

Vanderbilt Department of Anesthesiology

— *Department Profile 2025 - 2026* —



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MEDICAL CENTER



Vanderbilt Department of Anesthesiology

CLINICAL CARE • EDUCATION • RESEARCH

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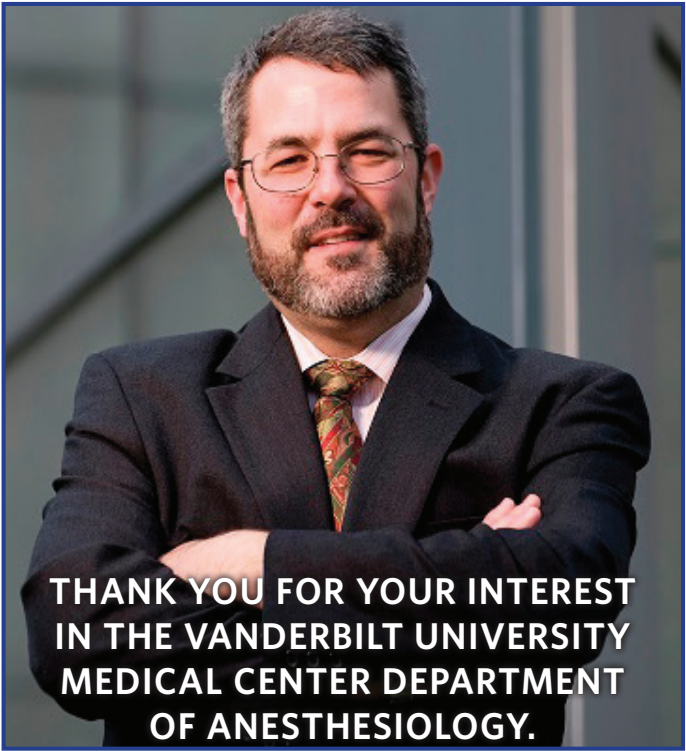
Vanderbilt University Medical Center



VANDERBILT UNIVERSITY
MEDICAL CENTER

722 Medical Arts Building • 1211 21st Avenue South, Nashville, TN 37212 • 615 936-1595 • www.vumc.org/anesthesiology

Welcome to the
Vanderbilt Department of Anesthesiology
Department Chair - Warren Sandberg, MD, PhD



Our growth and success stem from Vanderbilt University Medical Center’s five-pillar commitment to excellence: people, service, quality, growth & finance, and innovation. Pursuit of these pillars means that, every year, VUMC adds to its capabilities and it refreshes its commitment to the academic medical center mission. Vanderbilt’s credo drives us to achieve excellence in healthcare, research and education; we continuously evaluate and improve our performance, and we always treat others as we wish to be treated. As the role of the anesthesiologist evolves into that of a perioperative consultant, our ever-developing team of experts remains at the forefront of knowledge and technology in patient care, research and education.

Sincerely,
Warren Sandberg MD PhD

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Message from the Chair



Warren Sandberg, MD, PhD

Growth continues at the medical center main campus and satellite locations. VUMC has become a multi-hospital health care system, and Anesthesiology suffuses all locations where we could practice, most recently adding critical care services at our Southern regional hospitals. Over the summer of 2025 we opened 10 new operating rooms on the VUH campus. The Jim Ayers Tower remains under construction on 21st Avenue South, with six 30-bed inpatient floors opening sequentially throughout the coming year. Our critical care teams are staffed to grow into expanded ICU coverage, both inpatient and remote, and we continue recruiting vigorously to staff VUMC’s burgeoning anesthesia demand.

The Jim Ayers Tower is named in recognition of Janet and Jim Ayers’ philanthropic legacy and abiding interest in improving the health care and quality of life for Tennesseans. The 15-level, 470,000 square-foot tower will bring more care to patients in Middle Tennessee in high growth areas such as heart & vascular and neurosurgical service lines. Looking long-term, throughout calendar years 2026 and 2027, we are constructing the Vanderbilt Surgery Center One Hundred Oaks and Interventional Radiology suites, a 6-suite cath lab expansion, dedicated interventional pulmonology suites and an on-campus GI lab expansion. We anticipate adding around 30 new faculty positions and 50 CRNA positions in the coming years to staff these locations. Our training programs as well as outstanding recruitment and retention in all areas position us well to meet new demands for anesthesia services.

Our departmental values—compassion, creativity, commitment and collaboration—are the keystones of our structure and systems. You will see evidence of this throughout this guide. Our patients are recovering faster and with greater comfort through the implementation of Enhanced Recovery After Surgery (ERAS) protocols, a collaborative effort led by our faculty, trainees and surgical colleagues. The ERAS effort touches 40% of all scheduled surgical cases, and increasingly pulls in unscheduled high-criticality cases such as lung transplantation. I believe we are unique in our ability to

successfully deploy ERAS techniques to benefit trauma, emergency general surgery and transplantation patients. Our informatics infrastructure uses innovative data analyses and presentations to increase patient safety and clinician effectiveness. The results of these programs are absolutely spectacular, proving again the ongoing value of an engaged and disciplined anesthesiology service to the medical center.

Our investigators successfully competed for more than \$14 million in extramural research funding in federal fiscal year 2024, including more than \$11.8 million in awarded NIH grants—placing Vanderbilt Anesthesiology 5th among U.S. academic anesthesiology departments for NIH funding. The department’s research productivity, determined by publication in peer-reviewed journals, grant dollars and ongoing research studies, continues to be strong. Forty-six members of the department have been elected to the Association of University Anesthesiologists (AUA).

Our dedicated faculty is committed to equipping graduates for a promising future in anesthesiology. We offer training using cutting-edge technology along with opportunities to improve systems of care. We provide a closely guided mentorship program, balancing clinical training and experience with a broad range of academics. Career development for all role groups in the department assures that everyone has the potential and the opportunity to continually fulfill the best of their potential.

We attribute our success to the collaboration that occurs across Vanderbilt University Medical Center and beyond. Our clinical teams participated in more than 137,000 patient encounters last year, caring for patients along their journey to wellness within and beyond Vanderbilt’s traditional walls. The Vanderbilt Health Affiliated Network is the largest of its kind and growing rapidly, and our department is leading telemedicine and remote-presence projects that bring our expertise to more patients.

I invite you to peruse this guide and visit www.vumc.org/anesthesiology to learn more about our programs.

Warren Sandberg MD PhD

**Chair, Department of Anesthesiology
System Anesthesiologist-in-Chief
Vanderbilt University Medical Center
Chief of Staff, Vanderbilt University Hospital
Professor of Anesthesiology, Surgery and Biomedical Informatics
Vanderbilt University School of Medicine**

Leadership



Bret Alvis, MD
Associate Division Chief,
Anesthesiology Critical Care
Medicine



Arna Banerjee, MD, MMHC
Associate Vice Chair,
Anesthesiology Faculty Affairs



Christopher Canlas, MD
Division Chief, Ambulatory
Anesthesiology



Gordon Davis, MD
Medical Director, Vanderbilt
Wilson County Hospital



Eric Delpire, PhD
Director, Basic Science Research;
BH Robbins Director in
Anesthesiology Research



**Amanda Dickert, CRNA, DNAP,
MMHC, Chief CRNA;**
Director, Anesthesiology
Advanced Practice



Stephen Doherty, MMHC
Department Administrator



Susan Eagle, MD
Executive Vice Chair,
Anesthesiology



Holly Ende, MD
Division Chief,
Obstetric Anesthesiology



**Robert Freundlich, MD, MS,
MSCI, Division Chief,**
Informatics Research



Brian Gelfand, MD
Vice Chair, Educational Affairs



Travis Hamilton, DO, MMHC
Assistant Vice Chair, Off-Campus
Anesthesiology Operations



Jeana Havidich, MD, MS
Division Chief,
Pediatric Anesthesiology



Douglas Hester, MD
Division Chief,
Multispecialty Anesthesiology



Christopher Hughes, MD
Division Chief, Anesthesiology
Critical Care Medicine



Miklos Kertai, MD, MMHC, PhD
Vice Chair,
Perioperative Medicine



Brad Koss, CRNA, DNAP
Associate Chief CRNA



**Frederick Lombard, MBChB,
FANZCA**
Division Chief, Cardiothoracic
Anesthesiology



Bevan Londergan, MD
Division Chief,
Pediatric Cardiac Anesthesiology



Thomas Long, MD
Executive Vice Chair,
Pediatric Anesthesiology;
Anesthesiologist-in-Chief,
Monroe Carell Jr. Children's
Hospital at Vanderbilt



Letha Mathews, MBBS
Division Chief,
Neuroanesthesiology



Pratik Pandharipande, MD, MSCI
Vice Chair,
Anesthesiology Faculty Affairs;
James Tayloe Gwathmey Director
in Anesthesiology



Michael Pilla MD
Director, Anesthesiology
Residency Program



Mark Rice, MD
Executive Vice Chair Emeritus



Amy Robertson, MD
Vice Chair, Clinical Affairs



Edward Sherwood, MD, PhD
Vice Chair, Research; Cornelius
Vanderbilt Chair in Anesthesiology



Bantayehu Sileshi, MD
Assistant Vice Chair,
Anesthesiology Faculty Affairs



Amanda Toye, MD
Division Chief, Pain Medicine



Ann Walia, MBBS
Chief, Veterans Affairs
Anesthesiology Service



Nicole Werner, PhD
Director, Center for Research and
Innovation in Systems Safety



Jackie Woodruff, CRNA, DNAP
Associate Chief CRNA



Edward Yaghmour, MD
Assistant Vice Chair,
Perioperative Medicine;
Associate Division Chief,
Multispecialty Anesthesiology

About Nashville, TN

A growing population of 2.1 million in the Nashville metropolitan statistical area

Nashville ranked 5th Best City in the South by Southern Living

The Grand Ole Opry named in TimeOut's "The coolest new things to do in the USA in 2025"

Nashville ranked #7 on list of Best Food Destinations in the U.S. by TripAdvisor

Centennial Park ranked 5th best city park in the United States by USA Today 10 Best



Music has been a common thread connecting the cultural, business and social fabric of Nashville since the 1800s when the city became a national center for music publishing. The city boasts a diverse soundtrack, mixing the past, present and future with cuts of country, bluegrass, rock, pop, Americana, gospel, classical, jazz and blues.

Visitors and residents can enjoy what is considered a growing food city. Nearly 200 new restaurants have opened in the past two years, making Nashville a culinary destination. Hot chicken, barbecue, meat & three, vegan, and locally sourced menus are offered for the adventurous foodie.

Sports fans have plenty to enjoy in Nashville with several professional sports teams. From football to hockey to soccer to baseball, there is something for everyone. Nashville also boasts several college teams for even more options.



About Vanderbilt University Medical Center



VUMC regionally ranked #1 Hospital in Middle Tennessee by U.S. News & World Report

Monroe Carell Jr. Children's Hospital at Vanderbilt earned distinction as the #1 children's hospital in Tennessee U.S. News & World Report

VUMC has over 3.2 million patient visits annually

VUMC employs nearly 40,000 faculty and staff



Department History

The Vanderbilt Department of Anesthesiology was one of the first independent departments of anesthesiology in the United States, established on December 12, 1945.

After observing that the battlefield-wounded of World War II were more likely to survive if they received immediate, skilled anesthesia care, Vanderbilt physicians advocated that anesthesiology be established as an autonomous department. At that time, few medical schools possessed an academic anesthesiology service of any type. This tradition of pioneering in our specialty continues today.

Our exemplary faculty provide top-quality clinical services for a full spectrum of medical specialties.

Vanderbilt Anesthesiology is recognized as an innovator in perioperative management, healthcare information technology, clinical outcomes research, education and international capacity building. We also have high caliber basic science and clinical research teams pursuing fundamental and translational knowledge to directly improve patient safety and care.

Previous Department Chairs



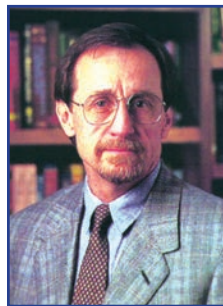
Dr. Benjamin H. Robbins
1946-1961



Dr. Charles B. Pittinger
1962-1969



Dr. Bradley E. Smith
1969-1993



Dr. Charles Beattie
1994-2001



Dr. Jeffrey R. Balser
2001-2004



Dr. Michael S. Higgins
2004-2010

Clinical Care

Serving in one of the largest clinical programs in the nation, Vanderbilt University Medical Center Department of Anesthesiology’s clinicians provide procedural, critical care, pain management and perioperative anesthesia services for more than 137,000 adult and pediatric patient encounters annually at approximately 175 anesthetizing locations. Of these, more than 16,000 patients are seen annually in the Vanderbilt Interventional Pain Clinic, and approximately 58,000 Vanderbilt adult and pediatric patients receive anesthetic care during a radiologic, gastrointestinal, interventional or other diagnostic or therapeutic procedure.

The department’s faculty, residents, fellows, certified registered nurse anesthetists (CRNAs) and nurse practitioners provide care in our operating rooms and five adult intensive care units at Vanderbilt University Hospital. All surgical specialties are represented, including adult and pediatric cardiac surgery, organ transplantation, robotic surgery, neurosurgery, and high-risk obstetrics. Anesthetics are provided by one of our highly skilled trainees or CRNAs under the direction of an anesthesiologist. We deliver the highest quality care in a safe and effective manner according to the Anesthesia Care Team model, using the unique skills of all team members.

Members of our department actively participate in the multidisciplinary perioperative care of complex patient populations, including trauma and organ transplantation. VUMC provides trauma care for patients within 80,000 square miles and manages close to 8,000 acute trauma cases, admitting 5,000 of those annually. Last year approximately 800 patients were transferred directly to the OR from the emergency department to receive care for their acute traumatic injuries. Performing 875 heart, liver, kidney, lung, and pancreas transplants in 2024 and more than 13,000 since 1962, VUMC ranks as the nation’s third largest transplant program by volume. Vanderbilt is one of the top heart transplant programs in the world and set a world record in 2024 by performing 174 adult and pediatric

heart transplants. In 2023, the Vanderbilt Transplant Center’s lung transplant team accomplished two notable firsts — its first combined lung-kidney transplant and first combined lung-liver transplant.

The Vanderbilt Preoperative Evaluation Center (VPEC) offers preoperative evaluation before patients undergo procedures at VUMC. VPEC faculty, nurse practitioners and staff perform comprehensive preoperative assessments, including interfacing with primary care physicians, specialist consultants and surgeons, while also making direct decisions regarding preoperative testing. VPEC offers both in-person and telehealth visits. Our center has expanded rapidly to meet increasing surgical demand.

Launched in July 2019, the Department of Anesthesiology Hi-RiSE (High-Risk Surgical Encounter) Service focuses on providing personalized, evidence-based perioperative medical care—from preoperative evaluation and optimization of underlying comorbidities to postoperative recovery—for patients at the highest risk of perioperative morbidity and mortality.

As the role of the anesthesiologist evolves into that of a perioperative consultant, our diverse team of experts remains at the forefront of knowledge and is fully engaged in patient care, from diagnosis to operative recovery. A full-time perioperative teaching service is available 24/7 for consultation, utilizing system-wide information technology and mobile applications to support clinical decision-making, capture data and measure outcomes such as the quality of recovery after surgery.

Each of our anesthesiologists is a member of one of our ten clinical divisions, with many providing care in a secondary division. Our divisions include ambulatory anesthesiology, anesthesiology critical care medicine, cardiothoracic anesthesiology, multispecialty anesthesiology, neuroanesthesiology, obstetric anesthesiology, pain medicine, pediatric cardiac anesthesiology, pediatric anesthesiology and Veterans Affairs anesthesiology.

13,000 + solid organ transplants since 1962

In the department
189 faculty **23 fellows**
285 CRNAs **83 residents**

VPEC provider visits
FY20: 14,052
FY21: 20,054
FY22: 26,012
FY23: 27,959
FY24: 29,713
FY25: 32,307

HiRiSE provider visits
FY21: 673
FY22: 1,745
FY23: 2,336
FY24: 2,484
FY25: 2,368

Ambulatory Anesthesiology

Division Chief - Christopher Canlas, MD

The Division of Ambulatory Anesthesiology continues to be a vital contributor to both the clinical operations and academic mission of Vanderbilt University Medical Center. In FY25, the division provided high-quality, safe anesthetic care to an expanding patient population, many of whom presented with higher acuity and required increasingly complex outpatient procedures.

Over the past year, the division administered more than 24,500 anesthetics—an increase of 2.7% over FY24. Despite this growth in volume and procedural complexity, same-day discharges remain the standard, supported by consistently high levels of patient satisfaction. Vanderbilt Health Belle Meade and Vanderbilt Surgery Center - Franklin each achieved patient survey scores above the 90th percentile, earning both sites the VUMC “Excellence in Patient Experience” award.

Education remains a core focus of the division. Faculty provide hands-on training in ultrasound-guided regional anesthesia to residents and fellows across multiple skill levels. Three regional anesthesia fellows rotate through the ambulatory surgery centers for half of their fellowship, developing advanced technical skills in a high-volume clinical setting. Additionally, CA1 and CA2 residents now receive early exposure to regional anesthesia during rotations at these centers—an opportunity previously limited to CA3 residents.

The division’s national and international reputation is further strengthened through the leadership of Rajnish Gupta, MD. As a prominent member of the American Society of Regional Anesthesia and Pain Medicine (ASRA Pain Medicine), Dr. Gupta continues to present at international conferences, including the 2024 European Society of Regional Anaesthesia & Pain Therapy (ESRA) meeting in Prague, Czeck Republic, and its upcoming 2025 meeting in Oslo, Norway. He is a founding contributor to ASRA’s educational initiatives and a key developer of the “ASRA Coags” mobile application, now in its fifth iteration. This tool supports the safe practice of regional anesthesia in anticoagulated patients and has become a global reference in the field. His work continues to position Vanderbilt as a leader in regional anesthesia education and innovation.

