The John H. Gibbon, Jr. Surgical Review

Jefferson
Philadelphia University
Thomas Jefferson University
HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

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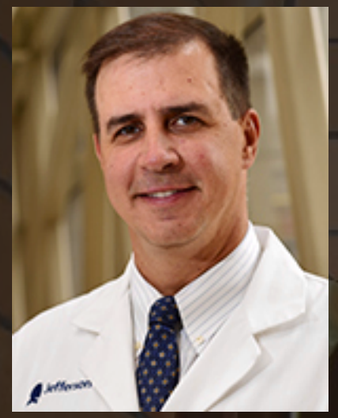
Faculty Mentor: Scott W. Cowan, MD, FACS

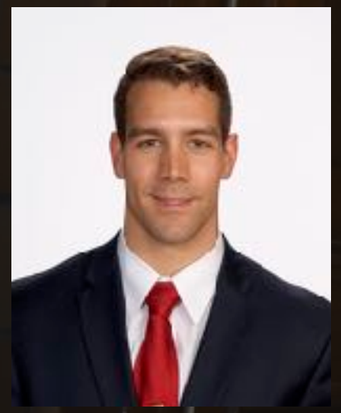


Scott Cowan MD, FACS was born and raised in Pittsburgh, Pennsylvania and completed his undergraduate studies in biology at the University of Pittsburgh. Dr. Cowan worked for the Pittsburgh Transplant Foundation as an organ recovery technician for several years and then resumed his studies at the University of Maryland at Baltimore where he completed a Master's Degree in Anatomy. He completed his medical school training at Jefferson Medical College in Philadelphia, Pennsylvania followed by a surgical residency at Thomas Jefferson University Hospital. Dr. Cowan completed his fellowship in cardiothoracic surgery at the Massachusetts General Hospital in Boston Massachusetts and worked three years at Penn-Presbyterian Hospital in Philadelphia. He joined the faculty at Thomas Jefferson University Hospital in 2010 and is an Associate Professor of Surgery.

Dr. Cowan is dedicated not only to the practice of thoracic surgery but also to improving the quality and safety of care provided to patients undergoing surgical procedures in the TJU health system. Currently he serves as Vice Chair for Quality in the TJUH Department of Surgery, Chairman for the TJUH Quality and Safety Committee, Vice-President of the Pennsylvania National Surgical Quality Improvement Program, and faculty advisor for the Gibbon Surgical Society. He thoroughly enjoys working on quality and safety improvement projects and historical vignettes with both medical students and surgical residents.

Dr. Cowan is married with two boys ages 14 and 11. He resides in Haddonfield, New Jersey.

John H. Gibbon Surgical Society President: Hunter Witmer



Hunter is a fourth year medical student at Jefferson and the current president of the John H. Gibbon, Jr. Surgical Society (GSS), one of the oldest and largest of such undergraduate surgical interest groups in the nation. Originally from Wilmington, Delaware, Hunter attended Wilmington Friends School ('10) and then Haverford College ('14) where he received a degree in molecular biology and played varsity lacrosse. While at Haverford, Hunter spent a semester abroad in Dublin, Ireland studying microbiology, human anatomy and biotechnology. Here at Jefferson, he has also served as president of the Dunglison Learning Society and a liaison for the Office of Student Life and Engagement.

Hunter began his involvement with Gibbon as a first year and subsequently, as a third year representative, founded the GSS Externship Program for students interested in general surgery, which is now entering its third consecutive year. Hunter also wrote a historical vignette titled, *Jonathan Letterman, MD: The Surgeon-Soldier & His Reform of Battlefield Medicine,* which profiles an immensely influential Jefferson alumnus and the changes he implemented as Medical Director of the Army of the Potomac during the Civil War. Hunter is currently applying for residency in general surgery with a special interest in surgical oncology.

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The John H. Gibbon Surgical Society Mission Statement:

The Gibbon Surgical Society is the surgical interest group of Sidney Kimmel Medical College at Thomas Jefferson University and is dedicated to providing a variety of surgical experiences and educational opportunities for students interested in the field of surgery. It is proudly one of the oldest and largest student-run societies at Jefferson, and aims to uphold the great tradition of excellent surgical education established by such individuals as Dr. Samuel D. Gross, and our namesake, John H. Gibbon.

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A Student's Perspective on JeffMD

Author: Somnath Das
Reviewer: Deborah M. Ziring, MD

Sidney Kimmel Medical College (SKMC), and Thomas Jefferson University (TJU) as a whole, have undergone a rapid flurry of changes in the last five years, including a merger with PhillyU, the incorporation of new hospitals such as Abington, Aria, and Virtua, and (of course) new students to add to the largest alumni network of medical professionals in the country. Perhaps the biggest change for the medical school has been the implementation of the new curriculum affectionately dubbed "JeffMD." As a first-year student, participating in JeffMD has felt like an opportunity to both receive high-quality medical training while also having great say in what the new curriculum will look like for future students. Overall, the opportunity to participate in this experiment has yielded both great results and continuing challenges. As a person interested in surgery, I have come to appreciate some of the changes the curriculum has made to SKMC's medical education, which I discuss in this piece, and aim to highlight JeffMD's areas of excellence and future growth with a focus on how its changes could impact future surgeons.

Perhaps one of the most valuable aspects of the new curriculum is its increased focus on teamwork skills in small groups. The previous curriculum had small group format sessions that usually focused on either practicing clinical skills or discussing reading assignments; JeffMD specifically adds a Case-Based Learning component to the curriculum that meets twice a week in lieu of having lecture on those days. On the first day, the groups are introduced to the case via the chief complaint. One-by-one, groups are expected to read and discuss the patient's HPI, physical exam, and imaging/labs to develop learning issues (questions) relevant to the case. While the cases are relevant to what is being discussed in lecture during that week, the groups are not expected to know everything to treat the patient initially. The group members are then expected to research their specific learning issues and present their findings during the second meeting of that week. With the knowledge of 10 learning issues, the students then collectively navigate how to best address the patient's pathology and manage their care. With the addition of CBL to the small-group curriculum, as well as the reduction in lectures, JeffMD shifts the emphasis from memorizing slides to integrating knowledge, in a collaborative context, to solve puzzles and treat patients.

An interesting development in JeffMD is the delivery of content via "threads," as opposed to discrete courses. Previously, students would take the (often grueling) three month Human Form and Development course immediately upon starting medical school and subsequently progress to separate courses on molecular biology, genetics, histology, and physiology. Anatomy is now a thread instead of a separate course and is thus taught continuously throughout the curriculum. With JeffMD, students now dissect the system they are learning about in the first week of each block while simultaneously studying lectures from different disciplines regarding the case for that week. For example, Block 3 (Cardiology/Pulmonology) began with a dissection focusing on the thoracic cavity and the accompanying case was a patient with tuberculosis (TB). Furthermore, in addition to anatomy lab and CBL, the students also had lectures on the physiology of breathing, TB in the context of global health, and the pharmacology of TB treatment. This approach allows us to see how structure and function intertwine with the various aspects of patient care; both our cases and weekly assessments further enable us to appreciate anatomical relationships within the context of our clinical case scenarios. For interested future surgeons, this integrated appreciation of anatomy may make it easier to visualize how defects in structure can lead to defects in function (or vice-versa). Additionally, integrating anatomy into clinical medicine makes learning anatomy much more palatable, which may end up assisting students in future surgical rotations should their knowledge of the pertinent anatomy be tested by attending surgeons.

"I feel that the biggest change in the curriculum is the integration of anatomy dissections with each systems block. Not only will this help each of us as future physicians orient what we've learned with its anatomical position and relationships better - but as aspiring surgeons it's creating a more stable foundation of anatomy from the start. Longitudinally I believe this will prove to make a difference in our overall ability to understand and grasp concepts, but more importantly set us up to enter clerkships and residencies well prepared and with more confidence"
- Katie Holland, MS1

This semester, the first year class was also introduced to our Scholarly Inquiry (SI) tracks. The tracks span multiple disciplines, including Clinical/Translational Research, Population Health, Health Systems, Design, and Humanities. Some of these tracks were previously part of the "College-Within-A-College" (CWIC) optional research program, whereas other disciplines are new (with more to come in the upcoming years). In addition to helping students find projects to assist with or conduct on their own, each track will be holding sessions designed to further strengthen the students' ability to conduct research in that discipline. For example, Clinical/Translational Research will hold sessions on analyzing clinical data while students in the Humanities may take courses on Creative Writing or Health Humanities. Throughout the SI curriculum, every student will be required to present their project in both written and oral formats. While research has always had a presence amongst SKMC students, the SI program can help anyone interested in surgery develop the necessary skills to conduct and present research via a longitudinal curriculum that begins earlier in the pre-clinical phase compared to CWIC. Another advantage of SI is that since every M1 is required to do a research project, students who decide to pursue a research-heavy residency relatively late in their training will have had progress on at least one research project with the opportunity to add more when they make that decision.

