



# ROUNDS

HARTFORD HOSPITAL'S WELLNESS MAGAZINE

Hartford Hospital's  
innovative  
simulation center  
helps medical  
professionals  
master new skills



## Learning by Simulation

# CESI: Training for Tomorrow

Hartford Hospital recently completed a multimillion-dollar expansion of its clinical education and training center, creating a regional hub for training the next generation of medical professionals and emergency personnel. The advanced Center for Education, Simulation and Innovation (CESI) is New England's premier destination for simulation and robotic surgery training.

With more than \$4 million in funding—including an anonymous million-dollar gift—and another \$3 million in in-kind support from industry, the hospital is growing its reputation as a leader in education and training. The original Simulation Center, launched in 1999 at the suggestion of Director of Trauma and Emergency Medicine Lenworth M. Jacobs, M.D., has grown from 900 to 14,000 square feet in size. Five simulated patient care rooms and two surgical robots provide state-of-the-art clinical training without real-life patient risks.

"We are building on our culture of innovation with the establishment of CESI, the first comprehensive, multidisciplinary center in the region," says Hartford Hospital Executive Vice President and Chief Operating Officer Jeffrey Flaks. "CESI will enhance patient safety and quality, and also provide leadership based on our existing success and expertise in training at the regional and national level."

The advent of laparoscopic and robotic techniques has brought a revolution in the minimally invasive options available to patients. The wide popularity of robotic surgery has spurred a growing need for physicians with surgical deftness and technical mastery of the sophisticated equipment used in complex procedures. "As a destination center, CESI will draw new talent to the region and reinforce our reputation for medical innovation," says Mr. Flaks. "The center is expected to be particularly effective for training physicians to perform low-frequency, high-risk procedures."

## Leadership for the Future

The development of CESI is a natural strategic direction for Hartford Hospital's nationally acclaimed surgery, training and robotic programs. As the second-largest surgical center in New England (after Mass General) and the Northeast's largest robotic surgery

center (with six Intuitive Surgical robots and a Hansen Sensei® cardiac robotic system), Hartford Hospital trains physicians from throughout the country. The pioneering vision behind the new endeavor is to merge surgical leadership—advanced simulation, minimally invasive techniques and robotic surgery—to build a regional center available to physicians from across New England.

CESI is home to the hospital's simulation center, where medical students, doctors, nurses, first responders and other clinicians can hone their skills by practicing on computerized replicas of the human body. Better than textbooks for clinical education, anatomically realistic patient simulators—featuring air hydraulics and touchscreen interactive technology—offer new training tools for medical professionals in patient-care scenarios.

"CESI represents the educational paradigm of the future for both procedural and clinical simulation scenarios," says Vice President, Academic Affairs Neil S. Yeston, M.D. "Not only do clinicians have an opportunity for hands-on training in the simulation center, but realistic simulations give surgeons an opportunity to rehearse in advance of performing an actual procedure."

## Leaving the Classroom Behind

Patient simulators are fully responsive human models that teach clinicians how to handle life-and-death situations. Computer chips make the simulator's pupils dilate when drugs are injected into its "arm" or provide real-time feedback about CPR performance. Simulators are so lifelike that they breathe in oxygen and exhale carbon dioxide.

Sometimes the simulator is a bruised and bleeding trauma victim lying inert and unconscious. Other times, he's a choking heart attack victim with shortness of breath and a difficult airway. His chest rises and falls, his tongue swells, he clenches his jaw and cries out in pain. The simulator can also become "pregnant" with the addition of female reproductive organs for labor and delivery scenarios.

The use of medical mannequins with sophisticated circuitry helps clinicians and first responders gain confidence as they learn how to administer medications, intubate the

Thomas Nowicki, M.D.

Thomas Nowicki, M.D., an emergency medicine specialist, is a fellow of the American College of Emergency Physicians and a member of the Society of Academic Emergency Medicine. A member of the international Society for Simulation in Healthcare, he has been an integral part of the development of simulation-based medical education for Hartford Hospital and the development of the new Center for Education, Simulation and Innovation (CESI).

He earned his medical degree from New York Medical College in 1995 and completed his residency in emergency medicine at the University of Connecticut in 1998. Board-certified in emergency medicine, Dr. Nowicki's primary areas of interest include airway management and simulation education. He holds a faculty appointment as an associate professor of emergency medicine at the University of Connecticut School of Medicine. He also serves as the director of Medical Simulation for the University of Connecticut School of Medicine.

His hobbies include photography, old cars, playing the guitar and home brewing.



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airway, defibrillate or resuscitate patients in critical care scenarios. Five simulation rooms replicate an operating room, a emergency department trauma room, an intensive care unit, a hospital patient care floor and an obstetrics-gynecology (labor and delivery) suite.

“It’s a long way from the classroom to the innovative technology we’re using to enhance patient safety,” says Stephen Donahue, RRT, a respiratory therapist who brings more than 20 years of experience as a primary critical care educator to his new job as director of the CESI program. “We teach critical thinking skills. We’re also using simulators for multidisciplinary team training for emergency services and the crew of our LIFE STAR helicopter.”

From behind a two-way mirror, CESI trainers evaluate and record the team’s performance (for later debriefing) as trainees monitor pulse and heart rates or perform procedures in a real-life patient environment. “For example, we can make the airway very narrow so it’s extremely difficult for students to insert a breathing tube,” says Thomas Nowicki, M.D., an emergency medicine physician. “Over the next few years, CESI will be part of the curriculum for all clinicians and health care providers, and robotic-assisted surgery will be an integral component of medical residency training programs.”

