

# System Versus Sepsis: UCHealth Aims to Save 120 Lives

By Tyler Smith

In late August a large group of hospital and physician leaders from around University of Colorado Health assembled at University of Colorado Hospital. They were there to discuss joining forces to battle sepsis, a systemic inflammatory response to infection that is the nation's number-one cause of death among hospitalized patients.

Roughly two-thirds of the way through a detailed presentation, Stan Gunstream, MD, vice president and chief quality officer for UCHealth North (Medical Center of the Rockies and Poudre Valley Hospital) showed a bar graph that compared fiscal 2014 sepsis mortality rates for Denver Health to the rates for each of UCHealth's hospitals.



*William Neff, MD, chief medical officer for University of Colorado Health, considers the sepsis initiative an important example of the advantages of system cooperation.*

The numbers were cause for concern. The sepsis mortality rates for UCHealth hospitals were roughly 2 to 6 percentage points higher than the rate for Denver Health, Gunstream said. He put the

cold data in human terms: if the system's hospitals each matched Denver Health's mortality rate, the lives of 119 patients potentially could be saved in a single year.

That sobering statistic frames a "sepsis initiative" at UCHealth that aims to raise awareness of the condition among providers, equip them with the knowledge to recognize it earlier, and implement the most effective, evidence-based protocols for treating it (*see box*). A system-wide executive steering committee convened Oct. 14 to address the next stages of the initiative.

**Surviving and saving.** There is great urgency: the percentage of inpatients with a sepsis diagnosis climbed steadily between 2011 and 2014 at each of UCHealth's hospitals, as did the average monthly volume of sepsis cases.

Nationally, the inpatient mortality rate for sepsis is greater than the rate for pneumonia, cancer, stroke, and heart disease combined, according to the National Hospital Discharge Survey. The Agency for Healthcare Research and Quality reports that the national cost of sepsis care quadrupled between 1997 and 2010, from \$4.3 billion to \$17.1 billion.

There is much work to be done on UCHealth's initiative, but the touchstone is to standardize best practices for sepsis care across the system in the name of saving lives that might otherwise be lost, said Derek Birzniaks, process improvement director for UCHealth.

It's important that a septic patient get the same quality of care no matter which UCHealth hospital door he or she enters, Birzniaks said. But standardization is not a synonym for complete uniformity, he added.

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"We are setting the expectation for reducing the sepsis mortality rate at the system level," he said. "Our marching order is to save 120 lives a year. But there will be local solutions to meet those expectations."

**Strength in numbers.** An important part of the work will be using the combined expertise of providers from all three areas to identify barriers to timely care of sepsis patients, said William Neff, MD, chief medical officer for UCHealth.

"We need to see what's keeping us from lowering the mortality rate and address the issues proactively," he said. For example, making the timely administration of antibiotics consistent across the system could alone improve care and save lives, he said.

Neff emphasized that the sepsis mortality rates at UCHealth hospitals generally compare favorably with those of other hospitals.

The University HealthSystem Consortium (UHC) collects data on the "sepsis mortality index" for its 216 member hospitals. The index is the ratio of observed to expected deaths. In simple terms, a score of 1 means that all patients expected to die for a given condition did so. A score lower than 1 means at least some patients who statistically would be expected to die did not; a score above indicates the reverse.

The index was less than 1 for sepsis patients at UCH, Poudre Valley Hospital, and Medical Center of the Rockies in fiscal year 2014, and it declined between 2010 and 2014 at all of them. But once again, the index for Denver Health was significantly lower, despite that hospital having a case mix index – a measure of the overall acuity of the patient population – that was equal to or higher than any UCHealth hospital. Denver Health ranked 12th among UHC hospitals on the sepsis mortality index. The highest ranking for UCHealth was 41st, at University of Colorado Hospital.

"Good is not good enough," Neff said. "We need to be great."

