



Department of Anesthesiology

UNIVERSITY OF WISCONSIN

SCHOOL OF MEDICINE AND PUBLIC HEALTH



DEPARTMENT PROFILE

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MESSAGE *FROM THE CHAIR*



It is an honor and a pleasure to serve as the chair of this historic department. Since joining the University of Wisconsin School of Medicine and Public Health in October 2019, I feel as though *I stand on the shoulders of giants* – those who defined and led anesthesiology, and who have contributed to academic leadership around the country and the world since the early days of anesthesiology.

Founded by Ralph M. Waters in 1927, ours was the first academic anesthesiology department in the United States. Today our mission reflects the same noble vision established by Dr. Waters: Excellence in clinical practice, education and research.

As clinicians, we serve communities in Dane County and beyond through diverse clinical service lines across the UW Health enterprise. As teachers, we educate and train medical students, residents and fellows. As scholars, we advance basic, clinical and translational research. In all these endeavors we cultivate a safe and supportive environment for individuals from all backgrounds to practice, teach, learn and conduct research.

Through this profile, I invite you to get to know us. By highlighting each of our mission commitments, it provides a comprehensive look at the UW School of Medicine and Public Health Department of Anesthesiology.

A handwritten signature in black ink, appearing to read "K. A. Kelly McQueen".

K. A. KELLY McQUEEN, MD, MPH, FASA

Ralph M. Waters Distinguished Chair in Anesthesiology
Chair and Professor, Department of Anesthesiology

OUR DEPARTMENT TODAY

CLINICAL EXCELLENCE

Our anesthesiology practice exemplifies a physician-led, team-based approach to patient care throughout UW Health and involves faculty anesthesiologists, fellows, residents and clinical anesthetists.

UW Health clinical sites include: University Hospital, a 505-bed quaternary care facility; American Family Children's Hospital, an 111-bed pediatric facility and The American Center, a 56-bed satellite hospital. Ambulatory locations include the Digestive Health Center, Madison Surgery Center, Generations Fertility Care and Transformations Surgery Center.

EXCEPTIONAL EDUCATION

The Department of Anesthesiology directs a range of robust educational programs. With 63 residents and interns, we house the second-largest UW Health residency program. We offer three accredited and several non-accredited fellowships. Third- and fourth-year medical students rotate with us year-round. We also offer anesthesiologist assistant rotation opportunities, up to 48 each year, and will initialize a new senior student registered nurse anesthetist rotation program in 2022.

CUTTING-EDGE RESEARCH

Our bold researchers and innovators excel at working in collaborative, multidisciplinary teams

to improve the well-being of people in Wisconsin and around the world.

Three of our faculty members pursue cutting-edge basic science research funded by the National Institutes of Health. Current areas of investigation include: the neural basis of consciousness and its disruption by anesthetics, sleep and delirium; understanding how modulation of GABA receptors impairs learning and memory; and identifying genetic factors that may influence anesthetic-induced neurotoxicity.

In clinical research, our department enjoys national and international recognition for its longstanding interest in testing new methods and techniques for the treatment of both acute and chronic pain. Other department researchers seek to develop respiratory monitoring technologies, improve care of patients in the intensive care unit and advance liver transplant surgery. Still others played a major role in the race for COVID-19 vaccine clinical research.

Finally, our commitment to translational research includes a project to develop novel treatments for chronic pain by focusing on the transition from acute to chronic pain, and a collaborative project with the Department of Family Medicine to investigate the antidepressant effects of psilocybin.

DIVERSITY, EQUITY AND INCLUSION

Excellence occurs when individuals from diverse backgrounds come together. With this conviction, our clinical, educational and research programs actively foster safe and supportive environments. Our residents, faculty and staff have participated in educational sessions on recognizing bias and microaggressions in health care. As part of the Accreditation Council on Graduate Medical Education (ACGME) Committee on Diversity and Inclusion, we closely monitor and implement its recommendations.

ALL WAYS FORWARD

As UW Health's surgical enterprise continues to expand, the Department of Anesthesiology's clinical activity will grow with it, particularly in the delivery of ambulatory anesthesia and non-operating room anesthesia (NORA). Plans for a comprehensive UW Health Preoperative Clinic are underway, which will serve all of our surgical patients, virtually and in person.

Our new Global Program will extend our impact to communities in need. By offering sustainable support for education, training and research in low-income countries we will engage our faculty and learners in the challenges of providing safe anesthesia care in resource-constrained regions.



PRE-OPERATIVE CLINIC

The Department of Anesthesiology is forming a new, comprehensive UW Health Pre-Operative (pre-op) Clinic. Allowing us to expand our reach and better evaluate and prepare patients for surgery, this comprehensive pre-op clinic will result in both improved patient outcomes and increased patient and family satisfaction. The clinic will be directed by Dr. William Hartman, who brings his expertise and experience in augmenting pre-operative care systems.

The Pre-Operative Clinic is currently being piloted in partnership with Dr. Jennifer Racz and the UW Carbone Cancer Center Surgical Oncology Clinic. The Pre-Operative Planning Team expects to use the results from this pilot program to guide our launch of the full-scale pre-op clinic at UW Health in the near future.

Timely preparation of surgical patients decreases their risk of complications and reduces costs related to longer hospital stays and readmissions.

The new clinic will dramatically increase the number of surgical patients we consult each year — from approximately 6,000 today to more than 22,000. Historically, our preanesthesia surgical service (PASS) clinic nurses performed chart reviews and screened phone calls to risk-stratify patients that surgical clinics had identified as high-risk. In contrast, our new, comprehensive pre-op clinic will risk-stratify patients based on comorbidities and/or surgical risk and will allow for both in-person and virtual patient consults.

Over time, we expect the new clinic to become a perioperative service, with a greater focus on Enhanced Recovery after Surgery (ERAS) processes and protocols. Eventually, it also will provide pre-habilitation for patients in need of baseline health improvements prior to surgery.

Increasing our capacity, efficiency and quality of care will also facilitate the study of anesthesia and surgical outcomes and the impact of pre-operative interventions.