"I am excited about the integration of Scholarly Inquiry (SI) into JeffMD. Each track is preparing us as aspiring surgeons to think about surgery from a unique perspective - be it design thinking, health care systems, translational research, or population health. I believe that acquiring skills in those areas is highly desirable to have as part of a future health care team, and are not available to many other medical students during their education."
- Dante Varotsis, MS1

Being the first class to experience a new curriculum has not been without its challenges. Both Evidence-Based Medicine (EBM) and Health Systems Science (HSS) are now taking bigger roles in the new curriculum, and it is certainly difficult to present these topics in a manner that is consistent with our education in clinical medicine and basic science. EBM is currently being delivered by online lectures, which students have mentioned to the administration is a fairly difficult way to learn statistics without much integration into either the CBL or lecture components of the curriculum. HSS is also integrated into the theme of each week (e.g. a lecture on bias in cardiovascular disease during Cardio/Pulm); however, some of the lecture content and delivery needs additional work. The idea has been proposed, for example, to integrate HSS instead into the small-group setting with more complex cases that present with both clinical and psychosocial health issues. These matters are currently being addressed via student focus groups on how to best improve content delivery and integration into the curriculum as a whole. The new curriculum is also an adjustment for the professors and administration, and occasionally, logistical problems regarding communicating learning objectives arise, which are fortunately being actively addressed with student and faculty feedback.

The chance to participate in a new curriculum is not an opportunity many medical students get to have. For students planning on pursuing a career in surgery, I believe that JeffMD is a welcome change. JeffMD's stress on early clinical exposure via clinical skills small groups and CBL clinical vignettes, the delivery of lecture content through integrated, longitudinal "threads" such as anatomy, and its emphasis on teamwork in small group settings are welcome new additions that will benefit future surgeons greatly. The next couple of months will hold many exciting changes, and potential lessons, for the first class (and faculty) to experience JeffMD. The spirit of the curriculum, however, is an excellent change for those passionate about learning clinical medicine. The benefits of this approach to learning will surely last in our future careers, and for years to come.

For more information please visit, "http://www.jefferson.edu/university/skmc/about/jeffmd.html", or view a presentation by the reviewer at "Ziring, MD, Deborah, "JeffMD Update" (2016) Department of Surgery, Grand Rounds. Presentation

Spotlight on TJUH's Surgery Quality and Safety Working Group: Current Endeavors

Author: Samantha L. Savitch
Reviewer: Scott W. Cowan, MD, FACS

Quality improvement (QI) has become an enormous driving force in healthcare in the past few decades. With the advent of national quality programs such as the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP), the National Cancer Database (NCDB), and the SEER-Medicare Database, hospitals are increasingly incentivized to focus on improving outcomes, cost, and practices, and studies have shown that participating hospitals do in fact see reductions in adverse events[1]. In order to improve outcomes, hospitals need to undertake quality initiatives that assess the state of their practices and patients, and implement interventions that actively address their weaknesses. In response to this need, the Department of Surgery at Thomas Jefferson University Hospital has created a Quality and Safety Working Group (QSWG) composed of attending surgeons, residents, research nurses, clinical reviewers, and students focused on improving hospital practices and patient outcomes through assessment of hospital data, clinical studies, and eventual implementation of new programs. The team meets on a weekly basis to discuss progress, obstacles, opportunities, and accomplishments related to quality and safety within the Department of Surgery. The current surgical QI endeavors at Thomas Jefferson University Hospital (TJUH) involve everything from waste reduction to tackling the opioid epidemic, and address practices in the operating room (OR), the post-operative inpatient setting, and after discharge. These projects are demonstrative of the ongoing potential for positive change at TJUH, and underscore the necessity of multidisciplinary, hospital-wide participation in QI initiatives. This article will discuss these various endeavors, in order to highlight the efficacy and importance of the QSWG's work, and hopefully inspire others to look at their practices and environment to identify where and how TJUH can improve.

The post-surgical inpatient setting offers perhaps the most opportunities for improving quality and safety, as many adverse outcomes can be avoided through the use of specific interventions in the post-operative period. One such endeavor is the ICOUGH program, a set of guidelines for improving respiratory outcomes in the inpatient population introduced in early 2017. Originally devised by a group at Boston Medical Center, the ICOUGH program consists of daily incentive spirometry, deep breathing, oral care, ambulation, head elevation, and patient education, and has been shown to reduce the incidence of adverse pulmonary outcomes and significantly improve compliance with preventative actions[2]. ICOUGH is currently implemented on a number of units throughout TJUH and Methodist, and others are actively in the process of starting the program. The clinical nurse reviewers in the QSWG oversee the training of staff, implementation, and compliance with ICOUGH parameters, and utilize regular audits of patient interviews and health records to assess the program's success. In addition, leadership from the QSWG performs twice a week afternoon rounds on participating units to obtain real-time feedback regarding ICOUGH and to offer support to nurses and patients. Although ICOUGH is still being implemented and tested, the services that have effectively incorporated it into their practices have seen an overall improvement in adverse patient outcomes, including pneumonia and ventilator dependence.

"The current surgical QI endeavors at Thomas Jefferson University Hospital (TJUH) involve everything from waste reduction to tackling the opioid epidemic, and address practices in the operating room (OR), the post-operative inpatient setting, and after discharge."

While ICOUGH is generally aimed at improving respiratory outcomes, a few ambulation-specific programs have evolved as offshoots of the program, with an extended focus on tackling venous thromboembolism (VTE). VTEs are one of the biggest areas of concern for inpatients, specifically in the post-surgical population, and assessing and reducing the incidence of VTEs has been a mainstay of the QI programs. The incidence of VTE on the Hepatopancreaticobiliary Surgery Service at TJUH is one of the lowest in the country, when compared to similar patients, likely due to their carefully designed post-surgical pathway that emphasizes strict adherence to perioperative VTE prophylaxis and the achievement of daily ambulation goals. The task of ensuring that each patient on the service is ambulating sufficiently each day falls to the third year medical students, an arrangement that has worked effectively for a number of years. Given the success of the student participation on this service, the QSWG has recently expanded student ambulation programs to other surgical services in a move to not only reduce VTEs throughout the department, but also expose a larger number of students to the educational opportunities borne out of participation and patient contact.

In thinking about QI for surgical departments, we must consider the various patient care settings involved – pre-admission facilities, the OR, inpatient recovery, outpatient recovery – as well as the process of moving a patient from one setting to the next. Care for surgical patients is multidisciplinary, and during the transition from the OR to the floor, it is extremely important that all providers involved are aware of the status of the patient and the plan of care. If not done correctly, the critical hand-off of a patient from anesthesia and surgical staff to acute care and nursing can result in misinformation and a disconnect between intended care plans and those that are actually utilized. In order to prevent errors in communication, members of each care team need to be present during a patient transfer, and the plan discussed needs to be properly documented. As such, TJUH has implemented a system that carefully tracks a patient from the operating room to the surgical intensive care unit (SICU), ensures timely notification to all departments of patient movement, and guarantees that an in-person timeout occurs at the bedside before a patient is officially transferred from surgical to post-surgical care. This system, titled IPASS[3] (so-named for the five parts of the hand-off documentation), was implemented in early December of 2017 and is now seamlessly integrated into the hand-off processes of numerous services.

Quality improvement often focuses on patient safety and outcomes, but the ability to properly care for patients requires a time and cost efficient hospital environment. Improvement can be costly, and figuring out ways to cut unnecessary spending can open the door for more innovative programs. Prior to a patient entering the OR, countless instruments, sutures, and disposables are opened in preparation for the procedure. The general practice has been to open everything that could possibly be needed for a procedure, including extra materials and backup instruments, but the reality is that much of what is opened does not get used. This system leaves both the patient and the hospital covering the cost of unnecessary items, some of which may add up to tens of thousands of dollars. A preliminary assessment of surgeon preference cards (a list of items that a specific surgeon would like available for a certain surgery) at TJUH found that some materials are being opened that have not been used for that procedure in years, yet no changes are being made to acknowledge the monetary and physical waste. Putting a value on all opened and unused supplies throughout the department, and updating preference cards accordingly, offers a simple cost saving measure while lowering the carbon footprint of the hospital in the process. A project spearheaded by a second year medical student has taken on this task, an endeavor that has already identified substantial evidence of waste and created a framework for reducing inefficient, waste-creating practices.

