



Terri Jennings

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A Simulation of Life

When OU medical students practice their treatment techniques, this ideal patient never complains.

A patient headed to surgery for a hernia repair watches the florescent lights move above him like cars on a highway. He suddenly feels the breath leave his body as his chest tightens. He tugs the white coat of a medical attendant, but before the attendant can respond, a screeching alarm sounds from a machine monitoring heart rate and blood pressure. The patient is unconscious, and fourth-year medical students are left to save his life.

The students awkwardly wait for one of their number to take the lead, then start talking over each other giving instructions. Within moments they find a rhythm as they learn to control their own adrenaline. Their response soon becomes a choreographed dance as the student who emerges as the leader gives orders to the others while monitors beep in warning or soothing tones. In a wave of aqua scrubs, one student checks for a pulse and then starts CPR, while another prepares a breathing tube to be inserted in the man's throat and yet another prepares a syringe filled with medication in case it is needed. They all observe the monitors, then begin dispensing medication to this 40-year-old man whose life is in their hands.

Even if the man is saved, soon the students will grab their backpacks and head for the next class, turning the lights off on their patient and locking the door behind them. The patient breathes, his brown eyes dilate and veins pulse beneath his skin, and although an anesthesiology machine thinks the patient is alive—he is not. The so-called patient is a Human Patient Simulator, a high-tech mannequin used to teach and assess the clinical skills of medical students and residents.

"I wish that these tools and methods had been available when I was a medical student," says Dr. M. Dewayne Andrews, executive dean of the University of Oklahoma College of Medicine and vice president of Health Affairs. "It would have provided a more organized and systematic approach to learning about these things and help reduce the uncertainty and anxiety level students naturally have."

The Human Patient Simulator is a new addition to the College of Medicine's Medical Simulation Center, where stu-

dents can practice their clinical skills on models before they perform them on real patients. Models of arms and hands are used to insert an IV or draw blood. Mannequin heads are used to insert breathing tubes. An E-Pelvis, donated to the college by OU alumnus Dr. LeRoy Heinrichs, is connected to a laptop computer and sensors, providing professors with information about how well a student conducts a pelvic exam.

The star of the lab is the Human Patient Simulator, which students will start using this spring. The simulator is attached to oxygen tanks and breathes—his chest rising and falling with each breath—which is why an anesthesiology machine cannot tell the difference between it and a human. The simulator, which even shows Sooner pride with a crimson OU tattooed on its right arm,

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has interchangeable parts, permitting instructors to change the head and genitalia, allowing the patient to simulate a woman.

The simulator is designed to give students the most realistic view possible of how to treat a patient without having to

Third- and fourth-year medical students run a “code blue” scenario on the Human Patient Simulator, practicing with a defibrillator for the first code they will encounter as interns when an actual patient’s heart stops.

Fourth-year medical student John Ronck injects medication into the Human Patient Simulator to return its heart rate to normal. Ronck scans a bar code on the syringe, which is actually filled with saline, so the computer can assign the injection a specific medication and amount. Dr. Chris Candler, associate dean for education and the director of the Office of Educational Development and Support in the College of Medicine, controls the scenario with a computer.



Terri Jennings

practice on a real human. The ultimate goal is to have students graduate from the college more confident and prepared to treat human patients.

“It will have a definite positive effect,” Andrews says. “This will be useful in residency training as well as medical student education, especially for certain specialties. The Human Patient Simulator allows us to create situations that range from very simple to very complex. Whenever residents possess greater knowledge and skills, especially in some of these procedural areas, patient care is going to be better.”

In essence, the Human Patient Simulator is like a baseball player taking batting practice. A professor acts as the pitcher behind an Apple computer instead of a dirt mound. Just as in a real emergency situation, students have no idea what will be thrown their way. The computer can present hundreds of different scenarios, and the professor can control how the simulator will respond to students’ work.

A large red toolbox near the simulator is filled with a variety of syringes labeled with the names of medications. Although the syringes are filled with saline, each one carries a bar code, and the simulator

will respond to the saline in the same ways a human responds to medications. Students scan the syringes before they inject the saline into the simulator; a wrong choice could send the “patient” spiraling into cardiac arrest while the correct choice could help bring the heart back into a steady rhythm.

“With the simulator we can see the effects the drugs have in real time,” says Paul Dillon, a fourth-year medical student from Norman. “We could actually look at the monitor and see the patient was responding appropriately. You could tell right there on the screen if you did it right.”