UNIVERSITY OF WISCONSIN DEPARTMENT OF ANESTHESIOLOGY



AMBULATORY ANESTHESIA

DIVISION CHIEF: JEFFREY LEE, MD



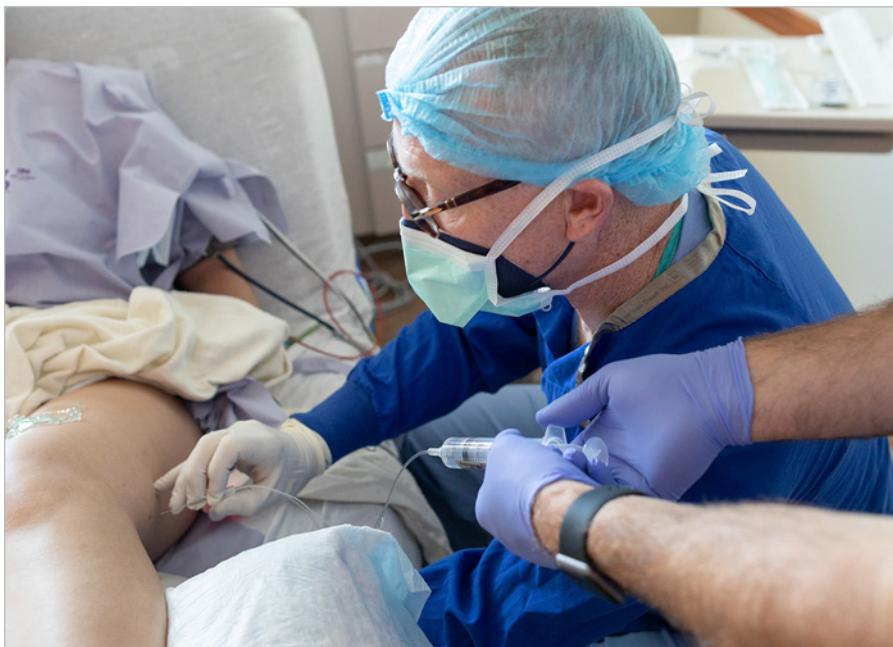
The Division of Ambulatory Anesthesia proudly provides comprehensive and compassionate care to an increasing number of patients in a variety of procedure and ambulatory surgery centers. We are able to effectively care for a wide spectrum of patients by adopting innovative approaches and the latest evidence-based anesthesia modalities.

At Madison Surgery Center and Transformations Surgery Center, for example, we employ a host of general, regional and Monitored Anesthesia Care (MAC) anesthesia techniques for the variety of general, ophthalmology, orthopedic, otolaryngology, plastics, pediatric, urology and vascular surgeries performed. At Generations Fertility Center and the Digestive Health Center, we provide sedation services. We also provide coverage for UW Hospital Outpatient Surgery Center (OSC), where patients with more serious comorbidities are cared for on an outpatient basis.

Complementing our steadfast clinical mission, our division also offers a variety of educational opportunities. Beginning in their CA-1 year, residents are required to spend a four-week rotation in OSC. There they are introduced to the challenges and nuances of ambulatory anesthesia. We also offer a senior ambulatory anesthesia elective for CA-3 residents who wish to operate in a more independent fashion. Finally, our division houses a unique ambulatory anesthesia and administrative medicine fellowship that offers insight into the business, financial and administrative aspects of an anesthesiology practice.



John Penner, MD, and nurse prepare patients for surgery at Madison Surgery Center.



DIVISION HIGHLIGHT

Dr. Jill Patzner serves as medical director at UW Health's highly regarded Madison Surgery Center (MSC) which offers a range of services from chronic pain procedures to advanced outpatient surgeries. As a valued leader in the ambulatory division, Dr. Patzner devotes her clinical and administrative efforts to maximizing quality and safety to ensure the ultimate patient experience.

CARDIOVASCULAR AND THORACIC ANESTHESIA

DIVISION CHIEF: JOSHUA SEBRANEK, MD



All faculty in our division are fellowship-trained in cardiovascular and thoracic anesthesia and provide anesthesia for scheduled and emergency cardiac, thoracic and vascular surgeries, as well as interventional cardiology procedures.

Cardiac procedures include coronary artery bypass surgery, valve surgery, heart transplants, ventricular assist devices and ascending aortic aneurysms/dissections. Thoracic procedures include lung resections, esophagus surgery, mediastinal masses, lung transplants and extracorporeal membrane oxygenation (ECMO). UW Health is a major center for complex aortic surgery.

In the cath lab we provide anesthesia for ablations and laser lead extractions, as well as MitraClip, Watchman and Transcatheter Aortic Valve Replacement (TAVR) procedures. Vascular procedures include bypasses, endarterectomies, aneurysms and dissection.

Our division also provides state-of-the-art anesthesia with intensive monitoring including transesophageal and transthoracic echocardiography. We are well known for our expertise in thoracic aortic aneurysms and transplants.

Each year two fellows complete their training in the accredited cardiothoracic and vascular anesthesia fellowship. Our fellows experience wide-ranging, in-depth clinical experience in cardiac, thoracic, vascular and thoracic anesthesia in addition to rotations in echocardiography, critical care, pediatric congenital anesthesia and interventional cardiology procedures. Upon completion, fellows obtain the National Board of Echocardiography Advanced Perioperative Transesophageal Echocardiography Certification.



Cardiovascular and Thoracic Anesthesia team members under the supervision of Joshua Sebrank, MD prepare a patient for open heart surgery at University Hospital.

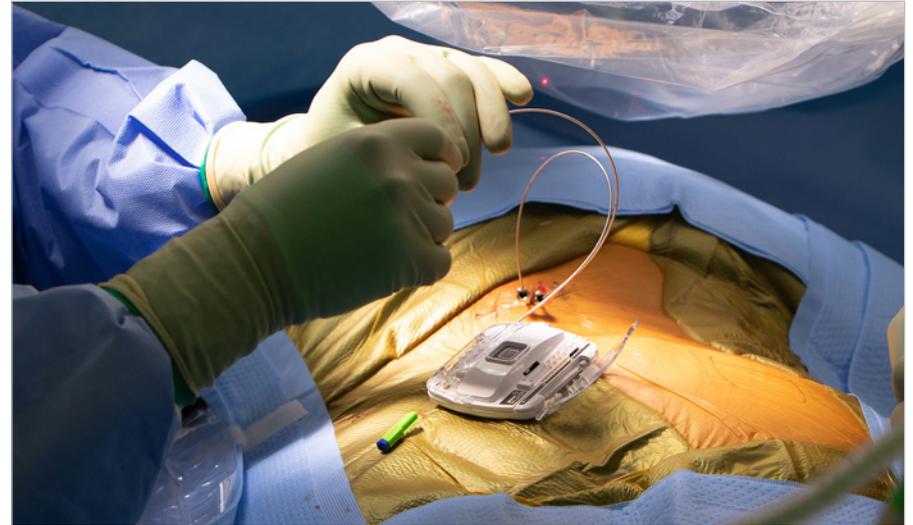


DIVISION HIGHLIGHT

Dr. Eric Simon, along with colleague *Dr. Patrick Meyer*, is beginning a clinical research trial investigating the use of bilateral pecto-intercostal fascial plane blocks with liposomal bupivacaine for analgesia following median sternotomy in elective cardiac surgery patients. Validation of the safety and efficacy of the pecto-intercostal fascial plane block will have major implications for enhanced recovery after cardiac surgery, potentially leading to improved patient outcomes and decreased health care costs.

