

GIBBON SURGICAL REVIEW

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The Evolution of Surgical Practice During the Ongoing COVID-19 Pandemic

Kapila Kommareddy, Class of 2024

On March 11th, 2020, COVID-19 was declared a pandemic by the World Health Organization, changing the delivery of medicine in the United States in an unprecedented manner and altering the future direction of healthcare. Since then, there has been an exponential rise in COVID-19 cases in the United States, a massive shortage of personal protective equipment (PPE) for frontline workers, and the overwhelming of hospital systems across the country as well as internationally.¹

The pandemic has also impacted surgical practice, both in and outside the operating room. A notable change has been the pause or reduction of elective surgeries due to state mandates. The reasoning for this was to preserve bed capacity, conserve PPE for frontline workers, have adequate staff coverage, and reduce risk of COVID-19 transmission within the hospital. As mandates have varied across states, so have surgical practices across different institutions.² While some states strictly defined “elective procedures”, others gave hospitals more autonomy to stratify.

In Pennsylvania, initial restrictions in March completely stopped elective procedures. The following month, hospitals were allowed to resume some elective procedures but had to reduce elective surgeries by 50% if the region experienced a 50% increase in COVID-19 admissions over two days, if less than 10% of non-ICU beds were expected to be available over three days, or if 33% of the hospitals anticipated staffing shortages within a week.³ These mandates affected not only patients, but hospital systems as well. The Thomas Jefferson University Hospital system lost over 300 million dollars in revenue³, and the enterprise continues to face issues, including a fall in surgical volume due to patients’ reluctance to return to hospitals and a decrease in patients’ ability to fund their healthcare due to economic hardships. The challenge the hospital faces is in shifting the responsibility onto insurance companies and being creative with keeping patient costs inside the premium.

A positive during this time is the collaboration between doctors across specialties and hospitals; several national organizations and teams of physicians collaborated to create recommendations and guidelines for hospitals at various levels nationally. There has also been an immense amount of work that has gone into restarting elective procedures across the country, including at Jefferson. Hospital networks across the nation have instituted committees whose goals are to modify procedures and

policies based on real time data and changes in the COVID-19 stream of information. The American College of Surgeons (ACS) came out with weekly guidelines for surgeons in different specialties. The core idea behind these recommendations was to minimize operative procedures by using nonoperative clinical treatments when possible, reduce OR times in situations where surgery could not be avoided, and most importantly, use sound judgement and provide timely care when treating patients.⁴ Additional guidelines from the ACS have stressed adapting intake protocols for preoperative assessment, revising nursing and anesthesia checklists, minimizing staff in operating rooms, creating guidelines for PPE use intraoperatively, prioritizing high acuity cases, and adhering to standard of care protocols post-operation (achieving the balance between decreasing length of stay and minimizing complications.⁵ At Jefferson, this year, an entire section of the Patient Safety Conference was devoted just to COVID-19 related initiatives made by students and doctors. Some of the solutions included making a central hub of information, which is accessible with QR codes, consisting of up-to-date clinical guidelines related to perioperative procedures for anesthesiologists, surgeons, and nurses.⁶ Other projects included nurse and provider safety workflow charts and checklists for COVID-19 patients.⁷ Many student initiatives involved screening patients for COVID-19 prior to doctor appointments.⁸

Once the Jefferson health system able to resume elective surgeries, they followed mandates proposed by the health department including all patients and employee having to wear masks. First and foremost, all patients undergoing non-emergent procedures had to have a negative COVID-19 test within 72 hours of the procedure. Patients who had tested positive for and recovered from COVID-19 within the past three months were not required to get tested to have procedures done. Precautions were taken in the hospitals to encourage adequate social distancing. Efforts were undertaken to disinfect the common areas and provide hand sanitizers at all locations, as well as a low touch care model implementation with no touch registration sites in the hospitals. Additionally, routine visits and checkups were shifted to a telemedicine model via JeffConnect which was a large shift in practice for many providers. Visitor hours were limited, and only one visitor could be in a patient room at a time.⁹ Given COVID-19 is transmitted via droplets, the use of N95

masks was widely adopted in most hospitals, especially during aerosol generating procedures like intubation, bronchoscopy, and endoscopy.⁴

In a town hall meeting organized by the surgical department at Jefferson recently, the Samuel D. Gross Chair of Surgery, Dr. Charles Yeo, discussed some of the goals of Jefferson Surgery going forward. Given the financial hit that the hospital has taken, they aim to increase surgical volume above the baseline of 100% as well as increase the number of complex cases the surgeons tackle.¹⁰ Additionally, the department hopes to focus on increasing the research productivity of faculty and residents to elevate the surgical department at Jefferson.¹⁰ The department plans to distribute surgeries from the Center City campus to outpatient sites at Methodist and Jefferson Northeast to reduce the flow of patients in one location.¹⁰ In addition, focus on restructuring the model of care around virtual visits and changing the layout of the physical locations to incorporate social distancing and COVID-19 safety guidelines continues to evolve.¹⁰

A dramatic change has also been observed in the educational sphere of surgery. With COVID-19, all Grand Rounds lectures and symposiums have been shifted to an online model where they are accessible to everyone, including attendings, residents, and medical students. Traditionally, these talks and town halls would not have had high attendance in the past year; however, virtual meetings are more accessible to those with busy daily agendas. While the virtual format has increased attendance somewhat, it is important to consider if it has increased or decreased the quality of conversation and amount of attention that each participant pays to the topic, given the ease of muting oneself. Since these events are often recorded, they also offer everyone the opportunity to go back and review them at their leisure. A database of information stored in the format of recorded town hall meetings and lectures lends itself to tremendously expanding and improving surgical education in the future.

The pandemic has also impacted research efforts since March 2020. Research is critical for improving surgical practices and education of fellow and residents. The pursuit of research during residency is important for those interested in an academic career and competitiveness in obtaining a fellowship. With the help of the Sidney Kimmel Cancer Center Research Committee, Dr. Yeo and the Vice Chair of the Division of Surgical Research, Dr. Johnathan Brody, developed guidelines to allow bench researchers to continue to perform research during COVID-19. These guidelines provided graduate students, residents, and Principal Investigators (PIs) methods within the lab mechanism to safely continue bench and clinical research. These include, virtual lab meetings, working in shifts to maintain social distancing, and virtual one-on-one meetings. PIs were encouraged to write more manuscripts and submit grants. As a student researcher in a lab at Jefferson during the pandemic, I saw firsthand these guidelines being implemented. PIs were advised to set up the expectations and build the appropriate infrastructure for communication between them and their lab members (via zoom or slack), strengthen internal and external collaborations, focus on filling gaps in knowledge, and doing other administrative tasks.¹¹

The COVID-19 pandemic has presented obstacles for surgical research, education, and operations, but these obstacles have been met with a strong effort to change the way the healthcare is delivered. Post-COVID-19, telehealth has become an increasing component of healthcare. COVID-19 rates are variable and still worrisome, but patient needs must be a priority. With the continued vaccine rollouts, hopefully public opinion will change, and more patients will be willing to return to hospitals to seek the care that they need. With careful consideration and adherence to the guidelines, hospitals can work towards providing quality care in a new era of medicine.

