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## Military Medical Technology

ONLINE EDITION

### Fake It Until You Make It



**The use of medical simulators has taken military medicine to the next level. In many circumstances procedures can be replicated and repeated using state-of-the-art hands-on simulators.**

**By Kenya McCullum**

Medical training—whether it is for medics being deployed to Iraq or Afghanistan, doctors at military medical centers stateside, or nurses treating veterans at a VA hospital—has come a long way, and through the use of technology it has promise to get better and better.

Many long-time military health care professionals remember the bad old days of their training, back when students primarily memorized the material they were learning, which came from textbooks and slides—an approach that unfortunately created a huge disconnect between theoretical knowledge and practical applications. When students did get the opportunity to hone their abilities through practice, they worked with each other in a very unrealistic way—one student would be moulaged with fake injuries to mimic the look of being wounded, while describing a set of symptoms for the other student to use as a guide for determining what ailment the “injured” soldier suffered from. When students weren’t engaged in these verbal exercises, they practiced certain simple procedures—like administering an IV—on each other.

Though this type of training did produce many excellent military medical practitioners, the use of medical simulators—realistic teaching tools that are designed to look, and to some extent behave and feel, like real human patients—has made medical training, and as a result the trainees, even that much better.

And since the current state of conflict demands more rapid deployment than ever before, better training is critical in order to fully prepare military medical practitioners for the realities they will face.

“A soldier can never be well enough trained. Medical skills are perishable and if you don’t work on these medical skills on a regular basis, you can lose them. The military will not go to war without medical skills and part of our mission is to sustain the fighting force—and we can’t do that without training. Medics are going almost straight from the schoolhouse to the battlefield, and these skill trainers become important because somewhere along the line, they will have to come in contact with a patient,” said Karla Currie, government accounts manager at Laerdal Medical—a company that manufactures several models of medical simulators that are being used by military personnel. As a former Army medic and medical trainer, Currie remembers very well the days when students stuck needles into each others arms and how tentative many of them felt when they did get the opportunity to work on actual patients. Thanks to medical simulators, however, this uncertainty has decreased exponentially.

“The confidence level goes way up when it comes to treating patients. A lot of times you see these medics get on these simulators, and at first they’re almost afraid to touch them,” she said. “But their confidence level goes way up, and then they start developing confidence in their own skills so they can treat patients that much better. If they have confidence in themselves, then the patients will have confidence in their abilities.”

This level of confidence is especially important as medical practitioners attempt to lower the amount of fatalities caused by the three most common preventable killers on the battlefield: collapsed lungs, airway compromises and bleeding.

### **The Real Benefits of Faking**

In addition to substantially increasing the confidence of students, the use of simulators has many other benefits for students, including the critical thinking skills they gain as they master the technology. And students using simulators during training are given many opportunities to practice a certain procedure, which—like repeating any other physical tasks—creates a muscle memory that will be used by a medical practitioner time and time again.

“The first time you tied your shoes, you weren’t quite sure how to do it; you had to practice a few times, and after a while it was just muscle memory. You don’t think about how to tie your shoes, you just do it,” said Ronda Peck, a simulator operator at the Fort Sam Houston Army base in San Antonio. “We’re glad that patient simulators can provide a type of checklist that students go through as they’re assessing and doing their interventions with a manikin, so that they can improve on muscle memory.”

The use of medical simulators has also made medical training across the board more uniform and realistic—with students from one simulation center to the next learning not only the medical skills they need, but how it actually feels to save lives on the battlefield. Trainers create numerous scenarios for students to practice with—such as in a darkened room filled with smoke, the sounds of bombs being blasted over loudspeakers, and several simulators placed around the room with different afflictions that teams work together to assess and treat, which also teaches the importance of working together as a unit. Although, of course, students realize that they are working with simulators in the safety of their training centers, this technology plays a large part in helping the students suspend as much disbelief as possible so that they soon feel like they are really attending to wounded soldiers.

And this level of realism, most importantly, makes the students just that much more competent

when it is time to work on actual patients—in fact studies show patient safety increases by about 30 percent when they are treated by students who trained on simulators, because the more mistakes students make during training, the safer the medical practitioners' future students will be.

"It's much better to have students kill a simulator than kill a patient to learn a specific task," said Stephen Barnes of the Air Force Center for Sustainment of Trauma and Readiness Skills. "Nothing we do in medicine is without risk and we all learn by repetition, so the opportunity to make errors in a simulated session should ultimately reduce the number of errors made in the real world."

While simulators have numerous benefits, the current technology still has some limitations that can create challenges for military health professionals. For example, those being trained in the Air Force can only be trained on the ground, as there are no simulators that have been approved for flight at this time.