CHRONIC PAIN AND PAIN MANAGEMENT TREATMENT

DIVISION CHIEF: ALAA ABD-ELSAYED, MD, MPH



The Division of Chronic Pain Management Treatment is part of a larger multidisciplinary pain management program at UW Health. In addition to treating all chronic pain conditions using the most advanced modalities and technologies, we also provide a second-opinion service, eConsults and telemedicine services. Members of our division have participated in many research endeavors including U.S. Food and Drug Administration trials. We also co-direct an accredited chronic pain fellowship in collaboration with the UW School of Medicine and Public Health Department of Orthopedics and Rehabilitation.

Members of the division pursue state-of-the-art clinical strategies to reduce chronic pain and manage general pain treatment with an emphasis on treating the whole patient and carefully considering the pathology of their pain. The team is able to dramatically improve quality of life with advanced technologies and modalities that successfully reduce or block pain.

Dr. Abd-Elseyed's clinical trial titled NOVA examines the efficacy of new spinal cord stimulation waveforms on improvement of low back pain in patients with severe pain resistant to all other modalities.

The division also participates in national research studies including neuromodulation Product Surveillance Registry (PSR) and the UPGRADE Study: Real World Outcomes® of Differential Target Multiplexed (DTM-SCS®) Stimulation in Existing and New Medtronic Intellis™ Implants, funded by Medtronic. New clinical trials will examine virtual reality programs in treating chronic pain and peripheral nerve stimulators for treating different neuralgias.

Alaa Abd-Elseyed, MD, MPH, performs a surgical procedure to address a patient's chronic back pain at University Hospital.



DIVISION HIGHLIGHT

Dr. Keth Pride serves as the associate director for the chronic pain fellowship program, section head of neuromodulation and the director for the anesthesia resident pain rotation. With a particular interest in peripheral nerve stimulation, he contributes to many ongoing research studies, including one which seeks to evaluate the efficacy of lumbar radio frequency ablation. An active instructor in the UW School of Medicine and Public Health, Dr. Pride teaches medical students as a Partner Longitudinal Teacher Coach.

CRITICAL CARE ANESTHESIA

DIVISION CHIEF: CHRIS CASSARA, MD



Faculty in the rapidly expanding Division of Critical Care Anesthesia provide intensivist coverage in the cardiothoracic surgical ICU, the surgical/trauma ICU and the medical ICU. Thanks to the growth of the transplant and mechanical circulatory device (VAD, ECMO, Total Artificial Heart) programs, our faculty now provide exclusive coverage in the CT surgical ICU. Our team of anesthesiology residents, fellows and advanced practice providers participate in daily, multidisciplinary ICU rounds where complex cases are discussed at bedside.

The UW School of Medicine and Public Health and UW Health are home to one of the nation's leading organ transplant programs. As experts in their field, our surgeons and physicians provide world-class care to heart, lung, heart/kidney, heart/liver and heart/lung recipients in the CT surgical ICU.



UW Health is also dedicated to growing its extracorporeal membrane oxygenation (ECMO) program. The current program supports approximately 60 cases per year. As part of UW Health's ECMO Team, our faculty participate in ECMO patient selection and management. Interested faculty will also play an increasing role in the cannulation of ECMO patients. Our division is developing ECMO cannulation training modules and will soon share this procedural responsibility with CT surgical colleagues.

The Division of Critical Care Anesthesia sponsors an ACGME-accredited ACCM fellowship for two fellows per year. In addition to our core responsibility to resident and fellow education, research endeavors are encouraged with well-developed institutional and departmental research funds.

Top left: Anila Bhatti, MD, conducts rounds in the CT surgical ICU.



DIVISION HIGHLIGHT

Dr. Gozde Demiralp joined the Division of Critical Care Anesthesia in August 2020 as medical director of the cardiothoracic surgery ICU. Dr. Demiralp has a specific interest in advanced cardiac critical care and mechanical circulatory devices (MCDs). As medical director, she will establish multidisciplinary collaborative rounding team modules for high-acuity ICU patients. She also envisions unifying all clinical service lines that require MCDs within the cardiothoracic surgery ICU, where all intensivists will serve as functional members of the ECMO team.

MULTISPECIALTY ADULT ANESTHESIA

DIVISION CHIEF: **TIMOTHY MCCORMICK, DO**



The Division of Multispecialty Adult Anesthesia delivers outstanding evidence-based care, fosters innovation and encourages individuals to pursue clinical and research interests.

We provide anesthesia care across a wide range of surgical specialties including ear, nose and throat (ENT), plastic surgery, orthopedic surgery, general surgery, neurosurgery and vascular surgery. We also provide anesthesia services for a number of non-OR procedures including those in interventional radiology, brachytherapy, interventional neuroradiology, gastroenterology and interventional radiology.

Our wide-ranging research interests include both lab-based basic science research and active clinical research. The diverse areas of interest to which our faculty have contributed include: developing ERAS protocols for various services; innovative use of jet ventilation for solid organ ablations; and groundbreaking work on the use of convalescent plasma and vaccines during the COVID-19 pandemic. Our faculty's ongoing projects include researching mechanisms of anesthetic action in animal models, a trial site of the large multicenter CONSCIOUS 2 study and conducting a multidisciplinary study of antidepressant effects of psilocybin. In addition to our own projects, we help residents and medical students produce research to present at regional and national meetings and publish in a wide variety of journals.

Non-OR anesthesia (NORA) cases make up approximately 20 percent of total anesthesia cases at UW Health, or more than 8,000 cases per year. These cases include cardiac, radiologic imaging, CT ablation, interventional radiologic, neuroendovascular, stroke and gastroenterology procedures, as well as radiation therapy treatments. Overall NORA volumes have increased approximately 10 percent annually for nearly 10 years. We see no likelihood of this changing in the future.

Because we train future professionals to advance the practice of anesthesia, education is integral to our division. We teach a variety of learners about our specialty and demonstrate how our work integrates with the world of medicine. We train residents at most of UW Health's clinical locations and expand our reach to alternative settings by providing educational opportunities in simulation for medical students, residents and other learners.

Richard Lennertz, MD, PhD and clinical anesthetist Rachel McAllister, CAA, prepare a patient for an outpatient procedure at University Hospital.



