WELCOME

Welcome to the first bi-annual newsletter of the Surgical Education and Activities Lab (SEAL). The SEAL is focused on providing a safe environment where learners of all levels can acquire surgical skills, and conduct cutting edge research into new surgical educational techniques and technologies. It has the distinction of being among the first Level 1 accredited simulation centers in the country by the American College of Surgeons. In the last fiscal year, the lab provided 5,764 learner hours of training to learners in Surgery, Emergency Medicine, Gastro-Intestinal Medicine, Interventional Radiology, Trauma, Nursing and Allied Health. The lab is actively engaged in training and research, and some of our latest developments are highlighted in this newsletter.

Since taking over as Medical Director in September 2011, I have been restructuring the lab, and building the infrastructure that will enable the lab to be one of the leading simulation centers in the country. To that end the Department has recruited two Associate Medical Directors to assist in research and teaching. Dr. Richard Pierce has joined the lab from Duke Raleigh General Surgery, and Dr. Chan Park is a laparoscopically-trained bariatric and general surgeon. Both have extensive training in minimally invasive surgery and will be involved in curricular development and research simulation. The department has also recruited new staff to support the lab, including Philip Clark, who was the Chief Administrator for Surgery at the University of Illinois and is currently the Administrator for the SEAL. Trent LeBoeuf, RN, a U.S. Navy Reserve officer, joins us with seven years of critical care, perioperative, and operational military nursing experience as the new Clinical Educator. Last, but not least, Megan Autry, has joined us as Administrative Assistant for the SEAL.

In January 2013, the SEAL will expand its footprint into the Duke School or Medicine’s Trent-Semans Center for Health Education, currently under construction. The SEAL will have a 650 square foot lab on the 5th floor of the building in collaboration with the School of Medicine’s Clinical Skills Lab and Anesthesiology’s Human Patient Simulation Center. We are very excited to be part of a new era of collaborative simulation training.

One of our first projects was to conduct a needs assessment and a faculty and resident survey was performed in February 2012. Based on the results of this survey, we formed a steering committee with broad representation of faculty, residents and program directors with the goal of pursuing a new general surgery simulation curriculum and also acquire new equipment and resources to support it. Details regarding the curriculum will soon be forthcoming. Our intention is to template this process and support other divisions in developing robust simulation curricula pertinent to their group. In order to update the resources and provide access to the latest simulation equipment, the lab has recently acquired three new high-fidelity simulators. Through grant support from the GME Innovations Fund and the hard-work of the Division of Urology, the lab has purchased the EDGE Simulator, which will be used to develop new training techniques in Urological Surgery. The lab has also acquired the CAE ProSim, a combined partial task and virtual reality laparoscopic trainer and the dV Trainer, a simulator for robotic-assisted laparoscopic surgery.

The SEAL is also proud to have initiated one of the first Surgical Education Research fellowships in the country and Dr. Brandon Henry is the first fellow to join the lab. He will be focusing on conducting research and education on surgical simulation training and is expected to provide research and curricular support to the faculty and residents participating in the SEAL. Dr. Henry is a PGY 3 resident in General Surgery and is in his first lab year.

I am looking forward to an exciting year in the SEAL and would encourage faculty and residents in the Department of Surgery and other Duke Departments to consider the lab for their future educational and research projects. Simulation training (particularly in Surgery) is very much an understudied area, and there are lots of opportunities to conduct groundbreaking and impactful research. In order to assist in such scholarly activity, the SEAL has obtained an IRB approval for data collection. If you have an interest in building your academic resume, we welcome your participation and the staff in the SEAL are ready and able to assist you in developing your ideas, and providing both educational and administrative support to execute your concepts. Both Dr. Jacobs and I are very interested in seeing the SEAL becoming an incubator for new surgical education techniques, and becoming a leader in simulation on a national level.

RANJAN SUDAN
Medical Director, Surgical Education and Activities Lab
Duke Urology, Multi-Center Validation Study into the Basics of Laparoscopic Urological Surgery

Duke Urology is proud to be one of only ten centers in the country chosen by the American Urological Society to conduct a validation study into the Basics of Laparoscopic Urological Surgery (BLUS). With the support of the American Urological Association, the centers will be validating a skills protocol that if successful will be adopted by Urological Residency Programs around the country. The protocol is based on the Fundamentals of Laparoscopic Surgery (FLS) currently adopted by the American Board of Surgery, and required to be passed by all General Surgeons before passing the Board. The SEAL is currently a certified center for FLS Training.