Looking ahead, the division is poised for expansion, with a new surgery center opening in summer 2026 at One Hundred Oaks. Led by Michael Higgins, MD, MPH, and Dr. Gupta, the facility will feature 12 modern operating rooms, three interventional radiology suites and a dedicated

fertility suite. This new center will significantly enhance the division’s capacity to deliver high-efficiency, high-quality outpatient surgical care and will advance the institution’s commitment to setting new standards in ambulatory surgery.



6,278 cases at Vanderbilt Health Belle Meade

3,627 cases at Vanderbilt Surgery Center – Franklin

2,428 cases at Vanderbilt Outpatient Surgery Center (FEL)

10,669 cases at Vanderbilt Surgery Center – Cool Springs

1,795 cases at Spring Hill Surgery Center

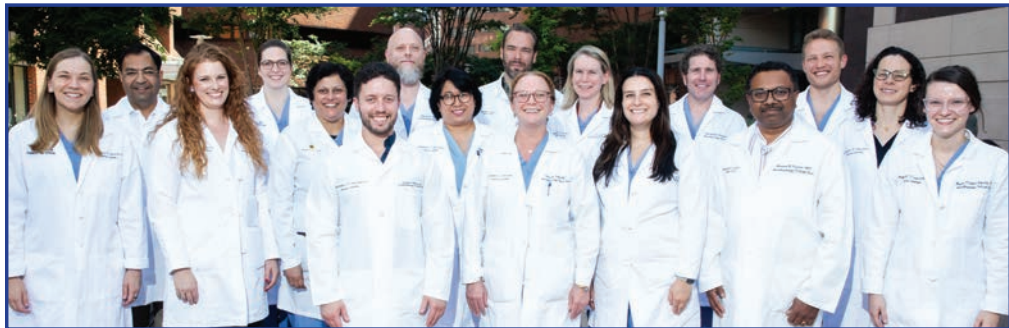
24,797 anesthetics provided at the free-standing surgery centers

totals based on FY2025

Anesthesiology Critical Care Medicine

Division Chief - Christopher Hughes, MD

Associate Division Chief - Bret Alvis, MD



Society of Cardiovascular Anesthesiologists, Early-Stage Anesthesiology Scholars, Society for Technology in Anesthesia, and American Delirium Society. Division clinical administration leadership includes director of the Operations Control Center at VUH; executive medical director of the Critical Care Clinical Service Center; medical directorship

of the cardiovascular, neurological, and surgical ICUs at VUMC; medical directorship of the Vanderbilt Preoperative Evaluation & Enhancement Center, High-Risk Surgical Encounter Service, Post-Anesthesia Care Unit, and Critical Care Outreach Team at VUMC; medical directorship of the perioperative service and surgical ICU at Nashville VA; and medical directorship of the medical/surgical ICU at VWCH. Additionally, division faculty are active in directorship of the Critical Illness, Brain Dysfunction, and Survivorship Center; the Vanderbilt Anesthesiology & Perioperative Informatics Research group; the Department of Anesthesiology BH Robbins Scholar Program; Department of Anesthesiology Point-of-Care Ultrasound; Department of Anesthesiology Maternal Critical Care; the VUMC Institutional Review Board; and the Vanderbilt University School of Medicine critical care immersion science program.

Research

Division faculty present at regional, national, and international academic conferences and publish in major general medical, critical care, anesthesiology, and surgery journals. Faculty have received funding from the NIH (including R01, R21, R35, K23, STTR/SBIR grants), Department of Defense, FAER, MPOG, and industry and are on numerous study review sections and data safety monitoring boards. Areas of investigation include mechanistic work (acute kidney injury, delirium, cognitive and functional impairment, fluid status, sepsis), clinical management strategies (sedation, oxygen tension, rapid response teams, alarms and monitoring, cognitive and physical training, medication reconciliation), and education (simulation, evaluation processes).

13 independent investigator grants

3 career development awards

40 faculty and up to 10 fellows

45 + advanced practice providers

70 + publications

ACCM Fellowship Details

- ACGME-accredited program
- Ten positions available each year
- Core rotations include CVICU, SICU, Neuro ICU, Burn ICU, Trauma ICU, Echo/Ultrasound
- Electives include intraoperative TEE, MICU, PICU, VA SICU, perioperative medicine, international, palliative care, medical subspecialties, and research

Cardiothoracic Anesthesiology

Division Chief - Frederick Lombard, MBChB, FANZCA

The Vanderbilt University Medical Center (VUMC) Cardiothoracic Anesthesiology Division provides anesthetic care for adult cardiac surgery, thoracic surgery, electrophysiology, and complex interventional cardiology procedures. The group is also closely affiliated with and integrated into several super-specialized care programs within VUMC, including the Vanderbilt Heart Transplant Program, Lung Transplant Program, Structural Heart and Valve Disease Program, Women's Heart Center, Adult Congenital Heart Disease Program, and Pulmonary Vascular Clinic. Deep engagement in these world-class services has profoundly shaped clinical practice and expertise within the group.

The Vanderbilt Heart and Vascular Institute consistently ranks among the nation's busiest and best heart programs. While our referral base is predominantly the Southeast, we receive referrals from national and international physicians. Our cardiac surgical program offers comprehensive tertiary and quaternary services to patients requiring the full scope of adult (including adult congenital) cardiac surgery procedures. Apart from routine to complex coronary artery revascularization procedures (on- and off-pump) and valvular surgeries (including minimally invasive), other procedures routinely performed include pulmonary endarterectomies, aortic arch procedures (including complex hybrid procedures) and ventricular assist device (VAD) insertions.

VUMC has established itself as one of the world's top transplant centers. Our success is rooted in passionate patient care and innovative research. In calendar year 2024, the program set a world record by performing a combined total of 174 adult and pediatric heart transplants in a single year. Similar exponential growth is also occurring in our lung transplant program, with 99 lung transplants performed in 2024. We are on track to comfortably exceed 120 lung transplants for 2025. For both programs, one-year survival rates well exceed national averages, which is remarkable considering that a significant percentage of our patients are complex referrals that other transplant centers have turned down.

At Vanderbilt, transesophageal echocardiography (TEE) imaging is performed by the Cardiothoracic Anesthesiology Division for all structural procedures. The Vanderbilt Structural Heart and Valve Disease Program ranks in the top five programs in the country in volume and employs the newest techniques involving transcatheter aortic valve replacement, transcatheter edge-to-edge valve repair, and left atrial appendage occlusion devices. We actively participate in the full spectrum of clinical trials in this field, ranging from left atrial appendage closure devices to transcatheter mitral and tricuspid valve replacement. With two additional state-of-the-art hybrid operating rooms built in 2021 and three more planned for the next two years, VUMC is set to further significantly grow the structural heart and valve disease program.

Vanderbilt's Women's Heart Center was established to lead the region in the prevention, diagnosis and treatment of cardiovascular disease in women. The Women's Heart Center provides personalized, team-based care, particularly during high-risk periods such as pregnancy. With one of the largest adult congenital heart disease programs in the country, we recognized a particular need for a core group of highly specialized anesthesiologists and intensivists to care for a growing number of obstetric patients with complex heart disease. Our cardio-obstetric unit consists of recognized experts in the field and represents a close collaboration between the Anesthesiology Critical Care Medicine, Cardiothoracic, and Obstetric Anesthesiology Divisions.

Cardiothoracic Anesthesiology Division faculty members are actively involved in conducting research in clinical transthoracic ultrasound, vascular biology, precision perioperative medicine, acute kidney injury, transfusion and the perioperative inflammatory response. Extramural grant support comes from a range of sources, including industry, the Department of Defense, and the National Institutes of Health. Our faculty members are actively involved in professional societies; some are regularly invited to present at both national and international conferences, and several currently serve as chairs of various committees.



174 adult and pediatric heart transplants in 2024

99 lung transplants in 2024

Cardiothoracic Anesthesiology Fellowship Details

- ACGME-accredited program
- Five positions available each year
- Core rotations include adult cardiac, thoracic, pediatric cardiac, TEE and ICU
- Electives include heart failure, TEE, CT surgery and research

Multispecialty Anesthesiology

Division Chief - Douglas Hester, MD

Associate Division Chief - Edward Yaghmour, MD

The Division of Multispecialty Anesthesiology (MSA) is the Department of Anesthesiology's largest division, providing perioperative anesthetic care in 60 operating rooms and procedure suites for a wide variety of surgical services, including general surgery, trauma, orthopedics, urology, plastic surgery, ophthalmology, vascular surgery, otolaryngology, gastroenterology, pulmonology, hepatobiliary surgery, liver and renal transplantation and oral/maxillofacial surgery. The division has 53 faculty members, most of whom have significant subspecialty training and expertise.

MSA division faculty provide our anesthesiology residents a variety of both introductory and advanced clinical experiences and make numerous contributions to the department's educational programs for medical students, residents and fellows. Additionally, MSA faculty members teach and supervise residents from other specialties, as well as student registered nurse anesthetists who rotate in the MSA Division. Faculty regularly give invited lectures regionally and nationally. In addition, numerous faculty participate in a wide array of workshops nationally, with content focused on regional anesthesia, airway management and simulation education.

MSA faculty serve the specialty by participating on many boards and committees for the American Board of Anesthesiology and the American Society of Anesthesiologists. Faculty create and administer exams for the board certification process. Faculty also work in advocacy for the specialty both locally and nationally.

Division faculty members pursue a wide range of academic interests, including perioperative cognitive dysfunction, echocardiography, ultrasound imaging, regional anesthesia, anesthesiology pedagogy, airway management, information technology, point-of-care diagnostics, perioperative medicine and the medical humanities, with a common goal of providing safer and more efficient perioperative care and throughput.

Since 2014, our Perioperative Medicine Consult Service (PMCS) has provided co-management of surgical patients, beginning with the decision to operate and continuing throughout the period after hospital discharge. Starting from a pilot program involving colorectal surgical patients, the PMCS has quickly grown to include care of orthopedic trauma, abdominal wall reconstruction, surgical weight loss, hepato-biliary-pancreatic/surgical oncology, gynecologic oncology and urology patients.



VUMC covers trauma care for patients within 80,000 square miles

VUMC trauma center has approximately 5,000 admissions annually

60 operating rooms and procedure suites in which MSA provides perioperative anesthetic care

Acute Pain Service & Perioperative Medicine Consult Service

Director - Danial Shams, MD

Associate Director - Nicholas Statzer, MD

The Vanderbilt Department of Anesthesiology provides both an Acute Pain Service (APS) and a Perioperative Medicine Consult Service (PMCS). Together these services provide preoperative evaluation and preparation, intraoperative care, acute postoperative care and pain management at Vanderbilt University Hospital in Nashville. By providing care before, during and after surgery, these services give patients better, personalized care throughout their entire perioperative period. With widespread use of regional anesthesia and other opioid-sparing pain management techniques, these services have led to a greater than 80 percent reduction in in-hospital opioid use and a greater than 66 percent reduction in opioids prescribed at discharge.

Enhanced Recovery After Surgery (ERAS) care pathways are evidence-based protocols designed to improve pain control and facilitate faster recovery for patients. APS/PMCS is a national leader in ERAS implementation. Throughout Vanderbilt University Hospital, the department cares for several thousand patients each year. APS/PMCS continues to develop ERAS protocols that improve patient outcomes and address the common reasons for prolonged hospital length of stay. Beyond this clinical work, the clinicians routinely give presentations at national and international meetings related to ERAS and non-opioid pain management. APS/PMCS at VUMC is staffed by 19 anesthesiologists, with representation from multiple divisions. APS and PMCS also include 16 advanced practice providers, fellows and residents.



Danial Shams, MD



Nicholas Statzer, MD

Regional Anesthesia & Acute Pain Medicine Fellowship Details

- ACGME-accredited program
- Three positions available each year
- Core rotations include anesthesiology perioperative medicine consult service, OR anesthesia, oral maxillofacial surgery, addiction psychiatry, ambulatory regional anesthesia, pediatric pain management, inpatient chronic pain and international anesthesiology
- Electives include research and obstetric anesthesiology

Perioperative Medicine Fellowship Details

- One year program (accreditation not offered by ACGME)
- Four positions available each year
- Core rotations include perioperative medicine consult service, high-risk preoperative evaluation clinic, echocardiography and cardiac device management, geriatrics and research

more than 80% reduction of in-hospital opioid use

more than 66% reduction in opioids prescribed at discharge

15-20% reduction in cost through PMCS collaborations

4,415 APS and PMCS patients in FY25

Neuroanesthesiology

Division Chief - Letha Mathews, MBBS



The Neuroanesthesiology Division provides perioperative care for patients undergoing complex intracranial and spine surgeries and staffs 9 to 12 operating rooms daily. Neurosurgery, spine surgery and other neurologic services continue to expand at VUMC, in keeping with the population growth in Middle Tennessee and beyond. In July 2025, 10 new state-of-the-art operating rooms designed specifically for intracranial and spine procedures opened in our beautifully redesigned Medical Center East South Tower.

Four neurointerventionalists, including three neurovascular surgeons, run a busy neurovascular service in the state-of-the-art interventional hybrid operating rooms dedicated solely to neurosurgical procedures. VUMC is certified as a comprehensive stroke center and provides care for patients requiring acute stroke interventions.

VUMC has designated neurosurgical operating rooms where anesthesia services are provided for operations, including brain tumors, blood vessel malformation, aneurysms, stroke intervention, trauma, complex spinal procedures, functional neurosurgery, and chronic pain management. The Division of Neuroanesthesiology also provides specialized anesthesia services for “awake craniotomies,” when patients are kept under sedation rather than general anesthesia to facilitate speech and motor mapping during surgery in order to preserve the most vital areas of the brain.

Development and practice of evidence-based perioperative ERAS pathways and guidelines have improved patient outcomes and reduced length of ICU stay and overall hospital length of stay. The division includes five full-time faculty, six CRNAs, and CRNAs from other divisions. Additionally, several faculty from the Anesthesiology Critical Care Medicine and Multispecialty Anesthesiology Divisions contribute significantly to the division’s work.

The Neuroanesthesiology faculty make significant contributions at national and international meetings, such as SNACC, SEA, IARS, AACD and NCS, and provide leadership in these organizations. Faculty are actively engaged in fellow, resident, medical student and allied health professionals’ education. The division offers one Neuroanesthesiology fellowship position each year, and it is certified by the International Council on Perioperative Neuroscience Training (ICPNT).

Neuroanesthesiologists face many unique challenges, including lengthy procedures (which may last more than 16 hours), unusual patient positioning and unexpected intraoperative events, such as seizures or intracranial hemorrhage. Residents on the neuroanesthesia rotation, as well as the faculty leading the training, discover that the ability to make an immediate impact on an operation and enhance the patient’s long-term outcome is both exciting and gratifying.

Neuroanesthesiology Fellowship Details

- One year program (ICPNT-certified; accreditation not offered by ACGME)
- One position available each year
- Core rotations include adult ORs, Neuro ICU, neuromonitoring and research
- Elective rotations include stroke neurology, neuroradiology and pediatric neuroanesthesia

3,000 neurosurgery and neurointerventional cases annually

1,700 ortho and neuro spine surgeries annually

Obstetric Anesthesiology

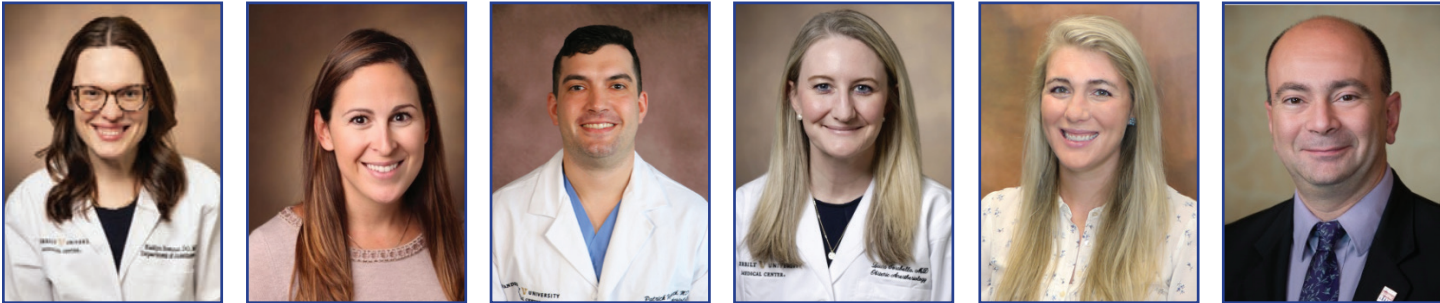
Division Chief - Holly Ende, MD

The Division of Obstetric Anesthesiology, led by Division Chief Holly Ende, MD, provides dedicated, 24-hour, in-house obstetric anesthesia care for over 5,000 deliveries at Vanderbilt University Medical Center annually—over half of the deliveries are considered high risk. The division provides a full complement of techniques for labor analgesia and operative deliveries. The faculty are consultants and critical care specialists for high-risk obstetric patients, abnormal placentation cases and intrauterine fetal surgeries. The division performs anesthesia services for gynecological surgeries in a suite of three operating rooms adjacent to the labor and delivery unit. The division faculty also assume leadership roles in quality initiatives to improve maternal health, including the use of multidisciplinary simulation training for obstetric emergencies and management of postoperative analgesia for women with opioid use disorder.

