Patient Observation

AV plays a key role in the final training of doctors at Johns Hopkins Hospital simulation center

by David Weiss

The main control area, where students being tested are monitored.

Photo by Peter Krogh

This is not a drill. Well, it is for the doctors, but not for the AV system.

The realization of the Clinical Skills and Simulation Center (CSSC) at Johns Hopkins Hospital in Baltimore, MD is all about AV expertise supporting faculty and medical students in real time. In a facility where doctors take some of their final steps toward improving and saving lives, the audio, video, and control systems here are mission critical.

Integrated by Maryland-based Professional Products, Inc. (PPI), the CSSC is located within the outpatient center building and provides training for John Hopkins medical students on how to conduct clinical examinations and perform intensive care, as well as simulating procedures in the operating room (OR). As they practice by working with actors — also known as standardized patients — and robots (in the OR), the students must be observed and recorded as discreetly as possible. Later on, the recorded scenes provide a solid basis for evaluation by their instructors, as well as valuable reference material for the students to review and improve upon.

In the simulation exam rooms, simulation operating rooms, ICU simulation, observation areas, classroom, and debriefing areas of the CSSC, PPI had deep experience to refer to in integrating medical school simulation centers. Installs at George Washington University, the Ohio State University Medical Center, and Weill Cornell Medical College, among others, helped them to understand the role of AV in meeting the varied needs of Johns Hopkins' faculty and students.

"In the exam rooms and operating rooms, what we've created is a very unobtrusive way to record the interaction between the doctor and the standardized patient," said Jim Hatcher, CTO of PPI. "The elegance of the system is that all of the audio and video is encoded, distributed over ethernet networks, recorded to hard drives, and is accessible by the instructors and their students.

"In addition to instant access to all of a student's test material after the fact, the other priority for a medical school faculty is a clear way of observing the student's interactions without standing over his or her shoulder. So the camera control needs to be responsive and the audio quality needs to be very good so they can see and hear everything that's going on. That way, the whole environment is simulating a more realistic experience."

A key requirement for control in the CSSC was seamless integration with B-Line medical software, a widely used solution for simulation center operation and management. For faculty members watching the action from observation areas and monitoring stations throughout the facility, control at Johns Hopkins flows from an AMX Netlinx NI4100 integrated controller. "AMX programming allows us to interact with the clinical skills software that B-Line has produced," Hatcher explained. "The AMX system allowed us to have a central point of control for all the processes that go on in the clinical skills center from a single interface — camera, audio, and the B-Line software."

For visual observation, ceiling-mounted Vaddio 50iR PTZ cameras maintain a watchful eye. "We like the performance-to-price-point ratio of the Vaddio cameras," said Hatcher. "At this point, the format is SD. We've discussed moving to HD, but Johns Hopkins is satisfied with SD at this point. When it comes to storage, an HD payload would be significantly larger than SD, although with the relatively low price of a terabyte right now, the cost of storing HD video is no longer a significant factor."

On the audio side, a Crown PZM11 on the wall and a beyerdynamic SHM 22h gooseneck mic mounted on the ceiling provides the system's ears, while processing comes courtesy of the Biamp Audia digital audio platform. QSC amplifiers fill out the signal path. "The PZM configuration provides the performance we need, while still being unobtrusive," Hatcher noted. "The Audia is standard in our clinical skills centers. We like how modular it is, its programming inter-

Photos by Peter Krogh

Real ROI

According to Jim Hatcher, CTO of Professional Products Inc., the CSSC's smooth-moving video distribution enabled by systems such as the VBrick MPEG-4 dual-channel encoder have delivered a solid return for the students of Johns Hopkins.

"The real ROI for the student is being in a realistic, immersive environment that is being recorded in an unobtrusive way, while providing real-time results," said Jim Hatcher. "They have an experience that's followed by immediate feedback that prepares them for the real world. I love that we can grab this content in real time and play it back immediately afterwards. From there, it provides a history: Students can go back, watch their performance, and see it improving."

Professors benefit as well, of course. "From the faculty side, the real ROI is being able to see the progress of any student collectively," he said, "rather than going through a myriad of videotapes and bits of data that are stored in difference places. To have one database, one snapshot up front of everything the student has done, makes the facility that much more effective.

"For Johns Hopkins itself, the efficiency of the system makes it a showpiece. We've built this to be a state-of-the-art simulation center – as a recruitment tool for prospective students, it's very impressive." — David Weiss

Opposite page, top: A station outside of the exam room where the students log in before entering the exam room.

Opposite page, bottom: Another view of the main control area, where people can sign on and monitor in real-time.

This page, top: The surgical simulation center control room.

This page, middle: One of the exam rooms.

This page, bottom: The surgical simulation room. Note the two-way mirror glass on the left.

face is very simple, it interfaces very well with the AMX control system, and the price point is right."

Redundancy and enterprise class specs were a must throughout the AV system. "This training is considered a mission-critical process," said Hatcher. "The worst thing is for a technical failure to interfere with the simulation; that takes the students out of the learning environment and turns them into troubleshooters."

For Hatcher and PPI, the distribution of the audio and video data, both in real time during the simulation exercise and over secure networks after the fact, is what sets the system apart. "The picture and sound are encoded from analog to MPEG-4 using VBrick dual channel encoders at the head end in the machine room," he said. "From there it's recorded to hard drives, and also multicast in real time via a switch over an intergroup manager protocol (IGMP). So rather than running baseband video to the monitoring station, we can decode the stream in the B-Line SimCube software and simply pick it off the ethernet network. The result is a signal path that saves a lot of money, and makes it possible to experience very low latency on the encode."

The Johns Hopkins CSSC represents the type of assignment that Hatcher and his team find it easy to get excited about. "What I like about the clinical skills sector is that it leads to the betterment of mankind through technology," he pointed out. "These AV systems, and how they manage the data, help to make medical students into better doctors. That's very rewarding, because there's a human side to all this: In order to provide the best health care possible, we need the best doctors possible. Through these simulation centers, we're allowing them to be that much better."

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