Beth Israel Deaconess Medical Center

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Department of Anesthesia, Critical Care and Pain Medicine

2022–2024 Report

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Executive Vice Chair, Emeritus
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Chair, Committee on Clinical Investigation

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Editor's Note

This biennial report of the Department of Anesthesia, Critical Care and Pain Medicine highlights the extraordinary work and achievements of our department members for the academic years 2022—2024.

Our department is a united community dedicated to a vision of excellent clinical care, ground-breaking research, and innovative medical education, where all are welcome.

I hope you find the report interesting and informative. —Alan

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Welcome

Welcome to the Department of Anesthesia, Critical Care and Pain Medicine at Harvard Medical Faculty Physicians and Beth Israel Deaconess Medical Center. This report documents some of the department's many impressive accomplishments over the last two years. These accomplishments underscore the remarkable work of our team. Together, we have provided skilled and compassionate clinical care, inspiring education, and innovative research. Our department members have led the management and continuous improvement of high-quality, effective patient-centered care. As chair and a longtime member of the department, I offer my personal appreciation and admiration for the expertise, collegiality and dedication of our impressive team of physicians, nurses and support staff whose work is reflected in this report.

Our department provides coverage for much of the Beth Israel Lahey Health (BILH) network. In addition to our work at the academic Beth Israel Deaconess Medical Center (BIDMC), we provide services at BID–Milton; BID–Needham; BID–Plymouth; Mount Auburn Hospital; New England Baptist Hospital and Anna Jaques Hospital. Across all of these locations our department has significant strengths. First and foremost, our faculty is clinically excellent. We provide cutting-edge clinical care supporting the most complex surgical services. We are among the hardest-working physicians in the network. We take huge pride in our individual achievements, our work as a department and the medical centers at which we work. This intense loyalty and dedication among our staff produce excellent results. The clinical outcomes of our cases are second to none across all three areas of service: operative anesthesia, critical care medicine and pain medicine.

Mission, Vision, and Values

Our Department of Anesthesia, Critical Care and Pain Medicine at Beth Israel Deaconess Medical Center has a progressive, forward-thinking mission; strong, unified values; and a clear vision backed by our five-year Strategic Plan.

Our **MISSION** as a leading academic department is to:

- **Improve** the quality of our patients' lives by providing compassionate, equitable, state-of-the-art care
- **Educate** and develop future talent in anesthesia, critical care and pain medicine
- **Advance** the field of medicine by generating and sharing new knowledge
- **Actively support** the unique personal and professional goals of our people
- **Strive** for a diverse department that serves vulnerable populations
- **Promote** improvement, innovation, and integration in a resource-responsible manner.

Our **VALUES** are kept at the forefront and guide us every day:

- **Patients First:** We are responsible for ensuring a superb patient experience, including high-quality, safe, and equitable care.
- **Trust and Respect:** We embrace the values of diversity, inclusion and respect among the entire care team and for all those under our care.
- **Innovation:** We seek opportunities to create new value through collaboration, implementation and breakthrough ideas.
- **Excellence:** We strive for excellence in all that we do.

Our **VISION** inspires us to be the best: We aim to be the preeminent Anesthesia Department in the United States by 2026.

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The Department of Anesthesia, Critical Care and Pain Medicine at BIDMC is a leader in providing compassionate, equitable, and state-of-the-art care to its patients at BIDMC and at six community hospitals across the BILH network. As you will see in the following pages, the department continues to innovate and advance the field of anesthesia, critical care and pain medicine through its commitment to excellence

Our Community Hospitals

We provide anesthesia, critical care and pain medicine services and oversee day-to-day operations of the ORs at seven locations including our BIDMC Boston main campus, BID-Milton, BID-Needham, BID-Plymouth, Anna Jaques Hospital in Newburyport, Mount Auburn Hospital in Cambridge, and New England Baptist Hospital in Boston.

Code of Conduct

Our code of conduct is the moral compass that guides our actions. We embrace these values and ask that all our members strive to model this behavior every day, every time.

W	E	L	C	O	M	E
Workplace	**Equity**	**Listening**	**Communication**	**Opportunities**	**Mindful**	**Educate**
Create a collegial and safe workplace	Equitable and fair treatment for all	Listen respectfully	Communicate frequently in a transparent, courteous and caring manner	Create and pursue opportunities for growth and development	Be mindful, observe your-self and treat others the way they want to be treated	Empower others and model welcoming behavior

Our History

The anesthesia services at two original Boston hospitals, Beth Israel Hospital (BIH) and New England Deaconess Hospital (NEDH) evolved into the Department of Anesthesia, Critical Care and Pain Medicine at Beth Israel Deaconess Medical Center. Our impressive 86-year history tells a story of clinical and academic excellence, with deep roots in social responsibility and patient care.

In 1896, the New England Deaconess Hospital (NEDH) was established by the New England Conference of Methodists, opening 14 patient beds in a residential brownstone on Massachusetts Avenue. From its founding, NEDH maintained a reputation as an outstanding tertiary-care hospital, developing many of the techniques used in cardiac, vascular, and transplant surgery. In 1907, NEDH built a 50-bed hospital and relocated to the Longwood area of Boston near Harvard Medical School.

In 1916, Beth Israel Hospital (BIH) opened on Townsend Street, Roxbury, with 45 patient beds. A Jewish-sponsored hospital, BIH was founded to care for the medical needs of Boston's immigrant Jewish community and to provide residency training opportunities for the area's Jewish doctors. The hospital

developed a strong reputation for social responsibility, care of the poor, and academic excellence.

In 1923 Frank H. Lahey, MD, a member of the NEDH surgical staff since 1914, founded the Lahey Clinic, a pioneering multispecialty group medical practice. Dr. Lahey was the NEDH surgeon-in-chief for many years.

In 1928, BIH dedicated its new facility at 330 Brookline Avenue (our East Campus). At this time, BIH and Harvard Medical School formed a teaching and research partnership, with Hermann L. Blumgart, MD, as director of Medical Research and head of the Harvard Teaching Service. The Beth Israel Hospital earned a place as one of the premier hospitals in the Harvard system.

In 1937, Samuel Gilman, MD, founded the anesthesia services and became head of anesthesiology at BIH. He trained many prominent anesthesiologists, including Leroy Vandam. He remained chair of anesthesiology until 1967.

In 1967, John Hedley-Whyte, MD, one of the fathers of critical care, was recruited from Massachusetts General Hospital by the new chief of surgery, William Silen, MD, to found a new independent academic department of anesthesia. Joining Dr. Hedley-Whyte from MGH was Leonard Bushnell, MD, to head the ICU at BIH. The department's key role in critical care at Beth Israel Hospital and now at BIDMC has continued over the decades. Dr. Hedley-Whyte was the chair from 1967 to 1987.

Throughout the years, prominent anesthesiologists have led the department who have made significant contributions to the field. In 1985, Ellison "Jeep" Pierce, MD, chair of anesthesiology at NEDH, founded the Anesthesia Patient Safety Foundation and, in 1982, served as president of the American Society of Anesthesiologists. His work resulted in a decrease in mortality from general anesthesia from 1/10,000 in the 1980s to the current rate of 1/250,000.

Edward Lowenstein, MD, considered one of the fathers of cardiac anesthesia, was chair from 1990 to 1997. His seminal paper in the New England Journal of Medicine, "Cardiovascular responses to large doses of morphine," was the basis for the use of high-dose opioid anesthetics in cardiac surgery.

In 1996, BIH and NEDH merged to form Beth Israel Deaconess Medical Center (BIDMC). The traditions of the two hospitals would become the foundation for a medical center with outstanding surgery, attention to patient safety, academic excellence, and a continued sense of social responsibility.

From 1997 until 2008, there were several chairs including Leonard Bushnell, MD (1997 to 2000, also acting chair from 1978 to 1979, 1984 to 1985, and 1987 to 1989), Carol Warfield, MD (2000 to 2006, a pioneer of the field of pain management) and Alan Lisbon, MD (acting chair from 2006 to 2009).

From 2009 until 2014, Brett Simon, MD, PhD served as chair and began the expansion of the anesthesia and ICU network with the addition of BID–Needham (Glover Hospital) and the ICU at BID–Plymouth (Jordan Hospital).

In 2014, Daniel Talmor, MD, MPH, became chair and has continued the expansion of the network to include Milton Hospital, New England Baptist Hospital, and Mount Auburn Hospital. In addition, over the past seven years, Dr. Talmor has greatly expanded the department's research efforts. He also expanded residency and fellowship programs, ensuring that the next generation of anesthesiologists receive the highest-quality training.

Today, the Department of Anesthesia, Critical Care and Pain Medicine at BIDMC is a leader in providing compassionate, equitable, and state-of-the-art care to its patients at BIDMC and at six community hospitals across the BILH network. The department continues to innovate and advance the field of anesthesia, critical care and pain medicine through its commitment to excellence.

Looking ahead

The next several years offer significant opportunities for growth and enhancement of our programs and further integration of a culture of excellence across our entire network. While recent years have focused on expansion of our clinical network, we are now working to embed evidenced-based guidelines and clinical innovations across all our practice sites. In this effort we are assisted by the expertise of our Quality, Safety and Innovation Division and their synergy with our Clinical Division, which provides us with the ability to identify the best practices and educate our clinicians on quality and safety issues.

Our education programs have similarly expanded over recent years, as has our capacity to develop and test new interactive learning environments. We benefit from an in-house medical education research center—the Center for Education Research, Technology and Innovation—that can continuously inform and evaluate our educational enhancements. In addition, our national status gives us an opportunity to develop collaborative efforts with other educational leaders for implementation of new technologies and interactive learning environments across a national education network.

The growth of our Research Division, in terms of both size and funding, and the stature and success of our senior investigators, present opportunities for major collaborations with other researchers for large, multi-center clinical trials. We have already seen this trend in recent years, and our researchers continue to receive funding for large-scale studies with prominent investigators across the country that are transforming and improving outcomes in anesthesia and critical care practice. In addition, the breadth and depth of our research allow us to attract and mentor junior faculty investigators as well as trainees interested in becoming clinician/researchers.

Our Professional Affairs Division is creating and operationalizing a vision for improving career satisfaction and wellness among all our staff. They are currently creating a comprehensive program that focuses on promoting diversity, equity, and inclusion and addresses the serious issues of burnout, resilience and sustainability. We plan to further solicit and utilize feedback from staff and faculty to promote these efforts that have shown promising results already. Our philosophy is that we value all our staff, and their professional growth and satisfaction bolsters our ability to excel in all our endeavors.

—Danny

Daniel S. Talmor, MD, MPH

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HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

2024

New BIDMC Klarman Building combines state-of-the-art procedure and patient space with enhanced healing features and environmental sustainability

In April, 2023, BIDMC opened the new Klarman Building, its first new building in 27 years. The 10-story inpatient building includes leading edge critical care and surgical sites, 158 single bed family friendly rooms and inviting spaces conducive to innovation and healing. It also includes a new medical helicopter landing pad, a peaceful rooftop garden and meeting spaces for collaboration and learning. Imaging and procedural sites house state-of-the-art technology that allow care teams to provide sophisticated diagnostics and extraordinary care.

In addition to the space's perfect design for clinical care and recovery, the Klarman Building achieves leadership in Energy and Environmental Design (LEED) Gold Status, a globally recognized symbol of sustainability. With an inventive rainwater reuse system, purposeful use of natural light and other environmental-friendly features. The building is constructed to lower greenhouse gas emissions by reducing the use of energy and water.

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Overview and Organization

The Clinical Anesthesia Division in the Department of Anesthesia, Critical Care and Pain Medicine provides anesthesia services for all operating rooms, the labor and delivery suite, and non–operating room procedural areas at Beth Israel Deaconess Medical Center (BIDMC) and the community sites.

At Beth Israel Deaconess Medical Center (BIDMC), the department staffs 56 operating rooms (ORs) between Boston's East and West Campuses including catheterization lab rooms; Feldberg and Shapiro Ambulatory Suite; labor and delivery ORs; remote non-OR procedural areas include gastrointestinal (GI) endoscopy suites, electro-physiology (EP) suites, angiography suites, an endovascular procedure suite, as well as CT, MRI, and ECT suites. Clinical anesthesia divisions include cardiac, vascular, thoracic, orthopedic, neurosurgical, transplant, ambulatory, regional, GI, office-based, pre-admission testing and obstetrics.

The Klarman Building, BIDMC's new in-patient medical tower on the West Campus, opened in April 2023 and is connected to our current OR space, doubling the square footage of the OR footprint on the West campus. There are seven new large ORs, four catheterization labs, an additional hybrid OR to add to our current three, and plenty of existing support space. Additionally, the recent buildout of New England Surgicare at One Brookline Place, was opened in 2022 and is co-directed and staffed by BIDMC anesthesia faculty. This outpatient facility serves patients undergoing gynecologic, ophthalmologic, orthopedic and gastroenterology procedures.

The department is expanding to support additional space and growing volume at our Boston campus and community hospitals. We have 130 attendings, 118 certified registered nurse anesthetists (CRNAs) and a house staff of 55 residents, 17 interns and 18 fellows.

Beth Israel Lahey Health (BILH) has recently expanded its cardiovascular services to include adult cardiac transplant surgery in our new in-patient building at BIDMC. While BILH is the leading provider of cardiovascular services in Eastern Massachusetts by market share, this is the first time the system is offering heart transplant services. Cardiac transplantation at BIDMC will enhance resident and fellow recruitment and education efforts, since many potential trainees are interested in cardiovascular anesthesia and critical care. The first cardiac transplant surgery was successfully done on August 13, 2023, and we have done 31 procedures in the first year.

The department's presence in the community more than doubled with the addition of anesthesia coverage in the fall of 2018 at BID–Plymouth and Anna Jaques Hospital in Newburyport, in addition to our long-standing coverage at BID–Needham and BID–Milton. Anna Jaques Hospital and BID–Plymouth both require in-house coverage for OB anesthesia, and both provide pediatric care. The department also covers the ICU and Pain Clinic at BID–Plymouth. New England Baptist Hospital and Mount Auburn Hospital were also integrated into our network.

CLINICAL ANESTHESIA DIVISIONS

Cardiac Anesthesia

The Division of Cardiac Anesthesia, directed by Dr. Feroze Mahmood, cares for patients undergoing a wide variety of cardiac surgical, electrophysiological and structural heart disease procedures. Our faculty members provide clinical services to a diverse group of challenging patients at the medical center and across the network. Division members participate in a wide array of administrative responsibilities at the department and hospital level. The cardiac surgical program has consistently performed more than a thousand open cardiac surgeries, including coronary revascularization, complex valvular and aortic arch surgical cases. In collaboration with interventional cardiology, BIDMC is also one of the busiest "structural heart disease" centers in the country, with a case mix that includes percutaneous aortic valve replacement (TAVR), transcatheter mitral edge-to-edge repair (TEER), percutaneous atrial and ventricular septal defect closures, and valve-in-valve therapy. We also participate in multi-center trials of percutaneous valve replacement therapy for mitral and tricuspid valves.

Areas of Excellence

BIDMC participates in the Society of Thoracic Surgeons (STS) database and shares our quality assurance and outcomes data. Some key metrics are compliance with perioperative antibiotics, beta-adrenergic blocking drug administration, allogenic blood product use, length of stay, re-admission rates and 30-day mortality. We have consistently exceeded all national quality benchmarks established by the Centers for Medicare and Medicaid Services and are rated amongst the top medical centers in the country. Of note, our cardiac surgeons perform 150 to 200 mitral valve procedures annually, and BIDMC has established a reputation as a "mitral surgery center" with a broad and growing referral base. This expertise is now being extended to aortic, tricuspid valve repairs and hypertrophic cardiomyopathy surgery. This success and excellence would not be possible without the procedural guidance provided by intraoperative transesophageal echocardiography, a service exclusively provided by our division. Division members are also involved in providing procedural guidance for complex structural heart disease interventions.

Clinical Procedure Areas

Traditionally, a case was considered "cardiac" when it involved use of cardiopulmonary bypass or high risk of going to bypass, but developments in the field have significantly broadened our specialty. The division now handles many cases that were previously not considered exclusively cardiac, particularly with the evolution of percutaneous structural heart disease interventions, ventricular assist devices and complex electrophysiological procedures. Our expanding heart failure service and ventricular assist device (VAD) program also provide state-of-the art care and give staff and trainees exposure to the types of complex cases that require a deep understanding of the nuances of device operation and their perioperative management. Division members regularly lead and participate in multi-disciplinary conferences related to scheduling of structural heart and electrophysiological procedures and heart failure service. As a result, the scope of our clinical practice has significantly expanded. Our Structural Heart Disease Program is growing and thriving under the expert leadership of our interventional cardiology team. In the last fiscal year, we performed 224 transcutaneous aortic valve replacements; 80 edge-to-edge percutaneous mitral valve repairs; 20 percutaneous tricuspid valve repairs; and 50 cases of para-valvular leak closures, atrial appendage occlusion, atrial and ventricular septal defect closure and valve-in-valve therapies. These procedures are entirely driven and guided by three-dimensional transesophageal echocardiograms (3D TEE), exclusively provided by the members of our division. With the incorporation of the medical center into the Beth Israel Lahey Health network, the activities of the cardiac division have expanded, and we now participate in cardiac cases at the Mount Auburn Hospital and collaborate with the cardiac division at the Lahey Clinic.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	3,226	3,129	3,926	4,683	5,925

Nancy E. Oriol Chair in Obstetric Anaesthesia

Yunping Li, MD, MSc was named Inaugural Incumbent of the Harvard Medical Faculty Physicians at Beth Israel Deaconess Medical Center Nancy E. Oriol Chair in Obstetric Anaesthesia in April, 2024. Dr. Li is Director of Obstetric Anesthesia at BIDMC and Associate Professor of Anaesthesia at HMS. She has been a distinguished clinician, educator, innovator and investigator in the care, safety and optimization of the pregnant patient during her extraordinary career. In addition to honoring Dr. Oriol, the endowed chair will empower Dr. Li to advance her academic research and teaching pursuits.

This endowed chair was established by Harvard Medical Faculty Physician's Inc. to honor BIDMC's first Director of Obstetric Anesthesia, Nancy E. Oriol, MD. Dr. Oriol is a remarkably accomplished physician, teacher and humanitarian who is Associate Dean for Community Engagement in Medical Education at Harvard Medical School.

As a longstanding anesthesiologist at BIDMC, she developed the "Walking Epidural," an anesthetic technique that allows women to ambulate during labor. She also founded the Family Van in 1992, a mobile health clinic that travels in Boston's underserved neighborhoods to provide care and address healthcare disparities. The Family Van remains a trusted community resource that provides over 4,000 health and social service visits a year. In addition, Dr. Oriol invented two medical devices: the NEO-VAC Meconium Suction Catheter for newborn resuscitation, and a fetal data processing system and method for assessing fetal heart variability during labor to detect fetuses at risk for birth asphyxia. Dr. Oriol's pioneering spirit of creativity and innovation has also helped transform how we teach medicine. She co-founded HMS MEDscience, an innovative high school biology curriculum based on mannequin simulation that addresses the education achievement gap of local high schools and stimulates interest in careers in science and medicine.

Dr. Oriol has great admiration for Dr. Li and is thrilled to have her distinguished colleague as the first recipient of the chair named in her honor. Dr. Li, an obstetric anesthesiologist and Director of Obstetric Anesthesia at BIDMC, shares many of Dr. Oriol's skills and values. She joined BIDMC in 2000, and since that time has demonstrated an unwavering commitment to improving obstetric anesthesia here as well as in her native country of China. As Director of the "No Pain Labor & Delivery - Global Health Initiative" since 2011, she has traveled to China with colleagues each year to lead this highly effective teaching and development program that has increased safe, pain-free delivery of obstetric anesthetics for women in China and decreased unnecessary caesarian births there. She is a co-author, along with her OB team, of "Obstetric Anesthesia: Quick References and Practice Guides," published by McGraw Hill in 2023. This succinct, evidence-based book delivers all the information needed to provide safe, effective anesthesia care to pregnant woman in subacute and emergency situations.

On personal level, Dr. Li is known as a generous colleague and leader and a much-loved mentor to BIDMCs anesthesia residents and obstetric fellows. Many of her mentees have been inspired to specialize in obstetric anesthesia and have faculty positions at BIDMC and other top institutions.

New Programs

- Cardiac transplant: BIDMC has launched a cardiac transplant program. Thirty-one transplants have been done in the first year.
- Hypertrophic obstructive cardiomyopathy (HOCM) surgery: Over the past year, we have established a HOCM surgery center, and our medical center is now an official referral center for HOCM surgery. Today, BIDMC surgeons routinely perform septal myomectomies for HOCM patients.
- Percutaneous valve therapy: BIDMC is also part of multiple clinical trials that relate to percutaneous valve therapies for tricuspid and mitral valves.

Obstetric Anesthesia

BIDMC is the second-largest delivery unit in Massachusetts and a tertiary referral center caring for these patients. The Division of Obstetric Anesthesia is an integral part of the medical center obstetric team and includes 13 full- and part-time specialized obstetric anesthesiologists. Our physicians are nationally recognized leaders in clinical care, cutting-edge research and innovation. We provide personalized world-class anesthesia care to both healthy pregnant women and high-risk obstetric patients, including the provision of consultative service for pregnant patients who have complex medical conditions, safe and effective labor analgesia, anesthesia for operative deliveries and assistance with multidisciplinary management of critically ill patients in the postpartum period.

About 90% of the women who delivered at BIDMC received neuraxial labor analgesia. Approximately 30–34% of women delivered by cesarean, and our overall general anesthesia rate remains around 1–2.4%, significantly below the national bench marker of 5%. General anesthesia usually is utilized for emergent cesarean delivery or massive obstetric hemorrhage.

Areas of Excellence

Our division's superb level of patient care has been awarded the Society for Obstetric Anesthesia and Perinatology (SOAP) Center of Excellence designation. Our center first received this honor in 2019, and we have been recertified in 2023. The New England Center for Placental Disorders at BIDMC is a unique and robust multidisciplinary program for treating placenta accreta spectrum (PAS) disorders. The center's successful and established program draws patients from around the region, country and world. Highly efficient, cooperative and coordinated teams are the cornerstones of the program's success, and our obstetric anesthesia services are a vital component of the center. We have developed guidelines for preparing and managing PAS cases. We all follow the same protocol to ensure consistent practice among the providers and trainees, efficient teamwork and optimization of workflow for the best outcomes.

Clinical Procedure Areas

Our division provides the entire range of obstetric anesthesia care necessary in a modern teaching hospital with high labor and delivery volume. Services include:

- Anesthesia consultation
- "Walking" labor epidural (low-concentration local anesthetics)
- Analgesia/anesthesia for operative vaginal delivery and cesarean delivery
- Anesthesia for non-obstetric surgery in pregnant women
- Anesthesia for fetal procedures
- Individualized care for high-risk pregnant women, including patients with cardiac, pulmonary and hematologic co-morbidities and opioid-use disorder
- Multidisciplinary and precise care for patients with placenta accreta spectrum
- Consultative and collaborative services for postpartum complications, such as massive hemorrhage, congestive heart failure or neurologic deficits
- Post-delivery visit to every patient

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	4,851	4,695	4,641	4,558	4,357

Education

The division provides a full spectrum of education to all levels of learners, including medical students from countries worldwide as part of the HMS clerkship, residency training in obstetric anesthesia, the ACGME obstetric anesthesia fellowship and ongoing staff education.

We have published a textbook titled Obstetric Anesthesia: Quick References and Practical Guides, McGraw-Hill Education, 2023). This text reflects our institutional traditions and achievements as well as significant contributions from our junior faculty. It provides standard instructions that can be integrated into everyday practice.

Multi-Specialty Anesthesia

The department launched a Division of Multi-Specialty Anesthesia in 2023. This division is the largest in the department and includes all anesthesia divisions except cardiac, OB, pain, and ICU. Akiva Leibowitz, MD is the director of this division, and its members care for patients undergoing vascular, neurosurgical, thoracic, orthopedic, gynecologic, general surgical and transplant surgeries. The goal is to provide a broad range of opportunities for the generalists in the department to do complex and challenging cases. Individual divisions of these specialties will continue to exist, and division directors will continue to be responsible for professional excellence in those areas.

Our educational efforts include development of a resident curriculum and approval for a fellowship in ambulatory anesthesia. The ambulatory anesthesia fellow will further invigorate research activities in the division. Along with our gastroenterology partners, the division is prolific in research and continues to lead with the publication of consensus statements for providing anesthesia for complex procedures like endoscopic retrograde cholangiopancreatography (ERCP).

Division Goals:

- To provide compassionate, extraordinary patient-centered care in a timely and cost-effective fashion
- Carry out cutting-edge clinical, translational and basic research
- Teach the science and art of our specialty
- Nurture the career development of our faculty

Gastrointestinal Anesthesia

The Gastrointestinal Anesthesia Division at BIDMC is one of the largest academic units in the United States by clinical volume, number and expertise of faculty and scope of research activities. BIDMC and affiliates have experienced a steady increase in endoscopy procedures, and our division has kept up with this growth and continued to provide expert and reliable anesthesia services for the Gastroenterology Department. The Gastrointestinal Anesthesia Division is proud to be associated with this world-class department as its sole provider of anesthesia services. The provision of state-of-the-art anesthesia services provides the foundation on which our anesthetics are tailor-made to provide the maximum patient safety and satisfaction as we offer optimal procedural conditions for endoscopists.

Areas of Excellence

The Gastrointestinal Anesthesia Division was unranked in 2018 by US News and World Report but has been steadily rising in the rankings to 49th in 2020, 40th in 2021, and 33rd in 2022 in the nation. Additionally in 2022, the Gastroenterology Department was ranked 25th in the World by the Newsweek global rankings. Our anesthesia clinicians have demonstrated the ways in which innovations like the endoscopy mask and high-flow nasal cannula can safely get patients through procedures without requiring intubation.

Key areas of clinical excellence include:

- Provision of monitored anesthesia care (MAC) for complex endoscopy cases
- Availability of round-the-clock anesthesia services for urgent endoscopy procedures, including lifesaving procedures like ERCP
- Provision of CRNA-based anesthesia services that allow efficient management of the endoscopy schedule
- Use innovations like high-flow nasal oxygen and endoscopy masks to get patients safely through complex endoscopy procedures
- Expanding services for amyotrophic lateral sclerosis (ALS) patients who need feeding tubes

The Department of Anesthesia, Critical Care and Pain Medicine is one of the nation's largest providers of anesthesia services for endoscopy procedures. Our anesthesia services for endoscopy at BIDMC currently exceed 100 to 110 cases daily.

In addition, our staff provides anesthesia in our three smaller community sites, where they average approximately 10,000 to 12,000 cases per year, adding another 30,000 cases to our department's gastrointestinal anesthesia volume. The department currently staffs five GI suites on the East Campus and two GI suites on the West Campus in the West Procedural Center.

The cases routinely performed include ERCP, small bowel enteroscopy, esophageal ultrasound, minimally invasive treatment of Barrett's esophagus and the gastric "POEM" (peroral endoscopic myotomy) procedure for gastroparesis.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	26,578	20,522	23,398	27,199	29,194

New Programs

- Program for anesthesia management for patients with ALS (in development)
- Anesthesia for the performance of POEM procedures

Education

Fellowship Program: The department was recently approved for an ambulatory anesthesia fellowship, and the selected candidate started in July 2023. The fellowship provides opportunities for training in anesthesia for endoscopic procedures. In addition, the fellow has opportunities to expand further research collaboration with the Division of Gastroenterology under the Department of Medicine. The Fellow is expected to also look at operational metrics, safety and satisfaction for the division as we push to make our anesthesia delivery more streamlined, and patient centered.

Neuroanesthesia

Anesthesiologists from the Division of Neuroanesthesia, led by Dr. Samir Kendale, provide comprehensive perioperative care for patients undergoing a wide array of complex intracranial, endovascular and spine procedures at BIDMC. The medical center performs approximately 2,500 intracranial and spine surgeries annually and has an international reputation for the surgical treatment of movement disorders, epilepsy, brain tumors and cerebral aneurysms. A multidisciplinary team of specialists is crucial to the overall success of this program.

Areas of Excellence

The Division of Neuroanesthesia delivers anesthesia services for the full range of spine surgery—from minimally invasive to complex functional neurosurgery, neuromodulation and epilepsy surgery, intracranial tumors (various types and locations, awake and asleep anesthetic approaches), and open and endovascular cerebrovascular procedures. The dramatic increase in intraoperative neurophysiologic monitoring has led our division to engage with the department in developing best practices for management, as these complex cases have unique anesthetic requirements.

Members from the division serve as attending faculty in our high-acuity Neurosciences Intensive Care Unit (NICU). As a tertiary-care regional referral center, the NICU treats patients with a wide variety of neurologic diseases.

Clinical Procedure Areas

The division maintains excellent care for the high volume of patients undergoing cerebrovascular procedures in the operating room and the interventional neuroradiology suite.

