CREATION OF A VIRTUAL REALITY TRAINING CURRICULUM IN SURGERY

STATEMENT OF FUNDS:
There are no pending external funds for this project. Needed funding in excess of the $26,481 we are applying for in this grant will be from internal funds from the Center for Minimally Invasive Surgery, Department of Surgery, The Ohio State University Wexner Medical Center.
SUMMARY:

For the past century, surgical training has been traditionally performed using the apprenticeship model. Under this training paradigm, residents and trainees gradually increase their operative participation until they are capable of performing the operation independently. However, there are a multitude of limitations with this training model. The time spent teaching in the operating room increases operative times, thereby reducing the total operative cases which can be performed daily and in effect, physician and hospital productivity. Additionally, there are few standardized metrics to evaluate resident and fellow performance to demonstrate adequate technical performance before training is complete. Most importantly, there are concerns regarding patient safety with inexperienced trainees, with or without experienced supervision. We strive to create a new paradigm of learning where the basic tenants of laparoscopic, endoscopic, and robotic surgery can be taught in a simulated environment, without risk to patient safety. Our ultimate goal is to produce competent and safe surgeons following residency and fellowship training in surgery. Our hypothesis is that a formal virtual reality simulation curriculum will improve clinical performance in the clinical setting.

We propose to accomplish our goal by conducting a study with two specific aims. First, we will create a virtual reality training curriculum in laparoscopic, endoscopic, and robotic skills for surgical residents and fellows. Second, we will determine if a novel virtual reality training curriculum translates to quicker learning compared to traditional teaching methods.

Our investigation proposes a randomized control study involving General and Gastrointestinal Surgery residents at The Ohio State University Wexner Medical Center (OSUWMC) in Columbus, OH. The study will span over one year and attempt to enroll all 38 General and Gastrointestinal Surgery residents in their post graduate year (PGY) 1 through 5, including categorical and preliminary residents. We will exclude those residents in the laboratory. Residents will be randomized into a control arm or experimental arm for up to 20 residents in each group. All residents (control and experimental) will undergo baseline simulation testing with the LapSim and Simbionix GI-Bronch Mentor virtual reality simulators during the first part of the academic year. All residents will also complete a baseline clinical testing during the first third of the academic year: one supervised laparoscopic cholecystectomy, one supervised upper endoscopy and one lower endoscopy, with a standardized scoring system. The experimental group will then complete a novel virtual reality simulation curriculum during the academic calendar year. Finally, post-simulation testing will occur at the end of the academic year for all residents, repeating the baseline simulation case scenarios, and one supervised laparoscopic cholecystectomy, upper endoscopy, and lower endoscopy, scored in an identical manner. We will compare the progress of residents who completed the simulation curriculum to those who did not for each post-graduate academic year. Additional confounding variables will be reviewed, including number of total and case-specific procedures performed clinically by each resident, and whether the Fundamentals of Laparoscopic (FLS) or Fundamentals of Endoscopic (FES) exams were taken. Multivariate analysis will then be performed to identify the independent contribution of simulation to improvement in clinical skills.
BACKGROUND

1. Problem

By the year 2050, it is estimated that there will be a shortage of nearly 500,000 physicians. A review of the number of current graduating surgeons demonstrates that we will need to train 100,000 surgeons by the year 2030, at an annual cost of almost $2 billion and total cost of nearly $37 billion. There are currently a limited amount of surgical residency positions, as there are only a finite amount of resources for training surgeons.

Recognizing the limitations of the previous teaching model, virtual reality simulators have become an area of interest within the past decade to augment traditional teaching methods. It is recognized that simulation performances predict intra-operative skills. A systematic review shows that virtual reality simulators may improve technical skills in surgical trainees. However, further research will need to be performed before a major paradigm shift in teaching residents. The question we wish to address, specifically, is if implementation of a virtual reality training curriculum in laparoscopic surgery will improve objective resident technique.