DIVISION HIGHLIGHT

Dr. George Arndt has dedicated his career to advancing the practice of anesthesiology in airway management. His many innovations — including the Arndt Endobronchial Blocker and the Arndt Wire-guided Airway Exchange Catheter — have improved the safety of anesthesia. Dr. Arndt's immense impact extends to education. He has trained residents and medical students for more than three decades. His Arndt Airway Course, held annually for the last 20 years, helps learners of all disciplines advance their practice of airway management.

NEUROANESTHESIA

DIVISION CHIEF: COREY AMLONG, MD



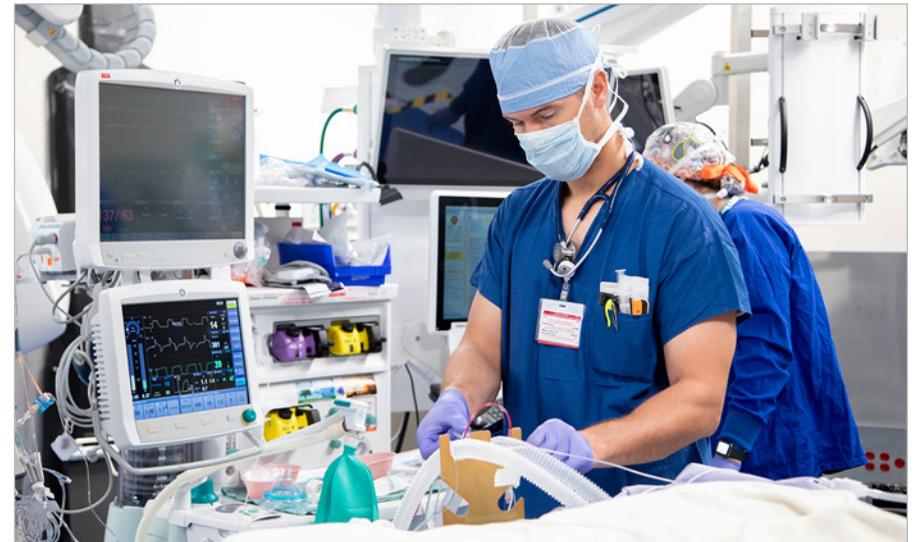
Internationally recognized surgeons from the Department of Neurological Surgery perform myriad surgical services, both open and endovascular. The Department of Anesthesia's Division of Neuroanesthesia is there for each of these patients, whether undergoing simple or complex neurosurgical procedures. We focus on the perioperative care of patients undergoing spinal fusions or decompressions, resection of spine and brain tumors, open or endovascular correction of spinal or intracranial vascular malformations and aneurysms, cerebrospinal fluid shunts and surgical interventions for movement disorders and epilepsy.

Annually the Division of Neuroanesthesia helps usher more than 600 patients through open craniotomies for tumors, craniotomies for repair of aneurysms or vascular malformations and endovascular treatment of intracranial vascular malformations.

As a Level 1 stroke center we take care of nearly 200 patients presenting for endovascular intervention for embolic stroke annually. It is anticipated that these numbers will continue to increase as our stroke program expands.

Endovascular cases are now done in two recently completed, state-of-the-art, hybrid endovascular operating rooms. These rooms allow us to safely perform combination open/endovascular cases in the same location, thus limiting unnecessary patient transports between the operating room and the interventional radiology suites.

The Division of Neuroanesthesia is proud to provide all patients with remarkable perioperative care while also staying abreast of the latest advancements in neurosurgical techniques, therapeutics and neuro-monitoring. We also endeavor to remain active in both clinical and bench neuroscience research while maintaining an atmosphere that is welcoming and nurturing to resident and medical student learners.



We structure our non-ACGME accredited neuroanesthesia fellowship around an individual's specific interests and provide ample free time to allow for additional educational or research pursuits. Fellows can fill their year with electives that are interesting to them. A fellow might, for example, choose to spend extra time reading intraoperative neuromonitoring or focusing on post-op ICU care.

Whitney Fallahian, MD leads a resident physician (opposite page) in preparation for brain surgery, and a clinical anesthetist attending to a stroke patient (below).



DIVISION HIGHLIGHT

Dr. Joel Johnson is an integral member of the Division of Neuroanesthesia. He brings unrivaled experience to the team. In his limited spare time Dr. Johnson serves as the co-Editor-in-Chief for the American Society of Anesthesiologist's ACE program as well as the medical director for UW Health's clinical anesthetists. Joel brings experience as a former department chair and is a perfect example of the hard work, dedication and depth of clinical knowledge and proficiency that the Division of Neuroanesthesia strives to maintain.

PEDIATRIC ANESTHESIA



The Division of Pediatric Anesthesia provides comprehensive anesthesia care for the diverse pediatric patients treated at the nationally recognized American Family Children's Hospital. All of our anesthesiologists are dedicated to providing safe, quality care for our patients, and we have a robust quality improvement program that strives to improve the management of anesthetic care for all children.

Our patients range from healthy toddlers and teens to the sickest-of-the-sick premature infants and critically ill children staying in our neonatal and pediatric intensive care units. We work closely with our pediatric surgical and procedural colleagues from many pediatric specialties including: cardiac surgery, general surgery, neurosurgery, otolaryngology, orthopedics, urology, plastic surgery, ophthalmology, transplant surgery, vascular surgery, gynecologic surgery, interventional cardiology and interventional radiology.

To meet our patients' varied needs our division also includes subspecialty-trained pediatric anesthesiologists in pediatric cardiac anesthesia and complex pediatric pain management.

Our growing comprehensive pediatric pain program provides perioperative consultative services in advanced pain management for our surgical and pediatric colleagues. We also treat patients with acute and chronic pain in both the outpatient clinic and an intensive inpatient rehabilitation program.



In addition to providing excellent clinical care, our pediatric anesthesiologists extend our impact through teaching fellows, residents and medical students, and by participating in global health endeavors.

Nationally, the pediatric anesthesia division is involved with several national databases and collaborative projects. Locally, we conduct a number of clinical studies. Our division also houses novel research and designs development projects aimed to improve monitoring and safety for patients globally.



Faculty physicians and clinical anesthetists caring for patients at American Family Children's Hospital.

DIVISION HIGHLIGHT

Dr. Ben Walker focuses on pediatric acute pain and regional anesthesia, including advanced epidural and perineural catheter placements. He has performed extensive research on the safety and efficacy of performing regional anesthesia techniques in children and has taught these techniques at a national level. At American Family Children's Hospital the pediatric acute pain team focuses on designing multimodal pain management plans that minimize opioid exposure to children.