With the arrival of new neurosurgeons focusing on various types of brain tumors, we have also seen an increase in complex tumor surgeries, from gliomas to meningiomas. Skull base surgeries, such as transsphenoidal pituitary surgery and resections of acoustic neuromas, are commonly performed in conjunction with ENT surgeons and require an understanding of the impact of tumor location on physiology and attention paid to timely and smooth emergence.

Surgery for tumors in the speech areas is now frequently performed while a patient is awake, necessitating a unique anesthetic technique, careful positioning and constant open communication between the anesthesiologist, neuromonitoring teams and the patient.

We have increasingly incorporated EEG monitoring during many neurosurgical cases to limit anesthetic exposure, help with clear neuromonitoring signals, and provide safe emergence and extubation, allowing for rapid neurologic assessment. We have also held educational sessions for several divisions, including workshops on electroencephalography in the perioperative setting.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	2,552	2,192	2,289	2,170	1,059

New Programs

The division has developed several quality-improvement projects, with several more currently underway. We have formalized handoffs for craniotomies, enhanced the anesthesia team's view of the surgical field during open cerebrovascular surgery, developed care pathways for spine surgery and adult spine deformity surgery, and engaged in multidisciplinary programs for improving various perioperative workflows.

As part of the division's commitment to enhancing care and justifying changing medical practices, we regularly engage in a neuroanesthesia journal club. We are currently creating an educational program for PACU nurses on postoperative care of neurosurgical patients, with instruction on writing case-management tips for our anesthesiologist colleagues and assessing the pain management protocol for patients undergoing craniotomy to reduce overall opioid use and maintain stable postoperative neurologic examinations.

In addition, team members are involved in Beth Israel Lahey Health system committees for the establishment of the Neurosciences Service Lines, which includes workgroups for both neuro-oncology and epilepsy. We have also recently integrated the Neuroanesthesia Division into several of the institution's stroke care committees, giving the division the ability to interface with the various groups involved in the care of stroke patients, including nursing, emergency medicine, neurology, neurosurgery residents due mainly to the online resources available through a learning management system, hands-on and radiology. Division members are also heavily involved in the Society for Neuroscience in Anesthesia and Critical Care.

Education

The neuroanesthesia rotations remain popular among teaching provided by the faculty and the "longitudinal oral board exam" conducted individually with each resident on the rotation through an online message board. A testament to the rotation's success is the increasing number of residents interested in pursuing neuroanesthesia projects or a neuroanesthesia fellowship after graduating. Current and former residents have written podcasts for the Society for Neuroscience in Anesthesiology and Critical Care (SNACC) and Anesthesia Toolbox and have worked on the neuroanesthesia classroom project with the Trainee Engagement Committee at the SNACC.

Fellowship Programs: The Neuroanesthesia Fellowship is a one-year non-ACGM-accredited program that has existed since 2017. The fellowship provides advanced clinical training in anesthesia for both the surgical and endovascular management of complex intracranial disease and the surgical treatment of complex acute and chronic spine disorders. Graduates of this program have gone on to major academic positions at BIDMC, Dartmouth-Hitchcock Medical Center, Yale New Haven Hospital and the University of Florida Medical Center.

For anesthesiologists who have completed a fellowship in critical care medicine, the department offers an additional one-year fellowship in neurocritical care. This fellowship, accredited by the United Council for Neurologic Subspecialties, leads to board eligibility for the subspecialty of neurocritical care.

Orthopedic Anesthesia

The Orthopedic Anesthesia Division, led by division director Lisa Kunze, MD, PhD, became a separate division at BIDMC in 2012 and encompasses all non-spine orthopedic anesthesia. While all clinical anesthesia providers take care of orthopedic surgical patients, there is a group of 18 anesthesiologists who form the core group that comprises this division. These individuals have been key in developing and implementing the elective total-joint arthroplasty pathways and developing and supporting the perioperative analgesia pathways for orthopedic anesthesia.

Areas of Excellence

The Orthopedic Anesthesia Division was one of the first divisions to develop clinical pathways and has demonstrated their benefits for improving patient care. Elements of the pathways, such as the use of tranexamic acid to reduce bleeding and need for transfusions, have been adapted into other surgical populations. The application of the total joint arthroplasty pathway reduced patient length of stay, which was of critical importance during the COVID peaks. The reduction of length of stay made the transition to outpatient total joint replacement surgery possible. The pathways are updated annually to reflect updated knowledge and trends.

There have been improvements in our care of geriatric hip fracture patients over the past three years. In conjunction with the orthopedic trauma surgeons and the geriatricians, patients having geriatric hip fracture now benefit from more efficient, standardized perioperative care, which improves the patient experience and hopefully demonstrates economic benefits to the hospital. The needs of geriatric hip fracture patients can be particularly complex, so the addition of geriatricians to the care team was key to improving perioperative care. We now place more focus on long-term outcomes, reducing further fracture risk and decreasing delirium, issues common to this frail patient population.

Orthopedic procedures are among the most painful procedures. The physicians in the Orthopedic Anesthesia Division,

in conjunction with the Regional Anesthesia Division, have worked to optimize analgesia through use of nerve blocks, nerve catheters and utilization of multimodal analgesia. The division is developing research projects to further elucidate ways to reduce pain and opioid use.

The elective knee and hip arthroplasty patients are commonly the population of choice for various research projects, and members of the division have been very helpful and engaged in various research projects. The multiyear SAGES I and II projects required collection of spinal fluid and blood from patients during spinal placement, and division members expertly and efficiently assisted with these efforts. The ongoing virtual reality study by Dr. Brian O'Gara requires significant involvement from members of the division but could result in great benefits to patients.

Clinical Procedure Areas

While we launched a successful outpatient total joint arthroplasty program in 2019, presently, less than 10% of our knee and hip arthroplasty patients are discharged home on the day of surgery, but that is largely due to the medical complexity of most of our patients. However, very few patients have returned to the hospital after being discharged home.

Many patients who present for elective total knee or hip arthroplasty have severe cardiac, pulmonary and other comorbidities such as cirrhosis. We have successfully cared for many patients who have pulmonary hypertension. These medically complex patients having elective orthopedic procedures are managed with multidisciplinary discussions among the surgeons, anesthesiologists, nursing team, medicine specialists and sometimes members of the Division of Cardiac Anesthesia.

The use of spinal anesthesia for elective arthroplasty and hip fracture has provided terrific educational opportunities for anesthesia residents and SRNAs. This older patient population offers anatomic complexity and challenges. The physicians in the Division of Orthopedic Anesthesia have expertise to achieve successful spinal anesthesia in over 95% of cases where spinal anesthesia was planned.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Knee arthroplasty	477	333	341	250	345
Hip arthroplasty	375	375	272	143	272
Shoulder procedures	433	354	216	137	104
Foot and ankle procedures	208	160	156	152	161
Oncology	184	183	218	216	215
Hand	1,070	880	806	547	547
Total	2,747	2,285	2,009	1,445	1,644

New Programs

We instituted use of intraoperative tranexamic acid (TXA) and routine use of fascia iliaca blocks in hip fracture patients. Our Emergency Department colleagues have been performing this block for patients as well. The earlier the block is performed, the lower the morbidity risk for the patient. There was even one patient who had her hip ORIF conducted under fascia iliaca block and sedation.

The Orthopedic and Regional Anesthesia Divisions created a new order set to prevent use of anticoagulant and antiplatelet medications after neuraxial anesthesia. The goal is to reduce the risk of epidural hematoma after neuraxial anesthesia. This simple project will likely save lives and reduce morbidity in any patient who has neuraxial or regional anesthesia.

Education

The clinical education in orthopedic anesthesia is excellent because the attending physicians and CRNAs in the division are exceptional teachers and we offer a great diversity of case types to optimize learning. We are creating a formal curriculum for our orthopedic teaching to further develop our educational program.

Regional Anesthesia and Acute Pain Service

The Division of Regional Anesthesia, and Acute Pain Service, led by Andrey Rakalin, MD, was established in 2008 to improve patient care, safety and comfort through pharmacologic interventions, neuraxial anesthesia and peripheral nerve blocks. The division provides high-quality care to patients across all surgical subspecialties. The goals of the division are to expand the use of regional anesthesia, provide high-quality patient care, develop residents and fellows as experts in a wide range of regional anesthetics and acute pain management, help anesthesia faculty maintain their proficiency with regional anesthesia techniques, and to serve as consultants to our surgical and medical colleagues in managing acute pain.

The division currently consists of 15 faculty members and two nurse practitioners. We perform nerve blocks for surgical procedures and manage patients with acute postoperative pain. One faculty staff member is assigned with a resident or a fellow each day as a regional team for this purpose. Subsequent anesthetic care is performed by an intraoperative anesthesia team. This dedicated nerve block service is present on both the East and West Campuses. This model has greatly increased the amount and quality of regional anesthesia performed at BIDMC. The development of the regional anesthesia team has increased patient and surgeon satisfaction and increased requests for regional anesthetics.

The volume of regional anesthetic cases has gradually increased over the past few years. We have expanded regional blocks for vascular patients, spine patients and thoracic patients to improve analgesia and patients' surgical recovery according to several enhanced recovery after surgery (ERAS) protocols.

Areas of Excellence

The Regional Division cares for simple and complex pain patients, working to improve their care while decreasing opioid use. Together with the Chronic Pain Service, we developed guidelines on management of perioperative patients on buprenorphine and chronic opioid therapy.

We offer regional analgesia to thoracic and breast surgery patients and have incorporated regional anesthetics into the ERAS protocol for bariatric patients. We have also extended our services to our community hospitals, ensuring standardized and quality patient care.

Clinical Procedure Areas

This division performs about 4,000 regional anesthetics every year. We perform nerve blocks for acute pain, place nerve catheters with continuous infusion of local anesthetic for inpatients and place all non-obstetric anesthesia epidurals. We offer consultation services for our surgical and medical colleagues—anything from curbside management of a patient-controlled analgesia pump to a comprehensive patient evaluation and follow-up.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	3,687	6,243	5,787	6,125	4,953

New Programs

- We developed a comprehensive hip fracture pathway that covers all phases of this surgery, an effort led by Dr. Lisa Kunze, director of Orthopedic Anesthesia. Through regional interventions, we can improve morbidity and mortality of the geriatric patients presenting for corrective surgery after falls. This process involves collaboration with surgeons, geriatricians, anesthesiologists and emergency room physicians and staff.
- We developed a comprehensive workflow for our vascular patients. This routinely involves placing sciatic and femoral nerve catheters for above- and below-knee amputations, and this has improved pain management and patient satisfaction for patients undergoing this life-changing surgery.
- We are evaluating various regional nerve block strategies to further optimize pain management for our thoracic surgery patients. We have performed epidurals, erector spinae plane blocks and paravertebral blocks for these patients.
- We perform various chest wall plane blocks for our cardiac patients.
- We perform spine plane blocks for patients undergoing lumbar spine surgery.

Thoracic Anesthesia

The Division of Thoracic Anesthesia, led by division director Maximilian Schaefer, MD, provides anesthesia services to thoracic surgery and interventional pulmonology (IP) patients in a variety of BIDMC locations and affiliated community sites. The combined volume of cases from January 2018 to December 2022 was 8,024 thoracic surgeries and interventional pulmonology procedures. During this time, we adopted high-frequency jet ventilation as our usual mode of ventilation during rigid bronchoscopy cases.

Over the past five years, we have recruited talented new anesthesiologists to handle increased case volume, particularly in robotic surgery. Of the current 15 members of our division, 10 have joined over the past five years. The new clinicians and continued assistance from the block team allow us to perform regional procedures via a multimodal approach to pain management. The division works closely with the Department of Thoracic Surgery and the Division for Interventional Pulmonology to constantly improve patient care, which results in the development and implementation of protocols to enhance post-procedural recovery and increase the efficiency and safety of the procedures.

Areas of Excellence

Patients undergoing thoracic surgery or interventional pulmonary procedures are often complex, requiring close collaboration between the anesthesia and surgical team. Our services include general and regional anesthetics; state-of-the-art, individualized conventional mechanical ventilation, high-frequency jet ventilation, advanced airway management, including intraoperative lung isolation and single-lung ventilation; and intraoperative bronchoscopy and the management of complex airways and advanced lung disease.

Collaborating closely with the Regional Anesthesia Division, we supplement general anesthesia with neuraxial and peripheral anesthesia techniques such as thoracic epidural anesthesia, ultrasound-guided erector spinae block, or intercostal nerve block. A recent retrospective analysis has shown that success for thoracic epidural anesthesia in our institution is 80% (BMC Anesthesiol.1), 10% higher than the success rate provided in the literature. Nonetheless, along with the Regional Anesthesia Division, we continually strive to further enhance the effectiveness of our blocks and neuraxial anesthesia through ongoing training of residents and attendings. We further leverage research findings from the Center for Lung Injury Research for clinical care and implement clinically relevant research findings into patient care. One example is individualized mechanical ventilation—our patients now receive individualization of tidal volume and positive end-expiratory pressure during one-lung ventilation.

Clinical Procedure Areas

The division provides anesthesia care, including flexible and rigid bronchoscopy involving stent placement, cryoablation and laser ablation, and surgical lung resection due to cancer, including open and video-assisted (VATS) procedures. As the Chest Disease Center at BIDMC has become a leading institution in treating tracheobronchomalacia, drawing patients from across the country to BIDMC, the Thoracic Anesthesia Division is challenged with providing anesthesia care during bronchoscopic evaluation, stent placement, and robotic or open tracheobronchoplasty for these patients. We are one of a few centers in the country that do tracheobronchoplasty. In addition, tracheal resections for patients with chronic tracheal stenosis are challenging procedures that require comprehensive intraoperative airway management. Finally, the minimally invasive thoracic surgery program has greatly advanced over the last two years. An increasing number of endoscopic procedures, such as minimally invasive esophagectomy, pose specific and interesting challenges for anesthesia management.

Seventy-four percent (74%) of thoracotomies receive thoracic epidural catheters, and over 90% of video-assisted thoracic surgery (VATS) procedures receive either erector spinae plane or paravertebral blocks. These regional techniques are either applied by the team from the Thoracic Anesthesia Division or the regional team in close collaboration. The total amount of opioid medication used in thoracic surgery and interventional pulmonology has dropped dramatically with the advent of multimodal pain therapy.[1]

[1] Levy et al., "Evaluation of early postoperative Intravenous Opioid Rescue as a Novel Quality Measure in Patients who receive Thoracic Epidural analgesia: A retrospective cohort analysis and prospective performance improvement intervention." BMC Anesthesiol. 21, 120 [2021])

Dana-Farber Cancer Institute and BIDMC forge new collaboration to build region's only free-standing cancer hospital

Beth Israel Deaconess Medical Center (BIDMC) and Dana-Farber Cancer Institute (Dana-Farber) formed an exciting new collaboration in September, 2023 that will build the region's only independent, free-standing inpatient hospital dedicated to the needs of adult cancer patients. This joint venture will advance the future of cancer treatment, provide better access to cutting-edge, higher-value care and integrate innovations at the bedside. The new hospital will benefit from the participation of two nationally-recognized medical centers known for superb clinical care and transformative science.

As members of the BIDMC affiliated physician group, Harvard Medical Faculty Physicians (HMFP), clinicians in the Department of Anesthesia, Critical Care and Pain Medicine will be an integral part of the clinical care model in this hospital. They will have the opportunity to participate in cutting-edge cancer care along with colleagues at both BIDMC and Dana Farber, one of the preeminent cancer centers in the US.

Located adjacent to existing Dana Farber and BIDMC facilities in the Longwood Medical Area of Boston, the new hospital will support seamless patient care and continued focus on research initiatives. Pending regulatory approvals, construction of this hospital will likely be completed in several years. While both organizations will remain independent, they will partner to establish a coordinated clinical and organizational structure for oncology care on this integrated campus.

Dana-Farber's current affiliation with Brigham and Women's Hospital for inpatient and surgical care will continue through the transition. BIDMC's nationally recognized independent oncology programs will also continue until the new collaboration is in place. Likewise, the cancer institute's partnership for pediatric cancer care with Boston Children's Hospital will not change. Beth Israel Lahey Health will also continue to invest in advancing cancer services at BIDMC and at its other hospitals, fulfilling their commitment to provide access to extraordinary care in community settings. For more information, visit: https://www.dana-farber.org/dana-farber-beth-israel-deaconess-cancer-collaboration.

With the US population aging and cancer incidence rising in younger adults, this forward-looking model will offer patients advanced technologies and treatment methods by harnessing the commitment and skill of these two dynamic organizations to accelerate the impact of discovery and innovation. Our department looks forward to helping to create the best care experience and outcomes for cancer care patients through this exciting new venture.

"Together, we are taking bold steps to transform how we care for individuals and families touched by cancer, expand equitable access to life-changing care, and harness the power of scientific discovery. This collaboration and a dedicated, free-standing cancer hospital will be truly unique in Massachusetts. Our community needs and deserves both." **Kevin Tabb, MD**, President and CEO of Beth Israel Lahey Health

"This collaboration will allow our patients and their loved ones to benefit tremendously from Dana-Farber's leading-edge scientific discovery and exceptional care. We believe this will position us to provide world renowned cancer treatment in outpatient and inpatient settings well into the future. BIDMC and the physicians of HMFP share our vision and are equally committed to ensuring a superior patient experience and advancing a collaborative focus on world-class cancer care and research."
Laurie H. Glimcher, MD, President and CEO of Dana-Farber.

The block team either supervises or conducts most regional techniques to control pain. In the case of thoracotomies, 74% receive thoracic epidural catheters. Two percent of VATS patients receive epidurals, usually when either pleural decortication or pleurodesis is planned. The pathway for video-assisted thoracic surgery provides multimodal pre-medications and intraoperative intercostal blocks to relieve pain in these patients. In addition, paravertebral and erector spinae blocks have been employed to reduce pain and lower the requirements for opioid medications in the postoperative period. The total amount of opioid medication used in thoracic surgery and IP has dropped dramatically with the advent of multimodal pain therapy. In 2018, 79 erector spinae blocks were performed.

Service Trends

	FY19	FY20	FY21	FY22	FY23
Total Procedures	1,748	1,484	1,450	1,644	1,401

New Programs

Since the advent of the robotic thoracic surgery program in 2019, several innovations and systemic improvements have made thoracic surgery safer and more comfortable for patients. In 2023, the program became fully functional, and robotic surgery has become part of the standard portfolio for thoracic surgeries involving lobectomies or segmentectomies of the lung.

In collaboration with the Division of Thoracic Surgery, we developed and implemented a comprehensive protocol to enhance recovery after thoracic surgery (ERATS). This protocol implements state-of-the-art treatment and prevention procedures, including preoperative nutrition, multi-modal pain prophylaxis and treatment, best practice management of mechanical ventilation and neuromuscular blockade and postoperative mobilization and physiotherapy. We are evaluating this protocol's clinical impact, specifically in terms of rescue pain medication requirement, pulmonary complications, and hospitalization duration.

In addition, the division has several ongoing quality improvement projects, including an initiative to increase comfort with one-lung ventilation in non-thoracic anesthesia faculty. This initiative assesses the skillset and comfort level of attendings who are not members of the thoracic anesthesia group but care for patients who require lung isolation and one-lung ventilation (e.g., during on-call hours). We have initiated a training program to enhance skill and confidence when initiating one-lung ventilation. We will evaluate the overall comfort level after participants have completed the initiative to evaluate success.

Education

The Thoracic Anesthesia Division is integrally involved in the department's educational mission through the teaching of medical students, residents, staff and allied health professionals. Local instruction occurs with anesthesia resident lectures, simulations and virtual bronchoscopy sessions. All interventional pulmonology (IP) fellows in New England come to BIDMC for a one-day orientation and demonstration session. This includes lectures on anesthesia and the practice of airway skills—both taught by anesthesiologists. A regular monthly session in virtual bronchoscopy, airway anatomy and double-lumen tube and bronchial blocker placement is now required before any of the residents rotate in thoracic anesthesia. Local CME courses on bronchoscopy, anesthesia practices, and airway workshops include anesthesiologists from BIDMC.

Transplant Anesthesia

The Division of Transplant Anesthesia, directed by Riccardo Pinciroli, MD, primarily cares for living donor liver transplants, with separate dedicated teams for the donor and recipient. Depending on scheduling needs, the team may also be involved in elective hepatic resections and major hepatobiliary surgeries. For patients undergoing kidney transplants (deceased- and living-donor), pancreas transplants, donor nephrectomies and dialysis access procedures, anesthesia is provided by any member of the department. However, the division oversees the clinical, academic, quality and safety aspects of these other subspecialty cases, constituting an overall institutional point of reference for the perioperative care of patients undergoing transplant surgery.

Providing anesthesia care for organ transplant surgery requires a high level of expertise, skill and close collaboration with the surgical team and other healthcare professionals involved in patient care. The Division of Transplant Anesthesia at BIDMC comprises eight senior attending anesthesiologists responsible for the intraoperative care of patients undergoing deceased-donor liver transplant surgery and related operations in the immediate postoperative period. Our clinicians are available 24/7 as an integral part of the institutional transplant team.

The division director oversees the division's clinical, educational, and research activities and ensures that the team provides safe and effective anesthesia care for patients undergoing organ transplant surgery. The director is a liaison between the Departments of Surgery and Anesthesia, communicating regularly with the surgical team. The director participates in weekly Liver Transplant Selection Committee and quarterly Transfusion Committee meetings to ensure the department is actively involved in the center's clinical activity.

Areas of Excellence

In September 2020, Devin E. Eckhoff, MD, was named chief of transplant in the Department of Surgery and director of the Transplant Institute, bringing extensive clinical and research expertise to the team. In 2022, the division performed 78 deceased donor liver transplants, one living donor liver transplant, 80 deceased donor kidney transplants, 18 living donor kidney transplants, and eight kidney/pancreas transplants.

The Division of Transplant Anesthesia provides exceptional care to patients undergoing organ transplantation. The division strives to achieve optimal outcomes with a team of highly skilled anesthesiologists, state-of-the-art monitoring and a collaborative approach to patient care. Examples of the division's cutting-edge approach include the following:

- Successful implementation of thromboelastography (TEG) as the standard of care for intraoperative monitoring of hemostasis in liver transplant surgery. TEG provides real-time assessment of coagulation function and guides the administration of blood products, resulting in reduced blood loss, transfusion requirements and postoperative complications.
- Development of comprehensive and standardized guidelines for kidney transplant anesthesia to optimize clinical outcomes, minimize complications associated with anesthesia administration and ensure patient safety.
- Regular internal auditing and review of clinical cases to identify areas for improvement, with the department-wide discussion presented at morbidity and mortality meetings.

The division is committed to improving outcomes and enhancing patient safety through innovative techniques and evidence-based practices.

Clinical Procedure Areas

Working alongside the department scheduling office, the division guarantees reliable year-round call coverage while remaining flexible. BIDMC's transplant anesthesiologists are skilled clinicians with vast experience managing patients undergoing high-acuity surgery. The division consists of attendings with diverse subspecialty backgrounds, including critical care and anesthesia for major procedures such as neurosurgery and thoracic and cardiac surgery. Consequently, all division members have knowledge of a variety of specialized monitoring techniques and advanced technologies, including pulmonary artery catheterization, transesophageal echocardiography (TEE), thromboelastography (TEG) and renal replacement therapy.

Service Trends

BIDMC Transplant Institute	FY22	FY23	FY24 Projected
Organs Transplanted			
Liver	79	113	138
Kidney	106	87	78
Pancreas	8	9	3
Total	**193**	**209**	**219**

Organ Donor Special Care Center

In November 2022, BIDMC won a request for proposal from the New England Donor Services to establish a new hospital-based Organ Donor Special Care Center (ODSCC). This new center will be the only one of its kind in New England and is expected to greatly enhance BIDMC's growing transplant program. By improving the medical management of deceased donor organs, we hope to reduce organ discard rates and provide better care to donors and their families. We are well-positioned to form a strong partnership between our institution and the organ procurement organization to create a leading-edge center. The establishment of this new center will also provide extensive opportunities to expand our educational and research efforts in the field.

Education

The Transplant Division is a prime example of our department's commitment to teaching. Our senior residents have unparalleled educational opportunities and are involved in all aspects of perioperative care, with a particular interest in the care of liver transplant patients, given their extreme complexity and unique challenges. Senior residents actively participate in every operation phase, from perioperative preparation to airway management, induction and emergence, intraoperative monitoring, pain control strategy selection and potential complication management. Our liver transplant cases are staffed with a 1:1 attending-resident ratio, thereby allowing for optimal bedside teaching opportunities. Moreover, we organize biannual resident lectures focused on transplant anesthesia, covering topics such as pathophysiology, intraoperative management, surgical considerations and case presentations. Since 2017, we have established a joint Anesthesia Transplant Fellowship Program with Lahey Hospital and Medical Center in Burlington, Massachusetts. Trainees from this program have become a more active presence in our operating room over time. We plan to expand the scope of this fruitful collaboration with Lahey Hospital, with the potential to acquire a second fellow position and a more constant involvement in the activity of the division beyond the intraoperative care of liver transplant cases.

Vascular Anesthesia

The Division of Vascular Anesthesia, directed by Dr. Robina Matyal, is a dedicated team of anesthesiologists who care for a challenging patient population and bring immense experience, motivation, enthusiasm and compassion to their clinical work.

Perioperative management of patients undergoing vascular surgery is a clinical challenge, and vascular anesthesiologists require specific skillsets to manage these patients. They are expected to have expertise in transesophageal echocardiography (TEE) and transthoracic echocardiogram (TTE), the ability to perform ultrasound-guided regional blocks and, when required, safely transition from sedation to a general anesthetic with maximal invasive monitoring.

The division continues to provide services for patients undergoing open and endovascular surgery. Division members participate in research, teaching and quality improvement initiatives simultaneously with their clinical responsibilities. The clinical volume has remained stable, and the vascular surgery division remains one of the busiest clinical services in the city. Our extensive clinical experience allows us to provide a state-of-the-art teaching environment for residents and fellows.

Areas of Excellence

Our division continuously strives to innovate educational tools, streamline operating room workflow and improve perioperative outcomes in our patients through multiple quality-improvement initiatives.

Lumbar Drains: We have created a standard of practice for the selection, ultrasound-guided placement, and management of lumbar drains in high-risk vascular surgeries, which has been adopted and distributed across the BILH network and published in Ann Vasc Surg[2].

Abdominal Aortic Aneurysm (AAA) Protocol: We have created a multi-disciplinary, standardized practice approach to streamline the implementation of the AAA rupture protocol, which has decreased complication rates and improved outcomes.

Peripheral Nerve Catheters: Another standard of practice was developed for peripheral nerve catheters to optimize analgesia in patients undergoing lower-extremity amputations, demonstrating improved outcomes.

Renal Function Protection Strategy: Our current quality-improvement initiatives include improving operating room efficiency and workflow and optimizing preoperative and intraoperative strategies to monitor and protect renal function through expert surveys and discussion sessions. We have also introduced new spinal drain equipment and two LiDCO hemodynamic monitors for non-invasive blood pressure monitoring.

Clinical Procedure Areas

The division's broad clinical experience allows us to provide a state-of-the-art teaching environment for residents and fellows. Endovascular procedures are performed in the "hybrid" operating rooms with the capability to support procedures under fluoroscopy or open surgical procedures. These procedures require the highest vigilance, monitoring and resuscitation, providing our staff with a unique clinical experience.

Service Trends

Our vascular anesthesia service runs 24/7. We constantly care for patients with ASA 3–5 scores as electives and emergencies. Our division covers open and endovascular abdominal and thoraco-abdominal aortic aneurysm surgery, open peripheral vascular surgery, open and endovascular carotid surgery, amputation surgery and MALS procedure for celiac ganglion release. Our clinical strengths include the quality of clinical care, the complexity of cases, the clinical efficiency of our team, and the collaborative relationship among the division members and the surgical staff, along with the 24/7 availability of help and consult.

	FY19	FY20	FY21	FY22	FY23
Total Procedures	810	682	852	878	808

New Programs

Advanced Vascular and Ultrasound Fellowship: Our fellowship is a productive experience for the current fellows and the department. The fellows participate in high-risk surgeries and gain expertise in advanced monitoring and management devices like ventricular assist devices, spinal drains, pacemakers and hybrid operating rooms with standby pumps. Our fellows assist in creating multiple educational tools, "standard of practice" pathways for equipment setup in TEVAR and EVAR, CSF drain placement in ruptured AAA and presentations in multidisciplinary grand rounds. Additionally, the fellows facilitate the supervision of residents in invasive monitoring of arterial line, central line and perioperative ultrasound.

