



TRANSFORMING HOW SURGERY IS PRACTICED AND TAUGHT

Imagine a future in which your surgeon is able to practice your procedure on lifelike organ replicas and human anatomy models—that even bleed when cut—before operating on you. This would help minimize surprises, anticipate potential complications, improve patient safety and quality of care, and increase the chances for a successful surgery.

At the University of Rochester Medical Center's Program in Simulation Innovation and Education, the future is here. Two physicians—Ahmed Ghazi, MD, FEBU, MHPE, an assistant professor in the Department of Urology, director of Simulation Training, and surgical educator, and Jonathan Stone, MD, MSE, a neurosurgery resident who also holds a degree in biomedical engineering—are pioneering a new procedure to create highly realistic simulation models for training, and they could soon be widely used to rehearse complex surgeries. No other medical center in the country is currently making personalized, realistic replicas like we are. Current organ replicas are made of rigid plastic, are not easy to cut, and don't have the intricate detail of real organs.

The process to make the organ replicas involves converting images obtained from medical scans into computer-generated designs and, using 3D printing, fabricate lifelike organs. The replicas are injected with hydrogel, which has the identical water consistency found in our bodies, making them feel like the real thing.



In addition to creating lifelike organ replicas, we can produce artificial muscle tissue, skin, fat, adjacent organs and structures, as well as artificial blood, urine, and bile.

The simulation model is a great opportunity for experienced surgeons to keep their skills sharp and learn new surgical technologies, and for surgical residents and medical students to practice complete operations. Dr. Ghazi has performed dry run simulations prior to complex renal surgery using a personalized lifelike replica of his patients' organs, drastically improving patient outcomes. Simulation will also enhance the way our third-year medical students learn, giving them the opportunity to perform real-life surgical experiences from beginning to end, instead of only observing live surgeries or performing partial task exercises in a classroom setting.

The demand for using the replicas has grown beyond urology to the entire Medical Center. There are now projects with neurosurgery, obstetrics and gynecology, vascular surgery, orthopaedics (spine), and general surgery, with discussions to create models for pediatric and trauma surgery, and orthopaedics (total joint), among others. There is also demand from medical device companies for carotid stenting, minimally invasive spine surgery, endoscopic bladder surgery, and minimally invasive brain surgery.

"Simulation is one of the fundamental things we need in surgery to allow us to improve what we do every day."

—Jean Joseph, MD, head of urologic laparoscopic and robotic surgery, Department of Urology.



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HELP US REVOLUTIONIZE SURGICAL TRAINING

Our plan to create a patient-centered approach to surgery is in its infancy. We intend to grow a program that offers advanced surgical training and rehearsals for all surgeons throughout the Medical Center, and to become a national—and ultimately an international—Center of

Excellence for personalized surgical simulation. We welcome philanthropic support—that can help us now and in the future—to propel us to that goal and to improve surgical outcomes for all patients.

ENDOWED PROGRAM IN SIMULATION INNOVATION AND EDUCATION—\$5,000,000

The naming of our Program in Simulation Innovation and Education would provide a permanent, flexible source of income for our faculty to lead the nation in developing innovative technologies that improve patient outcomes, and change the way medical students and seasoned physicians learn and approach complex surgeries. This endowment would help ensure that the Program's growth as a national leader in simulation innovation and education, training, and surgical services continues in perpetuity. Your support would also help us recruit the best faculty and trainees, keep up with new knowledge and develop new ways to share it, and attract the most visionary leaders.



“After touring the lab, we were amazed with the cutting-edge technology that will be able to help surgeons. We are excited to be able to jump start this incredible program and hopefully help many people.”

—Mark and Colleen Crane, who were the first philanthropic supporters of the program. Also pictured, from left: Drs. Ahmed Ghazi, Jonathan Stone and Jean Joseph.

FACULTY AND FELLOWS ENDOWMENT IN SIMULATION INNOVATION AND EDUCATION—\$2,000,000 TO \$4,500,000

It is vital that we are able to recruit and retain key faculty—full professors as well as early- and mid-career faculty—and fellows, so we can provide state-of-the-art patient care. Your help would provide the flexibility to help ensure—for generations to come—that we can recruit the best and brightest clinicians and researchers to the Program in Simulation Innovation and Education to help the Medical Center fulfill our mission to improve health and quality of life for patients.

SIMULATION INNOVATION AND EDUCATION FUND—\$100,000 TO \$1,000,000

There is a crucial need for start-up funds for equipment and personnel in order to reduce the time allotted to build our 3D models, and for the program to grow as a state-of-the-art simulation service. Your gift would support the purchase of a high-tech 3D printer—our most important equipment need—to reduce production time from three weeks to three to five days, allowing us to help more patients and train more students. Support would also be used for computers and software to allow us to more efficiently convert patient imaging with higher quality models, larger freezers to produce bigger models—and more of them, much-needed technicians, and a PhD fellow to proactively market simulation modelling services throughout the Medical Center, as well as working with medical device companies.

For more information about how your gift can make an impact, please contact Jennifer Koehnlein at:
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