

Vanderbilt Department of Anesthesiology

PROFILE 2026-2027



Clinical Care • Education • Research

VANDERBILT  HEALTH



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Vanderbilt Department of Anesthesiology

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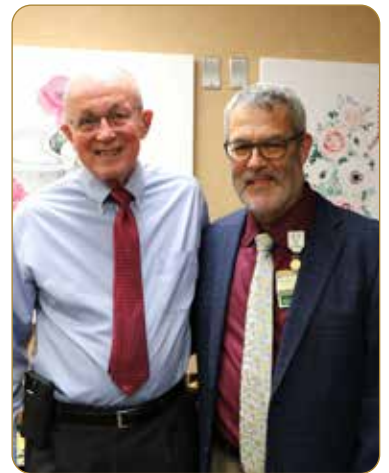
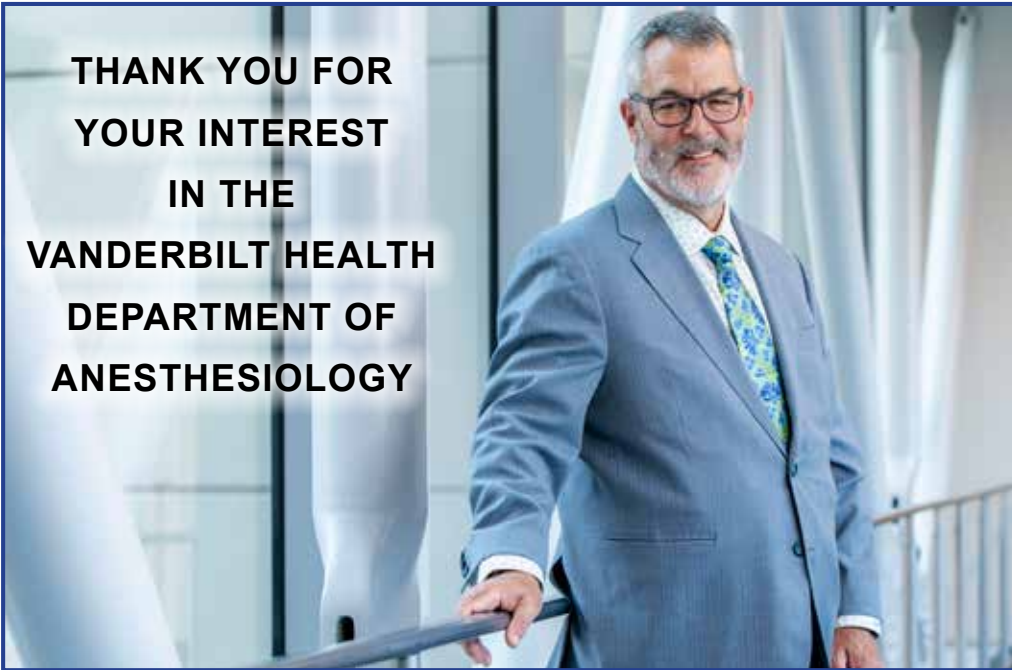
www.vumc.org/anesthesiology

Welcome - Vanderbilt Department of Anesthesiology

Warren Sandberg, MD, PhD – Department Chair



**THANK YOU FOR
YOUR INTEREST
IN THE
VANDERBILT HEALTH
DEPARTMENT OF
ANESTHESIOLOGY**



Our growth and success stem from Vanderbilt Health's five-pillar commitment to excellence: people, service, quality, growth and finance, and innovation. Pursuit of these pillars means that, every year, Vanderbilt 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

Vanderbilt Health's clinical enterprise continues to expand in both scope and scale across the main campus and a growing network. Vanderbilt Health depends on anesthesiology services wherever complex care is delivered. The Department of Anesthesiology now supports clinical operations across seven hospitals and seven surgery centers, with continued growth in surgical, procedural, and critical care services. On the Vanderbilt University Hospital campus alone, 11 new operating rooms were brought online recently, with additional major perioperative growth imminently opening.

Critical care capacity expansion also remains a central focus. Construction continues on the Jim Ayers Tower on 21st Avenue South, where six 30-bed inpatient units opened in 2026. Our critical care teams are fully staffed to support both in-person and remote ICU coverage, enabling scalable expansion as new beds come online. Additional capital projects in active development include the Vanderbilt Surgery Center One Hundred Oaks, expanded interventional radiology and cardiac catheterization suites, dedicated interventional pulmonology space, and an on-campus interventional cardiology expansion.

Collectively, these initiatives are projected to require approximately 30 new faculty positions and 50 CRNA positions over the coming years. Active recruitment continues across faculty, CRNA, and trainee roles to meet steadily increasing clinical volumes

throughout the health system. Our integrated training pipelines and sustained recruitment and retention strategies position the department to meet these workforce demands.

Operational performance is grounded in our departmental values of compassion, creativity, commitment, and collaboration. These principles are reflected in our Enhanced Recovery After Surgery (ERAS) programs, which now influence approximately one quarter of all surgical patients and are increasingly applied to high-acuity and unscheduled care, including lung transplantation. Our ability to extend ERAS protocols across trauma, emergency general surgery, and transplant populations distinguishes Vanderbilt Anesthesiology nationally. Complementing these efforts, a mature informatics infrastructure supports advanced data analysis, real-time visualization, and enterprise-wide quality and safety initiatives.

The department's research enterprise remains robust. In the most recent reporting year (federal FY25), investigators secured more than \$14 million in extramural funding, including \$11.5 million in NIH awards. Vanderbilt Anesthesiology now ranks 6th among the nation's leading academic anesthesiology departments in NIH funding. Scholarly output remains strong, with sustained publication volume, active clinical and translational research programs, and continued competitive grant success.

Education and professional development are core operational priorities. Our training programs integrate advanced technology, data-informed clinical practice, and structured mentorship. Faculty and trainees benefit from balanced clinical exposure, protected academic opportunity, and intentional career development pathways designed to support long-term professional success across all role groups.

Clinical activity continues at scale. During the most recent year, departmental teams supported more than 145,000 patient encounters, delivering care across perioperative, procedural, critical care, and non-traditional settings. As Vanderbilt Health expands, the department remains a system leader in serving patients wherever they present.

I invite you to explore this report and visit www.vumc.org/anesthesiology to learn more about our people, programs, and mission.

Warren Sandberg MD PhD

Chair, Department of Anesthesiology

System Anesthesiologist-in-Chief

Vanderbilt Health

Chief of Staff, Vanderbilt University Hospital

Professor of Anesthesiology, Surgery and Biomedical Informatics

Vanderbilt University School of Medicine

Department Leadership



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



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



Vikram Bansal, MD
Assistant Vice Chair, Physician
Workforce Deployment



Christopher Canlas, MD
Division Chief, Ambulatory
Anesthesiology



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,
MSCl**, 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 Anesthes-
iology; Assistant Vice Chair,
Quality, Safety & Outcomes



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
Division Chief, Cardiothoracic
Anesthesiology; Assistant Vice
Chair, Clinical Operations



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



Brian Mack, MD
Division Chief, Multispecialty
Anesthesiology



Pratik Pandharipande, MD, MSCl
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



Paul St. Jacques, MD
Assistant Vice Chair,
Quality, Safety & Outcomes



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 Science;
Bradley Smith Director in
Anesthesiology



Jackie Woodruff, CRNA, DNAP
Associate Chief CRNA



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

About Nashville, TN



- Nashville has a growing population of 2.1 million in the metropolitan statistical area
- In 2026 Nashville made Tripadvisor's Travelers' Choice Awards Best of the Best destinations
- Nashville is ranked #10 on the list of Best Food Destinations in the U.S. by Tripadvisor



- In 2026 *USA Today* ranked Centennial Park among the top 10 best city parks and Cheekwood among the top 10 best botanical gardens in the United States
- *Southern Living* ranked Nashville #4 on the list of The South's Best Cities 2026



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.

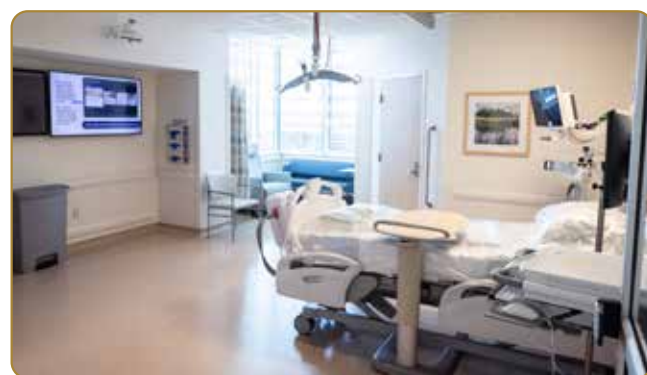
Sports fans have plenty to enjoy in Nashville with several professional sports teams. From football to hockey to soccer to baseball, there is something for everyone. The city also boasts several college teams for even more options.

The city has many family-friendly activities as well. Check out Centennial Park, Adventure Science Center, Cheekwood Estate & Gardens and the Nashville Zoo at

Grassmere. Nashville also offers a variety of cultural experiences, such as the Nashville Symphony at the Schermerhorn Symphony Center, the Frist Art Museum, the National Museum of African American Music, the Tennessee Performing Arts Center and an award-winning public library. Nashville is home to the NHL Nashville Predators and the NFL Tennessee Titans and will host Super Bowl LXIV in February 2030 at the new Nissan Stadium.