Quality-Improvement Projects: Division members participate in multiple ongoing quality-improvement projects throughout the year. For example, the availability of type-specific blood products as a prerequisite for elective carotid endarterectomy was eliminated, with resultant improved efficiency and cost savings. We also modified the protocol for the availability of four units of blood in the operating room for endovascular aortic aneurysm repair. We published our recommendations in the Journal of Vascular Surgery. One of the key components of quality assurance maintenance is the ongoing education of the staff, especially for uncommon procedures and cases. Endovascular procedures for the aorta causing the risk for spinal cord ischemia are done from twice to five times per month, and not everyone can get exposure. To address this, interactive training modules have been developed to enhance the performance of infrequent procedures.

[2] Chaudhary O, Sharkey A, Schermerhorn M, Mahmood F, Schaefer M, Bose R, Pannu A, Fatima H, Baribeau Y, Krumm S, Soden P, Thomas A, Cassavaugh J, Rashid R, Matyal R. Protocolized Based Management of Cerebrospinal Fluid Drains in Thoracic Endovascular Aortic Aneurysm Repair Procedures. Ann Vasc Surg. 2021 Apr; 72:409-418. doi: 10.1016/j.avsg.2020.08.134. Epub 2020 Sep 11. PMID: 32927046

Three-Dimensional (3-D) Printed Models: The endovascular repair of the thoracic aortic aneurysm is associated with many complications. We use a 3-D model of a patient-specific thoracic aneurysm for pre-planning and graft modification. With these well-established protocols and evidence-based management principles, our vascular surgery outcomes remain among the best in the country.

Patricia O'Connor, CRNA
System Chief CRNA

Nurse Anesthesia

The Division of Nurse Anesthesia, directed by System Chief CRNA Trish O'Connor, comprises a group of 150 skilled, compassionate and resilient certified registered nurse anesthetists (CRNAs) who demonstrate unwavering dedication to patient care. Over the past several years, the division has grown along with the expansion of our department. Working within a care team model, the nurse anesthetists provide perioperative anesthesia care for patients undergoing procedures from many subspecialties throughout the medical center and in community settings.

In addition to their clinical role, the CRNAs are committed to education and training. They actively assist with resident, medical student, nursing and nursing student training, and serve as clinical instructors to student nurse anesthetists rotating to the medical center. CRNAs also participate in a wide variety of hospital and department committees, including the multidisciplinary Faculty Hours, the Clinical Affairs Committee, the Emergency Manual Committee, the Perioperative Education Committee and the Advanced Practice Nursing Committee.

Areas of Excellence

The CRNA Division is committed to education and professional development and recently appointed Jen Phelan to the position of associate chief CRNA for education. Ms. Phelan helped develop the BIDMC Student Registered Nurse Anesthetist (SRNA) training program in coordination with Northeastern University and Boston College and focused on staff CRNA professional development. This includes lectures, hands-on workshops and case discussion groups for CRNAs.

Clinical Procedure Areas

We have grown to 45 CRNAs at BIDMC and 70 CRNAs practicing in our community settings, including BID–Needham, BID–Milton, BID–Plymouth, Anna Jaques Hospital, Mount Auburn Hospital, New England Baptist Hospital and One Brookline Place. We anticipate more growth over the coming years as we actively recruit the best CRNAs to join our thriving team of professionals.

Our CRNAs function primarily in a clinical role within our department, supporting our mission by providing efficient, high-quality care for patients undergoing many types of procedures. They work within a team care model that has proven remarkably effective at providing perioperative care for patients at all acuity levels from many subspecialties. Our work over the past two years has focused on more streamlined communication among the team and with other clinical staff, standardized clinical practice protocols across sites and a more integrated CRNA group within the department. The result is a group that is not only clinically excellent but part of a cohesive team that works together to ensure coverage for a high-volume practice with many patients who are critically ill and undergoing complex procedures.

The CRNAs have prescriptive authority, which enables them to provide immediate pre- and post-operative orders. This improves efficiency, and quality of pain management for patients during their entire surgical experience.

Global Health Education

Four years ago, under the strategic development and leadership of our pre-admission testing (PAT) nurse practitioner, Eileen Stuart-Shor, NP, PhD, the Boston-Africa Anesthesia Collaborative (BAAC) was formed. This important global health initiative works to help Liberia build an in-country, Liiberian-led nurse anesthesia school to increase the capacity for trained anesthetists to provide safe anesthesia. The program sponsors visits from Liberian CRNA students, who travel to Boston for training, and for our department CRNAs to travel to Liberia for teaching and collaboration. BAAC is described in further detail in the Global Health section of our Education Division.

CRITICAL CARE MEDICINE

The Division of Critical Care is a major clinical division in the Department of Anesthesia, Critical Care and Pain Medicine and provides critical care services in four surgical intensive care units (ICUs) at BIDMC: Trauma Surgical Intensive Care Unit (TSICU), Surgical Intensive Care Unit (SICU), Cardiovascular Intensive Care Unit (CVICU) and Neurosciences Intensive Care Unit (Neurosciences ICU). It also provides coverage of the Post Anesthesia Care Unit (PACU) and the Cardiology Care Unit (CCU) on the West Campus of BIDMC. The Division of Critical Care is directed by Dr. Todd Sarge.

Todd W. Sarge, MD

Vice Chair, Critical Care Medicine

Assistant Professor of Anaesthesia

The first ICU at Beth Israel Hospital was the Respiratory-Surgical ICU with seven ICU beds formed jointly by Dr. Leonard Bushnell of anesthesia and Dr. John Skillman of surgery in 1967. Dr. Alan Lisbon started the Critical Care Fellowship in 1990. A year later in 1991, Dr. Lisbon formed the Division of Critical Care with 12 beds, two anesthesia staff, and two surgical staff. This division now includes 21 division members who work with nine intensivists from the Department of Surgery, one intensivist from the Department of Emergency Medicine, and three intensivists from the Department of Neurology to provide 24/7 multidisciplinary coverage of the 40 beds in the four surgical ICUs and 10 beds in the CCU. The division also covers the ICUs in three community hospitals in the BILH network (BID–Plymouth, BID–Milton and BID–Needham) and provides site directorship for the ICUs at BID–Plymouth and BID–Needham. Outside of patient care, the division provides education for medical trainees at all levels and conducts extensive, innovative research on a variety of subjects, ranging from diseases such as acute respiratory distress syndrome (ARDS), sepsis, organ dysfunction and medical ethics in the ICU.

Mission Statement

Our division's mission is to provide exceptional compassionate care to critically ill patients supported by high-impact research while providing comprehensive learning experiences for medical trainees in our specialty so that they can do the same throughout their careers.

Critical Care Medicine Leadership

Dr. Todd Sarge serves as vice chair for Critical Care Medicine. Other critical care medicine leadership roles are listed below.

Leader	Department	Position
Michael Cocchi, MD	Emergency Medicine	Associate Chief Medical Officer
Somnath Bose, MD, MPH	Anesthesia, Critical Care and Pain Medicine	Intensive Care Unit (ICU) Site Director, BID–Needham
Daniel Walsh, MD	Anesthesia, Critical Care and Pain Medicine	Intensive Care Unit (ICU) Site Director, BID–Plymouth
Shahzad Shaefi, MD, MPH	Anesthesia, Critical Care and Pain Medicine	Director, Venovenous (VV) Extracorporeal Membrane Oxygenation (ECMO) Program
Ameeka Pannu, MD	Anesthesia, Critical Care and Pain Medicine	Director, Anesthesia Critical Care Fellowship Medical Director, Extracorporeal Cardiopulmonary Resuscitation (e-CPR)
Akiva Leibowitz, MD	Anesthesia, Critical Care and Pain Medicine	Director, Post Anesthesia Care Unit (PACU) Director, Multi-Specialty Anesthesia
Achikam Oren-Grinberg, MD, MS	Anesthesia, Critical Care and Pain Medicine	Director, Critical Care Ultrasound

Critical Care Service Trends

	FY19	FY20	FY21	FY22	FY23
Encounters	6,741	7,153	7,287	6,660	6,442
Total Admissions	1,902	1,877	1,901	1,799	1,785
Procedures	601	781	834	709	630

Areas of Excellence

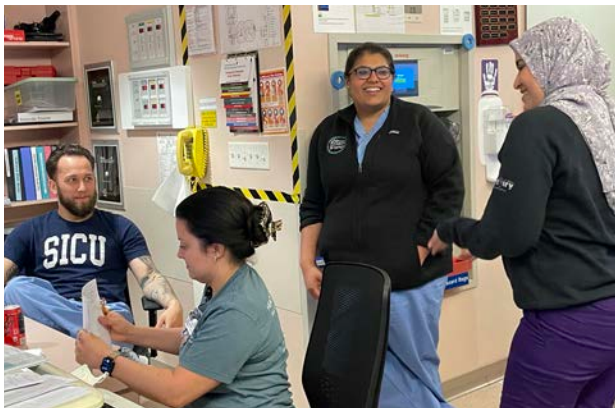
The Anesthesia Critical Care Division provides state-of-the-art care for the hospital's surgical critical care patients and is a recognized leader in the field for point-of-care critical care echocardiography and ultrasound, as well as clinical research in acute lung injury and acute respiratory distress syndrome (ARDS).

Critical Care Echocardiography and Ultrasound: Members of the division, and in particular Dr. Achikam Oren-Grinberg, are very active in the field of education in critical care echocardiography and ultrasound. Division members founded the highly successful Fundamentals of Critical Care Ultrasound course at the Society of Critical Care Medicine and have been active internationally with the World Interactive Network Focused on Critical Ultrasound, as well as courses sponsored by the American Thoracic Society. Division members previously directed a Harvard Medical School Continuing Medical Education (CME) course, "Ultrasonography for Intensivists and Emergency Medicine Clinicians," which sold out for 10 years leading up to the COVID-19 pandemic. Division members are also active in teaching point-of-care ultrasound to faculty within the department at quarterly hands-on ultrasound training sessions during Grand Rounds. They also teach bedside ultrasound to the division's anesthesia and surgical critical care fellows at their weekly echocardiography conferences, the department's residents during their orientation and academic days, and the department's interns during their annual "Basic Anesthesia and Ultrasound" course. Division members, specifically Drs. Achikam Oren-Grinberg, Akiva Leibowitz, Ameeka Pannu, Somnath Bose and Todd Sarge, have also been involved in research for point-of-care ultrasound in critically ill patients during cardiac arrest.

Research in Acute Lung Injury and ARDS: While the division is active in many areas of research (see Research section), they are leaders in research in acute lung injury and acute respiratory distress syndrome (ARDS). The division is part of the National Heart, Lung, and Blood Institute's (NHLBI) Prevention and Early Treatment of Acute Lung Injury (PETAL) Network at the National Institutes of Health (NIH), a large multicenter collaborative examining interventions for patients at risk for ARDS. Drs. Daniel Talmor, Somnath Bose and Brian O'Gara help lead the Boston Clinical Center within this network. The division also investigates the use of respiratory mechanics (Drs. Daniel Talmor and Todd Sarge) and fibrinolytic therapy (Drs. Daniel Talmor and Shahzad Shaefi) in treating ARDS patients as well as the use of inhaled anesthetics to prevent lung injury (Drs. Brian O'Gara and Daniel Talmor). Results of the division's research not only add knowledge to the healthcare community but also inform and improve how the division cares for its critically ill patients.

ECMO: Due to the COVID-19 pandemic, there is an increasing need for extracorporeal membrane oxygenation (ECMO) for patients. Dr. Shahzad Shaefi is the director of the VV ECMO service and has been active in researching the efficacy of veno-venous ECMO (VV-ECMO), specifically in COVID-19 patients, and is also involved with research on the efficacy of extracorporeal cardiopulmonary resuscitation (e-CPR), led by Dr. Ameeka Pannu. The Critical Care Division, along with the Division of Pulmonary Critical Care Medicine, currently provides a 24/7 ECMO consult service for the medical center. As the medical director of the e-CPR service, Dr. Ameeka Pannu has been working to ensure that BIDMC is able to participate in the Boston city-wide e-CPR initiative which coordinates the transfer and cannulation of patients in cardiac arrest among participating medical centers in the city. Both the VV-ECMO and e-CPR services focus on developing protocols to facilitate efficient and appropriate use of these procedures.

Airway Team: Before the COVID-19 pandemic, the division had already been providing airway management and support for all the ICUs. When the pandemic first started, its members were designated as the intubating team for COVID-19 patients. As the pandemic progressed, "airway teams" consisting of certified nurse anesthetists (CRNAs) were formed to help manage intubations. Although the pandemic has now ended, the Department of Anesthesia continues to provide the critical service of emergent airway response for the hospital as well as back-up for the emergency department for difficult airways.



New Programs

CCU Coverage: The Division of Critical Care has been providing intensivist

coverage for the Heart Failure patients in the Cardiology Care Unit (CCU) for several years but will now expand this coverage to general cardiology patients in the CCU as well in a joint effort with the Pulmonary Critical Care Medicine group. Clinical Activities

The Critical Care Division provides care for critically ill patients in the following surgical ICUs at BIDMC.

Trauma Surgical Intensive Care Unit (TSICU): The TSICU is a nine-bed unit caring for trauma, thoracic and acute-care surgery patients admitted largely through the emergency room. Intensivist coverage of this unit is shared 50% with the Division of Surgical Critical Care.

Surgical Intensive Care Unit (SICU): The SICU is an eight-bed unit caring for a variety of surgical patients, including transplants, hepato-biliary and general surgery. Similar to the TSICU, intensivist coverage of this unit is shared 50% with the Division of Surgical Critical Care.

Cardiovascular Intensive Care Unit (CVICU): The CVICU is a 15-bed unit caring for patients undergoing cardiac and vascular surgery. Additionally, post-cardiotomy patients supported via veno-arterial extracorporeal membrane oxygenation (VA-ECMO) as well as patients with severe respiratory failure supported by veno-venous ECMO are admitted to this unit. Intensivist coverage of this unit is solely provided by the Division of Anesthesia Critical Care.

Neurosciences Intensive Care Unit (Neurosciences ICU): The Neurosciences ICU is an eight-bed unit caring for neurology patients and neurosurgical patients. This unit is dedicated to the care of neuroscience patients. Intensivist coverage of this unit is shared with the Departments of Neurology and Surgery.

Cardiology Care Unit (CCU): The CCU is a 10-bed unit caring for critically ill patients with a primary cardiac problem including heart attacks, heart failure and malignant arrhythmias and includes patients requiring mechanical circulatory support including VA-ECMO (non-sternotomy), LVAD, Impella's and IABP's. The intensivist coverage of this unit is shared with the Department of Medicine's Pulmonary Critical Care Division and employs a multi-disciplinary co-rounding model with the General Cardiology and Heart Failure services.

All the surgical ICUs are semi-closed, and patients are cared for by multidisciplinary critical care teams. Below is our staffing model for the units at BIDMC.

Staffing Model for Surgical Intensive Care Units at BIDMC			
Unit	Weekday Day	Weekday Night and Weekend*	
SICU	Attending critical care physician (anesthesia, emergency medicine, or surgery) Critical care fellow (anesthesia or surgery) Dedicated house officers (anesthesia and surgery)	Attending critical care physician (anesthesia or emergency medicine) Critical care fellow (anesthesia or surgery)	Resident (anesthesia or surgery)
TSICU	Attending critical care physician (anesthesia, emergency medicine or surgery) Critical care fellow (anesthesia or surgery) Dedicated house officers (anesthesia and surgery)		Resident (anesthesia or surgery)
CVICU	Attending critical care physician (anesthesia or emergency medicine) Nurse practitioner/physician assistant Attending cardiac surgeon		Nurse practitioner/ physician assistant
Neurosciences ICU	Attending critical care physician (anesthesia, neurology or surgery) Critical care fellow (anesthesia, surgery or neurology) Resident (neurology) Nurse practitioner		Nurse practitioner/ physician assistant
CCU	Attending critical care physician (anesthesia, pulmonary medicine) Critical care fellow (anesthesia, surgery) Dedicated house officers (internal medicine)	Attending critical care physician (anesthesia or pulmonary medicine) Critical care fellow (anesthesia or surgery)	Resident (internal medicine)

***On weekends during the day:**
- An additional surgery attending critical care physician covers the TSICU or SICU.
- An additional anesthesia attending critical care physician covers the CVICU and CCU.
- An additional anesthesia, surgery or neurology attending critical care physician covers the Neurosciences ICU.

Besides covering the four surgical ICUs and CCU, the division provides an "ICU float" service based on the West Campus of BIDMC. One anesthesia critical care attending is assigned to this service per weekday during the day. This service serves several important roles, including critical care response to airway emergencies, cardiac arrest and peri-arrest situations outside of the ICU, triage and optimization of workflow and surgical ICU bed allocation within the hospital and critical care services to ICU-level patients admitted to the post-anesthesia care unit (PACU) during their perioperative course.

Additional clinical services provided by the division include:

- Airway management and support for all ICUs and floors on the West Campus
- Code coverage of the West Campus
- Anesthesia for tracheostomies in all ICUs
- Focused echocardiography support for in-hospital cardiac arrests using handheld ultrasound devices
- Coverage of the West Campus Post-Anesthesia Care Unit
- ECMO consults for respiratory failure (shared with the Division of Pulmonary Critical Care)
- e-CPR consults for emergent ECMO cannulation for cardiac arrests within the medical center

The division is also actively involved in the ICU coverage of our affiliate hospitals in the network. Since October 2012, the division has provided coverage and medical directorship for the critical care unit at BID–Plymouth. Since February 2016, the division has provided coverage for the critical care unit at BID–Milton. Since November 2020, the division has provided coverage and medical directorship for the critical care unit at BID–Needham. All three hospitals contain mixed medical-surgical ICUs and care for the wide variety of intensive care patients seen at a community hospital via different staffing models.

- The ICU at BID–Plymouth is a closed 14-bed unit staffed 24/7 by an intensivist and a team of advanced practice providers. Dr. Daniel Walsh serves as the medical director.
- The ICU at BID–Milton is a closed eight-bed unit staffed 24/7 by an intensivist with overnight help from the hospitalist service at BID–Milton.
- The ICU at BID–Needham is a closed seven-bed unit staffed 24/7 by an intensivist and a team of advanced practice providers. Dr. Somnath Bose serves as the medical director.

Education

The Division of Critical Care prioritizes education at all levels of undergraduate and graduate medical training with learners that include medical students, residents and fellows. Our Critical Care Fellowship program, directed by Dr. Ameeka Pannu, is highly competitive and accepts four fellows per year. In addition to trainee teaching accomplished through daily rounds and at bedside, the division also hosts robust multidisciplinary didactic programs. The division also actively participates in postgraduate education for division faculty and other physicians.

Leadership and Innovation

Over the past two years, the division has been involved in numerous faculty development and quality-improvement projects, including Anesthesia ICU handoffs, reduction/prevention of postoperative re-intubations, training for critical care advanced practice providers, faculty ultrasound education, and ICU volume and throughput initiatives. Dr. Ameeka Pannu is the newly appointed Chair of the Hospital Code Committee which is charged with providing excellent care of patients in cardiac arrest to ensure the hospital remains in compliance with the national AHA guidelines and metrics for patients suffering in-hospital cardiac arrest. See the research section of this report for Critical Care research projects including leading a bi-national multicenter randomized control trial funded through the BIRD Foundation to assess the efficacy of augmented communication strategies in mitigating the risk of ICU delirium.

Our faculty are also actively involved in hospital leadership roles. Dr. Todd Sarge recently completed a six-year-term limit as chair of the Critical Care Executive Committee, which oversees all matters regarding the provision of intensive care across the medical center. Drs. Shahzad Shaefi and Shahla Siddiqui are also standing members of this committee. This committee reports directly to the Medical Executive Committee. Dr. Michael Cocchi from the Department of

Emergency Medicine is the co-chair of the Quality Improvement Oversight Committee, a committee to assess and seek improvement for quality and safety in the hospital. Dr. Shahzad Shaefi is a standing member on this committee. Dr. Ameeka Pannu is the newly appointed Chair of the Hospital Code Committee that ensures the hospital is meeting important quality metrics reportable to the American Hospital Association around in-hospital cardiac arrest. Drs. Todd Sarge and Ameeka Pannu are standing members of this committee. Dr. Todd Sarge is also the chair for the Organ Donation Advisory Committee that works with our regional organ procurement organization, New England Donor Services (NEDS), to collaborate and ensure best practices are followed for critically ill patients near end of life with potential for organ or tissue donation. Additionally, Dr. Todd Sarge is a member of the steering committee and associate medical director for the newly awarded Organ Donation Center being developed and built in collaboration with NEDS to ensure optimal care and recovery of organs from patient-designated organ donors from the New England region. Dr. Shahla Siddiqui is the newly appointed co-chair of the hospital Ethics Advisory Committee which reviews consultative and educational activities across the hospital, and addresses any policy and systems issues identified through its activities. The Committee also oversees the activities and involvement of the BIDMC-wide network of Ethics Liaisons. Dr. Alan Lisbon is the chair of the Committee on Clinical Investigation (IRB) at BIDMC. Dr. Somnath Bose is the co-director of the Center for Humanizing the ICU at BIDMC and an Antimicrobial Stewardship Committee member.

Future Goals

In the spring of 2023, BIDMC opened its new inpatient building, the Klarman Building, to which the hospital moved its Cardiovascular Intensive Care Unit (CVICU) and Cardiology Care Unit (CCU) from the Rosenberg Building. The movement of Cardiology and Cardiac Surgery services out of the Rosenberg and Farr buildings has opened space for the expansion of other critical care service lines including Medical ICU, Surgical ICU, and Neurosciences ICU. The Anesthesia Critical Care Division will continue working closely with the hospital's other critical care service lines to plan and execute the expansion and to ensure appropriate staffing for the additional beds.

In addition, the open space in the Farr building has allowed the hospital to open (2024) a Donation Care Center (DCC), allowing BIDMC to expand its ability to accept and perform more organ donations, for the care and optimization of donor patients in the region. The DCC will be the only such center in the New England / Boston region. The Anesthesia Department was integral to the successful proposal and Dr. Todd Sarge will serve as the Medical Director for the DDC. The Critical Care Division will be a significant portion of the staffing for this specialized patient population and will work with New England Donor Services (NEDS) to streamline the organ donation process and overcome space constraints in the ICUs, which currently operate almost at capacity.

A day in the life in Klarman...






Pain Medicine

The William Arnold – Carol A. Warfield Pain Center (AWPC) offers compassionate, comprehensive and state-of-the-art care for complex chronic pain patients. Additionally, the center is at the forefront of pain medicine research and has one of the top pain medicine fellowships in the country, promoting consistent intellectual challenges and a passion for pain medicine in our clinicians. Our motto is that we always do our best to help our patients, and we train world-class leaders in the field of pain medicine. We are proud to live up to our principles and provide care and relief to the many people who rely on us to help relieve their pain.

Sanjeet Narang, MD

Network Pain Director

Assistant Professor of Anaesthesia

Pain medicine at BIDMC and across our community hospitals is directed by Network Director for Pain Medicine, Dr. Sanjeet Narang. Our clinical staff includes anesthesiologists, neurologists, physiatrists, nurse practitioners, pain fellows, anesthesia residents and a full-time team of nurses. Our multidisciplinary care team works closely with primary care physicians to provide evidence-based, safe, patient-centered care and address all concerns, including opioid consultations and counseling. We coordinate care among radiology, physical therapy and surgical teams to ensure thoroughness and quality. We treat challenging patients with multiple co-morbidities and a wide spectrum of pain disorders including musculoskeletal pain, cancer pain, visceral pain, headaches, neuropathic pain syndromes and other complex chronic pain states.

Our center conducts ongoing quality assurance efforts to ensure that our care and training meet the highest standards based on the most current evidence in the field. Over the past several years, we have developed screening protocols and treatment pathways for pain procedures. Our faculty also serve on key committees at BIDMC that relate to clinical and ethical issues in pain medicine, including the Interventional Procedure Committee, Radiation Safety Committee, Opioid Care Committee and the Perioperative Substance Abuse Committee. In addition, faculty participate in the annual GME Pain Fellowship Program Committee.

Our center has consistently grown in patient volume, number of sites, and services offered in the past several years. This growth included re-establishing the Comprehensive Headache Center under the direction of Dr. Sait Ashina, and expanding to the sixth floor at One Brookline Place.

As BIDMC has expanded into the community, our physician staff has continued to grow, and we have added several new specialists to the team. We now see patients at all BIDMC locations in the greater Boston area, including the Spine Center, Chestnut Hill, Chelsea, BID–Milton, BID–Needham and BID–Plymouth. Together, our providers offer every patient cutting-edge care tailored to their individual needs.

Areas of Excellence

Our fellowship program, directed by Dr. Jyotsna Nagda, is very competitive, with its focus on comprehensive, interdisciplinary, collaborative training in the treatment of acute, chronic and cancer pain. Our faculty collaborates with various other disciplines including the spine center, neurology, orthopedics, oncology and palliative care, gynecology, urology and gastroenterology. Dr. Jyotsna Nagda is a member of the Beth Israel Endometriosis and Complex Pelvic Pain team as well as the Intimate Health and Wellness team and works in close collaboration to provide multidisciplinary care for challenging patients with abdominal and pelvic pain.

Clinical and basic science research in chronic pain and headache continues to receive generous funding from various entities, both federal and corporate.

Clinical Procedure Areas

Many of our patients have seen multiple physicians before they reach our clinic. We approach these patients with the most advanced and sophisticated treatments and recognize and address the difficulties living with chronic pain has caused.

We also treat patients with multiple co-morbidities, including neck and back pain, cancer-related pain, osteoporosis, abdominal and pelvic pain, and many other chronic, painful medical conditions. Our Comprehensive Headache Center provides world-class diagnosis and treatment, basic science research, clinical trials and educational resources for a wide spectrum of headaches. We use traditional and integrated treatment options, such as Botox injections, nerve blocks, implantable therapies, medication management and other complementary modalities.

Treatment modalities at the Arnold – Warfield Pain Center include:

- Nerve injections, blocks and ablation therapy
- Comprehensive headache care including Botox
- Implantable therapy spinal cord stimulators, peripheral nerve stimulators and intrathecal drug delivery systems
- Advanced spine treatments, such as vertebral augmentation and the latest minimally invasive spine techniques
- Psychological counseling, meditation and biofeedback .

As BIDMC clinical services have expanded into the community, our physician staff has grown simultaneously. We have added four new pain specialists, including our Network Director for Pain Medicine, Dr. Sanjeet Narang. Together, our providers offer every patient cutting-edge care tailored to their needs, totaling over 28,000 visits in the past year.

Service Trends

After the creation of Beth Israel Lahey Health, our focus has been on establishing a pain network across multiple hospitals and stand-alone clinics in the Greater Boston area. Pain services in the community have been expanded and brought on to one platform, especially at the BID–Needham, BID–Milton and BID–Plymouth hospitals. In the next year, BID–Needham will grow to offer a five-day physician presence including expanded offerings on the implantable aspects of pain medicine.

The increased utilization of telehealth following the coronavirus pandemic is expanding our services to a statewide catchment area so patients can be evaluated and managed remotely, increasing access to therapy in underserved locations.

New Programs

The Pain Medicine Fellowship will expand to eight positions from the current six, using the increased number of physicians, services and patients as an opportunity to enhance educational opportunities. The Comprehensive Headache Center will add a one-year Headache Fellowship that will focus on training the next generation of physicians in the comprehensive treatment of headache and facial pain, an educational opportunity that is available in very few centers nationwide.

We also plan to increase our collaboration with oncology and palliative care and provide interdisciplinary care for patients with cancer-related pain, including the recent partnership with Dana-Farber Institute.

Research

Pain medicine research is a vital component of our enterprise, particularly through the ground-breaking contributions of Drs. Jay Gill and Thomas Simopoulos. The various methods they have studied to fluoroscopically visualize the spine have penetrated widely into the specialty and become common practice. In addition, Drs. Gill and Simopoulos are exploring novel therapeutic approaches, both chemical and electrical, including epidural micro pellets and spinal cord stimulation correlation with pain pathways. They are also involved in developing new tools for treatment of spinal conditions and outcome studies of current therapies.

The Headache Center Research Group, under the direction of Dr. Rami Burstein, is deeply involved in studying the pathophysiology of chronic headaches and developing novel strategies to treat migraine and other headache syndromes.

Community Anesthesia

Since 2014, the department has expanded anesthesia services beyond BIDMC to include a network of seven community hospitals including Anna Jaques Hospital, BID-Milton, Needham and Plymouth Hospitals, Mount Auburn Hospital and New England Baptist Hospital.