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Socially Responsible Surgical Care: A Movement Committed to Surgical Equity

Taylor Haddad, Class of 2023

Feminist-scholar Kimberlé Crenshaw coined the term “intersectionality” as a lens to more precisely explain the complex interactions between a myriad of identities, including race, ethnicity, socioeconomic status, gender, and sexuality, that yield forces of oppression.¹ These very forces exist within institutionalized healthcare, manifesting as, but not limited to, racially and socioeconomically stratified barriers to accessing care that precipitate as disparities in surgical outcomes.² As inequities in our healthcare system continue to be unveiled, utilizing an intersectionality lens to analyze both access to care issues and disparities in perioperative surgical care outcomes may help scrutinize and pinpoint structural violence etiologies, such as institutionalized racism, sexism, and classism.

The literature is saturated with recounts of surgical inequities: Medicaid users experience worse postoperative outcomes than their private insurance counterparts³; people of color are less likely to receive emergent surgical procedures⁴; black patients encounter a higher post-surgical mortality rate than white patients⁵; the COVID-19 pandemic exacerbated the United States (US) unemployment rate and left millions of people – disproportionately people of color – without employer-sponsored health coverage and consistent access to affordable care.^{6,7} It is no coincidence that the US healthcare system has been described as a predatory capitalistic model perpetuating the crisis of low access to care, thereby accentuating disparities in health outcomes and quality of life.⁸ This crisis of impaired access to care is underscored by surgical deserts (rural areas experiencing surgeon shortages) and the development of domestic and global regions of surgical poverty², further magnifying the above disparities and ultimately the complexity of fully achieving surgical equity.

Surgeons are therefore in a unique and vital position to reduce these disparities. While utilizing an intersectionality lens will help surgeons better advocate for patients and meticulously tailor and curate comprehensive care, addressing the unequal distribution of surgeons domestically and globally offers a platform for surgeons to directly intervene in the perpetuation of unequal surgical care access². The stark reality of limitations in care access paired with systemically rooted structural violence and the accompanying forces of oppression (e.g., institutionalized racism) facilitate creating a vast, surgically disadvantaged

population of patients.

Intersectionality allows for precise dissection of the relationship between decreased access to surgical care and poorer health outcomes, as demonstrated by the intimate intersection of race, history, geographical location, and socioeconomic status. Circa the 1930s in Philadelphia, “redlining” and modern-day gentrification efforts geographically marginalized black Philadelphians. The resultant concentration of poverty and barriers to resources inhibit black Philadelphians’ ability to break intergenerational socioeconomic disadvantage – a life sentence given the predatory, capitalist commodification of healthcare services in the United States. Additionally, these concentrated regions of poverty in North Philadelphia are disproportionately targeted by liquor stores, tobacco products, and are concurrently burdened by food deserts. These intersecting forces culminate in the infamous health-wealth zip-code phenomenon.⁹ In Philadelphia and other major urban hubs, life expectancy differs by almost two decades when comparing historically redlined neighborhoods and affluent zip codes.

Applying what we know about surgical perioperative disparities and barriers to accessing surgical care, a lens of intersectionality will help advocate for surgically disadvantaged populations. Socially responsible surgical care aims to address the lack of access to competent, consistent, and comprehensive care and simultaneously acknowledges the interplay of individual identities amongst the larger forces of oppression. Using Crenshaw’s lens, surgeons may begin to deliberate how a patient’s intersecting identities, lived experiences, and structural violence impact the delivery of patient care and the downstream perioperative surgical readmissions, mortalities, and morbidities. This bridging of surgery, public health, and advocacy creates a space for surgeons to provide socially responsible surgical care.

At the rise of 2014, Socially Responsible Surgery (SRS) chapters, with a mission to “...identify opportunities for leadership, research, and collaboration in the training of globally-minded surgeons committed to surgical equity”¹⁰ and groups-alike blossomed around the country, all curated with the tagline “surgical equity.” However, despite improved surgical quality over time, the improvement itself is a disparity, as it is fastest for white patients.¹¹ With an entire surgical population at risk, merely including diversity and inclusion committees to meet benchmarks

and increasing usage of social justice 'buzzwords' to check off boxes will not suffice. The consequences of surgical disparities are too grave to consider any inconsequential solution. Instead, continued surgical equity efforts need to be authentic in approach, compassionate at the core, and wholeheartedly and undeniably dedicated to acknowledging and caring for surgically disadvantaged populations.

The genesis of a solution rooted in intersectionality may begin with a distilled two-fold goal: develop and educate a generation of surgeons willing and able to understand the interconnected webs of oppression and creation of surgical care team that is eager to improve access to care, detests the unjust, and effectively works to mitigate the dire disparities that are in existence today.

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The MS4 Perspective on the Path to Surgery

William Connolly, Class of 2024

Choosing a specialty is a paramount task for medical students. A seemingly unique process for every student, the decision to pursue one type of medicine over another most definitely weighs on the minds of medical students. Starting medical school during the COVID-19 pandemic has no doubt abated the efforts of first year medical students (MS1s) to explore the world of healthcare. Limited clinical experience, online learning, and social distancing measures have made this process difficult for preclinical students who are unsure of the direction they wish to take their careers. I talked with three MS4s who recently matched into surgical residencies about what led them to surgery, and what advice they would give to an MS1 who might have no idea if they want to go into Neurosurgery or Family Medicine (that's me!).

When talking with Emily Papai, Nate John, and Yousif Hanna, I asked how and when they knew that surgery is what they wanted to do. Emily, like many medical students, was interested in surgery going into medical school, but lacked the operating room exposure to know for sure. Between her first and second year at Jefferson, Emily participated in the Gibbon Surgical Society's summer externship, where she experienced the operating room for the first time. "The first time in the operating room, I thought it was perfect", she said. "I like how ceremonial operating is, everyone has a role, there is such a routine... it almost feels like a religious experience". But while experience in the operating room is always going to be an important step in determining if surgery is for you, there are many other aspects of the field to consider. Yousif, who has always been interested in the business, politics, and systems of healthcare, looks at surgeons as leaders in their field who do more than just operate. "Work-life balance doesn't exist if you're always doing what you love. I realized a lot of surgeons have this. They're very direct, productive, mission driven, and focused". Yousif knew before starting medical school that he wanted to be a surgeon. He credits his year between college and medical school as the most impactful period for this decision. In contrast to Yousif and Emily, Nate says he had no idea he wanted to do surgery until his clinical years at Jefferson started. In fact, Nate pointed to the exact day that he knew he wanted to do surgery: September 19, 2019. Even at his very own bachelor party, Nate couldn't stop thinking about the 24-hour shift he had just worked to get the days off for his weekend. Nate told me he has a great time in any operating room. He says that he "loves that general surgeons actually still take care of their patients [and] don't need to consult. I didn't want to be shackled by having to pass my patient off".