Led by Dr. Michael Ferrandino and Dr. Andrew (“Drew”) Peterson, the Division of Urology received an award of $15,000 from the Duke GME Innovations Fund to assist in the purchase of the Simlab EDGE Simulator which is the base platform for the study. The simulator provides metrics that record time, path-length and Newton-force to measure the proficiency of the learner. The EDGE is the first simulator to measure the pressure that is applied on the laparoscopic instruments during the skills task and this could prove to be an important measure of skill.

The BLUS protocol contains four tasks including peg transfer, circle cut and intra-corporeal knot tie used in the FLS Exam. However, the BLUS protocol also includes a clipping task that uses a beating artery model to simulate the process of clipping and cutting an artery on a living body. The protocol has a more stringent scoring and penalty system than currently used by the FLS, and could prove to be a more robust skills proficiency measurement system for laparoscopic surgery.

“Duke Urology would not be able to participate in this project were it not for the support of the SEAL team. The staff have been critical in our ability to acquire and house the simulator, and will be instrumental in training, testing and data collection as the project starts up.”

Dr. Michael Ferrandino, Director of Minimally Invasive Urological Surgery, Duke Urology
Simanthal Highlighted in Interventional Vascular Publication

We congratulate Dr. Cynthia Shortell whose paper “The role of simulation in attracting medical students into interventional vascular surgery” was recently published in the Journal of Vascular Surgery. Dr. Shortell worked with staff in the lab using the Simanthal interventional cardiac and vascular simulator to study whether simulation played a role in the recruitment of trainees into vascular surgery. Simanthal is currently used to train students in interventional catheterization techniques. The simulator uses actual ultrasound and CT images, and a mechanized guide–wire to train students on procedures like balloon stenting.


GI Medicine Recruiting Subjects for Upper Endoscopy Studies

Congratulations to Dr. Jane Onken in GI Medicine who was awarded a GME Innovations Grant of $30,000 to develop new curriculum in endoscopic training. Using the SEAL Lab’s CAE/Immersion Endoscopy towers, Dr. Onken is currently researching the effects of virtual reality training in endoscopy in clinical skills transference, and is recruiting residents from any discipline to participate in the study. The SEAL has two virtual reality endoscopic simulators capable of teaching both upper and lower endoscopy. Asides from the research being conducted by Dr. Onken, the simulators are currently used to teach residents in multiple disciplines the basics of bronchoscopy and colonoscopy. The simulators are loaded with basic skills training exercises, and more complex case scenarios.

The goal of the research study is to teach upper endoscopy to inexperienced residents using simulation. Residents wishing to participate should have little or no experience in upper endoscopy, or in the use of the Endoscopy Simulator, but may be from any medical discipline. The total study will take about 15 hours to complete and includes three hours of didactic and simulator training and 12 hours of self-guided study. To volunteer to participate in the study, please contact Dr. Jane Onken onken001@duke.edu.

“The residents, who have participated in the study so far, absolutely loved the simulation experience. Many did not have a specific interest in Endoscopy, but really enjoyed using the simulators to learn Upper Endoscopy and had a fantastic time.”

Dr. Jane Onken, Associate Professor Division of Gastroenterology
SEAL accepted as a Research Partner with Robotic Surgery Simulation Company

The SEAL has joined a national coalition studying and validating the efficacy of virtual reality skills training for the acquisition of robotic surgery skills. Using the dV Trainer developed by Mimic Technologies, the lab will be studying the 40 modules developed for teaching robotic surgery. The modules are designed to teach the learner the basic controls of the da Vinci™ robotic system and the console is designed to replicate the controls of the system, including the finger controls and pedals.

Currently, Duke University Health System has four robotic systems, two at Duke University Medical Center and one each at Durham Regional Hospital and Duke Raleigh. Robotic Surgery is commonly performed in Urology, Gynecological Surgery, and General Surgery. However, it is still an emerging technology and requires a different skill set to traditional laparoscopy. Learning robotic surgery is not as challenging as laparoscopic surgery, but still requires training and practice. By providing an option to learn and practice these techniques outside of the OR, the SEAL hopes to provide a safe environment for surgeons and residents to learn basic robotic skills. By moving the training outside of the OR, the SEAL hopes to decrease the cost of training, and increase exposure to residents, and faculty across the health system.