Aileen Starnbach, MD
Vice Chair, Network Anesthsia
Site Chief, Mount Auburn Hospital
Instructor in Anaesthesia

Katherine Bourne, MD
Site Chief, Anna Jaques Hospital

Victoria Derevianko, MD
Site Chief, BID–Milton
Instructor in Anaesthesia

Hyun Kee Chung, MD
Site Chief, BID–Needham
Instructor in Anaesthesia

Erin Burns, MD
Site Chief, BID–Plymouth

Samir Patel, MD
Site Chief, New England Baptist Hospital

Anna Jaques Hospital

Anna Jaques Hospital is a 120-bed community hospital located 40 miles north of Boston. The department covers five operating rooms (ORs) and three endoscopy suites and administers sedation in the hospital's Comprehensive Pain Center. In addition, the department provides obstetrical anesthesia for over 700 deliveries annually with 24/7 in-house anesthesia coverage. Our anesthesia clinicians handle an average of 9,000 cases per year. We continue to take on a large volume of total and partial joint replacements, many of them using the Mako robot, following the protocols set forth by the New England Baptist Orthopedic Program, which we joined at the end of 2019. When the COVID-19 pandemic caused a lack of inpatient beds, we quickly transitioned to exclusively outpatient total joint replacements during the crisis. This was accomplished very effectively and as a result, we continue to perform many of these cases on an outpatient basis. In collaboration with our gynecological surgeons, we also continue to send many of our hysterectomy patients home using the enhanced recovery after surgery, or ERAS, program. By providing preoperative nutrition and hydration, multimodal analgesia and streamlined anesthesia pathways, our aim is to continually improve the surgical experience for patients. We are now working on extending the ERAS program to our C-section population and to other major surgeries. We expect our case volume to continue growing thanks to the recent arrival of new providers in general surgery, urology, endoscopy and interventional cardiology.

Anna Jaques Hospital

Miss Anna Jaques (1880-1884) was a wealthy, unmarried, childless woman who spent her entire life in Newbury, MA. She survived a sister and two very successful brothers, from whom she inherited a small fortune. In 1883, she consulted with her family physician, Dr. Francis Howe, on how she might best spend her money serving the community. He suggested that the community would benefit from a free hospital. Anna gave $25,000, and in 1884 the hospital opened its doors.

The hospital started with just 13 beds, but soon more were needed and in 1904 a new hospital was built where it stands now. Since then, Anna Jaques Hospital has thrived and grown and never lost sight of its commitment to the health of the community and its passion for excellent patient care. We take great pride in caring for the medical needs of those in the greater Newburyport area and in providing a meaningful, respectful place to work. At every level, through our hard work, loyalty, and willingness to help each other, the staff continue to sustain a culture that feels like family.

Our patients are equally dedicated and many say they don't want to go anywhere else for their care. Every day at least one patient tells me that they experience more kindness and genuine concern here than at any other hospital where they have received treatment. This culture of collaboration is nowhere more evident than in the Anesthesia Department—our team of doctors and CRNAs are like a second family. Together, we are committed to staying current with regional anesthesia, multimodal anesthesia and ERAS protocols. Most of our patients go home the same day, and so much of our focus is on quick recoveries and safe pain management.

Our affiliation with BILH gives patients the best of both worlds: personalized care with the support of the larger system to support best practices and appropriate referrals. We are looking forward to tightening those connections even further through the OneBILH project that is bringing us together as a network through more effective information systems.

Katherine Bourne, MD
Chief of Anesthesia, Anna Jaques Hospital

Beth Israel Deaconess Hospital–Milton

Beth Israel Deaconess Hospital–Milton (BID–Milton) is a 100-bed community hospital located eight miles south of Boston. BID-Milton has 24-hour emergency and surgical services, eight operating rooms, four endoscopy suites and an eight-bed intensive care unit (ICU). The BID–Milton Department of Anesthesia combines staff from both Harvard Medical Faculty Physicians and Associated Physicians of Harvard Medical Faculty Physicians to provide high-quality, patient-centered, team-based care throughout the hospital. Our current staff includes anesthesiologists who rotate in the operating rooms and endoscopy suites, intensivists who provide ICU coverage, pain medicine specialists, Milton-based nurse anesthetists and dedicated nurse practitioners for the Pain Clinic and the Pre-Admission Testing (PAT) Clinic.

While our case mix is varied, our specialty is orthopedic surgery, with these procedures making up approximately 40% of our operating room volume. Cases range from sports medicine procedures and primary total joint replacements to complex joint revisions. To support this program, we have developed an expansive regional anesthesia program to include nerve blocks for these surgeries, improving the patient experience, decreasing recovery time and decreasing length of hospital admission. We also support general surgery, gynecology, spine surgery, otolaryngology, plastic surgery, podiatry and urology, with these cases making up the remainder of our volume. BID–Milton uses a team-based care model, and the physicians regularly work with three or four nurse anesthetists in the operating room or the endoscopy suites. Our department is represented by both anesthesiologists and nurse anesthetists at almost all perioperative meetings for the hospital, including the Surgical Steering Committee, the Robotic Steering Committee and the Orthopedic Steering Committee. Our endoscopy unit is robust, averaging about 6,000 procedures per year.

BID–Milton

BID–Milton is a community hospital that is the perfect combination of academic medicine and patient-centered care. Even though we are offset from the main hospital, we pride ourselves on staying up-to-date on the latest evidence-based practices and are constantly updating protocols at our community site. In addition to continuously updating our Enhanced Recovery After Surgery (ERAS) protocols, maximizing regional anesthesia offerings, and staying up to date on the latest surgical procedures, we have implemented many innovative programs at the hospital, including a "Hip Fracture Pathway" to medically optimize and shorten length of stays for our elderly fracture patients and an "Airway Consult Team" to minimize after-hours intubations on the hospital floor.

With multiple area hospital closures in the last two years, our team has really stepped up to make anesthesia care more available to those who need it. We utilize every functional space to provide anesthesia care and have offered space to our nearby surgeons and gastroenterologists to allow them to continue to serve their patients during this difficult time. I am most proud of the way my group has come together to make this happen — working extra days, staying later than expected and jumping in to help with sick patients or challenging cases are daily occurrences. I often hear from my surgical colleagues, "You really have the best group!" and it is absolutely true.

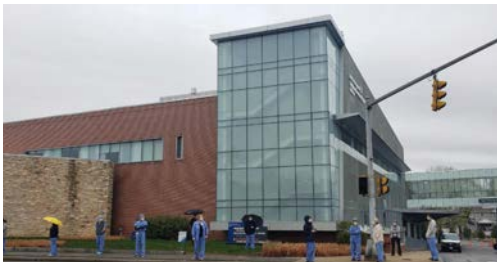
At BID–Milton, we not only treat our patients as if they were family, but we also treat each other like family. This shines through as we continue to attract patients and new staff. While the past two years has certainly presented our department with some unexpected challenges, we rose to the occasion with enthusiasm and ingenuity. We look forward to continuing to improve and expand upon our existing services.

Tory Derevianko, MD
Chief of Anesthesia, BID–Milton

Associated Physicians of Harvard Medical Faculty Physicians

Patrick Alvarado, MD
Holly Barko, MD
Arkadi Beloiartsev, MD
Sheri Berg, MD
Matthew Bloch, MD
Satrajit Bose, MD
Erin Burns, MD
Katherine Bourne, MD
Bahinah Callahan, MD
Sean Collins, DO
Sean Curran, MD, PhD *Instructor in Anaesthesia, PT*
Claire Eichinger, MD
Vladimir Eisenberg, MD
Maher El-Khatib, MD
Jonathan Erdman, MD
Jen Evansmith, MD
Fadi Farah, MD
Diana Fidrocki, MD *Instructor in Anaesthesia*
Lawrence Gibbons, DO
Zachary Glicksman, MD *Instructor in Anaesthesia*
Frank Gu, MD
Jessica Heath, MD
Sharon Herman-Berreby, MD
Mihaela Ionita, MD
Igrar Ismail-Zade, MD
Kara Joseph, MD
Lee-Wei Kao, MD
Sonia Kapoor, MD
Mark Kats, MD
Michael Kaufman, MD
Vladmir Kazakin, MD
Andrew Koropey, MD
Angela Lang, MD, MS
Marissa Lazor, MD
Helen Leung, MD
Michael Lubrano, MD
Anna Margulian, MD
Jan Matejka, MD
Kai Matthes, MD,PhD
Hollie Matlin, MD
John Mattimore, MD
Jennifer Merrell, MD
Lindsay Moore, MD
Ryan Nazemian, MD
Michael Natale, MD
Neil Oliwa, MD MD
James O'Rourke, MD
Samir Patel, MD
Yury Rapoport, MD
Schahid Rawoof, MD
Indu Reddy, MD
Thomas Russo, MD
Julie Selbst, MD
Maitriyi Shah, MD
Daniel Southren, MD
Aileen Starnbach, MD *Instructor in Anaesthesia*
Jeffrey Swanson, MD
Arun Uthayashankar, MD
Omkar Vaidya, MD
Tom Walsh, MD
Christopher Walters, MD
Jason Wang, MD
Mark Wechsler, MD
Elizabeth Welch Marsh, MD
Lisa Wollman, MD
Rowland Wu, MD
Svetla Yordanov, MD
Sana Zaidi, MD
Dana Zalkind, MD
Martin Zammert, MD

Beth Israel Deaconess Hospital–Needham



Beth Israel Deaconess Hospital–Needham (BID–Needham) is a 58-bed community hospital in the Beth Israel Lahey Health (BILH) network located eleven miles south of BIDMC. The surgical pavilion has a state-of-the-art, open-concept pre-anesthesia holding area and post-anesthesia care unit (PACU), along with six operating rooms. In addition, the recently built outpatient clinical center houses three endoscopy suites with bright and spacious pre-procedure and recovery bays. Our ORs handled 2,861 cases in 2022 as we continued to rebuild volume in the wake of the COVID-19 pandemic, and we are on track to surpass those numbers in 2023. Throughout 2022, we dramatically expanded our group of gynecologic surgeons and more than tripled our volume of gynecologic surgeries, including urogynecology. In the second half of 2022, we added a full-time orthopedic trauma surgeon, allowing us to treat the majority of these patients in the community where they reside rather than sending them to BIDMC. The year 2022 also saw the beginning of our student registered nurse anesthetist (SRNA) training program at BID–Needham. We serve as the introductory training site for up to three SRNAs in their first few months of training and welcome them back later in their training to learn regional anesthesia techniques. Of our inaugural class, all three have signed on to join our CRNA team at BIDMC and BID–Needham after graduation.

In the coming year, we look forward to continuing our expansion of anesthesia services for patients to receive care for increasingly complex procedures in the community where they live. In 2024, BID–Needham will expand its smallest operating room to accommodate nearly the complete range of surgeries we perform. We will also expand our colorectal surgery services with an additional surgeon and are in talks to bring robotic surgery equipment to BID–Needham for our general, colorectal, urologic and gynecologic surgeons.

BID–Needham

At BID–Needham, we are most proud of our experienced and highly qualified anesthesia providers. Our staff also practice at the main BIDMC campus and regularly care for critical patients undergoing complex surgeries, as well as those having routine elective procedures. The anesthesiologists at Needham are leaders in the HMFP anesthesia group. These leaders include site chiefs, division directors, and clinical administrators to mention a few areas of expertise. We are also privileged to have CRNAs who are leaders in the anesthesia department, specifically in the areas of administration and education. Our staff members include those with postgraduate doctoral degrees and those with fellowship training in the anesthesia subspecialties. We are proud to have a culturally diverse group and those with international clinical experience. Our dedicated caring staff is our strength at Needham.

Over the past two years, Needham has seen a steady increase in surgical volume and procedural sedation needs. Orthopedic anesthesia has changed greatly with the addition of our new orthopedic trauma surgeon. Complex, long duration, unscheduled orthopedics procedures are no longer transferred downtown and our group has met the subsequent increased late call and pager call demands. The construction of our new endoscopy unit has allowed our GI colleagues to expand their procedural practice. The endoscopy unit has been so successful with its safe and efficient care that there are already plans for expansion. Another area of sedation expansion is in radiology. We have instituted an anesthesia sedation pathway for inpatients that would otherwise have required transfer to Boston for sedated MRI scans. With proactive planning and adaptive scheduling, we have been able to meet the increased anesthesia demands at Needham without compromising patient care or efficiency.

The collegial relationship we have with our surgeons, perioperative nurses, and really all involved with patient care makes providing anesthesia at Needham unique. The principle of patient safety pervades every discussion, decision, and plan when it comes to perioperative care. There are no barriers in communication, no hierarchies overt or implied that prevent individuals from voicing concerns regarding improving care. It is obvious to all who work at Needham that when it comes to our patients there is one goal, to provide safe, high quality, efficient health care to all who come here.

Hyun Kee Chung, MD
Chief of Anesthesia, BID–Needham

Beth Israel Deaconess Hospital–Plymouth

Beth Israel Deaconess Hospital–Plymouth (BID–Plymouth) is a 153-bed community hospital located 43 miles south of Boston. In 2023, BID–Plymouth was again chosen as a Leapfrog "A"-rated hospital, a distinction the hospital has received 16 consecutive times. The BID-Plymouth Department of Anesthesia works closely with our tertiary care partner hospital in Boston to provide comprehensive anesthetic and pain management care to our patients. The Plymouth Department of Anesthesia comprises eight physicians, 19 CRNAs, and several nurse practitioners who provide care in pre-admission testing and chronic pain management.

Anesthesia care is provided in the operating rooms, the birthing center, pain management center, cardiovascular lab, endoscopy suites, interventional radiology, critical care unit and the emergency room. Anesthesiologists are available in the hospital 24 hours a day to meet urgent or emergent needs of the expanding South Shore community.

Obstetric services: In 2022, BID–Plymouth had 1,000 deliveries. The obstetric volume increased about 10%, while many other hospitals in MA experienced decreased obstetric volume.

Orthopedic and sports medicine: BID–Plymouth performs orthopedic cases, including joint replacements and sports medicine. The hospital currently has two Mako robots in use for joint replacement surgery. Joint replacements are done under spinal anesthesia whenever possible. We also perform complex spine surgeries using an image guided Brainlab. The hospital recently received certification as a Joint Commission Center for Excellence in Orthopedics.

The department is active in using advanced ultrasound-guided preoperative nerve blocks to minimize postoperative pain. Multimodal pain control is utilized whenever possible to limit narcotic use while providing excellent pain control and patient satisfaction. Fifty percent of our joint replacements are done on an outpatient basis.

For the past several years, BID–Plymouth has led a successful collaboration with the Commonwealth of Massachusetts to provide early intervention to patients when they arrive in the emergency room after a drug overdose. This intervention is done not only in the emergency room but after the patient is discharged. This program has helped highlight the potential pitfalls associated with the unnecessary use of opioids in the hospital environment. To that end, the department is committed to regional anesthesia whenever possible and beneficial, as well as multimodal non-narcotic alternatives to minimize or eliminate narcotic consumption while still providing excellent postoperative pain control. The department oversees the pre-admission testing center, including adoption of current evidence-based guidelines for preoperative testing. We are developing a multidisciplinary preoperative risk-stratification program for our joint arthroplasty surgical patients and will use this program to improve the management of more complicated patients.

The hospital constructed a new 25-bed observation unit in 2023 in response to a significant increase in patient volume. In addition, BID–Plymouth is planning a major emergency room renovation and expansion for 2024.

BID–Plymouth

Our anesthesiologists and CRNAs here at BID–Plymouth use a strong team approach to provide the best care for our patients at this busy and growing hospital in beautiful, historic Plymouth, MA. The hospital recently constructed a new 25-bed clinical decision unit to provide space for incoming, non-acute patients who do not require overnight hospitalization. Later this year, BID–Plymouth will begin a project to expand the emergency room to more than double the capacity in this area of the hospital and we also anticipate a new outpatient surgery center in Plymouth in association with BILH. The Department of Anesthesia looks forward to meeting these challenges with our usual blend of dedication and enthusiasm for our specialty and for patient care.

One particular area of excellence at BID–Plymouth is joint and hip replacement. We received Joint Commission core certification in this area, with 18 consecutive "A" ratings. Our hip fracture pathway gets patients to the operating room safely and efficiently and has been shared with other hospitals in our network. Currently, about 40% of our joint replacements are performed as outpatients.Within the last year we standardized protocols for dosing of local anesthetics to perform adductor canal and genicular blocks in total knee arthroplasties. We joined with surgical colleagues to use multimodal, opioid sparing anesthetics and use regional anesthesia when possible and strive to minimize postoperative pain with ultrasound guided nerve blocks for abdominal, breast, and orthopedic surgery.

Like other hospitals in our region, BID–Plymouth was directly affected by the closure of Brockton Hospital after a fire. We welcomed surgeons, gastroenterologists, and interventional cardiologists onto our staff and helped care for local patients impacted by this sudden event. The increased anesthesia volume has caused some scheduling challenges but our team went the extra mile, stepping up to work extra shifts. As always, we are grateful to have an incredible anesthesia department with skilled clinicians and a strong work ethic. Teamwork, inclusion, and respect for all members of our staff are the hallmarks of our culture and we look forward to working together to give each and every patient excellent and safe anesthesia care. .

Erin Burns, MD
Chief of Anesthesia, BID–Plymouth

Mount Auburn Hospital

Founded in 1886 as the first hospital in Cambridge, Massachusetts, Mount Auburn Hospital is dedicated to improving the health of the residents of Cambridge and its surrounding communities. Mount Auburn Hospital is a teaching hospital affiliated with Harvard Medical School and is the "third tertiary hub" in the Beth Israel Lahey Health system. The hospital is four miles from BIDMC.

Mount Auburn Hospital has 217 licensed beds and provides comprehensive inpatient and outpatient services in all medical specialties. We provide anesthesia services to a broad range of surgical specialties and performed approximately 12,889 cases in 2022 and 15,022 cases in 2023.

Mount Auburn Hospital is a Harvard teaching hospital and a clinical site for residents of multiple specialties. We host five to six student registered nurse anesthetists monthly from the Boston College Nurse Anesthesia Training Program. We are also a clinical rotation site for BIDMC Anesthesia residents, typically hosting one senior resident each month.

Mount Auburn Hospital

Mt. Auburn Hospital was founded in 1886 as the first hospital in Cambridge and is dedicated to improving the health of the surrounding communities of Cambridge, Belmont, Arlington, Watertown and Somerville. Many of our patients and families call Mt. Auburn "their hospital" and are reluctant to cross the river for care. Our broad clinical case mix, high patient acuity, cardiac surgical and structural heart capabilities, high OB volume and our affiliation with Harvard Medical School as a teaching hospital make us unique as a community hospital in the BILH system. We are a major site for the Boston College School of Nurse Anesthesia, hosting as many as 6 SRNAs each month in various clinical rotations.

Over the past year we have worked hard to build a dynamic group of physicians and CRNAs who work as a team to provide excellent patient care in the operating rooms and procedural areas. I am most proud of our culture of teamwork, inclusiveness and mutual respect. We have an excellent relationship with our surgical colleagues and work with them to develop new care pathways and collaborate on pain management strategies. We work together with our nursing and administrative colleagues to keep our ORs and procedural areas running efficiently and smoothly. Everyone pitches in to make it happen. We are well-respected clinicians in our hospital community.

We also enjoy spending time together outside of the hospital doing activities like archery, cooking classes, and book club. One of the surgical residents commented (somewhat longingly), "Wow, your department sounds really fun." Yes, we are!

Aileen Starnbach, MD
Chief of Anesthesia, Mount Auburn Hospital

New England Baptist Hospital

New England Baptist Hospital (NEBH), located a half mile from BIDMC in Boston, is a nationally recognized orthopedic subspecialty hospital whose mission is to promote wellness and restore function in patients with musculoskeletal diseases. Our department provides NEBH patients with high-quality and safe perioperative care, in accordance with the best evidence-based practices, to achieve rapid recovery. Through quality perioperative care planning, optimal pain management and intraoperative anesthetic techniques, our goal is to effectively improve the lives of our patients.

NEBH has 80 staffed hospital beds at the main campus, with 16 operating rooms (ORs). The hospital averages about 13,500 cases per year, with 6,500 total joint replacements, 2,000 spine surgeries, over 8,000 hospital admissions, and over 5,000 sports/outpatient procedures.

The department focuses on increasing the use of neuraxial and regional anesthesia techniques whenever possible has been very successful: in 2019, regional anesthesia was used for 30–40% of hip surgeries and has increased to over 90% from 2020 to the present time.

The department maintains an active relationship with the nurse anesthesia program at Boston College and generally has four student registered nurse anesthetists with us at a time. In addition, the department offers an anesthesia clerkship for Tufts University medical students and usually has one such student per month. The BIDMC regional residents and fellows are credentialed at NEBH to allow them to rotate on the busy block service.

The team continually works to improve the quality of our care and ensure our methods are based on the most up-to-date evidence in the field and has had considerable success with our internal quality-improvement projects over the past several years.

New England Baptist Hospital

The New England Baptist Hospital is a national leader in orthopedic care and surgery, and our Anesthesia Department team is a major part of that reputation for excellence. Our department's mission is to provide patients with safe, high-quality perioperative care guided by the best evidence-based practices, and help them achieve a comfortable and rapid recovery. Our continuous efforts to raise quality demonstrates our passionate commitment to provide the best anesthesia care for every patient. We have had made major progress with quality improvement over the past several years with projects mostly related to our long-standing, extensive perioperative nerve block database. We have:

- standardized perioperative anticoagulation management per American Society of Regional Anesthesia (ASRA) Guideline using outreach to community physicians to safely increase neuraxial and regional anesthetic options for our patients.
- developed a cardiac implantable electronic device (CIED) management pathway for the OR, Post-Anesthesia Care Unit (PACU) and floors.
- developed a perioperative Lidocaine Infusion protocol to assist with opioid sparing and optimal pain management in patients undergoing major reconstructive spine surgery.
- reviewed follow-up patient data on the effect of low-dose spinal anesthesia techniques on syncope incidence and time to patient ambulation

Of course, the glue that holds it all together our terrific team of physicians, CRNAs and physicians who expertly and compassionately care for our patients in our welcoming, inclusive and respectful environment! We are united in our efforts to improve the quality of life of our patients and look forward to the continued growth of our thriving and collegial anesthesia practice.

Samir Patel, MD
Chief of Anesthesia, New England Baptist Hospital

Service Trends

	FY19	FY20	FY21	FY22	FY23
Anna Jaques	8,919	7,234	9,064	8,884	9,313
BIDMC - Milton	13,593	11,685	10,788	10,766	11,164
BIDMC - Needham	7,017	6,574	9,099	12,488	13,763
BIDMC - Plymouth	16,213	15,867	19,488	20,299	23,394
Mount Auburn	2,034	10,545	12,207	12,889	15,022
New England Baptist	3,019	9,918	10,853	8,977	8,940

APHMFP CRNA Team

Claudia Ambrus, CRNA
Matthew Ascione, CRNA
Co-CRNA Site Lead at NEBH
Randy Barnhard, CRNA
Site Lead at Plymouth
Kristen Belmonte, CRNA
Hilary Bloom, CRNA
Amy Bogosian, CRNA
Joan Botelho, CRNA
Rachael Brennan, CRNA
Giovanna Burns, CRNA
Richard Burns, CRNA
Shelby Butler, CRNA
Katherine Canina, CRNA
Elizabeth Cardone, CRNA
Katelyn Caron, CRNA
Travis Caron, CRNA
Dayna Cary, CRNA
Joseph Casassa, CRNA
Ross Cerami, CRNA
Lori Cetrino, CRNA
Minwook Chong, CRNA
Jessica Clough, CRNA
John Cona, CRNA
Shannon Conley, CRNA
Michelle Cooper, CRNA
Alena Curry, CRNA
Chelsea D'Ascanio, CRNA
Matthew Daube, CRNA
Kathleen Demian, CRNA
Steven Demartini, CRNA
Beatrice DeRaco, CRNA
Nicholas D'Hemecourt, CRNA
Kevin Doherty, CRNA
Patrick Donohue, CRNA
Camie Doyle, CRNA
Nancy Dunn, CRNA
Susan, Emery, CRNA, PhD
Director, Nurse Anesthesia Program, Boston College, Wlliam F. Connell School of Nursing
Kathleen Evangelista, CRNA
Mary Foley, CRNA
Stacey Gargulio, CRNA
Victoria Gohh, CRNA
Paula Griesaker, CRNA
Penne Greer, CRNA
Shannon Griffin, CRNA
Sasha Griffith, CRNA
Richard Guillaume, CRNA
Rachel Hammerschmidt, CRNA
Erin Herrmann, CRNA
Co-CRNA Site Lead at Milton
Elizabeth Holcomb Demartini, CRNA
James Howard, CRNA
Beth Hughes, CRNA
Svetlana Ivanov, CRNA
Patrick Johnson, CRNA
David Kelleher, CRNA
Daryl Kinney, CRNA
Kimberly Kleinsorge, CRNA
Dorothy Kushmerek, CRNA
Ann Larson, CRNA
Joshua Lea, CRNA
Matthew Leblanc, CRNA
Christine Maggs, CRNA
Co-CRNA Site Lead at MAH
Michael Maguire, CRNA
Febrianty Manna, CRNA
Co-CRNA Site Lead at MAH
Hope Mangili, CRNA
Jennifer Manning, CRNA
Brad Manuel, CRNA,PA
Robert Martin, CRNA
Co-CRNA Site Lead at AJH
Kheyla Matthews, CRNA
Co-CRNA Site Lead at NEBH
Letitia Mazzaferro, CRNA
James McCowan, CRNA
Keegan McDonnell, CRNA
Elizabeth McGinnis, CRNA
Lauren McGrath, CRNA
Jah McLernan, CRNA
Karl Mitchell, CRNA
Leah Murnane, CRNA
Daniel Nichol, CRNA
Lisa Novak, CRNA
Martina O'Connell, CRNA
Marissa O'Connor, CRNA
Melanie Omojoloa, CRNA
Kathleen Oppenheim, CRNA
Casey Owens, CRNA
Elizabeth Pescosolido, CRNA
Katherine Polihrom, CRNA
Alexandra Post, CRNA
Taylor Pribaz, CRNA
Valerie Razis, CRNA
Lee Reeves-Blurton, CRNA
Susan Roessle, CRNA
Marybethe Sabeti, CRNA
David St. Germain, CRNA
Erin Sanchez, CRNA
Sachiko Sato, CRNA
Michael Schinis, CRNA
Gregory Sheedy, CRNA
Elizabeth Stansberry, CRNA
Elizabeth Staunton, CRNA
Elizabeth Stocksdale, CRNA
Jennifer Sullivan, CRNA
Ryan Swartz, CRNA
Wendi Sylvia, CRNA
Claudia Tetzner, CRNA
Amy Townsend, CRNA
Peter Tsinzo, CRNA
Victoria Turaman, CRNA
Maria Clara Vaz, CRNA
Caitlin Vitale, CRNA
Assistant Program Director, Nurse Anesthesia Program, Boston College, Wlliam F. Connell School of Nursing
Sten Willander, CRNA

Global Health

The department has a robust global health program that focuses mostly on Africa and South America, but has also been active in China, before the COVID-19 pandemic. In 2023, Edward Clune, MD, was named Director of Global Health Equity, to oversee all global health activity within the department. Dr. Clune is an attending anesthesiologist who has spent the last six years working in Botswana (ten months of the year in Botswana, two months at BIDMC) with the Botswana Harvard Partnership to build the country's anesthesia and critical care capacity. Dr. Clune recently returned to the US to practice anesthesia and take on this new leadership role. The goal of this new role is to consolidate the many ongoing efforts at improving anesthesia care around the globe and expand into new opportunities. The department is at a turning point regarding its international clinical reach and hopes to capitalize on the momentum already built around these efforts.

To continue this important work in Botswana, Dr. Catronia Stewart has moved abroad to take on the role of the Director of Anesthesia at the Botswana Harvard Partnership. She will use her many skills to move the program forward and expand upon the progress that has already occurred there. We are excited for the growth of the program and its promise for the future of BIDMC's global impact on anesthesia.

Following are descriptions of our programs, their activities and progress:

Boston-Africa Anesthesia Collaborative (BAAC)

The Boston-Africa Anesthesia Collaborative is a group of anesthesia providers, nurses and hospital/training institutions in Liberia and the US dedicated to creating accessible, high-quality, safe anesthesia care in Africa. The program is sponsored by the BIDMC Department of Anesthesia, Northeastern University Nurse Anesthesia Program (NEU) and Boston Children's Hospital (BCH).

Most of BAAC's focus has been on Liberia, where nurse anesthetists provide most anesthesia services in this country of 5.2 million. BAAC has made remarkable progress toward creating a self-sustaining anesthesia workforce and infrastructure to improve care and access to services in a country desperately in need of trained nurse anesthetists. At the start of the program, most Liberian counties had only one anesthesia provider per 100,000 citizens, far short of the World Health Organization's recommendation of 10 providers per 100,000 individuals. This innovative program has made strides toward narrowing that critical gap that imperils the health and lives of so many Liberian citizens.

The program, led by Dr. Eileen Stuart-Shor, a nurse practitioner from our Pre-Admission Testing (PAT) Division, joined with Liberia's Phebe College of Health Sciences to create an education program/curriculum to help train their nursing faculty to teach new nurse anesthetists. Needs were identified, such as scholarships; travel access to resource-poor, remote communities; and computer and online resource development, and strategies were deployed to create solutions. BAAC also implemented transnational online learning, with BAAC clinicians co-teaching courses at the school. This year a milestone was achieved when the program was formally elevated to granting a Bachelor's Degree in Nurse Anesthesia, with plans underway to advance to a Masters Degree in Nurse Anesthesia.