Despite all three of these soon to be MDs establishing their interest in surgery in different ways, each brought up the importance of mentors on their path. "Meeting someone that supports you and acknowledges your talent and believes in you is so important", says Emily. Yousif echoed these words, describing Dr. Scott Cowan, a thoracic surgeon at Jefferson, as someone that possesses qualities that Yousif wants to see in himself. "Having someone like him who was operating, doing big data quality improvement initiatives, and was so humble and so nice... I saw this on a daily basis". Nate put the importance of mentorship succinctly, saying, "a lot of what makes or breaks your experience is people who believe in you and give you opportunities... you have to jump on it when someone is willing to put the time into you".

In response to my inquiry about what advice they would give to a MS1 who believes they are interested in surgery, Emily, Yousif, and Nate all stressed the importance of finding mentors. Yousif also mentioned how crucial research is. "Start research now... if there are no opportunities, create them". He also emphasized the fundamentals of medical school: good grades and scoring well on the Step exams. Nate believes attitude plays a major role in how we decide what type of medicine to go into. He would advise an MS1 to, "keep an open mind to everything. Don't go into any rotation with a bad attitude. It can almost be a self-fulfilling prophecy". Lastly, Emily suggested looking at the people holding the positions that a student might see his or herself in one day. Pay attention to "the types of people, their behavior, how they treat each other, how they treat their patients. Surgeons are hardworking, they can put their head down. But they're also funny and enjoy their work. That was something I wanted to be around", she said.

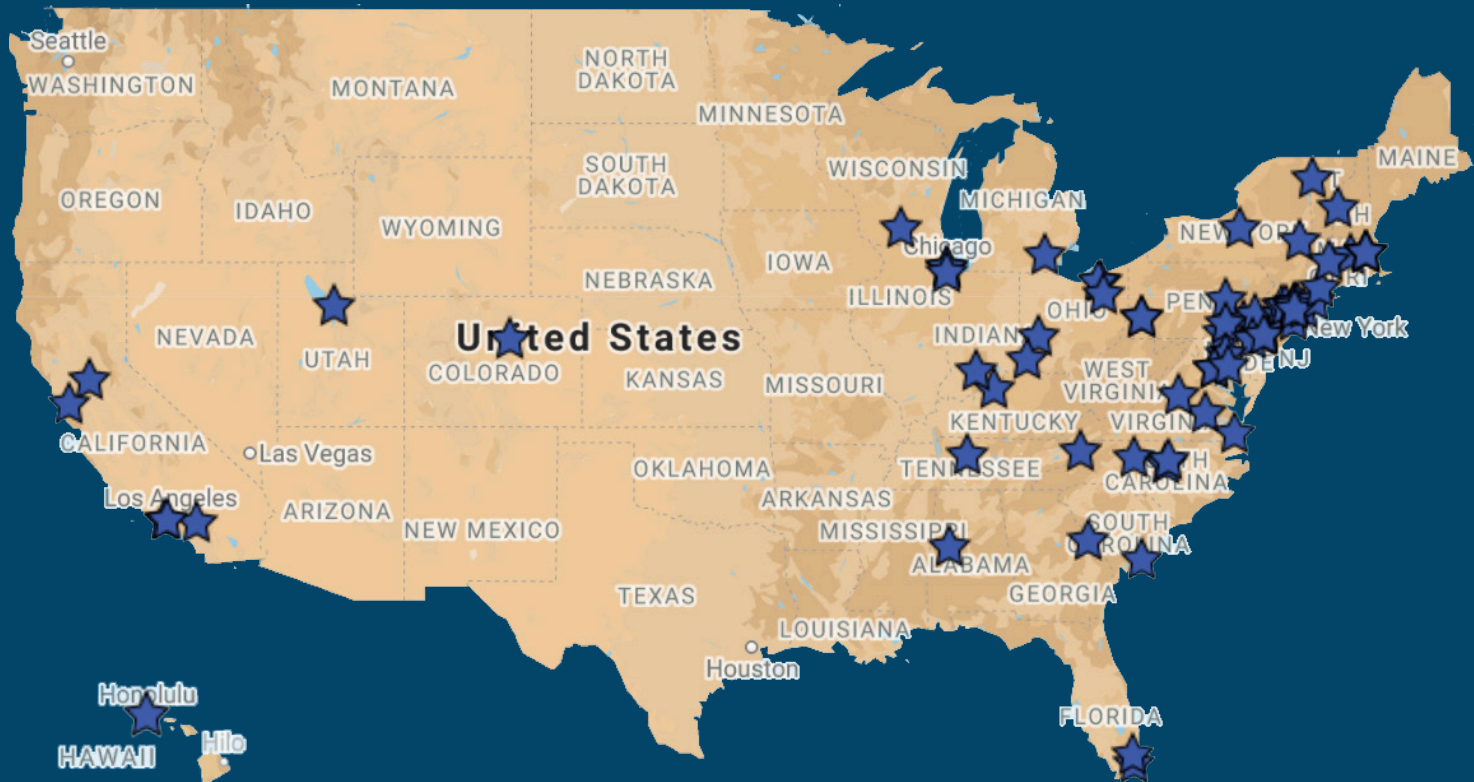
If, as Emily put it, surgery is something you want to be around, exposure to the operating room is important, but it is not the be all and end all. Learning from mentors, finding meaningful research projects, and excelling on exams all play substantial roles in the path to a surgical residency.

Thank you to Yousif Hanna, Nate John, and Emily Papai for taking the time to talk with me and answer my many questions about their journeys through medical school.

THE JEFFERSON LEGACY: WHERE ARE THEY NOW?

A look at where the SKMC students from the classes of 2016-2020 are completing their surgical residencies and where the newly matched class of 2021 is headed in July!

Congratulations class of 2021! We're so excited to see where your careers will take you.