Nashville typically enjoys a mild and pleasant climate, with only a few weeks a year having either very hot or very cold conditions and most rainfall occurring in the spring months.

- Vanderbilt Health is ranked the #1 hospital in Tennessee by *U.S. News and World Report*
- Monroe Carell Jr. Children's Hospital at Vanderbilt earned distinction as the #1 children's hospital in Tennessee and in the Southeast by *U.S. News & World Report*
- Vanderbilt Health - over 3.2 million patient visits annually
- Vanderbilt Health has nearly 40,000 employees



Vanderbilt Department of Anesthesiology 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



Benjamin Robbins, MD
(1946-1961)



Charles Pittinger, MD
(1962-1969)



Bradley Smith, MD
(1969-1993)



Charles Beattie, MD, PhD
(1994-2001)



Jeffrey Balser, MD, PhD
(2001-2004)



Michael Higgins, MD, MPH
(2004-2010)

Clinical Care

Serving in one of the largest clinical programs in the nation, Vanderbilt Health Department of Anesthesiology's clinicians provide procedural, critical care, pain management and perioperative anesthesia services for more than 145,000 adult and pediatric patient encounters annually at approximately 175 anesthetizing locations. There are more than 17,000 patients seen annually in the Vanderbilt Interventional Pain Clinic, and approximately 59,000 Vanderbilt adult and pediatric patients receive anesthetic care during a radiologic, gastrointestinal, interventional or other diagnostic or therapeutic procedure.

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 safely and effectively 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. Vanderbilt Health 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 960 adult and pediatric solid organ transplants in 2025 and more than 14,000 since 1962, Vanderbilt Health ranks as the nation's largest transplant program by volume. Vanderbilt is one of the top heart transplant programs in the world and set a world record in 2025 by performing 210 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 the medical center. 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 10 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.



CLINICAL CARE BY THE NUMBERS

- 14,000 + solid organ transplants since 1962

IN THE DEPARTMENT

- 228 faculty • 315 CRNAs • 26 fellows • 89 residents

HiRiSE provider visits

FY21: 673	FY24: 2,484
FY22: 1,745	FY25: 2,368
FY23: 2,336	FY26: 2,935

VPEC provider visits

FY20: 14,052	FY24: 29,713
FY21: 20,054	FY25: 32,307
FY22: 26,012	FY26: 37,799
FY23: 27,959	

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 Health. In FY26, the division provided high-quality, safe anesthetic care to an expanding patient population, many of whom presented with higher acuity and required increasingly complex out-patient procedures.

Despite this growth in volume and procedural complexity, same-day discharge remains 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 Vanderbilt Health Excellence in Patient Experience Award.

The division has also continued to advance quality and patient safety initiatives across the ambulatory enterprise. At the 2026 Society for Ambulatory Anesthesia Annual Meeting, Lakshmi Damalanka, MBBS, presented departmental research demonstrating that transfers from Vanderbilt surgery centers to acute care facilities are rarely attributable to anesthesia-related events. This work highlights the effectiveness of the division's perioperative screening, anesthetic management, and postoperative recovery processes while reinforcing the safety of its services for increasingly complex patient populations.

Further strengthening ambulatory operations, Lindsey Efird, MD, developed and implemented new patient transfer protocols for the Vanderbilt Surgery Outpatient Center (FEL). These protocols streamline escalation pathways for patients requiring higher levels of care and reduce reliance on Nashville Fire Department resources, improving operational efficiency while maintaining a strong focus on patient safety.

Innovation in perioperative workflow has also been a priority. Under the leadership of Merrick Miles, MD, Vanderbilt Surgery Center—Cool Springs (VSCCS) has incorporated HST technologies into clinical operations. These enhancements have improved patient safety, increased workflow efficiency, and reduced administrative burden by minimizing redundant documentation and paperwork requirements. Her work has also led to two first time cases at VSCCS: the first laparoscopic gall bladder removal and vascular kidney dialysis access.

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, CA2 residents now receive early exposure to regional anesthesia during rotations at these centers—an opportunity previously limited to CA3 residents.



Anesthesiology Critical Care Medicine

Division Chief - Christopher Hughes, MD • Associate Division Chief - Bret Alvis, MD



CLINICAL

The Division of Anesthesiology Critical Care Medicine (ACCM) provides critical care services in the burn ICU, cardiovascular ICU, neurological ICU, and surgical ICU at Vanderbilt University Hospital; the surgical ICU at the Nashville VA Medical Center; and the medical/surgical ICUs at Vanderbilt Bedford Hospital, Wilson County Hospital, and Tullahoma-Harton Hospital. Additionally, division members provide intraoperative anesthetic care for diverse surgical specialties, preoperative and perioperative consult service care for patients undergoing major surgeries, and rapid response service care for medical and surgical patients.

EDUCATION

Our ACGME-accredited ACCM fellowship provides an unparalleled innovative and in-depth critical care training opportunity. Rotations include numerous ICUs, critical care echo, and electives such as international experiences, medical subspecialties, and research.

ACCM FELLOWSHIP DETAILS

- ACGME-accredited program
- 10 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

The curriculum includes daily didactic sessions consisting of lectures, studios, quality improvement, echo case review, journal clubs, mortality and morbidity conferences, board preparation, simulation training, and many others.

LEADERSHIP

Division faculty have leadership roles in the Society of Critical Care Medicine, American Society of Anesthesiologists, Society of Critical Care Anesthesiologists, Society of Cardiovascular Anesthesiologists, Early-Stage Anesthesiology Scholars, Society for Technology in Anesthesia, and American Delirium Society. Division clinical administration leadership includes executive medical director of the Operations Control Center at Vanderbilt University Hospital; executive medical director of the Critical Care Clinical Service Center; medical directorship of ICUs across Vanderbilt Health; and medical directorship of the High-Risk Surgical Encounter Service, Post-Anesthesia Care Unit, Critical Care Outreach Team, and ECMO transport team. 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 frequently present at national and international academic conferences and publish in major general medical, critical care, anesthesiology, and surgery journals. Faculty have received funding from the NIH, Department of Defense, FAER, MPOG, PCORI, 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).

DIVISION STATS

- 40 + faculty
- 10 fellows
- 75 + advanced practice providers
- 70 + manuscripts

Cardiothoracic Anesthesiology

Division Chief - Frederick Lombard, MBChB, FANZCA



The Vanderbilt Health Cardiothoracic Anesthesiology Division provides care for patients undergoing cardiac surgery, thoracic surgery, electrophysiology, and complex interventional cardiology procedures. The group is closely affiliated with and integrated into 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. Engagement in these services has shaped clinical practice, expertise and research interests 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 nationally and internationally. 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 insertions.

Vanderbilt Health is one of the world's top transplant centers. Our success is rooted in passionate patient care and innovative research. In 2025, the program set another world record by performing 210 adult and pediatric heart transplants. Similar growth is occurring in our lung transplant program, with 149 lung transplants performed in 2025 (50 more than in 2024), making it the second-largest lung transplant center in the U.S. For both programs, one-year survival rates exceed national averages, and a significant percentage of our patients are complex referrals that other transplant centers have declined.

Transesophageal echocardiography (TEE) imaging is performed by the Cardiothoracic Anesthesiology Division for all structural procedures. The Vanderbilt Structural Heart and Valve Disease Program ranks among the top five in the country for volume and employs the latest techniques in transcatheter aortic valve replacement, transcatheter edge-to-edge valve

repair, and left atrial appendage occlusion. We participate in the full spectrum of clinical trials in this field, from left atrial appendage closure devices to transcatheter mitral and tricuspid valve replacement. With two hybrid operating rooms and three more planned over the next two years, Vanderbilt Health is set to significantly expand its 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. The 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 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 internationally recognized experts and represents collaboration between the Anesthesiology Critical Care Medicine, Cardiothoracic, and Obstetric Anesthesiology Divisions.

The Cardiothoracic Anesthesiology Fellowship is an ACGME-accredited, one-year advanced training program offering five positions annually. Fellows receive comprehensive clinical experience across adult cardiac surgery, thoracic anesthesia, pediatric cardiac anesthesia, perioperative TEE, and cardiothoracic critical care. Elective opportunities in heart failure, advanced TEE, cardiothoracic surgery, and research allow fellows to tailor their training to individual career goals. Graduates are prepared for leadership roles in academic and high-acuity clinical practices.

Faculty members conduct research in clinical transthoracic ultrasound, vascular biology, precision perioperative medicine, acute kidney injury, transfusion and the perioperative inflammatory response. Extramural grant support comes from industry, the Department of Defense, and the National Institutes of Health.

DIVISION STATS

- 210 adult and pediatric heart transplants in 2025
- 149 lung transplants in 2025

Multispecialty Anesthesiology

Division Chief - Brian Mack, 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 65 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.