The division works collaboratively with other medical specialties to ensure women in the perioperative period have optimal outcomes. The division collaborates with

the VUMC maternal-fetal medicine (MFM) group in caring for mothers with congenital heart defects and other co-morbidities. The obstetric anesthesiologists work with the MFM, gynecologic oncology, urology and emergency general surgery physicians in the care of patients with abnormal placentation and fetal surgery. In conjunction with the department’s perioperative consult service, division faculty and staff provide anesthesia care using multimodal, enhanced recovery after surgery (ERAS) protocols for gynecological cases and cesarean deliveries.

The division sponsors a highly regarded, ACGME-accredited obstetric anesthesiology fellowship led by Fellowship Director Stephanie Woodward, MD. Recent research projects include investigations on optimal analgesia in women with opioid use disorder, anemia treatments in pregnancy, risk prediction for uterine atony and outcomes using enhanced recovery after cesarean delivery and gynecological surgery.



5,000 + deliveries annually

2,800 GYN surgical cases annually

50% + deliveries are high-risk

20 abnormal placentation cases annually

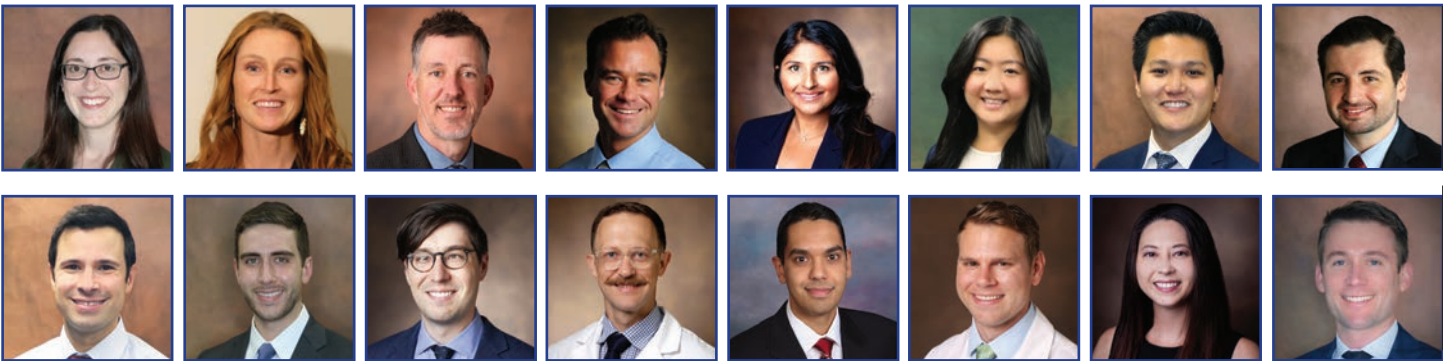


Obstetric Anesthesiology Fellowship Details

- ACGME-accredited program
- Two positions available each year
- Core rotations include experiences in maternal-fetal medicine and neonatology, with abundant time for research and training

Pain Medicine

Division Chief - Amanda Toye, MD



Clinical

Clinicians from the Division of Pain Medicine come from multiple specialties including Anesthesiology, Physical Medicine and Rehabilitation, Neurology, and Pain Psychology. Each clinic is set up to be multidisciplinary to provide a rich learning environment and to make incredible resources available to patients to manage their pain. Our providers see over 35,000 clinic visits annually. Our specialty pain clinics include: the Vanderbilt Center for Neuromodulation, Complex Cancer Pain Clinic, Pediatric Pain Management Clinic, Bridge Clinic (addiction medicine), Transitional Pain Services (complex perioperative management for patients with chronic pain or substance use disorders), and the Spine Clinic.

We offer care at pain management centers in several locations: Nashville One Hundred Oaks, Clarksville, Franklin, Spring Hill, Vanderbilt Ingram Cancer Center, The Village at Vanderbilt, Lebanon, and the Monroe Carell Jr. Children’s Hospital at Vanderbilt. Our attending physicians, fellows, and advanced practice providers also provide consultative care on the inpatient Comprehensive Pain Service for patients with chronic non-cancer and cancer pain, as well as post-surgical patients participating in the transitional pain program.

Education

Our ACGME-accredited Pain Medicine fellowship provides exceptional hands-on training, structured didactics, and exposure to high-volume complex and common pain treatments/interventions, cancer pain, addiction medicine, pediatric pain, and complex spine. Members of the Pain Medicine Division teach approximately one-third of the medical school class each year in a course entitled Pain, Policy, and Addiction, where students learn to be leaders and impact policy that affects patients. Faculty also provide formal didactic lectures to all internal medicine residents on pain pharmacology. All anesthesiology residents complete a comprehensive lecture program on all aspects of chronic pain management run by our faculty. Residents and students from all specialties frequently rotate in our clinics.

Leadership

Division faculty have leadership roles in national and local organizations, including the American Academy of Pain Medicine and the Tennessee Pain Society. At Vanderbilt, division faculty chair the institutional committee on opioid stewardship and safety, are active leaders involved in oversight of controlled substances, teach CME courses on prescribing, and develop hospital-wide policies related to pain management and medication administration.

Research

The division is active in research and innovation encompassing studies of pediatric acute and chronic pain, mindfulness and postoperative pain, the abuse potential of pain medications, clinical trials to develop new treatment modalities in peripheral ablation and neuromodulation, population health, drug development, perioperative acute and chronic pain transitions, opioid epidemiology, financial models of care, and more. Faculty have received funding from the NIH (NIGMS, NICHD, NCCIH, NIDA, NIA) and AHRQ. Department faculty also serve on multiple editorial boards of major journals in the field. No faculty accept payment from industry outside of sponsorship for research that we design and carry out.

Pain Medicine Fellowship Details

- ACGME-accredited program
- Five positions available each year
- Focus on comprehensive, multi-disciplinary treatment of acute, subacute, and chronic pain
- Rotations in interventional pain, psychiatry, addiction medicine, neurology, radiology, physical therapy, cancer pain, integrative medicine, and international pain delivery
- High volume training exposure with state-of-the-art therapies such as implantable spinal and peripheral stimulators, ablative/lytic therapies, fluoroscopic and ultrasound-guided procedures, neurosurgical treatments, intrathecal drug delivery systems
- Completion of publishable academic projects

Pediatric Cardiac Anesthesiology

Division Chief - Bevan Londergan, MD

The Division of Pediatric Cardiac Anesthesiology is made up of six faculty members and eight certified registered nurse anesthetists whose primary anesthesia care sites are the two cardiac operating rooms and three catheterization laboratories with the Pediatric Heart Institute at Monroe Carell Jr. Children’s Hospital at Vanderbilt. The division’s average annual case volume is approximately 480 cardiac surgeries and 1,200 cardiac catheterizations and electrophysiologic procedures. Our program performed 15 pediatric heart transplants in fiscal year 2025, and we are also among the busiest centers in the country for pediatric ventricular assist device placement.

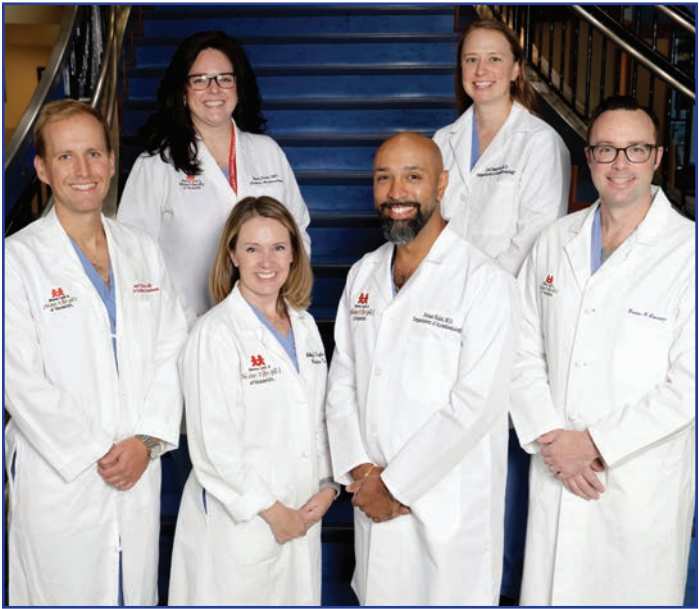
Division faculty members oversee the care of the congenital cardiac population for noncardiac operations and procedures, providing or coordinating appropriate anesthesia care for each child. The division also provides care for the growing and increasingly complex adult cardiac population in a collaborative effort with specialists at both VUH and Monroe Carell.

Beyond the operating rooms, members of the division are involved in providing care for patients undergoing

procedures in the pediatric cardiac intensive care unit and are called upon for their vascular access expertise and teaching throughout Monroe Carell.

The educational mission of the division is multifaceted. We provide an advanced fellowship in Pediatric Cardiac Anesthesiology, and the Pediatric Anesthesiology and adult Cardiothoracic Anesthesiology fellows rotate on the service. Senior Anesthesiology residents rotate with the service on an elective basis. The division additionally provides educational experiences to student nurse anesthetists, Emergency Medicine fellows, Critical Care fellows and Pediatrics residents. Our faculty participates in departmental didactics, including the pediatric anesthesia rotation lecture series, basic resident lecture series, pediatric fellow lecture series, resident and fellow journal clubs, simulation sessions, and mock oral board sessions. Division faculty members participate in international care education alongside other Vanderbilt Anesthesiology and Pediatric Heart Institute faculty and staff.

Division faculty members are involved in a range of research activities. Heidi Smith, MD, MSCI, has been awarded an R01 grant for a randomized controlled trial studying pediatric critical care delirium, and she was the co-chair and lead author for the recently published PANDEM guidelines providing recommendations for management of pain, agitation, withdrawal, delirium and early mobility in critically ill infants and children. Division faculty work within the Pediatric Heart Institute at Monroe Carell on research and quality improvement initiatives, including lesion-specific care pathways, coagulation therapies and postoperative pain management. Faculty members are also involved in multi-institution research and quality initiatives in congenital cardiac care with peer institutions throughout the country.



- 15 pediatric heart transplants in FY2025
- 480 pediatric cardiac surgeries annually
- 1,200 pediatric cardiac catheterization procedures annually

Pediatric Cardiac Anesthesiology Fellowship Details

- One year advanced fellowship program
- One fellowship position available per year
- Core rotations include: pediatric cardiac OR, pediatric cardiac cath lab, pediatric cardiac ICU, congenital echocardiography, and pediatric perfusion
- Electives include: fetal cardiology and imaging, transplant cardiology, additional advanced imaging, transfusion medicine, quality improvement or research, and adult congenital heart disease

Pediatric Anesthesiology

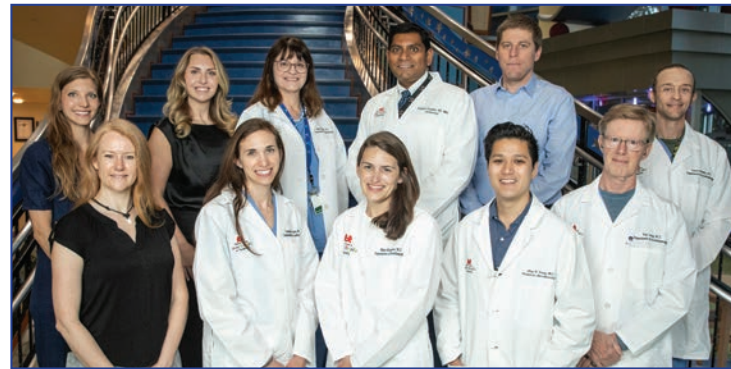
Division Chief - Jeana Havidich, MD, MS

The Division of Pediatric Anesthesiology provides perioperative care for more than 29,000 patients annually at the Monroe Carell Jr. Children's Hospital at Vanderbilt (Middle Tennessee's only comprehensive regional pediatric center) and the Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro. The division is led by Jeana Havidich, MD, MS, who also serves the department as assistant vice chair, Quality, Safety and Outcomes/Pediatric Services.

Academic interests of the division include best practice in handovers of care, outcomes research for pediatric craniofacial surgery, enhanced recovery after surgery, pediatric chronic pain management, non-invasive monitoring of volume status in the pediatric population, noise reduction in the OR, machine learning, application of processed EEG to guide anesthetic dosing, and international educational efforts to improve the care of children worldwide.

The division offers pediatric anesthesiology rotations, training approximately 60 anesthesiology residents and medical students each year. Angela Lucero, MD, is the pediatric anesthesiology rotation director. Our robust fellowship program trains four future pediatric anesthesiologists annually, with David Roberts, MD, at the helm as program director and Kelsey Neuhaufen, MD, as assistant program director. Their efforts help ensure that the field of pediatric anesthesiology remains vibrant into the future and continues to provide specialized care to neonates and children with very complex medical diseases. Additional training in pediatric cardiac anesthesiology is available for interested applicants.

The Pediatric Pain Service, led by Alan Hoang, MD, provides comprehensive acute pain management services to children throughout the hospital, utilizes regional anesthesia and enhanced recovery pathways to optimize recovery for children having surgery, and provides outpatient chronic pain management. Formed in the fall of 2022, the Multidisciplinary Assessment of Pain (MAP) Clinic, led by Amanda Stone, PhD, provides team-based chronic pain management for the most complex patients by using the skills of many medical providers, including physicians, nurses, psychologists, physical therapists and occupational therapists.



Some of the division's most complex patients are cared for by special clinical teams, including our pediatric liver transplant team led by Amanda Lorinc, MD, our craniofacial reconstruction team led by Srijaya Reddy, MD, MBA, and the pediatric spine surgery team led by Tom Romanelli, MD. Dr. Lorinc also serves as the division's Director of Clinical Operations and interfaces with perioperative surgical and nursing leadership to ensure that patients flow seamlessly through all phases of perioperative care. Jon Niconchuk, MD, leads anesthesiology services at the Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro, which provides anesthesia care to children in three operating rooms, a GI suite and a radiology suite. Our NORA (non-operating room anesthesia) is expanding its services to include care of pediatric burn patients in addition to pediatric oncology patients. This team is directed by Jordan Yokley, MD.

Enhancement of the perioperative experience for our pediatric patients is guided by quality and safety initiatives, efficiency and patient-centered care. These efforts are led by Carrie Menser, MD, who serves as the Perioperative Anesthesia Medical Director as well as the Executive Medical Director of Patient Safety at Monroe Carell. To prepare children and their families for their perioperative experience and to ensure that they are optimized prior to surgery, the Preoperative Assessment & Teaching for Children's Hospital (PATCH) team, directed by Clay Adams, MD, assures that procedures go smoothly. To provide the safest, best care practices for patients in the postoperative recovery room (PACU) area, the division has a robust nursing-anesthesia collaboration led by Christy Crockett, MD.

J. Matthew Kynes, MD, and Mark Newton, MD, lead the division's international anesthesia efforts and have deep rooted clinical and academic collaborations with medical centers in Kenya and other locations worldwide.

Pediatric Anesthesiology Fellowship Details

- ACGME-accredited program
- Four positions available each year
- Electives include ability to travel to Guatemala and/or Kenya for international care experiences
- Core rotations include pediatric OR & pediatric cardiac OR, PICU, NICU, pediatric pain service, preoperative evaluation clinic, & recovery room management
- Final month dedicated to 'supervisory' role to foster transition to the attending role

Perioperative Medicine

Vice Chair - Miklos Kertai, MD, MMHC, PhD

Assistant Vice Chair
Edward Yaghmour, MD

The Perioperative Optimization leadership team, spearheaded by **Assistant Vice Chair for Perioperative Medicine Edward Yaghmour, MD**, is advancing perioperative medicine as a core mission of not only our department but also the institution. This team has created seamless collaboration with surgeons, nurses and other key stakeholders through our Enhanced Recovery Program, which includes rigorous care standardization and evaluation of outcomes across all surgical populations. These efforts have led to the creation of improved care processes to generate better throughput across the enterprise, resulting in reduced length of stay, decreased readmissions and improved patient outcomes. As a part of these programs, we have established performance monitoring of process, outcome, quality and safety metrics across the entire perioperative care arc. This teamwork allows for promotion of faculty via mentoring activities such as scholarship, educational programming and research initiatives; and importantly, it forms a core component of our residency and fellowship training.

Perioperative Optimization Team Leaders

- **Kimberly Rengel, MD, MSCI:** Medical Director, High-Risk Surgical Encounter (Hi-RISE) Service
- **Sheena Weaver, MD:** Medical Director, Vanderbilt Preoperative Evaluation Center (VPEC)
- **Susan Eagle, MD:** Director, Perioperative Adult Congenital Heart Disease
- **Patrick Henson, DO:** Medical Director, PreOp/Post-Anesthesia Care Unit
- **Christina Jelly, MD, and John Bryant, MD:** Co-Directors, Point-of-Care Ultrasound
- **Danial Shams, MD:** Director, Acute Pain Service & Perioperative Medicine Consult Service (APS/PMCS)
- **Nicholas Statzer, MD:** Associate Director, Acute Pain Service & Perioperative Medicine Consult Service (APS/PMCS)
- **Chris Sobey, MD:** Medical Director, Pain Clinics
- **Amanda Teye, MD:** Chief, Comprehensive Pain Service/Transitional Pain Service
- **Jennifer Jayaram, APP:** Clinical Director, Enhanced Recovery After Surgery Program
- **Crystal Parrish, APP:** Coordinator, Enhanced Recovery After Surgery Program

Assistant Vice Chairs

Jeana Havidich, MD, MS, and Paul St. Jacques, MD

The Quality, Safety and Outcomes (QSO) leadership team, spearheaded by **Assistant Vice Chairs for Quality, Safety and Outcomes Jeana Havidich, MD, MS, and Paul St. Jacques, MD**, are proactively integrating the efforts of the quality and safety portfolio with the perioperative optimization portfolio. This team interacts with our department's division chiefs to proactively identify areas for improvement in quality, safety and outcomes across the entire perioperative care arc. Creating and continuing to develop structured review processes concerning quality, safety and outcomes of specific events or practice patterns generates improved care processes for our patients and perioperative systems. Additionally, this team develops new opportunities for monitoring and improving education and feedback related to quality, safety and outcomes throughout the perioperative period for all the team members. The Center for Evidence-Based Anesthesia (CEBA) is an important part of QSO and includes the creation and maintenance of over 150 adult and 70 pediatric documents (e.g., guidelines, clinical pathways and ERAS protocols) on the Perioperative Medicine Portfolio SharePoint site. The Multicenter Perioperative Outcomes Group (MPOG) Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE) task force is another important portfolio of QSO. The task force has worked on implementing department-wide educational initiatives and reporting for several anesthesia quality and safety processes and outcome measures. Faculty representing each clinical division, CRNAs, advanced practice providers and anesthesiology trainees are routinely involved in the teamwork and projects led by the QSO portfolio.

