The Rise of Simulation in Healthcare
Empowering Clinicians and Preventing Harm
Practice makes perfect, but there’s no room for error with real patients. Following in the footsteps of other industries that require precision to avoid deadly risk, healthcare is increasingly using simulation to train and assess its professionals.

Simulation comprises a variety of activities, from simple role-play to complex high-tech scenarios, with a shared purpose: reducing errors in order to improve patient safety. That can lead to higher patient and clinician satisfaction, and potentially reduce medical malpractice claims.

While traditional physician education has a “see one, do one, teach one” attitude when it comes to surgical procedures, such a philosophy doesn’t necessarily work in practice, said Dr. Christine Park, president of the Society for Simulation in Healthcare.

“Our mantra should be ‘See one, simulate many, do a few more, and then teach one,’ because simulation enhances training experiences before we do things in real life,” Park said.

Simulation products, including “task trainer” procedure models, manikins, computer simulation programs and virtual reality simulators, give clinicians and students a hands-on, realistic experience in treating patients without

Better care from better simulations.

The Peter M. Winter Institute for Simulation, Education, and Research (WISER) is a world class multidisciplinary training and research facility renowned for its use of simulation-based education for staff and faculty development training in a safe environment. WISER’s state-of-the-art simulation software and equipment make our experts uniquely qualified to train the medical professionals of the future. To learn more, visit Wiser.Pitt.edu.

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WISER is fully accredited by the Society for Simulation in Healthcare in all areas of specialization (Assessment Standards and Measurement, Research Standards and Measurement, Teaching/ Education Standards and Measurement and Systems Integration).
risking patient harm. The Society for Simulation in Healthcare, a global, non-profit membership group, works to further and support the science of simulation through industry meetings, research publications, program accreditation and professional certification.

Unlike a real patient, the challenges associated with a simulation can be adjusted. While an experienced professional may desire a multifaceted challenge to learn something new or prepare for a difficult procedure, professors may want to dial down this level of reality for a first-time trainee, taking a procedure step by step or phasing in certain risks.

“One of the great advantages we have at our disposal in simulation is the ability to control the level of realism that creates the most learning,” Dr. Park said. Setting the appropriate “signal-to-noise ratio” by experience level helps maximize the trainee experience, she said.

PROVEN SUCCESS

Simulation can save lives and limit patient harm by ensuring physicians young and old alike follow protocols and complete all the necessary steps in order to safely perform a procedure. In a study of 44 final-year medical students in Frankfurt, Germany, those who participated in a three-day simulation-based training course were found to have more thoroughly followed protocols for CPR and a trauma enactment in comparison to students who shadowed emergency physicians for three days. Students who trained on simulators scored an average of 90% on their ability to complete steps required on a standard CPR checklist, while the other students scored an average of 62%.

It’s not just students. Another study found that anesthesiologists who engaged in simulation-based training on how to properly wean patients from cardiopulmonary bypass performed better in real-life procedures than those who received traditional interactive seminars. Simulation-trained physicians scored over five percentage points higher when assessed two weeks later by senior staff on their ability to adequately complete necessary steps on a technical checklist. Similar results were shown five weeks after training.

Researchers seeking to understand whether simulation could help improve training for ultrasound-guided central venous catheter cannulation, found that 51% of simulation-trained residents were successful on the first try of cannulating a patient, as compared with the traditionally trained group’s success rate of 37%.

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according to a study published in the journal of the Association of American Medical Colleges.

Beyond the benefits to individual learners, simulation offers opportunities to appraise teamwork and systems, said Dr. Paul Phrampus, director of the Peter M. Winter Institute for Simulation, Education, and Research (WISER) at the University of Pittsburgh Schools of Health Sciences.

“Simulation provides a platform to educate and assess multidisciplinary teams with regard to best practices in teamwork and communications,” Dr. Phrampus said. “It also allows us to look into the systems of care and evaluate for the potential of unknown patient safety threats that may exist in a clinical practice environment.”

Jointly developed by UPMC and the University of Pittsburgh Schools of Health Sciences, WISER provides experiential learning and simulation-based education to nursing students, medical students, resident physicians and practicing healthcare professionals.

WISER’s difficult airway management program provides evidence-based education and assessment to anesthesiologists, Certified Registered Nurse Anesthetists, critical care physicians and emergency physicians, allowing them to practice and analyze how to best deal with patient airways that may present difficulty during intubation.

By training on a device that simulates airway issues, these clinicians can prepare for emergent situations they may encounter when treating real patients, such as difficulty visualizing patient vocal cords or difficulty placing a tube in the patient’s airway due to a blockage or swelling. Phrampus said, limiting adverse events that may limit a patient’s ability to breathe. The program contributes to UPMC’s low rate of airway incidents causing harm to patients because of management decisions or technical failures, according to Phrampus.

