

Cambridge group makes medical simulation dreams into reality

By Juliette Wallack, Associated Press Writer | August 14, 2005

CAMBRIDGE, Mass. -- -- The patient isn't doing very well.

His heart rate and blood pressure are dropping. A quick survey of symptoms backs up what a caregiver suspects: the injured soldier needs a chest tube.

It's a fast procedure, but one that involves puncturing his skin and inserting a tube between his ribs, something that leads to profuse bleeding. And for inexperienced medics who do this amid the chaos of the battlefield, it can be daunting.

This time, the intubation is too slow, and a wayward tube punctures a lung. Minutes later, the soldier is dead.

But it doesn't matter. This is happening inside a brightly lit laboratory instead of on a battlefield.

The patient isn't real. It's made of foam and rubber, and a computer program mimics the injury. The blood pouring from the intubation hole is fake, and the punctured skin is synthetic. The ribs, which can be felt through the fake skin, are metal.

No one is dead and no one is injured. Inexperience has not killed a real patient.

Simulation is not new to medical training. For decades, cardiopulmonary resuscitation has been taught using "Resusci Anne" plastic dolls. But the founders of CIMIT, a Cambridge-based consortium of hospitals and universities, are integrating technology and health care to create the next generation of medical simulation, with a focus on battlefield emergencies.

The virtual intubation system -- nicknamed VIRGIL™ -- is just one of CIMIT's innovations, which include simulators to provide training for smallpox inoculations and laparoscopic surgery.

Dr. John Parrish was inspired by his experience as a combat surgeon in Vietnam when he established CIMIT seven years ago.

"I found it very frustrating to not be able to make a difference," he said. "It helped me focus more on developing treatments and diagnostics than trying to treat one patient at a time."

He recruited schools like the Massachusetts Institute of Technology and the Rhode Island School of Design, and hospitals like Massachusetts General Hospital to be part of the program, which operates on an annual budget of \$10 million to \$15 million pieced together from federal dollars, grants and donations. Some of that funding comes by way of the U.S. Army, which contracts much of CIMIT's work.

Dr. Steve Dawson, head of CIMIT's Simulation Group, said realistic technology means first responders aren't training on real patients.

"The whole reason we're doing this is to take patients out of the learning curve and make sure that when your doctor walks up to treat you, they've done this to proficiency, and they aren't going to make big mistakes on you because you're the first one they've ever done," he said.

Besides "Resusci Anne," simulators are already assisting in other facets of medical training. Simulation centers around the country help emergency teams perfect their skills. But those centers are designed for teams that work in controlled settings like emergency rooms. And the centers are equipped with immobile human mannequins that can provide only limited feedback to trainees.

"Their usage is somewhat limited," said Dr. Gerald Moses of the chief clinical applications division of the Army's medical division.

VIRGIL™ is unique because of its mobility and the feedback it gives the trainee. While competitors' simulators are designed for use in mock emergency rooms and controlled settings, CIMIT's mannequin can be taken almost anywhere. And a user-friendly feedback system makes training easier.

A simulator that can't be used on a mock battlefield isn't valuable for training medics, Moses said. That's why CIMIT developed VIRGIL™ in response to the Army's specific needs for combat medic training.

"If a person or a soldier suffers an injury to the chest ... which is unfortunately frequently an occurrence, the insertion of a trauma tube makes all the difference in the world," Moses said.

Combat medics currently train by performing intubations on pigs -- whose cardiopulmonary systems are very different from humans' -- and on the job, where lives are at risk.

For now, VIRGIL™ exists only as a prototype. But it has been used to train doctors in Lithuania and Army medical workers at Fort Sam Houston in Texas. CIMIT is now searching for a partnership with a company that will manufacture and sell the system.

And VIRGIL™ is only the first step for Dawson and his researchers. Using what they learned making the torso-shaped simulator, they're attempting to design a full-body mannequin based on the Army's specifications.

None of the simulators now on the market mimic combat injuries and are transportable enough to be tossed onto a mock battlefield, Moses said.

"It's complicated. That's why it isn't available in everybody's closet right now," he said. But soon, "we're going to have a great training system."