Each year, BAAC sponsors a visiting scholar program that brings Liberian faculty from Phebe to visit Boston for one month, where they do rotations at BIDMC, Children's Hospital and Northeastern University. The curriculum is competency-based, with didactics, experiential learning and clinical experiences. Liberians who complete the program receive a Certificate in Advanced Nursing Anesthesia Education from the partner institutions. Boston faculty travel to

Liberia for teaching sessions and mentoring. These trips mutually benefit both parties, who learn from each other and form relationships that are simultaneously productive and meaningful. Travel stopped during the COVID-19 pandemic but resumed in 2023, with one trainee from Liberia visiting Boston and several Boston CRNAs visiting Liberia in 2024. The lapse in in-person activity was enormously productive, though, with online sessions and website development taking the place of in-person training.

One of the most useful ventures of the program is the monthly Grand Rounds conducted via web-based technology. These rounds cover topics/issues/cases, problem-solve, and assess current practice standards. Both Liberian and US faculty, as well as Liberian students and nurse anesthetists from around Liberia, participate in these sessions. BAAC funds cover Internet routers and Internet time at Phebe to host these rounds, as well as stipends to Liberian hospitals for Internet time to assure they can connect to the rounds. Since the inception of the rounds in 2018 and with the support of small stipends for Internet time, participation in rounds has grown from a handful of institutions to all 34 of anesthesia providing hospitals.

Phebe and BAAC have been so successful in achieving their goals that they plan to build the Phebe College of Health Sciences Anesthesia Program into a Regional Center of Excellence. They have already created a rigorous national anesthesia curriculum that has been approved by the Liberian Board of Nursing and Midwifery, which is recognized by the International Federation of Nurse Anesthetists.

BAAC has graduated 62 well-trained, ready-to-practice nurse anesthesia students during the program. (In 2018 Phebe graduated 2 students, in 2023, 18 students, and in 2024 12 students who for the first time trained in anesthesia with a BSc rather than a diploma.) This is enormous progress as a diploma is a certificate from a non-degree granting institution like a hospital and this class was educated in a university and received their bachelor's degree in nursing.

Botswana Global Health Program in Anesthesia and Critical Care

The Botswana Global Health Program in Anesthesia/Critical Care was launched in 2017 at Scottish Livingstone Hospital (SLH) in Molepolole, Botswana, in partnership with the Botswana Ministry of Health and the Botswana-Harvard Partnership. The program offers residents and fellows elective opportunities in a unique global health learning experience, which complements the existing programs in medicine and OB/GYN that are part of the Botswana Global Health Initiative started in 2011. This elective is available to senior residents in their CA-3/PGY-4 year and critical care fellows at BIDMC and other US institutions.

This four-week (or longer) elective at SLH was led by BIDMC faculty anesthesiologist Dr. Edward Clune since its inception in 2017. (Dr. Catronia Stewart took over in 2023). During his tenure, Dr. Clune served as the Chief of Anesthesia and Critical Care, Program Director for the Anesthesia and Critical Care resident and fellowship rotations, and Director of Anesthesia at SLH. Dr. Clune also joined the faculty at the University of Botswana's School of Medicine, the only medical school in this country of 2.3 million.

Practicing in a resource-poor country is invaluable to the development of young clinicians and often life changing. Trainees use their skills as educators and clinicians in anesthesia and critical care, with emphasis on developing clinical skills and improved use of resources in a limited setting. They often care for patients with advanced pathology of disease not often seen in their home institution's ICUs and ORs and gain confidence in their skills and decision-making abilities in an environment where clinical assessment, flexibility and communication/teamwork are crucial to success.

In addition to leading the trainee program, Dr. Clune's role when he arrived in Botswana in 2017 was to help shore up critical care capacity and provide training to local clinicians. At the time, SLH was able to provide straightforward internal medicine and OB/GYN care but had to transfer patients requiring complicated treatment to a larger hospital in the capital city of Gaborone via a long ambulance ride.

Dr. Clune brought anesthesia and critical care residents from the US to Botswana, including from BIDMC, and helped build medical infrastructure at SLH. They set up a larger ICU with 24-hour coverage, provided intensive care in the ICUs, and did trainings for Botswana providers to improve their skill in critical care and non-routine medical procedures.

Anesthesiology services are scarce and in high demand in Botswana since the limited number of anesthesiologists there are mostly foreign nationals like Dr. Clune. While providing local trainings, Dr. Clune and BIDMC OB/GYN physician Dr. Rebecca Luckett, who was also in Botswana, realized how powerful it would be if Botswana had a home-based residency program in anesthesia and critical care so the country could educate their own providers. Previous efforts to create anesthesia residencies in the country had not been successful. Drs. Clune and Luckett worked with their colleagues in Botswana to launch an anesthesia residency in 2019 at the University of Botswana's School of Medicine. The first class of residents graduated from the program in 2023.

Despite the COVID-19 lockdown, Dr. Clune continued his practice and his teaching efforts, putting an intense focus on training Botswanan residents and fostering their independence and initiative. His commitment, as well as the determination of his Botswanan colleagues, resulted in the creation of a self-sustaining residency program in Botswana. His vision is that this program will continue to be a truly collaborative effort and an ideal model for international collaboration and health equity.

Our New Expansive Global Health Vision

Our dynamic Global Health Outreach Program is expanding under the leadership of Dr. Edward Clune. The program's mission is to improve global health equity by accelerating the development, deployment and sustainability of education initiatives and resources to improve perioperative outcomes. They will accomplish this using:

- Collaborative research projects
- Train-the-trainers program
- Driving innovation and developing technology

The Outreach Program uses a needs-based, bi-directional approach. Core members include Drs. Robina Matyal, Ed Clune, Cullen Jackson, Feroze Mahmood, Sara Neves, Akiva Leibowitz, Dario Winterton and CRNA Patricia O'Connor. Fellow Anesthesia and OB/GYBN department staff members are also active members of this initiative.

In addition to existing programs, the team is currently working on development of an ultrasound training exchange program in Bolivia and developing partnerships in Pakistan, India, and Ethiopia. They are developing key in-country contacts for collaboration, meeting with in-country decision makers, stakeholders and Ministries of Health. They have also started ongoing discussions with other academic institutions such as HMS and Brigham and Women's Hospital to develop a global health curriculum for residents.

Hospital Services and Organization

Pre-Admission Testing

The BIDMC Pre-Admission Testing (PAT) unit is a state-of-the-art clinic that provides perioperative management of patients undergoing surgery at BIDMC. Our team does blood drawing, electrocardiogram testing, complete physical evaluations and targeted physical therapy assessments. Our approach is multidisciplinary, and our team includes anesthesiologists, perioperative advanced practice nurses, nurses, case managers, physical therapists, medical assistants and administrative staff.

The PAT mission is to ensure patients are entirely prepared for their planned anesthesia and procedure. We cover all bases, including assessing patients' pre-existing medical conditions, patient education, collecting chart information, and completing all laboratory work and testing before the procedure. In addition, we introduce the patients to the medical center to promote a comfortable, patient-friendly experience.

After three years as director of Pre-Admission Testing, Dr. Richard Pollard, who is also vice chair of Quality, Safety and Innovation at BIDMC, appointed Dr. Joan Spiegel as the new director of Pre-Admission Testing.

Areas of Excellence

The PAT clinic brings an evidence-based approach to the perioperative management of anesthesia patients. Our providers have initiated clinical strategies to improve patient care and satisfaction along with our surgical colleagues. These approaches include implementation of the Enhanced Recovery from Surgery (ERAS) protocols and guidelines to ensure the best practices in patient care.

Service Trends

BIDMC's Pre-Admission Testing clinic is a bright, cheerful, patient-centered environment that is busy and efficient. We perform 70 to 80 RN telephone assessments a day (more than 15,000 a year), see on average 30 patients in the clinic each day, and another seven or more are reviewed by the attending as a waive. Many require a history and physical (~85%), blood draws (> 70%), or ECG (~45%). During fiscal year 2020, we prepared 15,647 patients for procedures, with 5,044 (32.3%) coming in for in-person screening. We usually have a much higher volume, but due to the impact of the COVID-19 pandemic, surgical procedures were significantly reduced. This trend continued into 2021, but over the past two years has seen improvement. During the COVID pandemic, our nurse practitioners and other staff were redeployed to other clinical locations to provide the needed care.

New Programs

The PAT group recently updated our practice-management guidelines for patients with diabetes, cardiac implantable electronic devices and opioid-use disorders. Our expert nurses now coordinate anti-coagulant medication for all surgical patients, not just those who come to PAT. We also continue our work with the Enhanced Recovery after Surgery (ERAS) initiative and continue to enhance clinical pathways for multiple surgical specialties. In addition, we refined practice-management pathways for perioperative anticoagulation management and postoperative nausea and vomiting (PONV). We revised our pre-anesthesia orders to incorporate changes in PONV and other guidelines.

Education

Resident education is also an essential part of PAT's mission. Our clinicians work with our trainees on the full range of issues related to pre-anesthesia testing, including cardiac risk assessment, perioperative management of pulmonary disease, cardiac implanted devices, diabetes, endocrine disorders, opioid disorders, psychiatric disorders, substance abuse and use of anticoagulants. While PAT does not do research, we assist with recruiting patients for the many clinical trials in our department. Dr. Pollard recently completed a chapter in Evidence-Based Anesthesia, 4th edition, titled "Does Anesthetic Choice Affect Surgical and Recovery Time?", encouraging the use of ERAS guidelines. Dr. Spiegel and her PAT team look forward to continually improving our pre-anesthesia patient care to ensure a safe, expert and compassionate experience for our patients.

PACU

The Post Anesthesia Care Units at BIDMC provide high-level acute care for patients emerging from anesthesia for surgical and procedural interventions. Major anesthesia and critical care societies have recognized the transitional state between anesthesia and wakefulness as a critical point where patients are most vulnerable in a multitude of aspects—hemodynamics, airway and ventilatory support, altered mental states and elevated stress. The PACU addresses these issues, facilitating the transition to discharge to home or hospital wards with highly trained nursing staff and medical direction provided by the Department of Anesthesia, Critical Care and Pain Medicine. PACU staff provide care for the entire perioperative period, from patient admission to the pre-operative staging area to post-

procedural discharge. The pre-operative side provides patient preparation resources and a complete envelope to support peri-procedural interventions (invasive line placements, neuro-axial blocks, regional nerve blocks, etc.). Aside from direct patient care and clinical service, the PACU serves as a teaching site for medical students, residents and fellows in their perioperative locations. PACU and anesthesia staff are engaged in research and quality improvement projects pertaining to perioperative care.

BIDMC has two PACUs on the East Campus and one PACU on the West Campus. In addition to the PACU, several procedural sites provide post-anesthetic recovery services for patients undergoing anesthesia and monitored anesthesia care: (1) recovery for GI procedures in Stoneman 3, Stoneman 4 and West Procedural Center; 2) recovery for interventional cardiology, electrophysiology and transesophageal echocardiography (TEE) procedures in Baker 4; and (3) recovery for electroconvulsive therapy (ECT) in Deaconess 2.

The Department of Anesthesia, Critical Care and Pain Medicine has a pivotal role managing the PACUs. Attendings and trainees are routinely called upon to diagnose and treat many postoperative conditions. In addition, the recovery rooms are often the only place where residents learn symptom management, unlike in the operating room where they would be managing mostly signs. The department is also involved in the creation of many multidisciplinary policies and guidelines that ensure safe and effective care of patients in the recovery room.

Simulation Center

The Carl J. Shapiro Simulation and Skills Center at BIDMC is led by a multi-disciplinary leadership team: Daniel Ricotta, MD (Senior Director; Medicine); Cullen Jackson, PhD (Associate Director, Center for Education Research, Technology and Innovation), Ernest Gomez, MD (Director, External Partnerships; ENT Surgery) and Charles Parsons, MD (Director, Surgical Programs; Trauma Surgery). The center occupies approximately 5,000 square feet on the BIDMC East Campus and is accredited by the American College of Surgeons as a Level I Education Institute. This simulation and skills center is utilized extensively for simulation-based training for attending and resident physicians and surgeons, nurses and other allied health professionals and medical student education across most of our clinical departments. Learners complete part-task and team-based simulations for minimally invasive surgery, robotic surgery, basic and advanced airway management, invasive procedures, acute trauma, obstetrical complications, cardiac and pulmonary arrest, ultrasound-guided procedures and management of surgical complications.

Anesthesia Skills Laboratory

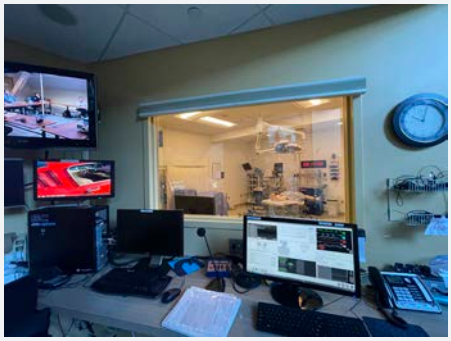
The Anesthesia Skills Laboratory is led by Robina Matyal, MD (Vice Chair for Education, and Director for the Center for Education Research, Technology, and Innovation (CERTAIN); Cullen Jackson, PhD (Associate Director [Research], CERTAIN); and Aiden Sharkey, MD (Associate Director [Clinical], CERTAIN). This 200-square foot facility is on BIDMC's East Campus and facilitates both individual and group skills training for our trainees and attendings. The space is flexible and allows for solo study as well as small- and large-group teaching, videoconferencing and live streaming. It is equipped with five networked computer workstations with the necessary software for individual study, data processing and analysis, research and simulation scenario design. This space also provides computer-based, part-task trainers, bench surfaces for hands-on practice with mannequin-based part-task trainers and a

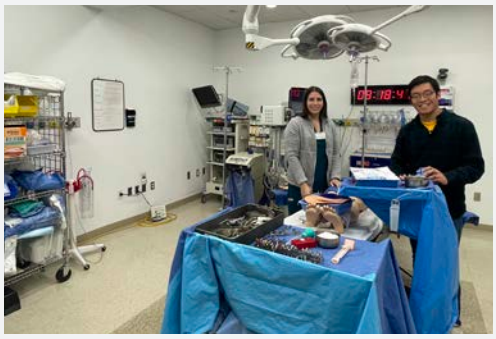
small conference room. We recently added six Meta Quest 2 virtual reality head-mounted displays, one Microsoft HoloLens 2 augmented reality head-mounted display, and laptop and desktop computers for connecting applications to these displays to facilitate access to novel mixed reality–based training environments.

Code Teams for Airway

The Department provides 24/7 coverage of airway management and support for the medical center. The Critical Care Division covers this service for the West Campus, including West Campus ICUs at BIDMC, handling urgent emergent airway issues on the floor, ICUs and procedure locations (e.g., catheter lab, gastroenterology, etc.). Backup coverage is provided by the West Campus operating room (OR) floor managers during weekdays and by the West Campus anesthesia call teams on nights, weekends and holidays.

On the East Campus, the OR floor manager provides airway management for the floors, procedure locations and the Finard ICU during weekdays. On weeknights, the East Campus airway management is shared between the East Campus anesthesia call attending and the OB anesthesia call attending. On weekends and holidays, the airway management service is covered solely by the OB anesthesia team on call.





Simulation offers opportunity for further growth and innovation

The Department of Anesthesia, Critical Care and Pain Medicine has a well-deserved reputation for excellence and innovation in the area of using medical simulation (real-life simulated situations that teach clinicians to handle medical crises without putting patients at risk) as a training method. They now have a partner of equal excellence to enhance their simulation program to even greater heights. In October, 2023, the Center for Medical Simulation (CMS) , a non-profit organization based in Boston and international leader in the area of medical simulation, merged with the Beth Israel Anesthesia Foundation (BIAF) of the Harvard Medical Faculty Physicians (HMFP) organization. BIAF is the research and education arm of the HMFP Department of Anesthesia, Critical Care and Pain Medicine. This merger is an important recognition of our department's status in medical simulation and our position as a leader in state-of-the-art clinical care, innovative research and exceptional anesthesia education.

The current CMS faculty remain with the center and continue to offer innovative, world-class courses and consulting services, along with members of our anesthesia department.

This merger is an exciting opportunity to build on our already impressive work in this area and presents the department with many advantages:

- It allows us to merge our resources with a highly respected center that shares our vision and expertise.
- It offers our faculty opportunities for unique collaborations that will foster continued innovation in this area.
- It furthers opportunity to collaborate on simulation-based research and teaching and strengthen our ability to obtain research funding for projects.
- It enhances our ability to provide simulation-based educational opportunities to our residents and fellows and be a strong recruitment tool to continue to attract the best trainees

On behalf of the Center for Medical Simulation, all our faculty and staff, we are immensely delighted to have merged with BIAF of HMFP. This merger will amplify our reach locally and globally, and strengthen our capabilities in fulfilling our Mission: "Experiential healthcare learning that never puts a patient at risk" And Vision: "Using simulation to improve safety, quality and education in healthcare."

Roxanne Gardner, MD, MPH, MSHPED, DSc
Executive Director, Center for Medical Simulation

Research Activities

Simon C. Robson, MD, PhD

Vice Chair, Research

Director, Center for Inflammation Research

Professor of Anaesthesia
Charlotte F. & Irving W. Rabb

Distinguished Professor of
Gastro-enterology and Hepatology

Joseph J. and Josephine A. Gazzola
Family Chair in the Field of
Inflammation Research at BIDMC

Overview and Organization

Research in the Department of Anesthesia, Critical Care and Pain Medicine at BIDMC includes a wide spectrum of investigation, ranging from basic mechanistic studies to translational research and innovative diagnostics. There are multiple clinical trials incorporated across all divisions in the department with long-standing collaborations forged locally, nationally and internationally.

Under the leadership of Dr. Daniel Talmor, the Research Division has more than doubled in size over the last five years. This was accomplished by strategic recruitment of research investigators at the assistant, associate and full professor levels, as well as by actively developing an internal pipeline of young investigators that consists of clinical faculty members and residents. Research activities are supported by a well-organized administrative structure, including the Vice Chair for Research (Simon C. Robson, MD, PhD) and the Administrative Director for Research (Alexander Shtifman, PhD) with support from the Chief Administrative Officer (Dawn Ferrazza).

The department currently employs over 80 research staff, which includes MD, PhD and MD/PhD investigators; approximately 30 postdoctoral fellows; residents who are participants in the research-track Loring Scholar residency program, as well as biostatisticians, research assistants, students and other research support staff. Over the past five years, research activities have been supported by grants from the National Institutes of Health (NIH), the Department of Defense (DoD), foundations, industry, philanthropy, Harvard Medical School, institutional and departmental funding. Annually, faculty members and staff publish over 200 peer-reviewed journal articles.

Vision and Opportunities

The Department of Anesthesia, Critical Care and Pain Medicine's primary goal, as defined in our strategic plan, is to become one of the world's preeminent hospital-based research departments in the areas of anesthesia, critical care, pain medicine, inflammation and headache. The Research Division contributes to achieving that goal by conducting studies that make a positive impact on clinical outcomes in critical care and perioperative medicine; implementing translational and clinical studies to promote superlative ICU and perioperative care; and managing pain, headache and inflammatory conditions.

Departmental leadership strives to support all researchers from idea conception and hypothesis generation through study completion, with dissemination of information, publication and translation to practice. The aim is to advance collaborations between clinical and research groups to optimize research outcomes, increase quality mentorship and thereby promote diversity and equity in the next generations of researchers and clinical scientists. Consistent with this strategy, departmental faculty and trainees are actively involved in a wide array of ongoing laboratory research and clinical translational projects.

Research conducted in the department has gained international recognition for its contributions to experimental neurosciences, with a focus on mechanisms of anesthesia, pain and headache, as well as basic and

clinical research in cardiovascular pathophysiology and delirium, purinergic signaling, inflammation, and respiratory pathophysiology in intensive care and perioperative settings. The department is dedicated to developing future clinician scientist leadership in research through mentorship, intensive research training and education.

Research Priorities

Growth and Recruitment: The department's long-term goals include programmatic growth, and an increase in the number of faculty members engaged in active research either as supporting members of collaborative teams or as independently funded investigators. This has been achieved through multiple approaches: 1) recruiting experienced investigators at all academic levels; 2) creating new Centers of Excellence; 3) assisting clinical faculty in developing de novo research programs; and 4) establishing a pipeline of new investigators through the residency program.

The department's senior leadership has been actively involved in recruitment of new faculty members who have established research programs. In the past five years, we successfully recruited four new faculty members from other institutions and other departments at BIDMC, all of whom have fully funded, robust basic research programs. The goal is to seek the top talent in clinical, bench and translational space and expand the research portfolio.

In conjunction with the recruitment of new faculty, the department has established four Centers of Excellence that include the 1) Center for Inflammation Research; 2) Center for Education Research, Technology and Innovation (CERTAIN); 3) The Sadhguru Center for a Conscious Planet; and 4) Center for Lung Injury Research (CLIR).

The department will continue to invest in developing research faculty. Over the past five years, multiple clinical faculty members received either T32 or K training grants. Several faculty members are currently participating in the Foundation for Anesthesia Education and Research (FAER) mentored training program and submitting grants to the National Institutes of Health and/or the Department of Defense. To further develop these faculty members, departmental leadership provided research space, the appropriate non-clinical time, as well as supplemental funding to conduct their studies and to hire research staff. Additionally, they established multiple grant mechanisms that aid junior and mid-level clinical faculty with the development and execution of new research projects.

Research Operations and Communication: The Center for Anesthesia Research Excellence (CARE; described in more detail below) is the department's core clinical research resource, and staffed with a senior program manager, project managers, PhD- and MS-level biostatisticians, a regulatory specialist and numerous research assistants, research fellows and research coordinators.

Research Training

Resident Research Program: The department is committed to supporting and facilitating clinical trainee research through the Anesthesia Resident Research Program. The goal of this program is to create meaningful and productive research experiences for the residents. Through the protected time and resources offered by the program, residents learn the basics of clinical or bench research, participate in, or lead research projects in line with their career goals, and ultimately have the chance to produce meaningful research that contributes to advancing the knowledge of the specialty. Residents who choose to participate are matched with a mentor, either within or outside the department, who can help develop and enhance their research skills. Additionally, residents benefit from the informal mentoring of the department's research leadership, offering meaningful insights and aid in overcoming any challenges that may arise along the way towards the successful completion of a project.

Loring Scholar Program: Applicants to the Anesthesia Residency Research Program have the option to apply for the Loring Scholar/Clinical Scientist Research Track.

The mission of the Loring Scholar/Clinical Scientist Research Track is to train future clinical scientists and leaders in research. The program aims to: 1) provide a solid foundation in research methodology; 2) develop a productive research career during training; and 3) produce clinical scientists of the highest caliber.

The department is also dedicated to training postdoctoral research fellows, undergraduate students and high school scholars. In 2023, about 30 research fellows received their postdoctoral training in basic, clinical and translational laboratories in the department.

Mentoring Program: The department has established a mentoring program for the research junior faculty. Each faculty member is provided with a mentoring committee consisting of their primary mentor and at least two other members of the faculty. The major goals of these committees include advising on career-related matters, providing guidance with research project developments and advising on grant opportunities and the publishing of papers.

Faculty Recruitment and Retention

The department is still in the growth and expansion phase with respect to its research program. As such, research leadership continuously seeks to recruit new research faculty in clinical, basic sciences and translational research domains either from other institutions worldwide or through the internal "grassroots" pipeline (the resident research program and Loring Scholar program). For the new recruits who have established research programs, the department offers competitive startup packages and obtains generous laboratory space.

Junior faculty or recent residency graduates receive considerable departmental support for their individual research projects. For example, the department recently established four new basic research laboratories with two investigators who were already members of the clinical faculty, and two investigators who were recent graduates of the BIDMC anesthesia residency program. Each investigator was provided with laboratory and office space on the BIDMC campus, as well as necessary equipment and supplies. Furthermore, the department has committed funds to ensure that each lab can sustain work until they are able to obtain their own funding.

Areas of Excellence

Over the past five years, the research program has expanded significantly, recruiting new faculty as well as developing outstanding new investigators. This has resulted in significant advances in the fields of inflammation, lung injury, perioperative outcomes, obstetric anesthesia, medical education and mindfulness/consciousness research, pain. and headache research.

DESCRIPTION OF RESEARCH EFFORTS

Centers of Excellence

Center for Inflammation Research

In 2018, the department created the Center for Inflammation Research, which has grown under the joint direction of Dr. Daniel Talmor and Dr. Simon C. Robson. This center was founded to support collaborative and multidisciplinary research. The goals of the center include integration of innate and adaptive immunologic advances in the diverse areas of inflammation and immunobiology and application of these advances to translational clinical care. With rising life expectancy, it is estimated that inflammatory diseases will claim up to one third of all health-related costs by 2030.

The center comprises basic scientists, immunologists, translational physicians and clinicians dedicated to prevention, treatment and cure of inflammatory diseases that will advance biomedical knowledge and enhance patient care. Growth has accelerated with the recruitment of three mid-level, independently funded principal investigators, who also serve as deputy directors in the center: Dr. Maria Serena Longhi, Dr. Joji Fujisaki and Dr. Ionita Ghiran. Each has their respective teams of scientists.

One major focus has been the discovery, characterization and investigations of mammalian ectonucleotidases, which are vascular, myeloid and regulatory lymphoid cell-expressed ectoenzymes that hydrolyze extracellular nucleotides, such as ATP and ADP, to adenosine and derivatives. CD39 and other gene family members expressed on the vasculature and regulatory immune cells are crucial in the maintenance of homeostasis, and in the control of inflammation and immune responses in transplanted as well as native organs, such as the lungs and liver.

These identified translational research challenges in inflammatory diseases of the cardiovascular system, lungs, liver, and gut are addressed from conception and preclinical development through to testing and validation of clinical translational impacts.

Achievements

In collaboration with prominent experts, the Center for Inflammation Research has published nearly 100 manuscripts and has active studies (NIH, industry, foundation and development funds, detailed below) spanning multiple areas of focus, such as arthritis and rheumatic disease specialties (ARDS); hyperoxic lung Injury; perioperative and post-trauma

inflammation and immunosuppression; transplantation biology; atherosclerosis; vascular calcification; Yentl syndrome; inflammatory bowel disease (IBD); and chronic autoimmune hepatitis (AIH); COVID; and lastly innovative pathways in the immunotherapy of cancer and immune exhaustion.

Simon C. Robson, MB, ChB, PhD, is the director of the Center for Inflammation Research. He has contributed to the development of the new science of purinergic signaling, where extracellular nucleotides and derivatives drive and control inflammatory reactions. He is known for the discovery of the function of vascular and immune cell CD39. Clinically he has been involved over several decades in the management and treatment of inflammatory and vascular liver diseases, inclusive of autoimmune hepatitis, liver transplantation, metabolic syndrome and inflammatory bowel disease, as well as studies in gastrointestinal liver cancer.

Current plans are to develop new knowledge and innovative reagents for purinergic and innate regulation of vascular responses, immune cell reactivity, and more recently in the context of inflammatory pain.

Joji Fujisaki, MD, PhD, is one of the deputy directors of the Center for Inflammation Research. He leads a laboratory focused on "stem immunology," which involves studies at the unique interface between stem cell biology and immunology. His laboratory has uncovered innovative regulatory mechanisms of the immune response against normal and malignant stem cells that have remained largely unexplored, despite the growing application of tumor immunotherapy and stem cell transplantation. Dr. Fujisaki's group has recently established the unprecedented understanding that the hematopoietic stem cell (HSC) microenvironment or niche within the bone marrow serves as an immunological sanctuary for stem cells, termed an "immune-privileged site."

Current plans are to develop new knowledge and innovative reagents in this area of stem immunology:

The Center for Studying Health System accommodates populations of unique regulatory T cells (Tregs) expressing ectonucleotidases, enabling rigorous immune protection of normal, transplanted, and malignant stem cells. The developing models can be applied to testing strategies to allow bone marrow transplant engraftment and tolerance.

Dr. Fujisaki's group has identified new mechanisms underpinning immune privilege for stem cells and niche-resident Tregs. These could serve as additional immunotherapeutic targets for inflammation, tissue injury, transplantation and cancer.

Ionita Ghiran, MD, PhD, is a recently recruited faculty member and third deputy director of the Center for Inflammation Research. He leads a laboratory focused on the biogenesis and tissue targeting of extracellular vesicles (EVs) or exosomes, and cargoes of extracellular circulating small, non-coding (nc) RNAs, with an emphasis on red blood cell (RBC)-derived EVs.

Current plans are to develop new knowledge and innovative reagents in this area of exosomes and ncRNA.