2. Significance

The Fundamentals of Laparoscopic Surgery (FLS) program was designed by the American College of Surgeons (ACS) and the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) as an effort to guide surgical residents, fellows, and attending physicians in the performance of laparoscopic surgery. The curriculum consists of a web-based study guide covering didactics and interactive patient scenarios, in conjunction with a box trainer with five non-procedure specific tasks to complete. The trainee will then complete an assessment in a two-part multiple choice exam and proctored hands-on tasks using the box trainer. The American Board of Surgery (ABS) now requires all surgical residents to take and pass the FLS curriculum prior to sitting for the qualifying board exam.

Similar to FLS, the Fundamentals of Endoscopic Surgery (FES) was developed to fill the skills gap in flexible endoscopy training amongst surgical residents. This program employs web-based didactic modules with hands on simulator testing. However, unlike FLS, FES is not a hands-on learning platform, and surgical trainees still require significant clinical experience with endoscopy prior to examination. FES curriculum is also mandatory for eligibility for the ABS qualifying board exam beginning in the academic year 2017-2018.

A robotic training program, the Fundamental Skills of Robotic Surgery (FSRS), utilizes a cognitive curriculum and manual tasks to develop proficiency with robotic skills on the da Vinci Skills Simulator device. Prospective studies have demonstrated construct validity of a validated FSRS curriculum, however this remains an optional program regarding ABS board eligibility.

3. Concurrent Study

Our Center for Minimally Invasive Surgery (CMIS) is investigating the role of a simulator based endoscopic curriculum in relation to FES in a SAGES-sponsored study. In this study, all General Surgery residents will have baseline and post-FES clinical endoscopic performance measured as
measured by the Global Assessment of Gastrointestinal Endoscopic Skills (GAGES). Upper endoscopies are graded based on ability to intubate the esophagus, scope navigation, ability to keep a clear endoscopic field, instrumentation (if applicable), and quality of examination. Lower endoscopies reflect the use of strategies and many of the categories from the upper endoscopy grading. The experimental group of residents will participate in a formal simulator based curriculum of 20 upper endoscopy and 20 colonoscopy cases, performed to experienced proficiency, prior to the FES exam. Currently, we are in the process of collecting baseline clinical testing as measured by GAGES.

4. Preliminary Data

We obtained preliminary baseline data from the virtual reality laparoscopic trainer device LapSim (Surgical Science, Goteborg, Sweden). All general surgery residents, including laboratory residents and incoming interns, performed baseline simulation testing including grasping, cutting, camera navigation, and peg transfer. As expected, an increase in post-graduate year level was correlated to an improvement of laparoscopic simulation skills. However, the majority of the times do not correlate to a passing score on the FLS examination for the peg transfer component.
HYPOTHESIS

We believe that a creation of a *prescribed training curriculum* will best serve to provide the necessary laparoscopic, endoscopic, and robotic skills for surgical residents and fellows to reach proficiency before graduation. Our *ultimate goal* is to produce competent and safe surgeons following residency and fellowship training in surgery, and to reduce intra-operative complications during training. Our *hypothesis* is that a formal virtual reality simulation curriculum will improve clinical performance in the clinical setting.

We propose to accomplish our goal by conducting a study with two specific aims. First, we will create a virtual reality training curriculum in laparoscopic, endoscopic, and robotic skills for surgical residents and fellows. Second, we will determine if a novel virtual reality training curriculum translates to quicker learning compared to traditional teaching methods.
METHODS

Specific Aim 1. To create a virtual reality training curriculum in laparoscopic, endoscopic, and robotic skills for surgical residents and fellows.

In order to create a virtual reality training program, our institution purchased the virtual reality laparoscopic trainer device LapSim (Surgical Science, Goteborg, Sweden). Inspired by the guidelines established by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), the system includes a Haptic hardware platform with a laparoscopic camera, basic skills training modules, task training, and camera anatomy training software modules.\[8\] Using this system, the trainee can practice numerous tasks including camera and instrument navigation, coordination, grasping, cutting, and fine dissection. Techniques can be repeated at varying levels of difficulty, incorporating thousands of new scenarios and complications. Each exercise is digitally recorded, providing the participant with detailed metrics, statistics and debriefing that ultimately will provide for immediate and long term skill development feedback.