Where We Matched in 2021

Abington Memorial Hospital
Anne Arundel Medical Center
Case Western Reserve/University Hospitals
Cedars-Sinai Medical Center
Christiana Care
Cleveland Clinic, Florida
Cleveland Clinic Foundation
Icahn School of Medicine at Mount Sinai
Medical University of South Carolina
Morristown Memorial Hospital
Summa Health/NE Ohio Medical University
Temple University

Thomas Jefferson University
Tripler Army Medical Center
UC Davis
UCSF - East Bay
U of Illinois, Chicago/Metro Group
University of Massachusetts Medical School
University of North Carolina Hospital
University of Utah Health
University of Vermont Medical Center
University of Virginia
University of Wisconsin
Yale - New Haven Hospital

The Role of Empathy in Surgery: a Commentary and Conversation with Dr. Harish Lavu

Lasya Rangavajjula, Class of 2023

As aspiring physicians choosing a future specialty, we come across stereotypes associated with each field. Perhaps you have heard the stereotype that general surgeons are callous and detached, as is commonly depicted on popular medical shows such as Grey's Anatomy. The surgeon comes into the patient's room, cold and calculated, and leaves the operating room the same way, with very little patient interaction or attention towards the patient's postoperative progress. Yet, so much of what we see on television and the notions we may have about surgeons, are, like most stereotypes types, false. Popular media rarely shows the interactions between patients and their surgeons in the clinic or elsewhere beyond the perioperative period - and what is shown is often inaccurate and one dimensional.

Empathy is considered to be a key component to a therapeutic relationship that enhances health.¹ Clinical empathy can be defined as the ability to understand the patient's personal experience, with careful attention to emotional, cognitive, and behavioral components.¹ The role of empathy in medicine is critical as it forms the backbone of the relationship between the patient and health care professional. Research points to an increased sense of security and trust for health care users when providers are empathetic. Perceived empathy is associated with higher adherence to treatment, reduced symptoms, and greater patient satisfaction.² Needless to say, empathy is integral across all health professions and is fundamental for proper care.

However, the perception of a provider's empathy can potentially strain these relationships. Prior literature shows that variation in patient satisfaction rates can be attributed to the perceived empathy of a healthcare worker.² In particular, the stereotype of a guarded and apathetic surgeon is one that is widespread and has far-reaching implications. A view through this lens can lead to patients feeling more guarded when disclosing information to their surgeon.³

Despite what is seen on television or perceived stereotypes, studies show that surgeons and their other medicine counterparts are equally as empathetic. In some instances, surgeons are proactively trying to break this stereotype to show who they are in and out of the operating room. In 2015, nearly 40,000 surgeons used Twitter to show pictures of themselves inside and outside of the operating room³. Patients responded enthusiastically to this movement, as it was "humanizing the profession". It was through this outlet that surgeons were able to create an image that truly represented themselves.

Studies have shown that surgeons themselves do not agree with this outdated stereotype. Social media, increased diversification of the surgical workforce, and outreach from many surgeons today are changing this image to more truly reflect themselves and to better represent modern-day surgeons.³ I spoke with Dr. Harish Lavu, a hepatopancreaticobiliary surgeon at Jefferson, about his experience with these stereotypes and the role of empathy in surgical practice.

Have you faced any stereotypes as a surgeon?

Definitely, there are stereotypes of surgeons being cold or abrupt in their interactions in the operating room. I think this perception comes from the focus and concentration that is required to perform the technical aspects of surgery. The reality though is that the healing process is a mind and body experience. I believe that being an empathetic doctor can actually improve patient outcomes and is a critical part of administering care even in fields as technically oriented as surgery.

Do you find that it is harder to build connections with patients given your field?

In my field, which is related to pancreatic cancer, I have found that I am able to connect meaningfully with my patients because we are embarking upon a treatment journey together and from the first interaction and

including all subsequent ones, it is very important to form a close bond. These visits are a critical part of the healing process. Modeling this behavior to our medical students is also very important so that the next generation of trainees can see that it is possible to have close relationships with their patients.

What is the importance of empathy in surgery?

Empathy allows for a closer relationship to the patient and ultimately fosters trust. It all begins with the first interaction, and then continues throughout every interaction. Science shows that the way we hear and react to inputs emotionally can affect both our autonomic and immune systems. Developing the skills to demonstrate empathy and being able to communicate news to the patient in a compassionate manner are vital to fostering

the healing process.

How do you show empathy in your daily practice?

Being entirely present with the patient. Avoiding distractions and not being in a hurry to leave. Even the tone of one's voice, speaking as clearly as possible and eliminating medical jargon, are very important. Walking through a complex medical issue slowly to allow the patient time to process can be helpful. I also ask patients to write down their questions so that we can continue the conversation at a second interaction, as it can often take some time to process medical information.

Have you noticed differences in your patient relationships by being empathetic?

One of the ways of feeling fulfillment as a physician is by showing compassion and empathy to your patients, creating a bond with them. Sometimes it is just explaining what is going on medically in a way that they can understand, and answering their questions. Letting them know that you are there for them.

How has the field of surgery changed with regards to empathy? Do you think the stereotype is still applicable?

The stereotype has become outdated. The people who

are being recruited to surgery today have high levels of compassion, emotional intelligence, and are excellent communicators.

Do you have any advice for aspiring surgeons on improving and maintaining patient connections or increasing their empathy with patients?

Practice! Listening to your patients is so important. Studies show that doctors on average wait only 10 seconds before they interrupt a patient. Learning to be present with a patient goes a long way. You may be an empathetic person, but learning to express it to the patient in a meaningful way is vital.

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Interview with Dr. Olugbenga Okusanya

Dominic Farronato, Class of 2024



Dr. Olugbenga T. Okusanya is an accomplished thoracic surgeon who currently serves as an Assistant Professor of Surgery at Thomas Jefferson University Hospital. Dr. Okusanya received his medical degree from the Perelman School of Medicine at the University of Pennsylvania, where he also later completed his residency in General Surgery. Dr. Okusanya then went on to complete his residency in Thoracic Surgery and fellowship in Minimally Invasive Thoracic Surgery at the University of Pittsburgh Medical Center. Prior to coming to TJUH, Dr. Okusanya served as a thoracic surgeon at the University of Pittsburgh Medical Center.

What specifically made you interested in entering the subspecialty of thoracic surgery after finishing your general surgery residency?

I have always liked cancer surgery in general. I liked that it was a little different every time and wasn't always the same sort of procedure, day to day, patient to patient, and I thought that required a fair amount of planning and being cerebral about your patients. Before residency I planned on being a trauma surgeon, [but] after I did some chest surgery as a first- and second-year resident, I really thought the anatomy was fascinating. I thought the dissection was difficult and intrinsically sort of fun. Combining the oncological aspects with the wide variety in surgery types really made me want to do thoracic.

Can you talk a little about your decision to pursue a career in academic medicine?

I felt very strongly about having both teaching and research being a part of my career profile. I always had wonderful experiences with my mentors and educators throughout my entire journey. Being around others who were always interested in research was very intellectually stimulating. Much like why I chose thoracic surgery, I chose academia so that not only the 30-year-old me would be interested but also the 60-year-old me.

You recently started at Jefferson. Can you speak a little on that and what attracted you to coming here?