Maria Serena Longhi, MD, PhD, is the first to be appointed deputy director of the Center for Inflammation Research. She leads a laboratory focused on studying the mechanisms involved in immune tolerance breakdown in chronic inflammatory and autoimmune conditions, Crohn's disease and autoimmune hepatitis (AIH).

Her laboratory works on several preclinical projects and in the development of innovative reagents in inflammatory bowel disease (IBD) and autoimmune hepatitis. The lab has made major advances in the last five years.

Research Faculty Pipeline Development

Department-supported resources, as in the Loring scholarship awards, Federal NIH Grant T32/KL2 and other resources, are currently available for students, residents, trainees, fellows and faculty to foster education and training in biomedical research in the areas of focus of the Center for Inflammation Research.

The emphasis over the past several years has been on preclinical and experimental models of human inflammatory disease and the planned application of innovative discoveries to translational studies. This effort will also use currently available resources within other departments at BIDMC, the inter-institutional T32 award, as well as facilities at Harvard Catalyst, which serves to bring together the "intellectual force, technologies, and clinical expertise of Harvard University and its affiliates and partners to reduce the burden of human illness."

Such a coordinated research portfolio provides a platform for the development of training programs that cross disciplines and place the focus on innovation, discovery and translation. This program area will continue to develop relevant research and therefore prepare future generations of academic physicians and scientists.

Center for Lung Injury Research (CLIR)

The Center for Lung Injury Research (CLIR) is a multidisciplinary group of anesthesiologists, intensivists and pulmonologists who are world leaders in the field of applied lung-protective mechanical ventilation, both in the operating room and in the intensive care unit. The group is led by Drs. Daniel Talmor, Elias Baedorf-Kassis and Maximilian Schaefer. This unique collaboration allows us to utilize an unmatched methodological portfolio and knowledge base to investigate lung-protective ventilation strategies.

The center launched a series of projects using esophageal manometry, electrical impedance tomography and estimation of ventilation intensity to understand lung-protective ventilation and develop strategies to avoid postoperative pulmonary complications. A subsequent round of studies will focus on implementing these strategies into routine daily practice utilizing improved ventilator functions.

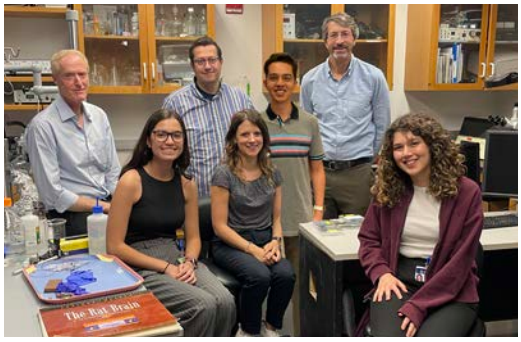
The Center for Education Research, Technology and Innovation

The Center for Education Research, Technology and Innovation (CERTAIN) was founded in late 2019 with the main goal of creating an environment of educational excellence through a process of continuous learning, assessment and feedback. CERTAIN faculty members conduct wide-ranging educational research and use the findings to improve educational programs and evaluate those programs to maintain heightened levels of learning and satisfaction. State-of-the-art technology is used to create innovative teaching and assessment methods that allow the department to tailor educational efforts to individual trainees and focus on their learning needs. CERTAIN presently manages over 10 projects that engage more than 25 department faculty members.

CERTAIN is led by Dr. Robina Matyal, vice chair for education, who has extensive experience in medical education research and teaching, along with the two associate directors. The associate research director, Dr. Cullen Jackson, leads research that focuses on applying cognitive science and human factors, engineering theories and methods to challenges in the perioperative setting. The associate clinical director is Dr. Aidan Sharkey, whose research interests include transesophageal echocardiography and point-of-care ultrasound.

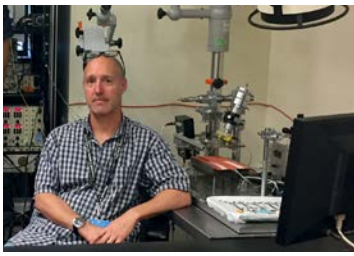
Another major CERTAIN objective is to train future educational leaders and provide them with support to conduct meaningful educational research projects. Mentorship is integral to this process. Center-affiliated faculty members actively mentor other faculty and residents in both project and career development. Drs. Matyal and Jackson are presently the primary mentors, but other team members are being trained so they can fill these roles over time. A team approach to research is strongly endorsed, and CERTAIN's projects have involved over 25 department members to date.

Headache Research



Headache research is one of the key research priorities in the department. Currently, there are multiple research groups engaged in bench, clinical and translational research that focuses on a better understanding of the physiology of the meningeal sensory system in health and migraine, the pathophysiology of migraine, post-traumatic and post-ictal headache, the mechanisms of action of migraine abortive and prophylactic drugs, and identification of biomarkers of response to selective migraine drugs.

In clinical research, the impact of any published article can only be judged years later when the published work is accepted and confirmed by others and when it has changed disease understanding, diagnosis and treatment. Taking this caveat into consideration, the highest and most immediate impact of the lab work done by the Burstein Lab, directed by Dr. Rami Burstein, the John Hedley-Whyte Professor of Anaesthesia, is attributed to a series of papers that collectively led to (1) immediate implementation of combination therapy for the prophylactic treatment of migraine in patients whose response to monotherapy is not satisfactory, (2) invention and distribution of devices that target retinal transmission in the treatment of migraine and photophobia, and (3) invention of a novel method for identification of treatment responders and treatment non-responders to anti-CGRP monoclonal antibodies using a simple and affordable test that can easily be implemented in non-academic headache clinics.



The major accomplishments and high impact of the Levy lab, led by Dr. Dan Levy, associate professor of Anesthesia, relate to preclinical published work demonstrating: 1) key cellular and molecular mechanisms that drive pain in migraine with aura via the activation and sensitization of meningeal afferents that involve astrocytes, 2) development of innovative two-photon imaging tools and algorithms to study the activity of dozens of meningeal in the intact meninges of awake-behaving animals, 3) development and implementation of a unique model of post-concussion headache and the delineation of the role of mast cells and calcitonin gene-related peptide (CGRP) signaling, 4) collaborative work with Dr. Isaac Chiu at HMS, which investigates the role for meningeal afferent CGRP signaling in mediating bacterial meningitis.

Sadhguru Center for a Conscious Planet

The Sadhguru Center for a Conscious Planet was founded in 2020 and is directed by Dr. Balachundhar Subramaniam. It is a multidisciplinary research center that combines science with yoga and meditation practices to create interventions that promote overall well-being and health. The center does research, facilitates thoughtful conversations and exploration, and builds awareness through education and community outreach. Its approach is to expand our experience and understanding of human consciousness, cognition and compassion. One of the center's major missions is to enhance the holistic health of the community and advance scientific frontiers through rigorous research in contemplative sciences. It also works to build collaborative partnerships and to offer tools for well-being and transformation.

The Sadhguru Center faculty conduct rigorous, cross-disciplinary research for mental and physical health outcomes in collaboration with prominent neuroscientists, physicians and biomedical researchers to more deeply investigate, through physiological and psychological correlates, how consciousness, cognition and compassion are aided by meditative practices. Their research employs both clinical and mindfulness-based interventions, such as multimodal intraoperative general anesthesia and opioid-sparing effective pain control in the postoperative period to improve post-operative outcomes, particularly related to cognitive decline and delirium that often occur in aged patients.

Achievements

In collaboration with prominent experts, the center has published over 25 journal articles and has 21 active studies (NIH and philanthropy funded) spanning diverse areas of focus such as perioperative delirium, cognitive decline, opioid-sparing, as well as the impact of non-pharmacological mind-body interventions on sleep, cognition, aging, inflammation and mental health in healthy and clinical populations.

The center brings together scientists, global experts and thought leaders across multiple disciplines (including healthcare practitioners, contemplative scholars, neuroscience and consciousness experts, and the public) to foster conversations and collaborations through speaker series, workshops and panel discussions. In addition, to nurture the next generation of impactful leaders and researchers, the center has established a robust and competitive internship program that provides research, clinical and community outreach experience to high school and college students from across the country.

Division Research Highlights

Critical Care

The Division of Critical Care faculty are dedicated intensivists and researchers focused on improving outcomes for patients with critical illness. Their investigations are wide-ranging, with mechanistic work at the bench extending into translational work, as well as interventional clinical trials supported and informed by epidemiologic surveys. The division performs qualitative research on ICU survivorship, provider moral distress and ethics and humanities in the critical care environment. It also investigates new drugs, novel mechanical ventilation management techniques and more. The most common disease targets are acute respiratory distress syndrome, sepsis and other organ failures.

The division leverages a strong network of collaborators in other departments as well as critical care researchers across the United States and Canada. This cross-pollination leads to exciting and innovative ideas, with expanded resources to test novel hypotheses in multi-center studies.

Notable/high-impact critical care research over the past five years

Drs. Daniel Talmor, Somnath Bose and Brian O'Gara, along with Valerie Goodspeed (program manager of the Center for Anesthesia Research Excellence [CARE]) and Dr. Nathan Shapiro in the Department of Emergency Medicine, lead the Boston Clinical Center within the National Heart, Lung, and Blood Institute's (NHLBI) Prevention and Early Treatment of Acute Lung Injury (PETAL) Network at the National Institutes of Health (NIH). This network aims to design and execute clinical trials to improve outcomes for very ill and at-risk patients across the United States. As part of this effort, the division is involved in related epidemiologic investigations, including studies on characterizing COVID-19 patients.

Funded by a grant from the Department of Defense, Drs. Daniel Talmor and Shahzad Shaefi are participants in a multi-center translational project titled DAMP-Mediated Innate Immune Failure and Pneumonia After Trauma – the Harvard-Longwood [HALO] Campus Area Consortium. This study addresses development of lung injury after severe trauma and investigates the underlying innate immunological mechanisms. The major focus is on the pathogenic role of immune cell signaling caused by "danger-associated molecular patterns" (DAMPs) that are derived from injured somatic tissues and include mitochondria-associated factors.

Drs. Daniel Talmor and Todd Sarge are involved in research on leveraging respiratory mechanics to improve outcomes. The research includes a multi-center study on the efficacy and safety of INTELLiVENT-ASV versus non-automated ventilation and a multi-center clinical trial on management of acute respiratory distress syndrome (ARDS) with esophageal pressure–guided positive end-expiratory pressure (PEEP) titration compared to an empiric high-PEEP strategy.

Dr. Shahzad Shaefi leads research on the prevention and treatment of organ dysfunctions in critically ill patients. He is involved in a multi-center clinical trial investigating the use of deferoxamine for the prevention of acute kidney injury associated with cardiac surgery. Dr. Shaefi's lab is also collecting data and specimens from patients after cardiac surgery to investigate mechanisms of postoperative organ dysfunction following cardiac surgery.

Funded by a grant from the Department of Defense, Dr. Bose leads a multi-center observational study (Addressing Post-Intensive Care Syndrome [APICS] on Survivors of Acute Respiratory Failure). This study examines the relationship between unmet needs after hospital discharge and patient outcomes. In 2021, this project was expanded to include COVID patients. Dr. Bose is now studying how to use machine learning to identify patterns of post-discharge healthcare needs and their fulfillment and identifying risk factors contributing to those patterns.

Dr. Shahla Siddiqui received a BIDMC Healthcare Delivery Sciences Innovation Grant for her study on improving communication among anesthesiologists, surgeons and nurses in the perioperative setting through inter-professional education in the time of COVID-19. She also does research on ethics, burnout, racial equity in end-of-life care and the leadership of women in critical care.

Drs. Talmor, Shahzad Shaefi, Somnath Bose and Brian O'Gara have been involved in studies with COVID-19 patients, including investigating the use of inhaled nitric oxide gas to treat mechanically ventilated patients with severe ARDS in COVID-19, fibrinolytic therapy to treat ARDS in COVID-19 patients, compassionate use of tissue plasminogen activator (tPA) for treating respiratory failure in COVID-19 patients, and outcomes of COVID-19 patients treated with hydroxychloroquine as well as an observational study on patients receiving volatile anesthetic sedation during the COVID-19 pandemic. In addition, Drs. Kadhiresan Murugappan, Daniel Walsh and Shahzad Shaefi researched resource allocation during the pandemic, including the allocation of veno-venous extracorporeal membrane oxygenation (VV-ECMO) and how crisis standards of care scores could exacerbate racial disparities in healthcare.

Drs. Daniel Talmor and Brian O'Gara lead research on the use of inhaled anesthetics to prevent lung injury. This research explores the lung-protective potential of volatile anesthetics in critically ill patients at risk for ventilator-induced lung injury.

Dr. Brian O'Gara researches the use of volatile anesthetics for sedation in the ICU and serves as a consultant for Sedana Medical (Danderyd, Sweden), which developed the AnaConDa, a medical device that helps administer inhaled anesthetics to mechanically ventilated patients.

Drs. Shahzad Shaefi and Brian O'Gara are involved in research on postoperative delirium in older cardiac surgical patients. Funded by an NIH grant, Dr. Shahzad Shaefi is analyzing postoperative delirium in these patients exposed to intra-operative normoxia versus hyperoxia.

Funded by an NIH grant, Dr. Shahzad Shaefi is leading a study on sepsis and the benefits of permissive hypoxia.

Drs. Todd Sarge, Achikam Oren-Grinberg and Akiva Leibowitz perform studies on echocardiography in critically ill patients during cardiac arrest. Along with Drs. Somnath Bose and Ameeka Pannu, they are also investigating the use of point-of-care ultrasound during cardiac arrests.

Dr. Daniel Walsh is involved with research on educating trainees, from anesthesiology interns to Navy combat and tactile medics, on how to use point-of-care ultrasound to make accurate diagnoses.

As director of the VV-ECMO Program, Dr. Shahzad Shaefi leads research on the efficacy of VV-ECMO, specifically in COVID-19 patients. Along with Dr. Ryan Gardner from the Department of Emergency Medicine, he is also involved with research on the efficacy of extracorporeal cardiopulmonary resuscitation (ECPR).

Funded by a two-year grant from the Israel-U.S. Binational Industrial Research and Development (BIRD) foundation shared with EyeControl Inc., IL, Dr. Somnath Bose is conducting a bi-national multicenter randomized control trial to assess the efficacy of an innovative communication platform (EyeControl) in reducing ICU delirium among older (> 50 years old) mechanically ventilated patients.

Cardiac Anesthesia

The research portfolio of the Division of Cardiac Anesthesia spans basic science research, data-based outcomes research, educational research and clinical research. The division has maintained an active basic science laboratory with ongoing projects related to ischemia and reperfusion, neo-angiogenesis, nanoparticle-based targeted drug delivery and metabolic syndrome–related myocardial ischemia. Currently, there is an ongoing NIH-funded trial regarding peri-menopausal ischemia–related myocardial injury during cardiac surgery. There is a robust data-based outcomes research operation with ongoing projects regarding gender-based outcomes after cardiac and non-cardiac surgery, perioperative blood transfusions and enhanced recovery after cardiac surgery.

The division is proud to possess a one-of-a-kind echocardiography simulation center with multiple state of the art echo simulators. Investigators in the division have conducted innovative educational research projects, and staff members and have won numerous educational grants, pioneered the use of motion metrics to track progression of proficiency during complex clinical tasks, and used it as a tool for training. Clinical research in the division includes innovative echocardiographic research for the application of three-dimensional imaging for ventricular and valvular analysis, assessment of suitability of valve repair techniques and their durability, and use of three-dimensional printing techniques to enhance understanding of valve structure and function. Members of the division also contribute to multiple national and international multi-center trials regarding percutaneous structural heart disease interventions. Some investigators are involved in clinical research regarding acute kidney injury, post-cardiac surgery delirium, use of regional anesthesia techniques for cardiac surgery and enhanced recovery after surgery. There are also several ongoing quality improvement research projects, such as early extubation, opioid-free cardiac surgery and perioperative transfusion management.

Vascular Anesthesia

The Division of Vascular Anesthesia is led by Robina Matyal, MD. Faculty members conduct clinical, basic science, outcomes and educational research. The division provides its faculty members a broad range of research opportunities along with exceptional mentorship. Faculty members of this division have published over 50 original papers and numerous case reports and book chapters.

Clinical research ranges from database analysis and use of ultrasound for cardiac and lung assessment to three-dimensional printing of patient-specific thoracic aortic aneurysms for preplanning related to various arterial branching re-anastomosis procedures. The clinical research focuses on identifying optimal anesthetic techniques in patients undergoing lower-extremity amputations through analysis of national databases and demonstrated improved outcomes with regional anesthesia. In addition, the division established that preemptive use of continuous peripheral nerve block in patients undergoing lower-extremity amputation allows for enhanced recovery through reduction in pulmonary complications, sufficient pain control and decrease in opioid consumption.

Basic science research involves nanoparticle-based remote delivery of angiogenic molecules for microvascular growth, pathophysiology of post-cardiac surgical atrial fibrillation and gender-based differences in diabetic cardiomyopathy. Currently, gender-based differences are being explored in heart failure and altered adenosinergic responses in the setting of post-menopausal estrogen deficiency, along with the translational implications via pharmacological Adora2AR agonist. Division members have presented their research at various annual scientific sessions at the American Society of Anesthesiologists, Society of Cardiovascular Anesthesiologists, American Heart Association and Harvard Medical School.

Vascular division faculty members have received numerous prestigious grants and funding from organizations such as the National Institutes of Health, National Institute of General Medical Sciences, and National Institute of Diabetes and Digestive and Kidney Diseases to investigate benefits of permissive hypoxia in sepsis, use of deferoxamine for the prevention of acute kidney injury, the gender-based differences observed in heart failure and altered adenosinergic responses in the setting of post-menopausal estrogen deficiency. Investigators in the division received funding from a

National Institute of Aging grant to study the role of purinergic dysfunction in heart failure with preserved ejection fraction and women's heart disease. Recently they have also received grant funding from FAER for a project on the development of an ultrasound curriculum and an NIH grant for a study on PGC-1a, purines and the post-menopausal heart.

Pain Medicine

Advancing the field of pain medicine through research is a central tenet of the Division of Pain Medicine. Faculty members in the division design and implement a variety of research projects centered around pain management. The division also mentors interested residents in their research endeavors, walking them through the Institutional Review Board (IRB) process, research conduct, analysis and publication of findings.

The division has been active in refining fluoroscopic techniques in interventional pain medicine. They have previously standardized the contralateral oblique view, which is becoming a standard of care for epidural access. Continuing in the same vein, the clinic has ongoing projects testing the utility of various views. In addition, the clinic faculty spearheads a multi-society effort to develop a standard nomenclature for interventional spine procedural reporting.

Another research focus centers around the assessment of spinal cord stimulator complications and outcomes. The division has published several prominent publications on this topic and continues investigation in this area of pain treatment. The division has also published several articles on technical and clinical aspects of spinal cord stimulation and analysis of variability in spinal cord stimulation practice parameters.

Over the past five years the division has conducted and completed multiple industry-funded studies and is currently participating in an international registry of spinal cord stimulator outcomes. Investigators in the clinic are also conducting another study comparing pulse dosing to continuous stimulation for spinal cord stimulation and an NIH-funded study to understand the mechanisms of spinal cord stimulation.

Neuroanesthesia

The Division of Neuroanesthesia conducts research on the delivery of anesthesia for neurosurgical procedures, perioperative brain health and perioperative brain monitoring.

Anesthesia for neurosurgical procedures: Coinciding with the division's strong clinical approach to neuroanesthesia, investigators are examining perioperative risk factors for adverse outcomes in neurosurgical procedures and are undergoing a multidisciplinary exploration of the potential of anesthetic relationships to neurosurgical outcomes, specifically hemodynamic management and choice of anesthetic regimen. They also have an ongoing randomized controlled trial examining the perioperative use of dantrolene for spine procedures.

Perioperative brain health: The division has engaged in multispecialty, large database outcomes research involving risk assessments for postoperative delirium and postoperative stroke. Members of the division are uniquely interested in the implications of intraoperative hemodynamic and ventilatory management on postoperative outcomes. Previous work, with the Outcomes Lab at BIDMC, explored the relationships between arterial hypotension and hypocapnia on outcomes in a broad surgical population. As there is growing interest in perioperative brain health, the division intends to continue research in this field.

Perioperative brain monitoring: The division has a strong investment in exploring and advancing the use and understanding of perioperative brain monitoring including electroencephalogram (EEG), cerebral oximetry and cerebral autoregulation. Members of the division are focused on several aspects, including multispecialty acquisition of EEG data and repository building, efficacy of training of EEG interpretation and EEG signatures. With newly-arriving enhancements in cerebral oximetry technology, they will explore the relationship of cerebral autoregulation to postoperative delirium and relationships of anesthetics to cerebral autoregulation.

Gastrointestinal Anesthesia

The division of Gastrointestinal Anesthesia, led by Dr. Eswar Sundar, conducts research around the use of monitored anesthesia care, endoscopy masks and high flow oxygen.

They have published the first-ever consensus guidelines for the performance of anesthesia for endoscopic retrograde cholangiopancreatography (ERCP) procedures. Using the Delphi method, they reached consensus on several pressing issues. The international panel had representation from the United States, United Kingdom, Thailand and Australia.

Obstetric Anesthesia

The mission of the Division of Obstetric Anesthesia is to create an environment fostering excellence in clinical care, education and research. Physician-researchers in the division bring their clinical insights to basic and translational research, and conduct clinical research to provide scientific data to support evidence-based medicine to improve patient care.

Investigators in the division engage in clinical and basic research focused on topics relevant to obstetric anesthesia. Some of our ongoing research projects are:

Mitochondrial and metabolic mechanisms of aging placenta: This project focuses on characterizing the changing metabolism of the placenta as it ages and encounters other stressors, as well as on determining how mitochondrial dysfunction and metabolic changes in the aging placenta affect the timing of labor onset.

Gastric emptying during labor: The current philosophy of nothing per mouth (NPO) for pregnant women originated from Mendelson's observation in the 1940s that a higher incidence of pulmonary aspiration occurs among obstetric patients who undergo operative vaginal delivery and cesarean delivery under general anesthesia. Since then, obstetric anesthesia procedure has undergone a significant evolution. The widespread use of neuraxial analgesia/anesthesia has driven the rate of general anesthesia <5% on a national level. There is increasing evidence that the NPO policy may have minimal effect on the rate of aspiration. However, the gastric emptying in pregnant women during labor is partially studied using indirect measurement of paracetamol absorption. The division is involved in a randomized controlled trial that examines the rate of gastric emptying by comparing a carbohydrate-based and a protein-based sports drink to evaluate the effect of oral intake on laboring women by using ultrasound technique.

Non-invasive blood pressure monitoring vs. invasive arterial line in the management of placental accreta spectrum: Four of the five leading causes of maternal mortality require close blood pressure monitoring: preeclampsia with severe features, hemorrhage, infection or sepsis, and high-risk pregnant women with cardiac comorbidities.

BIDMC has established the New England Center for Placental Disorders to focus on improving the treatment of women with placenta accreta. Typically, these patients are monitored with an invasive intra-arterial catheter for continuous blood pressure monitoring (IABP). In the current research study, the group measures the effectiveness of a continuous non-invasive arterial pressure monitoring (CNAP) compared to IABP in awake women undergoing cesarean hysterectomy. A key secondary goal is to assess potential markers of volume depletion to see if there is a target to improve fluid repletion in these pregnant patients.

Optimal intrathecal morphine dose for post cesarean analgesia: Cesarean delivery is the most common surgical procedure in the United States. Intrathecal morphine (ITM) is the gold-standard for pain control after cesarean delivery. We hypothesize that with optimized early recovery after cesarean (ERAC) perioperative management, lower doses of ITM would provide similar duration of analgesia compared to a higher dose.

In a prospective, randomized, double-blinded and controlled trial, the primary outcome was timed to the first request for supplemental analgesic. A notable finding in our study is that 86% of patients did not require supplemental opioids in the first 24 hours and 51% remained opioid-free 72 hours after delivery. However, in the setting of a multimodal ERAC protocol, lower doses of ITM are inferior to a higher dose (250 mcg) when measuring the time to the first rescue analgesic.

Multidisciplinary transfusion education decreases avoidable peripartum blood transfusion: Postpartum hemorrhage (PPH) is a leading cause of maternal mortality and morbidity worldwide. Investigators in the division studied all peripartum red blood cell transfusions over four years at our tertiary maternal care center. 430 transfusion cases were reviewed, including a three-year baseline period (294 cases) followed by a one-year post-impact period (136 cases). Multidisciplinary transfusion education decreased clinically avoidable transfusion, lowered the rate of transfusion-related complications, and decreased the practice of giving [3] two units of red blood cell transfusion together without recheck hemoglobin concentration.

Influence of neuraxial anesthesia on outcomes of external cephalic version: Deliveries with breech presentation carry excess risk for neonatal mortality and morbidity, so cesarean delivery is often chosen in this situation. External cephalic version (ECV) may help to avoid cesarean delivery. We examined the impact of neuraxial anesthesia on the success rate of ECV in our medical center, reviewing 301 ECV cases. We found that neuraxial anesthesia was associated with a small but not statistically significant increase in success rates (42.1% vs. 35.3%). Using low-dose spinal did not decrease the success rates of ECV but also did not statistically reduce the recovery time before discharge.

Thoracic Anesthesia

Research in the Division of Thoracic Anesthesia includes various studies investigating perioperative care in the operating room and intensive care unit. Patients having thoracic surgery are particularly vulnerable to postoperative respiratory complications, so there is a strong focus on investigating strategies to alleviate these detrimental events. In this context, lung-protective ventilation, both in the operating room and intensive care unit are a central element of research within the division. Ongoing studies aim to further understand the physiology of mechanical ventilation during one-lung ventilation, which is a key part of thoracic surgery. Through numerous studies, our group has determined that proper management of neuromuscular blockade is an important factor for avoiding postoperative respiratory complications.

In addition to studying the prevention of postoperative respiratory complications, other studies investigate strategies to improve overall recovery after surgery, including avoidance of other clinically relevant adverse events, and delirium. Research led by members in the division has found that intraoperative hypoxemia and impaired cerebral perfusion are important contributors to postoperative delirium, especially in older patients. Postoperative recovery and patient satisfaction can be further impaired by postoperative nausea and vomiting, which are long-known side effects of anesthesia.

Finally, data published from members in the division show a strong increase in the prevalence of cannabis consumption among surgical patients, and they are currently investigating the implications of cannabis use for perioperative care.

Regional Anesthesia

The Division of Regional Anesthesia is working on several ongoing research studies. Current projects include:

Improved recovery room length of stay with regional anesthesia and improving perfusion and pain control during graft surgery

Using botulinum toxin for TAP block injections to improve outcomes after component separation and ventral hernia repair surgery

Benefits of erector spinae plane blocks in thoracic surgery

Orthopedic Anesthesia

The Division of Orthopedic Anesthesia participates in the Successful Aging After Elective Surgery (SAGES) study that aims to collect spinal fluid for analysis of multiple inflammatory markers in joint-replacement patients. In addition, several faculty members participate in a study that evaluates multimodal analgesia for patients having total joint arthroplasty.

Training Grants

Over the past five years faculty of the Department of Anesthesia, Critical Care and Pain Medicine have been awarded the following federal, foundation and institutional mentored training grants.

