# Carolinas Simulation Center

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The Carolinas Simulation Center was established in 2007 to address the training needs of learners from multiple disciplines using simulation as a new training paradigm. The goals of the Institute include enhancing the education and training of a variety of learners, promoting patient safety by improving the training effectiveness of health care personnel, and developing cutting-edge educational research that will result in evidence-based training paradigms and lead to the continuous improvement of educational methods.

Through repetitive and deliberate practice on life-like mannequins and procedural simulators in a safe learning environment, health care professionals have the opportunity to become more skilled, confident, and efficient in performing their clinical duties likely leading to improved patient care. In addition, through collaboration with other centers, the exchange of ideas can be enhanced and the development of new programs and curricula accelerated for the benefit of our learners.

The Carolinas Simulation Center is part of the Carolinas Healthcare System, the third largest public health care system in the United States. Its physical location is near downtown Charlotte, North Carolina at the Carolinas Medical Center main campus and is housed within the Carolinas College of Health Sciences at the Rankin Education Center. The Education Institute consists of a procedural and a patient simulation suite and has immediate access to the vivarium for hands-on training on animal models. The Center was born from an institution-wide initiative with strong support from the chair of the department of surgery Frederick Greene, MD, FACS and benefited from the vast experience with educational courses of the Carolinas Laparoscopic and Advanced Surgery Program (CLASP) led by B Todd Heniford, MD, FACS, which has offered postgraduate courses to practicing surgeons successfully since 1998. CLASP is currently part of the Education Institute.

The main strength of Carolinas Simulation Center is its people. A dedicated, hard-working, and enthusiastic personnel guarantees the flawless operation and growth of the Center. A multidisciplinary steering committee that meets regularly oversees the operations of the Center and provides advice about ongoing challenges and future directions. Devoted and enthusiastic faculty and learners ensure a sound training environment that promotes learning and the continuous development of new curricula and training tools. Strong support by the administration of the institution guarantees sustainability and growth of the Institute.

In addition, the multiple disciplines involved in the Education Institute strengthen the program by allowing for collaboration and the sharing of a diverse range of expertise and ideas that acts as a springboard for team training and curriculum development. The variety of available simulators in the Center facilitates training in a broad range of skills for learners from many disciplines. Health care providers receive a well-rounded training that ranges from experience on high-fidelity mannequins that respond physiologically to interventions, speak, and breathe to practicing basic manual skills using simple box trainers.

Finally, the generation of cutting-edge educational research that is a priority for the Institute permits the continuous improvement of the educational methods used based on scientific evidence and attracts the participation of academic researchers leading to the generation of several national presentations, publications in peer-reviewed journals, and grant funding.

Our Education Institute serves an extensive array of learners and offers a variety of courses. During the last decade, over 2000 surgeons from 30 states and 9 countries have participated in 193 CLASP courses. Courses are offered several times each year and most recently addressed the following topics: advanced laparoscopic surgery, laparoscopic and open hernia repair, bariatric surgery, laparoscopic hysterectomy, flexible endoscopy, hepatobiliary surgery and tumor ablation techniques, lymphatic mapping and sentinel lymph node removal, inferior vena cava filter placement, and percutaneous tracheostomy. The majority of course participants have been practicing surgeons from outside institutions.

In addition to practicing surgeons, the Institute serves many other learners. At the present time, 6 residency programs are engaged in organized skills curricula including general surgery, orthopedics, pediatrics, family medicine, emergency medicine, and obstetrics and gynecology. Residents train in discipline-specific techniques and procedures and participate in discipline-specific clinical scenarios. Some courses are offered on a weekly basis, whereas others are offered less often but incorporate a more concentrated learner experience. This training schedule has been devised based on need and resident availability of each program. Furthermore, several fellows participate in simulation training including the minimally invasive, cardiothoracic, and

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vascular fellowships. Rotating medical students through our institution also have the opportunity to engage in skills and scenario-based training. In addition, several dozen premed college students are offered the opportunity to participate in skills training through enrollment in research studies on skills training methodologies.

Beyond practicing physicians, residents, and medical students, however, many other disciplines benefit from the availability of our Education Institute. The MedCenter Air program, which is a comprehensive critical care transport service that provides transportation to hospitals using fixed-wing aircraft, helicopters, and ground ambulances, has a simulation curriculum in place for continued competency assessments and for their hiring process. Nursing students and Certified Registered Nurse Anesthetist (CRNA) students also participate in scenario-based training using the center's high-fidelity simulators. In addition, through collaboration with other entities, the Center has established a nurse residency program for new graduate nurses going into the intensive care unit.