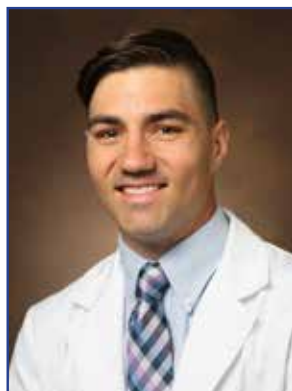
- Vanderbilt Health covers trauma care for patients within 80,000 square miles
- Vanderbilt Health trauma center has approximately 5,000 admissions annually
- 60 operating rooms and procedure suites in which MSA provides perioperative anesthetic care

Acute Pain Service & Perioperative Medicine Consult Service

Director - Danial Shams, MD • Associate Director - Nicholas Statzer, MD



Danial Shams, MD



Nicholas Statzer, MD



The Department of Anesthesiology provides both an Acute Pain Service (APS) and a Perioperative Medicine Consult Service (PMCS). Together they provide preoperative evaluation and preparation, intraoperative care, acute postoperative care and pain management at Vanderbilt University Hospital. By providing care before, during and after surgery, these services give patients better, personalized care throughout their entire perioperative period. Using regional anesthesia and other opioid-sparing pain management techniques, these services have led to a greater than 42% reduction in in-hospital opioid use in opioid naïve patients and 27% reduction in opioid tolerant patients when compared to similar surgical cohorts prior to ERAS implementation. Inclusion has also led to a greater than 66% 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. 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 is staffed by 22 anesthesiologists, with representation from multiple divisions. APS/PMCS also include 16 advanced practice providers, three fellows and residents.

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 annually
- Rotations in perioperative medicine consult service, high-risk preoperative evaluation clinic, echocardiography and cardiac device management, geriatrics and research

APS/PMCS STATS

- More than 42% reduction of in-hospital opioid use in opioid naïve and 27% reduction in opioid tolerant patients
- More than 66% reduction in opioids prescribed at discharge
- 15-20% reduction in cost through PMCS collaborations
- 4,502 APS/PMCS consults in FY26 (by 6/1/2026)
- 4,262 APS/PMCS procedural interventions in FY26 (by 6/1/2026)



The Neuroanesthesiology Division provides perioperative care for patients undergoing complex intracranial and spine surgeries and staffs 12-13 operating rooms daily. Neurosurgery, spine surgery and other neurologic services continue to expand at Vanderbilt Health, 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. Vanderbilt Health is certified as a comprehensive stroke center and provides care for patients requiring acute stroke interventions.

The medical center 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.

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

DIVISION STATS

- 3,000 neurosurgery and neurointerventional cases annually
- 1,700 ortho and neuro spine surgeries annually

Obstetric Anesthesiology

Division Chief - Holly Ende, MD



Front row, left to right: Kaithlyn Brennan, DO, MPH; Marie Louise Meng, MD; Laura Sorabella, MD; Holly Ende, MD

Back row, left to right: Ted Yaghmour, MD; Patrick Hesketh, MD; IB Adedugbe, MBBS, MBA; Stephanie Woodward, MD



The Division of Obstetric Anesthesiology, led by division chief Holly Ende, MD, provides dedicated, 24-hour, in-house obstetric anesthesia care for over 5,500 deliveries at Vanderbilt University Hospital annually with over half of the deliveries 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 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 Vanderbilt Health 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 protocols for 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 postpartum hemorrhage and prediction of adverse cardiac events in patients with hypertensive disorders of pregnancy.

DIVISION STATS

- 5,600 + deliveries annually
- 50% + deliveries are high-risk
- 30 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 in the Division of Pain Medicine represent multiple primary specialties: anesthesiology, physical medicine and rehabilitation, neurology, emergency medicine, and psychology. Our providers see over 32,000 clinic visits annually. In addition to our flagship clinic at Nashville's One Hundred Oaks location and multiple satellite clinics throughout Middle Tennessee, the division supports specialty pain clinics centered on neuromodulation, spine care, cancer pain, pediatric pain, comorbid pain and addiction, and transitional pain (complex perioperative pain management). Finally, the division provides consultative care to hospitalized patients with chronic pain via the Comprehensive Pain Service.

EDUCATION

The ACGME-accredited Pain Medicine fellowship provides hands-on training to five fellows annually through high-volume exposure to advanced pain treatments and a comprehensive didactic program. Division faculty teach approximately one-third of the medical school class each year in a course entitled Pain, Policy, and Addiction. All anesthesiology residents complete a comprehensive lecture program on all aspects of chronic pain management run by our faculty. Faculty also provide formal didactic lectures to internal medicine residents, psychiatry residents and addiction medicine fellows on pain and opioids.

LEADERSHIP

Division faculty have leadership roles in national and regional pain organizations. At Vanderbilt Health, division faculty chair the institutional committee on opioid stewardship and safety, are active leaders involved in healthcare innovation and oversight of controlled substances, teach CME courses on prescribing, and develop hospital-wide policies related to pain management and medication administration.

RESEARCH

Division faculty have received extensive independent funding from the NIH (NIGMS, NICHD, NICCIH, NIDA, NIA) and AHRQ and serve on multiple editorial boards of major pain journals. Faculty have recently published original research and commentary in prominent outlets including the *New York Times*, *Time*, *British Journal of Anaesthesia*, *Pain*, *Regional Anes-*

thesia and Pain Medicine, *Journal of Pain*, and *Anesthesia and Analgesia*. Ongoing investigations include work in pediatric acute and chronic pain, mindfulness and postoperative pain, pain medications' abuse potential, population health, drug/device development, perioperative acute and chronic pain transitions, and opioid epidemiology.



PAIN MEDICINE FELLOWSHIP DETAILS

- ACGME-accredited program
- Five positions available each year
- Focus on comprehensive, multi-disciplinary treatment of chronic pain
- Rotations in interventional pain, addiction psychiatry, neurology, neuroradiology, spine, cancer pain, integrative medicine, and palliative care
- 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
- Completion of publishable academic projects

Pediatric Cardiac Anesthesiology

Division Chief - Bevan Londergan, MD



Front Row: Michael Kuntz, MD; Amy Babb, MD; Aman Kalsi, MBBS; Bevan Londergan, MD. Back Row: Heidi Smith, MD, MSCI; Cori Banerdt, MD

The Division of Pediatric Cardiac Anesthesiology includes 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 program's annual case volume is 550 cardiac surgeries and 1,200 cardiac catheterizations and electrophysiologic procedures. Our program performed 17 pediatric heart transplants in 2025, and we are also among the busiest centers in the country for pediatric ventricular assist device placement. In 2026 we became the first program in the world to perform an infant DCD REUP transplantation.

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

collaboration with specialists at both Vanderbilt University Hospital 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, is principal investigator for a randomized controlled trial studying pediatric critical care delirium, and she is the current president of the American Delirium Society. 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.

PEDIATRIC CARDIAC ANESTHESIOLOGY FELLOWSHIP DETAILS

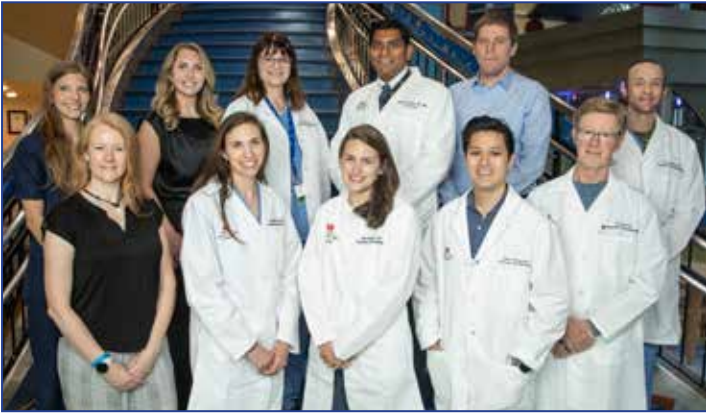
- One year advanced fellowship program
- One fellowship position available per year
- Core rotations include: pediatric cardiac OR, pediatric cardiac cath lab, pediatric cardiac ICU, congenital echocardiography, and pediatric perfusion
- Electives include: fetal cardiology and imaging, transplant cardiology,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

DIVISION STATS

- 17 pediatric heart transplants in FY2025 including 4 DCD transplants
- 550 pediatric cardiac surgeries annually
- 1,200 pediatric cardiac catheterization procedures annually

Pediatric Anesthesiology

Division Chief - Jeana Havidich, MD, MS



Front Row: Left to Right: Hannah Lonsdale, MBChB, Alex Cates, MD, Mary Ellingboe, MD, Alan Hoang, MD, and Thomas Long, MD. Back Row: Left to Right: Jessica Clark, DO, Adrianna Gatt, MD, Jeana Havidich, MD, MS, Andrew Franklin, MD, MBA, Jordan Yokley, MD, and Trevor Robinson, MD

The Division is led by Thomas Long, MD, executive vice chair of Pediatric Anesthesiology and anesthesiologist-in-chief, and Jeana Havidich, MD, MS, division chief and assistant vice chair for Quality, Safety, and Outcomes/Pediatric Services. The Division of Pediatric Anesthesiology delivers comprehensive perioperative care to more than 27,000 patients annually.

SPECIALIZED CLINICAL SERVICES

Amanda Lorinc, MD, director of Clinical Operations, provides strategic and operational oversight of perioperative activities and coordinates with surgical and nursing leadership to ensure efficient, high-quality care across all service lines.