The projects described thus far are in-hospital interventions aimed at in-hospital change, but TJUH exists in a larger community. Treatments can have consequences far outside the four walls of the hospital itself, and those effects need to be considered when assessing quality and safety. When caring for surgical patients, the goal is to ameliorate the underlying disease process in the OR while minimizing the risk of complications as a result of the surgical intervention and hospital stay, while simultaneously maintaining the highest level of comfort for the patient. However, this can lead to over cautious pain management practices that, while ensuring that most immediate patient needs are met, actively contribute to the growing opioid epidemic in the United States[4]. Patients being discharged after surgical procedures are often sent home on opioid painkillers, sometimes with prescriptions for 30 or 40 pills, yet, most of those patients will not use all of their prescription, resulting in large amounts of unused opioids entering the community[5]. Though unused prescriptions only account for a fraction of the widespread misuse and abuse of these medications, understanding the reality of what patients really need after surgery and adjusting prescribing practices accordingly can help to reduce the excess availability of controlled substances. Currently, the QSWG is conducting patient surveys in an attempt to determine the average number of opioid painkillers being taken after discharge for various surgical procedures. The

"The success of these initiatives is a direct reflection of the buy-in and active participation of the entire Jefferson surgical community."

results of these surveys will allow for further discussion into prescribing practices, patient and physician attitudes toward painkiller use, methods for patients to dispose of unused medications, and how the surgery departments at Jefferson can best mitigate unintended abuse.

The numerous efforts of the QSWG are consistently refining the effectiveness and safety of patient care, but it is not enough to just identify areas for improvement and implement programs; we must also demonstrate the value of those programs and constantly recognize new areas of weakness. As such, a portion of the group is dedicated to comparing Jefferson's outcomes and practices to the national standards in order to confirm our progress, identify how and why our initiatives have been successful, and disseminate that information throughout the health system, both locally and nationally. That said, the success of these initiatives is a direct reflection of the buy-in and active participation of the entire Jefferson surgical community, and it is imperative that these efforts continue to be a hospital-wide collaboration moving forward.

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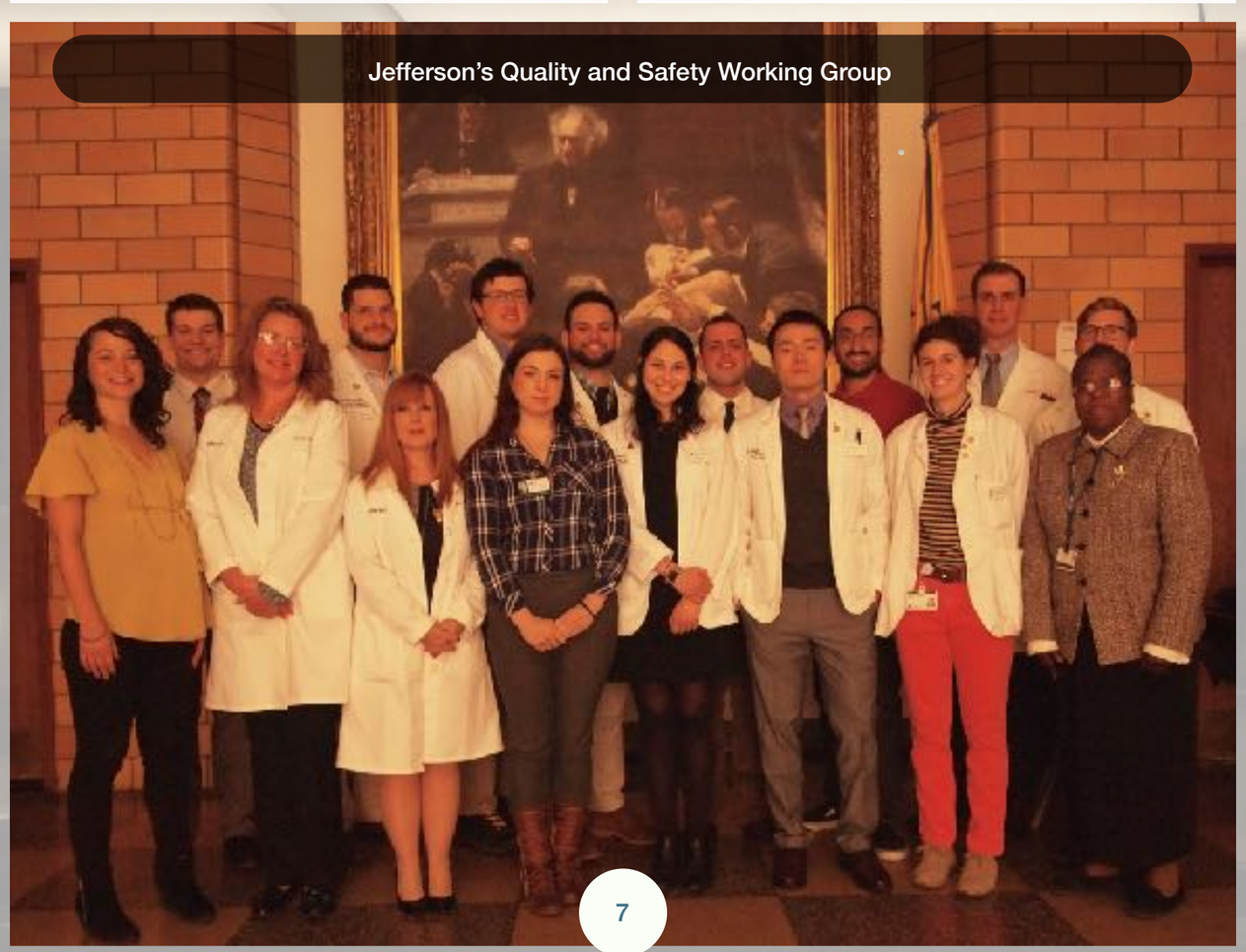
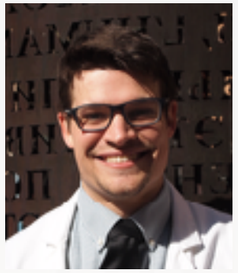


Medical Student Involvement in Quality Improvement Research: An Opportunity for Students and Hospital Sanctioned Initiatives Alike

Author: Tyler M. Bauer

Reviewer: Scott W. Cowan, MD, FACS



Quality improvement (QI) is a priority in our health care system and has received increased attention since the landmark publication of the Institute of Medicine report, "To Err is Human: Building a Safer Health System".[1] Research in QI presents many opportunities to further advance the quality and value of care provided for our patients. Currently, all surgical residents are required to participate in a QI project as part of the Accreditation Council for Graduate Medical Education (ACGME) requirements. While residents and attending physicians are frequently involved in QI initiatives, medical student involvement is modest at best.[2]

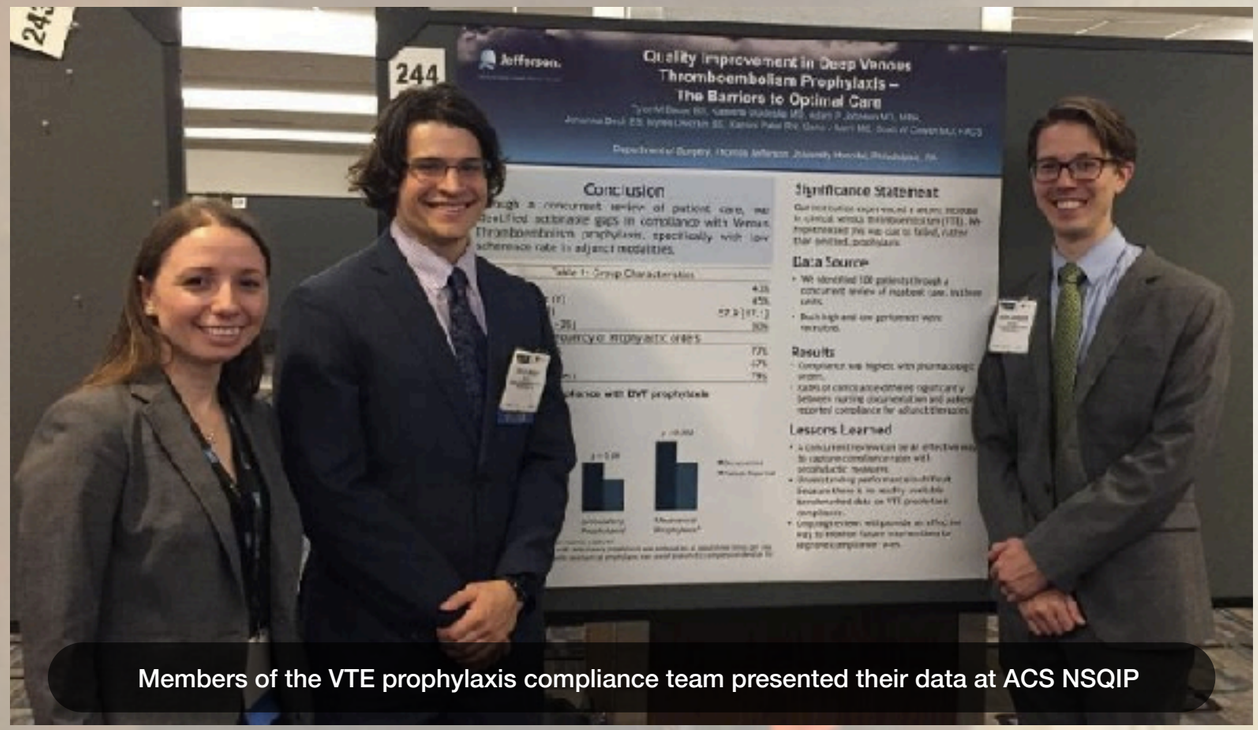
Low medical student involvement in QI research is exemplified in a recent article in which a single institution found that only 6% of internal medicine internship applicants accepted to interviews had documented QI engagement on their curriculum vitae or letters of recommendation.[3] Accompanying this paucity of research involvement is a deficit in the education of undergraduate medical students in quality and safety, which has been corroborated by a recent systematic review.[4] While there have been recent successes in the literature describing new education and research initiatives targeting medical students, the vast majority of medical students are not receiving education or opportunities in QI.[2,5,6]

