sustainable technology ecosystem that provides early warning alerts for serious disease, as well as real-time integration. Moreover, the organization continues to blaze new paths.

"Working with Ascom enables Humber to innovate," said Fernandes. "One such innovation is the new Fetal Alert Notification solution. This first of its kind workflow is expected to generate positive patient outcomes by integrating end-to-end with Ascom's Myco mobile devices."

Ascom is also committed to raising the quality of healthcare by partnering with leading-edge hospitals like Humber River. For its part, Ascom can provide the tools, technologies and support needed to create advanced communication and alerting ecosystems.

For Humber River Hospital, the early planning and investment in mobile solutions have been well worth it: At a time when healthcare frontline workers are often exhausted, and hospitals are at near capacity, solutions that improve patient care and simultaneously enhance staff satisfaction and retention are extremely valuable.

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