Award Type	Year	PI	Title
T-32 (MGB)	2023	David Melton, MD, PhD	Macrophage-derived extracellular vesicle miRNAs in trauma-associated acute lung injury and pneumonia
FAER-MRTG	2022	Erin Ciampa, MD, PhD	Mitochondrial and metabolic effectors from the aging placenta may trigger the onset of labor
FAER-MRTG	2023	Ruma Bose, MD	Developing proficiency in rescue-guided crisis management using a modular competency-based curriculum for advanced learners in anesthesia
FAER-MRTG	2024	Jessica Cassavaugh, MD, PhD	Estrogen, inflammation and metabolic disease
FARE	2024	Sara Neves, MD	Developing automaticity in invasive procedures: Novel application of an immersive virtual reality simulator
Shore	2024	Anastasia Katsiampoura, MD, PhD	Characterization of CD39 expression on Tregulatory cells in regulation of inflammation during cardiopulmonary bypass
Shore	2023	Samir Kendale, MD	Cerebral Autoregulation in Non-cardiac Surgery and Relationship to Postoperative Delirium
Shore	2022	Sankal Sehgal, MD	PEctoraLis nerve block for anaLgesia in patients undergoing cardiovascular implantable electronic device procedures: A randomized, triple-blinded, placebo-controlled trial (PELLUCID)

NIH/DoD-Sponsored Research in Fiscal Year 2023-2024

PI Name	Title	Sponsor
Bose, Somnath	APICS-COVID	DoD
Burstein, Rami	Cortical mechanisms of headache: Beyond CSD	NIH NINDS
Fujisaki, Joji	Roles and therapeutic potential of CD150 high niche-associated regulatory T cells in bone marrow injury and engraftment	NIH NHLBI
	Identification of unique nitric oxide-expressing hematopoietic stem cells and their special vascular niche	NIH NIDDK
	Immune privilege of the hematopoietic stem cell niche in the bone marrow shields metastatic prostate cancer from immunity	DoD
	Privileged and primitive hematopoietic stem cells, niches, and regulatory T cells	NIH NHLBI
Ghiran, Ionita	Effect of methodological and biological variability on molecular profiling of extracellular vesicles in cancer detection	NIH NCI
	Supplement: Effect of methodological and biological variability on molecular profiling of extracellular vesicles in cancer detection	NIH NCI
	Integrative, multi-parametric characterization of the EV surface protein and nucleic acid landscape by nano-flow and sorting cytometry	NIH NCATS
	Molecular dissection and imaging of extracellular vesicles to define their origin and targets	NIH NCATS
	Red blood cells shuttle beta amyloid between brain and heart: Implications for the pathogenesis and the progression of Alzheimer's and Cardiomyopathy	NIH NHLBI
	Red blood cells shuttle beta amyloid between brain and heart: Implications for the pathogenesis and the progression of Alzheimer's and Cardiomyopathy	NIH NHLBI
Jackson, Cullen	Virtual operating room team exercise (VORTeX) simulation environment	NIH NIBIB
	VORTeX COVID-19 supplement	NIH NIBIB
Levy, Dan	Mechanisms of CSD-evoked activation and sensitization of meningeal nociceptors	NIH NINDS
	Cortical-meningeal interactions underlying migraine headache	NIH NINDS
	Response Properties Of Meningeal Afferents In Health And Disease	NIH NINDS
Longhi, Maria Serena	Immunomodulatory effects of bilirubin are mediated through three aryl hydrocarbon receptor, O2 and purinergic pathway	NIH NIDDK
	Alterations of aryl hydrocarbon receptor signaling in autoimmune hepatitis	NIH NIDDK
Matyal, Robina	PGC-1a, purines and the postmenopausal Heart	NIH-NIA
Noseda, Rodrigo	Pathophysiology of occipital migraine	NIH NINDS
Robson, Simon C.	DAMP-mediated Innate Immune failure and pneumonia after trauma	DoD
	Enteric glia and visceral pain	NIH NIDDK
	New driver of fibrosis and calcification in CAVD	NIH NHLBI
	PGC-1alpha, purines and the postmenopausal heart	NIH-NIA
	Targeting purinergic signaling in Chagas disease	NIH-NIAID
	T cell genotype/phenotype influence on atherosclerotic cardiovascular disease	NIH-NHLBI
Shaefi, Shahzad	Sepsis and the benefits of permissive hypoxia	NIH NIGMS
	Hepcidin-ferroportin-iron axis in cardiac surgery-associated acute kidney Injury	NIH NIDDK
	Deferoxamine for the prevention of acute kidney injury	NIH NIDDK
Subramaniam, Balachundhar	Scheduled prophylactic 6-hourly IV acetaminophen to prevent postoperative delirium in older cardiac surgical patients	NIH NIA
	An anesthesia-centered interventional bundle to reduce postoperative pulmonary complications	NIH NHLBI
	Admin supplement: Scheduled prophylactic 6-hourly intravenous acetaminophen to prevent postoperative delirium in older cardiac surgical patients (PANDORA)	NIH NIA
	Bioinformatic tools for applied perioperative physiology	NIH NIBIB
	Scheduled prophylactic 6-hourly IV acetaminophen to prevent postoperative delirium in older cardiac surgical patients (PANDORA)—EEG Administrative Supplement	NIH NIA
Talmor, Daniel	DAMP-mediated innate immune failure and pneumonia after trauma	DoD
	PETAL Network ICC for ACTIV-3: Therapeutics for severely ill Inpatients with COVID-19 (TESICO)	NIH NHLBI
	PETAL: Acetaminophen and ascorbate in sepsis: Targeted therapy to enhance recovery (ASTER)	NIH NHLBI
	CCC for NHLBI: Prevention and early treatment of acute lung injury—PETAL Network Cost Extension	NIH NHLBI

Industry-Sponsored Research in Fiscal Year 2023-2024

PI Name	Title	Sponsor
Ashina, Sait	A phase 3, multicenter, randomized, double-blind, placebo-controlled parallel-group study to evaluate the efficacy, safety, and tolerability of atogepant for the prevention of chronic migraine (PROGRESS)	Allergan
	A phase 3, multicenter, open-label 52-week extension study to evaluate the long-term safety and tolerability of oral atogepant for the prevention of migraine in participants with chronic or episodic migraine	Allergan
	A Phase II/III, multicentre, 8-week run-in phase followed by a 12-week, prospective, parallel-group, double-blind, randomized withdrawal, placebo-controlled study, with a 52-week open label extension, to evaluate the efficacy and safety of daily 1.5 to 3.5 mg basimglurant in patients with pain associated with trigeminal neuralgia with suboptimal response to their current anti-pain therapy	Noema Pharma AG
	A phase 3 multicenter 24-week open-label study to evaluate the safety, tolerability, and efficacy of atogepant when added to onabotulinumtox (BOTOX) for the preventative treatment of chronic migraine	AbbVie
	Interventional, randomized, double-blind, parallel-group, placebo-controlled study with an extension period to evaluate the efficacy and safety of eptinezumab for the prevention of migraine in patients with unsuccessful prior preventative treatments	Lundbeck Inc.
Goodspeed, Valerie	Nitric oxide treatment In COVID-19 evaluation (NOTICE)	Mallinckrodt Inc.
	Quantitative image scoring to understand temporal course of COVID-19	Pfizer
Burstein, Rami	Novel insight into migraine pathophysiology and galcanezumab mechanisms of action	Lilly USA, LLC
	Sleep and fremanexumab	Teva Pharmaceutical Industries, Ltd.
	BOTOX effects on seizure severity and susceptibility	Allergan
Ferrigno, Massimo	The time course of Transcutaneous pCO2 (tcpCO2), after induction of general anesthesia, and its difference with End-Tidal CO2 (etCO2), at a time when cardiac output (and pulmonary blood flow) may be transiently decreased	Radiometer
Gill, Jatinder	A global registry to evaluate the long-term effectiveness of neurostimulation therapy for pain	Boston Scientific
Leibowitz, Akiva	Point of care ultrasound lung artificial intelligence (AI) validation data collection study	Philips Healthcare
O'Gara, Brian P.	Sub K In from Hospital of Clermont-Ferrand: Inhaled sedation in COVID-19-related acute respiratory distress syndrome (ISCA).	Sedana Medical
	A phase 3, multicenter, randomized, controlled, open label, assessor-blinded study to evaluate the efficacy and safety of inhaled isoflurane delivered via Sedaconda ACD-S compared to intravenous propofol for sedation of mechanically ventilated intensive care unit adult patients	Sedana Medical
Ramachandran, Satya K.	Intraoperative opioid waste and related outcomes	Fresenius Labs, LLC
Robson, Simon C.	CD39/purinergic signaling in cancer	Tizona-Trishula Therapeutics
	Targeting ENTPD3 to boost extracellular ATP and inflame tumors	Emerson Collective
Schaefer, Maximilian S.	The implementation of Sugammadex in an academic teaching hospital and its effects on postoperative adverse outcomes and hospital costs	Merck & Co, Inc
Subramaniam, Balachundhar	Effects of the orexin receptor antagonist Suvorexant on sleep architecture and delirium in the intensive care unit: A pragmatic, randomized-controlled trial	Merck & Co, Inc
	Perioperative multimodal general anesthesia focusing on specific CNS targets in patients undergoing cardiac surgeries: The PATHFINDER 2 Study	Masimo Corporation

PI Name	Title	Sponsor
Talmor, Daniel	Prospective, multicenter, randomized, controlled study comparing efficacy and safety of INTELLiVENT-ASV versus non-automated ventilation in adult ICU patients (EASiVENT)	Hamilton Medical
	Study Chair Agreement: EASiVENT	Hamilton Medical
	HIBISCUS: A phase II multi-center, double-blind, randomized and placebo controlled study of the safety and efficacy of intravenous recombinant human interferon beta-1a for the treatment of hospitalized patients with COVID-19 Infection	Faron
	Study Chair Agreement: HIBISCUS	Faron
	Combination of preoxygenation with face mask standard oxygen and high flow apneic oxygenation using a new anesthesia workstation machine: A proof-of-concept study	Mindray Medical

Foundation/Other Sponsored Research in Fiscal Year 2023-2024

PI Name	Title	Sponsor
Bose, Somnath	Multicenter clinical trial—investigating delirium management via communication intervention technology	BIRD Foundation
Bose, Ruma	Developing proficiency in rescue-guided crisis management using a modular competency-based curriculum for advanced learners in anesthesia	FAER
Ciampa, Erin	Mitochondrial and metabolic effectors from the aging placenta may trigger the onset of labor	FAER
Fujisaki, Joji	Tolerance against normal and malignant stem cells	Harvard
Longhi, Maria Serena	CD39 antisense: A new therapeutic target for Crohn's disease	Crohn's & Colitis Foundation of America
Ma, Haobo	Development of a cost-effective 3D modular airway model for schema-based fiber optic intubation training	Society for Education in Anesthesia
O'Gara, Brian P.	Perioperative VR to reduce sedative and opioid requirements	BIRD foundation
	2022 Medical Student Anesthesia Research Fellowship (MSARF) Summer Program	FAER
	2023 Medical Student Anesthesia Research Fellowship (MSARF) Summer Program	FAER
Ramachandran, Satya Krishna	CONcISE SPREAD initiative	CRICO
Robson, Simon C.	Development funds for postdoctoral fellow	Jane Siegel Fellowship Grant Other Development Office-sponsored

Clinical Trials

BIDMC Anesthesia Interventional Human Subject Research Studies over the past five years, including drug and device trials, holistic and survey research.

PI Name	Protocol Title
Ashina, Sait	A Phase II/III, multicenter, 8-week run-in phase followed by a 12-week, prospective, parallel-group, double-blind, randomized withdrawal, placebo-controlled study, with a 52-week open label extension, to evaluate the efficacy and safety of daily 15 to 35 mg basimglurant in patients with pain associated with trigeminal neuralgia with suboptimal response to their current anti-pain therapy
	A phase 3 multicenter 24-week open-label study to evaluate the safety, tolerability, and efficacy of atogepant when added to OnabotulinumtoxinA (BOTOX) for the Preventive Treatment of Chronic Migraine
	A phase 3, multicenter, open-label 104-week extension study to evaluate the long-term safety and tolerability of oral atogepant for the prevention of migraine in participants with chronic or episodic migraine
Baedorf Kassis, Elias	The frequency of screening and SBT technique trial: The FAST trial
	Adaptive support ventilation In ARDS
	Incidence of dyssynchronous spontaneous breathing effort, breath-stacking and reverse triggering in patients with severe hypoxemic lung injury
Bose, Somnath	Addressing post-intensive care syndrome (APICS). [DoD]
	Inhaled nitric oxide gas therapy in mechanically ventilated patients with severe acute respiratory syndrome in COVID-19
	BOTOX effects on seizure severity and susceptibility

PI Name	Protocol Title
Burstein, Rami	Novel insight into migraine pathophysiolgy and galcanezumab mechanism of action
	Fremanezumab, migraine and sleep
Feinstein, David M.	A behavioral study of digital technology for improving post-operative incentive spirometer adherence
Gill, Jatinder	Prospective randomized clinical evaluation of the neuroanatomical lead position using the Senza™ spinal cord stimulation (SCS) system in the treatment of chronic intractable back and leg pain
	A prospective, multicenter, randomized, double-blinded, sham-controlled study to evaluate the efficacy and safety of clonidine micropellets for the treatment of pain associated with lumbosacral radiculopathy in adults: RePRIEVE-CM (achieving Radicular Pain Relief Via Epidural injection of Clonidine Micropellets)
	RELIEF: A global registry to evaluate long-term effectiveness of neurostimulation therapy for pain
Hess, Philip E.	Uniport and multiport epidural catheters in post-surgical patients
Hess, Philip E	Assessment of the use of ultrasound for epidural catheter placement and comparison with palpation technique
	Identification of L3-L4 interspace in parturients
	Examining the gastric emptying halftime of water versus a carbohydrate in early labor
	Optimal dose of intrathecal morphine for postoperative analgesia after cesarean delivery
	Dexamethasone vs ondansetron as the first-line antiemetic to prevent postoperative nausea and vomiting after cesarean delivery
Kowalczyk, John J.	Prospective evaluation of the effects of IV ketorolac on platelet function post-cesarean delivery
	Comparison of continuous non-invasive arterial blood pressure to invasive arterial blood pressure measurement in pregnant women with placenta accreta
Leibowitz, Akiva	Point of care ultrasound lung artificial intelligence (AI) validation data collection study
O'Gara, Brian P.	Prevention of early postoperative decline
	Anesthetics to prevent lung injury in cardiac surgery
	Virtual reality in the operating room using immersive relaxation as an adjunct to anesthesia
	Postoperative virtual reality (VR) for recovery after bariatric surgery
	Intraoperative virtual reality for older patients undergoing total knee arthroplasty
	A phase 3, multicenter, randomized, controlled, open-label, assessor-blinded study to evaluate the efficacy and safety of inhaled isoflurane delivered via ventilated intensive care unit adult patients (INSPiRE-ICU2)
Pollard, Richard J.	The use of dantrolene to improve analgesia in posterior lumbar surgery
Robson, Simon C.	New driver of fibrosis and calcification in cardiovascular and aortic valve disease
Sehgal, Sankalp	Pectoral nerve block (PEC) for cardiovascular implantable electronic device placement: A pilot study
Shaefi, Shahzad	The relationship between administered oxygen levels and arterial partial oxygen pressure to neurocognition in post-operative mechanically ventilated cardiac surgical patients
Simopoulos, Thomas	Complications of spinal cord stimulators

PI Name	Protocol Title
Subramaniam, Balachundhar	Effects of the orexin receptor antagonist suvorexant on sleep architecture and delirium in the intensive care unit: A randomized controlled trial
	Guided meditation as an adjunct to enhance postoperative recovery: A feasibility study
	EEG changes with meditation: A proposal to analyze EEG changes with a simple, online, guided meditative tool
	Pecto-intercostal fascial block for postoperative analgesia after cardiac surgery: A pilot study
	Perioperative multimodal general AnesTHesia FocusINg on specific CNS targets in patients undergoing carDiac surgERies—The PATHFINDER study: a feasibility trial
	Resilience to sleep deprivation and changes in sleep architecture in Shoonya meditators (REST)
	Yogic breathing and guided meditation for long COVID symptoms
	Perioperative multimodal general AnesTHesia FocusINg on specific CNS Targets in Patients Undergoing carDiac surgERies—the PATHFINDER II study (PATHFINDER-II)
	Meditation and breathing for mental health in Parkinson's disease
	Brain health with inner engineering—longitudinal study of Shambhavi Mahamudra Kriya meditation (BLISS)
	Dexmedetomidine and IV acetaminophen for the prevention of postoperative delirium following cardiac surgery in adult patients 60 yours of age and older [NIH]
	PANDORA: Scheduled prophylactic 6-hourly intravenous acetaminophen to prevent postoperative delirium in older cardiac surgical patients [NIH]
Talmor, Daniel	ORCHID: Outcomes related to COVID-19 treated with hydroxychloroquine among Inpatients with symptomatic disease [NIH]
	ROSE: Reevaluation of systemic early neuromuscular blockade [NIH]
	VIOLET: Vitamin D to improve outcomes by leveraging early treatment [NIH]
	A randomized controlled trial of mechanical ventilation, directed by esophageal pressure Measurements, in patients with acute lung injury.
	DAMP-nediated Innate Immune Failure and Pneumonia after Trauma- the Harvard-Longwood (HALO) Campus Area Consortium [DoD]
	HIBISCUS: A phase II multi-center, double-blind, randomized and placebo-controlled study of the safety and efficacy of Intravenous recombinant human Interferon beta-1a for the treatment of hospitalized patients with COVID-19 Infection
	Prospective, multicenter, randomized, controlled study comparing efficacy and safety of INTELLiVENT-ASV versus non-automated ventilation in adult ICU patients: EASiVENT
	OPTIMASK: Comparison of pre-oxygenation with standard face mask combined with high flow nasal oxygen with pre-oxygenation with standard face mask alone
	Ventilator PEEP settings guided by P-V curve analysis and esophageal manometry
	EPVent 2—A randomized controlled trial of mechanical ventilation directed by transpulmonary pressures [NIH]
	BLUE CORAL: Biology and longitudinal epidemiology of COVID-19: Observational study [NIH]
	A Multicenter, adaptive, randomized, blinded-controlled trial of the safety and efficacy of investigational therapeutics for hospitalized patients with COVID-19 (INSIGHT014/ACTIV-3/TICO) [NIH]
	ASTER: Acetaminophen and ascorbate in sepsis: targeted therapy to enhance recovery [NIH]
	CLOVERS: Crystalloid liberal or vasopressors early resuscitation in sepsis [NIH]

Endowed Professorships and Chairs in the DACCP

Professorship/Chair	Incumbent
Edward Lowenstein Professor of Anesthesia	Daniel Talmor, MD, MPH
John Hedley-Whyte Professor of Anesthesia	Rami Burstein, PhD
Charlotte F. and Irving W. Rabb Distinguished Professor of Medicine; Joseph J. and Josephine A. Gazzola Family Chair in the Field of Inflammation Research	Simon C. Robson, MD, PhD
Leonard S. Bushnell, MD, Endowed Chair of Anesthesia	Robina Matyal, MD
Ellison C. "Jeep" Pierce, MD, Endowed Chair of Anesthesia	Balachundhar Subramaniam, MD, MPH
Nancy E. Oriol Endowed Chair in Obstetric Anesthesia	Yunping Li, MD, MSc

Resources

Center for Anesthesia Research Excellence (CARE)

The Center for Anesthesia Research Excellence (CARE) is a key departmental resource established to facilitate all aspects of clinical research within the Department of Anesthesia, Critical Care and Pain Medicine. It is led by Medical Director Maximilian Schaefer, MD, and Senior Program Manager Valerie Goodspeed, MPH. CARE has consolidated expertise in the full spectrum of clinical research activities, from study start-up to execution, close-out and publication. This "one-stop shop" is available to all faculty members and trainees. Since its inception, CARE has supported over 130 researchers, including anesthesia faculty and trainees, and faculty from other departments at BIDMC. Many requests are for multiple services, such as study design and statistical consultation, or database design, as well as assistance with data collection.

The core function of CARE is to facilitate the smooth flow of research studies from beginning to end. CARE services include idea development; Institutional Review Board (IRB) submission support; subject recruitment and data capture; statistical support; and funding application assistance targeting departmental, industry, foundations and/or federal funding sources. They also assign project managers and research staff to help manage research projects. A statistical and data analysis core and writing support for grant submissions and publications are also available. CARE works closely with the Committee on Clinical Investigations, the Office of Sponsored Programs, the Clinical Trials Office and Harvard Catalyst's Clinical Research Center at BIDMC.

Prospective research

The prospective trial arm of CARE has supported numerous investigators in the past year. This arm is comprised of teams for critical care, perioperative and pain medicine research, and is staffed by project managers, regulatory specialists, research coordinators and research fellows. During the past year, the group has responded to applications for a wide array of services.

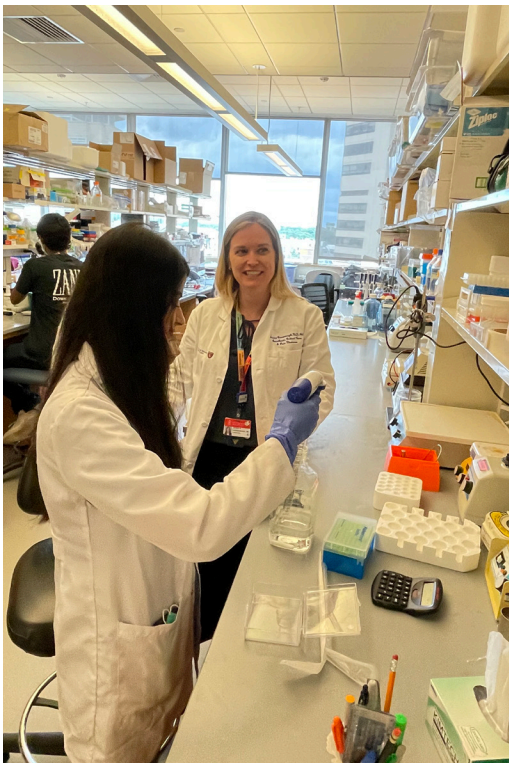
Retrospective research

In 2021, the department established the Perioperative Outcomes Lab within CARE, thereby adding the capability of providing faculty and residents in the department with support for large-scale retrospective studies. This perioperative outcomes-focused arm of CARE leverages large data sets and applies a broad variety of advanced statistical methods to answer timely and relevant questions related to patient outcomes following anesthesia and surgery. Additionally, CARE governs the anesthesia and intensive care research data repository, a database comprising over 700,000 patients who underwent anesthesia or intensive care at BIDMC. This resource, including analytical support, is available to all faculty and staff in the department.

Training and onboarding

CARE works across all departmental divisions to provide research and compliance education, foster collaboration, and provide mentoring. By simplifying and streamlining the research process, CARE helps faculty members and trainees succeed in their research endeavors while providing education with every supported research project. CARE emphasizes support for young investigators lacking resources to complete research projects on their own. Thereby,

CARE strengthens researchers from the beginning of their careers and guides them toward becoming independent investigators, supporting and growing the population of clinician scientists within the department.



Departmental Grant Programs

The department has established three internal grant programs aimed at assisting early- and mid-career research faculty to develop their research programs. These grant programs include Seed Grants ($25,000 for 1 year), Career Development Grants ($60,000 per year for up to 3 years) and John Hedley-Whyte/Eleanor and Miles Shore Faculty Development Awards ($50,000 for 1 year). These grant opportunities are open to all faculty in the department, and all subject areas and methodologies are eligible for funding.

Faculty Mentoring Program

The department has established a mentoring program to support the research of junior faculty. Each junior faculty member involved in research is offered the chance to work with a mentoring committee of their primary mentor and at least two other faculty members. The major goals of these committees include advising on career-related matters as well as providing guidance with project development and advising on grant opportunities and the publishing of papers.

Education and Fellowship Activities

Robina Matyal, MBBS

Vice Chair, Education

Director, Vascular Anesthesia

Director, Center for Education Research, Technology and Innovation (CERTAIN)

Program Director, Advanced Perioperative Clinical Fellowship

Leonard Bushnell Chair of Anaesthesia at BIDMC

Professor of Anaesthesia

Sara E. Neves, MD

Program Director, Anesthesia Residency

Instructor in Anaesthesia

Overview and Organization

The Education Division in the Department of Anesthesia, Critical Care and Pain Medicine is committed to training the next generation of anesthesiologists, critical care and pain physicians. Our anesthesia residency and fellowships are consistently rated among the best in the country and attract superb trainees from top national and international universities and training programs. The division also has a thriving medical student program and offers continuing medical education instruction that utilizes the clinical, teaching, and technical expertise of our faculty members. In addition, our in-house education research center, the Center for Education Research, Technology and Innovation, benefits us with cutting-edge research to improve our educational models and teaching methods for optimal learning.

The division is led by vice chair of education, Dr. Robina Matyal, Professor of Anesthesia, whose clinical expertise and investigational work drive both excellence and innovation in medical education. Our residency program director, Dr. Sara Neves, works closely with the associate program directors to develop a comprehensive and innovative training program. Associate Program Director Dr. Daniel Walsh spearheaded our newest initiative, Tuesday Education Day, which provides residents with dedicated education time. Dr. Robitaille has led our resident rotations, which he will be transitioning to our newest Associate Program Directors, Dr. Matthew Gao and Dr. Mona Hedayat. Dr. Lindsay Rubenstein had been leading our efforts in resident wellness and mentorship, before moving on to the Division of Professional Affairs. Drs. Hedayat and Gao will also be assuming these responsibilities and initiatives. Dr. Meredith Colella, director of the categorical internship, recently replaced Dr. Scott Zimmer (director until 2023). Dr. Maria Borrelli is the newly appointed medical student clerkship director.

The division has approximately 66 residents, 22 clinical fellows, 27 postdoctoral research fellows and 115 staff anesthesiologists who hold joint appointments to the faculty of Harvard Medical School and Beth Israel Deaconess Medical Center (BIDMC). This represents a recent expansion of our residency class from 18 to 22 residents per year (from 12 to 16 categorical interns), leveraging the expanding educational opportunities offered by our department.

Training is conducted in 46 operating rooms (ORs); 18 non-OR anesthetizing locations (including endoscopy, interventional radiology/angiography, the cardiac catheterization laboratory); four surgical intensive care units (including dedicated neuroscience and cardiac surgery ICUs); 3 obstetric ORs and 14 labor and delivery suites; the New England Center for Placental Disorders; the Pre-Admission Testing Clinic; the Post-Anesthesia Care Unit; the Arnold–Warfield Pain Management Center, and throughout the hospital when training with the Postoperative Pain Management Service. Residents also rotate through New England Baptist Hospital, Boston Children's Hospital, the VA Hospital and other outside facilities.

The addition of community hospitals to our network has allowed us to offer our trainees a wide and varied experience. Our rotation at Mount Auburn Hospital (MAH) in Cambridge gives our residents experience in complex cases in a community setting. The addition of the New England Baptist Hospital rotation provides an excellent opportunity for expanding regional anesthesia training in a high-volume, high-throughput clinical orthopedic hospital.

Leader	Position
Sara Neves, MD	Program Director, Anesthesia Residency, ACGME
Daniel Walsh, MD	Associate Program Director, Anesthesia Residency
Matthew Gao, DO	Associate Program Director, Anesthesia Residency
Mona Hedeyat, MD	Associate Program Director, Anesthesia Residency
Mark Robitaille, MD	Associate Program Director, Anesthesia Residency (until 2024)
Lindsay Rubenstein, MD	Associate Program Director, Anesthesia Residency (until 2024)
Lior Levy, MD	Director, Resident Simulation
Dan McGrail, MD	Director, Resident Ultrasound Education
Brian O'Gara, MD, MPH	Director, Resident Research
Simon C. Robson MD, PhD Shahzad Shaefi, MD, MPH Max Schaefer, MD	Directors (joint), Loring Scholar Program
Ruma Bose, MD	Program Director, Adult Cardiothoracic Anesthesia Fellowship, ACGME Program Director, Adult Structural Heart Anesthesia Fellowship, non-ACGME Administrative Director, Fellowship Programs
Aidan Sharkey, MD	Associate Director, CERTAIN
Ameeka Pannu, MD	Program Director, Critical Care Fellowship, ACGME Program Director, Advanced Critical Care and Ultrasound Fellowship, non-ACGME accredited
Jessica Cassavaugh, MD	Course Director, Harvard Medical School Anesthesia Respiratory-Surgical Intensive Care Clerkship
Philip Hess, MD	Program Director, Obstetric Anesthesia Fellowship, ACGME accredited
David Feinstein, MD, MS	Program Director, Anesthesia Clinical Informatics Fellowship
Robina Matyal, MD	Master's in Education Fellowship, non-ACGME Advanced Perioperative Clinical Fellowship, non-ACGME
Jyotsna Nagda, MD	Program Director, Pain Medicine Fellowship, ACGME accredited
Richard Pollard, MD	Program Director, Neuroanesthesia Fellowship, non-ACGME accredited Co-Director, Executive Scholar Program in Quality and Safety
Andrey Rakalin, MD	Program Director, Regional Anesthesia and Acute Pain Medicine Fellowship, non-ACGME accredited
Satya Krishna Ramachandran, MD, MBA	Co-Director, Executive Scholar Program in Quality and Safety
Shahzad Shaefi, MD, MPH	Program Director, Neurocritical Care Fellowship, UCNS accreditation
Eswar Sundar, MBBS	Program Director, Anesthesia for Outpatient Surgery/Clinical Anesthesia Fellowship, non-ACGME accredited
Meredith Colella, MD	Director, Categorical Internship
Maria Borrelli, DO	Director, Medical Student Education
John Bellamente, MD	Director, Anesthesia Rotators

Mission

The department's educational mission is to develop leaders in our profession through excellent clinical experience, strong mentorship, innovative teaching curricula and a flexible program of unique offerings that can be adapted to meet each learner's needs. This is accomplished via a relentless pursuit of excellence through creativity and continuous quality improvement grounded in sound educational theory and evidence.

The quality of our training program is continuously assessed through a variety of metrics. These include resident academic productivity, resident satisfaction as measured by a variety of survey instruments, success in fellowship and job placement, and board certification rate. In recognition of our success, our core residency program and fellowships in adult cardiothoracic, pain management, obstetric and critical care, all hold the maximum 10-year cycle under the Accreditation Council for Graduate Medical Education's Next Accreditation System.

