

UF developing mixed-reality simulators for training in treatment of injured soldiers

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On the battlefield, wounded soldiers depend on how quickly and efficiently medical personnel can treat and stabilize their life-threatening injuries.

To help military medical personnel acquire, practice or maintain these key skills while deployed, University of Florida and U.S. Army Research Laboratory Simulation and Training Technology Center researchers have received a \$1.75 million grant to design, develop and validate a set of portable, rugged simulators to help military clinicians train — no matter where in the world they happen to be. This grant was funded by the Telemedicine & Advanced Technology Research Center, a subcommand of the U.S. Army Medical Research and Materiel Command.

“If something happens, like 9/11, personnel may get shipped out with little or no time for training stateside,” said the study’s principal investigator, [Samsun “Sem” Lampotang, Ph.D.](#) (<http://anest.ufl.edu/research/faculty-of-research/samsun-lampotang-phd/>), a professor of [anesthesiology](#) (<http://anest.ufl.edu/>) in the [UF College of Medicine](#) (<http://med.ufl.edu/>) and director of the [UF Center for Safety, Simulation & Advanced Learning Technologies](#) (<http://anest.ufl.edu/research/cssalt/>). “But while stationed overseas in combat zones or waiting for hostilities to start, reservists may still need training to become proficient with unfamiliar military

medical procedures or equipment not routinely used in civilian medicine. Each of the proposed simulators will fit inside a military-spec padded case that meets airline-checked luggage size requirements so they can be readily deployed.”

Lampotang’s team is building and testing mixed-reality simulators for five different medical procedures, all designed to work in low-tech environments using the same hand-held equipment and tools health care workers employ during actual medical procedures.

The proposed simulators are based on innovative technologies developed at UF, which UF Health researchers are tailoring and improving to meet the military’s needs. The first simulator enables health care workers to practice central venous access — typically referred to as placing a central line — to quickly introduce medication and fluids into the body. The procedure requires precise skill because the needle can puncture the lung or artery if not guided properly, Lampotang said.

During the simulation, trainees attempt to place the tip of a tracked needle into the vein of an anatomically correct 3-D model. Each movement is tracked through a miniature sensor embedded near the needle tip and activity is shown on a linked laptop. As soon as the user correctly places the needle tip into the target vein, the syringe lights up blue to simulate blood that would flow out of the vein. The simulator also alerts users when the needle tip has inadvertently struck the lung or an artery.

Another simulator originally developed for [UF’s department of neurosurgery](http://neurosurgery.ufl.edu/) (<http://neurosurgery.ufl.edu/>) will help military clinicians practice relieving pressure in the brain after injury, a procedure known as a ventriculostomy. In this procedure a catheter needs to be precisely placed through a hole drilled in the skull to remove fluid from the brain. Practice is crucial because guiding the ventriculostomy catheter into the wrong part of the brain could result in death. In addition, the more attempts made to place the catheter in the correct spot, the more trauma is imposed on healthy brain tissue.

“The military is excited about our technology and how it can be of assistance to those who treat wounded warriors,” Lampotang said.

The third simulator researchers are adapting for military use involves regional anesthesia, which will help train medical personnel to keep wounded soldiers more comfortable.

The last two simulators under development involve chest tube insertion and a procedure called focused assessment with sonography for trauma, or FAST, which enables medical personnel to pinpoint and treat the location of internal wounds.



Samsun “Sem” Lampotang, Ph.D., a professor of anesthesiology in the UF College of Medicine and director of the UF Center for Safety, Simulation & Advanced Learning Technologies. (Click image for high Res download)

In addition to developing the simulator technology, the research team, which includes [UF Health Jacksonville \(http://ufhealthjax.org/\)](http://ufhealthjax.org/) faculty, will assess whether the simulators are effective as training tools, change actual patient care practices, improve patient outcomes and are cost-effective.

“This translational simulation in health care component of the grant is aligned with the recent addition of simulation as a new core activity of the NIH-funded [UF Clinical and Translational Science Institute \(https://www.ctsi.ufl.edu/\)](https://www.ctsi.ufl.edu/),” Lampotang said.

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