Vermont Air National Guard Lt. Col. David Jones, M.D., uses a mannequin in the UVM Clinical Simulation Laboratory.

It’s a Friday morning in spring and 15 third-year medical students are gathered in the Task Trainer Room at the Clinical Simulation Laboratory in UVM’s Rowell Building. They sit around blue-draped lab tables on which are displayed several artificial limbs — a section of arm bent at the elbow; a hand and wrist model, facing palm up; a knee joint with a fluid bag hanging above. Over the next hour, the students — who are in the middle of their six-week Family Medicine rotation — practice inserting needles into the different artificial joints, part of a lesson on arthrocentesis and joint injection.

The new Clinical Simulation Laboratory brings together different groups of learners, all focused on honing skills and improving the care of patients.
Sim Lab from its counterparts throughout the country. 

The laboratory is a collaborative effort of the College of Medicine, the College of Nursing and Health Sciences, and Fletcher Allen Health Care, with support from the Vermont Air National Guard and a centralized hub that brings together many different groups and constituencies, with the ultimate goal of improving quality and safety of care.

The broad group of users, combined with the lab’s integration of standardized patients into simulations, distinguishes the UVM sim Lab from its counterparts throughout the country.

Creating Learning Experiences

Medical simulation today has evolved from two main developments. The first involved the growth of standardized patient programs, first pioneered at the University of Southern California in the 1960s. The second came from technology that fulfilled the students’ need to practice dealing with abnormal findings, such as abnormal heart sounds, or to learn a skill, such as inserting a chest tube. Computer-based models, mannequins, and virtual reality programs began appearing in the early 1970s. That technology has advanced to the complex computerized mannequins of today, which can simulate nearly every human physical condition.

Practice Makes Perfect

Internal Medicine Chief Resident Zechariah Gardner, M.D. ’05, has seen the impact simulation trainings can have on physicians’ skills. The recent nationwide focus on reducing medical errors has brought renewed attention to simulation as a way to improve physicians’ skills and patient safety. Gardner and Co-Chief Resident Mia Hockett, M.D. ’07, led a group of residents every other week this year in mock code scenarios with mannequins, assisted by staff from the Sim Lab.

Residents are expected to run most of the code situations in the hospital,” Gardner says. “It really helps them to have the opportunity to put themselves through those steps in a somewhat less stressful environment — so that when you actually get into a real code situation, things will come more naturally because you’ve practiced it.”

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type of simulation practice Raferty did — deliberate practice with meaningful feedback — makes a huge difference, Nicholas says. She cites the “4/10” rule: it takes four hours a day of practice for 10 years to become an expert at something, and continued practice to maintain skills or improve. Over the years, there’s been a greater understanding of how people learn and the fact that clinical skills education that relies on time and chance isn’t adequate.

“The benefit of simulation is that we can provide whatever you need, whenever you need it, tailored to the student,” Nicholas says. “So, if every medical student needs to know how to manage a 23-year-old woman with a migraine with aura, I can give you twelve 23-year-olds with migraine with aura on Tuesday at 2:30 p.m.”

Hayato Couta, M.D.-’11, did an intensive rotation as a “sim-tern,” or a Sim Lab intern this spring. He notes that there are many skills, such as lumbar punctures or placing chest tubes, that medical students never get a chance to perform in the past that they will now be able to do on a simulator.

“If you have a simulation with a mannequin it’s not going to complain about your poor technique, it’s not going to ask you how many times have you done this before. You can, in a very low-pressure environment, learn.”

ZeZiCerin, Senior Simulation Specialist at the lab, puts the benefit succinctly. “We help build a muscle memory of success that can then be used in the clinic.”

The need to practice and learn advanced skills is critically important for nurses as well, says Sue Greenfield, Ph.D.- R.N., associate professor of nursing.

“This is due to the increasing acuity of patients in the hospital, and the need for nurses to be able to perform more complex tasks. That’s where simulation comes in. They really need to be able to practice clinical decision-making, critical thinking in a safe environment where they can make a mistake,” Greenfield says.

Nursing students — as well as practicing nurses at Fletcher Allen — use the Sim Lab for trainings. Recently, a group of nursing students performed different clinical scenarios with a high-fidelity mannequin. The 67-year-old male “patient” had been admitted to the hospital with complications of COPD. Two students were assigned to be the primary and secondary nurses; two others played family members. One student approached the patient, introduced herself, checked his pulse and took his vital signs. The mannequin began coughing, while the other two students — playing his wife and daughter — became increasingly demanding. “How long is this going to take?” the wife said. “I don’t think he can breathe.” The student playing the nurse learned how much she could do on her own, and when a respiratory therapist was needed to assist.

The Sim Lab provides opportunities to work in collaborations that parallel real-life medical care, says Michael Ricci, M.D., a vascular surgeon and director of clinical simulation at UVM/ Fletcher Allen.

“We don’t treat patients in silos. When we treat an emergency situation, there are physicians and nurses and students and other support people that are in the room taking care of that patient,” Ricci says. “This collaborative effort in the Simulation Lab gives us the opportunity to practice in the same way we actually care for patients.”

A COMMUNITY RESOURCE

Clinical simulation not only benefits residents, students, and nurses, but also community emergency medical technicians (EMTs) and Vermont National Guard members. (Ricci, who also serves as a colonel in the Vermont Air National Guard, spearheaded the Guard’s involvement with the laboratory.)

“Many of the medical techs don’t have the opportunity to practice patient care during peacetime,” says Sr. Master Sgt. Kathleen Corcoran, an EMT and senior health technician with the Guard. “Doing clinical simulation helps them hone these skills.”

A TASTE OF REAL LIFE

As clinical simulation continues to evolve at the University of Vermont and throughout the country, educators emphasize that simulation trainings must include feedback and debriefing for students to really learn.

“Also, it’s not only the mannequin that creates the optimal learning experience, it is everything else that goes on around it,” Nicholas says.

That environment can include situations that appear very life-like. This is especially true in hybrid simulations, where standardized patients work together with the simulators. “We have a standardized patient who’s the mom of a five-year-old, plastic simulator, and you would think that mannequin is alive, the way she interacts with him,” Nicholas says.

Catherine Minsk, M.S., R.N., a clinical assistant professor of nursing, has seen students responding to the simulators in very real ways. “You watch them. They put a hand on the patient’s hand. They get into it. It’s not just a piece of plastic anymore.”