There have been recent reports of new initiatives aimed at improving medical student involvement in QI research. One such instance involved the implementation of an elective QI research and education track which runs concurrently with the student's four year medical school curriculum.[5] This four-year track included lectures and dedicated research time focused on QI projects. The program resulted in 11 national presentations by the 11 students that chose to pursue the track and two students were selected for an Institute for Healthcare Improvement (IHI) leadership development program.[5] Another successful initiative involved the development of a QI curriculum that required research projects focusing on improving outcomes related to quality of care at community-based family practice rotations.[6] The project involved over 70 second year medical students and focused on raising the rates of documentation of eye and foot exams and decreasing the mean glycohemoglobin during their study period.[6]

Over the past few years, our institution has demonstrated success in medical student-led quality improvement projects that have addressed issues such as catheter-associated infections, postoperative unplanned intubation, and venous thromboembolism prophylaxis.[7,8] Despite low overall involvement in QI research in the literature, it is clear that medical students can play a more active role in QI research projects throughout our health care systems.

A compelling reason that students should engage in QI research relates to the rapid pace at which projects can be completed. This is most noticeable in projects that retrospectively identify quality gaps due to availability of data collected by programs such as the American College of Surgeons National Surgical Quality Improvement Program (NSQIP). Retrospective analyses provide opportunities for students to focus on understanding the appropriate statistical methods as well as honing their research-related writing skill set. Since medical students have approximately three and a half years to build a curriculum vitae, it is a challenge to complete prospective studies and/or bench research projects within this time frame, due in part to the significant amount of time it takes for these projects to be completed. Additionally, medical students involved in research may not be considered for first authorship, as they cannot be the primary driving force for the lifespan of that project. In our experience, retrospective quality improvement projects can produce high quality abstracts and papers, often within a year of initiation, and offer opportunities for presentations and publications which are exceptional education experiences.

Students should engage in QI research in order to prepare for practicing in today's health care environment. The transition of our health care system from a quantity- to quality-based system is having a significant impact not only on care provided, but also on provider reimbursements and penalties incurred by our hospital systems. For example, the Merit Incentive Payment System (MIPS) proposes adjustment of physician reimbursement by Medicare by almost 10%, based primarily upon quality measures in the coming years.[9] This can significantly impact hospital finances, not only because quality metrics affect Medicare reimbursement, but also because the adverse event itself is costly (estimates of postoperative



Members of the VTE prophylaxis compliance team presented their data at ACS NSQIP

reintubation are ~$62,000[10] per event and ~$46,000[11] per event for central line infections). It is a valuable skill for physicians to understand how to implement initiatives to improve their quality metrics, and it will be increasingly important for hospitals to recruit individuals with knowledge of the value of care provided.

Student involvement in QI research also allows for collaborative interactions with a myriad of medical professionals. Successful QI initiatives should leverage all stakeholders in patient care including attending physicians, residents, nursing staff, and medical students. This manifests at our home institution by having house staff and students participate in committees that frequently coincide with areas of research interest (ex. Missed Opportunity, Patient Safety Indicators (PSI), and the Deep Venous Thrombosis Prevention Committees). Additionally, a multidisciplinary team convenes weekly to discuss QI research projects in a "roundtable" format, where medical students present proposals and provide updates regarding successes and opportunities for project improvement. Exposure to these collaborative groups builds an appreciation of each profession's role in patient care and in the prevention of adverse events.

QI projects expose students to processes aimed at cultivating and supporting research best practices. These core concepts are readily available, and apply to all research, in addition to QI.[12,13] One aspect of QI research methodology is the formation of the "Implementation Team."[12] The key members of the team are a senior leader, a representative from each of the medical professions, and a data analyst.[12] In our experience, this has manifested in research project teams that are led by a senior physician, with involvement from one upper year resident, and stakeholders from other disciplines including nursing, physical therapy, and medical students.

While medical students have much to gain from QI research, hospital led initiatives stand to benefit from medical student involvement in QI projects as well. Effective QI initiatives often hinge on recruitment of all stakeholders of patient quality, and the failure to engage medical students remains an unmet need. This is especially true for students on clinical rotations, who are often extremely engaged in patient care, and therefore can have a significant impact on the quality of care provided. Indeed, many of the quality improvement projects at our home institution have involved collecting data on medical student proficiency at tasks such as hand washing and Foley catheter insertion. These projects benefited from the input of the medical students on the team, especially with respect to finding a realistic study design that did not disrupt the hospital workflow. Certainly, eliciting medical student viewpoints on patient care strengthens the team's approach to initiating interventions aimed at addressing deficits in the quality of care at an institution.

In summary, medical students interested in pursuing projects should consider QI as a focus of their research. This pursuit allows for the opportunity to increase competency in clinical research and statistical analysis while offering an early introduction to the multidisciplinary approach to improving the quality and safety of care provided. Hospitals planning QI interventions should actively seek medical student input and encourage participation due to their extensive involvement in the care of patients. A review of the literature has shown that there are some promising attempts to involve medical students in QI initiatives, but as a whole, there is a tremendous opportunity for increased participation.

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Global Surgery: A Shift in the Global Health Paradigm

Author: Myles S. Dworkin
Reviewer: Jennifer Kincaid, MD

In 2008, Drs. Paul Farmer and Jim Kim, co-founders of the non-profit Partners in Health, described surgery as the neglected stepchild of global health.[1] Over the past decades, there has been a focus in attention on communicable diseases such as HIV and tuberculosis leading to productive research and advocacy. Unfortunately, global surgical services have notably been overlooked for many reasons. Communicable diseases are responsible for roughly 19% of global deaths and effective strategies, such as mass drug and vaccination administrative programs, exist for addressing them.[2] As these diseases pass from person to person in the current age of globalization they have the propensity to spread globally. The recent Ebola outbreak is just one example of the worldwide threat caused by the spread of communicable diseases. Furthermore, surgery is a complex endeavor from both a technical and logistical standpoint demanding substantial investment even for the most basic interventions. The lack of access to surgical treatment and care in low-income and middle-income countries (LMICs) has become a global crisis. The Lancet Commission on Global Surgery published their findings in 2015 demonstrating the extent of the issue. Their findings include:[3]

Figure 1: The Lancet Commission findings on the extent of the Global Surgery Crisis

- 5 Billion People do not have access to safe, affordable surgical and anesthesia coverage.
- 143 million additional surgical procedures are needed in LMICs per year.
- The Poorest 1/3rd of the population receives only 6% of surgeries per year.
- Lack of Surgical Coverage in LMICs is predicted to lead to a loss of economic productivity estimated at 12.3 trillion between 2015-2030.

Surgical care in LMICs is an "indivisible, indispensable part of health care".[1] To remedy this dearth of delivery requires a collective international

effort. The purpose of this article is to provide an overview of global surgery including its current status, challenges, and future directions.

In order to begin to shift the paradigm of global health and address the blatant inequalities in delivery of surgical care, one must first consider what the term "global surgery" means in order to better define its objectives.[4] This nascent term links surgical need with the overarching global health agenda.[5] Global health can be thought of in terms of geographical reach, level of cooperation, and target population.[6] In this sense it can be defined as a field of healthcare involving cooperation, both locally and globally, that transcends national boundaries with the goal of addressing health disparities concerning the individual as well as the population. The term surgery in this context does not strictly refer to procedural based initiatives, but rather the broader field, which includes subjects such as patient safety, hospital-acquired infections, preventative medicine, and pre/post-operative care.[3] With these ideas in mind, the opportunities and challenges within global surgery become more apparent.

