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HEALTH

Medical training goes virtual

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NEW BRUNSWICK, New Jersey (AP) -- The days of new doctors practicing on real patients may be numbered.

Today, many doctors in training are making their first diagnoses -- and their first mistakes -- on plastic, wires and computer circuits rather than flesh and blood. These virtual patients come in different shapes and sizes, much like the real ones.

Some are almost lifelike mannequins with plastic ears and hair, veins that can be injected, eyes that can move and interchangeable genitals. They can't be hurt or killed, even though they have a pulse, a beating heart and lungs that breathe. The most sophisticated can be programmed to simulate every imaginable medical crisis and then respond as a doctor works on the "patient."

Other, virtual reality-type simulators combine video or computer images with tactile feedback. Trainees insert needles or surgical tools into a plastic box whose innards give the sensation of cutting flesh or pushing through body parts such as the throat or colon. A video screen shows what a doctor would watch during the procedure, such as ultrasound images.

"Do I think this is a wave of the future? No question," said Dr. Stephen Miller of the American Board of Medical Specialties, which oversees certification for medical specialists. "This is a major goal of the medical education and evaluation system."

The top systems are pricey but so realistic that experts predict they'll become standard for training new doctors and for testing experienced ones who soon will face tougher recertification.

Military medics have trained on simulators

The technology is barely 10 years old, and already simulators are widely used for training U.S. military medics and



Dr. Cynthia Yuan, right, a second-year resident at Robert Wood Johnson Medical School, checks the pulse on the foot of a medical mannequin June 30, as RN Lisa Falcon, assists.

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nurses and medical technicians at many community colleges. At least half of the nation's 120 medical schools already use simulators such as Medical Education Technologies Inc.'s Human Patient Simulator mannequin and Laerdal Medical's SimMan to teach students and residents, or graduates completing training at hospitals.

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"The mannequin is excellent," said Dr. Eric Chang, a second-year surgical resident who has trained in the simulation center at Robert Wood Johnson Medical School in New Brunswick. "This kind of buffs you up in terms of encountering certain problems ... You have to react to what's happening" and select the right treatment.

Cynthia Yuan, a second-year resident in anesthesia, said the mannequin "helps them to think when they're in a real situation. I think they should do more of this."

Medical school professors say simulators help their students and residents build confidence and make mistakes -- before they treat real patients.

"It's an extraordinary advantage," said Dr. Adam I. Levine, director of the anesthesiology residency program at Mount Sinai School of Medicine in New York. "If you have to think through the problem yourself and get your answer, you learn it better."

Students sometimes get so caught up in a training scenario that they are upset if a monitor shows the patient has died. One anesthesiology resident who had sedated a "patient" for surgery, then couldn't insert a breathing tube, frantically resorted to mouth-to-mouth resuscitation, Levine recalled.

"They just were so desperate to come up with a way to get oxygen to this patient ... who was dying in front of them," Levine said.



The lower torso of a Human Patient Simulator lies opened at Robert Wood Johnson Medical School.

Dr. Jeffrey S. Hammond, professor of surgery at Robert Wood Johnson, said advanced simulators offer better surgery practice than cadavers, pigs or dogs.

"I think every school is ultimately going to ... determine this is one of the more effective and cost-effective ways to train students," said Hammond, who is working with colleagues at the American College of Surgeons on national standards for simulator centers.

He notes two studies have shown that surgical residents trained on simulators made fewer errors and operated more quickly than those who got the traditional "See one, do one, teach one" training, in which residents observe experienced doctors, do procedures under supervision and then independently, and later train others.

Simulators pay for themselves

A six-month study just released by Immersion Medical, a top maker of virtual reality patient simulators, shows its Accutouch simulators can pay for themselves in less than six months because trainees can do procedures quicker and make fewer errors.

Still, the simulators are expensive.

Scaled-down simulators cost at least \$40,000 and the most high-tech ones cost well over \$200,000. Because different models teach different skills, putting together a bare bones lab costs at least \$600,000 and a top-notch center can cost \$2.5 million, Hammond said.

Given the cost crunch for medical schools and other training programs, Dr. Stephen Small, director of the University of Chicago's patient safety center, is working to create a regional simulator center for training doctors, nurses and even teaching

paramedics to handle biochemical attacks or other mass casualties.

"The goal is to get people to work as a team under stress ... (and) improve patient care," Small said.

One pioneer in simulator development, Stanford University obstetrics and gynecology professor Dr. LeRoy Heinrichs, is about to open the school's third simulator lab and is working on ways to use the computer-based systems for distance learning. He's also a consultant to Immersion Medical, which recently rolled out a new model for gynecological surgery.

Immersion's widely used CathSim, which combines computer images with an "arm" to insert the needle, makes students go through all the steps of a blood draw, from confirming a patient's identity to pushing the needle in the until they feel the "pop" as it enters a vein.

Even though the rubber forearm and attached box don't look that realistic to professor Jesse Guiles at the University of Medicine and Dentistry of New Jersey, he says his students still get upset if the computer indicates they hurt the patient.

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