The SEAL is currently looking for experienced robotic surgeons to develop research in this developing field of surgery.

To learn more about the dV Trainer contact Philip Clark in the SEAL Lab philip.clark@duke.edu.

CAE ProMIS

The CAE ProMIS simulator is a partial task trainer that uses physical models to measure the effectiveness of training. The ProMIS was developed by a Haptica, an Irish company, but was recently acquired by CAE Healthcare, the Canadian powerhouse manufacturer of flight simulators. CAE have taken the base ProMIs model and developed the concept further to create a very robust system that adds a new dimension to the skills training paradigm.

The CAE ProMIS was delivered to the SEAL Lab in June and is intended to be used to provide a more robust system of researching skills acquisition in laparoscopic surgery. The unique features of the simulator include the ability to record the training session, to track the path length in a virtual animation, and to perform full procedures on animate models. Duke Surgery has purchased the system with three additional models that include cholecystectomy, nissen fundoplication and appendectomy. The system also has a replaceable skin that allows the insertion of standard and specialty trocars that enables more advanced training modules to be developed.

The system is anticipated to be heavily used to study advanced surgical techniques in simulation training including the application of single-incision surgery. Also, we anticipate the simulator will allow Duke to develop entirely new training modules not yet developed in a partial task trainer.

We welcome faculty and residents to come to the lab and discuss their ideas about developing new modules or validating and testing this new simulator.

To learn more about how you can use the CAE ProMIS to conduct research in surgical education, please contact Philip Clark philip.clark@duke.edu.
Surgical Education Research Fellowship

The SEAL has opened up a research fellowship training program focused on surgical education. The Surgical Education Research Fellowship is one of only a few such programs in the country and will provide the fellow the opportunity to learn the techniques and skills required to develop and conduct effective teaching modules. The fellow is also expected to develop their own research projects in the SEAL and to provide a resource to faculty looking to initiate new research projects.

The American College of Surgeons has recognized the need to develop fellowship training in the field of surgical education, and has commented that the surgical skills-training is an understudied area that represents a real opportunity for research. Dr. Ranjan Sudan will be his research mentor.

For academic year 2012-2013, Dr. Brandon Henry has been recruited as the first Surgical Education Research Fellow. Dr. Henry graduated from the second year of the General Surgery residency program and will be spending his research years with the lab.

“The need for innovation in training future surgeons is paramount. Increasing patient volume and complexity coupled with stringent duty hour restrictions have created a residency training environment that necessitates efficient and effective methods of teaching core surgical principles to trainees. The Duke Surgical Education and Activities Lab strives to enhance surgical education by actively engaging our trainees, utilizing cutting edge equipment and conducting much needed research. I am thrilled to join in this effort and look forward seeing the results of this lab’s many exciting initiatives”, Dr. Brandon Henry, Surgical Education Research Fellow

To contact Dr. Henry, please email brandon.henry@duke.edu.

American College of Surgeons – Accredited Education Institute

The Duke Comprehensive Education Institute (CEI) includes the Surgical Education and Activities Lab, and partner resources within the department including, the Human Fresh Tissue Lab, the Vivarium and the Endosurgery Center. The CEI is proud to announce that it was re-accredited by the American College of Surgeons as an Accredited Education Institute for another three years.

The ACS-AEI program current certifies 65 other programs in the United States and the Duke CEI is proud to be among one of the first accredited programs in 2007. Part of the commitment for accreditation of the CEI is to provide training to multiple learner groups which include medical students, residents, practicing providers, nursing and allied health providers. As a result, we are always interested in working with new partners across the health care continuum, and welcome collaboration in educational curriculum development and research.

The secondary commitment made by the department to the ACS-AEI program is to facilitate research in surgical education. As a result, the lab’s focus is not just in teaching, but extends to research into new surgical education training techniques and clinical transference. The lab welcomes faculty and residents looking to conduct new research projects and will be happy to assist in bringing your ideas into fruition.