Quality, Safety and Outcomes Team Leaders

- **Aditi Balakrishna, MD:** Director, Quality and Patient Safety
- **Lusine Danakian, MD:** Associate Director, Quality and Patient Safety
- **Michael Mantinan, MD, and Jordan Simpson, CRNA, DNAP:** Senior Advisors, Quality and Patient Safety
- **Michael Higgins, MD, MPH:** Chair, Peer Review Committee
- **Brian Tinch, MD:** Co-Director, CEBA (Pediatric)
- **Marissa Mery, MD, MBA:** Co-Director, CEBA (Adult)
- **Leslie Fowler, EdD:** Director, Perioperative Education and Research
- **Patrick Henson, DO:** MPOG ASPIRE Program
- **Aika Patejdl:** Associate Program Manager, Perioperative Medicine Portfolios



26,000 + anesthetics in operating and sedation rooms at Monroe Carell Jr. Children's Hospital at Vanderbilt

3,261 anesthetics in operating and sedation rooms at Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro

571 anesthetics for neonates (< 1 month old)

173 spine fusions and 39 craniofacial surgeries

An expanding pediatric solid organ transplant program
all stats based on annual numbers

Veterans Affairs Anesthesiology Service

Chief - Ann Walia, MBBS

The Anesthesiology Service at the Tennessee Valley Healthcare System (TVHS) provides a variety of anesthesia services for over 130,000 veterans across its three main campuses in Nashville, Clarksville and Murfreesboro.

The service includes 23 full-time anesthesiologists, 10 part time anesthesiologists, 14 CRNAs, 24 nurse practitioners, 2 anesthesiology residents, 1 fellow, 9 medical instrument technicians and 5 administrative support staff. We also serve as a clinical site for SRNAs from Middle Tennessee School of Anesthesia, hosting two senior students every month. The service is heavily engaged in educational activities within TVHS as well as nationally.

The TVHS Anesthesiology Service has gained national recognition for its Preoperative Evaluation Clinic as well as the Perioperative Care Service, which was started in 2016. Since implementation, the Perioperative/SICU section has been credited with savings of more than \$10 million/year by reducing patient ICU and hospital length of stay to well below national benchmarks. This service has also been instrumental in decreasing in-hospital and long-term opioid use by greater than 80 percent of baseline in the surgical patient population. The Preoperative section has been credited with outstanding preoperative risk stratification and management, resulting in a day-of-surgery cancellation rate of less than 0.5% for anesthesiology reasons. This section leads nationally in the number of e-consults completed successfully, thus saving the facility travel costs and improving patient satisfaction. This year, the clinic providers have successfully implemented the new ACA-AHA evaluation guidelines, resulting in a significant decrease in the number of stress tests and cardiology consults.

TVHS is the only facility in Veterans Integrated Service Network (VISN) 9 that provides comprehensive complex pain management, including invasive procedures like radiofrequency ablation, spinal cord and peripheral stimulator implantation, kyphoplasty and vertebroplasty, tumor ablation, MINDS, suboxone implants and inpatient ketamine infusions for unremitting pain and detoxification. The ketamine clinic has been successful in many ways, including helping veterans wean themselves from their opioid dependency completely and improve quality of life. At the two main facilities, collaboration with the Psychiatry Service has led to expansion of the electroconvulsive therapy program and low dose ketamine infusion program for depression.

15,000 pain clinic & interventional visits

8,000 operating room procedures

8,000 non-operating room procedures

20,000 telehealth & video-connect visits

The service is credited with over 8,000 surgical and 8,000 non-OR procedures, 8,000 pain clinic visits, 7,500 interventional procedures and 20,000 telehealth and video-connect visits across three campuses. In addition, the Anesthesiology Service is responsible for oversight of the facility surgical intensive care, perioperative service, Rapid Response Team, CPR, pain management, non OR airway management, and moderate sedation program.

Faculty and staff members teach at national Veterans Health Administration (VHA) and Department of Defense conferences and at the national simulation center. Additionally, collaboration with the Anesthesia Patient Safety Foundation and VHA Field Advisory Boards of Gastroenterology, Endocrinology, Cardiology and Anesthesiology has led to development of several national guidelines, including anesthesia and GLP-1 agonists and SGLT2 inhibitors, obstructive sleep apnea, deep sedation, and guidelines for anesthesia evaluation prior to surgery. Additionally, we provide support across VHA to several other facilities in key areas such as the ERAS protocols, ketamine infusion program for complex chronic pain and opioid detoxification, labor mapping, coding and workload capture. Several faculty serve on VHA National Anesthesia Program committees, such as National Patient Safety Foundation, reviewing nationally submitted anesthesia events and presenting lessons learned at the Anesthesia Chiefs Meeting; National Pain Management and Opioid Safety Committee; National Information and Technology Committee; and National Practice Standards committee. The chief serves as the National Disciplinary Appeals Board member, chair of the National Anesthesiology Surgical Advisory Board, member of the Field Advisory Committee, and VISN 9 Anesthesiologist-in-Chief. The chief also chairs or co-chairs several other National Anesthesia Program sub-committees.



Certified Registered Nurse Anesthetists

Chief - Amanda Dickert, CRNA, DNAP, MMHC



Jackie Woodruff, Amanda Dickert, Brad Koss

The Vanderbilt University Medical Center (VUMC) Department of Anesthesiology continues to set the national standard for collaborative practice and innovation in patient care. Our multidisciplinary collaborative approach integrates anesthesiologists, residents, certified registered nurse anesthetists (CRNAs), student registered nurse anesthetists (SRNAs) and anesthesia technicians and technologists to deliver exceptional care. The CRNA Division is the largest group within the Anesthesiology Department and is led by Chief CRNA and Director of Anesthesiology Advanced Practice Amanda Dickert, CRNA, DNAP, MMHC, and Associate Chief CRNAs Brad Koss, CRNA, DNAP, and Jackie Woodruff, CRNA, DNAP.

Leadership within the CRNA Division is strategically designed to foster practice innovation, support ongoing education and promote professional development. Eight divisional CRNA managers play a pivotal role in guiding team growth while maintaining a strong emphasis on enhancing patient experience and outcomes. Complementing this structure are specialized leadership roles, including a CRNA Manager of Education, who oversees onboarding, coordinates student affiliations and drives continuous professional development initiatives. Additionally, a Senior Quality and Patient Safety Advisor serves as an integral member of the department's quality team, ensuring adherence to best practices and advancing patient safety standards.

The CRNA Division has experienced remarkable growth, now serving five hospitals and eight ambulatory surgery centers. Nearly 300 CRNAs provide anesthesia care in a wide range of surgical procedures, including cardiac, pediatric, vascular, trauma, neurosurgery, plastic surgery, radiologic, and other specialized interventions. CRNAs deliver general, regional, and monitored anesthesia care for both scheduled and emergency cases, including obstetric

and diagnostic procedures. With a "can-do" attitude, these professionals thrive in the complex environment of an academic medical center, caring for the most challenging patients in Tennessee and beyond.

In addition to practicing clinical excellence, VUMC CRNAs play a significant role in education. The division proudly serves as a clinical site for three affiliated nurse anesthesia programs, and we are excited to collaborate with Vanderbilt School of Nursing on its new Doctoral Nurse Anesthesia program, which will welcome its inaugural cohort in 2026. Brent Dunworth, CRNA, DNP, MBA, and former Nurse Executive of Advanced Practice at VUMC, will serve as the founding academic program director for this initiative. Our current affiliated programs include Middle Tennessee School of Anesthesia (Madison, Tennessee); Emory University Nurse Anesthesia program (Atlanta, Georgia); and Marian University (Indianapolis, Indiana). Student nurse anesthetists gain invaluable experience during Vanderbilt rotations, participating in over 7,000 anesthetics annually. Both CRNAs and anesthesiologists provide expert clinical teaching, ensuring these learners are highly sought after upon graduation. Additionally, Vanderbilt CRNAs contribute to global health initiatives by teaching nurse anesthesia students in Kijabe, Kenya, both onsite and virtually as part of the Vanderbilt International Anesthesia program.

The Anesthesiology Department also benefits from the expertise of over 40 anesthesia technicians, who help ensure safe, efficient anesthesia care by providing skilled support at both on- and off-campus clinical locations. To foster the next generation of anesthesia technicians, VUMC has partnered with the Anesthesia Technology program at Columbia State Community College in Columbia, Tennessee, offering clinical rotations in adult and pediatric anesthesiology.

Education



The Department of Anesthesiology Office of Educational Affairs is led by a dedicated team committed to fostering excellence in training, professional development, and support for residents, fellows, and faculty. At the helm is Vice Chair of Educational Affairs Brian Gelfand, MD, whose vision shapes the department’s educational programs. He is joined by Anesthesiology Residency Program Director Michael Pilla, MD, who oversees the residency program with a focus on high standards and innovative learning opportunities. Anesthesiology Residency Associate Program Director Meredith Kingeter, MD, plays a key role in curriculum development and resident mentorship, while our new Anesthesiology Residency Assistant Program Director Willie Agee, MD, PhD, brings fresh insights to support trainee advancement and Undergraduate Medical Education. In addition to our core residency program, we offer 11 subspecialty programs led by a group of excellent program directors and assistant program directors. Our group of program administrators, LaurieAnn Hembree, Brooke Hoover, Elisabeth Hudson, Lisa McIntosh, Jillian Powell and Jayne Wolbert, embody professionalism, positivity and a profound commitment to excellence in education, ensuring that our trainees, faculty and staff receive the resources and support needed to thrive.

Residents

The VUMC Anesthesiology Department’s residency program is rated among the top 15 training programs in the United States and is highly sought after by the nation’s top medical students.

The physician educators in the Anesthesiology Department are nationally and internationally recognized as leaders in their fields, and the department successfully supports residents interested in academic anesthesiology so they can develop careers focused on advancing knowledge in the specialty. Peer-reviewed publications and the presentation of research by residents at national meetings are clear indications that the department’s educational programs are creating physician-scholars who are prepared for medical practice, peer-education, and scientific investigation.

The educational program for residents and fellows consists of a combination of comprehensive didactic conferences, hands-on workshops, mentored clinical training by subspecialists in every domain of anesthesiology, simulation training and self-study. Simulation training features prominently in the cognitive, procedural and teamwork aspects of anesthesia education, and the Center for Experiential Learning and Assessment (CELA) is a nationally renowned, on-campus resource for this training. Additionally, transesophageal echocardiography (TEE) and

point-of-care ultrasound (POCUS) training are now core educational aspects in our residents’ curriculum.

The goal of ongoing curriculum development and revision in the Milestones era is to continue to reach the highest level of educational achievement using modern learning techniques.

Fellows

Building from the department’s strength in subspecialties, fellowships in 11 clinical areas are offered to individuals seeking advanced, focused subspecialty training:

Anesthesiology Critical Care Medicine*

Program Director: Marcos Lopez, MD

Cardiothoracic Anesthesiology*

Program Director: Kelly Mishra, MD
Assistant Program Director: John Bryant, MD

Clinical Informatics*

Program Director: Dara Mize, MD
Assistant Program Director: Jonathan Wanderer, MD, MPhil

Global Anesthesiology

Program Director: J. Matthew Kynes, MD

Pain Medicine*

Program Director: Puneet Mishra, MD

Neuroanesthesiology

Program Director: Roy Neeley, MD

Obstetric Anesthesiology*

Program Director: Stephanie Woodward, MD

Pediatric Anesthesiology*

Program Director: David Roberts, MD
Assistant Program Director: Kelsey Neuhalphen, MD

Pediatric Cardiac Anesthesiology

Program Director: Bevan Londergan, MD

Perioperative Medicine

Program Director: Miklos Kertai, MD, MMHC, PhD

Regional Anesthesia & Acute Pain Medicine*

Program Director: Brian Allen, MD

*Indicates fellowship accredited by ACGME

Education

Nurse Anesthetists

The continuing education of more than 200 certified registered nurse anesthetists (CRNAs) in the department is supported with recurring programs, including Grand Rounds and Mortality, Morbidity & Improvement (MM&I) Conferences. In addition, Vanderbilt is a clinical affiliate for Middle Tennessee School of Anesthesia, Emory University Nurse Anesthesia Program (Atlanta, Georgia) and Marian University (Indianapolis, Indiana). On-campus training is coordinated by Anesthesiology Department CRNA leaders, with guidance from CRNA Manager of Education Matthew Fosnot, CRNA, DNAP.

Advanced Practice Nurses

The Department of Anesthesiology has a unique partnership with the Vanderbilt University School of Nursing to offer an Acute Care Nurse Practitioner (ACNP) Intensivist track as part of the ACNP master’s degree program. The program combines the didactic training of the School of Nursing’s ACNP Program with supplemental specialty lectures in critical care medicine. Students perform their clinical rotations in seven of the Vanderbilt and VA ICUs. Students also receive additional exposure to ICU medicine through twice-monthly simulation sessions and weekly clinical case conferences, taught jointly by members of both faculties.

Additional partnership programs between the Anesthesiology Department and the School of Nursing are being planned. Vanderbilt University Medical Center is one of the largest employers of nurse practitioners in the country. The Anesthesiology Critical Care Medicine Division has 75 advanced practice nurses who work in intensive care settings. The Preoperative Evaluation Clinic and Perioperative Medicine Consult Service include another 17 APNs as an integral part of these teams.

The Center for Experiential Learning and Assessment

Under the leadership of Monica Bhutiani, MD, MEd, CELA offers medical learners at all levels simulation education on computerized, life-like mannequins. CELA was endorsed by the American Society of Anesthesiologists (ASA) as one of approximately 40 centers in the nation officially approved to deliver certified educational programs. At CELA, anesthesiologists can receive continuing medical education (CME) simulation training that qualifies for American Board of Anesthesiology Maintenance of Certification in Anesthesiology (MOCA®) credit. To achieve the ASA endorsement, the CELA program met strict criteria, which include having strong leadership and the necessary equipment, facilities, and personnel to provide consistent, effective training.

MPOG ASPIRE Quality Improvement Project

Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE) is the quality improvement (QI) arm of the Multicenter Perioperative Outcomes Group (MPOG). The goal is to improve the care of patients undergoing anesthesia by reducing unexplained variation in practice and collaborating with anesthesia providers to define best practices. Participating sites work together to build quality measures, review best practices and exchange ideas for improving patient outcomes. ASPIRE has developed numerous quality measures, spanning several anesthesia care domains.

The Department of Anesthesiology at VUMC joined MPOG ASPIRE in 2020 and has the full support of departmental leaders. To mobilize resources and develop a cohesive plan for implementation of ASPIRE quality measures department-wide, the ASPIRE Task Force was created. The task force, led by Miklos Kertai, MD, MMHC, PhD, identified three adult specific measures and three pediatric specific measures on which a QI project would initially focus.

Of note, 22 ASPIRE measures have been identified. A key component of ASPIRE includes monthly feedback emails showing departmental

compliance with ASPIRE measures and then later provider level performance data. The project vision and timeline were introduced at Grand Rounds in January of 2021 to department groups: attending physicians, CRNAs, fellows, residents and SRNAs.

Ultimately, this QI project will improve patient care with the delivery of detailed feedback to anesthesia providers. In addition, the provision of education that is ASPIRE-measure specific will further enhance best practices in the care of patients undergoing anesthesia.

The Academy for Excellence in Education

A collective of outstanding faculty educators in the School of Medicine, the AEE provides a forum to foster higher levels of participation and promote excellence and scholarship in the delivery of education to health professionals. The mission of the AEE is to enhance the educational environment at Vanderbilt University School of Medicine and VUMC by advocating for the development, support and recognition of dedicated educators; by sustaining a community of educators; and by fostering educational excellence, innovation, leadership and scholarship. The AEE collective currently consists of 181 faculty, 16 of whom are Anesthesiology Department faculty members.

Educational Research

The department is a national leader in rigorous educational research, and numerous faculty are involved with the latest in pedagogical and educational implementation science research. J. Matthew Kynes, MD, Mark Newton, MD, Brian Allen, MD, Amy Robertson, MD, Jonathan Wanderer, MD, MPhil, Brian Gelfand, MD, and Bantayehu Sileshi, MD, are the current education researchers.

Dr. Kynes’ research focuses on the impact of high-fidelity simulation workshops on clinical skills for providers involved in obstetric care in Kenya. He also studies the preparation and experience of anesthesiology residents participating in international rotations and their impact on improving clinical exposure and long-term engagement in humanitarian activities. Dr. Kynes’ research includes the FAER grant impact of and utilization of online curricula in pediatric anesthesiology by providers in low- and middle-income countries.

Dr. Sileshi has funded research investigating the effects of education capacity-building efforts and the implementation of a novel perioperative data collection tool in low- and middle-income countries, including Kenya and Ethiopia.