The objectives of global surgery are fairly straightforward: create sustainable systems in order to increase access to surgical care. This can be carried out through three main methods of on-the-ground work: living, "twinning," and volunteering. Living refers to a surgeon living full time in a LMIC and working full time at a local hospital. This facilitates both increased procedural coverage as well as the development of educational opportunities for local students and physicians. "Twinning" is a strategy established by academic surgeons in which a Western university or department partners with a counterpart in a LMIC. Surgeons spend time at both institutions with the goal of developing an academic and clinical relationship. Examples of this include the University of California San Francisco's Program in Surgery and Global Health and Harvard's Department of Global Health and Social Medicine.[7] The last hands-on approach, the volunteer model, relies on relief-based organizations that provide physician support on an episodic basis. These include organizations such as Médecins Sans Frontières, the International Committee of the Red Cross, as well as countless non-profit and faith-based organizations. Although the increase in interest and support for global surgical initiatives is encouraging, the escalation of involvement has revealed new challenges. It has also raised questions regarding how to engage in this kind of developmental work in a responsible, ethical, and meaningful capacity as healthcare professionals.

The barriers to surgical care in LMIC can be stratified into patient, physician, and institutional related causes.[8] Examples of patient centered challenges include issues with health literacy, stigma and traditional beliefs, and social support. Health literacy is a primary factor preventing patients from successfully interacting with healthcare systems all over the world and remains a key mechanism described by the World Health Organization to meet their health-related Sustainable Development Goals.[9] This involves patients knowing when to seek help and how to do so. A lack of health related education is correlated with medical adherence issues as well as a determinant of health-seeking behavior.[10] Stigma against health facilities and traditional beliefs may also prevent patients from receiving the services they need. For example, a fear of hospitals and the stigma of an abnormal birth were significant factors while trying to encourage Bengali women to deliver in health centers.[11] Furthermore, surgical care in LMICs must be viewed as a social process for a family, for it is the family that must provide for the patient both in the hospital and during the recovery phase.[12] Due to severe workforce shortages, many families are forced to take over the nursing role and provide everyday care for their loved ones. This challenge requires a significant investment of both time and resources. The obstacles preventing surgical care extend beyond the individual, however, and include both physician and institutional wide challenges.

One of the most concerning problems with surgical care in LMIC is the lack of access for millions of individuals. As seen in table 1, the discrepancy in surgeons per 100,000 individuals between LMICs and high-income countries is alarming. The health worker shortages hinder the delivery of medical services in all aspects of healthcare. This limitation of human resources significantly impacts surgical service delivery, which often relies on multidisciplinary teams and continued post-operative management. In response to this, many countries have turned to non-physician surgical providers to handle the increasing demand in the community setting. In fact, studies have shown that in some LMIC the majority of surgical providers are paramedical professionals.[8] This is exacerbated by the common emigration of surgeons and other highly trained individuals away from their home countries. Even with trained surgical personnel available, institutional roadblocks exist which often prevent the delivery of surgical care.

Systemic barriers include a number of topics, but two important considerations include resource/supply chain management and physical infrastructure. Many countries experience severe limitations in resources and are often inefficient with those they have.[8] For example, in a review of the provincial and district hospitals in Afghanistan it was found that 30% did not have adequate oxygen supply, 40% did not have access to uninterrupted running water, and 66% did not have continuous electrical power.[13] The allocation of these resources is also concerning with most of the supplies located in limited geographical areas such as major cities. This coupled with severe infrastructural problems such as poor road conditions, fuel costs, and lack of transport options greatly impedes rural patients with surgical emergencies from accessing care. A recent study in Nepal demonstrated that one of the leading factors for individuals foregoing surgical care was due to living in rural areas and long travel times.[14] In order to begin addressing the issues of rampant surgical inequalities we must consider the barriers that encompass the problem.

The global surgical burden and lack of access to surgical care has caused a worldwide crisis. While the international health community has made great strides towards addressing issues concerning communicable diseases, global surgery has until recently been left out of the conversation. The paradigm of global health is changing and a shift towards the inclusion of surgical issues is occurring through a refinement of methods and strategies to address important issues. Changes to health systems, however, must be systemic similar to the evolution undertaken to address infectious diseases. The growing interest in the field is encouraging, but special concerns and barriers require close deliberation. Although the disparities in surgical coverage are daunting, with a comprehensive and collaborative effort care can be provided to those in need.

Table 1

Country	Number of General Surgeons per 100,000	Population	Comparably Populated Region	Number of General Surgeons per 100,000[13]	Population
Malawi	0.43	15,000,000	Pennsylvania	9.2	12,800,000
Sri Lanka	2.96	20,800,000	New York	10.1	19,700,000
Republic of Yemen	0.81	27,580,000	Texas	6.3	27,860,000
Morocco	3.74	35,280,000	Canada	35.29	36,290,000
Kenya	2.35	48,460,000	Spain	109.07	46,350,000
Democratic Republic of the Congo	0.19	78,740,000	Germany	112.85	81,910,000

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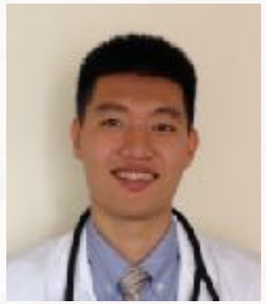
Thomas Jefferson University Design Vault

Author: Victor B. Hsue, BS
Reviewer: Dominick J. Gadaleta, MD



The Jefferson Design Vault is nestled inconspicuously in the basement of the old bank vault on 925 Chestnut next to Jefferson's Post Office. Headed by Dr. Bon Ku and Dr. Rob Pugliese, the space is filled with numerous new technology and gadgets for medical students to play and experiment with. Here is where the two of them teach design thinking to medical students to spur innovation. Design thinking is a human-centered approach to innovation that draws from design tools such as empathy and experimentation to come up with solutions better suited for the user, such as the patient or caregiver. In the past 1.5 years at Jefferson, I have been fortunate to be very deeply involved with the many offerings of the Design Vault. I am a part of the JeffDesign CwiC as well as JeffSolves. JeffDesign is an extra-curricular program that accepts twenty medical students to work on projects each year to identify and solve problems inside the Jefferson Hospital.

Through JeffSolves, the product design oriented summer program, I collaborated with three other students to create ALAFLEX, a patent pending ergonomically-shaped axillary bandaging system for patients suffering from the dermatological condition Hidradenitis Suppurativa. Lastly, I have also worked on a variety of design-related independent surgical research. From all these experiences, especially my surgical research, I have learned how to fix the problems and complaints I see in the hospital through design thinking, a linear, yet deeply creative process.

Currently, my Design research group collaborates with Jefferson Otolaryngology on a variety of surgical training and planning projects via 3D printing. The core team consists of myself, two other second-year medical students, Denis Huang and Nick Rankin, and a Jefferson ENT resident, DJ Gadaleta. Over this past summer, with the help of college interns, we first created a workflow for processing CT datasets into physical models using a pipeline of various open source software and our personal Ultimaker 3D printer. Armed with this consistent tool, we could now isolate specific parts of patient's CT scans, such as their mandibular bone, and reproduce them with accurate, physical models from our 3D printer .

Our main project involves reducing operating room (OR) times and costs associated with mandibular reconstruction surgeries. The complexity of this common procedure used by ENT surgeons after head and neck cancer resections made it an ideal candidate for our first efforts. Reconstruction of the mandibular area is a multi-step process involving the transplant of tissue from another part of the body, generally the fibula, to replace the removed bone. The fibula flap is then secured to both sides of the remaining bone using special titanium plates, which are bent by the surgeon to the contours of the patient's original jaw. This is an incredibly labor intensive and time-consuming process, with some adjustments taking up to an hour to get the perfect curvature and fit. The technology to provide custom pre-bent plates for each patient's case already exists, offered by companies like Stryker, but the costs are prohibitive and not a scalable solution for a hospital. With knowledge of the cheaper costs of personal-sized 3D printing, we aimed to achieve the same clinical outcomes as these pre-bent plates while significantly reducing the time and cost. Using our workflow and patient CT scans, we 3D printed out exact models of each patient's mandible for approximately $5 each. The surgeon is now able to reference the diseased area anatomically and plan with a 3D object in his/her hand. The 3D print also serves as an ideal substitute to pre-bend the titanium plate before the operation, saving time in the OR.

Our group has also used this workflow for two other projects. The first project involves creating 3D models of midfaces from patient CT scans to provide ENT surgeons with a physical model for surgical planning for maxillofacial and orbital reconstructions. For this project, we had to do extra troubleshooting because the midface is a much more complex print, taking on average 30 – 40 hours to complete. 3D printed models are always created with a system of supports to keep it stable during the printing process. Because the face is much more complex in curves and fissures, the print comes out with more support material, many of which is harder to remove by hand. We solved this issue by finding a new printer that could print the supports as water-dissolvable plastic. Our last project involves 3D printing human temporal bones as a replacement for cadaveric bone for temporal bone drilling practice, an important component of otolaryngology training. With this project, we are now specifically focusing on color coding important internal structure in the bone, such as the facial nerve, to enhance them, as educational aids.