The ACS-AEI program current certifies 65 other programs in the United States, and the Duke CEI is proud to be among one of the first accredited programs in 2007.
In January 2013, the SEAL is eagerly anticipating the opening of the School of Medicine’s new Trent-Semans Center for Healthcare Education. The new center will provide an expansive learning space for medical students and residents at Duke University, including a 15,000 square foot space dedicated to simulation training. The floor will include simulation from the Clinical Skills Lab (School of Medicine), the Human Patient Simulation Center (Anesthesiology), and the Surgical Education and Activities Lab (Surgery).

The Department of Surgery has been allocated 650 square feet which will be dedicated to training in Trauma and Emergency Medicine. The suite has been fitted with a control room with a two way mirror, and will be outfitted with video and audio recording equipment that will feed into the METI Learning System software servers housed on the floor and fitted in most of the rooms. This provides the SEAL with a robust environment to monitor and assess the learners training sessions that can be used for conducting research in situational simulation, including training in diagnostics, communication skills and team-training.

In May 2012, Dr. Ranjan Sudan and Philip Clark were fortunate enough to be able to visit the suite, while still under construction and were given a tour of the simulation floor. They were both very excited about the new space, and look forward to collaborating with faculty and residents in the department, and across the university wishing to develop new curricula and to conduct simulation-based research.

In May 2012, the SEAL had the pleasure of hosting visitors from Arkana University in Kazakhstan who were visiting Duke University as part of the Global Health Management Program. A group of 14 students from various health sciences disciplines including Pediatrics, Obstetrics and Gynecology, Family Medicine, and Surgery visited the lab, and were given a hands-on experience on the latest technologies in simulation.

The students were given an overview on the role of simulation in healthcare by Dr. Wahidi in Pulmonary Medicine and an overview of the SEAL by Dr. Ranjan Sudan. The students then rotated through a simulation experience that included several modules for the Fundamentals of Laparoscopic Surgery, and Basic Endoscopy, and SimMan. The students particularly enjoyed watching SimMan simulate a heart attack. The students attempted to cut a circle from a gauze using the laparoscopic box trainers, and took home the resulting circle as a souvenir.

The SEAL welcomes domestic and international visitors from high schools and colleges interested in exploring simulation and healthcare from this unique perspective. Groups interested in learning more about a career in Surgery are particularly welcome.

If you are interested in bringing your high school or undergraduate college students to the SEAL, please contact Philip Clark philip.clark@duke.edu.
Surgical Education and particularly skills acquisition is largely understudied, and is an emerging field very much in its infancy. Part of the reason, is that the traditional approach to surgical training is undergoing a paradigm shift. Surgery has traditionally been taught under the apprentice model. However recent restrictions on resident duty hours, the development of new teaching technologies, and even potentially challenges to the traditional model under the ACGME Next Accreditation System are threatening that system.

Simulation is emerging as a viable method of teaching surgical students outside of the clinical environment. Encouraged by the success of flight simulation, companies have been developing new simulation technologies for the medical field. Much like flying, surgery is a high stakes field, where failure can have fatal consequences. Simulation provides residents the opportunity to learn and practice outside of the pressure of the operating room. Furthermore a controlled environment gives educators the opportunity to assess and evaluate learners skills before exposing them to patients.

However, simulation in surgery is a largely under-studied area that is ripe with opportunities. These include, but are by no means limited to: validation of skills modules, development of new simulation models, skills acquisition and clinical skills transference. The American College of Surgeons has recognized the value of simulation training and is actively encouraging programs to conduct more research in this area.

Certainly, the benefits to both a clinical and educational surgery program are significant. By performing training outside of the operating room, the learning curve for residents can be accelerated, translating into increased clinical productivity. Also, the implications on risk are also significant. Since the simulation environment is low risk, mistakes during the learning curve are tolerated, whereas, mistakes in the clinical setting can result in medical errors and subsequent malpractice claims.

The financial benefits to health systems are, also, significant. However the provision of funding to support simulation does not currently follow the form. In fact, one of the limiting factors to the growth of surgical simulation is the availability of funding. Fortunately, the leadership in Duke Surgery and in the GME Office is forward thinking and has been very supportive of the development of simulation training. This means that the SEAL is fortunate enough to be supported by the department, and has been maintained to provide residents and faculty a valuable resource for both teaching and research. The GME Office through the GME Innovation Fund is providing up to $100,000 per year in funding to projects that develop innovation in residency training (including simulation).

