Young at Heart

Developing an Academic Congenital Heart Surgery Program
Duke Surgery

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On the cover:
Anatomical heart by Megan Llewellyn, CMI. Artwork for cover and feature story colored by the children of Drs. Andrew Lodge, Joseph Turek, and Nicholas Andersen.
At Duke Surgery, our surgeons meet healthcare challenges every day. This high level of preparedness enables us to treat the most complex cases in the region even at a moment’s notice. In this issue of the Duke Surgery newsletter, we focus on several initiatives that highlight our “at the ready” skills across a wide spectrum of highly complex cases, along with stories that cross generational time horizons.

As indicated on the cover (with thanks to our budding artists!), we are featuring our growing academic congenital heart surgery program. Although we have long offered quality pediatric cardiac care, our efforts have been redoubled over the past few years to include robust discovery-based work as well as high-volume, high-complexity clinical work. Combining cutting-edge research with top-tier clinical care, our program treats the most complex congenital heart defects, often presenting at birth and requiring urgent surgery, with some of the lowest patient mortality rates in the nation.

In another cardiac-themed story, we feature our growing expertise in robotic and minimally invasive cardiac surgery. This story also highlights our educational mission, and a passing of the torch between two surgical generations in structural heart surgery.

As a level 1 trauma center, Duke Hospital has the unique opportunity to treat the most complex trauma cases. In April, our emergency preparedness efforts were put to the test when a devastating gas explosion occurred in downtown Durham. In an all-hands-on-deck effort, our surgeons and staff treated patients quickly and efficiently under a Mass Casualty Plan that was 2 years in the making. Upon word of the explosion, our emergency staff and trauma surgeons were ready to intake the large number of casualties from the explosion with swift and efficient patient triage and transport.

On the research side, we present a novel laboratory integrating research methodology to improve operational performance throughout the hospital. Unique to Duke Surgery, the Laboratory for Transformative Administration unites hospital administration and data scientists, shoulder to shoulder with clinicians to improve communication in the analysis of clinical data and its use in solving real world problems.

We are also leaving our borders to share our expertise in complex heart surgery in low-resource settings. In a surgical outreach trip led by two cardiothoracic surgery residents, a Duke Health team brought equipment, expertise, and medical training to physicians and staff in Honduras. We look forward to more outreach trips there in the future.

Through these efforts, we continue to advance our mission of providing high-quality care to all patients, a mission at the heart of all we do.

Sincerely,

Allan D. Kirk, MD, PhD, FACS
David C. Sabiston Jr. Distinguished Professor and Chair Department of Surgery Duke University School of Medicine Surgeon-in-Chief Duke University Health System
Every minute, 250 infants are born worldwide, and two of those are born with a congenital heart defect. Severe cases require immediate surgical intervention, and for a pediatric cardiac surgeon, early and accurate detection is essential to creating a successful patient care plan.

In the Division of Cardiovascular and Thoracic Surgery, Andrew Lodge, MD, Joseph Turek, MD, PhD, and Nicholas Andersen, MD, work closely as a three-person surgical team, part of a larger interdisciplinary pediatric cardiac program at Duke.

A High Wire Act

Dr. Lodge, Associate Professor of Surgery and Pediatrics and member of the division since 2003, worked for years to help build the program and provide clinical care to an ever-growing number of patients. It was a challenging task, as he was the only congenital heart surgeon at Duke for two different periods.

“When I started 16 years ago, the program was smaller and my responsibilities were split between congenital heart surgery and adult heart transplant and ventricular assist devices,” says Dr. Lodge. “About 8 or 9 years ago, I became the sole congenital heart surgeon for a period of about 6 months. At the time we had a productive lab, but not as much protected time for research, and as we were growing clinically...
it didn’t leave a lot of time for non-clinical pursuits."

Changes came in 2014, when Allan D.
Kirk, MD, PhD, Vice Dean of the Section
of Surgical Sciences, assumed the role of
department chair and began to allocate
resources for program growth.

“Dr. Kirk made a commitment to fully staff
each section in children’s surgery with a
minimum of three people to manage the
clinical enterprise,” says Dr. Lodge. “With
the additional manpower, we could be
academically productive, or productive in
other pursuits. This commitment allowed
us to add Joe [Turek] and Nick [Andersen]
to the team.”

When Dr. Turek, Associate Professor of
Surgery and Pediatrics and Chief of the
Section of Pediatric Cardiac Surgery, joined
in 2017, he collaborated with Dr. Lodge to
improve care for patients with congenital
heart disease.

“When I arrived, we worked on some
changes to our programmatic approach,”
says Dr. Turek. “Pediatric heart surgery
is not just about the operation. It’s not
just about the preoperative care or
postoperative care. It is a fine balance
between all of these things. It’s a high wire
act—everyone has to be performing well.”

A Game of Millimeters

For the surgical team, achieving this
balance starts with an adequate
preoperative strategy. Preparation for
surgery on a heart sometimes no larger
than a strawberry presents unique
challenges. Dr. Andersen, Assistant
Professor of Surgery, joined the team in
2018 and speaks to the delicate nature of
surgery on children.

“There is no margin for error,” he says.
“Our field is a game of millimeters, and
sometimes a one-millimeter difference can
mean life or death for an infant or child.”

Most preparatory imaging modalities,
such as echocardiograms, CT scans, or
MRIs, are valuable tools but offer a limited
perspective: a two-dimensional picture that
must be mentally converted to analyze
spatial relationships. Through a partnership
with the Division of Cardiology in the
Department of Medicine, the team uses
flat images to create 3D-printed models,
valuable assets in charting an appropriate
surgical course.

“The 3D model is as good as it gets,” Dr.
Andersen says, “to examine how a pathway
between chambers connects, to assess if there are any obstructing muscle bundles you have to work around. You can plan essentially where you are going to put every single stitch of the repair."