Many features make this simulator lifelike. Its eyes react to light, and the tongue can be made to swell, throwing a curve ball that students could face in actual practice. Students can strike out if they knock out the simulator’s teeth while inserting an intubation tube, the procedure used to place a breathing tube down a patient’s throat. The same thing can happen to a living patient if a doctor is too rough with the metal scope used in the procedure.

An experience beyond textbooks

The simulator provides new challenges for students, who in the past have been

tested by remembering textbook scenarios.

“The physical and the mental worlds are combined,” says Taylor Lancaster, a fourth-year medical student from Tulsa. “You have to think and do rather than just do. You really have to be a well-oiled machine rather than just textbook regurgitating.”

Students face complications with the simulator they would not ordinarily face in textbook scenarios. If the tongue should swell, for instance, the simulator may not respond to the first dose of drugs it receives, or its vocal cords may spasm, providing new challenges for students to master.

“In the textbook, there are no problems with intubating,” Lancaster says.

Code blue

One of the best experiences students can gain from the simulator is how to “run a code,” a scenario where a patient stops breathing, and his or her heart rate is sporadic or stops completely.

“You hear the interns talk about their first night on call,” says John Ronck, a fourth-year medical student from Enid. “The pager goes off. They think, ‘Who’s in charge here?’ Then they realize, ‘I guess that’s me.’”

Since every code is not the same, nei-

ther are the code programs in the simulator. “There are endless scenarios,” Ronck says. “You’ll have a little bit more confidence going into your first code.”

Working to save a life that is fading is a powerful experience, and the first time is not easily forgotten, no matter how many patients a doctor treats, Lancaster says. “A code is a physically intensive situation, and I bet you every physician can tell you when their first code was.”

In a crisis situation with a real patient, there are no second chances to get a procedure right. If a student or resident cannot perform the procedure quickly or accurately enough, the attending physician must step in. To use another baseball analogy, the simulator provides practice swings so students and residents will gain even more experience before they begin working with people.

“I think it helps with your procedural skills,” Ronck says. “The first time I

intubated was on a real person. It would have helped to have had the practice. That’s huge. (With the simulator) they’re not (fading) in front of you while the attending is behind you yelling.”

A wave of the future

More schools are looking to use simulators, but currently OU is one of only a few universities in the country with a Human Patient Simulator, says Dr. Chris Candler, associate dean for education and the director of the Office of Educational Development and Support in the College of Medicine.

Medical Education Technologies Inc., which designed the simulator used by OU, also manufactures simulators of children as well as mobile simulators used to train paramedics. The military uses the simulators to train medical teams, and there is even a scenario to treat a victim of a land mine. According to METI’s Web site, military personnel at the Fort Bragg,

cal skills they learn from textbooks and instructors, professors know it cannot totally replace the human experience. The computer stores pictures of imaginary patients with each case simulation, but it does not tell whether the patient is a single father of two children or a newly married bride.

“Always in the back of your mind, this is just a simulator,” Dillon says. “No matter how realistic they try to make the situation look or feel, it’s a simulator. The only thing it doesn’t have is a family standing around or an attending (physician).”

While the simulator does an incredible job of emulating the human body, some things cannot be replicated. The simulator can produce urine, but it cannot produce saliva. Before an exercise, vegetable oil is sprayed down the throat of the mannequin to coat its plastic skin for a breathing tube.

A speaker in its head allows an instructor to speak through a cordless microphone and act as the simulator’s voice, telling students he is in pain. But the simulator does not wince in pain as students are performing assessments, and there are no tears of fear or message requests to pass on to families.

“It’s not the same rush as being there,” Lancaster says. “It’s still very mechanical. It’s still very dehumanized. Rubber and steel and plastic are not a good comparison to flesh and bone. People are floppy. This (simulator) is very stiff.”

Some lessons only a human patient can teach, such as developing personal skills and professional behavior, Candler says. “You can only experience it with live persons. With the technology we have today, the amount of realism is still limited. It still comes nowhere near being a human being.”

Although the simulator may not be a perfect replica of a human body, Lancaster and Dillon insist the experience it provides is invaluable.

“That little bit of confidence is going to make the difference,” Dillon says. “It’s going to pay dividends in medical school education.”

“This is something that’s long overdue in my opinion,” Lancaster agrees. “This is something that should be—and thankfully is—part of my education.” 🍷



Terri Jennings

Paul Dillon practices placing an IV needle into a model hand at the Medical Simulation Center. A variety of models allow medical students to sharpen their skills before working on actual patients.

North Carolina, army base are using the Human Patient Simulator in operating room scenarios and in settings of a virtual hospital.

What technology cannot emulate

While the simulator provides a chance for students to step up to the plate and repeatedly practice the clinical