Virtual reality taking the dummies out of medical simulation

JAN 9, 2018

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The situation did not represent the circumstance or the stakes.

That is what a fourth-year medical student quickly discovered while working an emergency medicine simulation rotation a half decade ago.

The “patient” was essentially a larger version of a CPR dummy. It could shake to simulate a seizure and had a pulse, but beyond that—for physical reasons, demographic reasons and many others—it was not an accurate portrayal of an emergency department encounter.

“I saw the limitations of those mannequins first-hand,” said Ryan Ribeira, MD, clinical instructor at Stanford University’s School of Medicine. “They can’t really represent rashes. You can’t tell if they are awake or asleep. They were testing your skills in a fake environment and practicing clinical scenarios that don't look like real life.”

That experience led to the birth of SimX, a product that uses virtual reality technology to give medical trainees customizable experiences with virtual patients of all sizes, ages and colors.

“Because the patients are virtual, you can do just about anything you could do in a video game,” said Dr. Ribeira, SimX’s CEO. “You can have a patient give birth over the course of the scenario and then treat the patient and the baby. These are things that would be almost impossible to recreate with mannequins or robotic physical simulators.”

Simulating patients who talk back

Dr. Ribeira had a background of working with medical start-ups, so he understood the blueprint for turning an idea into a product. His medical knowledge also gave him a keen awareness of the problem: Medical error results in thousands of unnecessary deaths each year.

SimX aims to help reduce those deaths with a more visually realistic patient scenario than a

mannequin would offer.

“It is one of the tools in our arsenal for combating the problem of medical error,” Dr. Ribeira said. “This is a product that can help make simulation drastically cheaper and more accessible. It’s an opportunity to improve public health.”

While wearing the SimX headgear, a user can see a virtual clinic and those working with them in a scenario. Trainees also can talk with the patient to find out what is wrong. A moderator, who is often a faculty member, chooses responses for the patient and is able to give custom responses to fit the case.

“Every doctor is aware that the moment you walk into a room and look at a patient, that’s one of the most important parts of the initial exam,” said Dr. Ribeira, a member of the AMA Board of Trustees. “Many of those things that you pick up in that moment can’t be portrayed in mannequin-based simulation.”

Indvidualized learning goals

The SimX hardware is small enough to fit in a backpack and the software can play on multiple devices, including smartphones. Another perk of the technology is that it allows for multiple trainees to work on a scenario from multiple locations, creating an opportunity for interprofessional education.

“Our system was designed so each person can have their own learning goals for a case,” Dr. Ribeira said. “You can do cases where you have a respiratory therapist, a nurse and a physician working on the same patient and with their own objectives that are designed to fit their roles.”

SimX was a finalist in the 2016 AMA Innovation Challenge, which recognized it as a project that could help transform physician education. The product officially launched as a training tool in two educational facilities—Stanford University School of Medicine and the Indiana University-Purdue University Columbus Simulation Center—late in 2017.

The team at SimX is working on a feature that will allow educators to author custom cases and share them with other institutions.

Dr. Ribeira also sees the technology changing from virtual reality to augmented reality (AR), offering an experience that incorporates tactile involvement.

“While we can do augmented reality cases now, the technology is younger,” Dr. Ribeira said. “And as AR technology improves we see that becoming a larger and larger part of the simulation landscape, because it allows trainees to use the same tools they use on actual patients during a simulation.”

“The more it matches up with your real treatment scenarios,” he said, “the more that the training is going to be accessible to you when you are working with real patients.”