The models also help in decision-making as to whether an invasive or non-invasive procedure is necessary.

“The 3D models give us an idea of whether the heart is amenable to putting a stent in,” Dr. Turek says. “For babies who have insufficient blood flow to the lungs, we primarily like to stent patients in the catheterization lab now, if at all possible. If not, we then move toward doing a surgically placed shunt.”

The Room Where It Happens

Best laid plans are only as good as the surgeons performing in the operating room, and there, two sets of eyes are better than one.

Teaming up for surgeries has been an effective programmatic change. Using a 1–5 rating system, high-profile, complex cases in the 4–5 range are flagged, requiring two attending surgeons.

“Having two fully trained, board-certified surgeons has made a difference,” says Dr. Andersen. “Our outcomes are heavily scrutinized and gain lot of attention in national press. With two of us in the OR, we can perform faster, safer, and with far better results.”

“Complex cases are where you incur higher mortality,” adds Dr. Turek. “To make this work, we double-scrub on a lot of cases and it is a huge time commitment, but it has greatly improved quality.”

As case numbers rise, so does the incidence of cases that require highly-specialized skills for effective treatment. Single ventricle defects, which result in an underdeveloped left side of the heart, are considered by the surgical team to be the last frontier of pediatric heart disease.

The Norwood Procedure, a common but risky operation for single ventricle defects, is one that Dr. Turek has focused on improving due to its 15–20 percent national mortality rate.

“The Norwood Procedure is the highest risk thing we do,” he says. “I’ve developed the operation so that we perform it while giving blood flow to the entire body. For these cases we use a heart–lung machine, and we work with the perfusionists to make sure we are getting proper flow to the proper locations.”

In their recent series of Norwood operations employing this all-region perfusion strategy, mortality has decreased to less than 10 percent.

When Repair Isn’t an Option

For congenital defects that are too severe for repair, the last resort is heart transplant.

Even after a successful transplant, the patient’s heart needs to be replaced, on average, every 14 years. Life for a child after a heart transplant means potentially undergoing several more highly invasive surgeries. A solution for developing tolerance to the transplanted heart could mean fewer future transplants and better long-term patient health.

But how? The immune system is complex and often works in nebulous ways. A solution could be found in the thymus, which trains its T cells to create an ample defense system in recognizing self and non-self proteins. By co-transplanting this captain of the immune system with another organ, you could theoretically retrain the recipient’s immune system and steer the ship in a new direction. Duke, it turns out, is uniquely suited for this type of research.

Duke is the only center in the Western Hemisphere that performs thymus transplants, a specialty that originated at Duke 25 years ago. Professor of Pediatrics Mary Louise Markert, the impetus of the thymus transplant program, began studies in 2012 in an animal model to test thymus transplant as a way to induce tolerance.
"We’ve been talking about co-transplant for years with Dr. Markert,” Dr. Lodge says. “She really thinks outside the box, and one of the ideas she shared was the tolerance-induction model. Our group didn’t at first have the resources to pursue it, but now we can."

With the team’s expansion allowing protected time for research, Dr. Turek has worked with Dr. Markert to continue this project.

“We’ve successfully demonstrated tolerance in a rat model,” Dr. Turek says. “We’ve received a cooperation grant and applied for a DOD grant to continue this study in non-human primates. We’re funded to continue these studies there, with an eye on introducing this groundbreaking work in infants in the near future."

If successful, this research has the potential to improve tolerance in other types of transplants in the future.

**Continued Growth**

Though still evolving, the congenital heart surgery program has seen measurable differences in only a few years. Even with an increase in patient volume and a higher case mix index, outcomes have improved.

“2019 for us has been such a productive period,” says Dr. Turek. “We have less than one-half percent mortality for all of our pediatric congenital heart cases. On top of that, the program has grown incredibly. Based upon our programmatic growth in 2019, we look to be in one of the top 10 programs in the country according to volume this year."

Dr. Lodge says that the team’s success relies heavily on the complementary nature of their different skillsets.

“We have skillsets that overlap to some extent, but also complement each other,” he says. “My strongest skillset is in the operating room and the ICU, so I can provide a lot of perspective and guidance clinically. Joe is great at focusing on program growth and expansion, with an innovative side and new approaches to things. Nick has a strong academic background as a resident and fellow, and he can continue that research here at Duke."

As the program continues to grow and mature through the team’s efforts, the children under their care are given a much stronger chance of doing the same. ☛
An explosion occurs at the 115 block of North Duke Street in Durham. The hospital’s response was swift and calculated, a collaborative effort guided by a Mass Casualty Plan developed by the Divisions of Emergency Medicine and Trauma, Acute, and Critical Care Surgery. Below, follow the morning’s timeline and read firsthand accounts from members of these divisions who played key roles in the 2 hours and 24 minutes between the explosion and the hospital’s call to stand down.

Anjni
JOINER, DO, MPH
Assistant Professor of Surgery
Durham County EMS Medical Director

Amy
ALGER, MD
Assistant Professor of Surgery

Brenda
LANAN, MD
Assistant Professor of Surgery
Assistant Director of PreHospital and Disaster Medicine

Jason
THEILING, MD
Assistant Professor of Surgery
Medical Director, Division of Emergency Medicine

Cory
VATSAAS, MD
Assistant Professor of Surgery

10:06AM
An explosion occurs at the 115 block of North Duke Street in the Brightleaf District of downtown Durham.

My office downtown at Durham County EMS is about 8 or 9 blocks away from the explosion. We heard the explosion, but they were doing construction right above us and I thought it was that at first. The first call from the fire department came in at 10:07.

A.J.