Jeff has always been known as a clinical powerhouse, which was attractive. Dr. Nathaniel Evans (Director, Division of Thoracic Surgery) and I were good friends while I was in residency and the opportunity to work with him and Dr. Tyler Grenda was hard to pass up. Being a relatively young attending, your colleagues can make all the difference in the world in terms of collegiality, enthusiasm, and collaboration. So, the opportunity to work with them at an institution I think highly of, in a city I consider a second home, was kind of a no brainer for me.

You're a practicing thoracic surgeon, researcher, and teacher. Can you discuss your work-life balance and how that may have changed throughout your career?

My wife is also in medicine – she is a rehab medicine physician here at Jefferson. We have two kids, a 6-year-old and a 9-month-old, and a dog. I would say every time our family has grown, some aspect of our home life has changed significantly. We make sure to invest in our home life, just as you would your work life. My wife is awesome, be sure to publish that. My wife and I work as a great team and support one another's personal aspirations [and] career aspirations, and keep a healthy balance. Balance is finding the best version of yourself, whatever that means in terms of work life and personal life is up to you. But at the end of the day it's effort, like anything else you have to work at it.

Can you describe what a typical week in the hospital looks like for you?

We typically are operating on Mondays, Wednesdays, and Fridays. Tuesday is sort of an administrative, meeting, and research day and then Thursday is clinic. We do our call system by week, so you may be on one week and then have no call responsibilities the next. Most days we start around 6:30am and if nothing crazy happens we get out around 5:00pm.

What aspects of thoracic surgery do you see changing in the near future? How about 20-30 years from now?

I think the management of lung cancer or lung nodules has become much more multidisciplinary in terms of screening programs and working with our pulmonologists and oncologists to maximize our level of care. Screening has become vital in improving lung cancer care. In the near future I think having the surgeon work closely with the rest of the team involved in the screening process is going to become much more important to ensure we are being judicious in the management of all the nodules we are going to find. Long term, I think the move towards minimally invasive procedures on all fronts is clearly what is going to happen. I believe that will include the use of robotics for diagnostic biopsies and the delivery of endobronchial therapies like radio wave ablation, and these are skill sets that we're going to have to learn and grow with as they advance. Due to the benefits of immunotherapy, targeted

drugs, chemotherapy and radiation the land scape of cancers that come to surgery is sure to change.

I noticed you published a paper on intra-operative molecular imaging, and you are interested in minimally invasive surgery. How do you see these technologies evolving in thoracic surgery and do you think they will replace more invasive surgeries?

These days, most training programs are teaching robotics and are implementing that in their curriculum. So, myself for example, [I] came out more comfortable doing a robotic lobectomy than I was doing a VATS lobectomy and I think that trend is only going to continue. You will be having trainees coming out who only do robotic surgery and that's it.

A recent publication that you co-authored addressed the COVID-19 pandemic and how it has changed the educational approach of thoracic surgery residency programs. How do you think this pandemic has changed the future of medical education?

The impact will be significant I think. One of the ways we judge our residents is on the number of cases they do, which is not consistent with actually being able to do the case independently and safely. You can do 20 cases and know nothing or you could do something twice and know everything about it. I think it has challenged our dogma of "just keep doing it repeatedly" to "not only are you here for the case but are you actually extracting something from that experience". I also think it has reemphasized the benefit of simulation because you may be seeing fewer cases overall. Any decrease in volume, as we've seen with this pandemic, will inevitably lower the amount of operations performed. Now for things like conferences

or grand rounds, we clearly see those don't need to be as limited. We can use the internet and connect with other institutions to enhance the educational atmosphere.

What do you like to do outside of work?

We have a very busy home life so I make sure to make time for things I enjoy. I love to grill and am a big fan of barbecuing. I'm also a huge Indianapolis Colts fan so I will admit I watch a lot of football on Sundays. My wife and I are also very significant dancers. In our past lives she did a lot of Latin and salsa dancing while I did a lot of hip hop and jazz. So, in a perfect world we'd love to be out and dancing, enjoying what free time we have.

What advice do you have for medical students who are interested in entering the field of surgery?

Despite a lot of the negative energy and things people will say to students who are interested in surgery, you will absolutely love your job, as I do. Being a surgeon is amazing. I get the chance to help people every day, I think about interesting problems, I work with really great people, and I get to do something that has such clear tangible benefits. It's hard to over emphasize how valuable that is to not only your future patients but to your own self and sense of doing good in this world. I would say despite whatever negative feedback you may encounter throughout your journey, I want to remind you that surgery is truly a beautiful thing and I can't overstate that enough. The training itself is very difficult but it has this sense of specialness that is hard to replicate. My friends from residency are some of my absolute closest friends and during those tiring times you will truly push each other to do great things.

Welcome to the other new surgery faculty at TJUH!



Wilbur Bowne, MD, FACS
General Surgery



Jessica Latona, MD
Acute Care Surgery



Claudia Lozano-Guzman, MD
Acute Care Surgery



Susanna Nazarian, MD, PhD, FACS
General Surgery



Radu Nedelcoviciu, MD, FACS
Acute Care Surgery



Michael Nooromid, MD
Vascular and Endovascular Surgery



Konstadinos Plestis, MD
Cardiac Surgery

The Ultimate Test in Medicine: Adapting Patient Care, Procedures, and Training During a Pandemic

Madalyne Sunday, Class of 2023

As members of the medical field, we are taught that death is a natural part of the process, but we study and work long hours to treat patients and prolong the inevitable. We discover new treatments, make breakthroughs in science, and provide as much hope to our patients as we can. Our identities soon become linked to our careers. We are what we do. But when faced with a disease that even we as medical professionals are ill-equipped to address, doubt soon arises, and sooner or later, we find ourselves in a crisis attempting to rekindle the work we do while fighting to save both our patients and ourselves.

As the year 2020 rang in, many were excited for the new decade and reaching major milestones at work, within families, and in careers. It was also the beginning of warning signs from the World Health Organization (WHO) that a novel virus with the possibility of causing a pandemic had been discovered, and on January 21st, 2020, the United States reported the first Coronavirus (COVID) case in Washington State. While my classmates and I had heard about the virus during our pulmonology block I don't think we could have begun to understand the effect that this virus would have on the lives of so many here at Jefferson. It wasn't until the beginning of February that we even caught the news about a possible pandemic, but on March 6th, 2020, Jefferson confirmed its first case of the virus and notified its employees.