DEDICATED LEADERSHIP

Pediatric Liver Transplant – Amanda Lorinc, MD
Craniofacial Reconstruction – Srijaya Reddy, MD, MBA
Pediatric Spine Surgical – Tom Romanelli, MD
Non-Operating Room Anesthesia (NORA) – Jordan Yokley, MD
Ambulatory Surgery – Jon Niconchuk, MD
Acute Pain and Regional Anesthesia – Andrew Franklin, MD, MBA
Chronic Pain – Alan Hoang, MD
PATCH Medical Director – Clay Adams, MD
PACU Medical Director – Christy Crockett, MD
Pediatric Sedation – Mark Newton, MD
Director of Neuroanesthesia – Katie Loh, MD

Daily operating room activities are directed by the Anesthesia-in-Charge Team: Drs. Tom Long, Amanda Lorinc, Carrie Menser, Clay Adams, and Mary Ellingboe.

QUALITY, SAFETY, AND OPERATIONAL EXCELLENCE

Perioperative quality, safety, and patient-centered care are advanced under the leadership of Dr. Menser, the Perioperative Anesthesia medical director, executive medical director of Patient Safety, and associate chief of staff, who collaborates closely with Dr. Havidich to strengthen safety systems and drive evidence-based initiatives.

Dr. Crockett serves as medical director for Children's Anesthesia and actively participates in the Children's Surgical Verification Program. Under Dr. Newton's leadership, the Pediatric Sedation Program received the Center of Excellence designation from the Society for Pediatric Sedation. Dr. Franklin leads the development and implementation of Enhanced Recovery After Surgery protocols.

The division actively collaborates with the Neonatal and Pediatric Intensive Care Units. Dr. Lonsdale partners with NICU leadership to develop systems that prepare high-risk patients for surgical procedures. She received the 2026 IARS Mentored Research Award for her work, "Predictive Modeling for Improved Critical Care Availability," which focuses on assessing NICU patients' readiness for discharge. Dr. Brian Tinch, a dual-trained pediatric anesthesiologist and intensivist, serves as the Operating Room–PICU liaison and leads the development of Clinical Evidence-Based Anesthesia guidelines.

The Peer Support Program, led by Drs. Angela Lucero, Sam Wood, and Jessica Clark, supports colleagues after stressful or adverse clinical events and is a key quality and patient safety initiative.

EDUCATION, RESEARCH, AND ACADEMIC ACTIVITIES

The ACGME-accredited fellowship program, directed by David Roberts, MD, with assistant program director Kelsey Neuhalfen, MD, trains four fellows annually. Structured pediatric anesthesiology resident rotations are provided for approximately 60 anesthesiology residents each year under the direction of Sam Wood, MD.

Srijaya Reddy, MD, MBA, leads research initiatives and mentors faculty, fellows, and residents across a broad range of topics.

Faculty actively contribute to the advancement of the specialty through participation in national and international professional organizations.

DIVISION STATS - based on annual volumes

- 23,018 pediatric OR cases
- 3,256 non-OR anesthesia (NORA) cases
- 977 sedation cases
- 288 neonatal anesthetics (< 1 month of age)
- 40 liver and kidney transplants

Pediatric Outpatient Pain Medicine

Clinical Director - Alan Hoang, MD



The Pediatric Pain Clinic at Monroe Carell Jr. Children's Hospital at Vanderbilt provides comprehensive outpatient care for pediatric patients with chronic pain. The clinic is a part of the Division of Pain Medicine in collaboration with the Division of Pediatric Anesthesiology and is directed by Alan Hoang, MD. There are multiple services that the pediatric pain clinic offers, including the iPATH (Integrated Pediatric Pain Assessment and Treatment Hub) Clinic, physician-only clinic, and pain psychology clinic.

The iPATH Clinic (formerly known as MAP Clinic) provides comprehensive care for children and adolescents with chronic pain. Our mission is to facilitate personalized functional restoration for youth with chronic pain through creative and collaborative interdisciplinary care. The iPATH team includes pain physicians, psychologists, physical therapists, and occupational therapists who work together to evaluate and treat pain using a biopsychosocial approach, addressing the physical, emotional and functional impact of pain. Although a similar model of care is utilized at other major children's hospitals, our program is a leader by offering interdisciplinary care that includes physical and occupational therapy at all follow-up visits.

PEDIATRIC PAIN INTERVENTION

- Since the clinic launched in September 2022, the interdisciplinary team has treated over 450 patients and families
- As one of the only comprehensive pediatric pain centers in the Southeast, we have served patients from a broad catchment area that includes TN, KY, GA, AL, AK, IN, OH, WV, MO, and MI
- One of the only clinics in the US that involves occupational therapy at initial evaluation and follow-ups
- Our unique outpatient intensive follow-up model improves functional disability with low rate of referral to inpatient pain rehabilitation programs
- Research presented at multiple national and international meetings, including International Symposium on Pediatric Pain, IASP World Congress on Pain, International Association for Autism Research, Society for Biopsychosocial Science and Medicine, US Association for the Study of Pain

We have also recently introduced pain psychology co-treatment with PT and OT, where patients are able to learn and immediately implement useful pain psychology strategies while performing challenging rehabilitation exercises.

The interdisciplinary team includes:

Alan Hoang, MD

Gloria Han, PhD

Puja Patel, PhD

Jaelyn Connolly, MS, OTR/L

Michaela Kent, PT, DPT, OCS

Megan Bartholomew, RN

The pain physician-only clinic offers individualized pain management for patients who are better candidates for medications and/or interventional pain procedures, or are otherwise not appropriate for a functional restoration program.

Our pediatric pain psychologists are experts in nonpharmacologic pain management strategies and provide care within the iPATH Clinic as well as to individual patients that may not necessarily require the pain physician or our rehabilitation colleagues. We have also introduced a pain psychologist-led initiative to improve patient compliance by assessing patients' readiness to participate in and understanding of the treatment provided by iPATH.

In addition to clinical care, our team has articles published and pending regarding our clinic model, as well as presented research based on the clinic at several national and international conferences, including the International Symposium on Pediatric Pain and the IASP World Congress on Pain.

Perioperative Medicine

Vice Chair - Miklos Kertai, MD, MMHC, PhD

PERIOPERATIVE OPTIMIZATION

The Perioperative Optimization leadership team, spearheaded by assistant vice chair **Edward Yaghmour, MD, FASA**, is advancing perioperative medicine as a core mission of our department and the institution. This team has created collaborations with surgeons, nurses and other key stakeholders through our Enhanced Recovery After Surgery (ERAS) Program, which includes standardized care and outcomes evaluation across all surgical populations. These efforts have led to the creation of improved care processes 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. Teamwork allows for promotion of faculty via mentoring activities such as scholarship, educational programming and research initiatives, and 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) Clinic
- **Bobbie Jean Sweitzer, MD**: medical director, Vanderbilt Preoperative Evaluation Center (VPEC)
- **Susan Eagle, MD**: director, Adult Congenital Heart Disease
- **Patrick Henson, DO**: medical director, PreOp/Post-Anesthesia Care Unit (PACU)
- **Christina Jelly, MD**, and **John Bryant, MD**: co-directors, Point-of-Care Ultrasound (POCUS)
- **Danial Shams, MD**: director, Acute Pain Service & Perioperative Medicine Consult Service
- **Nicholas Statzer, MD**: associate director, Acute Pain Service & Perioperative Medicine Consult Service
- **Chris Sobey, MD**: medical director, Pain Clinics
- **Shravani Durbhakula, MD, MPH, MBA**: chief, Comprehensive Pain Service/Transitional Pain Service
- **Jennifer Jayaram, APP**: clinical director, ERAS Program
- **Crystal Parrish, APP**: coordinator, ERAS Program
- **Leslie Coker Fowler, Ed.D., M.Ed.**: director, Perioperative Education and Research
- **Aika Patejdl**: associate program manager, Perioperative Medicine

QUALITY, SAFETY AND OUTCOMES

The Quality, Safety and Outcomes (QSO) leadership team, led by **Jeana Havidich, MD, MS**, and **Paul St. Jacques, MD**, integrates quality and safety with perioperative optimization. They collaborate with division chiefs to improve quality, safety, and outcomes across the perioperative continuum.

By reviewing processes for specific events and patterns, the team enhances patient care and strengthens perioperative systems. QSO also provides ongoing monitoring, education, and feedback on quality, safety, and outcomes.

The Center for Evidence-Based Anesthesia (CEBA) offers over 220 resources, including guidelines, clinical pathways, and Enhanced Recovery After Surgery protocols, to team members via the Perioperative Medicine Portfolio SharePoint site.

Another QSO initiative is participation in the Multicenter Perioperative Outcomes Group (MPOG) Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE). Through MPOG/ASPIRE, the department implements broad educational initiatives and individualized reporting strategies to support anesthesia quality measures.

Recognizing the professional challenges inherent in perioperative care, QSO is also developing a peer support program to provide confidential support to faculty and staff following difficult or stressful experiences. By fostering a culture of resilience and mutual support, the program aims to promote well-being and support for team members.

Faculty representing each clinical division, along with CRNAs, advanced practice providers, and anesthesiology trainees are actively engaged in QSO-led initiatives and projects.

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**: director, Peer Review Committee
- **Jennifer Neva, MD**: director, Peer Support Program
- **Brian Tinch, MD**: co-director, CEBA (Pediatric)
- **Marissa Mery, MD, MBA**: co-director, CEBA (Adult)
- **Patrick Henson, DO**: director, MPOG ASPIRE Program



Veterans Affairs Anesthesiology Service

Chief - Ann Walia, MBBS



The Anesthesiology Service at the Tennessee Valley Healthcare System (TVHS) provides anesthesia services to over 140,000 veterans across its three campuses in Nashville, Clarksville and Murfreesboro.