I heard the explosion from here in my office. My window was open and it slammed shut. From my experience in the military, I’ve heard enough explosions to know what it was. I started collecting my things and getting ready to go. As I was doing that, the phone call came in from the ER that there was an explosion and there was potentially a large number of casualties.

A.A.

I was coming back from huddle, and our clinical operations director called down the hall that there was some information about an explosion. I confirmed that this was not a drill, and I had just seen Cory Vatsaas, so I went to him because he was on call. He said he would immediately go to clinic, and we knew that Amy Alger was on call. I called her and gave her a brief rundown.

J.T.
10:08 AM Duke University Hospital receives word from Durham EMS about the explosion.

“\nWhen the call came out, I realized the sound I heard was the explosion. One of our assistant chiefs called me and told me to get down to Duke Street right away. We went with a couple of the other chiefs, and we were on scene by 10:11.”

A.J.

I was on duty and we were notified by multiple sources about the explosion. Some off-duty nurses near the scene called the charge nurse, and a call came in from EMS dispatch. We pulled our team a few minutes after and started ramping up activities to start the Mass Casualty Plan.”

B.L.

I was on call for the previous 24 hours. I had been up through the night and I was on my way to clinic to see the three patients who were there so I could go home and get some sleep. I ran into Jason Theiling in the hallway, who knew that there was an explosion but no other information yet. While making some calls, I went over to clinic to see as many people as I could.”

C.V.

10:21 AM The first patient arrives at the Emergency Room of Duke University Hospital.

“\nAfter the initial brief overview, I hung up the phone and started calling my partners and told them to meet me in the emergency room. When I got to the ER, the patients had already started to arrive, so I didn’t have the chance to get a brief about what we were expecting—I had to take an assessment of how many patients were already there, and I had two of my partners down in the ER, so we split up and covered rooms.”

A.A.

We cleared out the Speed, A POD, B POD, and Resuscitation areas. When the first patient arrived, I was walking through the department and reassigning physicians and making sure they knew their objectives. We were told by EMS that there would be 40–50 patients. We opened 36 rooms in a span of 15 minutes.”

B.L.

I was getting a lot of calls from people who were ready to come in and help. Part of what we’ve learned from previous incidents is that there is a rush of people to the scene initially, but as time passes, they get tired and need sleep. I knew we had adequate staffing already, so I made sure anyone that called in was ready in case we needed a second wave of support to come in later.”

J.T.

10:24 AM The Mass Casualty Plan is activated, triggering a set schedule of events to maximize the efficiency and expediency of the crisis response.

“\nWe could have activated the ED limited plan, or hospital-wide plan—this decision is made by the rapid intervention team in the ED. Those guidelines are outlined in the plan. The ED Charge Nurse or Nurse Clinical Team Lead makes the choice with the approval of the Operations Administrator, or whoever is on duty that day. It is a group effort.”

B.L.

Brenda Lanan was already actively involved, so I was listening to her requests and fulfilling them. Our first priorities in the plan are that we need space and people. It was about 15 minutes of preparation, and then a fairly intense hour and 15 minutes of active patients coming in. We didn’t know immediately how many people were potentially trapped, and so it could have gone from 10 to 100, depending on who was in the area.”

J.T.

The patient I had was one of the first patients from the blast explosion. While operating, we were just looking for anything that was bleeding and worked to stitch it. It was a huge collaborative effort. Anesthesia was there putting in blood, platelets, and plasma, to help the blood to clot. They were fighting against his inhalation injury in his lungs.”

C.V.
On scene, primarily I worked in patient triage. We created a patient collection point on the north side of the explosion. From there we could triage the sickest patients and determine who needed more rapid transport. Many of the patients we saw were from the Duke building across the street, and bystanders. The more serious patients were transported within minutes.

A.J.

"Everyone wants to help and everyone comes to the ED. Since I came here in 2015, I’ve been on the committee for disaster management to help with revising the Mass Casualty Plan. There was a plan to station overflow help, but the hardest part is that you don’t want to send people away, but you also don’t want them to get in the way. Thankfully we had some space outside the ER so we were using that space."

A.A.

"I was in the operating room for what felt like a few hours, removing glass shards. You are mostly in an operating vacuum and not aware of what’s happening—that’s why it is so important to have someone making decisions and directing who is going to triage and figuring out who needs to go where. My priority was my one patient. Alger had to maintain a lot of awareness, and I had to maintain focus on one patient.”

C.V.

I was on scene all day. EMS set up rehab for fire fighters, checking vital signs and making sure they are fit to return to the scene. I also was providing moral support. Having a physician on scene for mass casualty events is helpful in triaging and determining which patients need to be transported. Orange County and Wake County provided mutual aid by responding to 911 calls for the rest of the county. This was a peak time of the day so that was really helpful.

A.J.

"We worked hard for 2 years revamping the plan and training staff, so the whole concept was fresh in the minds of our nursing staff, techs, and registration. It didn’t take long for them to get into action. The event covered all components we had practiced, including setting up our HazMat tent. After finalizing our after-action report, we can see where we need to improve. The plan is constantly being updated to meet anticipated and unanticipated needs."

B.L.

"I started working with the original plan 7 years ago, so I knew the nuts and bolts of it, which has now evolved considerably. The plan is always like a set of Russian dolls—one plan fits inside another larger plan. Even if you have good plans, you need to have good people who know that the plans need to be continually updated. There is no ‘good enough.’"

J.T.

Suresh AGARWAL JR., MD
Professor of Surgery
Chief, Division of Trauma, Acute, and Critical Care Surgery

"This event demonstrated the exceptionalism of the entire health care community, particularly at Duke. From first responders in Durham and Duke EMS to physicians and nurses in the Emergency Department and throughout the hospital, the institution came together with the single-minded goal of caring for the injured. The outcomes that day were a direct extension of the planning and practice that had gone on for years prior to the explosion, and enacted through the collaboration of the entire health care team. Furthermore, as we review the processes, strengths, and opportunities for improvement of the event that unfolded, we continue to improve our strategies and preparedness for caring for victims of future Mass Casualty Events. It is through the commitment to exceptional care of everyone at Duke and its community partners that we are able provide, and improve upon, the medical attention that the region and state rely upon during unexpected, and potentially catastrophic, events.”