REGIONAL ANESTHESIA AND ACUTE PAIN

DIVISION CHIEF: LISA KLESIUS, MD



The Division of Regional Anesthesia and Acute Pain Management draws upon the abundant resources and surgical case diversity afforded by a world-class health care institution. Our division provides exemplary pain management to orthopedic, breast, cardiac, thoracic, vascular, general surgery and transplant surgical procedures. We also extend our expertise throughout the hospital to provide care to patients suffering with chronic pain/exacerbations, cancer pain and acute pain following traumatic injuries.

In addition to providing excellent clinical care, the Division of Regional Anesthesia and Acute Pain Management is active at the regional and national level. Members of our team hold multiple leadership positions within the Wisconsin Society of Anesthesiologists, the American Society of Regional Anesthesia and the American Society of Anesthesiologists. Our members are also active academically. We perform significant clinical research and disseminate information and technical expertise through lectures and workshops.

Residents consistently rate the regional anesthesia and acute pain medicine rotation as one of the most popular. We offer residents intensive hands-on training, didactics, cadaver and simulation experiences. Medical students and other learners also benefit from instruction at the hands of acute pain medicine specialists and leave better equipped to manage patients with an array of complicated pain management problems. Finally, our fellowship program has produced alumni who have excelled in private practice and academic settings.

The Division of Regional Anesthesia and Acute Pain Management is a team comprised of health care providers from diverse backgrounds. Our physician anesthesiologists, nurse practitioners, physician assistants, block nurses and nursing assistants make valuable contributions to our ability to serve our patients.





Faculty and resident physicians preparing patients for surgery in the pre-op clinic.

DIVISION HIGHLIGHT

Dr. Patrick Meyer is the current fellowship director for the regional and acute pain management fellowship. Dedicated to providing the best educational experience for our fellows, he ensures our graduates provide outstanding, cutting-edge regional anesthesia and acute pain care. In 2020-21, the residency class voted Dr. Meyer Teacher of the Year!

TRANSPLANT ANESTHESIA

CHIEF: LAURA HAMMEL, MD and MOLLY GROOSE, MD, MS

Each year the Division of Transplant Anesthesia assists more than 100 liver transplants and hundreds of other abdominal organ transplants, including kidney and pancreas transplantation. We provide the anesthetic and perioperative care for abdominal organ transplant recipients and organ donors and exclusively anesthetic care for liver transplant recipients and donors. Our core group of board-certified anesthesiologists possesses the diverse and multi-disciplinary training and experience needed to understand the complex physiology of end-stage organ failure, liver disease and the intricacies of the liver transplant and abdominal transplant surgery. In addition to fellowship training in transplant anesthesia, many members of the division are also formally trained and board-certified in additional anesthesia subspecialties and other medical specialties such as cardiovascular anesthesia, critical care anesthesia, internal medicine and transfusion medicine.

Our tradition of close collaboration with the transplant surgeons and other members of the transplant department has become the model for liver transplant centers for the American Association of Anesthesiology and the United Network of Organ Sharing. Working closely with the Department of Surgery, division co-leaders take an active role in the selection and preoperative evaluation of transplant recipients, particularly liver recipients. We frequently collaborate with transplant surgeons and other specialists — such as cardiology, pulmonary or other disciplines — to plan multidisciplinary care and create guidelines for the pre- and post-operative care of particularly complex patients.

We ensure all anesthesia residents are instructed not only on the intra-operative anesthetic management, but also receive education on end-stage organ failure and physiology, the process of organ resource allocation and the evaluation of potential transplant candidates.



Our one-year transplant anesthesia fellowship is designed to train our fellows to become experts in the specialty of transplant anesthesia and to become local and national leaders in the field.

Laura Hammel, MD (above left) and Elizabeth Townsend, MD, PhD (opposite, top right and bottom), support physicians performing a living donor organ transplant.



DIVISION HIGHLIGHT

Dr. Molly Groose studies the effects of vitamin C on biochemical and cellular damage in liver transplant recipients in order to optimize graft outcomes. Her randomized, double-blind, placebo-controlled clinical trial titled “Parenteral Ascorbic Acid Repletion in Transplantation (PARTI)” aims to determine the clinical response to parenteral vitamin C supplementation in patients undergoing liver transplantation. Because recipient need is so much greater than donor availability, improving recipient outcomes and maximizing graft survival is critically important.

EDUCATION

Directed by Vice Chair for Education Dr. Kristopher Schroeder, Associate Vice Chair for Education Dr. Kristin Bevil and Residency Program Director Dr. Christopher Darling, the Department of Anesthesiology's Division of Education recruits learners from diverse backgrounds, cultivates an equitable and inclusive educational environment and fosters a culture of respect and support for all learners, faculty and staff.

MEDICAL STUDENT EDUCATION

Because we believe all future physicians should learn fundamental principles of anesthesiology, we provide a basic, required clerkship for all medical students. Each year 150 students rotate in operating rooms throughout Wisconsin. They also participate in simulations focused on recognizing hemodynamic or respiratory instability and making initial decisions and interventions to stabilize a patient. We also offer elective rotations to our medical students and students from other institutions (www.med.wisc.edu/education/md-program/visiting-students). Additional elective rotations are available in critical care ("The Shock Course"), pain management and research.

ANESTHETIST EDUCATION

Clinical anesthetists are a critical part of the patient care team at UW Health. Each year up to 48 anesthesia assistant students from around the country rotate with our department. We also have a partnership with the Medical College of Wisconsin for two students per class which allows them to do their entire clinical training at the UW School of Medicine and Public Health. We also offer additional rotational opportunities for up to three additional students each month.

We are in the process of initializing a new program that will provide a general rotation to senior-student registered nurse anesthetists (SRNAs) to expand their anesthesia experiences with a variety of cases and help encourage autonomy. The program's inaugural SRNA students will hail from the Mayo Clinic Health System–Franciscan Healthcare.



Other educational opportunities include simulation activities and continuing education for clinical anesthetists. The current design of our simulation program focuses on skill development, including central line placement, ultrasound-guided IVs and arterial lines, regional anesthesia, and scenario-based cases.

Above: A Clinical Anesthetist inserts a breathing tube under the guidance of a faculty member at University Hospital. Opposite Page: MOCA training at the UW Health Simulation Center.

EDUCATION PROGRAM HIGHLIGHTS

Research Opportunities: The Department of Anesthesiology accepts medical students in the UW School of Medicine and Public Health's Shapiro Summer Research Program. These students conduct eight to 10 weeks of mentored research in the summer between the first and second years to work on a hypothesis-driven project in basic science, clinical and translational research, health services, population/public health or global health.