Special Lectures and Awards



The department hosts special lectureships throughout the year and presents distinct recognitions to department members who have provided exemplary service both to their patients and to their colleagues.

Many of these are a direct result of philanthropic support from our alumni, as well as from current department members and other program supporters. Funding is provided by private donors, whose gifts materially improve the academic life of the Vanderbilt Department of Anesthesiology.

Dr. James Phythyon Endowed Lectureship in Pediatric Anesthesiology

The lectureship was established by the family of Dr. James Phythyon, a founding member of the Pediatric Anesthesiology Division. Dr. Phythyon's widow, Mrs. Marlin Sanders, and the couple's daughters, Mary Neal Meador, Elizabeth Donner and Sarah Miller, are strong department supporters.



Featured guest speaker Kathy Glas, MD, presented the 16th annual **Dr. Bradley E. Smith Endowed Lectureship on Medical Professionalism** in February 2025.



The Sandidge Pediatric Pain Management Endowed Fund

During her retirement, Vanderbilt anesthesiologist Paula C. Sandidge, MD, created The Sandidge Pediatric Pain Management Endowed Fund at Monroe Carell Jr. Children's Hospital at Vanderbilt in 2010 to recognize and encourage progress in pain management for children. Dr. Sandidge passed away in September 2018.

The Dila Vuksanaj Memorial Fund for Resident Education

Pediatric anesthesiologist Dila Vuksanaj, MD, practiced at Vanderbilt Children's Hospital (later Monroe Carell) for 13 years, dedicating herself to her patients and to the hundreds of trainees who looked to her as a role model, mentor and friend. Following her death in 2009, her family, including her husband, Jacques Heibig, MD, founded the Dila Vuksanaj Memorial Fund for Resident Education.



Featured guest speaker Aditee Ambardekar, MD, MEd, presented the 19th annual **Dr. James Phythyon Endowed Lectureship in Pediatric Anesthesiology** in April 2025.



Dr. Bradley E. Smith Endowed Lectureship on Medical Professionalism

Former Department Chair Bradley E. Smith, MD, defined what it means to be a true professional, and in 2009 a lectureship on medical professionalism was established in his name by then Department Chair Michael Higgins, MD, MPH. The goal of the lectureship is to reflect on the characteristics, responsibilities and rewards of professionalism as applied to the practice of anesthesiology.

Dr. Charles Beattie Endowed Lectureship on Perioperative Medicine and Systems-Based Practice

Established by current Department Chair Warren Sandberg, MD, PhD, the lectureship is intended to bring innovators in anesthesiology from unique backgrounds and compelling world views to Vanderbilt as visiting professors.



Featured guest speaker John E. Fiadjoe, MD, will present the 6th annual **Dr. Charles Beattie Endowed Lectureship on Perioperative Medicine and Systems-Based Practice** on December 19, 2025.

Vanderbilt International Anesthesia

Through Vanderbilt International Anesthesia (VIA), the Department of Anesthesiology is committed to improving perioperative and anesthetic care in underserved regions of the world through service, education and research. The commitment of our department is shown through the involvement of faculty, trainees and staff in a variety of innovative projects across many low- and middle-income countries. From long-established partnerships of educational capacity-building to short-term service trips to international advocacy and research, VIA has invested in improving anesthesia care to save lives, promote health and impact the healthcare systems of countries in need.

The department's newest global education initiative, launched in 2022, is the Pediatric Anesthesia Training in Africa (PATA) collaboration, led by Mark Newton, MD. Fifty-four million children per year need surgery but are unable to receive this essential surgery. PATA aims to improve perioperative care for children by building education capacity for advanced subspecialty training at teaching hospitals across the continent. PATA has supported the development of three new pediatric anesthesiology fellowship programs (located in Nigeria, Uganda and Zambia), more than doubling the number of such programs in Africa. After 2025, PATA will have graduated 28 pediatric anesthesiologists who are working in eight countries. PATA is funded by The ELMA Foundation, Smile Train, and Kids OR.

Another global education initiative is ImPACT Africa. Supported by grants from GE Foundation and The ELMA Foundation and led by Mark Newton, MD, and Bantayehu Sileshi, MD, the program collaborates with local institutions, hospitals and ministries of health in Ethiopia and Tanzania to train physician and non-physician anesthesia providers and build capacity for education. During the 2024-25 academic year, several department members, including Robert Deegan, MB, ChB, PhD, Julio Gonzalez-Sotomayor, MD, Christina Jelly, MD, Mark Newton, MD, and Bantayehu Sileshi, MD, traveled to Ethiopia to provide subspecialty teaching and workshops to local residents and faculty. In addition, Jordan Yokley, MD, Clay Adams, MD, and Mark Newton, MD, traveled to University of Zambia to teach the PATA fellows. Several department members are involved in contributing to the development of e-learning modules used by learners throughout Africa.

In addition to these programs, VIA offers an ACGME-/ABA-accredited elective rotation to Kenya for the department's residents and fellows. Since the rotation began in 2009, VIA has sent 135 residents and fellows to AIC Kijabe Hospital in Kenya to provide anesthesia care and education. While in Kenya, the department's trainees are supervised by faculty members J. Matthew Kynes, MD, and Greg Sund, MD, who are based full-time in Kijabe. Residents and fellows also work alongside residents from the Kijabe Hospi-

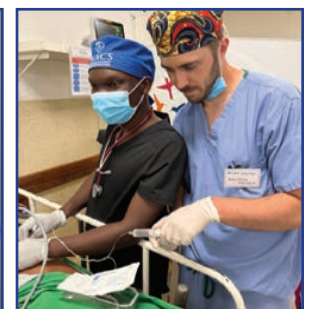
tal anesthesiology residency, which was started in 2022, with Dr. Kynes as the program director. In preparation for the rotation, trainees participate in the annual Preparing Residents for International Medical Experiences (PRIME) simulation-based workshop, which is led by Cori Banerdt, MD. The Kijabe rotation is a highlight for many of the department's trainees and helped pave the way for the Global LEAP (Global Leadership in Anesthesia Pathway) program, an advanced track for residents interested in developing in-depth global health expertise and extensive international experience.

Looking back, in the 2023-2024 academic year, the department welcomed its first Global Anesthesiology fellow, Tolulope Kehinde, MD, MBA. Tolu spent time in Nashville, Uganda, Malawi, Kenya and Liberia and made a significant impact wherever she went. She was a clinical and simulation educator for the Kijabe anesthesiology residency and student nurse anesthetist programs, led a multidisciplinary obstetric emergencies simulation course in Malawi, and conducted teaching and strategic planning for the University of Liberia simulation center and JFK Hospital in Monrovia. In recognition and celebration of Tolu's ability to combine expertise with effective collaboration, the University of Liberia and BRIDGE-U: Liberia presented her with the "Supportive and Proactive Visitor" Award.

Our department is also proud of the on-going global health contributions of our CRNA team members. Several of the department's CRNAs were integral in the planning of the inaugural Pan African Nurse Anesthetists Conference (PANAC), which took place in June 2024 in Nairobi, Kenya. PANAC brought together non-physician anesthesia providers from 18 different countries across Africa for continued education, advocacy and networking. Many members of the department contributed financially to the success of the conference. Thanks to the generosity of these donors, VIA was able to award travel scholarships to 23 participants from 10 African countries to attend PANAC.

The department has a long track record of research by trainees and faculty that advances safe anesthesia globally. Recently, faculty member Stephanie Woodward, MD, was awarded the SOAP/Kybele International Outreach Grant for a research project on using spinals for labor analgesia at Kijabe Hospital. The project was implemented in the 2024-2025 academic year. Research manuscripts based upon large longitudinal data collection in multiple countries in Africa looking at outcomes are being developed with our Africa based colleagues, anesthesia trainees and medical students interested in global health issues.

The department looks forward to continuing to expand efforts to improve anesthesia care across the globe in 2026 and beyond.



Research

The vision of the Research Division is to advance knowledge in the fields of perioperative medicine, critical care, pain medicine and related disciplines by fostering collaboration and research excellence. The underlying goal of our research program is to improve patient care and advance science.

In federal fiscal year 2024, the Vanderbilt University School of Medicine (VUSM) ranked 5th among United States medical schools for National Institutes of Health (NIH) funding, with more than \$586 million in funding. VUSM funding from all sources has more than doubled since 2001. Investigators in the Department of Anesthesiology successfully competed for more than \$14 million in extramural research funding. This included more than \$11.8 million in awarded NIH grants, which placed Vanderbilt Anesthesiology 5th among United States academic anesthesiology departments in NIH funding.

Vanderbilt Anesthesiology faculty published 262 peer-reviewed papers in fiscal year 2024, up from 69 papers in fiscal year 2010, within the peer-reviewed literature.

The department's Clinical Research program focuses on advancing knowledge and improving healthcare. The program supports investigator-initiated studies, including NIH-supported single center and multicenter clinical trials, and industry-sponsored clinical projects. Our research is advancing medical practice in the fields of perioperative care, critical care, chronic pain and medical devices. Investigators are practicing physicians who use clinical expertise to develop research protocols to answer clinically significant questions and investigate novel treatments.

The Perioperative Clinical Research Institute (PCRI), the Vanderbilt Anesthesiology Clinical Research Advisory Committee (VACRAC) and the Vanderbilt Anesthesiology & Perioperative Informatics Research (VAPIR) group support and facilitate the clinical research program.

PCRI supports successful clinical research by providing key services to clinical investigators, including regulatory management, data management, contracts management, biostatistics, bioinformatics, study execution and financial oversight. The PCRI oversees more than 85 active clinical studies, with many more studies in development. The PCRI is led by Medical Director David McIlroy, MB.BS., MD, MClInEpi, Vice Chair for Research Edward Sherwood, MD, PhD, and PCRI Manager Gail Mayo, RN. The research team consists of highly trained and broadly experienced professionals, including research nurses, clinical trial coordinators, research assistants, regulatory specialists and administrative assistants.

VACRAC is composed of a panel of experienced clinical investigators who review research protocols and work with investigators to optimize study design and implementation.

This process consists of a rapid initial review process followed by formal discussion of projects and protocols to optimize study design and mobilize resources to support successful completion of projects. The support provided by VACRAC improves the design and execution of clinical research projects, resulting in more rapid and effective study origination and completion.

VAPIR provides support to optimize informatics-focused projects and dissemination of knowledge and information throughout the department. Through the development of automated email systems and dashboards, VAPIR has strengthened internal communication and plays a vital role in providing near real time feedback to clinicians to help them improve perioperative care. VAPIR is led by Director Robert Freundlich, MD, MS, MSCI. VAPIR supports department research efforts by working with investigators to optimize the design and execution of informatics- and artificial intelligence-based studies. The VAPIR group collaborates internally with other departments at Vanderbilt to facilitate information analysis and dissemination, with the goal of improving outcomes for surgical patients. VAPIR also supports access to the electronic medical record to allow for high quality data acquisition and analysis to support research and quality improvement initiatives.

Investigators in the Basic Science Division conduct high quality, impactful basic and translational research, with the goal of advancing current knowledge and improving patient care. Specific areas of interest include ion transport, cell signaling, drug discovery, organ protection, pain management, the neurobiology of addiction, innate immunity and device development. The Basic Science Division is led by Director Eric Delpire, PhD. Through high-throughput screening and mechanistic studies, investigators have made major contributions to drug development and understanding the pathogenesis of diseases that impact the cardiovascular, renal, neurological and immune systems.

Investigators in the Center for Research and Innovation in Systems Safety (CRISS) in the department conduct basic and applied research to improve patient safety and clinical quality. Using a wide range of human factors and systems engineering, cognitive psychology, biomedical informatics, and implementation science techniques, CRISS studies performance during patient care and in realistic simulations to better understand how and why care deviates from optimal. Interventions are then designed and evaluated to improve safety and care quality. The Center is led by Director Nicole Werner, PhD.

The Vanderbilt Department of Anesthesiology has a strong, multifaceted approach to research, which can be viewed on the following pages.

- Among U.S. medical schools, Vanderbilt University School of Medicine ranked **5th for NIH funding**, with more than **\$586 million** in funding (*federal fiscal year 2024*)
- Among U.S. anesthesiology departments, VUMC's Anesthesiology Department also ranked **5th for NIH funding** (*federal fiscal year 2024*)

- Anesthesia investigators successfully competed for more than **\$14 million** in extramural funding, including more than **\$11.8 million** in awarded NIH grants
- In FY2024 our department faculty published **262** peer-reviewed papers

Lab Research Advancing Medical Science

Director – Eric Delpire, PhD

The work of the Basic Science Research Division is diverse and ranges from ion channel physiology and pharmacology to immunology to pain. Multiple projects by investigators are sponsored by the National Institutes of Health. Brief descriptions of work within the Research Division and its core investigators are provided here.

Frederic T. (Josh) Billings IV, MD, MSCI, Professor of Anesthesiology and Medicine, is developing new therapy for perioperative organ injury by conducting clinical trials and evaluating mechanisms of surgery-induced organ injury. Broadly this includes studying and manipulating the patient response to acute surgical stress to reduce morbidity, but specifically he is investigating the impact of perioperative oxidative damage as a mechanism of acute kidney and brain injury in patients having surgery.

Stephen Bruehl, PhD, Professor of Anesthesiology, has identified pain-related alterations in interacting cardiovascular-pain modulatory systems that contribute to enhanced pain responsiveness.

Eric Delpire, PhD, Professor of Anesthesiology, Molecular Physiology and Biophysics, Director of Basic Science Research and BH Robbins Director in Anesthesiology Research, utilizes genetically modified mouse models and a variety of molecular techniques to investigate how neuronal Cl⁻ transporters modulate inhibitory synaptic transmission and how renal Na⁺ transporters and associated proteins regulate salt reabsorption and blood pressure.

Jerod Denton, PhD, Professor of Anesthesiology and Pharmacology, is doing early-stage drug discovery for a family of potassium channels involved in renal, endocrine, cardiac and brain function. The goal is to develop sharp

pharmacological tools for exploring the integrative physiology and, ultimately, druggability of these channels.

Brad Grueter, PhD, Associate Professor, and **Carrie Grueter, PhD**, Research Associate Professor, are researching the neurobiology of addiction and reward-related behaviors. They utilize state-of-the-art electrophysiology techniques, including optogenetics, as well as a battery of specialized neurobehavioral tests performed in genetically modified mouse models.

Matthew Morris, PhD, Associate Professor of Anesthesiology, is investigating biopsychosocial factors that influence the transition from acute to chronic pain among traumatic injury patients and the course of chronic low back pain.

Matthias Riess, MD, PhD, Professor of Anesthesiology and Pharmacology, is investigating the mechanisms of cardio- and neuroprotection following cardiac arrest, myocardial infarction and stroke in various translationally relevant cell, isolated organ and animal models.

Edward Sherwood, MD, PhD, Professor of Anesthesiology, Pathology, Microbiology and Immunology, Cornelius Vanderbilt Chair in Anesthesiology and Vice Chair for Research, and **Julia Bohannon, PhD**, Associate Professor of Anesthesiology, are studying several aspects of sepsis and burn injury and the application of immunotherapy in critically ill patients.

Lori Schirle, PhD, CRNA, Assistant Professor of Anesthesiology, is researching the influence of genomics and sex on prolonged postoperative pain and opioid use.



Advancing Technology & Improving Patient Care



The perioperative informatics groups advance patient care through innovations in patient safety and quality. By harnessing innovative technology into clinical applications, VAPIR and Perioperative Informatics are advancing the frontiers of science and healthcare. Through the Division of Informatics Research, faculty members collaborate to improve education, clinical care and research within informatics.

Perioperative Informatics

Perioperative Informatics, led by Jonathan Wanderer, MD, MPhil, designs, develops and implements system enhancements for the periprocedural and inpatient care areas. The team supports vendor products and integrates them with the Epic unified application suite. Using health information technology solutions, the Perioperative Informatics group supports best practice care and workflows to improve patient safety, care quality, efficiency and communication through accurate and reliable real-time data acquisition and delivery.

Recent accomplishments include:

- Implementation of electronic periprocedural code status order.
- Improved pre-procedure workflow with real-time tracking of patient readiness for surgery.
- Rollout of alerts for intraoperative hypothermia.

Vanderbilt Anesthesiology & Perioperative Informatics Research (VAPIR)

VAPIR, led by Director Robert Freundlich, MD, MS, MSCI; Associate Director of VAPIR Research and Education, Christina Boncyk, MD; Associate Director of VAPIR Quality and Safety, Mias Pretorius, MBChB, MSCI; and Assistant Director Karen McCarthy, EdD, collaborates broadly to better understand perioperative care.

Trainees can participate in seminars, journal clubs and a structured summer research training program. Experts in biomedical informatics and clinical research share their research at monthly seminars as visiting scholars.

Among its many ongoing projects, VAPIR has:

- Created the informatics backbone that supports the Vanderbilt Perioperative Medicine Consult Service.
- Analyzed the impact of real-time decision support tools created by the Perioperative Informatics team.
- Worked closely with Perioperative Informatics to develop a common data architecture, enabling seamless data analysis from our legacy Electronic Health Record, VPIMS (Vanderbilt Perioperative Information Management System) and current eStar (Epic) system.
- Participated in multiple large, NIH-, AHRQ-, and PCORI-funded research projects, providing a critical informatics backbone to support innovative research.

Operations Research

The Operations Research group, led by Analytics Senior Director Vikram Tiwari, PhD, performs implementable research using management sciences to design better healthcare delivery systems and operational processes. The group exemplifies the department's stated goal of fostering innovation in all aspects of the delivery of excellent clinical care.

The group has an active post-doctoral fellowship program. Incoming fellows have either MD or PhD degrees and an interest in pursuing analytics-based research. To date, the group has guided three research fellows.