JOINER
ALGER
LANAN
THEILING
VATSAAS

A.A.
Donald D. Glower Jr., MD, had a roundabout entry into the field of robotics and minimally invasive surgery. Originally hired in 1989 for coronary bypass surgery, he soon became involved in minimally invasive surgery using the Heartport Port Access System in 1996. Duke was the 4th institution in the United States to perform surgeries using this recently Food and Drug Administration (FDA)-approved equipment, and among the first dozen institutions to use robotic techniques for mitral repair, mammary artery harvesting, atrial septal defect repair, and coronary bypass.

Dr. Glower, along with several other Duke surgeons, traveled to Emory University School of Medicine in Atlanta, Georgia, to train under Douglas A. Murphy, MD, an early advocate for minimally invasive cardiac surgery and a principal investigator in early clinical trials in robotically assisted heart surgery.

Now thoracic surgeons are coming on with previous experience in robotic minimally invasive surgery during their residency training. By the time Brittany A. Zwischenberger, MD, joined the team, the Surgical Education and Activities Lab, a state-of-the-art surgical simulation center, offered 24-hour access to the Da Vinci Surgical System for practice, which she uses before all her robotic surgery cases. Dr. Zwischenberger’s interest in robotics began during her fellowship, when she attended a robotic surgery course hosted by the American Association for Thoracic Surgery.

Dr. Glower, who has been with Duke for 40 years and in robotics for the last half of that time, says that under the leadership of Allan D. Kirk, MD, PhD, Vice Dean of Surgical Disciplines, and Anthony G. Visco, MD, head of the robotics committee, Duke has fostered a supportive environment for this still-developing field.

Dr. Zwischenberger says that she and her partners encourage each other to use the robotic technology. “The cardiac surgeons will assist each other at the console and at the bedside,” she explains.

Dr. Zwischenberger’s mentors, Dr. Glower and Jeffrey G. Gaca, MD, encouraged her to expand the cardiac robotic program when she joined the faculty in 2018, which she did by focusing on left internal mammary artery takedown for single vessel coronary artery bypass grafting. “If we’re to survive as a field, we have to have a critical mass of people learning these techniques,” says Dr. Glower.

Within the U.S., about 20 hospitals perform 75% of all robotically assisted surgeries, and Duke performs an average of 30 robotic mitral repairs a year. Duke uses C-SATS, an online feedback program, which connects with other cardiac surgeons performing these techniques.

“This is a niche operation with few surgeons performing nationwide, so access to this community of cardiac surgeons with experience in robotics is invaluable,” says Dr. Zwischenberger.

Dr. Glower recalled a mentor that once forecasted “the 20th century was about decreasing mortality, and the 21st century will be about decreasing morbidity.” Robotic surgery offers unique minimally invasive opportunities in a traditionally maximally invasive specialty, and as the technology advances, surgeons can treat a wider spectrum of diseases with safe, minimally invasive techniques than ever before.

“The robot is only a tool in your armamentarium of surgical techniques to treat heart disease,” says Dr. Zwischenberger. “The robot technology is only as good as the surgeon behind every stitch and the team surrounding them.”
When Sir Isaac Newton came up with his three laws of motion, he applied the scientific method: ask a question, construct a hypothesis, design the experiment, test the experiment, replicate the experiment, and publish the results.

The Duke Section of Surgical Disciplines is now using this same method to enhance the quality and value of surgical care, sending patients home healthier, faster. Formed in 2017, the Laboratory for Transformative Administration (LTA) conducts methodical research to improve patient outcomes and patient movement throughout the hospital.

“When you think about a laboratory, you always think about test tubes and pipettes and gels and stuff, but this is obviously not that,” says Dr. Christopher Mantyh, Professor and Chief of Colorectal Surgery. “In the true sense of the word, it is really research. It’s a lab where you ask questions, gather data, and try to come up with methodology, results, and end up with a conclusion.”

Led by Drs. Allan D. Kirk, Vice Dean for the Section of Surgical Disciplines, and Lisa Pickett, Assistant Professor of Surgery, with Wendy Webster, Director of Clinical Operations, and Dr. Joshua Watson, General Surgery Resident, the LTA is one of many quality improvement initiatives in the Section of Surgical Disciplines that aims to collect and analyze postoperative data to better inform care decisions. The team also includes John Rollman, Management Engineer from Performance Services, and Winnie Li, Business Analyst from Duke Health Technology Solutions.

Approximately 83,800 inpatients move through Duke Hospital every year. This large volume of patients requires a highly efficient care delivery system. In an effort to continually improve care, the quality team mines the data to determine how patients can receive more timely treatment while leaving the hospital faster.

“We really need to understand data to drive better decisions around improving care, around improving efficiency,” says Ms. Webster. “We need a data scientist and a surgeon side by side to really look at the data and validate it.”

One project focused on reducing case delays considers surgeon, patient, and OR platform factors. By standardizing case
entry at the time of posting, the new system makes better use of staff time and better instrument availability due to consistency of posting on the front end. Simply reducing the number of “clicks” to enter case information in the electronic medical record (EMR) database has saved surgeons time, giving them more time to spend with their patients.

“The quality team recently streamlined morbidity and mortality conferences, including a hospital mortality review committee, which resulted in 100% participation from surgeons. This improved communication of outcome data between hospital operations and surgeons means surgeons can learn from the data and improve their care strategies.”