Our institution has also purchased the Simbionix GI-Bronch Mentor (Simbionix™ Ltd., Airport City, Israel) virtual reality simulator. This robotic interface features a Pentax ECS-38040F endoscope, a flat screen monitor, and simulation modules with over 120 tasks and clinical patient cases.\[9\] The simulator is able to measure procedural time, bowel visualization, as well as mechanical pressures on the bowel. This is among the most studied virtual reality platforms for endoscopy and demonstrates expert and construct validity. As the FES curriculum does not employ a hands-on learning platform, this simulator will offer surgical trainees a unique opportunity to overcome the early parts of the learning curve during simulated exercises, prior to clinical patient encounters and the FES exam.

Our current surgical skills training curriculum consists of didactic sessions taught by faculty, online training modules, simulation modules, and in vivo labs. However, there is currently a small focus on simulation. We wish to create an additional novel training curriculum with a strong focus on simulation. Junior residents will perform basic laparoscopic skills including grasping, cutting, clip applying, and handling intestines, and basic endoscopic skills including esophageal intubation and scope navigation. Senior residents will practice fine dissection and complete modules involving realistic case scenarios on both the laparoscopic and endoscopic trainer. The surgical trainees will complete modules with increasing level of difficulty as time progresses. All residents participating in the novel training curriculum will perform the tasks to completion at the proficiency level. We will arrange for protected time for the residents participating in the new curriculum to complete the tasks.

Regarding the robotic curriculum, all residents will complete online community modules and demonstrate competency as a bedside assistant with a minimum of five bedside cases prior to training at the console. On the training robot, the residents will complete five basic modules to 90% completion prior to sitting at the console for a live operative case. In all aspects, our training curriculum will be periodically evaluated and revised based on participant feedback.
**Proposed Laparoscopic and Endoscopic Simulation Curriculum**

<table>
<thead>
<tr>
<th>Month</th>
<th>Resident Level (Junior= PGY1-2, Senior= PGY3-5)</th>
<th>Simulation Requirement*</th>
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<tr>
<td><strong>July</strong></td>
<td>Junior</td>
<td>Laparoscopic Baseline Testing**</td>
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<td>Senior</td>
<td>Laparoscopic Baseline Testing**</td>
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<td><strong>August</strong></td>
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<td>Laparoscopic Basic Skills 1-6: Camera navigation, instrument navigation, coordination, grasping, cutting, clip applying</td>
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<td>Laparoscopic Cholecystectomy Basic Modules</td>
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<td>Laparoscopic Basic Skills 7-13: Lifting and grasping, handling</td>
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<td>Junior</td>
<td>intestines, fine dissection, seal and cut dissection, catheter insertion, suturing, precision and speed</td>
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<td>Laparoscopic Cholecystectomy Advanced Modules</td>
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<td>Junior</td>
<td>Laparoscopic Cholecystectomy Dissection and Removal</td>
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<td>Senior</td>
<td>Laparoscopic Appendectomy Cases: Loop technique, single stapling, dual stapling, optional stapling</td>
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<td><strong>November</strong></td>
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<td>GI Mentor: Endobasket 1-2; Endobubble 1-2; Module 1 Lower GI case 1; Module 1 Upper GI case 1</td>
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<td>Robotic Modules Camera Targeting 2; Energy Dissection 1; Matchboard 3; Ring Walk 2; Suture Sponge 1,2,&amp;3</td>
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<td>Laparoscopic FLS Task Training</td>
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<td>Laparoscopic Baseline Testing***</td>
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*Simulation Requirement is subject to change

**Laparoscopic Baseline Testing includes camera navigation, instrument navigation, coordination, grasping, cutting, clip application, lifting and grasping, handling intestines, fine dissection, seal and cut dissection, suturing, precision and speed, peg transfer, pattern cut, and ligating loop