LIMITING RISK

In addition to the obvious benefits for patient safety, effective training programs reduce financial risk for healthcare organizations and their clinicians. Less errors can mean less medical-malpractice suits, which can mean lower professional insurance premiums.

Medical malpractice payouts have begun climbing upward since 2012, reaching $3.9 billion in 2016.

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Connecticut’s payout rate per capita is among the highest in the nation. In hopes of reversing this trend and reducing risk, Connecticut-based Hartford HealthCare sought to improve simulation-based training for obstetricians, who are at a particularly high risk for malpractice suits.

The health system’s Center for Education, Simulation and Innovation (CESI) developed a simulation-based training program that evaluates physician effectiveness in preventing shoulder dystocia, a high-risk labor complication in which labor is obstructed by the infant’s shoulder. The project utilized technology that measures the amount of force being applied to a simulated baby, eliminating the subjectivity of a doctor-to-doctor evaluation.

“Verdicts in the state of Connecticut have been steadily increasing, with some exceeding $20 million,” said CESI Director Stephen Donahue. The device has given physicians more confidence in their abilities, and protected them from preventable risk that can result in lawsuits.

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About 200 HHC doctors and nurses have completed the training since its inception, allowing the health system to limit preventable shoulder dystocia cases. Since the training was completed in February 2015, there have been no malpractice claims related to the condition.

**TRAINING FOR THE NEXT GENERATION**

Simulation has been growing in popularity. An AAMC survey cites a 19% increase in computer simulation at medical schools between 2003 and 2011, and another AAMC survey found that 83 of 90 participating medical schools use simulation at some point across a five-year span of residency education.

Responding to a new generation of clinicians that yearns for information whenever and wherever, Champaign, Ill.-based SIMnext is creating training software that clinicians can take with them throughout the clinical environment. The company is located in the Research Park of the University of Illinois Urbana-Champaign and collaborates closely with the Jump Trading Simulation and Education Center, a collaboration between the University of Illinois College of Medicine at Peoria and OSF Healthcare, a Peoria-based health system.

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SIMnext has created Health Scholars, an interactive app that allows clinicians to learn new safety protocols or refresh existing techniques on a tablet they can take with them to a patient’s bedside. The app includes courses on infection prevention, medication safety and blood transfusion that simulate patient scenarios and offer guidance on how to prevent errors.

An independent academic study, currently in peer review, has confirmed that the platform allows clinicians to acquire new skills as fast or faster than traditional training methods, and at a fraction of the expense. The app reduces clinician time spent training and in orientation, reduces labor costs associated with in-person training and helps hospitals avoid adverse events, said Dr. John Vozenilek, vice president and Chief Medical Officer for simulation at Jump.

New generations of clinicians are more accustomed to “just in time” learning and mobility options, Vozenilek said. Sitting in a lecture hall is no longer a sufficient educational experience.

“These students are more challenging, but the challenges have stretched our creativity and new technologies have emerged,” Vozenilek said, noting recent advances in the use of virtual reality.

**CALCULATING RETURN ON INVESTMENT**

Enthusiasm for innovation is sometimes tempered by cost concerns. As healthcare organizations face increasing cost pressures, executives are considering return on investment when paying for simulation equipment and services.

While simulation technology comes at an expense, it can allow clinicians to train in an effective environment that limits costly risks to patients. A recent National Council of State Boards of Nursing (NCSBN) survey found that high-quality simulation experiences could be substituted for up to half of traditional clinical hours across prelicensure nursing curriculum, given evidence of the benefits of simulation.

Health systems going at risk under value-based care agreements will be hard-pressed to find a more effective option for training their physicians and nurses to improve quality and reduce expensive errors, Vozenilek said. A Mayo Medical School meta-analysis of 289 research studies concluded that simulation-based education is indeed effective.

“The pressures on healthcare today to continuously improve quality while reducing cost will make traditional training obsolete,” Vozenilek said. “Scalable, affordable platforms such as these which have a demonstrable ROI are going to radically change the traditional model for professional development and learning.”

To calculate the total value of simulation initiatives, it is important to weigh both short-term and long-term benefits, experts say. By empowering physicians to be more confident in their abilities, consistent simulation-based training can improve clinician satisfaction and reduce employee turnover. Clinicians are fond of simulation: a recent survey showed that 78% of emergency room personnel rated simulations as extremely valuable or valuable.

It can be somewhat difficult to prove ROI in simulation training, but experts agree it’s even harder to put a price on patient safety.

“Enlightened organizations will look beyond direct ROI on the per program, or per course basis, and recognize that there is a significant value provided through the investment in simulation,” Phrampus said.
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