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## **Tele-Treatment Monitoring From Afar, 'eICUs' Fill Medical Gap**

By Liz Kowalczyk  
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On a recent Saturday night, Dr. Craig Lilly studied a wall of video screens, monitoring the heart rates, urine output, and breaths per minute of fragile patients in the intensive care unit. One patient was clearly in trouble.

Franklin Sisler, a retired Air Force master sergeant, was suffering from an aggressive infection in his left knee that had reached his lungs. A blue line tracking Sisler's kidney function was climbing, a warning that his organs were failing, and Lilly decided he needed an operation right away.

He advised a junior doctor to give Sisler more fluid and antibiotics immediately, call in an infectious disease expert, and make sure Sisler got the next available surgery slot to clean out his knee. "It might make the difference between him walking out of the hospital or not," Lilly told a colleague.

Lilly is an intensive care specialist, but he was seated not in the intensive care unit, and for that matter, not even in Sisler's hospital. Rather, he was working out of a low-rise office building in downtown Worcester - 3 miles from where Sisler lay at UMass Memorial Medical Center.

From this carpeted, fluorescent-lit support center, called an "eICU," Lilly and nurse practitioner Joanne Lewis were supervising the care of 109 of UMass Memorial's sickest patients, scattered among eight ICUs at three of the system's hospitals. They are part of a new program that aims to cope with the soaring number of ICU patients, a problem exacerbated by a shortage of intensive care specialists.

There are 20 percent more ICU beds nationwide now than there were 10 years ago, and too few doctors trained to care for the patients filling them. The vast majority of hospitals do not have an ICU specialists working at night or on weekends, despite studies showing that when intensive care doctors manage or help manage ICU patients, the patients' chances of dying in the hospital decrease by 30 percent.

UMass Memorial Health Care is the first hospital network in Massachusetts to build an eICU, which it opened in February; there are about 40 nationally.

The emergence of eICUs shows that so-called "telemedicine" has reached a point where specialists trust it enough to make real-time treatment decisions for the sickest patients.

“This is a technology that enables us to practice better medicine,” said Wendy Everett, president of the New England Healthcare Institute, a nonprofit research organization in Cambridge that wants to expand eICUs across the state and plans to study whether they improve survival rates for patients and reduce medical costs.

Some US hospitals using the approach since 2000 have seen significant decreases in patient mortality when intensive care doctors supervise care from a central command center, compared with having no intensive care specialists among the doctors on duty. But others report little difference in the outcomes. No studies have compared patient outcomes in hospitals using eICUs with hospitals staffed around the clock with on-site intensive care doctors.

“Whether this model is as good as having someone there who can put their hands on the patient is unknown,” said Dr. William Hoffman, director of the cardiac ICU at Massachusetts General Hospital.

One significant concern raised by the New England Healthcare Institute in a report last March is whether the high cost - UMass spent more than \$8 million to equip its program - means the technology won't reach the hospitals that need it the most: small, struggling community hospitals.

Another issue: As programs grow nationally, on-site and remote doctors have had to learn to cooperate with one another, in a physical divide that has not always proven easy to bridge.

### **Some Reassurance**

During the week before an ambulance rushed him to UMass Memorial Medical Center's University campus, Frank Sisler, 62, of Orange, became mysteriously sick and eventually stopped eating and walking. By the morning of Nov. 10, he was struggling to breathe and told his wife to call an ambulance.

When Gloria Sisler arrived at the seventh floor ICU hours later, her husband was on a respirator and heavily sedated. “A nurse told me he was critical, and they felt he was getting worse,” she said in an interview later. She called their two daughters, and summoned them from their homes in California and New Mexico.

The residents, or doctors in training, in the ICU diagnosed Sisler with respiratory failure, kidney failure, pneumonia and sepsis, all possibly the result of a staph infection. Sisler's wife sat by his bed, as the residents and nurses set his respirator to ensure he was receiving enough oxygen, pumped in intravenous antibiotics, and took EKG readings of his heart.

The monitors instantaneously transmitted the treatment settings and results over a secure data line to computers in the eICU. Lilly also could see Sisler's electronic medical record,

including nurses' notes and blood test results, while video conferencing equipment allowed him to use a camera to zoom in on the patient and gauge his color and level of consciousness.

Traditionally, residents at teaching hospitals have called senior doctors at home at night to review serious cases and take orders; sometimes those doctors head into the hospital. But Lilly said that the advantage of the eICU is that he has far more information about the patient than a doctor would have at his or her house. Lilly, with 25 years of experience as an ICU doctor, agreed with the findings and treatment of the on-site staff in Sisler's case, but said his role was to speed up the process and reassure the family.

"We were just going to put the patient on a little faster track," Lilly said later.

At about 8:20 pm, nurses told Gloria Sisler that Lilly would further explain the plan for her husband's care through a speaker in the ceiling. "It sounds like you've had a pretty rough night of it," Lilly said.

"It's been a rough few days," she responded, looking at her husband and holding his hand.

At 10 p.m., Sisler went into surgery.

Gloria Sisler said in an interview a few days later that she was reassured by the extra set of eyes, even if she could not see them herself. The company that makes UMass's system, Baltimore-based VISICU, is planning an upgrade to the system that would permit a two-way video feed, which means patients and their families would not just "hear a voice coming out of the wall," as Gloria Sisler described it.

The Sisler family met Lilly last Tuesday morning when he was on regular duty at the hospital. Doctors at UMass rotate between the eICU and the hospitals. Sisler's kidney function had improved, and he opened his eyes for a few seconds at a time. He squeezed the hands of his daughters, Tena Davidson and Nena Garcia. Garcia began to cry.

## **Results Scrutinized**

When the New England Healthcare Institute evaluated internal and published results of eICUs early this year, the organization was cautious. Only one hospital system, Sentara Healthcare in Virginia, had published significant improvements: Mortality fell 25 percent, length of stay in the ICU fell 14 percent, and operating costs dropped 25 percent after the system opened an eICU, partly because the ICUs could move patients through the ICUs faster.

And even at Sentara, the medical ICUs, where 80 percent of admitting doctors allowed remote intensive care doctors to be involved in patient care, have shown far more dramatic improvements than the surgical ICUs, where only 35 percent of surgeons accepted help. But since then, Everett said, the results at UMass - which Lilly declined to

release because he plans to submit them to a medical journal - are so good that the institute is trying to recruit community hospitals outside the system for the eICU. They would pay a fee to UMass for the service.

Earlier this month, UMass hooked up the first community hospital in its network, UMass Memorial Marlborough Hospital, and plans to add UMass Memorial HealthAlliance Hospital in Leominster and UMass Memorial Wing Memorial Hospital early next year.

Immediately, the eICU doctors and those at Marlborough were forced to confront the divide. A man experiencing complications after colon cancer surgery was transferred to the hospital's 10-bed ICU at night. His blood pressure plummeted, which Lilly saw on his monitors in the eICU. Lilly called the ICU and asked the doctor on duty to triple the amount of fluid he was giving the patient. The doctor disagreed, concerned that the extra fluid would fill up the patient's lungs and cause breathing problems, but eventually relented. The patient improved.

"The biggest benefit for us is we're going to be able to hang on to sicker patients who we might normally have had to transfer out," said Dr. Kim Robinson, Marlborough's lone intensive care doctor, who works during the day.