The service includes 21 full-time, nine part-time, 14 CRNAs, 24 nurse practitioners, two anesthesiology residents, eight medical instrument technicians, and four administrative support staff. We also serve as a clinical site for SRNAs from the Middle Tennessee School of Anesthesia, hosting two senior students monthly. Additionally, we engage in educational activities nationally within TVHS.

The TVHS Anesthesiology Service's Preoperative Evaluation Clinic and Perioperative Care Service, started in 2016, have gained national recognition. The Perioperative/SICU section has saved over \$10 million annually by reducing ICU and hospital stays below national benchmarks. It has also decreased in-hospital and long-term opioid use by over 80% in surgical patients. The Preoperative section excels in risk stratification and management, resulting in a day-of-surgery cancellation rate of less than 0.1% for anesthesiology reasons. It leads nationally in e-consults, saving travel costs and improving patient satisfaction. This year, the clinic implemented new ACA-AHA evaluation guidelines, reducing stress tests and cardiology consults. It also followed the National Anesthesia Program's perioperative medication management for SGLT-2i, GLP1-a, Insulin, and NPO guidelines, endorsed by the ASA, APSF, and VHA National Endocrinology, Gastroenterology, and Cardiology Field Advisory Boards. The clinic also managed patients with obstructive sleep apnea, provided deep sedation, and developed guidelines for anesthesia evaluation before minor surgery.

TVHS, the sole facility in Veterans Integrated Service Network (VISN) 9, offers 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 successfully helps veterans wean from opioid dependency and improve quality of life. Collaboration with the Psychiatry Service expanded the electroconvulsive therapy and low-dose ketamine infusion programs for depression.

The service has over 5,500 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. The Anesthesiology Service oversees surgical intensive care, perioperative service, Rapid Response Team, CPR, pain management, non-OR airway management, and moderate sedation.

Faculty and staff teach at national VHA, Department of Defense, and simulation center conferences. They support VHA facilities in ERAS protocols, ketamine infusion for chronic pain, opioid detoxification, labor mapping, coding, workload capture, and quality assurance.

Faculty serve on VHA committees, reviewing anesthesia events, presenting lessons learned, developing templates for Cerner transition, and developing practice standards.

The chief serves on the National Disciplinary Appeals Board, National Anesthesiology Surgical Advisory Board, and Field Advisory Committee and serves as VISN 9 anesthesiologist-in-chief. The chief also chairs or co-chairs several other national anesthesia program sub-committees.

VA SERVICE STATS - based on annual volumes

- 15,000 pain clinic & interventional visits
- 5,500 operating room procedures
- 8,000 non-operating room procedures
- 20,000 telehealth & video-connect visits

Certified Registered Nurse Anesthetists

Chief - Amanda Dickert, CRNA, DNAP, MMHC



The Vanderbilt Health 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 one of the largest groups 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 professional development initiatives. Within this portfolio, we have service specialists who serve as resource CRNAs across unique service lines and subspecialties. 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. Our

leadership team also includes a daily charge CRNA (C1) in our adult, pediatric and Wilson County services. As an extension of leadership, the C1 role provides daily operational support by assisting with staffing callouts, coordinating transport support, lending support for leveled and other complex cases, facilitating daily relief, and serving as a key resource for providers. This role is essential to ensure consistent, direct support across our team.

The CRNA Division has experienced remarkable growth, now serving five hospitals and eight surgery centers. Of the five hospitals our CRNA team serves, three are regional community hospitals: Vanderbilt Wilson County Hospital, Vanderbilt Tullahoma-Harton Hospital, and Vanderbilt Bedford Hospital. Over 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.



CRNA FACTS AND STATS

- More than 300 CRNAs
- One of the largest groups in the Anesthesiology Department
- Serving five hospitals and eight surgery centers
- 40 anesthesia technicians

Certified Registered Nurse Anesthetists

Chief - Amanda Dickert, CRNA, DNAP, MMHC



The 2025 American Association of Nurse Anesthesiology (AANA) Annual Congress took place at the Music City Center in Nashville. The hybrid event offered both in-person and virtual participation, focusing on advancing nurse anesthesiology education, clinical practice, and professional excellence.

New Doctoral Nurse Anesthesia Program Rolls Out



A celebration of the opening of the new Doctoral Nurse Anesthesia program was held at the School of Nursing, welcoming 24 students to the inaugural class. They will graduate in May 2029.

Brent Dunworth, CRNA, DNP, MBA, and former nurse executive of Advanced Practice at Vanderbilt Health, serves as the founding academic program director for this initiative. Our other affiliated programs include Middle Tennessee School of Anesthesia (Madison, Tennessee); Emory University Nurse Anesthesia program (Atlanta); and Marian University (Indiana).

napolis). 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 at both on- and off-campus clinical locations. To foster the next generation of anesthesia technicians, Vanderbilt Health has partnered with the Anesthesia Technology program at Columbia State Community College in Columbia, Tennessee, offering clinical rotations in adult and pediatric anesthesiology.

DOCTOR OF NURSING PRACTICE

Nurse Anesthesia Program

Vanderbilt's full-time, in-person program combines rigorous, comprehensive coursework, technology-enhanced simulations, and more than 2,500 hours of extensive clinical training from experts at one of the nation's top academic medical centers.



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 10 subspecialty programs led by a group of excellent program directors and assistant program directors. Our program administrators, LaurieAnn Hembree, Brooke Hoover, Elisabeth Hudson, Lisa McIntosh, Jillian Powell and Jayne Wolbert embody professionalism, positivity and a commitment to excellence in education, ensuring that our trainees, faculty and staff receive the resources and support needed to thrive.

RESIDENTS

The Vanderbilt Health 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 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.

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 is a nationally renowned, on-campus resource for this training. Additionally, transesophageal echocardiography and point-of-care ultrasound

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 10 clinical areas are offered to individuals seeking advanced, focused subspecialty training:

Anesthesiology Critical Care Medicine*

program director: Marcos Lopez, MD
assistant program director: Aditi Balakrishna, MD

Cardiothoracic Anesthesiology*

program director: Kelly Mishra, MD
assistant program director: John Bryant, MD

Global Anesthesiology

program director: J. Matthew Kynes, MD

Pain Medicine*

program director: Benjamin MacDougall, MD,
assistant program director: Jenny Kim, 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 Neuhaufen, 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*

Nurse Anesthetists

The continuing education of more than 300 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.

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 simulation training that qualifies for American Board of Anesthesiology Maintenance of Certification in Anesthesiology 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 Vanderbilt Health Anesthesiology Department joined MPOG ASPIRE in 2020 and has the full support of departmental leaders. A key component of ASPIRE includes monthly feedback emails showing departmental compliance with ASPIRE measures and then later provider level performance data.

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 Vanderbilt Health 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.

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 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 James Phythyon, MD, 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.

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 Jr. Children's Hospital at Vanderbilt, 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.

Dr. Bradley E. Smith Endowed Lectureship on Medical Professionalism

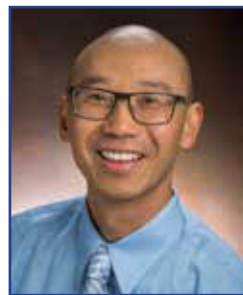
Former department chair Bradley E. Smith, MD, defined what it means to be a true professional, and in 2009 a lectureship on medical professionalism was established in his name by then department chair Michael Higgins, MD, MPH. The goal of the lectureship is to reflect on the characteristics, responsibilities 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 Daniel Saddawi-Konefka, MD, MBA, presented the 17th annual Dr. Bradley E. Smith Endowed Lectureship on Medical Professionalism in February 2026.



Featured guest speaker Kha M. Tran, MD, presented the 20th annual Dr. James Phythyon Endowed Lectureship in Pediatric Anesthesiology in April 2026.



Featured guest speaker Daniel I. McIsaac, MD, MPH, FRCPC, will present the 7th annual Dr. Charles Beattie Endowed Lectureship on Perioperative Medicine and Systems-Based Practice on November 6, 2026.



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.

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 it. 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 four new pediatric anesthesiology fellowship programs (Nigeria, Uganda, Ethiopia and Zambia), more than doubling the number of such programs in Africa. After 2026, PATA will have graduated 42 pediatric anesthesiologists who are working in eight countries.

Vanderbilt Institute for Global Health (VIGH) with departmental faculty organized a 12-week leadership, policy and advocacy workshop led by University of Zambia faculty to advance anesthesiology in their countries. Multinational research projects are studying population outcomes with Africa-based colleagues and developing manuscripts to advance research. For instance, the Mobile Obstetric Simulation Team training has been taught in six African countries to train hospital staff caring for mothers and newborns. Poster presentations with Africa-based academic collaborators and Vanderbilt faculty were presented at the 2026 World Congress of Anesthesiology in Morocco.

Another global education initiative is ImPACT Africa. Supported by grants from GE Foundation and The ELMA Foundation and led by Dr. Newton 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 2025-26 academic year, several department members, including Robert Deegan, MB, ChB, PhD, Julio Gonzalez-Sotomayor, MD, Christina Jelly, MD, and Drs. Newton and Sileshi traveled to Ethiopia to provide subspecialty teaching and workshops to local residents and faculty. In addition, Jordan Yokley, MD, Clay Adams, MD, and Dr.