***Repeat testing for graduating residents

**Specific Aim 2. To determine if a novel virtual reality training curriculum translates to quicker learning compared to traditional teaching methods.**
Resident performance during a live laparoscopic procedure may be measured by the Global Operative Assessment of Laparoscopic Skills (GOALS).\[10\] GOALS is an objective measurement based on depth perception, bimanual dexterity, efficiency, tissue handling, and autonomy. Trainees’ clinical endoscopic abilities are likewise measured by GAGES.\[11\] Designed by expert surgeons and endoscopists, these tools standardize clinical assessment for residents and fellows, thereby identifying areas of strengths and weaknesses, and allowing the objective comparison between groups of trainees.

We hypothesize that a formal virtual reality simulation curriculum will improve clinical performance over time as measured by GOALS and GAGES in the clinical setting.

**Study in Detail:**

Our investigation proposes a randomized control study involving General and Gastrointestinal Surgery residents at The Ohio State University Wexner Medical Center (OSUWMC) in Columbus, OH. The study will span over one year and intends to enroll all 38 General and Gastrointestinal Surgery residents in their post graduate year (PGY) 1 through 5, including categorical and preliminary residents. We will exclude those residents in the laboratory. Residents will be randomized into a control arm or experimental arm for up to 24 residents in each group. A list of general surgery residents will be created and sorted by last name, and randomization will occur with a random number generator; odd numbers will assign residents to the experimental group, and even numbers to the control group. Participation in the study will be voluntary. Exclusion criteria includes any resident who fails to perform informed consent, and data on that trainee will not be used for research.

**Group 1- Experimental Arm:**

The experimental arm will consist of up to 20 randomly chosen General Surgery residents across post-graduate years. This group will first undergo baseline simulation testing with the LapSim and Simbionix GI-Bronch Mentor virtual reality simulators during the first part of the academic year. Baseline testing with the LapSim device will determine residents’ coordination and speed. Using 15 simulated scenarios, information will be obtained including time to complete a virtual task, accuracy, and vector determination as objective measures of hand-eye coordination. Following completion, these residents will complete a baseline clinical testing during the first third of the academic year. Residents will perform one supervised laparoscopic cholecystectomy, and will be scored by the GOALS score sheet as well as the task specific checklist during dissection.
of the gallbladder off the liver bed. Additionally, residents will perform one supervised upper endoscopy and one lower endoscopy, with baseline GAGES recorded.

Following baseline simulation and clinical testing, residents in this group will then complete the virtual reality simulation curriculum as proposed in Specific Aim 1 during the academic calendar year to completion at proficiency level. Finally, post-simulation testing will occur at the end of the academic year, repeating the baseline simulation case scenarios, and one supervised laparoscopic cholecystectomy, upper endoscopy, and lower endoscopy, scored in an identical manner.

**Group 2- Control Arm:**
The control arm will consist of up to 20 randomized General Surgery residents across post-graduate years. These residents will also undergo baseline simulation and clinical testing in the first third of their academic year, as described above. In contrast, these residents will not participate in the formal simulation curriculum. There will not be a restriction to use the simulators for personal learning.

In the end of the academic year, the control group residents will proceed with simulation and clinical testing as measured by GOALS and GAGES.

**Data Analysis**
Simulation and clinical testing data will be analyzed using univariate analysis with fisher's exact test and student t-test to assess for improvement over time between the two groups. Additional confounding variables will be reviewed, including number of total and case-specific procedures performed clinically by each resident, and whether the Fundamentals of Laparoscopic Surgery (FLS) or Fundamentals of Endoscopic Surgery (FES) exams were taken. Multivariate analysis will then be performed to identify the independent contribution of simulation to improvement in clinical skills.