Anesthesiology residents have dedicated research time to work with faculty on existing research projects or on a project of their own design.

Global Health: Led by Dr. Deborah Rusy, residents can participate in global anesthesia efforts (including clinical service, education and training and research) to support patients and providers in low- and middle-income countries.

Simulation: Residents participate in simulation activities throughout their training. First-year simulations focus on procedural skills such as central line placement and advanced airway management. Clinical anesthesia sessions offer active training for crisis scenarios and rare anesthesia-related events and provide practice in difficult patient scenarios.

Faculty Development: Faculty and residents participate in our yearly series of in-person and virtual interactive workshops to improve their teaching skills. Recent topics include giving effective feedback and successfully mentoring learners.

Teaching Opportunities: Residents and fellows have the opportunity to teach in many settings including leading medical student small-group sessions, teaching procedural skills in the UW Health Clinical Simulation Program and teaching students and junior residents in the operating room



Continuing Education for Faculty: Continuing education for faculty, residents and anesthesiologists: MOCA, Arndt Airway, GE course: Among other continuing education opportunities, our course, Simulation in Anesthesia for the Practicing Anesthesiologist, fulfills the simulation education requirement for Maintenance of Certification in Anesthesiology (MOCA)[®] Part IV (Practice Performance Assessment and Improvement).

Undergraduate Shadowing Program: We support UW School of Medicine and Public Health's pre-health advising program that connects undergraduate students from underrepresented populations with mentors in the health care professions. For more information visit: prehealth.wisc.edu/health-professions-shadowing-program.

RESIDENCY PROGRAM

We take pride in being the first academic department of anesthesiology, founded in 1927 by Dr. Ralph Waters. Our state's motto is Forward and, in that spirit, we continue to provide our residents with an environment that promotes outstanding patient care, prioritizes education, supports collegiality and advances the scientific foundation of our discipline. We have designed our residency program to train superior anesthesiologists, ready to practice confidently and competently in any setting and prepared to serve as leaders in their practice group and specialty. Our residency program is ACGME-approved for 16 categorical positions per class. Typically, we offer categorical, advanced and reserve (physician only) positions each year through the National Resident Matching Program (NRMP) Main Residency Match. For more information visit: <https://anesthesia.wisc.edu/education-training/residencies>



Resident camaraderie that is second-to-none.



THE UW DIFFERENCE

- **Diversity in residency:** Our 63 residents hail from 32 medical schools spanning 20 states and three countries.
- **Outstanding clinical training by subspecialty-trained faculty committed to resident teaching:** In 2019–20, ACGME resident case log numbers ranged from the 52nd to the 92nd percentile nationally.
- **Early exposure to anesthesia subspecialty cases.**
- **State-of-the-art simulation center with a detailed core curriculum.**
- **Teaching opportunities:** Residents and fellows have the opportunity to teach in many settings.
- **Diverse research opportunities available within and outside the Department of Anesthesiology.**
- **Global health opportunities:** Residents can participate in global anesthesia efforts to support patients and providers in low- and middle-income countries.
- **Wellness Committee with resident leadership.**
- **100% board certification rate in the last 10 years.**
- **Structured resident mentorship program:** Residents connected with faculty mentors committed to their development and success.



FELLOWSHIP PROGRAMS

We offer one-year ACGME-accredited fellowships led by top-notch faculty in adult cardiothoracic, critical care and pediatric anesthesiology. We also support the accredited pain management fellowship housed in the Department of Orthopedics and Rehabilitation. Each program accepts up to two fellows per year. Our non-accredited fellowships include regional and acute pain management, transplant anesthesia, ambulatory and administrative medicine, neuroanesthesia and research. For more information visit: <https://anesthesia.wisc.edu/education-training/fellowships>

ACGME-ACCREDITED FELLOWSHIPS

- **Adult cardiothoracic anesthesiology:** 2 positions
- **Critical care anesthesiology:** 2 positions
- **Dual adult cardiothoracic and critical care anesthesiology:** 1 position
- **Pediatric anesthesiology:** 2 positions
- **Pain medicine** (in collaboration with the Department of Orthopedics and Rehabilitation): 2 positions

NON-ACCREDITED FELLOWSHIPS

(50 percent faculty appointment in the department)

- **Regional and acute pain management:** up to 4 positions
- **Neurosurgical anesthesiology:** 1 position
- **Transplant anesthesia:** 1 position
- **Ambulatory and administrative medicine anesthesiology:** up to 2 positions

RESEARCH

Department of Anesthesiology faculty in all academic tracks, residents and fellows take part in our basic, translational and clinical research programs. We also are committed to developing the next generation of exceptional anesthesia researchers and offer projects for trainees in basic, clinical and outcomes research.

In 2020–2021, the Department of Anesthesiology brought in more than \$4.5 million in external research funds from federal agencies, foundations, pharmaceutical and biotechnology companies and collaborating universities.

Our basic research endeavors in consciousness, memory, neuromodulation, respiratory compromise and anesthetic neurotoxicity are supported by the National Institutes of Health, private endowments and other external sources. Current projects focus on elucidating the mechanisms for unconsciousness, understanding the nature of consciousness and factors contributing to cognitive dysfunction, developing a clinically useful respiratory monitoring device, understanding how general anesthetics alter central nervous system function and identifying genetic determinants of anesthetic neurotoxicity.

The department's robust clinical research portfolio includes a variety of industry-sponsored clinical trials and investigator-initiated studies that span a spectrum from perioperative care to chronic pain to investigational drugs and devices. Our clinical researchers seek clinical strategies to reduce pain, evaluate techniques and therapies, improve patients' recovery and optimize outcomes.

To enhance and grow the department's research enterprise our research office supports researchers at all levels. The office's services include pre- and post-award grants management, clinical research coordination, protocol and survey development, biostatistics and regulatory compliance.



RESEARCH HIGHLIGHTS

Dedicated to cultivating the next generation of world-class physician scientists, the Department of Anesthesiology provides comprehensive support to junior faculty establishing their research careers.

Dr. Aaron Hess main research interests focus on transfusion biomolecular chemistry. One of Dr. Hess's most promising research projects involves the study of platelet mito-epigenetics and how it may play a role in improving transfusion therapies.

Seeking novel treatments for chronic pain, **Dr. Richard Lennertz** aims to understand the transition from acute to chronic pain by studying inhibitory neurons in the brain. He takes particular interest in the analgesic potential of subtype-selective GABA modulators.