**Pulling together.** The system-wide sepsis initiative does not mean that individual hospitals haven't paid attention to the problem. For example, UCHealth North last year implemented a "rapid improvement event" to beef up screening patients for sepsis in the emergency department, said Rebecca Kubala, RN, a clinical quality improvement specialist.

Nurses triage patients and call "sepsis alerts" that involve nurses, physicians, and the clinical lab if patients meet a combination of key criteria. These include infection or suspected infection, changed mental status, and vital signs that are out of range. The Epic electronic health record (EHR) aids in the process, triggering a best practice alert if a patient meets the criteria.

The efforts have helped North's hospitals implement changes to get possible sepsis patients cared for more quickly. For example, the EDs now stock antibiotics so they can be administered within an hour to a septic patient, and exam rooms have point-of-care testing for elevated levels of lactate, a key indicator of sepsis.



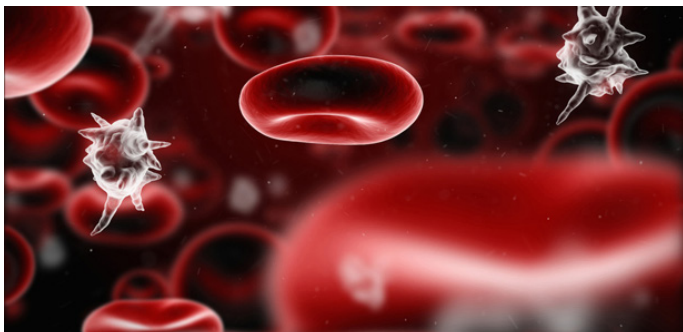
*Robert McIntyre, MD, medical director of the Surgical Intensive Care Unit at UCH and a member of the team crafting UCHealth's sepsis initiatives, discusses the condition during Surgical Grand Rounds Oct. 6.*

At University of Colorado Hospital, providers created a "presumed severe sepsis pathway," which provides a map of care for providers. The hospital began working on standardized care for sepsis patients to reduce mortality rates early in 2011 with the formation of a [Sepsis Task Force](#) led by critical-care nurses and physicians.

**Moving targets.** The challenge going forward is to identify the best of these individual efforts and create standards that have the best chance of success in each area of UCHealth. But that's a deceptively difficult task, said [Robert McIntyre, MD](#), medical director of the Surgical Intensive Care Unit at UCH.

"There is benefit to having uniform protocols across the system," McIntyre acknowledged. Across-the-board improvements might include using the Epic EHR to assist with clinical decision making, developing consistent order sets, and evaluating processes of care and their impact on outcomes, he said.

But McIntyre cautioned that standardizing care does not mean setting processes in stone. A dozen years ago, he noted, the [“Surviving Sepsis Campaign”](#) recommended a bundle of care steps, supervised by a trained team of physicians and nurses, that focused in part on regularly measuring central venous pressure (CVP) and central venous oxygen saturation. One study showed the approach, called Early Goal-Directed Therapy (EGDT), decreased sepsis mortality compared to standard care that didn’t follow a protocol.



A subsequent trial, dubbed [ProCESS](#) (Protocolized Care for Early Septic Shock), however, compared 60-day mortality rates among three groups of patients: those randomly assigned to EGDT, to a team-directed protocol that did not mandate placing a central venous pressure catheter, or to bedside providers who didn’t belong to a team and didn’t follow a protocol. There were no differences in mortality rates between the three groups, the study concluded.

**Firm but flexible.** In McIntyre’s estimation, the ProCESS trial showed that maintaining central venous pressure and central venous oxygen saturation are not mandatory elements of a sepsis-treatment protocol, although they should be used selectively depending on an individual patient’s condition. The trial also showed, he said, that the usual care provided sepsis patients improved significantly as providers gained more experience over the course of a decade in treating the condition and absorbed practical lessons.