Newton 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 150 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 fulltime in Kijabe and will be joined by Cori Banerdt, MD, in 2027. Residents and fellows also work alongside residents from the Kijabe Hospital anesthesiology residency, which was started in 2022, with Dr. Kynes as the program director. The residency graduated its first class in 2025, training physicians from four countries. Trainees participate in the annual Preparing Residents for International Medical Experiences simulation-based workshop led by Stephanie Woodward, MD. The Kijabe rotation is a highlight, paving the way for the Global LEAP program, an advanced track for residents seeking global health expertise and international experience. The department also offers a Global Anesthesiology Fellowship for advanced training in leadership, research and service.

Our department is also proud of the ongoing 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 nurse anesthetists from 18 different countries across Africa for continued education, advocacy and networking. Vanderbilt Health CRNAs were able to fund travel scholarships to 23 participants from 10 African countries to attend PANAC. The AANA 2025 Conference and our CRNA global anesthesia team hosted Mary Mungai, anesthesia nurse educator at Kijabe (Kenya), who was a session speaker, along with Dr. Newton.

In 2026-27, the department looks forward to growing our global footprint as we seek to improve anesthesia education, research and patient safety with our anesthesiology colleagues outside the USA.

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 FY25, Vanderbilt University School of Medicine (VUSM) ranked 7th among U.S. medical schools for NIH funding, exceeding \$564 million. VUSM funding has more than doubled since 2001. Department investigators secured over \$14 million in extramural research funding, including \$11.5 million in NIH grants, placing Vanderbilt Anesthesiology 6th among U.S. academic anesthesiology departments in NIH funding.

Vanderbilt Anesthesiology faculty published 262 peer-reviewed papers in FY25, up from 69 papers in fiscal year 2010, within the peer-reviewed literature.

The department's Clinical Research program advances knowledge and improves healthcare by supporting investigator-initiated studies, including NIH-supported clinical trials and industry-sponsored projects. Our research advances medical practice in perioperative care, critical care, chronic pain, and medical devices. Practicing physicians develop research protocols to answer clinically significant questions and investigate novel treatments.

The Perioperative Clinical Research Institute (PCRI), Vanderbilt Anesthesiology Clinical Research Advisory Committee (VACRAC), and Vanderbilt Anesthesiology & Perioperative Informatics Research (VAPIR) group support and facilitate the 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 optimizes informatics-focused projects and disseminates knowledge throughout the department. It develops automated email systems and dashboards to strengthen internal communication and provide near real-time feedback to clinicians for improved perioperative care. Led by director Robert Freundlich, MD, MS, MSCI, VAPIR supports department research by collaborating with investigators to optimize informatics and AI-based studies. It collaborates with other Vanderbilt departments to facilitate information analysis and dissemination, improving surgical patient outcomes. VAPIR also supports access to the electronic medical record for high-quality data acquisition and analysis to support research and quality improvement.

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 Science (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.

RESEARCH FACTS & STATS

- Among U.S. medical schools, Vanderbilt University School of Medicine ranked 7th for NIH funding, with more than \$564 million in funding (federal fiscal year 2025)
- Among U.S. anesthesiology departments, Vanderbilt Health's Anesthesiology Department ranked 6th for NIH funding (federal fiscal year 2025)

RESEARCH FACTS & STATS

- Anesthesia investigators secured over \$14 million in extramural funding, including \$11.5 million in NIH grants
- In FY25 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.

Julia Bohannon, PhD, associate professor of Anesthesiology and Pathology, Microbiology and Immunology, is developing innovative immunomodulatory therapies to prevent life-threatening infections and sepsis following severe burn injury. Her team investigates how severe burn injury disrupts mitochondrial function, cellular metabolism, and antimicrobial capacity, and how targeted activation of Toll-like receptor (TLR) pathways can reverse these deficiencies. The lab's patented synthetic TLR4 agonist, PHAD, was developed for clinical adaptation and is now in trials through Revelation Biosciences, with plans for evaluation in burn patients.

Stephen Bruchl, 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 modu-

late 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, 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.



The perioperative informatics groups advance patient care through innovations in patient safety and quality. By harnessing innovative technology into clinical applications, Vanderbilt Anesthesiology & Perioperative Informatics Research (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 a pragmatic clinical trial for intraoperative oxygenation
- Improved mobile anesthesia workflows
- Rollout of enhanced decision support for postoperative nausea and vomiting

VAPIR LEADERSHIP

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.

VAPIR HAS:

- Created the informatics backbone for the Vanderbilt Perioperative Medicine Consult Service
- Developed, validated, and implemented predictive models for risk stratification and real-time clinical decision-making in the EHR
- Analyzed the impact of real-time decision support tools
- Collaborated with Perioperative Informatics to develop a common data architecture for seamless data analysis from legacy EHR, VPIMS, and current eStar systems
- Provided a critical informatics backbone for NIH-, AHRQ-, and PCORI-funded research projects

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 four 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, estimating bed ratios between intensive, stepdown and acute care for inpatient units, and innovative efficiency metrics.

OUR FACTS AND STATS

- Informatics database size: 30 terabytes
- 36 active projects
- 2,442,496 cases contained in the perioperative data warehouse

Perioperative Clinical Research Institute

David McIlroy, MB.BS., MD, MClinEpi • Edward Sherwood, MD, PhD

The mission of the Perioperative Clinical Research Institute (PCRI) is to:

- Promote a culture of large and robust clinical trials that, in turn, provide high-quality evidence to inform perioperative practice nationwide
- 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 an electronic submission of a brief and focused proposal (<https://redcap.vumc.org/surveys/?s=XE44E798XF>).

The PCRI team offers comprehensive support services, including project development, IRB application submission, contract management, clinical study initiation and execution, regulatory oversight, data management, and biostatistics/biomedical informatics support. The goal is to promote well-designed clinical research studies addressing important questions, from preliminary studies to multi-center investigator-initiated studies.

In federal FY25, Vanderbilt Health's Department of Anesthesiology ranked 6th in NIH funding nationwide. Over the past five years, department investigators have published multiple high-impact clinical research studies in prestigious journals like the *New England Journal of Medicine*, *JAMA*, and *The BMJ*.

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.

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.

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



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

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 Bonczyk, MD

A Phase 3, Multicenter, Randomized, Controlled, Open-Label Assessor-Blinded Study to Evaluate the Efficacy and Safety of Inhaled Isoflurane Delivered via the Sedacon 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, MS, MA

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



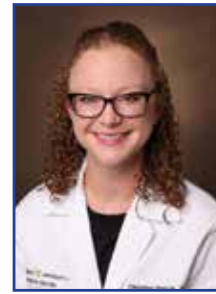
Bret Alvis, MD



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,
MS, MA



Frederick Lombard,
MBChB, FANZCA



Marcos Lopez, MD



David McLroy,
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

The Alvis laboratory, in collaboration with the Vascular Waveform Analysis Group (VWAG), focuses on improving physiological monitoring through non-invasive venous waveform analysis (NIVA). This novel approach assesses volume state in adults and children and sheds light on adult respiratory conditions. Using a piezoelectric sensor on the wrist, venous waveforms are captured. The lab analyzes waveforms to study cardiac, respiratory, and harmonic patterns in various states. Human, porcine, and bench-top studies are conducted. Dr. Alvis' lab supports active NIVA research at multiple US academic centers. Current studies include venous waveforms during acute hemorrhage, sepsis, burns, atrial fibrillation, heart failure, pediatric resuscitation, pediatric hemorrhage, pediatric goal-directed fluid therapy, acute respiratory distress, athletic dehydration, and acute volume overload.

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

Dr. Billings and long-term collaborator Marcos G. Lopez, MD, MS founded the Perioperative Organ Protection and Physiology Laboratory (PROTECT Lab) in 2021 to develop new therapies for perioperative organ injury. They conduct clinical trials and evaluate mechanisms of surgery-induced organ injury. The lab studies and manipulates the patient's response to acute surgical stress to reduce morbidity. They specifically investigate the impact of perioperative oxidative damage on acute kidney and brain injury in surgical patients. PROTECT Lab conducts preclinical studies in mice, bench experiments with human tissues, mechanistic, explanatory, and pragmatic clinical trials, and large-data epidemiologic studies to advance the R35-funded Research Program.

Julia Bohannon, PhD

Dr. Bohannon's lab investigates the impact of innate immune memory on the host response to infection. Emphasis is placed on improving resistance to infection in critically ill and injured patients. Her work shows that activation of innate immune memory greatly augments the ability of burn patients to respond to infection via augmentation of leukocyte recruitment to sites of infection and enhancement of the antimicrobial functions of innate leukocytes. Dr. Bohannon's work utilizes experimental models of infection, cell culture systems and clinical samples obtained from patients with serious injuries, infections and sepsis.

Stephen Bruehl, PhD

The work in Dr. Bruehl's lab is focused on understanding acute and chronic pain and enhancing pain management. For more than 10 years, a key focus of the lab has been on understanding the physiological (endogenous pain inhibitory function) and psychosocial factors that influence the benefits versus risks experienced when individuals use opioid analgesics for pain management. The lab's current work examines several hypothesized mechanisms that may contribute to known associations between elevated stress and risk for opioid misuse. Mechanisms

examined in this work include operant reinforcement (subjective opioid effects), endogenous opioid function, endocannabinoids, and vagal inhibition (heart rate variability). Dr. Bruehl's lab has also studied the mechanisms of beneficial effects of non-pharmacological interventions for chronic pain (aerobic exercise, mindfulness, spinal manipulation).

