

# Telepresence in the Operating Room

By Steven Holstein

Practice makes perfect. It's a saying that applies to many professionals. Athletes. Musicians. Pilots.

It is also a very important concept when it comes to training and educating healthcare professionals. And at the University of Arizona College of Medicine, Tucson, Arizona, it is an adage that has been taken to the next level through the Arizona Simulation Technology and Education Center (ASTEC).

One of the busiest medical simulation centers in the United States, the ASTEC provides medical students, residents, paramedics, attending physicians, and nurses with hands-on experience in trauma, critical care situations, and laparoscopic surgery. Practicing, practicing, and practicing in a setting where there are no risks to real patients.

The lab features a state-of-the-art simulated operating room that is designed, equipped, and supplied to be identical to any modern hospital operating room where surgeries are occurring every day. But there are a few notable exceptions.

As a for instance... the patient. In this case, the operating table is occupied by life-like, computer-controlled mannequins (adult and pediatric) whose pupils dilate, chests expand and contract, and that can be programmed to simulate a wide range of symptoms and will respond, for better or worse, based on the treatment and care that is given. Students not only learn medical procedures, but also how to assess, diagnose, make critical decisions, and work as a team.

## A better educational experience

Allan J. Hamilton, MD, UA professor of surgery and ASTEC executive director says, "Research studies have shown that skills learned in the virtual-reality environment lead to more efficient and effective learning and have the potential to reduce errors, ultimately saving thousands of lives every year."

Much of those learning enhancements can be attributed to yet another departure from the typical operating room – cameras.



***The fully integrated system enables instructors to see two or three different views of what is happening simultaneously***



Students at the University of Arizona College of Medicine, Tucson, Arizona, attend a computer-controlled mannequin in the operating room.

Lots of cameras. Cameras mounted high, low, and inside medical instruments. They're key for everything from virtual reality laparoscopic surgical trainers to telecommunications for broadcasting lectures and demonstrations to other medical schools and hospitals.

Phoenix, Arizona-based ExhibitOne has been and continues to be instrumental in equipping ASTEC with not only cameras, but microphones, digital recording capabilities and Ericsson's Virtual Presence Systems (ViPr).

The ViPr system that integrates camera, monitor, microphone, and sound into a highly advanced desktop communications

system that produces DVD-quality video. The ViPr desktop terminal displays full-motion, full-color video on a 17-inch (diagonal) widescreen display with 1280x768 (16:9) resolution, 500-Nit brightness, and wide viewing angle. The display is enhanced with an extremely rugged, easily cleaned glass capacitive touchscreen. The terminal features an integrated digital video camera with progressive scan, 3:1 zoom plus macro focus, manual pan and tilt, and a privacy shutter. The integrated phased array microphone with dynamic beam-forming enables clear, hands-free audio. And with all of this, perhaps the greatest hallmark of this sophisticated equipment is its ease of use. It's as intuitive as a telephone.

### **Better than the real thing**

With all of this technology, the most important aspect to creating a virtual presence within a simulated operating theater is ExhibitOne's ability to integrate it all into a very unobtrusive and seamless system that strengthens the learning experience both right there in the lab and as far away as...let's say...Kosovo or Senegal.

The virtual presence environment that has been created within our operating room provides extraordinary benefits to both students and educators," said ASTEC's Senior Program Coordinator and Curriculum Development, Alyson Knapp. "We have found that remote training can be even superior to proximal training in some cases."

So, rather than having an instructor breathing down everyone's neck during a procedure, s/he can be outside of the operating room – whether that's in ASTEC's control room, in an office down the hall, or completely off campus. This not only allows students to proceed unencumbered – but it gives the instructor a MUCH better view of what is actually going on.

The fully integrated system enables instructors to see two or three different views of what is happening simultaneously: perhaps an overhead view showing everyone working, a closer view of the actual procedure being performed, and potentially a view from the perspective of the medical equipment being used. Talk about an out-of-body experience!

This capability also enables us to better leverage our instructors' time," Knapp said. Ordinarily, an instructor would need to be physically present as a student is practicing. But, by being available remotely, an instructor can be in an office attending to other matters and yet, for example, when the student gets to the point of tying off his/her sutures, the instructor can see what the student is doing, provide any needed advice, and both can continue on with their respective activities. With more than 170 medical students and health professionals using the lab a month, leveraging an instructors' time can have a huge impact.

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### **Expanding to a global theater**

Another tool that has made a strong impact on the learning experience came online when ExhibitOne expanded the system's capability to include digital video recording. That has created a number of new advantages. Better than a football official stepping off the field to watch an instant replay, it enables instructors to view, review, and closely analyze student performance. It also allows their work to be viewed by an even more critical group of observers – the students themselves.

Soon, this remote monitoring capability will expand as ExhibitOne installs a ViPr unit at the University Physicians Healthcare – Kino Campus (also in Tucson), to enable emergency physicians there to provide lectures and observe and critique students as they learn and practice procedures in the virtual lab.

UPH – Kino is a small matter of six miles from ASTEC. However, 6,439 miles to the east is the Serbian province of Kosovo. This spring, ASTEC and the Arizona Telemedicine Program will be linking up with a hospital there, enabling students to see and hear exactly what the students and instructors at ASTEC are seeing and hearing. And plans are under way to extend this virtual presence into Senegal this fall.

Practice is good only when the skills and techniques are being practiced in a correct manner. With all of the different factors that need to be monitored in an operating room, it can become difficult, if not impossible, for an instructor to see everything. However, through an integrated system of cameras, microphones, video recorder, and Ericsson's Virtual Presence System, instructors at the Arizona Simulation Technology and Education Center can see it all as medical students and others practice to be perfect.

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**Steven Holstein** has been active in the telemedicine industry since 1993 when he became involved with the development of emergency telemedicine applications for people in remote environments. He is currently a strategic business development advisor for companies, agencies and institutions wanting to introduce or expand telehealth-related services and products.

### **For more information**

ASTEC -- [www.ASTEC.arizona.edu](http://www.ASTEC.arizona.edu)

ExhibitOne-- [www.exhibitone.com/audiovisual\\_medical.htm](http://www.exhibitone.com/audiovisual_medical.htm)

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