According to Dr. Nowicki, “CESI will provide a wide range of medical simulation technologies rang-

ing from basic procedures—such as inserting an intravenous line—through laparoscopic surgical skills and robotic training all the way to full patient encounters.” During the complex scenarios that take advantage of the center’s human patient simulators, the participants treat the mannequin as a real patient—introducing themselves, performing a history and physical exam, ordering diagnostic tests and ultimately providing treatment for their “patients.”

**Battle Ready**

Paramedics from the Connecticut National Guard recently converged on CESI for a daylong training session. Two military ambulances brought a contingent of “medics” in full-body Kevlar armor who treated wounded soldiers while wearing night vision equipment in the dark fog of smoke from a simulated explosion.

The medics ran combat scenarios against a backdrop of battle sounds as bullets whizzed and artillery shells thudded realistically. Wearing helmets and M16 rifles slung over their shoulder to simulate battlefield conditions, the medics spent the day learning to sharpen their clinical and decision-making skills for combat readiness.

One simulated “patient”—a soldier with extensive burns on his face—wheezed noisily as the medics struggled to open his blocked airway. As the trainees ran through the rooms of the high-tech training center, confronting





Above, simulation software allows trainees to practice suturing, cutting and cauterizing as they control robotic instruments in “virtual reality.” At right, Dr. Shichman, CESI’s medical director, looks on as surgical resident Dr. David Chalmers manipulates the robot’s “EndoWrist” instruments, which provide surgeons with natural dexterity and a range of motion far greater than the human hand.



a series of lifelike injuries and trauma scenarios, they never knew what was coming next. Not only did the medics practice emergency response teamwork, but they also honed communication skills that will be vital when they deploy to Iraq or Afghanistan.

### Surgical Robotics

An outgrowth of a U.S. Army effort in the 1980s to develop a remote-controlled laparoscopic robot for battlefield surgery, Intuitive Surgical’s da Vinci robot reduces blood loss, lessens pain and speeds recovery after tumor removal, nerve-sparing prostatectomy, hysterectomy or abdominal surgery.

“Like a fighter jet pilot who practices for hours in a simulator before flying solo, physicians at Hartford Hospital use simulation software

to train on the da Vinci robot,” says urologist Joseph R. Wagner, M.D., director of the hospital’s Robotic Surgery Program. “Virtual reality models help people learn in a calm, less stressful environment.”

Computer-assisted technology is revolutionizing the delivery of health care. Today, a growing number of the 27 million operations performed annually in the United States rely on robotic techniques to enhance the steadiness and precision of minimally invasive surgery. The multiple instrument arms of the spider-like robot and a slender fiberoptic camera are inserted through the navel and four small incisions in the patient’s abdomen.

In the skillful hands of a surgeon, the da Vinci robot manipulates instruments with precision and artistry. “Today 85 percent

of all prostatectomies (removal of the prostate gland) are performed robotically,” says Dr. Wagner, who was only the second surgeon in the country to perform the procedure using the da Vinci in 2001.

“We’re working with industry and the hospital’s biomechanical engineering center to develop new products and training courses to create a truly comprehensive center for surgical innovation,” adds CESI Medical Director Steven J. Shichman, M.D., a urologic surgeon and nationally recognized pioneer in minimally invasive surgery for kidney removal. “We need to train new physicians to become experts in these new technologies and techniques. The high-definition, open-access network allows three-dimensional medical imaging and real-time surgery to be



broadcast over the web to the hospital community and beyond.”

CESI will be open to all Hartford Healthcare health providers and physicians throughout the country. “In the old days, the usual practice was to ‘see one, do one, teach one’ when it came to surgery,” says Dr. Shichman. “The traditional, apprentice-style training that physicians receive is not always the best way for doctors to learn high-tech surgical procedures—such as robotic surgery—that require practice before being used on patients.”

### Training the Next Generation

Five computer servers hum gently in the background as physicians monitor high-resolution screens projecting the three-dimensional view seen by surgeons when a patient lies on a table in the glare of the operating room. X-rays and ultrasound images projected on a large screen beside the operating table give the entire surgical team a camera’s-eye view.

Across the room, the surgeon sits at a sleek gray console—about the size of an ATM machine—operating sophisticated hand controls and bright yellow or blue foot pedals. Eyes glued to the viewfinder, the surgeon’s feet move seamlessly across the pedals. The robot’s “EndoWrist” instruments are designed to provide surgeons with natural dexterity and a range of motion far greater than the human hand. Virtual reality shows trainees how to delicately lift a blood vessel, cauterize it in two places with a lifelike puff and sizzle, then swap pedals and slice it neatly.

“Learning in a virtual environment helps students gain proficiency and receive real-time feedback to track their progress,” says CESI Program Director Donahue. “The open architecture of the da Vinci system software allows for future development of new practice modules. Each patient simulator is computer-controlled and can be programmed to react in very human ways.”

When patients clamor for robotic surgery, they should understand that laparoscopic alternatives may be faster and safer for some procedures. Virtual reality helps physicians prepare for the real life-and-death challenges of high-risk surgery. In the hands of an experienced and highly trained surgeon—but *only* in the hands of an expert—the da Vinci robot speeds surgery and transforms even a hint of a tremor into rock-solid steadiness.

“One drawback to the rapid switch to robotics has been the very real need to train physicians to harness new technologies with speed and safety,” says Dr. Wagner. “Hartford Hospital is recognized as one of the foremost robotic surgery training centers in the region. We have been very fortunate with our track record in surgical outcomes after robot-assisted surgery at Hartford Hospital.”