In each of these projects, we applied the process of design thinking in order to create our most viable solution, and I learned to appreciate this method in

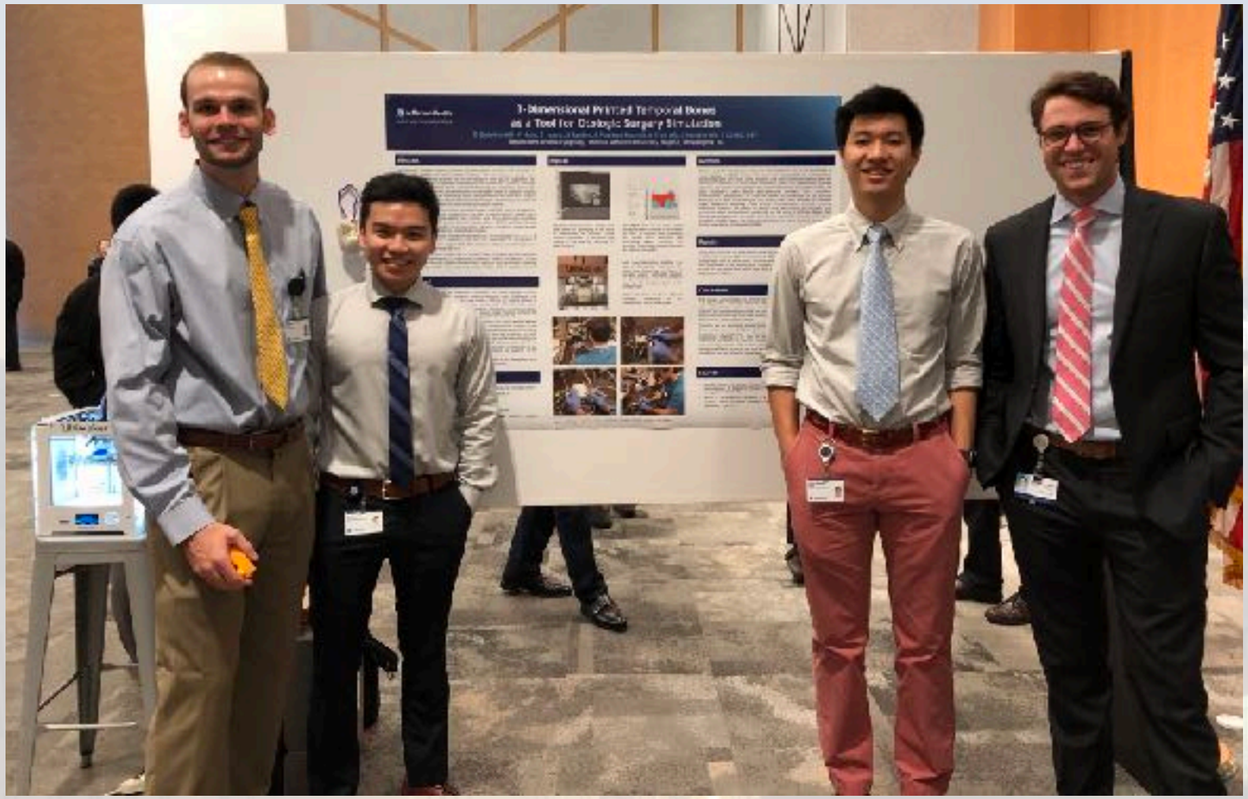
Image Reference: "http://design-health.com/"

creating products. After working in a setting and seeing procedures over and over again, it is easy to focus on what is not working and what is inefficient. Innovation does not occur immediately after a problem is identified. First, we search for the root of the problem. Who is affected the most by this issue? Why is it so bad? Next, we painstakingly iterate on and prototype different solutions, with some great ideas but many more that would never work. Lastly, we let the users test our prototypes and figure out what facets are helpful and what must still be improved upon. With this method, we can confidently say that we have solved an issue in the best manner for our user. Our research team followed this model exactly for creating the mandibular models. We started off by shadowing and documenting the head and neck cancer surgery procedures extensively and meeting the operating teams that worked on these cases the most. Next, we created and improved on all aspects of our procedure, including changing the workflow around, testing with different print settings, and changing our print materials around. Lastly, DJ would bring our models into cases and get valuable feedback from attending physicians on how to improve them for their benefit. In this way, our models are rigorously user-tested and critiqued, resulting in a model that most resembles what the ENT surgeons initially envisioned.

Because surgeons always employ a fairly fixed set of tools in their practice, they will always notice what does not work or takes too long. Wherever I am in my future career, with my training in the Jefferson Design programs, I will be able to work through the design thinking process starting from identifying future issues and eventually iterating to a user-centered solution. Although we are only working with the ENT department right now, we are confident that the model that we follow can be translated to other surgical departments at Jefferson.

Additional Links: For more information about the Jefferson Design Vault and various Design Programs, please visit, "http://design-health.com/". For more information about the JeffSOLVES 2017 product ALAFLEX, please visit "https://www.alaflexdesign.com/".

Pictured Below: Students present Mandibular ENT 3D printing project at house staff meeting in 2017.
From left to right: Nicholas Rankin, BS, Denis Huang, BS, Victor B. Hsue, BS, Dominick J. Gadaleta, MD



Pictured Left: Head of the Department of Surgery, Charles J. Yeo, MD and the five vice chairs of the department.

From left to right: Jonathan Brody, PhD, Ernest Rosato, MD, Karen Chojnacki, MD, Charles J. Yeo, MD, Scott Cowan, MD, Francesco Palazzo, MD

Citation: (2015) "On the Job," *Jefferson Surgical Solutions*: Vol. 10 : Iss. 2 , Article 7. Available at: http://jdc.jefferson.edu/jss/

Physician Spotlight: Ernest (Gary) L. Rosato, MD, FACS

Author: Carrie E. Andrews, BA
Reviewer: Charles J. Yeo, MD, FACS

Dr. Ernest Rosato is a longtime member of the Jefferson family. After graduating from Jefferson Medical College in 1990 and completing his residency at Jefferson in 1996, he joined the faculty in the Department of Surgery as a general surgeon. The Rosato family has a significant history at Jefferson. Gary's father, Dr. Francis E. Rosato Sr., was formerly the Chair of Surgery and the sixth Gross Professor at Jefferson from 1978 to 2000 and his son, named Francis after his grandfather, is now a fourth year student at Sidney Kimmel Medical College. At the beginning of his career, Dr. Rosato practiced at Jefferson with his father, and he continues this legacy today. He currently serves as the Director for the Division of General Surgery and the Vice Chair for Clinical Affairs within the Department, and his clinical and research interests are incredibly diverse. After spending some time on the Green Surgery service this fall and personally observing Dr. Rosato's operative mastery, as well as his empathetic and warm engagement with patients, I spoke with Dr. Rosato about his career, family legacy, and advice he has for aspiring surgeons. (This interview has been condensed and edited.)

Q: What drew you to surgery initially?
A: I had a strong family interest in surgery. My grandfather was the equivalent of a colorectal surgeon back in the 1940's and 1950's [at the former St. Mary's Hospital in Northeast Philadelphia], and he also ran a family practice office out of his home [in Port Richmond], which was not uncommon at that time. Then both my father and my uncle went to medical school and entered surgery residency training programs. My father ultimately ended up here at Jefferson, and my uncle was at Penn. Both were longtime general surgeons, and so they had a profound influence on my decision to go into surgery. My father was a fantastic mentor to have, and certainly he was the strongest influence on me.
I was always fascinated by science, and I liked fixing things, so surgery seemed like a logical career choice. During high school and college, I worked in the Jefferson research lab in nephrology and transplant surgery, getting some experience with hands-on surgery and technical training. I had the opportunity to be exposed to a lot of good mentors at that time, including Dr. Bruce Jarell, who was director of transplantation, and Dr. Anthony Carabasi, who was a vascular surgeon here. I had the chance to fly out to observe organ harvest for transplant, to go to the OR, and to make rounds. At that time there was no laparoscopy. I stood on a stool in the OR and could only see a little bit, but I could tell there was something really interesting going on. When I got to medical school, the first few years were not so exciting, but the clinical years really sealed it. I got a chance to get involved with the whole surgery team concept. All of those things came together and I ended up going into this career.

Q: Was there anything about surgery that was different than you originally expected?
A: There's more to surgery than the technical aspects of it that attracted me initially. There's a family doctor component, where you're taking care of people and solving their problems, sometimes in areas where there are no solutions. That requires a different skill set, which I certainly didn't have when I started medical school. It adds a degree of challenge and interest to me that was different from what I thought I would experience when I got into practice. Practice can initially be very stressful, and that growth period was very exciting for me. I've heard that you're supposed to learn more between the ages of one and three than during any other time in your life. My impression was always that I learned more between my third year of medical school to the end of residency than I did in those first three formative years.

Q: Your father was an important member of the Department of Surgery at Jefferson, including serving as the Gross Professor. What was your experience like, working with him?