At the Forefront of the Fight Against COVID-19



Research in the Hartman Laboratory focuses on clinical trials of novel therapies to fight worldwide pandemic viruses. We specialize in rapid implementation of medical therapeutics in conjunction with national programs and pharmaceutical companies. Our analysis allows therapeutics to reach patients in an expeditious manner that is also consistent, safe and scientifically sound. Present trials include:

UW Adult COVID-19

Convalescent Plasma Program: In conjunction with the National Consortium for COVID-19 Convalescent Plasma and the Mayo Clinic Emergency Access Protocol, and in partnership with local and national representatives of the American Red Cross, we are developing a program to: identify donors; transport and store convalescent plasma; and effectively identify and treat COVID-19 patients.

UW Pediatric COVID-19

Convalescent Plasma Program: Using our UW Pediatric Compassionate Use COVID-19 Convalescent Plasma Protocol, we are evaluating the effectiveness of convalescent plasma in children infected with SARS-CoV-2 who have been hospitalized for the virus. Using the FDA Emergency Investigational New Drug (EIND) application we are able to evaluate, treat and follow up with patients as young as one-month-old.

UW-Regeneron Reg-CoV-2 Antispikes Monoclonal Antibody Cocktail:

In partnership with Regeneron Pharmaceuticals, and with funding provided by Operation Warp Speed (OWS), we are evaluating the safety and effectiveness of a combination of two non-competing monoclonal antibodies to the spike protein on SARS-CoV-2. Three separate double-blind, randomized, placebo-controlled studies allow us to evaluate the effect of this cocktail on hospitalized patients, outpatient individuals and household contacts of patients with COVID-19.

If effective, the antibody cocktail will prevent attachment of the virus and entry into cells.

UW-Astra Zeneca COVID-19

Vaccine Trial: In partnership with the bio-pharmaceutical company Astra Zeneca and Oxford University, we are testing the safety and efficacy of AZ1222, an OWS-sponsored COVID-19 vaccine as part of a worldwide phase III clinical trial. A total of 30,000 patients will be evaluated in a double-blind, randomized, placebo-controlled study. Results and outcomes will be evaluated in real-time in order to rapidly assess the safety and effectiveness of this method of conferring active immunity.

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Exploring Mechanisms of Consciousness



Research in the Banks Laboratory focuses on changes in the brain when people lose and regain consciousness.

We seek to answer fundamental questions about how neocortical circuits are organized, how information processing occurs under normal conditions and how it is disrupted under anesthesia, in sleep and in disorders of consciousness such as delirium. We do this by applying state-of-the-art electrophysiological, pharmaco- and opto-genetic techniques to rodent neocortex, and using state-of-the-art techniques to analyze data collected from human neurosurgical patients.

This research has broad implications for understanding the neural basis of consciousness and the relationship between cortical network activity and cognition and perception. It also is foundational for developing both noninvasive monitors for evaluating awareness in clinical settings and more targeted agents to modulate awareness.

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Caitlin Murphy
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Driving Collaboration between Industry & Respiratory Care



The Bilen-Rosas Laboratory explores non-invasive methods of quantifying airflow using ultrasound signaling. Our mission and passion is to prevent catastrophic outcomes by developing a clinically useful respiratory monitoring device.

Monitoring respiratory parameters and recognizing abnormal values is vital for the safety of patients under sedation. When respiratory compromise is not detected in time, a lack of oxygenation to the brain and heart leads to grave consequences including permanent neurologic and cardiac damage or even death. Advanced detection can save lives and reduce costs.

Our lab is developing a patented methodology that uses ultrasound signaling at the air-tissue interface to quantify and correlate airflow and flow parameter changes in the expiratory and inspiratory phases of respiration. With machine learning methods, this technology estimates real-time, continuous and quantitative feedback of respiratory parameters including airflow

velocities, respiratory rate, tidal volume, phases of breathing and apnea/obstructive events.

The overall objective of our research is to develop a miniaturized, wearable respiratory monitor that uses ultrasound signaling to continuously and quantitatively monitor respiration.

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LAB MEMBERS:

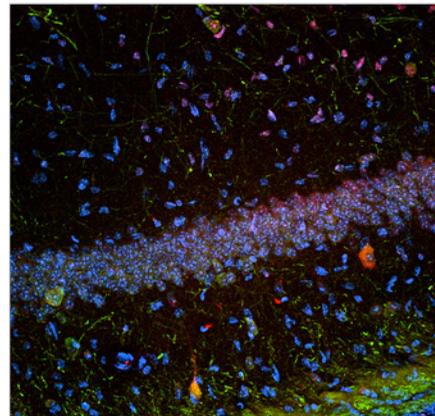
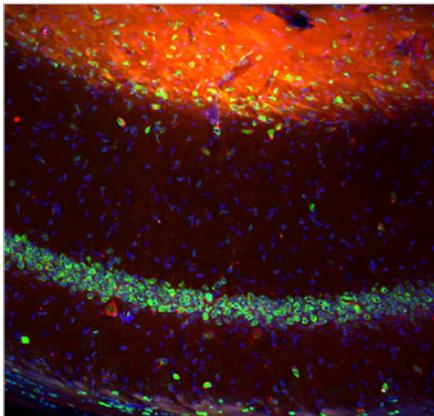
John Ma

Associate Research Specialist

Lin Qi

Research Specialist

Elucidating the Mechanisms of Memory Suppression During General Anesthesia



With a focus on the general anesthetic suppression of memory, research in the Pearce Laboratory seeks to understand how anesthetics and other drugs that target GABA and NMDA receptors control memory formation.

Memory suppression is one of the fundamental components of general anesthesia. Using a variety of methods, including electrophysiology, optical recordings and behavioral measures of learning and memory, we are investigating how inhibitory circuits in the hippocampus support and control neural network activity.

We are particularly interested in determining how different classes of interneurons regulate synaptic plasticity, how they generate or control complex circuit characteristics such as theta and gamma oscillations and how they control the formation of “place cells” in the hippocampus as a surrogate for contextual memory formation. In addition to improving our understanding of how general

anesthetics produce their effects, this work will also help explain the neural basis of memory and how it is impaired by disease.

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Cracking the Code of Genetic Determinants of Volatile Anesthetic-Induced Collateral Effects in the Nervous System

The Perouansky Laboratory, in close collaboration with Dr. David Wassarman's laboratory in the UW School of Medicine and Public Health's Department of Medical Genetics, studies the pharmacogenetics of volatile general anesthetic (VGA)-induced "collateral effects." These effects include sedation, amnesia, hypnosis and immobility, and extend beyond the spectrum of clinical anesthesia.