We will compare resident testing improvement between experimental and control groups using a two-sample t-test. With n=19 residents per group, we will have 80% power to detect a 20% difference with a coefficient of variation of 20% assuming an alpha level of 0.05.
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<td>1. Michael P. Meara</td>
<td>Principal Investigator*</td>
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<td>2. David S. Strosberg</td>
<td>Co-Investigator</td>
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REFERENCES


LOCAL INSTITUTIONAL REVIEW BOARD

The study protocol has been submitted to the Institutional Review Board (IRB) at The Ohio State University Wexner Medical Center and is pending approval.
AVAILABLE RESOURCES

The Ohio State University

The Ohio State University (OSU) is the largest university in the United States and Ohio’s flagship public university. The National Science Foundation ranks Ohio State 20th among in research and development expenditures.

The Ohio State University Wexner Medical Center

OSU Wexner Medical Center (OSUWMC) includes a top-30 ranked (U.S. News and World Report) College of Medicine, six hospitals, a unified physician practice, and a network of primary and specialty care practices. More than a dozen research centers and institutes and 20 core laboratories draw on the expertise of biomedical investigators across the OSU campus. This education, patient care, and research enterprise is supported by more than 6.8 million square feet of space in more than 70 buildings, and by more than 13,000 dedicated faculty, staff, and students. As an academic medical center, the OSUWMC mission includes: education, research, and patient care.

The Ohio State University Department of Surgery, Division of General and Gastrointestinal Surgery

The Ohio State University Division of General and Gastrointestinal Surgery is one of seven specialty divisions within the Department of Surgery. The Division is nationally recognized for its clinical care and research contributions in: minimally invasive techniques, treatment of gastroesophageal reflux disease, wound care, aspects of hepatobiliary and pancreatic cancer, surgical critical care, and trauma. The division provides outstanding educational programs, offering research opportunities in surgical techniques and basic science, including a master of medical science program, to residents and medical students. The residency program accepts six categorical general surgery residents every year. Graduates of the program are well prepared to enter private practice or vie for competitive surgical fellowships throughout the country.

The OSU Center for Minimally Invasive Surgery (CMIS)

CMIS is a multidisciplinary center that specializes in minimally invasive surgical interventions. Our collaboration with members of The Ohio State University Wexner Medical Center healthcare teams fosters innovation in clinical surgical care, education, and research pertaining to minimally invasive surgery, leading to new techniques and technology in this ever-expanding field. The Center has been awarded over 8 million dollars in the last ten years for a variety of research in new technology and training in gastrointestinal disease treatment. CMIS has a multidisciplinary faculty composed of board certified surgeons, gynecologists, urologists, and researchers. In addition to faculty, CMIS also supports three clinical fellows, a postdoctoral researcher, and a support staff which includes a program manager, full-time research coordinators, education coordinator, and information systems manager. Sufficient office space and computers are available in the CMIS for personnel working on this project.

Gastrointestinal Endoscopy Suite at OSUMC
The GI endoscopy suite at OSUMC has been recently renovated and expanded. The suite has 16 procedure rooms, including two rooms with integrated fluoroscopy units, a dedicated endoscopic ultrasound (EUS) room (with cytology), and a motility room. All rooms are equipped with state-of-the-art high-definition flat screen monitors and the most advanced Olympus endoscopes currently available, allowing for both white light and narrow band imaging. All rooms are spacious enough to allow for anesthesia faculty, staff, and equipment, should higher sedation be necessary. All endoscopy procedures are staffed with at least one RN whose sole responsibility is focusing on the sedation and monitoring of the patient, as well as a second RN or surgical technician whose role is physician assistance with technical aspects of the procedure and equipment management. The suite provides 42 private patient pre-operative and recovery rooms. Each patient recovery room is spacious enough and equipped for minor unsedated procedures, such as gastrostomy tube changes and liver biopsies.