A: I know some people have trouble working with their family members, but he was very easy to work with and very supportive. For me, it was absolutely great. For him, I don't know [laughs]. We worked well together, and I basically had the best resource, not just as a medical student or a resident, but even more importantly when I was a junior faculty member. I was able to call him in at any time; I could ask him questions about cases; if I got into trouble he could help me out. That's something that is pretty rare to have access to, and that was invaluable in my early development. My children were very close with him, and we would have family dinner with him a couple times a week. We'd talk shop, about this case or that case. It was a constant mentorship that he provided for me.

Q: Are there any lessons that your father taught you that you remember as being particularly significant?
A: A team can achieve much more than an individual in the world of surgery, and being a good team is very important. Do your best, and that will in the long run pay off more than anything else that you can do in your career. Always strive to be the best and to be honest with yourself, as well as your patients. Those are the things I try to emulate.

Q: What does it mean to you to be a member of the Thomas Jefferson community, given that your family has been such an integral part of the university for many years?
A: I love working at Jefferson. I think it's the greatest hospital and university that there is, though I may be a little biased. Jefferson has some really famous alums and people who shaped surgery at the turn of the century, people who were surgical giants in an era where things that we take for granted were just being pioneered. They were learning on the fly and breaking new ground all the time. To come from that type of medical and surgical legacy is really an honor. For me, I love being part of Jefferson. People are extremely collegial and care about how you do. They're working toward the same goals you have, which are good patient care and advancing science.

Q: Do you have a favorite surgical procedure? What do you enjoy about it?
A: I trained primarily in open surgery, and then only later in my career did I get into minimally invasive procedures, which have shown really dramatic improvements in outcomes. With the minimally invasive esophagectomy, there is an amazing difference between how people recover now compared to when I was in training. Plus it's a good example of thoracic surgery, general surgery, and critical care working together to take care of these patients, and I'm very proud of that program.

Q: Is there an aspect of operating that you particularly like?
A: I really enjoy the technical aspects of it, but also the actual operative planning. You meet a patient with a problem, and then there's a process where you try to figure out the appropriate solution. It's not always black and white, and there may be a lot of different options. Being able to sift through those options and figure out what you think is the best for that patient is like solving a puzzle, and you have to make some decisions in the operating room to finish it. I like that challenge, the figuring out.

Q: What do you find most rewarding about your surgical practice? Has this changed over the course of your career?
A: I do like the variety of cases that I see, and there is a certain gratification to having that patient go home with their problem fixed. Some of the problems that you deal with in our specialty are not one hundred percent fixable, so that isn't something you see every day, and so that really gives me a thrill, when it does happen. That has always been the most rewarding part for me. A lot of the time you remember the patients in whom you've had complications. You sometimes forget the ones who do very well, because they're in and out quickly, but often they're the ones who appreciate the fix most.

Q: What are the most challenging aspects of being a surgeon, in your experience? What helped you to deal with those challenges?
A: Certainly there is a stress component associated with it that can sometimes be distracting from your outside life. It's hard to let go of what goes on at work; it's always in the back of your mind, and there's always a strong sense of ownership. Pulling yourself away from your patients and their needs can sometimes be difficult, but you need to make time for your personal life and your family.
Dealing with unsolvable problems, like cancers that will never be cured with surgery, and having to tell people those things and help them through it, can be a real challenge. The outcomes are not always good, but patients appreciate the help. And of course, everyone has bad outcomes, no matter how good they are. Someone once told me that surgery is a very humbling sport, and it is. No matter how good you think you are, there's always a problem that can pop up. I think dealing with complications and imperfect outcomes is something you have to learn as you get older. I had some great mentors, and when things seemed absolutely devastating to me, they had a more seasoned view and put things in perspective to help me through. And having my colleagues around to always help me, that's an invaluable asset, and I've been lucky in that respect.

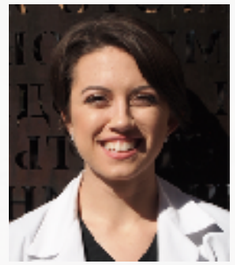
Q: What role has research played in your career? What excites you about surgical research?
A: I started in the labs in college and medical school, learning things that helped later in my career in terms of techniques and being comfortable handling tissues. Later I took a year off and did bench research, which taught me a couple of different things. It gave me insight into what other researchers go through, and how challenging and frustrating it can be. It also taught me that I wasn't going to be a basic science researcher for the rest of my life. I found that I would understand what goes on in the lab, but there likely would not be a major role for me as a bench researcher if I were going to do clinical surgery. Basic science research is a very difficult thing to do, and few people can balance it with surgery. But I do enjoy research, especially looking at outcomes. I've been surrounded by very talented people in my group, who have put together great research based on our clinical areas of interest. In that respect, I've been blessed with people who've run with that research idea.

Q: Do you have advice for students who are considering becoming general surgeons? What do you think they need to know before they enter this field?
A: It's a fantastic field. It is extremely challenging. You may never master it, no matter how far along you are, but that's part of what draws people to the field. If you like fixing things, and you like the challenge of solving problems, I think it's probably one of the best things to go into.

Q: Where do you see the field of surgery going in the future? How can aspiring surgeons prepare for these changes? Is there a particular way that you find the best or the most about new advances?
A: I think in the future there are going to be more minimally invasive techniques for taking care of general surgery problems, like better robots and advancements to even smaller laparoscopic instruments. I think there still will be a role for general surgery procedures, and I see them being done in ways that are less and less stressful for the patient, and hopefully for the surgeon too. I think in the realm of cancer, there are going to be advancements that are going to make a lot of cancer surgery hopefully obsolete, figuring out ways to treat tumors beyond just simply removing them. Obviously there have been phenomenal gains made in those areas recently, and I think that will continue accelerating.
All of these changes tend to happen in waves during your training. You have to be able and willing to learn well beyond what you get in your medical school and surgical training. I learned more as an attending than I ever did during my surgical training. Having the ability to look at new techniques and new ways of treating things, to evaluate them critically, and also to be willing to adopt those in your practice, if you see that they're better than what you doing before, is an important attribute. You have to be flexible, to be someone who pursues self-learning, and hopefully to be someone who wants to push the field forward with your own endeavors. It's easy to do the same things over and over again, but to change your practice and your comfortable operative procedures takes a little bit of push.

SCALPELS: Simultaneous Curriculum for Advanced Learning in Preparation for Entering Life as a Surgeon

Author: Emily Papai
Reviewer: Gerald Isenberg, MD, FACS



In 2008, the AAMC published updated Recommendations for Clinical Skills Curricula for Undergraduate Medical Education, which promoted the goals of "advanced beginner level in the performance of basic procedural skills" and "enhanced preparation of medical students for the clerkship experience".[1] This monograph has been embraced across the nation as medical colleges have announced fine-tuned curriculums that enhance early clinical exposure and skill education - Sidney Kimmel Medical College's (SKMC) new JeffMD curriculum included. We should also acknowledge the changes in surgical education that have occurred; long gone are the days of "dog lab" as a chance for students to perform independent surgery and anesthesia on canines before internship. However, since the ACGME last created Prerequisite Objectives for Graduate Surgical Education in 1997, based on program director feedback of "essential" and "desirable" skills for the graduating medical student,

pre-clinical medical students have continued to crave the start of third year clerkships in order to begin practicing these espoused skills.

Although Jefferson is renowned for producing desirable graduates who excel in intern year, some surgeons at SKMC felt that structured procedural skills training could begin even earlier in medical education -- even at the first year level -- for those interested in surgical specialties. Furthermore, what if the institution could develop a program to take advantage of *all four years* of medical school to foster these skills and provide longitudinal learning for fields of medicine that require general technical skills? This idea has lead to SCALPELS, which stands for Simultaneous Curriculum for Advanced Learning in Preparation for Entering Life as a Surgeon: a new type of optional/supplemental curriculum, designed to bring surgery-focused lectures, clinical skills, and team-based learning to first and second year students that complements their education in JeffMD. Sponsored by the Gibbon Surgical Society and physicians such as Dr. Gerald Isenberg and Dr. Harrison Pitcher, the initiatory group of first and second year SKMC students are already spending nights practicing their surgical knots and scrub technique.

Dr. Isenberg's experience as director of surgical undergraduate education prompted him to think of best methods to engage students in the surgical fields before clerkships began. He believed that the best approach to promoting interest in surgery was for students to embrace it head on early in medical school and that such exploration could be an integral component of the didactic years. His vision was a new curriculum that actively perpetuated student interest in the field while tailoring the learning experience to their level of knowledge such that proficiency in surgical skill and understanding could be accelerated throughout their training. In 2016, Dr. Isenberg partnered with a group of SKMC 2016 graduates - Casey Lamb, Jillian Bonaroti, Megan Lundy, and Carly Comer - to begin synthesizing their ideas. After a pilot program in the 2016 school year, the program has been enacted by a new generation of fourth year students. This Fall, Randa Barsoom, Laura Steel, and Hanna Miedl, along with Dr. Isenberg and Dr. Pitcher, led the recruitment and enrollment of seventy-five first and second year students to be a part of their project with the goal in mind of readying mature, skilled, and knowledgeable surgeons.