While the COVID-19 pandemic has touched many lives across the globe, the medical profession has been especially targeted. Trained to treat patients with the utmost care, medical professionals put their own lives at risk for the betterment of their patients and their families. Hospital departments were also significantly affected as staff, supplies, and equipment had to be meticulously accounted for to limit exposures and ensure safety. In surgery departments, where there are multiple moving parts, from office visits and pre-operative clearances to perioperative care and post-operative follow-up, COVID presented a significant challenge. How would staff and patients be kept safe from the virus? Would the hospital have enough room for surgical patients? Would there be enough staff to coordinate the daily perioperative routines? All of these concerns boiled down to a common consequence across the United States and internationally: canceling all elective surgeries during the height of the pandemic in order to conserve room, staff, and resources for emergency cases. In fact, it has been estimated that over 100,000 elective cases per week were canceled with an overall estimate of over 1 million cases canceled in North America during a 12-week interval in the early spring.¹

The decline in elective surgeries during both the initial phase of the pandemic and later in 2020 was not only due to resource allocation and personnel safety. Recently, the New York Times published an op-ed titled, "Should I have Elective Surgery During a Pandemic", highlighting the worries and anxieties that many patients were experiencing.² These concerns centered not only on whether the patient would contract an infection, but also the lack of emotional support and advocacy that patients would experience without family members or visitors. As a result, many patients did not seek medical care for ailments that could be addressed in the acute setting, such as appendectomies, before the pathology developed into something more severe.³ In addition, the rate of cancer screenings and surveillance through routine outpatient procedures decreased over this time.⁴

In adjusting to the decrease in elective cases, departments were tasked with maintaining a surgical service for emergent cases while protecting staff. This required implementing new protocols for COVID positive and negative patients in addition to providing staff with the appropriate PPE for surgical procedures. In addition, many surgeons were asked to assist with the critically ill, returning back to their days of training in multiple different specialties. At Jefferson, the schedules of surgical residents were altered to minimize exposures between residents. Dr. Zachary Callahan, a chief surgical resident, notes, "During the first wave, we split the residents into an A-team and a B-team. We stretched each team to cover all services, worked seven days straight, followed by seven days off. It was a grueling, demanding schedule." In addition to the workflow changes themselves, the conditions under which procedures were being done were stressful. "The COVID central lines were challenging because we were wearing PAPRs and N95s in these tiny rooms with patients that couldn't be laid flat," said Dr. Callahan.

All of these changes raise the question: what effect will the pandemic have on surgical training? Have residents and medical students missed key opportunities to further develop their skills in the OR? The Journal of the American College of Surgeons recently published an article highlighting the significant disruption that the pandemic has had on surgical training.⁵ For Dr. Callahan, his "biggest fear is the educational ramifications of missing so much operating. We had a few other things happen this year that decreased our case volume and COVID brought it to a screeching halt. It is unclear what long-term effects this will have on our training and our ability to be competent and safe surgeons." This concern not only resides at the residency level, but also on the undergraduate medical educational level, as clerkships for medical students were cut short, away-rotations were cancelled, and interviews were held virtually.

While it's impossible to articulate the insurmountable effects that the pandemic had on members of our Jefferson community, the past year highlights our ability to adapt to change for the betterment of patients. We are not always

The Gibbon Surgical Society Year in Review

going to win the fight over life and death, but we will continue to strive on, focused on implementing new protocols, procedures, and schedules to improve the lives of those around us; a virus will never stop us in this pursuit.

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Despite the pandemic preventing certain GSS programs from occurring, the 2020-2021 academic year was full of successful and exciting events for medical students interested in surgery. In addition to switching over to a virtual format for established events, a number of new programs were started. Here is a look at a few of the ways the GSS made this year great...

Double scrubbing

A new podcast, led by GSS board members Emily Papai and Robert Ries, that features interviews with Jefferson surgery faculty and explores the journey to becoming a surgeon, current practices at Jefferson, and hot topics in surgery.

Virtual anatomy

This series, which was implemented into the SCALPELS longitudinal curriculum, applies the anatomy that pre-clinical students are learning in the cadaver lab to real surgical cases. Sessions occur throughout the year in concordance with the MS1 and MS2 course schedule.

Association of Women Surgeons

The GSS is proud to have founded a medical school chapter of the AWS with the goal of encouraging female interest in surgical careers, addressing gender equity issues in surgery, and offering an opportunity for female mentorship within the Department of Surgery at Jefferson.

Robotic Surgery: Development, Applications, and Future Directions

Shale Mack, Class of 2024

Introduction

Surgery is an ever-innovating field. Improvement of surgical care, with a patient-centered approach, can occur both in the perioperative area and intraoperatively; the latter frequently focuses on improvement of the technical approach used. Robotic-assisted surgery is one of the most exciting surgical innovations in modern operating rooms. Arguments in favor of robotic surgery, intended as an extension of minimally invasive surgery (MIS), include a 3-dimensional view and stable image, improved dexterity with broad wrist mobility, and superior ergonomics for the operating surgeon. These advantages enhance recovery after surgery by reducing postoperative pain, scarring, surgical complications, and many other high-quality metrics.¹

Development

Robotic surgery had been hypothesized as the future of surgery for many years. Surgical robots went through many changes from procedure-specific tools to the all-encompassing systems with widespread capabilities that they are today. The first reported robot to be used in operating rooms for orthopedic arthroscopy was the Arthrobot, created in 1983 by engineer James McEwen, PhD. Soon after, in 1984, urologist Dr. John Wickham pioneered MIS and then similarly fathered robotic surgery in 1988.¹ As a result of the initial success, high-stakes institutions became involved with research and development, including the United States Army and NASA.² Around the same time, Phil Green, PhD and plastic surgeon Joseph Rosen, MD, aimed to improve surgeon dexterity for microsurgery by remote control of instruments. By the 1990's, robotic innovation was booming.

Robotic surgery applications as we know them today were first introduced by Computer Motion, Inc. and followed up by Intuitive Surgical, Inc.³ In 1990, Dr. Yulun Wang founded Computer Motion, a trailblazer in robotic surgery. Initially funded by NASA, the company developed the voice-controlled Automated Endoscopic System for Optimal Positioning (AESOP), the first surgical robot to receive FDA clearance in 1994. Subsequently, Computer Motion developed Zeus, a complete robotic surgical system that merged AESOP's software with laparoscopic instrumentation. Immediate applications were fallopian tube anastomosis and coronary artery bypass grafts.⁴ This became the prototype for modern surgical robots. In 2001 during a procedure dubbed Operation Lindbergh,

Zeus proved the concept of telesurgery when Dr. Jacques Marescaux, a surgeon in New York, performed a cholecystectomy on a patient in France.² This event opened the door for telesurgery on the battlefield, in global surgery, and beyond.



Figure 1. Zeus Robotic Surgical System Utilization.⁵

Dr. Frederic Moll founded Intuitive in 1995, which now dominates the market with the da Vinci surgical robots. The da Vinci system, which provides clearer imaging, a 3-dimensional view and greater precision, received FDA approval in 2000 for general surgery indications. While originally imagined for cardiothoracic surgery, the da Vinci initially found its niche in urology, which continues to be a leading specialty in robotics. The standardized da Vinci system is what you see in operating rooms today; it consists of three surgical arms equipped with circumferential wrists and a depth perceptive camera that obey commands.⁵ Demonstrating the extensive training required for mastery, robotic surgery continues to develop with surgeons training specifically in MIS fellowships.