“We want to make sure that if we are going to do a procedure, we’re doing it for the right reason, at the right time,” says Dr. Mantyh.

So far, these efforts are paying off. Duke Hospital has been consistently recognized as one of 66 hospitals that have achieved meritorious outcomes for surgical patient care by the American College of Surgeons National Surgical Quality Improvement Program® (ACS NSQIP®).

Mr. Rollman says the next step is to harmonize the data and provide actionable items that physicians and surgeons can understand.

“At the end of the day, surgeons want to know what they can do and what that means for them,” says Mr. Rollman. “They speak in procedures and operations and you really have to take all that information and get a story out of it so you can actually change what needs to be changed.”

Using a scientific approach to answer healthcare challenges provides a tremendous return on investment: patients who come to Duke get optimal care, shorter wait times, and faster discharges. But the quality improvement team continues to ask, “How can we get better?”
Integrated systems approach defines the antiviral pathways conferring protection by the RV144 HIV vaccine.

Performance of a multigene genomic classifier in thyroid nodules with indeterminate cytology: a prospective blinded multicenter study.

Long-term evaluation of AAV-CRISPR genome editing for Duchenne muscular dystrophy.

Mucosal vaccine efficacy against intrarectal SHIV is independent of anti-Env antibody response.

HIV-1 vaccination by needle-free oral injection induces strong mucosal immunity and protects against SHIV challenge.

Multidisciplinary approach to Clostridium difficile infection in adult surgical patients.

Perioperative bundle to reduce surgical site infection after pancreaticoduodenectomy: a prospective cohort study.

Bioengineered human acellular vessels recellularize and evolve into living blood vessels after human implantation.

Intramyocardial injection of mesenchymal precursor cells and successful temporary weaning from left ventricular assist device support in patients with advanced heart failure: a randomized clinical trial.

LncRNAs-directed PTEN enzymatic switch governs epithelial-mesenchymal transition.

Challenges with novel clinical trial designs: master protocols.

Adeno-associated virus vectored immunoprophylaxis to prevent HIV in healthy adults: a phase 1 randomised controlled trial.

Association of patient sex with efficacy of immune checkpoint inhibitors and overall survival in advanced cancers: a systematic review and meta-analysis.

A fully magnetically levitated left ventricular assist device—final report.

Does this patient have a severe snake envenomation? The rational clinical examination systematic review.

Human tumor-associated macrophage and monocyte transcriptional landscapes reveal cancer-specific reprogramming, biomarkers, and therapeutic targets.

Pacemaker implantation after mitral valve surgery with atrial fibrillation ablation.

Structure and immunogenicity of a stabilized HIV-1 envelope trimer based on a group-M consensus sequence.

Difficult-to-neutralize global HIV-1 isolates are neutralized by antibodies targeting open envelope conformations.

Clinical and genomic risk to guide the use of adjuvant therapy for breast cancer.

Oncogenic IncRNA downregulates cancer cell antigen presentation and intrinsic tumor suppression.

Immunization expands B cells specific to HIV-1 V3 glycan in mice and macaques.

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Joseph W. Turek, MD
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Society of Surgical Oncology

Lola Fayanju, MD, MPH
Using Modifiable Risk Factors to Predict Inferior Care and Survival after Breast Cancer Diagnosis: A Novel Approach to Addressing Health Disparities
National Institutes of Health

Rachel A. Greenup, MD, MPH
A Shared-Decision Tool to Improve Communication About Breast Reconstruction
The Plastic Surgery Foundation

Sabino Zani Jr., MD
Precision Medicine in Liver Cancer Across an Asia-Pacific Network
National Cancer Centre Singapore

SURGICAL SCIENCES
Priyamvada Acharya, PhD
Structures of Initial CD4 Engagement With Pre-Fusion, Closed HIV-1 Envelope Trimer and Early CD4-Induced Conformational Changes Required for Infection
National Institutes of Health

Dawn E. Bowles, PhD
Awakening Endogenous Retroviruses with the Space Environment
National Aeronautics and Space Administration

Zachary C. Hartman, PhD
Investigation of Stimulating Stress Response Mechanisms to Enhance Antibody-Dependent Cellular Phagocytosis
Bantam Pharmaceutical, LLC

Li Huang, PhD
Aloperine Derivatives as Novel Anti-Influenza Agents
National Institutes of Health

Yuliya Krauchanka, MD, PhD
Determinants of Geographic Disparities in Mortality and Multimorbidity in the U.S.
National Institutes of Health

UROLOGY
Brant A. Inman, MD
Heat-Targeted Therapy for Bladder Cancer
Urology Care Foundation

J. Todd Purves, MD, PhD
Inflammasome-Mediated Inflammation in Diabetic Bladder Dysfunction
National Institutes of Health

Russell S. Terry Jr., MD
In Vitro Assessment and Optimization of New Laser Lithotripsy Technologies for Treatment of Kidney Stones
Urology Care Foundation

John S. Wiener, MD
Urologic Management to Preserve Renal Function Protocol - Component C
Centers for Disease Control and Prevention

National Spina Bifida Patient Registry and Urologic Management of Young Children with Spina Bifida - Component B
Centers for Disease Control and Prevention
ABDOMINAL TRANSPLANT SURGERY
Allan D. Kirk, MD, PhD
Viela Bio Inc., VIB4920 Drug Study for Kidney Transplant Patients
Viela Bio, Inc.

Debra L. Sudan, MD
Novartis - CFZ533A2201 Study for Kidney Transplant Patients
Novartis Pharmaceuticals Corporation

CARDIOVASCULAR AND THORACIC SURGERY
Matthew G. Hartwig, MD
Increasing Lung Transplant Availability Using Normothermic Ex Vivo Lung Perfusion (EVLP) at a Dedicated EVLP Facility
Lung Bioengineering, Inc.