For the most part, simulation projects do not have to be costly to initiate, and can be completed with little or no funding, if the capital equipment is available. The SEAL is fortunate to have numerous high-fidelity simulators (see inside back cover) that are available to faculty and residents interested in conducting research into surgical simulation. Staff in the SEAL is also available to assist in finding funding for more expansive research that may require capital purchases.

Furthermore, research in simulation is a low risk activity, which means that the oversight and governance requirements of the Institutional Review Board are far less stringent. The research does not involve patients or animal subjects, and does not require the collection of specimens, or HIPAA data. The research does involve human subjects, but these are usually faculty, residents or medical students undergoing training. Research protocols need to ensure that the student/teacher relationship is not compromised by the research, and that confidentiality is secured. The staff in the SEAL is available to assist in writing research protocols, collecting data from research projects, and in proctoring and executing research –related teaching activities.

For faculty and residents, research in simulation training can provide a real opportunity for resume building. Because the field is so understudied, the potential projects that are available for study are numerous. Also, an increased interest in simulation on the national level means that the likelihood of papers and posters being accepted for publication is much higher. The actual effort of initiating and conducting research for individual investigators is much lower than basic science or clinical research, because of the reduced regulatory requirements. Also, the SEAL is an established lab equipped with the latest simulation technologies and with a support staff dedicated to assisting new investigators to initiate projects.

To schedule a consultation on your potential research project, please contact Brandon Henry Brandon.Henry@duke.edu.
## Currently Available Simulators

<table>
<thead>
<tr>
<th>Simulator</th>
<th>Uses</th>
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| CAE ProMIS      | Laparoscopic Surgery Procedures:  
                  | Basic Skills  
                  | Fundamentals of Laparoscopic Surgery  
                  | Adrenalectomy  
                  | Appendectomy  
                  | Cholecystectomy  
                  | Single Incision Surgery  
                  | Customizable Platform  
                  | Skills Video Recording  
                  | Specialties:  
                  | All Surgical Sub-Specialties                                     |
| SimMan [Laerdal] | Pediatric Diagnostics and Basic Procedures:  
                  | Customizable Platforms  
                  | Specialties:  
                  | Pediatrics and Pediatric Sub-Specialties  
                  | Family Medicine  
                  | Nursing  
                  | Emergency Medicine                                               |
| SimBaby [Laerdal]| Adult Diagnostics and Basic Procedure:  
                  | Customizable Platforms:  
                  | Specialties:  
                  | All Medical Specialties  
                  | Nursing                                                          |
| dV Trainer      | Robotic-Assisted Surgery:  
                  | Basic Skills Acquisition  
                  | Specialties:  
                  | Surgical Sub-Specialties                                        |
| Blue Phantom    | Diagnostic Radiology:  
                  | Specialties:  
                  | Emergency Medicine  
                  | Surgery  
                  | Obstetrics and Gynecology                                       |
| Stryker Video Trainers | Laparoscopic Surgery:  
                  | Fundamentals of Laparoscopic Surgery  
                  | Specialties:  
                  | All Surgical Sub-Specialties                                   |
| EDGE Simulator  | Laparoscopic Surgery:  
                  | Basics of Laparoscopic Urological Surgery  
                  | Customizable Platform  
                  | Specialties:  
                  | Urology  
                  | General Surgery                                                 |
| Immersion Laparoscopy VR | Laparoscopic Surgery:  
                  | Basic Skills Acquisition  
                  | VR Cholecystectomy  
                  | Specialties:  
                  | All Surgical Sub-Specialties                                   |
| CAE Endoscopy VR | Endoscopy (Upper and Lower):  
                  | Bronchoscopy  
                  | Colonoscopy  
                  | Specialties:  
                  | Surgical Sub-specialties  
                  | Colon and Rectal Surgery  
                  | GI Medicine  
                  | Pulmonary Medicine                                              |
| B-Line – Standardized Clinic Room | Standardized Patient Encounters:  
                  | Diagnostics  
                  | Professionalism  
                  | Systems Practice  
                  | Video Recording Capabilities  
                  | Specialties:  
                  | All Medical Specialties  
                  | Nursing  
                  | Allied Health                                                   |

*Please note, the lab has many lower fidelity models for use in basic procedure training not currently listed, if you do not see a simulation model that matches your needs, please ask the SEAL Lab Administrator, Philip Clark.*