Applications

The advent of robotic surgery advances the whole area of MIS by expanding on laparoscopy. The challenges of open surgery, namely difficult exposure, higher blood loss, risk for postoperative incisional hernia, and lengthy and complicated postoperative recovery, established a need to access body cavities in the least invasive way possible. Laparoscopy, an original MIS technique, accomplished this by improving the patient experience in both ambulatory and complex surgical procedures. By creating smaller incisions than open operations, MIS reduced post-operative pain and shortened recovery.⁵ For example, a minimally invasive valve repair leaves a few inconspicuous lateral chest incisions rather than an

overpowering sternotomy scar.⁶

Robotics is the next step in MIS as it tries to compensate for the limitations of laparoscopy. One such barrier is the fulcrum effect, a limitation due to instrument movement from a fixed point. Surgical robots overcome this problem by providing complete rotational ability, increasing possible angles of operative approach.² Robotic surgery also has the potential to decrease natural, and sometimes inevitable, human error by serving as an extension of the sterile hand.³ As the surgeon controls the robotic arms from a console separated from the patient, the machine filters out inherent hand tremors. Additionally, in laparoscopy a surgeon is standing with their hands away from their body; robotics offer an ergonomic solution

are also multiple opportunities for students, residents, and attending surgeons to learn innovative techniques in surgery with Jefferson's high tech simulation center.

Future Directions

With many possibilities to revolutionize surgery for both the patient and healthcare team, robotic surgery is innovating at a rapid pace. We are already seeing new advancements with the da Vinci Xi; its upgraded capabilities include integrated table motion to dynamically position the patient for optimal operative approaches. Furthermore, Intuitive has begun to apply robotics outside of the field of surgery with the development of the Ion Endoluminal system that performs minimally invasive lung



Figure 2. Da Vinci Xi Surgical System: patient cart, surgeon console, and vision cart.⁹

for the surgeon to comfortably sit and place their hands directly in front of them.² However, while robots can help address these limitations of laparoscopy, they lose the tactile feedback of open and laparoscopic operations. Solutions are being explored with force sensors being applied to the robotic arms⁷, but these developments will take time and additional expense to integrate.

The da Vinci system works as an operative tool, but the true impact will be measured by the benefit to the patient and the hospital. Astoundingly, a single da Vinci system costs approximately two million dollars. However, it remains unclear if the medical benefits are worth the increased healthcare expenses.⁸ Extensive research and development are underway to answer that question with more than 15,000 peer-reviewed publications and five million procedures performed with the technology.⁹ The da Vinci continues to be implemented in many specialties with diverse operations ranging from mitral valve repair to hysterectomy.

The Thomas Jefferson University Hospital system remains at the forefront of robotic surgery with a dedicated minimally invasive and robotic surgery center at Methodist Hospital, which is equipped with a da Vinci Si robot. Meanwhile, Thomas Jefferson University Hospital in Center City houses both the da Vinci Xi and Si robots. At Jefferson, robotic-assisted surgeries are performed in several surgical specialties including general (such as bariatric and colorectal surgery), thoracic, cardiac, hepatobiliary, otolaryngology, gynecology, and urology.¹⁰ Within general surgery, the da Vinci robots are utilized for pancreatotomy, colectomy, hernia repair, and more. There

biopsies.¹¹

A significant benefit to health care, and society as a whole, will come from competing manufacturers due to enter the robotics arena. These companies include Verb Surgical, a Johnson and Johnson and Alphabet Inc. collaboration, and Medtronic.¹² New developers will challenge the Intuitive monopoly and likely drive the cost of robotic surgery down. Additionally, continuous innovation is certain with more manufacturers.

Concurrent with robotic innovation, there is increasing need for training with these complex surgical tools. A study regarding robotic colorectal surgery reported that facilities which perform higher volumes of such operations show better outcomes, indicating a steep learning curve for robotic techniques.¹³ Because of the frequent innovations, current and future physicians must remain up to date on the ever-changing capabilities of robotic surgery in order to provide the best evidence-based care to their patients. Room for improvement in robotic surgery is boundless, with much of the research focusing on improving postoperative outcomes across many surgical specialties. For example, multiple studies show improved outcomes with a minimally invasive compared to open approach in a distal pancreatectomy.^{14,15} In contrast, later studies report equal clinical outcomes with robot-assist and laparoscopic approach in the Whipple procedure.¹⁶ These data highlight the need for further research to determine which surgeries are optimal for robot-assisted surgery and which are not. Studies are underway throughout many specialties, including a clinical trial for a robotic approach to a nipple-sparing mastectomy.¹⁷

With a similar inventive mindset, robotic-surgery experts began practicing single incisions for operations that could approach various parts of the body by way of the same port.¹⁸ For example, robotic cholecystectomies are possible with a single port.¹⁹ These techniques limit the number of incisions and amount of time the robot is docked to the patient. However, single incision port access is a controversial topic due to the increased risk of complications, including incisional hernia. This example once again highlights the challenges of innovation.

Future possibilities include the utilization of artificial intelligence to allow robotic computer systems to gather comprehensive data on past surgeries, and subsequently

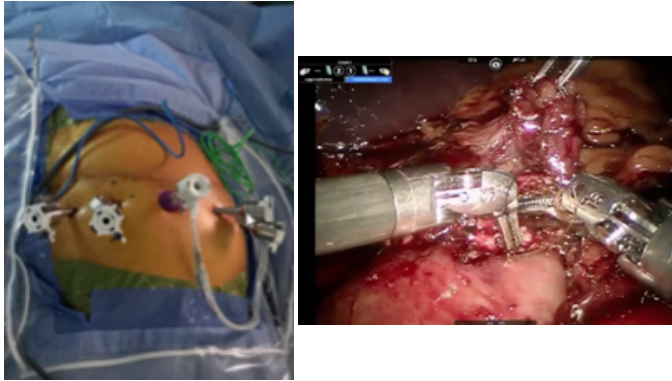


Figure 3. Port placement for robotic Whipple procedure, and example view with all three instrument arms during robotic Whipple procedure.¹¹

teach itself evidence-based techniques of operations.²⁰ Additional areas of innovative interest include the ability of the robotic platform to synchronize with available preoperative imaging. The robotic system can then generate an augmented reality intraoperatively to alert the surgeon of proximity to critical areas.

These rapidly advancing innovations further exemplify how the field of surgery must continually adapt in order to improve patient care. Overall, by enhancing postoperative recovery and increasing the capabilities across various surgical specialties, the burden of surgery can be decreased on a grand scale. For patients and the healthcare team alike, robot-assisted surgery has the promise to change the practice of surgery forever.