Investigators in Operations Research use diverse research methodologies—linear and non-linear optimization, simulation and systems dynamics modeling, econometric and statistical modeling. Implemented projects include predicting day-of-surgery case volume, perioperative capacity planning, provider scheduling and innovative efficiency metrics.

informatics database size: 30 terabytes

26 active projects

2,301,887 cases contained in the perioperative data warehouse

Perioperative Clinical Research Institute

The Perioperative Clinical Research Institute (PCRI) is led by David McIlroy, MB.BS., MD, MClInEpi, and Edward Sherwood, MD, PhD.

The mission of PCRI is to:

- Promote a culture of large and robust clinical trials that, in turn, provide high-quality evidence to inform perioperative practice nation-wide.
- Promote high-quality, high-impact clinical research tailored to the experience and expertise of individual clinicians and accessible to all members of the department.
- Create opportunities for junior investigators to learn the process of clinical research.
- Mentor investigators throughout the research development and implementation process.
- Promote Good Clinical Practice (GCP) and ensure regulatory compliance.

All clinical research for which the PI is a member of the Department of Anesthesiology is routed through PCRI via electronic submission of a brief and focused proposal (<https://redcap.vumc.org/surveys/?s=XE44E798XF>).

The PCRI team provides a full range of support services, including project development, submission of the IRB application, contracts management, initiation and execution of clinical studies, regulatory and compliance oversight, data management, and biostatistics and biomedical informatics support. The end-goal is execution and publication of well-designed clinical research studies that address important questions, from smaller studies designed to generate preliminary, pilot or feasibility data in support of subsequent grant applications through to multicenter investigator-initiated studies.



In 2024-25 the VUMC Department of Anesthesiology was ranked 5th in NIH funding nationwide, and over the past five years has published multiple clinical research studies in the highest-impact journals, including the *New England Journal of Medicine*, *JAMA*, and *The British Medical Journal*.

Most of the department's investigators are practicing physicians who use their clinical expertise to develop research protocols that address clinically important questions. The PCRI team consists of highly trained and broadly experienced research professionals, including research nurses, clinical trial coordinators, a regulatory specialist and administrative support.

Currently active studies include a mix of extramurally and department funded studies, investigator-initiated and industry-sponsored studies, single-center and multicenter clinical trials, observational studies and retrospective data analyses. The department and medical center strongly support the initiation, development and execution of large pragmatic trials. Recent or current clinical trials supported by PCRI include:

- The multicenter REGAIN trial of regional anesthesia vs general anesthesia after hip fracture.
- The single-center COPE-iOS trial testing the effectiveness of cognitive and physical exercise to improve outcomes after surgery.
- A single-center study of pharmaco-genomic guided beta-blocker administration in patients undergoing cardiac surgery.
- Large pragmatic trials of intraoperative ketamine and high-flow nasal cannula to reduce re-intubation after cardiac surgery.
- The TRIGS trial assessing the impact of tranexamic acid on surgical site infections in patients undergoing abdominal surgery.
- A single-center trial assessing the impact of soluble guanylyl cyclase stimulation on vascular reactivity and organ injury during cardiac surgery.
- A trial to evaluate the efficacy of anti-oxidants to decrease chronic pain after total knee arthroplasty.
- A multicenter trial assessing the impact of intraoperative hyperoxia on perioperative outcomes.

Scan for link to PCRI for electronic submission of a brief and focused proposal



Key Clinical Research Studies

Brian Allen, MD
Effect of A Novel Educational Offering on Knowledge Acquisition and Behavior Change Concerning Opioid Prescribing Practices

Bret Alvis, MD
Non-Invasive Waveform Analysis (NIVA)-a proof of concept¹

Frederic Billings IV, MD, MSCI
Impact of Intraoperative Oxygenation Practices on Patient Outcomes (Intraop Ox)²

Minimizing ICU Neurological Dysfunction with Dexmedetomidine-induced Sleep (MINDDS II)^{1,2}

Julia Bohannon, PhD
Immunomodulation Strategies to Protect Against Nosocomial Infections After Severe Burn Injury Through Trained Immunity¹

Christina Boncyk, MD
A Phase 3, Multicenter, Randomized, Controlled, Open-Label Assessor-Blinded Study to Evaluate the Efficacy and Safety of Inhaled Isoflurane Delivered via the Sedacona ACD-S Compared to Intravenous Propofol for Sedation of Mechanically Ventilated Intensive Care Unit Adult Patients²

Stephen Bruehl, PhD
Reducing Perioperative Oxidative Stress to Prevent Postoperative Chronic Pain Following Total Knee Arthroplasty^{1,2}

Evaluating Specific and Non-Specific Mechanisms in Two Distinct Complementary/Integrative Interventions for Chronic Pain¹

Holly Ende, MD
Postpartum Hemorrhage Risk Prediction: A Pragmatic Randomized Controlled Trial of a Prediction Model with Clinical Decision Support Compared to Standard of Care²

Robert Freundlich, MD, MS, MSCI
Reducing Reintubation Risk in High-Risk Cardiac Surgery Patients with High-Flow Nasal Cannula^{1,2}

Christopher Hughes, MD
Cognitive and Physical Exercise to Improve Outcomes After Surgery (COPE-iOS) Study^{1,2}

Clinical Trial Protocol for CoMind One EFS

Miklos Kertai, MD, MMHC, PhD
Pain Sensitivity and Unpleasantness in People with Alzheimer’s Disease and Cancer^{1,2}

Daniel Larach, MD, MSTR
Low-dose Buccal Buprenorphine: Relative Abuse Potential and Analgesia¹

Frederick Lombard, MBChB, FANZCA, and Miklos Kertai, MD, MMHC, PhD
Temperature During Cardiopulmonary Bypass and Adverse Outcomes After Cardiac Surgery

Marcos Lopez, MD
The Effects of Soluble Guanylyl Cyclase Stimulation on Perioperative Vascular Reactivity and Organ Injury in Cardiac Surgery Trial^{1,2}

David McIlroy, MB.BS., MD, MClinEpi
Evaluating the Association between Mean Arterial Blood Pressure Through the First 24 Hours After Cardiac Surgery and Postoperative Acute Kidney Injury¹

Tranexamic Acid to Reduce Infection After Gastrointestinal Surgery (TRIGS) Trial^{1,2}

Matthew Morris, PhD
Acute to Chronic Pain Transition and Race (ACTR)¹

Racial and Socioeconomic Differences in Chronic Low Back Pain (ERASED 2)¹

Mark Newton, MD
Evaluation of Mobile Obstetric Simulation Training (MOST)on Multidisciplinary Team Management and Outcomes of Obstetrics Emergencies in the Lake Region of Tanzania

Pratik Pandharipande, MD, MSCI
Maximizing the Efficacy of Sedation and Reducing Neurological Dysfunction and Mortality in Septic Patients with Acute Respiratory Failure (MENDS2 Study)^{1,2}

Kimberly Rengel, MD, MSCI
Systemic Inflammation and Biology in Acute Respiratory Failure—Relationship with Treatment Response and Outcomes in INSPIRE-ICU Trials^{1,2}

Joseph Schlesinger, MD, FCCM
ICU Noise and Delirium

Development and Evaluation of Novel, Information-rich Auditory Alerts to Enhance the Efficiency and Security of Warfighter Communication

Heidi Smith, MD, MSCI
Maximizing the Efficiency of Goal-directed Sedation to Reduce Neurological Dysfunction in Mechanically Ventilated Infants and Children (mini-MENDS)¹

Amanda Stone, PhD
Experiences of Functional Nausea in Adolescent Girls and Their Parents

¹Federally funded

²Randomized Controlled Trial

Key Clinical Researchers



Brian Allen, MD



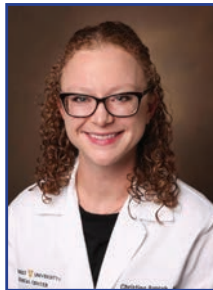
Bret Alvis, MD



Frederic Billings IV, MD, MSCI



Julia Bohannon, PhD



Christina Boncyk, MD



Stephen Bruehl, PhD



Holly Ende, MD



Robert Freundlich, MD, MS, MSCI



Christopher Hughes, MD



Miklos Kertai, MD, MMHC, PhD



Daniel Larach, MD, MSTR



Frederick Lombard, MBChB, FANZCA



Marcos Lopez, MD



David McIlroy, MB.BS., MD, MClinEpi



Matthew Morris, PhD



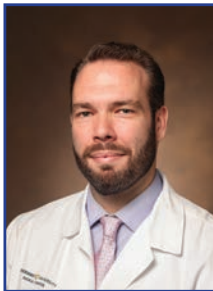
Mark Newton, MD



Pratik Pandharipande, MD, MSCI



Kimberly Rengel, MD, MSCI



Joseph Schlesinger, MD, FCCM



Heidi Smith, MD, MSCI



Amanda Stone, PhD

Bret Alvis, MD

Dr. Bret Alvis was awarded a five year NIH grant to study non-invasive venous waveform analysis (NIVA) as a means of quantifying intravascular volume status in critically ill and perioperative patients. His group works to better understand the entire spectrum of intravascular volume status through clinical and translational research of venous waveforms and device development.

Frederic T. (Josh) Billings IV, MD, MSCI

Dr. Billings’ research focuses on the prevention and treatment of perioperative organ injury. His research encompasses preclinical mechanistic models and clinical trials. Broadly this includes studying and manipulating the patient response to acute surgical stress, but specifically he is investigating the impact of variable oxygen administration on development of perioperative organ injury. Mechanisms of organ injury under study include excess production of reactive oxygen species, impaired vascular function, and heme-protein mediated tissue damage. His group studies the impact of oxygen delivery on these processes so that they can determine optimal oxygen administration throughout the perioperative period. This addresses a large unmet need for millions of patients, because oxygen administration during surgery is ubiquitous, highly variable, unguided, often excessive, and potentially harmful.

Julia Bohannon, PhD

Dr. Bohannon’s NIGMS-funded research seeks to understand how severe burn injury impacts innate immune cell function, metabolism and mitochondrial integrity and determine their contributions to greater susceptibility to infection in these patients. Her lab is investigating toll-like receptor signaling pathways and how these pathways can be harnessed for therapeutic benefit in reversing immunometabolic dysfunction after severe burns to enhance resistance to infection. Using mouse models of burn injury and infection, as well as immune cells collected from human burn patients, her lab is studying the therapeutic impact of toll-like receptor agonists on improving immune function and protection against infection after severe burn injury.

Carrie Brintz, PhD

Dr. Brintz’s research aims to test and optimize psychosocial, mind-body interventions to improve outcomes and accessibility for people with chronic pain and post-surgical pain. Her work is currently funded by an NIH K23 Career Development Award to adapt and test a mindfulness-based intervention to enhance patient recovery after lumbar spine surgery.

Stephen Bruehl, PhD

Dr. Bruehl is principal investigator on two active NIH studies. The first study is entitled “Evaluating Specific and Non-Specific Mechanisms in Two Distinct Complementary Integrative Interventions for Chronic Pain.” This project evaluates the role

of both specific (theory-related) and non-specific mechanisms underlying the beneficial effects in Mindfulness-Based Stress Reduction and Spinal Manipulation Therapy for improving function and reducing pain in chronic low back pain patients. The second study is titled “Stress and Opioid Misuse Risk: The Role of Endogenous Opioid and Endocannabinoid Mechanisms.” This project tests the role of endogenous opioid and endocannabinoid mechanisms as contributors to observed associations between elevated stress and opioid misuse risk.

Drs. Bruehl and Billings have also been awarded a collaborative grant from the National Institute on Aging to assess the impact of oxidative stress on postoperative pain in patients undergoing joint replacement surgery. They will execute a prospective randomized placebo-controlled trial that will examine preoperative, perioperative, and long-term oxidative stress; pain; and functional outcomes and test for the first time the hypothesis that a potent antioxidant intervention (glycine plus N-acetylcysteine [GlyNAC]) reduces oxidative stress and chronic postsurgical pain in patients undergoing knee replacement surgery.

Eric Delpire, PhD

Dr. Delpire’s research is funded by two NIH grants and a Leducq Foundation Networks of Excellence grant, the goal of which is to expand upon the NIH funded research. He studies the regulation of transporters involved in salt reabsorption in the kidney with a focus on protein kinases and adaptor proteins. The kinases serve as rheostats stimulating sodium reabsorption in conditions of potassium deficiency. The research also involves cotransporters involved in the control and maintenance of cell volume.

Jerod Denton, PhD

The Denton lab does early stage drug discovery and target validation for ion channels implicated in various cardiovascular, metabolic, and neurological diseases. The team utilizes high-throughput screening, electrophysiology, medicinal chemistry, and molecular modeling to develop first-in-class pharmacological probes of potassium and chloride channels to explore their druggability and therapeutic potential in pre-clinical models.

Susan Eagle, MD

Dr. Eagle’s research is a multi-disciplinary NIH NHLBI R01 funded effort with Co-Principal Investigator Brett Byram, PhD, in Biomedical Engineering. Dr. Eagle and her team study a novel approach to optimize transthoracic echocardiography imaging using artificial intelligence and deep neural networks to visualize the left atrial appendage in patients with atrial fibrillation.

Dan France, PhD, MPH

Dr. France studies the impact of nursing workload on quality of care, patient safety and nurses’ well-being. His work seeks to understand the impact of situational workload on these parameters and develop clinical decision support tools to optimize clinical care and nurses’ well-being.

Robert Freundlich, MD, MS, MSCI

Dr. Freundlich utilizes informatics and big data to answer important questions in the fields of perioperative medicine and critical care. His NIH-funded research examines factors contributing to reintubation in patients undergoing cardiac surgery, with the goal of identifying risk factors and decreasing the incidence of reintubation, which is an important contributor to extended hospital stays and delayed recovery.

Brad Grueter, PhD

The nucleus accumbens is an essential hub in the reward system, integrating cognitive, contextual, sensory, and affective information into behavioral outcomes. The proposed work will test the hypothesis that feed forward microcircuits within the nucleus accumbens regulate motivated behavior and are hijacked by drugs of abuse. By defining circuits and synaptic mechanisms recruited by drugs of abuse, the proposed research is relevant to the NIH and NIDA’s mission that pertains to developing fundamental knowledge that will help reduce the burdens of addiction.

Christopher Hughes, MD

Dr. Hughes is investigating cognitive and physical prehabilitation as a means of improving outcomes in elderly surgical patients. His NIH-funded clinical trial will enroll 250 patients over the age of 60 who are undergoing major non-cardiac surgery. His team will investigate the impact of prehabilitation on global cognition, disability and markers of organ injury at baseline and up to 12 months after hospital discharge.

Daniel Larach, MD, MSTR

Dr. Larach’s research investigates alternative pain management strategies, with the goal of optimizing the treatment of pain and decreasing opioid requirements. His NIH-funded study is investigating the efficacy of buccal buprenorphine for management of post-operative pain.

Marcos Lopez, MD

Dr. Lopez investigates the contributions of endothelial dysfunction to perioperative organ injury, especially in patients undergoing cardiac surgery. His NHLBI-funded research is testing the hypothesis that administration of a soluble guanylyl cyclase stimulator prior to surgery will enhance perioperative vascular reactivity and decrease cellular markers of renal tubule and neuronal injury.

Matthew Morris, PhD

Dr. Morris’ research examines racial disparities in the transition from acute to chronic pain in trauma patients. His NIH-funded research will enroll 300 patients suffering level 1 trauma to assess differences in pain transition among non-Hispanic black and white populations and test the hypothesis that potential differences are impacted, in part, by biobehavioral risk factors.

Edward Sherwood, MD, PhD

Dr. Sherwood’s lab investigates the impact of innate immune memory on the host response to infection. Emphasis is placed on understanding metabolic reprogramming in innate leukocytes as a mechanism underlying innate immune memory. His work shows that activation of innate immune memory greatly augments our ability to respond to infection via augmentation of leukocyte recruitment to sites of infection and enhancement of the antimicrobial functions of innate leukocytes. Dr. Sherwood’s work utilizes experimental models of infection, cell culture systems and clinical samples obtained from patients with serious infections and sepsis.

Heidi Smith, MD, MSCI

Dr. Smith’s research seeks to optimize sedation protocols in critically ill and mechanically ventilated children. Her NIH-funded clinical trial will randomize 372 pediatric patients on mechanical ventilation to alpha-2 agonist vs GABAergic agent to test the hypothesis that optimized sedation will decrease delirium prevalence, decrease the length of mechanical ventilation and improve recovery.

Amanda Stone, PhD

Dr. Stone’s research focuses on perioperative pain management in children. Her NIH-funded research investigates biopsychosocial predictors of opioid use in pediatric surgical patients, with the goal of gaining information that will optimize perioperative pain management in children, decrease waste and minimize opioid exposure.

Nicole Werner, PhD

Dr. Werner is principal investigator on three active projects funded by the NIH National Institute on Aging and National Institute of Child Health and Human Development. She also has active projects funded by the Patient Centered Outcomes Research Institute (PCORI), the Agency for Healthcare Research and Quality (AHRQ), and the Lilly QI Initiative. Her research focuses on applying Human Factors Engineering theory and methods to enable scientific discovery related to the work of clinicians, patients, and family caregivers in managing chronic conditions and then using that scientific discovery as the foundation for the user-centered co-design, implementation, and rigorous evaluation of technology and healthcare process interventions to improve caregiver and patient outcomes.

Center for Research and Innovation in Systems Safety

Director - Nicole Werner, PhD

VUMC's Center for Research and Innovation in Systems Safety (CRISS), directed by Nicole Werner, PhD, is a highly interdisciplinary and collaborative center, with projects spanning numerous clinical domains and disciplines. CRISS investigators include anesthesiologists, PhD researchers, nursing and design staff, and faculty collaborators across Health Sciences, numerous hospital settings, and the School of Engineering.