George Charles Hughes IV, MD
RelayBranch System
Bolton Medical, Inc.

CLINICAL TRIALS
Jacob N. Schroder, MD
OCS DCD HEART
TransMedics, Inc.

OCS Heart EXPAND CAP
TransMedics, Inc.

UROLOGY
Brant A. Inman, MD
Phase 2 Study of BC-819 in Patients with Non-Muscle Invasive Bladder Cancer Whose Disease Is Unresponsive to Bacillus Calmette–Guerin
Anchiano Therapeutics

Aaron C. Lentz, MD
Patient Assessment of Novel Protective Underwear Incontinence Products (PUW)
Domtar Personal Care Clinical Research

DUKE SURGERY ADVANCED EDUCATION COURSES
Masters of Minimally Invasive Thoracic Surgery Conference
October 10–12, 2019
Hilton Orlando Bonnet Creek & Waldorf Astoria, Orlando, FL

Duke Transplant Advanced Practice Provider Bootcamp
October 18, 2019
Duke University Hospital North Pavilion, 2003 Lecture Hall, Durham, NC

Duke Solid Organ Transplant Summit
October 19, 2019, Great Hall of the Trent Semans Center, Durham, NC

11th Clinical Robotic Surgery Association Worldwide Congress
November 1–2, 2019
Washington Duke Inn, Durham, NC

Duke Tuesday in Urology Conference
November 12, 2019
Duke Searle Conference Center, Durham, NC

Duke Urologic Assembly & Urologic Cancer Symposium
March 26–29, 2020
Omni Oceanfront, Hilton Head, SC

For a complete list of courses, please visit innovation.surgery.duke.edu/courses.
Congratulations to Head and Neck Surgery & Communication Sciences on achieving department status in the Duke University School of Medicine on July 1, 2019.
When he first arrived at Duke, Cardiothoracic Surgery Resident Dr. Alejandro Murillo-Berlioz knew he wanted to help his home country of Honduras. Because of limited resources, many Hondurans have no access to life-saving cardiac surgery.

“One of the things I want to do once I finish my training is to get back home and become an agent of change,” says Dr. Murillo. “Dr. Carmelo Milano reached out and said, ‘Hey, I recall you had an interest in helping Honduras, let’s talk.’”

Word of their global outreach efforts soon spread. Dr. Jatin Anand, a Cardiothoracic Resident, asked to help organize the program. “Global health is an area that I became interested in during medical school and now, as a cardiac surgery resident, global cardiac surgery outreach is something I’ve wanted to become involved with for a long time,” says Dr. Anand.

Honduras experiences a higher incidence of rheumatic heart disease (RHD) than other countries. An easily preventable heart condition, RHD develops when rheumatic fever goes untreated. Rheumatic fever resolves itself in 75% of patients when treated with antibiotics. When left untreated, the infection can progress over 10–15 years and damage heart valves, requiring surgery for valve repair. Acquired valvular heart disease can be seen in young patients who are otherwise healthy, nonsmokers, and physically active.

In partnership with the Instituto Nacional Cardiopulmonar (INCP) in Tegucigalpa, Honduras, the Duke team formed the Duke Heart for Honduras program to develop a long-term, sustainable cardiac surgical care program for patients with acquired valvular heart disease. The team plans to make several trips to INCP every year to provide ongoing surgical support and training.

“What we want to do is work side by side with a local team, learn from each other, and build a program that they will end up managing,” says Dr. Murillo. “Our focus is going to be academic and training the team rather than just traveling, operating, and leaving.”

In July of this year, the Duke Heart for Honduras program assembled a team of 19 surgeons, anesthesiologists, perfusionists, nurses, medical students, a biomedical engineer, and a physician assistant to travel to INCP.

Over the course of 8 days, the team performed surgery on 11 patients, including single and double valve replacements for rheumatic disease, mitral repair for degenerative disease, two coronary artery bypass grafting procedures, and resection of a large tumor inside of a patient’s heart.
“It was a hard week,” says Dr. Murillo. “We basically worked from the start of the day to almost midnight back to back. All the team members were excited and vested. I think there was teaching and learning on both sides.”

Working with English translators from the American School of Tegucigalpa to overcome language barriers, the teams bonded with each other. Nurses from Duke and INCP learned to communicate and formed a close camaraderie. When a bypass machine broke down, Brian Gore, a Duke biomedical engineer, was on hand to fix it, even fixing a broken balloon pump machine so that the local surgeon can use it for surgeries.

“This was a lot of teams coming together,” says Dr. Murillo. “It’s beautiful how it works.”

Dr. Anand says the best part of the trip was the last day when, despite sheer exhaustion, the teams decided to persevere to treat the 11th patient who needed an operation.

“I believe we all went to this hospital and to this country to try our best to make a difference,” says Dr. Anand. “That day was amazing—Honduran surgeons and American surgeons working together—their entire OR team working in one room with our entire OR team in another. We left exhausted but fulfilled, and we are happy to report that all patients were discharged home in good condition and without complications. The next most important challenge is to prove that the patients will receive the long-term follow-up care that is necessary to ensure lasting success.”
NEW FACULTY

**AUBREE L. ANDERSON, MD**
Medical Instructor in the Department of Surgery, Division of Emergency Medicine

Clinical interests include emergency medicine. Research interests include endotracheal tube cuff inflation pressures in intubated emergency department patients, resident and medical student education, global health, and patient care and flow optimization.

**JOSEPH S. FERNANDEZ-MOURE, MD**
Assistant Professor of Surgery, Division of Trauma, Acute, and Critical Care Surgery

Clinical interests include chest wall injury, penetrating vascular injuries, acute traumatic wound healing, hernias, and abdominal wall reconstruction. Research interests include immunomodulatory nanomaterials, device development, and tissue engineering for traumatic wounds.