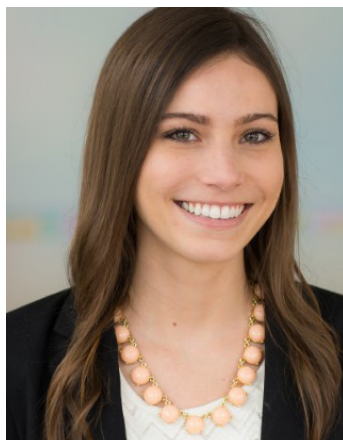
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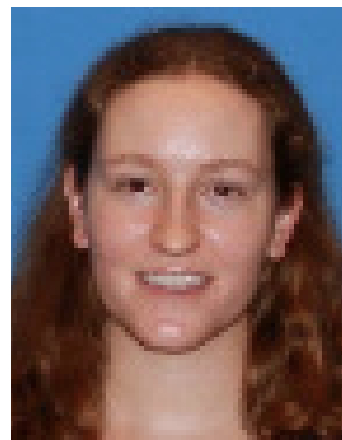
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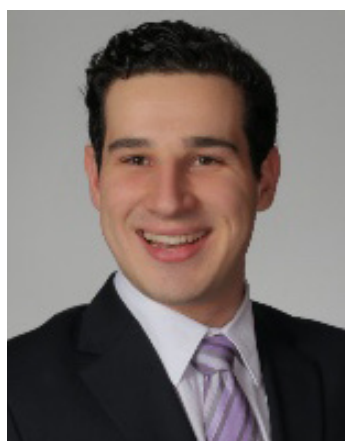
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GIBBON SURGICAL SOCIETY

The John H. Gibbon, Jr. Surgical Society (GSS) at Sidney Kimmel Medical College (SKMC) at Thomas Jefferson University is a unique student interest group that has been working hard to increase interest in the field of surgery among medical students for the last 37 years. The society has over 400 total active members on a year to year basis, spread across the four-year curriculum. The GSS increases exposure and interest to the surgical field through a unique blend of episodic and longitudinal programming that helps bring together students, residents, and faculty in an educational setting.

The crux of the GSS approach to bolstering medical student interest is early exposure. Over the years, the GSS has run many programs specifically targeted at students in the pre-clinical curriculum to increase surgical exposure, including overnight shifts on the trauma service, call with the organ procurement team, and SCALPELS, a longitudinal surgical curriculum that runs concurrently with the pre-clinical curriculum.

There are also events that are available to all students. The GSS runs a quarterly journal club, which is led by a surgeon at Jefferson in the field that is currently being studied by the second-year medical students. Many surgeons take this time to not only educate the students in critical review of the findings of papers, but also the underlying statistics that were used. The Philadelphia Surgical Symposium is the GSS's signature event each year. Students from all medical schools in the Philadelphia region are invited, and it is intended to be an informative opportunity for medical students interested in surgery. There is an associated regional medical student research poster session and competition during the event, complemented by presentations from a faculty member from each school, ranging in topics from clinical experiences, to advocating for a particular field of surgery, to hot topics in research.

While the COVID-19 pandemic has changed the landscape of medical education, the GSS has worked tirelessly to create new and exciting programs to keep students engaged. Between moving some previously established programming to a virtual format to starting new and innovative experiences including podcasts and virtual anatomy sessions, the GSS board has ensured a robust experience for all students wanting to become more involved with the surgery department at Jefferson.

The GSS was presented at the AAMC's Learn, Serve, Lead 2017 conference as a model for an effective medical student interest group. This journal, the GSR, is written, compiled, and curated by SKMC students through the invaluable help and planning of the GSS members, and stands not only as a testament to the involvement and hard work of the GSS, but also of the student body as a whole.

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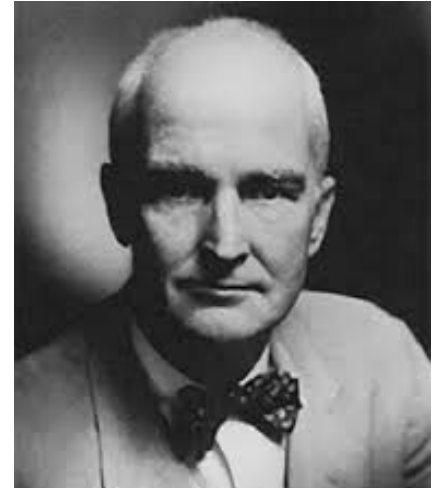
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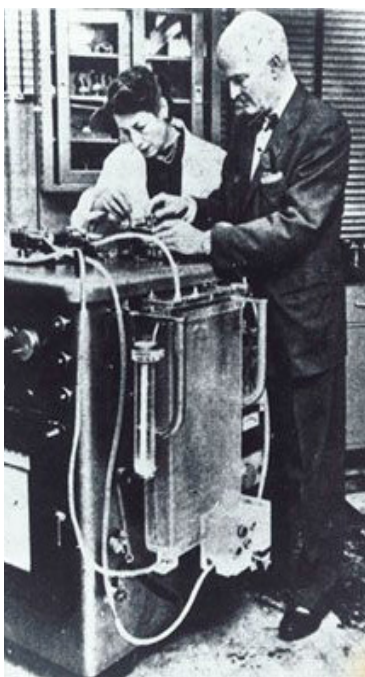
JOHN H. GIBBON JR., MD

Dr. John Heysham Gibbon, Jr. 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 Dr. Gibbon's determination to produce a heart-lung machine.



Dr. Gibbon was Chief of Surgical Services at the 364th Station Hospital in the Pacific Theater. After the war, upon returning to Philadelphia, his alma mater offered him the position of Professor of Surgery and Director of Surgical Research, which he accepted. Through Jefferson Medical College'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." His wife, Maly Gibbon, and the Jefferson Medical College 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.

On May 6, 1953 at Jefferson Medical College Hospital, Dr. Gibbon and his staff, with the help of his latest-designed heart-lung machine, "Model II," closed a very serious atrial septal defect between the upper chambers of the heart of eighteen-year-old Cecelia Bavolek. This was the first successful intracardiac 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. 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." After the triumphant Bavolek case in May of 1953, Dr. 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.

During the years leading up to his successful surgery, Dr. Gibbon had been sharing his blueprints and experiences with Dr. John Kirklin at The Mayo Clinic. Eventually, the Mayo Clinic built the "Model III" based on the proposed changes from Dr. Gibbon's lab, which led to several successful operations there. While Dr. Gibbon turned to his non-cardiac interests, others continued to perfect cardiac surgery. It is clear that Dr. Gibbon's contributions to the field of cardiac surgery were necessary in order for the field to develop, which is why he is often referred to the "father of cardiac surgery".

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