CRISS applies human factors, usability and systems engineering, cognitive psychology, and implementation science techniques to improve patient safety and care quality. Researchers study care processes and clinician performance both during actual patient care and in realistic simulations to better understand how and why care deviates from optimal, then design and study interventions to improve care safety and quality.

Our research team designs and evaluates both patient-facing and clinician-facing medical technologies and interfaces, including those using artificial intelligence/machine learning. We also use electronically generated clinical data to identify evolving events and support decision-making.

CRISS explores the nature of expertise, clinician communication, situational awareness, the workload and well-being of individual clinicians and of teams, teamwork, individual and group performance-shaping factors, alarms, human-technology interactions and novel methods of information presentation to improve care processes and outcomes.

We provide internal and external consulting services for numerous customers. Internally, CRISS faculty and staff currently provide support for myriad safety, informatics

and quality improvement initiatives and projects across the medical center and university. CRISS also conducts formal usability testing of software applications and of medical devices.

Externally, CRISS is involved in numerous academic collaborations to re-engineer medical processes, improve clinician decision-making and enhance the usability and usefulness of clinical technology. For example, CRISS has supported the Department of Veterans Affairs for nearly two decades to improve its national EHR system and care processes, including the development, testing and implementation of decision support tools in several clinical domains.

CRISS also helped to create a national standardized approach to human factors and user-centered design in VA healthcare. Further, CRISS conducts FDA-compliant human factors engineering consulting for proprietary medical devices and medical software systems.

CRISS faculty teach courses in the Department of Biomedical Informatics, the School of Nursing and the School of Engineering.

\$2.8 million annual research budget

67 external collaborators

85 internal collaborators

80 peer-reviewed publications

23 invited talks



Vanderbilt Anesthesiology Clinical Research Advisory Committee

VACRAC (Vanderbilt Anesthesiology Clinical Research Advisory Committee), in partnership with the Perioperative Clinical Research Institute (PCRI) and Vanderbilt Anesthesiology & Perioperative Informatics Research (VAPIR), supports new and established investigators as they develop clinical research projects. The committee oversees the development and execution of NIH-funded, industry-sponsored and investigator-initiated research by providing guidance to assure optimal study design and protocol development, as well as managing essential research services and programs to assure effective resource utilization.

The mission of VACRAC is to:

- Promote a culture of large and robust clinical trials that, in turn, provide high-quality evidence to inform perioperative practice world-wide.
- Promote high-impact clinical and informatics research tailored to the experience and expertise of individual clinicians and accessible to all members of the department, with the goal of answering important questions related to perioperative care, critical care and pain management.
- Create opportunities for junior investigators to learn the process of and gain experience in conducting clinical research.
- Mentor investigators throughout the research development and implementation process.
- Promote Good Clinical Practice (GCP) and ensure regulatory compliance.

VACRAC is co-chaired by Edward Sherwood, MD, PhD (Vice Chair, Research), David McIlroy, MB.BS., MD, MClinEpi (Medical Director, Perioperative Clinical Research Institute), Pratik Pandharipande, MD, MSCI (Vice Chair, Anesthesiology Faculty Affairs), and Matthew Shotwell, PhD (Department of Biostatistics). The committee's membership is composed of established clinical investigators in the Department of Anesthesiology.

Any member of the Department of Anesthesiology may submit a clinical research proposal that includes a brief background and significance of the clinical problem, a primary hypothesis for testing, a research strategy to test the hypothesis, and resources needed to pursue the project. All proposals undergo rapid review by a research committee, with written feedback provided, including a traffic-light style triage system and advice on what is required to advance the project. Resource intensive projects undergo discussion and review in a more intensive VACRAC studio where investigators present their proposals to senior clinical researchers within the department for real-time discussion and dialogue aimed at refining the study methodology.

Investigators can submit proposals to VACRAC by scanning the QR code below or using this link:
<https://redcap.vumc.org/surveys/?s=XE44E798XF>



David McIlroy, MB.BS., MD, MClinEpi



Pratik Pandharipande, MD, MSCI



Edward Sherwood, MD, PhD



Matthew Shotwell, PhD

BH Robbins Scholar Program

The Benjamin Howard Robbins Scholar Program was initiated in 2007 to support the professional development of department early-stage physician-scientists. The program builds critical research skills under direct mentorship of established scientists with the goal that all Robbins Scholars establish vigorous, independently funded research programs. The program is named in honor of the department's first chairman, a renowned



physician-scientist. The BH Robbins Scholar Program is multidisciplinary, encouraging and supporting mentorships and collaborations that extend well beyond traditional boundaries of anesthesia. Scholars apply and are rewarded on a competitive basis.

Department Chair Warren Sandberg, MD, PhD, notes, "The BH Robbins Scholar Program provides a unique mentored research experience for early-stage investigators that includes a two-year multidisciplinary fellowship devoted to research. Our Robbins Scholars benefit from one-on-one mentorship, a wealth of research and educational resources, protected research time and a stipend during their residency and fellowship. The program, with a more than 15-year track record of excellence, is material evidence of our staunch commitment to identifying and developing future generations of anesthesiologist clinician-scientists."

The BH Robbins Scholar Program is led by **F. T. (Josh) Billings IV, MD, MSCI**, and **Associate Director Carrie Grueter, PhD**. Dr. Billings states, "We strive to mentor, develop and support physician-scientists so that they make discoveries that advance the care of perioperative and critically ill patients. This is a critical goal of academic anesthesiology and our department."

Current BH Robbins Scholars and Projects

Matthew Barajas, MD, is a cardiothoracic anesthesiologist investigating post conditioning in a diabetic rat model of cardiac arrest. One such method of conditioning is ischemic post conditioning instituted through short pauses in compressions after the initiation of CPR. In addition, he continues to evaluate peripheral intravenous waveform analysis (PIVA) and its utility across several types of shock, including hemorrhage, respiratory arrest, and acute obstructive shock. Dr. Barajas' research program is supported by a mentored research training grant from the Foundation for Anesthesia Education and Research (FAER). He looks forward to continued success under the mentorship of Matthias Riess, MD, PhD, and Susan Eagle, MD.

Stephanie DeMasi, MD, MS, is an emergency medicine physician focused on improving care of patients requiring time sensitive interventions in the Emergency Department and ICU. She is using pragmatic clinical trials with advanced regulatory constraints, such as waiver of informed consent or exception from informed consent processes, to conduct comparative effectiveness research. A current focus is the design and execution of the INtubation with Sedation only to Preserve Independent Respiratory Effort (INSPIRE) trial, a single center, pragmatic randomized controlled trial of sedation only vs. sedation with neuromuscular blockade to impact the incidence of hypoxemia, successful intubation on the

first attempt, and awake immobility in critically ill adults undergoing emergency tracheal intubation. Dr. DeMasi is mentored by Wes Self, MD, Matthew Semler, MD, MSc, and Jon Casey, MD.

Brandon Farmer, MD, PhD, is a CA-3 resident in the Department of Anesthesiology. His research focuses on how neuroinflammatory lipid droplets in the brain may form potential reservoirs for lipophilic anesthetic agents and how this may contribute to post-operative and critical illness-related cognitive dysfunction. Dr. Farmer's primary mentor is Fiona Harrison, PhD, and his mentorship committee includes Pratik Pandharipande, MD, MSCI, and Brad Grueter, PhD. In July 2026, Dr. Farmer will be joining the faculty in the Multispecialty Anesthesiology Division.

Gloria Han, PhD, is an assistant professor in the Division of Pain Medicine in the Department of Anesthesiology. She is a clinical psychologist with primary interests in quantitative methods, co-occurring psychiatric and medical conditions in autism, and pediatric chronic pain. She has a K23 grant application examining the prevalence, assessment, and mechanisms underlying chronic pain in children with autism pending review. Dr. Han's primary mentor is Stephen Bruehl, PhD.

Kelsey Hudson, MD, PhD, is a CA-1 resident. Her prior research focused on the impact of pain and pain medications on CNS injury recovery and how alterations in GABA receptor functionality are mechanistically involved. Dr. Hudson intends to continue pain research, likely examining the role of GABA on the transition from acute to chronic pain.

Abby King, DO, MPH, is a CA-2 resident interested in perioperative patient outcomes and the impact of intraoperative anesthetic practice on critical illness. Dr. King is a co-investigator on the IntraOp Ox pragmatic clinical trial that will assess the impact of different

intraoperative patient oxygenation practices on perioperative organ injury and postoperative mortality. She will be attending the 2025 annual meeting of the American Society of Anesthesiologists as the department nominated Foundation for Anesthesia Education and Research (FAER) Resident Scholar. Dr. King is mentored by Josh Billings MD, MSCI, and Kimberly Rengel MD, MSCI. She is continuing to build her mentorship committee.

Hannah Lonsdale, MBChB, FRCA, is an associate professor in the Division of Pediatric Anesthesiology, investigating the applications of machine learning in perioperative medicine. She is currently supported by the Training in Perioperative Science Fellowship T32 grant. She is interested in the role of modeling to predict length of stay and bed availability, facilitating timely surgery, and interventions to support discharge from hospital. Her primary goal is the implementation of safe and effective predictive models that impact clinical care. She was awarded the 2024 Association of University Anesthesiologists Junior Faculty Perioperative Medicine Research Award, lectures internationally on perioperative AI applications, and has published on this topic in high-profile journals. Dr. Lonsdale's primary mentor is Robert Freundlich, MD, MS, MSCI.

Kimberly Rengel, MD, MSCI, is an assistant professor in the Division of Anesthesiology Critical Care Medicine interested in improving long-term recovery for patients after major surgery or critical illness and the role of skeletal muscle health in acquired disability. Her research program is focused on the use of ultrasound to examine skeletal muscle health throughout critical illness and its relationship to long-term acquired disability. Further, working with her mentors, she plans to translate this research into the perioperative space, identifying patients at risk for acquired disability and using interventions like prehabilitation to prevent physical decline after major surgery. Dr. Rengel has a pending K23 grant application. She is mentored by Christopher Hughes, MD, and Pratik Pandharipande, MD, MSCI.

Connor Snarskis, MD, is an assistant professor in the Division of Anesthesiology Critical Care Medicine interested in improving patient safety and reducing delivery of futile care in rapid response systems. His research program focuses on utilizing electronic health record machine learning algorithms to provide real-time predictive data to practicing clinical teams. Further, he and his mentors plan to implement automated warning systems

to predict inappropriate escalations of care as well as optimize earlier interventions in deteriorating patients. He is supported by the department's NIH T32 mentored research training grant and is completing a Master of Science in Clinical Research for Health Professionals at Drexel University over the next two years. Dr. Snarskis is mentored by Liza Weavind MBBCh, MMHC, Robert Freundlich MD, MS, MSCI, Shilo Anders, PhD, and Christopher Hughes, MD.

Two scholars completed the program June 2025: Drs. Daniel Larach and Kaille Meguiar.

Daniel Larach, MD, MSTR, is an associate professor in the Department of Anesthesiology. A clinical anesthesiologist and pain physician, his research focuses on the assessment and optimization of risks related to perioperative opioid prescribing. His research and career development are supported by a K23 award from the National Institute on Drug Abuse to study the abuse potential and analgesic efficacy of low-dose buccal buprenorphine in the laboratory and perioperative settings. He is interested in whether buprenorphine may be a potential alternative to traditional full mu-agonist opioid prescribing following surgery. Dr. Larach is mentored by Stephen Bruehl, PhD.

Kaille Meguiar, DO, MPH, was recently appointed assistant professor at Vanderbilt University Medical Center in the Department of Pediatrics. She is a pediatric hematologist oncologist who, during her time as a BH Robbins Scholar and T32 fellow, investigated psychosocial outcomes in adolescent and young adult patients in the survivorship realm. Dr. Meguiar is mentored by Deb Friedman, MD, MS, Adam Esbenshade, MD, MSCI, and Bruce Compas, PhD.

We welcome **two new scholars** to the program: **Courtney Burns, MD**, and **Terilyn Stephen, MD, PhD**.

Dr. Burns' research is focused on clinician well-being and mental health among the anesthesiology workforce, psychological sequelae of adverse clinical events, and the association of clinician occupational well-being challenges with healthcare quality and patient outcomes.

Dr. Stephen's prior research focused on the molecular mechanisms of adult hippocampal neurogenesis and the impact of caveolin-1 signaling on memory formation in Alzheimer's Disease.

Congratulations to all these Scholars for their ongoing successes and commitment!



Anesthesiology Faculty Affairs

The Anesthesiology Faculty Affairs (AFA) Office in the Department of Anesthesiology seeks to facilitate the professional and academic development of its faculty, improve career satisfaction, and instill a sense of meaning in our faculty from the practice of their vocation.

The major pillars of AFA are faculty development, engagement, and well-being, which are strengthened through programming, as shown in the timeline on page 39.

— THE YEAR IN REVIEW —

12 faculty promoted (7 to associate professor, 3 to professor, 1 to associate in, 1 track change with tenure)

14 faculty promotions in progress

35 prestigious nominations (e.g., AEEE, AECM, AUA, FAER Councils, ELAM, VUMC Faculty Awards)

16 new mentor/mentee pairings (116 total pairings)

8 faculty recently recommended for promotion by the Appointments and Promotions Committee

Appointments and Promotions

This critical function is executed by the department's Appointments and Promotions Committee (APC), which annually assesses each faculty member's academic and career progress. The APC recommends faculty to the Anesthesiology Department Chair for promotion. Once approved by the department chair, the promotion packet is constructed and submitted to the School of Medicine for consideration. All faculty in the Professor rank are eligible to serve on the APC. The APC generally has 12 to 14 members, who are selected by the AFA Vice Chair to serve staggered three-year terms to ensure fair representation across divisions and tracks. The AFA Office also processes faculty track changes to better align faculty career goals with the academic tracks available.

Career Development Award (CDA) Program

The CDA Program aims to provide clinical faculty with academic and administrative days, allowing dedicated time to advance their careers, achieve success in administrative roles and contribute to the missions of the department and institution beyond direct patient care. Each year, faculty submit CDA applications based on their planned administrative, educational, scholarship and academic service goals. We have implemented an automated process that increases efficiency for both the faculty and the CDA Review Committee. This CDA Committee, consisting of APC members and the department's division chiefs, uses an NIH-style grant review process to evaluate the applications. After an initial review, the CDA Committee meets to discuss all applications via a transparent process based on published guidelines, considering prior success of faculty and alignment with departmental missions. The resulting CDA recommendations are reviewed and approved by the department chair.

Academic Achievement Award (AAA) Program

The AAA Program provides annual merit-based financial incentives to encourage professional development and academic achievement. It recognizes faculty contributions to the department's numerous missions beyond direct patient care, especially in the areas of education, scholarship and professional service. Future development of a faculty database that populates contributions into an automated report is ongoing.

Continuous Professional Development (CPD)

Continuous professional development (CPD) of clinicians is a core mission of the Department of Anesthesiology. This includes a broad range of educational and professional development activities for faculty and healthcare professionals. The core mission of this program is to identify, develop, implement and evaluate educational opportunities that enable healthcare professionals to provide the best possible care to their patients and perform optimally in their other professional activities. CPD partners with the Office of Educational Affairs, the Perioperative Optimization and Quality, Safety and Outcomes leadership teams, and Advanced Practice Anesthesiology. Initial programming consists of implementing Point-of-Care Ultrasonography (POCUS) certification and establishing training modules for select perioperative ultrasound-guided regional anesthesia techniques for interested faculty.

Annual Faculty Reviews

The AFA Office coordinates annual faculty reviews, a time to celebrate faculty successes, identify challenges and provide faculty an opportunity to discuss career goals with senior departmental leadership. An individual letter is generated based on the meeting that includes summative feedback and specific recommendations. The objective is to create individualized career development plans aligned with each faculty member's unique career goals and to maximize support for the well-being of faculty.

Mentorship Program

The Mentorship Program was introduced to pair faculty with mentors aligned with their desired career development path. The Mentorship Program is based on various scholarly interests within the department, which are arranged thematically into categories that cover broad areas of basic science, education, quality improvement, clinical research, systems engineering, informatics, clinical operations, genomics and clinical and administrative service. A tiered approach, through which mentors are assigned senior mentors, serves to boost the efficacy of the program.

Professional Development

Faculty professional development fosters valuable post-medical training skill sets for a successful and balanced career. In the past fiscal year, through interactive workshops and simulation exercises, AFA launched an innovative faculty professional development program that highlights key topics such as communication, conflict resolution, strategies to avoid burnout, and advocating career goals. Professional development programs are tailored to be relevant across faculty ranks and applicable throughout an academic medical career.

Anesthesiology Faculty Affairs

VANDERBILT UNIVERSITY
MEDICAL CENTER

FY 2024-2025 – Departmental Editorial Assistance

This year, Clarity editors...