**Health Sciences Library Clinical Skills Center**

The Clinical Skills Education and Assessment Center is located in the Health Sciences Library on the OSUMC campus. Recently expanded by 18,000 square feet, it provides a state-of-the-art training center with simulated patient care experiences to medical students and resident-physicians. It houses patient simulators, procedure labs, four virtual critical care bays, an ultrasound training room, and a 70-seat seminar room. The surgical skills laboratory houses laparoscopic surgery box trainers, a robotic surgical simulator, the LapSim (Surgical Science, Goteborg, Sweden), and the Simbionix GI-Bronch Mentor (Simbionix™ Ltd., Airport City, Israel) used in this study. The Clinical Skills Center employs a medical director, procedures lab manager, program coordinator, technology manager, program coordinator, program manager, and office associates.
A. Personal Statement

As an assistant professor, I am actively involved in surgical education including mentorship of medical students and General Surgery residents. I was awarded the Fellow Teaching Award at The Ohio State University Wexner Medical Center as a fellow in flexible endoscopy and minimally invasive surgery. My clinical and research interests predominantly include flexible endoscopy, ERCP, and surgical education. Along with Dr. Jeffrey Hazey, I am a co-investigator of our institution’s SAGES FES awarded grant entitled “Virtual Reality Simulation in Flexible Endoscopy: Implications for Resident Training.” I believe that the promotion of surgical education research will encourage the best and brightest students and residents to pursue a career in General Surgery, become competent and safe surgeons, and will ultimately translate to improved patient outcomes.

B. Position and Honors

Positions and Employment
07/2013 – present: Assistant Professor of Surgery, Department of Surgery, The Ohio State University Hospital East, Columbus, OH
07/2013 – 06/2014: Clinical Assistant Professor, Department of Surgery, The Ohio State University Wexner Medical Center, Columbus, OH
07/2007 – 06/2013: Clinical Instructor House Staff, Department of Surgery, East Carolina University, Brody School of Medicine, Greenville, NC

Other Experience and Professional Memberships
07/2013 – present: American College of Surgeons, Associate Member
07/2007 – 06/2013: American College of Surgeons, Resident Associate
07/2007 – 06/2013: North Carolina Chapter of the ACS
03/2007 – present: Arnold P. Gold Humanism in Medicine Honor Society
05/2012 – present: Society of American Gastrointestinal Endoscopic Surgeons
04/2015 – present: SAGES Guidelines Committee Member
04/2015 – present: SAGES Educational Resources Committee Member
03/2015 – present: American Society of Gastrointestinal Endoscopy

Honors
08/1997 Eagle Scout – Boy Scouts of America – Troop 6, Enid, Oklahoma
08/1999 Robert C. Byrd Scholarship, Washington University, Saint Louis, Missouri
08/1999 Dean’s Scholarship, Washington University, Saint Louis, Missouri
02/2006 Dr. Lawrence L. Jones Scholarship
06/2014 General Surgery Resident’s Fellow Teaching Award, The Ohio State University Wexner Medical Center, Columbus, OH

C. Selected Peer-reviewed Publications


D. Research Support

Ongoing Research Support

Virtual Reality Simulation in Flexible Endoscopy: Implications for Resident Training
SAGES FES Awarded Grant- 2014
PI: Dr. Jeffrey Hazey
Role: Co-investigator
Amount: $30,000
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

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<td>Post-Doctoral Research Fellow</td>
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**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

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**E. Personal Statement**

My research interests primarily include surgical education and improving patient-oriented outcomes in surgery. As a general surgery resident, I have been fortunate to play a large role in medical student and junior resident education with didactic and hands-on simulation sessions. I am currently a post-doctoral fellow in the Center for Minimally Invasive Surgery, where I am focusing on minimally invasive and endoscopic simulation training, including implementation of the SAGES-sponsored FES Grant. With the mentorship of Dr. Meara and the rest of the CMIS support team, I am confident that I will contribute to research to improve laparoscopic training nationwide.