Eric Delpire, PhD

The Delpire laboratory is creating and studying genetically modified mouse models of the cotransporters and of proteins that regulate them. The work involves molecular biology, physiology, electrophysiology and behavior. These studies have significance in pain perception, hyper-excitability and epilepsy, nerve conduction, peripheral neuropathy and paraplegia. GABAergic neurotransmission depends on the transmembrane Cl concentration gradient at the synapse. Intracellular Cl concentration in CNS and PNS neurons is regulated by cation-chloride cotransporters like Na-K-2Cl and K-Cl. Immature CNS neurons express high Na-K-2Cl cotransporters, resulting in high intracellular Cl⁻ and GABA depolarizing or excitatory responses. Mature CNS neurons have low Na-K-2Cl cotransporters and high K-Cl cotransporters, leading to low intracellular Cl⁻ and GABA hyperpolarizing or inhibitory responses.

Jerod Denton, PhD

Dr. Jerod Denton leads a discovery-driven research program focused on ion channel pharmacology and chemical biology, with direct translational applications in renal, neurological, vascular, reproductive and metabolic health. His lab integrates high-throughput library screening, electrophysiology, and structure-guided medicinal chemistry to develop first-in-class small-molecule modulators of clinically relevant ion channels. These include Kir1.1, Kir4.1/5.1, Kir6.2/SUR1, Kir6.1/SUR2B, Kir7.1, Kv3.1, and TMEM175, among others. His group's ion channel modulators serve as both tool compounds for mechanistic dissection and development candidates for drug discovery pipelines.

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, MS, MA

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.

Pratik Pandharipande, MD, MSCI

Dr. Pandharipande's research seeks to optimize sedation protocols in critically ill and mechanically ventilated adults and children. His NIH-funded research has focused on sedation in the ICU and the role of sedative medications in delirium and cognitive impairment in critically ill patients.

Heidi Smith, MD, MSCI

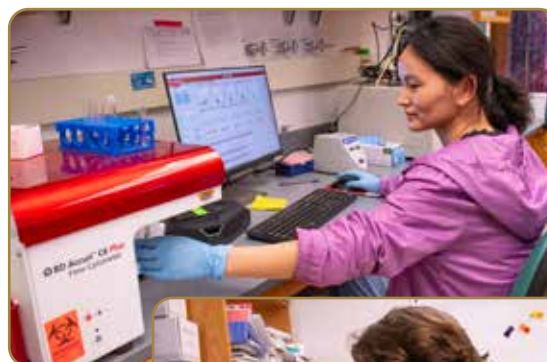
Dr. Smith's research seeks to optimize sedation protocols in critically ill and mechanically ventilated children. Her NIH-funded clinical trial will randomize 372 pediatric patients on mechanical ventilation to alpha-2 agonist vs GABAergic agent to test the hypothesis that optimized sedation will decrease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

Director - Nicole Werner, PhD



The Center for Research and Innovation in Systems Science (CRISS) is a systems engineering research center emphasizing a human-centered design approach. CRISS research spans numerous clinical domains and disciplines to design, evaluate, and implement human-centered healthcare technologies and processes. CRISS includes an interdisciplinary team of anesthesiologists, PhD researchers, nursing and design staff, and faculty collaborators dedicated to designing and implementing solutions that clinicians, patients and families can—and will—use.

CRISS applies human factors, systems engineering, cognitive psychology, informatics, and implementation science to improve healthcare safety and quality. Researchers study care processes and performance during patient care and in realistic simulations to better understand how and why care deviates from optimal, then design and study interventions to improve outcomes. CRISS explores the nature of expertise, clinician communication, situation awareness, workload and well-being, teamwork, performance-shaping factors, human-technology interactions, and novel methods of information presentation to improve care processes and outcomes.

CRISS projects include AI-driven decision support, electronic health record-integrated tools, immersive technologies, innovative healthcare processes, and digital interventions across a range of clinical and consumer domains. We provide internal

and external consulting services for numerous customers. Projects across the medical center and university include those focused on patient safety, informatics, software design, usability testing, process design, and quality improvement. Externally, CRISS is involved in numerous collaborations to re-engineer medical processes, improve clinician decision-making, and enhance the usability and usefulness of technologies. 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 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.



OUR FACTS & STATS

- \$4.1 million annual research budget
- 67 external collaborators
- 85 internal collaborators
- 30 peer-reviewed publications
- 19 invited talks



David McIlroy, MB.BS., MD,
MClInEpi



Pratik Pandharipande, MD, MSCI



Edward Sherwood, MD, PhD



Matthew Shotwell, PhD

The Vanderbilt Anesthesiology Clinical Research Advisory Committee (VACRAC), 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 worldwide
- 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>



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 (as of June 2026)

Courtney Burns, MD, is a CA-1 resident. Her prior work has focused on the occupational mental health challenges experienced by anesthesiologists, including clinicians' emotional dis-

stress resulting from adverse patient events. She has a particular interest and experience in qualitative research methodology and dissemination of research findings using arts and humanities-based strategies that bridge the gap between research science and the community. She aims to expand this to the critical care environment, specifically related to ICU survivorship and post-intensive care syndrome.

Brandon Farmer, MD, PhD, is a former T-32 fellow and a current assistant professor 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. Dr. Farmer joined the faculty in July 2026 in the MSA Division.

Kelsey Hudson, MD, PhD, is a CA-2 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 focusing on pain in the obstetric patient population.

Abby King, DO, MPH, is a CA-3 and chief anesthesiology 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. Dr. King is mentored by Josh Billings, MD, MSCI, and her mentorship committee includes Kimberly Rengel, MD, MSCI, Daniel Larach, MD, MS, MA, and Jonathan Casey, MD, MSCI.



Connor Snarskis, MD, is an assistant professor in the Division of Anesthesiology Critical Care Medicine interested in improving patient centric decision making and delivery of palliative care. His research program focuses on utilizing electronic health record machine learning algorithms to provide real-time predictive data to practicing clinical teams conducting goals of care discussions. 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. Dr. Snarskis is mentored by Robert Freundlich, MD, MS, MSCI, and Christopher Hughes, MD, with rapid response team expertise provided by Liza Weavind, MBCh, MMHC.

Terilyn Stephen, MD, PhD, is a CA-1 resident. Her prior research focused on the molecular underpinnings of adult hippocampal neurogenesis and the impact of caveolin-1 signaling on memory formation in Alzheimer's disease. Dr. Stephen intends to expand her research to better understand the mechanisms by which intraoperative stress impacts blood-brain barrier dynamics, with a particular focus on pathways contributing to postoperative delirium in critically ill patients.

Four scholars completed the program in June 2026:

Drs. Matthew Barajas, Gloria Han, Hannah Lonsdale, and Kimberly Rengel.

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 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 FAER. He looks forward to continued success under the mentorship of Matthias Riess, MD, PhD, and Susan Eagle, MD.

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.

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 is a

2026 International Anesthesia Research Society (IARS) Mentored Research Award Recipient, 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.

We would also like to welcome four new scholars into the program: Drs. Brittani Bungart, Joseph Formella, Catherine Lyons, and Mitsu Yoshida.

Brittani Bungart, MD, PhD, assistant professor of Anesthesiology effective October 2026, studies optoacoustic device development with machine learning-based image analysis, local anesthetic dosing and toxicity, nociceptor-targeted genetic therapies in rodent pain models, and high-throughput screening of incretin-based medications in a neuronal model of pain. She is developing a research program on the potential of incretin-based medications to improve perioperative pain and opioid-related outcomes.

Joseph Formella, MD, is a pediatric critical care fellow researching endothelial dysfunction in pediatric septic shock. His previous interest and work in immunomodulatory oncologic therapies (CAR-T cells with co-stimulatory domains and immune-related adverse events with immune checkpoint inhibitors in renal cell carcinoma patients) drives his current interest in delineating the mechanisms behind endothelial dysfunction in pediatric septic shock through metabolomic and transcriptomic analyses.

Catherine Lyons, MD, is a PGY-1 resident developing a research program to reduce preventable maternal morbidity and mortality during childbirth through pragmatic, physiology-driven interventions and by understanding how environmental and structural factors shape risk.

Mitsu Yoshida, MD, PhD, an assistant professor recently recruited from Wash-U, is building a research program at the intersection of neuroscience, immunology, and metabolism, with a focus on understanding the fundamental mechanisms of aging and age-related diseases. He investigates how neurocircuitry, neuroimmune interactions, and metabolic pathways influence systemic aging, chronic pain, and neurodegenerative conditions.

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 41.

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.

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 devel-

opment 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 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. 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.

THE YEAR IN REVIEW

- 12 faculty promoted (7 to associate professor, 4 to professor, 1 to associate in)
- 19 faculty promotions in progress
- 43 prestigious nominations
- 24 new mentor/mentee pairings (92 total pairings)
- 6 faculty recently recommended for promotion by the Appointments and Promotions Committee



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. It has three components: structured editorial support (primarily for submitted manuscripts), a curated list of self-guided training opportunities designed to improve writing skills, and other support related to publishing and other scholarly processes.

FY 2025-2026 – Departmental Editorial Assistance

This year, Clarity program editors assisted 74 authors (faculty and fellows) in 9 divisions.