- Assisted 63 faculty authors in 9 divisions, plus VAPIR + CRISS
- Completed 97 editing encounters
- Helped submit work to 22 journals

Things we do:

- Pre-submission editing of peer-reviewed manuscripts, grants, book chapters, and other materials
- Help with other editorial tasks, including use of iThenticate, EndNote, and ORCID

CLARITY
Communicate with intent

Honorific Nominations

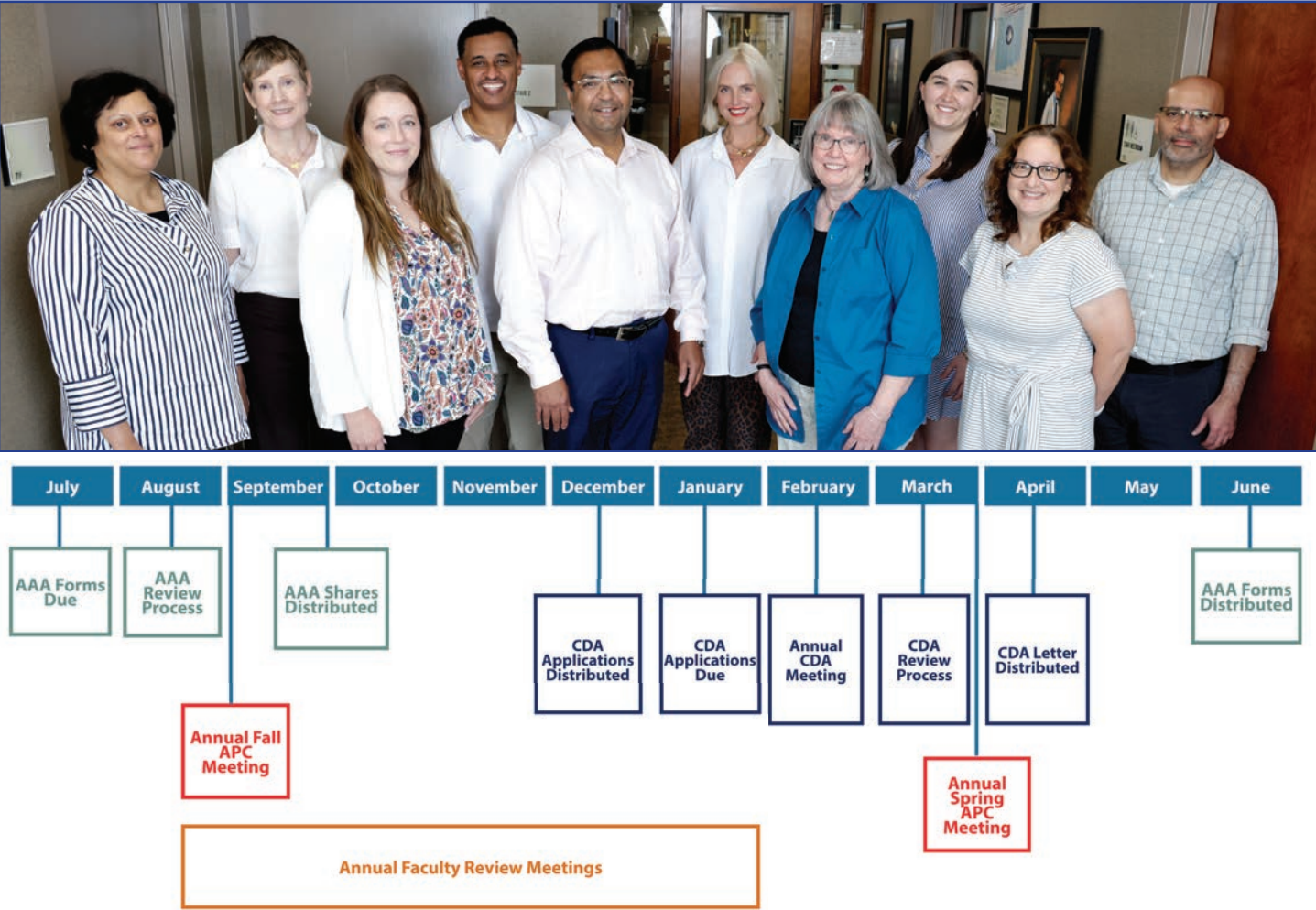
The AFA Office works with divisional and departmental leaders to solicit and nominate faculty for honorific nominations as a means of recognizing faculty who are pursuing novel and impactful clinical, educational, research, scholarship and service activities.

Wellness and Support Initiatives

Faculty in an academic medical center have extremely demanding jobs with associated stressors that can degrade well-being and disrupt work-life integration. To address these pressures, our office is supported by Gloria Han, PhD, a clinical psychologist, who serves as our director of Faculty Professional Well-Being. AFA works to identify and address issues related to the professional well-being of faculty and has designed initiatives that include a comprehensive faculty survey, consultation with faculty and department leadership regarding well-being, and collaboration on programming to help build skills to support workplace engagement and interprofessional collaboration.

CLARITY

CLARITY is a departmental initiative designed to enhance the written communication skills of clinicians, researchers and staff. The program has three components: structured editorial support (primarily for manuscripts being submitted for publication and grants), a curated list of self-guided training opportunities designed to improve writing skills, and other support related to publishing and other scholarly processes.



Faculty Recruitment

Knowing who we are and what we believe is an important part of making a career match. At Vanderbilt University Medical Center, we believe in the power of teamwork and collegiality. Our doctors, nurses, technicians and support staff operate as teams drawing on and respecting the individual skills that each brings to the patient. Our researchers, lab techs and students collaborate to advance medical science.

We believe that building a great place to work is the most important step in making our patients and customers happy and satisfied with their experience at Vanderbilt. We want our staff, no matter who they are, to take ownership of what our patients and customers need and to feel rewarded for doing so. We promise to invest in your growth and development and share our financial success with you in recognition of your contributions to that success.

We believe in the power of asking questions and constantly seeking answers. It is part of our character to constantly seek better ways of doing things, different ways of looking at things. It drives our research, our teaching, our nursing care and the way we clean patient rooms. And it is something we expect of ourselves, of the students who train with us and the patients we care for... we want them to ask.

If you are considering a career with us at Vanderbilt University Medical Center, thank you. Making a decision about where you want to invest your talents, your energy, your experience and your expertise is an important moment in your life.

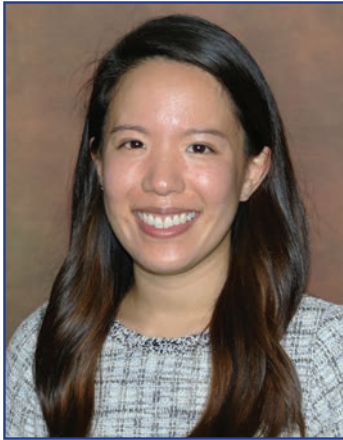
Please feel free to contact Anesthesiology.recruiting@vumc.org with any questions you might have regarding employment in the VUMC Anesthesiology Department.



Mark Rice, MD
Executive Vice Chair Emeritus



Kelly Mishra, MD
Medical Director, Faculty Recruitment



Katie Loh, MD
Associate Director, Faculty Recruitment



Camille Roberts, MD
Associate Director, Faculty Recruitment



Tom Lynch
Physician Recruiter



Melanie Cundiff
Program Manager



Jennifer Sanchez
Associate Program Manager

2024 - 2025 Selected Publications

Peer-reviewed Publications

179 Peer-reviewed publications

94 Original research publications

44 Reviews



7 Infographics

16 Editorials/Commentaries

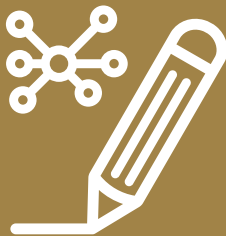
8 Letters to the editor



Authors

91 Faculty

6 Trainees



9 Research staff

3 Advanced practice nurse practitioners/CRNAs

The Department of Anesthesiology places a strong emphasis on faculty, trainee and staff career development in academic anesthesiology. Active mentoring programs pair junior and mid-level investigators with experienced mentors in broad categories of scholarship, including basic and clinical research, education, global health, health services, patient safety, informatics and the humanities. Research productivity, determined by publication in peer-reviewed journals, grant dollars and ongoing research studies, continues to be strong. Selected publications, highlighting the breadth of research conducted, publication type and contributing authors, are provided on the next few pages.

A complete list of department publications can be found at: vumc.org/anesthesiology/communications or by scanning the QR code provided here:



2024 - 2025 Selected Publications

BASIC SCIENCE

Balzer C, **Eagle SS**, Baudenbacher FJ, **Riess ML**: A new method to predict return of spontaneous circulation by peripheral intravenous analysis during cardiopulmonary resuscitation: a rat model pilot study. *Intensive Care Med Exp* 2024; 12(1):102

Cummins ML, Wechsler S, Delmonte G, **Schlesinger JJ**: The emerging role of Panx1 as a potential therapeutic target for chronic pain. *Mil Med Res* 2024; 11(1):44

Ferdaus MZ, Terker AS, **Koumangoye RB**, Al-Qusairi L, Welling PA, **Delpire E**: Deletion of KS-WNK1 promotes NCC activation by increasing WNK1/4 abundance. *Am J Physiol Renal Physiol* 2024; 327(3):F373-F385

Karakas E, **Strange K**, **Denton JS**: Recent advances in structural characterization of volume-regulated anion channels (VRACs). *J Physiol* 2025;10.1113/JP286189

Li K, Satpute Janve V, **Denton J**: Characterization of four structurally diverse inhibitors of SUR2-containing K(ATP) channels. *Channels (Austin)* 2024; 18(1):2398565

McBride MA, Caja KR, Patil TK, Owen AM, Luan L, **Bohannon JK**, Hernandez A, Stothers CL, Trenary IA, Rahim M, Young JD, Calcutt MW, Stephens VR, **Davis X**, Oliver MA, **Hao D**, Si C, McRae M, Nguyen KK, Davis NS, **Wang J**, Patil NK, **Sherwood ER**: Immunoresponsive gene 1 facilitates TLR4 agonist-induced augmentation of innate antimicrobial immunity. *J Leukoc Biol* 2025; 117(2)

Yashiro K, Iwaki Y, Urata H, Kokubo M, Mori T, Sekioka Y, Isami K, Kato J, Wieting J, McGowan KM, Bridges TM, Boutaud O, Engers DW, **Denton JS**, Kurata H, Lindsley CW: Discovery of ONO-2920632 (VU6011887): A Highly Selective and CNS Penetrant TREK-2 (TWIK-Related K+ Channel 2) Preferring Activator In Vivo Tool Compound. *ACS Chem Neurosci* 2025; 16(5):960-967

CLINICAL AND TRANSLATIONAL SCIENCE

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Bendrath SC, Mendez HG, Dankert AM, Lerma-Cabrera JM, Carvajal F, Dornellas APS, Lee S, Neira S, Haun H, **Delpire E**, Navarro M, Kash TL, Thiele TE: Corticotropin-Releasing Factor Modulates Binge-Like Ethanol Drinking in a Sex-Dependent Manner: Impact of Amygdala Deletion and Inhibition of a Central Amygdala to Lateral Hypothalamus Circuit. *Biol Psychiatry Glob Open Sci* 2025; 5(1):100405

Carmona-Berrio D, Adarve-Rengifo I, Marshall AG, Vue Z, Hall DD, Miller-Fleming TW, Actkins KV, Beasley HK, Almonacid PM, Barturen-Larrea P, Wells QS, **Lopez MG**, Garza-Lopez E, Dai DF, Shao J, Neikirk K, **Billings FT 4th**, Curci JA, Cox NJ, Gama V, Hinton A, Jr., Gomez JA: SOX6 expression and aneurysms of the thoracic and abdominal aorta. *iScience* 2024; 27(9):110436

Chen G, Douglas HF, **Li Z**, Cleveland WJ, Balzer C, Yannopoulos D, Chen IY, Obal D, **Riess ML**: Cardioprotection by poloxamer 188 is mediated through increased endothelial nitric oxide production. *Sci Rep* 2025; 15(1):15170

Delpire E: Chloride-Dependent Cation Transport via SLC12 Carriers at Atomic Resolution. *Annu Rev Physiol* 2025; 87(1):397-419

Ferdaus MZ, **Delpire E**: Calcium-binding protein 39 in with-no-lysine kinase signaling and the modulation of renal tubular transport. *Curr Opin Nephrol Hypertens* 2025:10.1097/MNH.0000000000001083

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Hao D, McBride MA, **Bohannon JK**, Hernandez A, **Klein B**, Williams DL, **Sherwood ER**: Metabolic adaptations driving innate immune memory: mechanisms and therapeutic implications. *J Leukoc Biol* 2025; 117(5)

2024 - 2025 Selected Publications

Li Z, **Barajas MB**, Oyama T, **Riess ML**: Role of Nitric Oxide in Cardioprotection by Poloxamer 188. *Cells* 2025; 14(13):1001

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Nishizawa Y, Thompson KC, Yamanashi T, Wahba NE, Saito T, Marra PS, Nagao T, Nishiguchi T, Shibata K, Yamanishi K, **Hughes CG**, **Pandharipande P**, Cho H, Howard MA, 3rd, Kawasaki H, Toda H, Kanazawa T, Iwata M, Shinozaki G: Epigenetic signals associated with delirium replicated across four independent cohorts. *Transl Psychiatry* 2024; 14(1):275

Peeters LD, **Grueter BA**: Wrapping Our Minds Around Perineuronal Nets: Brevican Influences Nucleus Accumbens Parvalbumin Interneuron Synaptic and Behavioral Plasticity. *Biol Psychiatry* 2024; 96(9):686-688

Walter MJK, Shiota M, Li Z, **Barajas MB**, Oyama T, **Riess ML**: Effects of High Glucose on Simulated Ischemia/Reperfusion Injury in Isolated Cardiomyocytes. *International Journal of Molecular Sciences* 2025; 26(13):6050

EDUCATION

Aggarwal AK, Barad M, Chai NC, Furnish T, **Mishra P**, Kohan L, Moeschler S, Reddy RD, Yalamuru B: Current state of the pain medicine match: perspective and an eye to the future. *Reg Anesth Pain Med* 2024:10.1136/rapm-2024-105770

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Winkler K, McKinney J, **Reale C**, **Anders S**, Rubenstein M, Cavagnini L, Crowe R, Ward MJ: A Qualitative Analysis of Barriers to Evidence-Based Care in the Prehospital Management of Patients with Suspected Acute Coronary Syndrome. *Prehosp Emerg Care* 2025; 29(3):274-282

GLOBAL HEALTH

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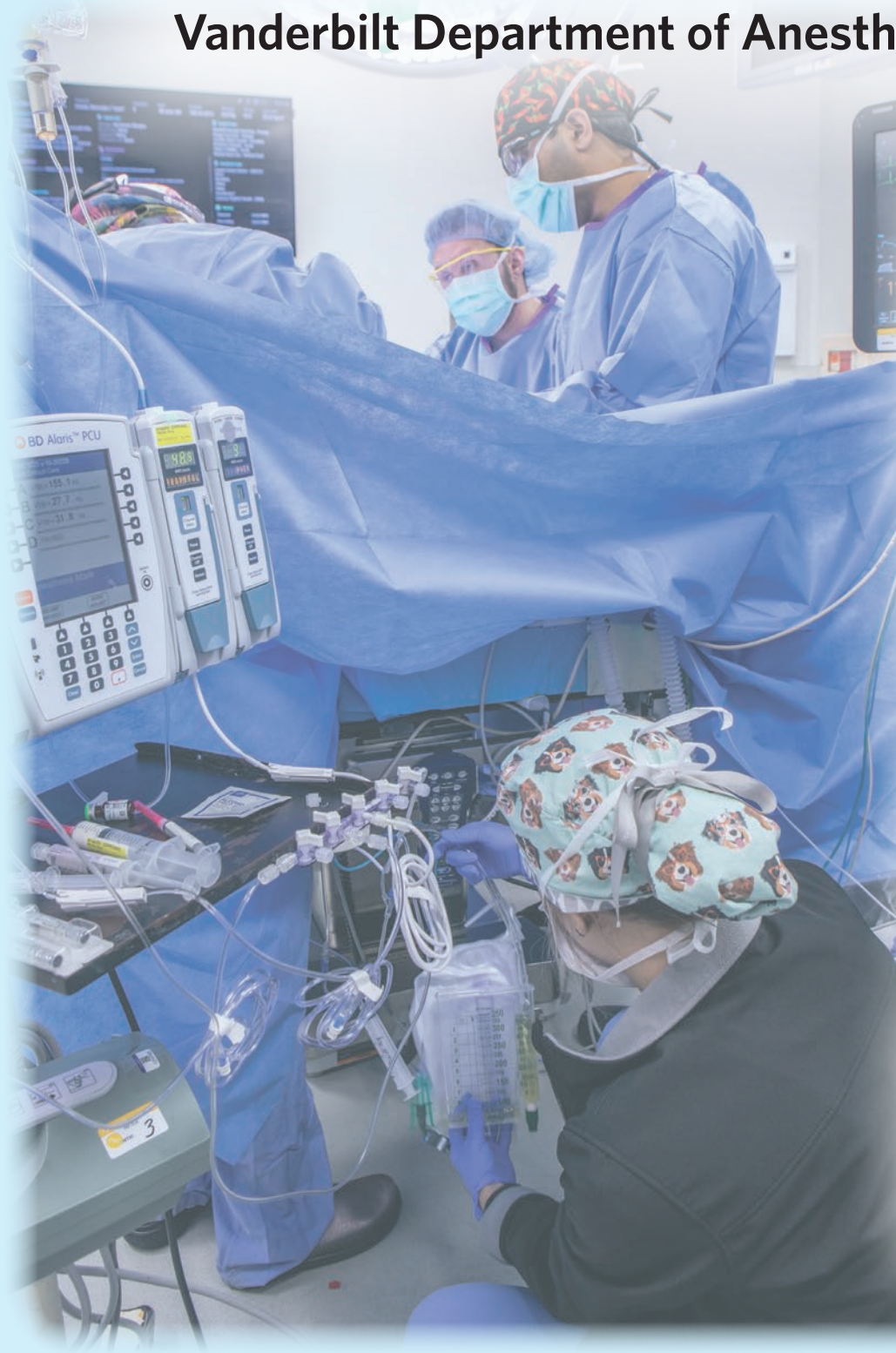
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