**F. Position and Honors**

**Positions and Employment**

07/2015 - present: Post-Doctoral Research Fellow, Department of Surgery, The Ohio State University Wexner Medical Center, Columbus, OH

07/2012 - present: Clinical Instructor House Staff, Department of Surgery, The Ohio State University Wexner Medical Center, Columbus, OH

**Other Experience and Professional Memberships**

10/2015 (expected): Courage to Teach, Ohio State University College of Medicine

07/2014- present: Gold Humanism Honor Society, Resident Member, The Ohio State University Wexner Medical Center, Columbus, OH

07/2012- present: American Medical Association- Resident Member
07/2012-present: American College of Surgeons- Resident Member
05/2012-present: Alpha Omega Alpha, Upstate Medical University, Junior Induction
07/2011-05/2012: Gold Humanism Honor Society, Medical Student Member, Upstate Medical University, Syracuse, NY

**Honors**

06/2015: The Ohio State University Department of Surgery Resident Teacher Award
06/2015: Columbus Surgical Society Outstanding Surgical Resident Award, Columbus, OH
06/2015: Courage to Teach Induction- The Ohio State University Chapter, Columbus, OH
02/2015: Arthur P. Gold Foundation: Humanism & Excellence in Teaching Award, The Ohio State University, Columbus, OH
07/2014: Columbus Surgical Society Outstanding Surgical Resident Award, Columbus, OH
06/2013: Department of Surgery Intern of the Year Award, The Ohio State University Wexner Medical Center, Columbus, OH
03/2013: 10-East Rhodes Resident of the Month, The Ohio State University Wexner Medical Center, Columbus, OH
06/2012: Society for Vascular Surgery- Vascular Annual Meeting Travel Scholarship
05/2012: Merck Manual Award, Upstate Medical University, Syracuse, NY
09/2011: Medical Alumni Merit Scholarship, Upstate Medical University, Syracuse, NY
06/2010: Practice of Medicine Award for Excellence in Clinical Skills, Upstate Medical University, Syracuse, NY

**G. Selected Peer-reviewed Publications**


**H. Research Support**

**Ongoing Research Support**

None
PARTICIPATION IN SAGES

Michael P. Meara has been a SAGES member since May 2012, and currently acts as a SAGES Guidelines Committee member and Educational Resources Committee member since April 2015. He has attended numerous annual SAGES meetings. He is the first author for “Economic Impact of Per Oral Endoscopic Myotomy Versus Laparoscopic Heller Myotomy and Endoscopic Pneumatic Dilation,” and a co-author for “Near-Infrared Fluorescent Cholangiography Does Not Facilitate the Identification of Biliary Anatomy in Acute Cholecystitis During Laparoscopic Cholecystectomy,” both posters presented at SAGES 2014 annual meeting. He had three presentations at the SAGES 2015 meeting, including “A Novel Method for Evaluation of the Extent of Per Oral Endoscopic Myotomy,” “Subjective Gastroesophageal Reflux After Per Oral Esophageal Myotomy Does Not Correlate with Objective pH Studies: Should all Patients be on Proton Pump Inhibitors?” and “Prior Treatment Does Not Influence the Performance or Early Outcomes of Per Oral Endoscopic Myotomy for Achalasia.” Two of these articles have been accepted for publication in Surgical Endoscopy. He has also submitted two video presentations for the upcoming SAGES 2016 annual meeting. He is co-author of the book chapter “Tools and Instruments” for The SAGES Manual: Operating Through the Endoscope. Finally, Michael Meara is a co-investigators in the SAGES sponsored FES study at The Ohio State University Wexner Medical Center, entitled “Virtual Reality Simulation in Flexible Endoscopy: Implications for Resident Training.” Dr. Meara is also on the SAGES Guidelines and SAGES Educational Resources Committees.

David S. Strosberg is not a SAGES member, however he has submitted two abstracts as primary author for the presentation at the upcoming SAGES 2016 annual meeting. One abstract is entitled “Preventing anastomotic complications: early results of laparoscopic gastric devascularization two weeks before minimally invasive esophagectomy,” with Drs. Kyle Perry and Robert Merritt, and the other is entitled “A retrospective comparison of robotic cholecystectomy vs. laparoscopic cholecystectomy: operative outcomes and cost analysis” with Drs. Vimal Narula and Peter Muscarella II. He is also a co-author for the SAGES Manual of Groin Pain, chapter entitled “Chronic Groin Pain Following Anterior Hernia Surgery,” and is currently writing the chapter “Retirement” for the SAGES Transition to Practice Manual with Dr. David Renton.