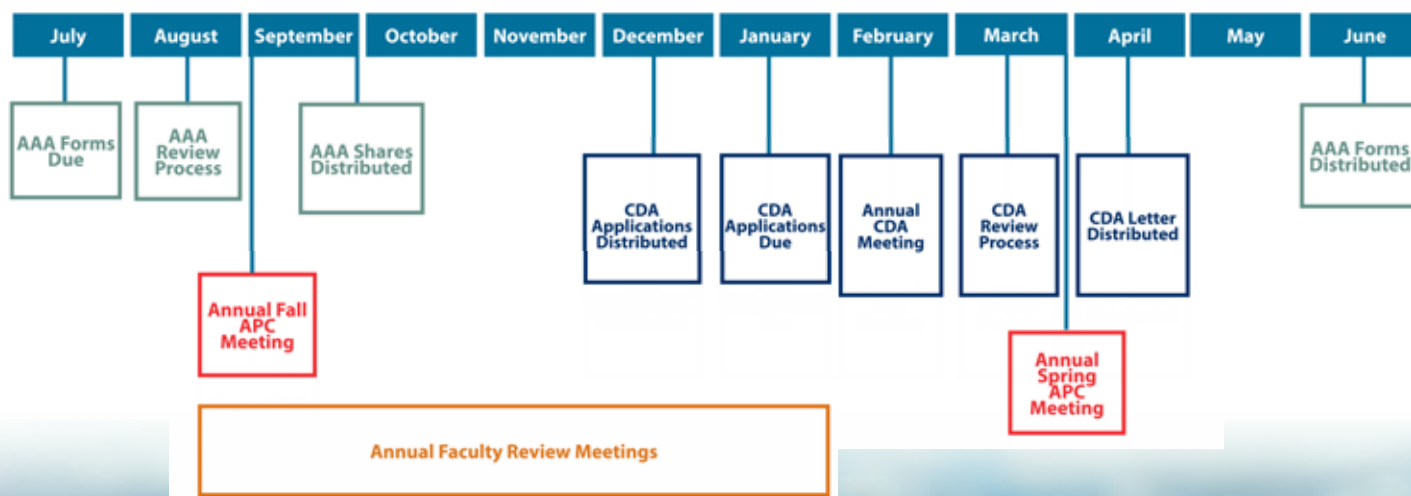
Clarity editors completed 84 editing encounters and helped submit work to 31 different journals.

Clarity's assistance includes the following:

- Pre-submission editing of peer-reviewed manuscripts, book chapters, and other materials.
- Assistance with the online submission process.
- Help with other editorial tasks including the use of iThenticate, EndNote, and ORCID.



VANDERBILT HEALTH



Faculty Recruitment

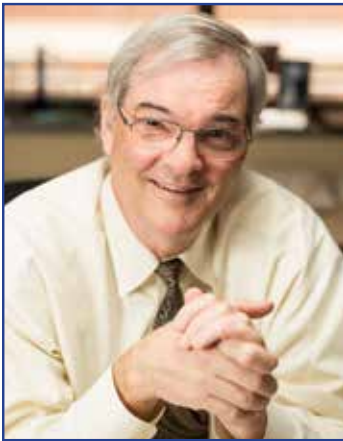
Knowing who we are and what we believe is an important part of making a career match. At Vanderbilt Health, we believe in the power of teamwork and collegiality. Our doctors, nurses, technicians and support staff operate as teams drawing on and respecting the individual skills that each brings to the 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 Health, 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 Anesthesiology Department.



Mark Rice, MD
Executive Vice Chair, Emeritus



Kelly Mishra, MD
Medical Director, Faculty Recruitment



Katie Loh, MD
Associate Director, Faculty Recruitment



Dorothee Mueller, MD
Associate Director, Faculty Recruitment



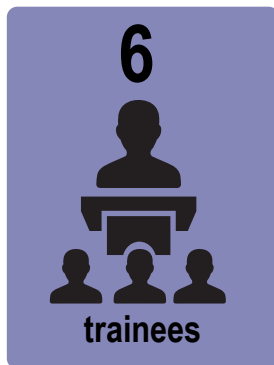
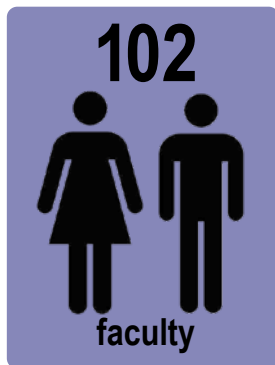
Camille Roberts, MD
Associate Director, Faculty Recruitment



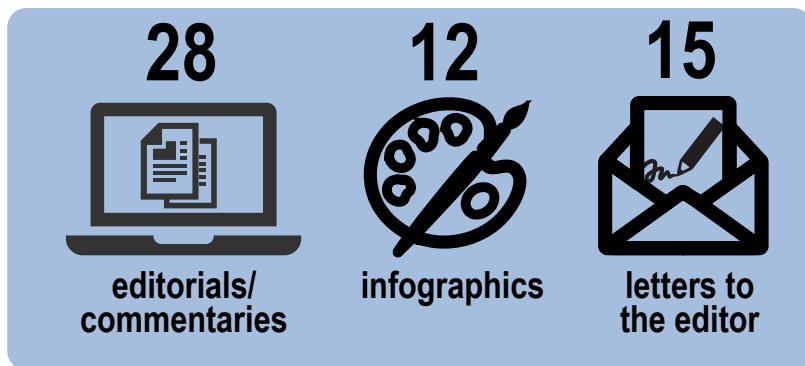
Melanie Cundiff
Senior Program Manager



Authors



Peer-reviewed Publications



The Department of Anesthesiology places a strong emphasis on faculty, trainee and staff career development in academic anesthesiology. Major translational research initiatives are moving discoveries from the bench to the bedside, and our scientists are working to transform both health care and health care delivery. 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:
<http://vumc.org/anesthesiology/communications>
 or by scanning the QR code.



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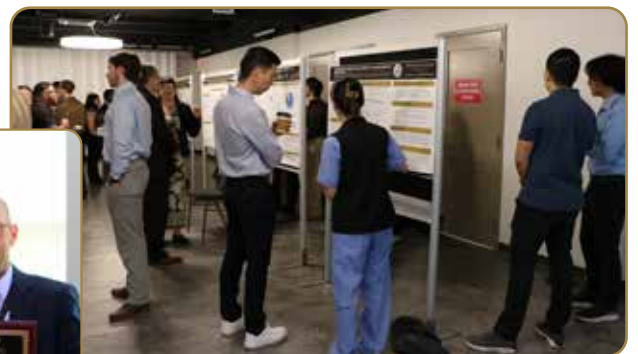
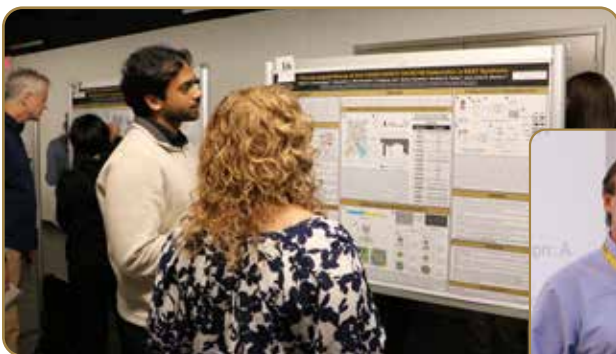
Special Events



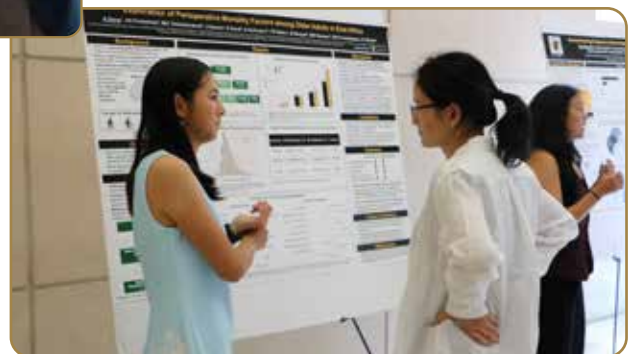
2026 Phythyon Dinner Reception



David Chestnut, MD, Retirement Party



2026 Research Symposium



Achieving Balance



The Vanderbilt Department of Anesthesiology is a dynamic group, providing the very best in patient care, presenting challenging educational programs for our trainees, and leading our specialty in investigational research. But productivity and career satisfaction aren't all about work. We know how to take that same energy and have a great time.

We gather regularly for family-friendly events, including picnics, events to welcome new residents, and other fun activities throughout the year. Here are just a few snapshots from our events.

December 2025 Holiday Party

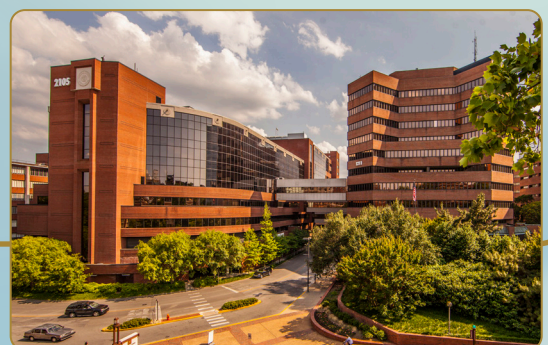


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