The students completing their Team Based Learning session.

SCALPELS aims to accomplish this goal while instilling a love and respect for the field of surgery. It is paramount that the program does not simply offer what is being taught in clerkships, but provides a holistic approach of introducing students to surgery. In addition to the didactic and skills components, students are also required to get involved with the department. SCALPELS measures this involvement by a newly developed point system where students document activities such as shadowing in the operating room, presenting a paper or poster, or volunteering for department events in order to be acknowledged for their initiative. The goal of this system is to yield preclinical students who know the faculty, experience life as a surgeon, and who apply their knowledge from the curriculum in real-life situations. Next steps outside of continuing the curriculum as planned include holding surgical skills competitions and fostering mentoring opportunities to further create a community of students excited and engaged about the field.

Just as understanding the lifestyle and community of surgery is important to prepare students for a future in surgery, so is completing one. Per Dr. Isenberg, by fourth year of medical school, students in SCALPELS should be able to perform a laparoscopic cholecystectomy on a simulator with little to no guidance. With such an interactive curriculum and this high level of expectation, it is no wonder students are passionate about being a part of this new and improved education. "SCALPELS has been a great opportunity to learn," said Somnath Das, a first year enrolled in the program, "it's also been great meeting the other people interested in surgery including upper years involved with Gibbon." I, personally, could not contain myself when I was told there was chance I could highlight laparoscopy skills at a residency interview. Overall, Dr. Isenberg predicts that these medical students will be exceedingly well prepared, much more than any other medical student, for not only their surgical clerkship in third year, but also for surgery interviews and residency.

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The members of the SCALPELS curriculum met for their first lecture, "So You Want to be a Surgeon?" by Dr. Isenberg.

Recent Publications at Thomas Jefferson University Hospital

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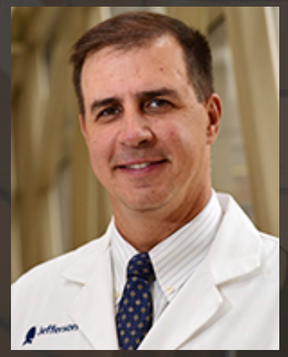

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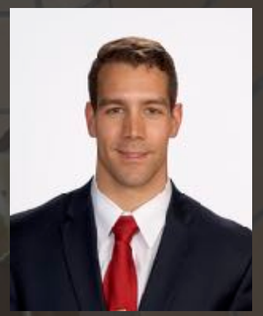

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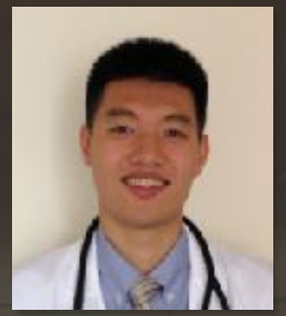

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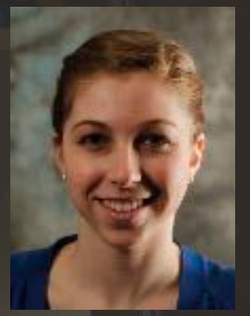

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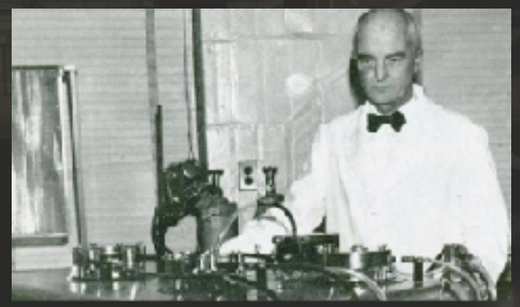
John H. Gibbon Jr., MD

John Gibbon and his wife May Hopkinson developing the first heart/lung machine.

On May 6, 1953 at Jefferson Medical College (JMC) Hospital, Dr. John Heysham Gibbon, Jr. and his staff, with the help of his latest-designed heart-lung machine, "Model II," closed a very serious septal defect between the upper chambers of the heart of eighteen-year-old Cecelia Bavolek. This was the first successful intercardiac surgery of its kind performed on a human patient. "Jack" Gibbon did not follow this epoch-making event by holding an international press conference or by swiftly publishing his achievements in a major medical journal. In fact he later recalled that it was the first and only time that he did not write his own operative notes (which were supplied by Dr. Robert K. Finley, Jr.). According to a recent biographical review by C. Rollins Hanlon, "therein lies a hint of the complex, unassuming personality behind the magnificent technical and surgical achievement of this patrician Philadelphia surgeon."

Gibbon graduated from Jefferson Medical College in 1927 and in a brief series of events he was named Fellow at Massachusetts General Hospital. In 1930 he found himself assisting Dr. Edward Churchill in an emergency pulmonary embolectomy. At that time the procedure was one of desperation as no patient in the U.S. had survived the removal of blood clots in open-heart surgery. As Dr. Gibbon recorded the patient's waning vital signs prior to the procedure he thought, "if only we could remove the blood from her body by bypassing her lungs, and oxygenate it, then return it to her heart, we could almost certainly save her life." Despite a successful removal of large clots from the patient's pulmonary artery, she never regained consciousness. This "critical event" initiated Gibbon's determination to produce a heart-lung machine. By 1939, he published results of total body perfusion experiments on a number of laboratory cats that survived by employing his early apparatus.

He was made Chief of Surgical Services at the 364th Station Hospital in the Pacific Theater. After the war, returning to Philadelphia, his alma mater offered him the position of Professor of Surgery and Director of Surgical Research, for which he accepted. Through JMC's connections, IBM and its premier engineering department entered the picture and worked with Dr. Gibbon and his oxygenator to develop a larger device known as IBM "Model I." Maly Gibbon and the JMC surgical residents were also deeply involved in the evolution of this huge apparatus (too heavy for the building's elevators) which proved repeatedly successful in experiments on dogs. But limitations on the machine for human patients existed and the decision was made to cannibalize parts of Model I for Model II which was ready for its first test in February 1952. Although the heart-lung device was fully functional, the first patient, a 15-month old baby, died during the operation. A post-mortem revealed a much larger defect than was suspected. After the triumphant Bavolek case in May, Gibbon employed the Model II on two more patients in July 1953. Both children subsequently died, prompting Gibbon to declare a year's moratorium regarding use of the heart-lung machine, pending investigations into solving clotting problems and blood loss.



Charles J. Yeo, MD, FACS

Dr. Charles J. Yeo was born in East Orange, New Jersey, and attended Spring Valley Senior High School in Spring Valley, New York. He received his undergraduate degree from Princeton University in 1975, summa cum laude with an A.B. in Biochemistry. Dr. Yeo graduated in 1979 from the Johns Hopkins University School of Medicine, being awarded the Upjohn Achievement Award and was elected to Alpha Omega Alpha and Phi Beta Kappa. He went on to complete his residency in General Surgery and fellowship in advanced GI and vascular surgery at the Johns Hopkins Hospital.

Dr. Yeo joined the faculty of the Johns Hopkins University as an Instructor and Assistant Chief of Service in the Department of Surgery in 1985, and rose to the rank of Professor of Surgery in 1996. Dr. Yeo directed the Pancreatic Cancer Interdisciplinary Working Group at Johns Hopkins, and served as the Surgical Clerkship Coordinator and Surgical Curriculum Consultant. In 2001, Dr. Yeo received the Alumni Association Excellence in Teaching Award from the Johns Hopkins University School of Medicine. In 2002, Dr. Yeo was named to an endowed chair at Johns Hopkins, becoming the inaugural John L. Cameron M.D. Professor for Alimentary Tract Diseases.

On October 1, 2005 Dr. Yeo was named the 8th Samuel D. Gross Professor of surgery and he assumed the chairmanship of the Department of Surgery at Sidney Kimmel Medical College at Thomas Jefferson University in Philadelphia, Pennsylvania. He currently serves on the Board of Trustees of the Thomas Jefferson Hospital System.

Dr. Yeo's academic accomplishments include being Editor-in-chief of *Shackelford's Surgery of the Alimentary Tract*, 7th Edition, being an Associate Editor of *Advances in Surgery* and Co-Editor-in-Chief of *Journal of Gastrointestinal Surgery,* and serving on the editorial boards of *Langenbeck's Archives of Surgery*, *Surgery*, and *Annals of Surgery.* He is the author of over 500 peer reviewed scientific papers, numerous abstracts, over 105 book chapters, and over 15 books or monographs.

Dr. Yeo's primary interests and research have been in the field of alimentary tract surgery, focusing on hepatopancreaticobiliary surgery - the evaluation of patients with pancreatic, biliary and related cancer, and the management of patients with unusual pancreatic neoplasms, as well as acute and chronic pancreatitis. He travels nationally and internationally teaching and lecturing on the treatment of benign and malignant pancreatic diseases and has personally performed over 1500 Whipple operations.

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