"That is something we believe that we need because right now we use the simulators on the ground to train clinical skills, technical skills and equipment skills," said Barnes. "As soon as we get in the back of the aircraft where we truly recreate the environment students will have to practice medicine in, we no longer have the simulators, so there is no feedback to the student."

Additionally, the current medical simulators being made do not allow students to practice many kinds of surgery, so after students learn these procedures in the classroom, they rely on the classic "see one, do one" apprenticeship model where students learn most of their skills by watching a doctor perform the surgery on actual patients, and then they practice the procedure on other patients themselves.

Another issue that arises from the use of simulators is that, although trainers notice improvements in the students' performance, it's difficult to gauge how much of it is due to familiarity with the skill being trained versus familiarity with the simulator.

"One of the difficulties with simulation is when you see improvement in performance. How much of that improvement in performance is based on the student learning how to play with the simulator, and how much of it is actual learning of a clinical skill? Is your response time and recognition time of a problem in a simulated flight based on your increased comfort level with the simulator or did we actually increase your knowledge base to become a better physician in the back of a plane? It's very hard to determine," said Barnes.

## **Types of Simulators**

The most fundamental type of simulator that is popular for training military medical personnel is the partial task simulator, which is a representation of one region of the body that allows students to practice the tasks that are performed in that specific area of a patient. One company that supplies these kinds of simulators to the military—as well as to civilian medical professionals—is Limbs & Things Ltd., which has been selling these hands-on educational tools since 1990. Their products—which are made from rubber, silicone, and latex—are designed to teach skills including basic surgical skills (from products such as the company's abdominal opening and closure training kit); clinical skills (from products like the injection trainer, female pelvic examination trainer, and the prostate and rectal examination trainer); minor surgery (from products such as the suture tutor and local anesthesia pad); and basic surgical skills (from products like the abdominal opening and closure trainer and the knot tying trainer).

In addition, Limbs & Things product manager Lindsay Smith said that because there are not

necessarily enough OBGYNs that are readily available on the battlefield, there is an increased need for more gynecological skills training. As a result, there has been much more demand for birthing products that the company supplies to the military, including items like episiotomy repair kits, birthing simulators designed to teach students how to perform complex deliveries, and an open hysterectomy trainer.

The next level of simulator is the full body simulator, which are produced by companies such as Laerdal Medical and Simulaids, Inc. Products such as Laerdal's SimMan or Simulaids Deluxe CRiSis manikin allow students to improve their patient care skills on realistic devices that can behave much like a real patient—including responses such as bleeding, breathing and eye movements. This is especially important during training because it allows students to have a certain level of autonomy as they learn a procedure. They are able to use their critical thinking skills to determine what is wrong with their "patient" and then tell the instructor—rather than the instructor telling the student what the simulator's vital signs are, and what they should be doing and looking for. Although students generally train on the adult models of these simulators, there are also smaller ones available for them to learn how to treat infants and toddlers as well.

In addition, these products are each connected to a laptop computer that can save the specifics of what the student did to the simulator during a scenario in order for the student to receive detailed feedback during a debriefing when the exercise is finished. This computer also allows instructors to choose from a list of preprogrammed scenarios for the students to participate in, or to tailor their own scenarios based on the specific needs of the students.

However, in a hectic medical environment, sometimes the wires that connect the simulator to the laptop can be inconvenient. In order to remedy this, the next wave of simulation needs to introduce wireless technology—which Medical Education Technologies, Inc., or METI, has addressed in its new iStan simulator. In addition to convenience, this battery-operated simulator has even further increased the product's realism through more lifelike bodily secretions, heart and bowel sounds, and breath. And as simulators advance, the more prepared military medical professionals are when it's time to go into the stressful environments waiting for them after training.

### **The Future of Simulation**

While the current generation of simulators has taken military training to the next level, there is—like with any technology—a lot of room for improvement that will make medical practitioners even that much better. Many experts speculate that simulators of the future will be even more durable, will be designed for students to practice hands-on surgery, and will have an even greater range of motion than those currently available.

In fact, U.S. Army Research, Development and Engineering Command's Simulation and Training Technology Center is currently developing simulators that not have only a more realistic look, but also have more realistic smells to prepare students for that reality of medical practice.

Although simulators have become more and more realistic, they of course will never be a true substitute for what will be experienced on the battlefield or in hospitals and clinics—although they are coming closer and closer to feeling real for students.

"It's going to be tough to fully replicate an actual scenario. However, you can get as close to the real thing as possible, and the way technology is going it's getting to be more and more realistic," said Paul Marshal, Simulation Center manager at the Naval Medical Center in Portsmouth.