**XIAOYANG HUA, MD, MMed, PhD**
Assistant Professor of Surgery, Department of Head and Neck Surgery & Communication Sciences

Clinical interests include chronic ear disease, eardrum perforation, cholesteatoma, hearing problems, cochlear implants, BAHA placement, Ménière's disease, sinusitis, allergies, septal deviation, and other diseases. Research interests include airway mucosal immunology and nucleoside/nucleotide signaling in the pathogenesis of chronic upper airway inflammation.

**ANDREW W. GODFREY, MD**
Medical Instructor in the Department of Surgery, Division of Emergency Medicine

Clinical interests include prehospital physician medicine, disaster medicine, trauma care, and emergency airway management. Research interests include EMS education, cardiac arrest care, and airway management.

**DEBORAH R. KAYE, MD**
Assistant Professor of Surgery, Division of Urology

Clinical interests include urologic surgical oncology. Research interests include healthcare value and payment policy.

**JOHN DAVID PURAKAL, MD**
Assistant Professor of Surgery, Division of Emergency Medicine

Clinical interests include acute management of congestive heart failure, hypertension, and chest pain, as well as screening for social determinants of health. Research interests include health disparities, social determinants of health, patient-centered health education, hypertensive disease states, and sepsis.

**BENJAMIN S. BRYNER, MD**
Assistant Professor of Surgery, Division of Cardiovascular and Thoracic Surgery

Clinical interests include adult cardiac surgery, extracorporeal membrane oxygenation (ECMO), heart failure, mechanical circulatory support, and thoracic transplantation. Research interests include utilization and outcomes of ECMO, patient/family education and decision-making in ECMO, and preservation of donated organs for transplant.

**SERGEY R. KERTITSCHENKO, MD**
Assistant Professor of Surgery, Division of Gastroenterology

Clinical interests include gastrointestinal motility, functional bowel disorders, inflammatory bowel disease, and therapeutic endoscopy.

**HADIZA SHU’AIIB KAZAURE, MD**
Medical Instructor in the Department of Surgery, Division of Surgical Oncology

Clinical interests include thyroid disorders, including goiter and thyroid cancer; parathyroid disorders, including hyperparathyroidism and adrenal tumors, such as aldosteronoma and pheochromocytoma; and endocrine syndromes, including multiple endocrine neoplasia. Research interests include outcomes and quality of life improvement for patients with endocrine disorders and care of elderly patients.

**DEBORAH R. KAYE, MD**
Assistant Professor of Surgery, Division of Urology

Clinical interests include urologic surgical oncology. Research interests include healthcare value and payment policy.

**SUSAN E. ROWELL, MD**
Assistant Professor of Surgery, Division of Surgical Oncology

Clinical interests include trauma, acute, and critical care surgery. Research interests include biomarkers of brain injury and clinical outcomes in traumatic brain injury.
JOHN C. EPPENSTEINER, MD
Medical Instructor in the Department of Surgery, Division of Emergency Medicine

Clinical interests include emergency medicine. Research interests include sterile inflammation, damage-associated molecular patterns, and early prognostic biomarkers in critically ill trauma patients.

GARTH S. HERBERT, MD
Assistant Professor of Surgery, Division of Surgical Oncology

Clinical interests include surgery for both benign and malignant hepatic, biliary, pancreatic, gastric, small bowel, and adrenal conditions. Research interests include optimization of clinical outcomes following gastrointestinal surgery for cancer.

JANET LEE, MD
Assistant Professor of Surgery, Department of Head and Neck Surgery & Communication Sciences

Clinical interests span the range of pediatric otolaryngology, including chronic ear disease, airway reconstruction, congenital anomalies, vocal cord paralysis, dysphagia, sleep surgery, and sinus surgery. Research interests include laryngeal reinnervation, resident education, pediatric dysphagia management, and applications of technology in global health.

MARTIN V. TAORMINA, MD
Medical Instructor in the Department of Surgery, Division of Vascular and Endovascular Surgery

Clinical interests include the full spectrum of vascular surgery disorders with a special interest in endovascular procedures for carotid artery disease, aortic aneurysms, lower extremity arterial disease, and dialysis access. Research interests include dialysis access and lower extremity arterial limb salvage procedures.

CHARLES J. GERARDO, MD
Chief, Division of Emergency Medicine, promoted to Professor of Surgery

SANDHYA A. LAGOODEENADAYALAN, MD, PHD
Division of Surgical Oncology, promoted to Professor of Surgery with Tenure

EILEEN M. RAYNOR, MD
Department of Head and Neck Surgery & Communication Sciences, promoted to Associate Professor of Surgery with Tenure

GEORGIA M. BEASLEY, MD
Assistant Professor of Surgery, Division of Surgical Oncology

Elected to the Alpha Omega Alpha Medical Honor Society. Received the 2019 Young Investigator Award at the Society of Surgical Oncology Annual Cancer Symposium.

BRADLEY H. COLLINS, MD
Associate Professor of Surgery, Division of Abdominal Transplant Surgery

Received the 2019 Leonard Palumbo Jr., MD Faculty Achievement Award.

THOMAS A. D'AMICO, MD
Gary Hock Professor of Surgery, Division of Cardiovascular and Thoracic Surgery

Invited to join the Editorial Board for Annals of Surgery.
FACULTY AWARDS
(Continued from page 21)

LEILA MUREEBE, MD
Associate Professor of Surgery, Division of Vascular and Endovascular Surgery
Appointed Chief Health Informatics Officer at the VA Mid-Atlantic Health Care Network.

ANDREW C. PETERSON, MD, MPH
Professor of Surgery, Division of Urology
Elected to the Alpha Omega Alpha Medical Honor Society.