“Through years of research we’ve learned that it’s early recognition of the severity of sepsis, aggressive early fluid resuscitation, early administration of broad-spectrum antibiotics, and constant reassessment of the interventions that are most effective,” McIntyre said.

In the end, he added, a protocol based on the best available evidence is useful, but it should never be a substitute for a provider’s best medical judgment or override evidence. “We should develop protocols but not mandate steps such as placement of a CVP line,” he said.

**Keeping score.** Similarly, developing a system for scoring sepsis could help a provider make clinical decisions, but it doesn’t replace critical thinking, said [CT Lin](#), MD, medical information director for UCHealth.

Lin said he and other system leaders are in the early stages of considering implementing in Epic a “Modified Early Warning System” (MEWS) for sepsis. It’s essentially a scorecard of measures that are indicators of sepsis, such as heart and respiratory rates, blood pressure, temperature, and urine output. A score above a designated cutoff might trigger a call to a “rapid response team,” similar to the sepsis alert at UCHealth North or to a trauma activation team in a trauma center.

The MEWS/rapid response team approach is strongly supported by the [Institute for Healthcare Improvement](#), and the concept is tempting in its apparent certainty. But Lin cautioned that a MEWS doesn’t provide magic answers.

For example, he said, there is probably no one-size-fits-all MEWS because hospitals vary widely in their locations, workflows, cultures, and geographic locations. One example: oxygen levels in patients at Denver hospitals versus those at sea level. “There are lots of potential confounders that could make a score unhelpful,” Lin said.

In addition, a MEWS is only a warning: it sounds the sepsis alarm, but it’s not a definitive diagnosis. That fact raises thorny questions, Lin said.

“If the MEWS score detects every patient that is at risk of developing sepsis, great, but what if for every true positive, there are 100 false positives?” he wrote in an email. Even a far lower number of such “electronic false alarms,” he said, might negate the benefit of the tool.

“We really want to make a difference in sepsis, but it is far from clear how best to do it,” Lin concluded.

**Devils in the details.** Kubala said that working through the data at UCHealth North to determine how many patients whose symptoms triggered a sepsis alert actually were septic is still “a work in progress.” She acknowledged that some patients who received antibiotics may not actually have had the condition – making antibiotic resistance an unintended and undesired consequence of the alerts.

But she maintained the consequences of waiting too long to start care outweigh those risks. Patients with sepsis can go downhill very quickly and mortality rates skyrocket for those who go into septic shock, which is characterized by organ failure and dangerously low blood pressure, she noted.

“You have to be able to identify who these patients are early; otherwise, you’ve burned valuable time,” Kubala said. “Patients might not look sick at first, but it’s an evolving process.”

These and other issues will make it a challenge to lower the system’s sepsis mortality rates, McIntyre said. And he added that even a finely crafted protocol won’t immediately root itself in system culture. It can take years for treatments established as effective in studies to become “widespread, generalizable practice,” he said.

But these are the kinds of problems that the system may be best equipped to handle, McIntyre added.

“We can use the investments we’ve made in process improvement and the electronic health record and maximize the resources we have to help us,” he said. “Changes I make in the SICU at the hospital may be impactful, for example, but now we can fully deploy resources to make those changes at the system level.”

## Taking on Sepsis

A few scary numbers on the threat of sepsis, courtesy of Stan Gunstream, MD, of UCHealth North:

- » 78 percent of ER sepsis presentations are walk-ins – not ambulance arrivals
- » Sepsis accounts for 2 percent of hospitalizations, but 17 percent of deaths
- » Sepsis increases mortality 4 times over other patients with other conditions
- » Septic shock increases mortality 33 times
- » Sepsis cases account for the greatest hospitalization expense

Elements of evidence-based bundles of care to be completed within three hours for patients with severe sepsis:

- » Measure lactate levels
- » Obtain blood cultures prior to administration of antibiotics
- » Administer broad-spectrum antibiotics
- » Administer appropriate amounts of crystalloid for hypotension