We use fruit flies (*Drosophila melanogaster*) as a model to investigate collateral effects in two clinically relevant contexts: traumatic brain injury (TBI) and

mitochondrial genetic disease.

The fruit fly is experimentally flexible and offers access to an unsurpassed genetic toolbox. By combining pharmacologic, genetic and molecular techniques we aim to advance genome-informed perioperative precision medicine which, for example, will allow providers to make drug and dosage choices informed by each patient's genomic data.

In our TBI model, we investigate the interaction of VGAs with the pathophysiology of secondary brain injuries (that is, injuries that

follow the primary mechanical trauma to the skull). Our findings indicate that the brain harbors potent mechanisms that mitigate deleterious consequences of brain injury and that these mechanisms are recruited by VGAs. Our fly TBI model allows us to dissect the molecular pathways that protect the brain from secondary injury.

We are also investigating the role of mitochondrial VGA targets, with particular focus on the deleterious effects of Complex 1 mutations in patients exposed to volatile general anesthetics.

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LAB MEMBERS:

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Dena Johnson-Schlitz

Amanda S. Sharenbrock, BS



CLINICAL ANESTHETISTS

Clinical anesthetists are integral to the Department of Anesthesiology and valued members of our anesthesia care team, comprised of faculty anesthesiologists, certified anesthesiologist assistants and certified registered nurse anesthetists. Clinical anesthetists care for patients in multiple clinical subspecialties including orthopedics, otolaryngology, vascular, pediatrics, urology, neurosurgery, plastics, peripheral vascular, thoracic, trauma, transplant, and cardiac. They also work across multiple UW Health facilities including University Hospital, The American Center, Digestive Health Center and Madison Surgery Center.



Our group of clinical anesthetists is still growing to meet UW Health's expanding patient care needs. Clinical anesthetists enjoy competitive salary, comprehensive benefits, excellent clinical case variety, a wide range of educational opportunities and flexible scheduling.



SUSTAINABILITY INITIATIVES

A healthy planet leads to healthy people. That's why the missions of both UW Health and the Department of Anesthesiology include a commitment to advancing health through social responsibility. In the past decade, our department has enhanced the social, environmental and economic sustainability of our practice through waste reduction and education about climate-smart anesthesia practice.

In 2012 we began education initiatives with Grand Rounds lectures, new employee orientation, signage and a resident sustainability educator. Over time we have seen steady reduction in our anesthetic gas wastage with a savings of more than \$30,000 per month. We have also achieved a 73 percent reduction in our carbon dioxide emissions compared with 2011 – the equivalent of eliminating the emissions of more than 2400 cars per year (comparing baseline 2011 with 2018).

We have also reduced our landfill waste stream by 23 percent, diverting more than 9,000 cubic yards from landfill in one year. To reduce upstream waste reduction we favor reusable supplies wherever possible and educate providers to avoid wasteful set up with excessive supply opening.

In just two years UW Health and the Department of Anesthesiology have collected and recycled 352 pounds of medication vial caps with an approximate volume of 20 cubic feet (about a freezer chest full). These caps get a second life as stacking bins, stools and even toys. We also collect and sort caps for art projects.

To learn more about our sustainability initiatives visit:

www.anesthesia.wisc.edu/green



GLOBAL PROGRAMS



Members of the UW School of Medicine and Public Health Department of Anesthesiology have had a long-standing interest in caring for the underserved, both at home and abroad. The department has sponsored numerous service and visiting educator trips, many coordinated with UW School of Medicine and Public Health surgical colleagues, to locations throughout the world. These trips have often included junior faculty, residents, students and staff. Historically, these endeavors were individually initiated and the funding for this important work was ad hoc.

With more than 25 years committed to addressing the Global Anesthesia Crisis, Dr. Kelly McQueen brings a new focus within the Department of Anesthesiology. A new global fund has been established to support education and training, service and research overseas.

Dr. Deborah Rusy has been chosen to serve as the inaugural director of the department's newly created Global Programs.

The Department Anesthesiology's new, sustainable commitment to serving those in need in low- and middle-income countries will be made in partnership with the UW School of Medicine and Public Health Department of Surgery and other educational partners.



DIVERSITY, EQUITY AND INCLUSION

The Department of Anesthesiology is committed to Diversity, Equity and Inclusivity (DEI), and aligns with both UW School of Medicine and Public Health and UW Health DEI commitments and activities. Our commitment to DEI is manifested by our desire to ensure a departmental culture that is supportive and respects every member, and a climate that fosters belonging and ensures equity and transparency.

In 2021, the Department of Anesthesiology established a Diversity, Equity and Inclusion Committee whose open membership policy ensures representation from faculty, fellows, residents, clinical anesthesiologists and administrative staff. Among the committee's first tasks are to seek expert guidance, provide evidence-based information on the science of DEI, and thoughtfully consider related programming.



WELLNESS

The Department of Anesthesiology is committed to promoting the health and wellness of all of its members including faculty, clinical anesthesiologists, residents, advanced practice providers, fellows, administrators, and staff. The goal is to establish a strong wellbeing and work-life balance for all members of the Department of Anesthesiology. As part of an ongoing effort, the Wellness Committee has started a few initiatives including its own Peer Support Program.

Peer Support is a confidential, legally protected connection to a clinical peer for support after experiencing difficult and stressful work events.

The Department of Anesthesiology's Peer Support Program works in conjunction with the hospital-wide Peer Support Program.

EXPERIENCE MADISON



From [Visit Madison](http://www.visitmadison.com): Madison's a good eats kind of a city. A get on your feet kind of city. A city where history and future meet. We've got a small-town feel. And big-city amenities. Lake life, campus cool, and endless things to do. Discover more of Madison! www.visitmadison.com

BY THE NUMBERS

- **568,593** people live in the greater Madison metropolis
- **45,317** students enrolled at UW-Madison
- **81st** largest city in the U.S.
- **2nd** largest city in Wisconsin
- **77 miles:** between Madison and Milwaukee
- **122 miles:** between Madison and Chicago
- **5:** lakes: Mendota, Monona, Wingra, Waubesa, Kegonsa
- **12:** public beaches
- **15:** off-leash dog parks in Greater Madison
- **Under 20 minutes:** the average commute time for Madisonians
- **14:** communities that makeup Greater Madison – (Cottage Grove, Cross Plains, DeForest, Fitchburg, Maple Bluff, McFarland, Middleton, Monona, Oregon, Shorewood Hills, Stoughton, Sun Prairie, Verona and Waunakee)
- **Under 30:** The age of more than half of Madison's population





Department of Anesthesiology

UNIVERSITY OF WISCONSIN
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