LOLA FAYANJU, MD, MPH
Assistant Professor of Surgery, Division of Surgical Oncology
Named a 2019 Emerging Leader in Health and Medicine Scholar by the National Academy of Medicine. Received the 2019 American College of Surgeons/American Society of Breast Surgeons Health Policy Scholarship. Selected as the West African College of Surgeons International Visiting Professor for 2020.

GAYATHRI R. DEVI, PhD
Associate Professor in Surgery, Division of Surgical Sciences
Elected to the Board of Directors of the Association for Clinical and Translational Science (ACTS).

SHELLEY HWANG, MD, MPH
Mary and Deryl Hart Professor of Surgery, Division of Surgical Oncology
Awarded the Mary and Deryl Hart Professor of Surgery distinguished professorship from the Duke Board of Trustees.

HOWARD W. FRANCIS, MD
Interim Chair, Department of Head and Neck Surgery & Communication Sciences
Awarded the Richard Hall Chaney, Sr. Professor of Otolaryngology distinguished professorship from the Duke Board of Trustees.

SCOTT T. HOLLENBECK, MD
Associate Professor of Surgery, Division of Plastic, Maxillofacial, and Oral Surgery
Received the Professionalism Award by second-year medical students.

STUART KNECHTLE, MD
Division of Abdominal Transplant Surgery
Will serve as consultant to the American College of Surgeons Division of Education. Began his second year serving on the Board of Trustees for the Society for the Surgery of the Alimentary Tract.

CHRISTOPHER MANTYH, MD
Professor of Surgery, Division of Surgical Oncology

CAROLYN S. MENENDEZ, MD
Assistant Professor of Surgery, Division of Surgical Oncology
Featured in Cary Living Magazine as one of the 2019 Faces of West Wake County.

LEILA MUREEBE, MD
Associate Professor of Surgery, Division of Vascular and Endovascular Surgery
Appointed Chief Health Informatics Officer at the VA Mid-Atlantic Health Care Network.

ANDREW C. PETERSON, MD, MPH
Professor of Surgery, Division of Urology
Elected to the Alpha Omega Alpha Medical Honor Society.
Lisa C. Pickett, MD
Assistant Professor of Surgery, Division of Trauma, Acute, and Critical Care Surgery
Received the 2019 Excellence in Professionalism Award from the Office of Faculty Development.

Laura H. Rosenberger, MD
Assistant Professor of Surgery, Division of Surgical Oncology
Invited to present her manuscript “Decreasing Rates of Axillary Lymph Node Dissections Over Time: Implications for Surgical Resident Exposure and Operative Skills Development” at the 2019 AWS Annual Conference in San Francisco.

Charles Scales Jr., MD
Associate Professor of Surgery, Division of Urology
Appointed director of the Duke Surgical Center for Outcomes Research (SCORES).

Elisabeth Tracy, MD
Assistant Professor of Surgery, Division of Pediatric General Surgery
Received a grant from the Triangle Comparative and Evolutionary Medicine Center for the study “Comparative Analysis of Hemostatic Immaturity in Infants and Piglets to Develop a Translational Model of Infant Extracorporeal Membrane Oxygenation.”

Cynthia K. Shortell, MD
Professor of Surgery, Chief, Division of Vascular and Endovascular Surgery
Received the 2019 Excellence in Professionalism Award from the Office of Faculty Development.

Peter K. Smith, MD
Mary and Deryl Hart Professor of Surgery, Chair, Division of Cardiovascular and Thoracic Surgery
Appointed Director of the Clinical and Implementation Research Skills Development Program at the Cardiothoracic Surgical Trials Network. Received the American Association of Nurse Practitioners NC State Award for Excellence - Nurse Practitioner Advocate.

Michael Stang, MD
Associate Professor of Surgery, Division of Surgical Oncology
Invited as a guest on The People’s Pharmacy® on WUNC FM/91.5 Chapel Hill, NC.

Ranjan Sudan, MD
Vice Chair of Education, Professor of Surgery, Division of Metabolic and Weight Loss Surgery
Accepted into the American College of Surgeons (ACS) Academy of Master Surgeon Educators as an Associate Member.

Julie K. M. Thacker, MD
Associate Professor of Surgery, Division of Surgical Oncology
Elected to serve on Duke University’s Academic Council.

Betty Tong, MD
Associate Professor of Surgery, Division of Cardiovascular and Thoracic Surgery
Elected to serve on Duke University's Academic Council.

John S. Wiener, MD
Professor of Surgery, Division of Urology
Elected to serve on Duke University’s Academic Council.

Brittany A. Zwischenberger, MD
Assistant Professor of Surgery, Division of Cardiovascular and Thoracic Surgery
Received the Duke Heart Leadership Council Junior Faculty Development Award.
PARTNERS IN PHILANTHROPY

A gift to the Duke Department of Surgery is a gift of knowledge, discovery, and life. Every dollar is used to further our understanding of surgical medicine, to develop new techniques, technology, and treatments, and to train the surgeons and researchers of the future.

VISION

Duke Surgery: United, for All Patients

MISSION

Through sustainable, multidisciplinary teams we:

1. Provide insight regarding the fundamental nature of patient health and disease
2. Empower all patients, trainees, and colleagues with knowledge
3. Provide safe and high-quality care based on an advanced understanding of and respect for our patients’ needs and guided by best practices

DUKE SURGERY ALUMNI

Keeping in touch with our alumni is important to us. Please update your Duke Surgery alumni profile via the online form below:
surgery.duke.edu/alumni-update

If you would like to make a philanthropic investment in Duke Surgery, please contact Marcy Romary, Senior Major Gifts Officer, with Duke Health Development and Alumni Affairs at marcia.romary@duke.edu or visit surgery.duke.edu/gift.