Through collaboration with the Charlotte Area Health Education Center (AHEC), the Simulation Center has developed a nurse refresher course aimed at refreshing the skills of nurses who desire to return to practice after spending more than 5 years away from the bedside. This course occurs 8 times each year. In conjunction with the Carolinas Laparoscopic and Advanced Surgery Program, the Center hosts 2 quarterly courses for different groups of practicing physicians. Through partnership with the institutional Community Training Center, simulation-based Advanced Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS) courses for health care providers seeking ACLS or PALS certification are offered in our Institute.

In 2009 our educational institute offered over 40 courses and recorded 5,787 learner encounters. The Center offers a wide variety of simulators to meet the learning objectives of its users. On the procedural side, several Fundamentals of Laparoscopic Surgery (FLS) simulators, portable laparoscopic box-trainers


**FIGURE 1.**

**FIGURE 2.**

(Ethicon, Inc, Somerville, New Jersey), and virtual reality laparoscopic simulators (Simbionix USA, Corp, Cleveland, Ohio) are available for training in laparoscopic techniques. The virtual reality simulators also offer procedural modules including laparoscopic cholecystectomy, laparoscopic ventral hernia repair, and laparoscopic treatment of ectopic pregnancy for training. Two other virtual reality simulators for IV insertion and phlebotomy (Laerdal Medical Corporation, Wappingers Falls, New York) are used by nurses and phlebotomists for their training. The Vascular Intervention Simulation Trainer (Mentice, Inc, Evanston, Illinois) is a high-fidelity endovascular simulator

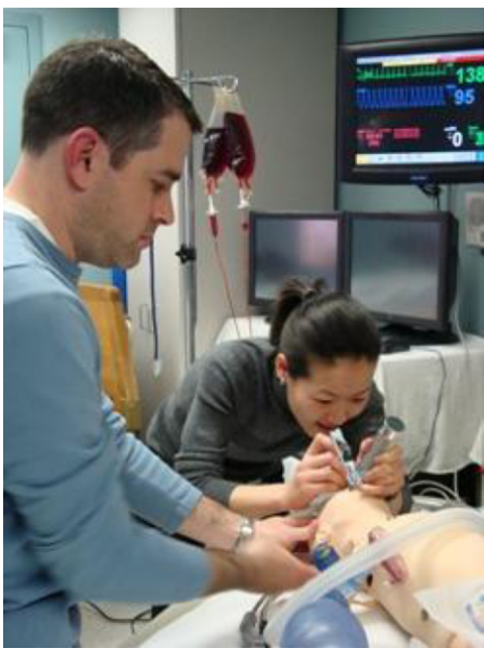

**FIGURE 3.**

used by the vascular and cardiothoracic fellowship and general surgery residency programs for training in angiographic and interventional vascular techniques. A portable ultrasound machine is available for use with some of these simulators (SonoSite, Inc, Bothell, Washington). Part-task trainers like TraumaMan, CentraLineMan, and FemoraLineMan, orthopedic joint injection models and arthroscopy simulators, arterial puncture, thoracentesis, paracentesis, catheterization, and lumbar puncture trainers are available for training of a variety of disciplines. The patient simulation side houses a variety of high-fidelity simulators for scenario-based training of multiple disciplines. The METI Human Patient Simulator (HPS) adult and pediatric, the Laerdal SimMan and SimBaby, the NOELLE birthing simulator and newborn HAL are brought to life during several daily training sessions, filling learners with excitement. In addition to these simulators, several web-based resources are available to our learners including the American College of Surgeons (ACS)/Association of Program Directors in Surgery (APDS) skills curriculum, and many other modules offered by the Division of Education of the American College of Surgeons.

Several curricula have been built around the aforementioned simulators helping learners hone their skills and improve their knowledge. Such curricula have been designed to incorporate defined objectives and measurable outcomes. Unique teaching methods employed include the use of a secondary task during laparoscopic training to assess the attentional spare capacity of our learners and, thus, their automaticity and readiness to transition to the operating room from the simulator. (Figs. 1-3).

## CONTACT

The Carolinas Simulation Center is fortunate to have dedicated staff members. Dimitrios Stefanidis, MD, PhD, FACS, is the Medical Director of the Center. Dawn Swiderski, RN, BSN, CCRN, is the Simulation Center Coordinator and serves as the administrative contact (Dawn.Swiderski@carolinas.org). Other key personnel include Jim Jay, Simulation Specialist, Jennifer Hayes, RN, MSN, Simulation Education Specialist, Katerina Coker, Simulation Training Specialist, and Lisa Howley, PhD who is the Director of Curriculum and Evaluation of our system.