Inclusion

Our department has long been committed to fostering a diverse and inclusive anesthesia community. Consistent with that mission, we have expanded our efforts to promote healthcare

equity by adding the topic of healthcare disparities to our curriculum. Our application review committee and staff at large receive enhanced implicit bias training. Additionally, we have increased outreach to students in the community. Associate program director Dr. Dan Walsh partnered with Dean Nancy Oriol to increase our presence in the HMS MedScience program, which uses simulation to introduce high school students in the Boston area to careers in medicine.

Anesthesia residents are active in seeking out opportunities to increase our visibility in support of underrepresented minorities and members of the LGBTQ+ community. Dr. Maria Borrelli secured funding to support medical students from underrepresented minorities financially in coming to our department for a visiting rotation. We have continued our Faculty Advisors program and added a one-to-one faculty mentorship program to help support our trainees' growth and development as professionals.

Accomplishments

The division has several faculty with strong contributions to educational leadership within our department, and a prominent national presence. Vice chair Dr. Robina Matyal serves on the ABA's Objective Structured Clinical Exam (OSCE) Committee and holds NIH R21 funding for research in women's cardiovascular health. Dr. Sara Neves, our residency program director, serves on the Society for Education in Anesthesia (SEA) Committee on Resident Education and the American Society of Anesthesiologists (ASA) Committee on Residents and Medical Students and received FAER funding for research in virtual reality education in invasive procedures. Drs. Sugantha Sundar and Shahzad Shaefi are American Board of Anesthesiology (ABA) board examiners. We have developed open courseware through our Learning Management System, Docebo, and several faculty and trainees have contributed modules to this peer-reviewed online resource. Dr. Ameeka Pannu and Dr. Feroze Mahmood are contributing authors for UpToDate Anesthesiology.

The division has a significant presence presenting on education and other topics at national meetings, including the SEA, ASA, Society of Cardiovascular Anesthesiologists (SCA) and others. Dr. Sugantha Sundar directs the Harvard Anesthesiology Update each spring, a major Continuing Medical Education (CME) event with many of our faculty contributing lectures. In addition, our department runs the very popular Regional Anesthesia Workshop during the Anesthesiology Update. We offer Maintenance of Certification in Anesthesiology courses in the BIDMC simulation center on a regular basis, as well as our long-running Evaluating and Treating Pain course and several echocardiography and perioperative courses.

Education Programs

The department values continuous learning and offers many opportunities for further education, including protected non-clinical academic days for residents, interdisciplinary grand rounds and mortality and morbidity sessions.

The residency program begins with a one-month tutorial for new residents to receive didactics on the basics of anesthesiology and one-on-one intraoperative teaching with an intensive simulation schedule designed to bring new residents rapidly up to speed on safe and comprehensive perioperative care. After the tutorial period and consistent with ACGME guidelines, the curriculum is organized into month-long rotations that provide residents the opportunity to learn through clinical experience, mentorship and didactics while providing excellent care to a diverse patient population.

Didactics are multimodal and include:

- Grand Rounds
- Morbidity and Mortality Conferences
- Tuesday Full Education Day
- Wednesday Academic Day
- Mock Oral Boards
- Journal Club
- Thursday In Situ Simulation
- Skills Workshops
- Division-specific Lectures and Curriculum

- Global Health Rotation
- Internship (PGY-1)

Overview of Training

Our residency education begins with a dedicated internship. Meredith Colella, MD is Director of our Internship Program. In 2010, our program incorporated a categorical internship primarily based in the BIDMC Departments of Medicine and Surgery. Medical rotations include time at BIDMC and the West Roxbury VA Hospital. Interns rotate through cardiology and oncology, as well as general, transplant and thoracic surgery. They also experience two months of critical care, anesthesia, emergency medicine and neurology training. This balance of clinical experiences builds a solid foundation in perioperative care and allows interns a head start in getting to know BIDMC and their future surgical and medical colleagues.

Residency Program (PGY-2 to PGY-4/CA-1 to CA-3)

Overview

Our residency program has experienced an increasing number of applicants over the last several years, (this year we had nearly 1,800 applicants). To accommodate for this, we were granted complement increases for our PGY-1 classes. The graduating class of 2027 will be the first class to reflect this increase, graduating 22 residents.

While applying for residency, applicants can also apply for the Loring Scholar position. This research track focuses on developing physician scientists who are strong clinicians and graduate prepared to take on research-focused positions. .

Sample Rotation Information

Critical Care: The Critical Care resident rotation provides a comprehensive foundation of knowledge regarding the care of critically ill patients in the post-surgical or trauma setting. Residents care for complex trauma, thoracic, transplant, vascular and general surgical patients. They are active participants of the care team, gaining expertise in management of ICU ventilators and severe respiratory failure, support of failing organ systems, care of trauma patients, and use of invasive monitors and advanced resuscitation.

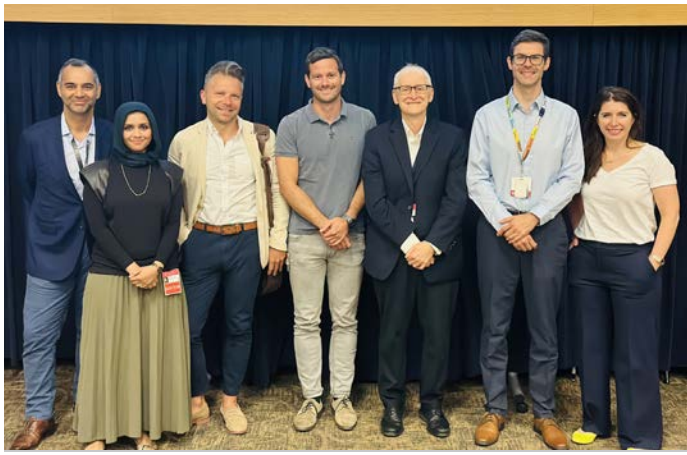
Categorical interns and first-year (CA-1) residents have a one-month ICU rotation; second year (CA-2) residents have two one-month ICU rotation; and interns, CA-1 residents and CA-2 residents rotate in the Surgical Intensive Care Unit (SICU) and Trauma Surgical Intensive Care Unit (TSICU). Third year (CA-3) residents can choose to do an elective one-month ICU rotation, which aims to mimic the Critical Care Medicine Fellowship experience. Residents have a one-hour lecture four days a week on topics including organ donation, pharmacology topics, and sepsis, shock, liver failure, transfusions, hemodynamic monitoring, quality and safety, nutrition, resuscitation, mechanical ventilation, end-of-life care, ethics, extracorporeal membrane oxygenation (ECMO), acute kidney injury, tracheostomies, gastrointestinal bleeding, acid/base physiology and sedation.

Regional: The regional anesthesia rotation, completed by CA2 and CA3 residents, is one of the most popular residency rotations. First-year anesthesia residents are introduced to regional blocks during their first pain management rotation. Our graduates are proficient in the use of neuraxial anesthesia and ultrasound-guided regional anesthesia for a wide variety of surgical procedures. We also introduced a more formal training in the Education Lab with computer-assisted peripheral block models, thoracic and lumbar epidural models with modifiable difficulty, and dedicated ultrasound and video tutorials to ensure junior residents have an appropriate level of basic regional anesthesia knowledge and skills prior to starting their rotation. Every quarter, there is an education day for all residents in the education lab to continue to hone their skills in ultrasound and procedural training.

Thoracic: In 2019 and 2020, 52 residents completed their thoracic anesthesia rotation. An initiative was started to expand the education program through interactive, online-based teaching modules our learning management system Docebo. This program facilitates resident education in thoracic anesthesia in three steps: 1) completion of an interactive online introductory course; 2) hands-on simulator training; and 3) teaching and training in the operating room. The curriculum is supported by ongoing lectures and a journal club discussing

important scientific manuscripts in thoracic anesthesia. Our division also supervises the thoracic anesthesia rotation of the Cardiothoracic Anesthesia Fellowship program. This rotation has been extended by an educational "mini attending" rotation where, under the supervision of a thoracic anesthesia attending, cardiothoracic anesthesia fellows supervise and teach residents, acquiring important skills in trainee supervision and teaching that will be highly applicable when entering anesthesia practice.

Vascular: We developed a comprehensive curriculum for the vascular rotation that includes pre-learning with web-based interactive modules and simulator-based training to maximize learning from every clinical exposure with the patient. The learning begins before the rotation with identifying knowledge and skill expectations and meeting minimum numbers, followed by self-assessment tools and problem-based scenarios. We are transitioning to an advanced portal called Docebo, to further enhance our teaching standards. The teaching activities include bedside teaching, formal lectures, and participation in national and international conferences.



PGY-5/Loring Scholar (optional): The Loring Scholar/Clinical Scientist Research Track is individualized and created by the residency program and the Center for Anesthesia Research Excellence (CARE). It features the following:

- Identification of research focus, appropriate departmental mentor, Harvard Catalyst and MIT resources
- Intensive mentoring

The mission of the Loring Scholar/Clinical Scientist Research Track is to train future clinical scientists and leaders in research. We aim to:

- Provide a solid foundation in research methodology
- Develop a productive research career during training
- Produce clinical scientists of the highest caliber.

See below for an overview of the program's timeline:

Year	Research Time	Course(s)	Conference(s)
PGY-1	1 month	BIDMC Intro to Research	Consultation with Harvard librarian
PGY-2*-3		BIDMC Intro to Research (if not taken in PGY-1)	ASA, FAER Scholars, or equivalent One research presentation at conferences covered
PGY-4	6 months	Successful Grant Writing Strategies (Harvard Catalyst workshop) Case-Based Stats for Clinical and Biological Scientists (Harvard Catalyst online course)	Two research presentations at conferences covered

*Mentors will be identified in the PGY-2 year

Residency Educational Resources

Simulation Center

The Carl J. Shapiro Simulation and Skills Center at Beth Israel Deaconess Medical Center is led by a multi-disciplinary leadership team. The center occupies approximately 5,000 square feet on the BIDMC East Campus and is accredited by the American College of Surgeons as a Level I Education Institute. This center is utilized extensively for simulation-based training for attending and resident physicians; surgeons, nurses and other allied health professions; and medical student education across most of our clinical departments. Learners complete part-task and team-based simulations in minimally invasive surgery, robotic surgery, basic and advanced airway management, invasive procedures, acute trauma, obstetrical complications, cardiac and pulmonary arrest, ultrasound-guided procedures and managing surgical complications.

Anesthesia Skills Laboratory

The Anesthesia Skills Laboratory is led by Robina Matyal, MD, vice chair for education and director of the Center for Education Research, Technology, and Innovation (CERTAIN); Cullen Jackson, PhD (Associate Director - Research, CERTAIN), and Aiden Sharkey, MD (Associate Director - Clinical, CERTAIN). This 200-square-foot facility is on BIDMC's East Campus and facilitates individual and group skills training for trainees and attendings. The space is flexible and allows for solo study as well as small and large group teaching, videoconferencing and live streaming. It is equipped with five networked computer workstations, all fully equipped with the necessary programs for individual study, data processing and analysis, and research and simulation scenario design. This space also provides computer-based, part-task trainers, bench surfaces for hands-on practice with mannequin-based part-task trainers and a small conference room. We recently added six Meta Quest 2 virtual reality head-mounted displays, one Microsoft Hololens 2 augmented reality head-mounted display and laptop and desktop computers for connecting applications to these displays to facilitate access to novel mixed reality-based training environments.

Unique Skills Training Programs

Perioperative Ultrasound Training

This multimodality training program enhances proficiency in various aspects of perioperative ultrasound. Multiple staff members are certified in perioperative transesophageal echocardiogram (TEE) and critical care ultrasound. Residents learn various aspects of rescue TEE, cardiac monitoring and point-of-care ultrasound. A pilot training program for the clinical use of the ultraportable Butterfly Ultrasound was introduced during the COVID-19 pandemic. The program utilizes the web-based storage of ultrasound images for real-time consultation and feedback. Our members provide peer support across the Beth Israel Lahey Health (BILH) network and have received awards for teaching excellence at Harvard Medical School. Division members serve on professional, national and international committees, editorial boards and educational symposia. The team members run many national and international courses teaching perioperative ultrasound, including two-dimensional and three-dimensional TEE. This program is shared with national and international anesthesia, cardiology and surgical training programs.

In Situ Simulation Training

Our current quality-improvement initiatives are improving operating room efficiency by focusing on on-time start, facilitating communication and pre-planning between various team members, and improving workflow using a high-fidelity in situ simulation training program for our residents.

ICU BASIC Course

Since 2011, division faculty and fellows have led the day-long ICU BASIC Course, an introductory training that residents complete prior to their surgical ICU rotations. The course is taught four to five times a year at the Shapiro Skills and Simulation Center and is focused on teaching core tenets and practical clinical considerations in contemporary surgical critical care to our residents. Morning didactic sessions consist of formal lectures on fundamental critical care concepts including shock, respiratory failure and neurological emergencies. A session on harm reduction is followed by afternoon hands-on high-fidelity simulation-based training, including ventilator management, cardiac arrest simulation and simulated central line placement. This course is currently led by division faculty members Drs. Jessica Cassavaugh and Somnath Bose, with instructors including current critical care fellows and respiratory therapists. The course has expanded to include critical care advanced practice providers alongside interns and residents training in general surgery, anesthesia, vascular surgery, plastic surgery, otolaryngology and interventional radiology.

Fellowships

We currently offer eight fellowships, both ACGME-accredited and non-ACGME-accredited. See below for descriptions of each fellowship.

Fellowship	ACGME Accreditation
Adult Cardiothoracic Anesthesia	✔
Advanced Perioperative Ultrasound and Clinical Anesthesia	-
Critical Care Medicine	✔
Neuroanesthesia	-
Obstetric Anesthesia	✔
Pain Medicine	✔
Regional Anesthesia and Acute Pain Medicine*	-

*ACGME accreditation pending

Adult Cardiothoracic Anesthesia Fellowship

The Cardiothoracic Anesthesia Fellowship is designed to produce experts and leaders in cardiothoracic anesthesia. This training program provides the academic and clinical foundation for a career as a cardiothoracic anesthesiologist. Emphasis is on an in-depth understanding of cardiopulmonary pathophysiology, pharmacology and therapy, in addition to learning all aspects of clinical management of patients undergoing cardiothoracic procedures. Our fellows are also provided with the knowledge and skills necessary to become certified in perioperative transesophageal echocardiography as outlined by the National Board of Echocardiography

Advanced Perioperative Ultrasound and Clinical Anesthesia Fellowship

Advanced Perioperative Ultrasound and Clinical Anesthesia fellows participate in high-risk surgeries and gain expertise in advanced monitoring and management devices like ventricular assist devices, spinal drains, pacemakers and hybrid operating rooms with stand-by pumps. Our fellows assist in creating multiple educational tools, “standard of practice” pathways for equipment setup in TEVAR and EVAR, CSF drain placement in ruptured abdominal aortic aneurysms and presentations in multidisciplinary grand rounds. Additionally, the fellow facilitates the supervision of residents in invasive monitoring of arterial line, central line and perioperative ultrasound. This fellowship develops advanced perioperative clinical anesthesiologists who will be able to provide the highest level of clinical care and train the next generation.

Critical Care Medicine Fellowship (ACGME)

Our top-ranked Critical Care Medicine Fellowship has been ACGME accredited since 1990, and to date, successfully trained 83 fellows in advanced critical care medicine. (Recent graduates and current locations are listed below.) This 12-month program consists of nine months of rotations in the ICUs (TSICU, SICU, CVICU, Neuro ICU and a combined medical/surgical ICU) and three months of electives/research time. Throughout the year, the fellows rotate and are on-call on weekday nights and the weekend; they also have six weeks of weekday in-house overnight calls (Monday through Thursday = one week of nights). The fellowship is directed by Dr. Ameeka Pannu and currently accepts four fellows per year into the program through the San Francisco match system. The division has expanded its two-year fellowship opportunities, recruiting fellows for both our dual adult cardiothoracic anesthesia/critical care and emergency medicine critical care pathways.

The dual adult cardiothoracic anesthesia/critical care pathway is a two-year fellowship for physicians interested in completing both an Adult Cardiothoracic Anesthesia Fellowship (one year) and an Anesthesia Critical Care Fellowship (one year) in our department. Between 2018 and 2023, three fellows graduated from this pathway.

In 2018, the American Board of Anesthesiology (ABA) approved our fellowship for a training pathway for physicians who have completed an Emergency Medicine residency to become board-certified in Critical Care Medicine through a 24-month period of Critical Care Medicine Fellowship training. Our first two Emergency Medicine trainees have graduated from this new pathway in 2021 and 2022.

The goal of the Critical Care Medicine Fellowship is to ensure that by the completion of their training, fellows will be able to provide complete care for critically ill patients, lead a multidisciplinary critical care team, have a working knowledge of the administration and management of a critical care unit, be able to critically appraise the literature as it pertains to critical care medicine, and have a basic understanding of the principles of research in critical care medicine. Outside of learning in the clinical setting, fellows have a structured didactic schedule.

In March 2020, our fellowship program received a commendation from the ACGME for demonstrating substantial compliance with their requirements. In addition, since June 2017, the division has co-directed BIDMC's Neurocritical Care Fellowship, which was approved by the United Council for Neurologic Subspecialties, with the Department of Neurology. Currently, Dr. Shahzad Shaefi in the Anesthesia Critical Care Division and Dr. Jason Yoon in the Department of Neurology serve as the co-directors for this fellowship. Neurocritical Care fellows can be accepted from Anesthesia or Neurology training backgrounds and spend one or two years dedicated to managing these specialized critical care patients. Since the start of the fellowship, three fellows have matriculated and graduated from the fellowship.

Neuroanesthesia Fellowship

The Neuroanesthesia Fellowship is a one-year non-ACGME-accredited program that has existed since 2017. The Neuroanesthesia Fellowship is designed to provide advanced clinical training in the provision of anesthesia for both the surgical and endovascular management of complex intracranial disease and the surgical treatment of complex acute and chronic spine disorders. Graduates of this program have gone on to prestigious academic positions at BIDMC, Dartmouth-Hitchcock, Yale and the University of Florida.

For anesthesiologists who have completed a fellowship in critical care medicine, the department offers an additional one-year fellowship in neurocritical care. This fellowship, accredited by the United Council for Neurologic Subspecialties, leads to board eligibility for the subspecialty of neurocritical care.

Obstetric Anesthesia Fellowship (ACGME)

We offer two positions for a one-year ACGME-accredited fellowships in obstetric anesthesia. These fellowships combine advanced clinical training with ample opportunities for clinical research and residency education. The faculty includes dedicated obstetric anesthesiologists and training and consultation with intensivists, cardiologists, obstetricians, maternal-fetal medicine specialists, neonatologists and pathologists, each integral to the fellow's education program.

Our Obstetric Anesthesia fellows complete several rotations throughout the year to provide them with a broad and comprehensive education in:

- Transthoracic echocardiography
- Point-of-care ultrasound
- Transfusion medicine and blood bank
- Maternal-fetal medicine
- Neonatal intensive care
- Clinical research
- Elective global health mission

We train physicians who can educate their colleagues across disciplines and participate in the scientific evolution of obstetric anesthesia. To create experts, we expose our trainees to a wide variety of educational materials, clinical experiences, instruction and opportunities for independent learning.

Pain Medicine Fellowship (ACGME)

Our Pain Medicine Fellowship program is considered one of the top pain fellowships in the country and provides an exceptional learning experience, preparing fellows to deliver the highest standard of care to patients with pain. The goal is to train future leaders in Pain Medicine by providing a broad and holistic experience, including state-of-the-art interventional procedures and a stimulating research environment. In addition to the members of our physician group, all of whom have appointments at Harvard Medical School, various guest lecturers from different specialties and backgrounds are brought in to foster a multi-disciplinary approach to pain medicine. Pain fellows also participate in departmental grand rounds, special seminars and clinical case conferences.

The Pain Medicine Fellowship is a multidisciplinary program dedicated to patient care, teaching and research using cutting-edge knowledge and technology. Our fellows train in the outpatient Arnold – Warfield Pain Center, the inpatient Acute/Chronic Pain Services, and satellite pain clinics in the greater Boston area. Members of our faculty specialize in diagnosing and treating patients who have not responded to conventional therapies, so our fellows are trained to offer comprehensive care to patients with complex pain syndromes. The multidisciplinary team includes specialists in anesthesiology, neurology, physiatry, internal medicine, psychology, nursing, physical therapy and complementary medicine. The fellowship provides trainees with a focused year of training focused on developing clinical expertise, leadership, research and clinical care through multidisciplinary training.

Fellows also see patients in our Comprehensive Headache Center (part of the Division of Pain Medicine), participate with our pain psychologists in initial pain psychology evaluations, and gain exposure to the assessment and treatment of pediatric pain at Boston Children's Hospital. They also rotate with the palliative care team at the hospital to enhance their understanding of treatment of cancer pain. A variety of affiliated faculty in pain psychology, neurology, spine surgery and physiatry also teach our fellows multidisciplinary and multimodal approaches to pain treatment.

Regional Anesthesia and Acute Pain Medicine Fellowship

The Regional Anesthesia and Acute Pain Medicine Fellowship teaches fellows the skills to serve as consultants for other physicians interested in regional anesthesia and provide optimal perioperative pain control for their patients.

Fellows alternate two weeks at a time on adult regional anesthesia and the acute pain service along with practicing as attending anesthesiologists within the Department of Anesthesia, Critical Care and Pain Medicine at BIDMC. We have opportunities for fellows to rotate through the community hospitals in the Beth Israel Lahey Health system for a private practice experience in regional anesthesia. Fellows will have an intermittent two to three days per week rotation throughout their training at New England Baptist Hospital, and there is a short rotation available at Boston Children's Hospital.

Fellows are expected to attend weekly departmental grand rounds, give didactic lectures to residents and conduct a monthly Journal Club covering pertinent acute pain medicine and regional anesthesia topics. Every fellow is also expected to complete at least one quality and safety, or one research project, during the year.

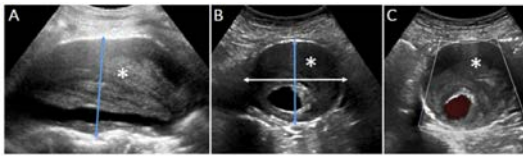
The regional fellow will accomplish an intermittent two to three days per week rotation throughout their fellowship training at New England Baptist Hospital. This rotation provides in-depth exposure to the management of regional anesthesia for patients in the community setting.

Working with members of the anesthesia services, the fellow will have the opportunity to use multimodal analgesic management, including peripheral nerve single shot blocks and catheters. As a member of the regional anesthesia service, the fellow will provide anesthesia techniques for adolescents and adults, including head and neck blocks, upper and lower extremity blocks, and truncal blocks.

Special Programs

Advanced Structural Heart Program

Our Cardiac Anesthesia Division offers a unique advanced fellowship in structural heart disease imaging. The fellows learn 3D imaging of the heart for evaluation of the valve function structure and use this modality to guide the interventional cardiologist for procedures. Our division is the first in the country to introduce a six-month-long Structural Heart Disease (SHD) fellowship dedicated to the management of patients undergoing structural heart disease interventions. The program has already graduated four SHD fellows and recruited multiple candidates for future fellowship training.



Clinical Ultrasound and Vascular Fellowship

This unique year-long program is offered to candidates who, after finishing up their anesthesia board requirements, want to learn invasive monitoring techniques and ultrasound for diagnosis and management.

Executive Education

We currently offer executive scholars program in healthcare quality and safety, directed at developing the next generation of leaders in this field. Over 50% of the program alumni are currently directors in their hospitals.

The Executive Scholar Program in Quality and Safety

This unique 2-year program includes training at Harvard Medical School (culminating in a Masters of Healthcare Quality and Safety), clinical practice in anesthesia/critical care at BIDMC, engagement with hospital operations and access to a renowned research program. The ultimate goal is to develop leaders to improve patient safety and quality of care in a health care environment that is continually evolving and technologically and clinically complex. It is specifically designed to accelerate careers by exposing scholars to all organizational aspects of healthcare quality and safety and give them access to mentors who are recognized leaders in their fields. In addition, trainees are integrated into the department's Quality and Safety Outcomes Research Lab that contains rich data resources that allow for operationally relevant research using high-end methodology. The scholars also receive expert training in simulation through the world-renowned Center for Medical Simulation. Examples of projects are neuromuscular blocking agent safety, work intensity and outcomes, safety outcomes after airway device introduction, cost effectiveness of clinical change, educational workshops (root cause analysis and action, implementation science and quality week), systems focused event reviews and presentations, team training and other interventions aimed at improving safety culture and communication.

Program Objectives: In concert with MHQS program at HMS, candidates will learn to:

- Drive strategic change and foster a culture of quality and safety
- Generate data-driven solutions to address operational challenges
- Use data to support rational and evidence-based improvements
- Measure, interpret and communicate meaningful health care outcomes
- Identify quality and safety gaps and develop strategies to address them
- Develop and implement quality improvement initiatives within a tight budget
- Assess and improve health care processes through evidence-based best practices
- Identify, design, and implement malpractice prevention and intervention strategies

Growth and Recruitment

Fellowship in Medical Education

We recently received Graduate Medical Education Committee (GMEC) approval for a new two-year Fellowship in Medical Education. The program will combine formal training through HMS, training at BIDMC and a dynamic research component. The fellowship aims to give trainees a solid foundation in the theories and principles underpinning health professions education and provide them with tools and protected time to engage in research on important issues in the field.

Medical Student Program

The Division offers clinical rotations to medical students that offer them broad exposure to elements of anesthesia, critical care and pain medicine. These rotations include a core clerkship that gives students experience in the field that is consistent with their career goals and assigns them to learning activities, primarily in the BIDMC ORs, and offers experience with more complex procedures as rotation progresses. In addition, the students are offered rotations in pain relief in childbirth that cover theory and practice of obstetric anesthesia; a respiratory and surgical intensive care clerkship that exposes students to the management of critically ill patients in a surgical setting; a pre-clinical experience that familiarizes students with specific aspects, aside from anesthesia administration, that every anesthesiologist should know; a perioperative rotation that gives a more comprehensive exposure to the field and the issues associated with management of perioperative patients, and a post-PCE curriculum that provides an in-depth introduction to anesthesiology. These clerkships taken together form a comprehensive package that gives students a basic grounding in all aspects of the field of anesthesia and a familiarity with what a career in anesthesia entails.

SRNA Program

BIDMC became a primary clinical site for training Northeastern University student nurse anesthetists and student anesthetists from Boston College.

Courses Taught at Harvard Medical School - 2023

Anesthesiology Update

Course Director: Sugantha Sundar, MD
May 8–12, 2023
Course Overview: Many significant clinical changes that affect the practice of anesthesiology have occurred in recent years. This comprehensive CME program provides special and timely opportunities for anesthesiologists, nurse anesthetists and others with interest in the field to hear about these changes directly from world-renowned specialists and master clinicians. The curriculum of Anesthesiology Update 2023 ensures not only that attendees leave with a comprehensive understanding of the latest advances, risk mitigation strategies, and anesthesiology guidelines, but also with specific recommendations to incorporate these updates into practice. The interactive format encourages attendees to ask questions to the national and international expert presenters at this event. Participants receive important guidelines and checklists that they can use in their anesthesia practice.

Evaluating and Treating Pain

Course Directors: Carol A. Warfield, MD, and Thomas T. Simopoulous, MD, MA
June 19–23, 2023
Course Overview: A significant amount of research has indicated that many, if not all, types of pain are undertreated. Some data indicate that only 25% of patients treated for pain receive adequate relief. In addition, several studies have shown that various pain-relieving techniques may be used inappropriately, which can result in patient harm. This course provides a comprehensive review and update of basic science and advances in pain medicine. The faculty includes specialists in many aspects of pain medicine, including anesthesiology, neurology, psychiatry and psychology, internal medicine, physical medicine and rehabilitation, orthopedic surgery, interventional radiology and neurosurgery. Participants learn how to diagnose common pain problems and explore various options for treatment of chronic pain, acute pain and cancer-related pain, including pharmacologic, behavioral and interventional treatments. Ample time will be spent addressing the role of opioids in the management of pain.

Boston Structural Heart

Course Directors: Feroze Mahmood, MD, Ruma Bose, MD, Aidan Sharkey, MD, and Sohail Mahboobi, MD
August 11–13, 2023
Course Overview: Boston Structural Heart is a unique, state-of-the-art course in structural heart disease (SHD) imaging that teaches participants skills they can immediately bring back to their practices. It is presented as a virtual, live course with an extended period of access to attendees. This course is designed for cardiologists, anesthesiologists and physicians commonly involved in SHD imaging, as well as cardiac anesthesia fellows who want to become experts in 3D imaging and broaden their skillset in imaging for SHD interventions. This course is presented by expert faculty from a high volume SHD imaging center with extensive experience in the management of variations in SHD imaging. It teaches the entire process of SHD imaging with a curriculum that provides a graded progression of concepts from the very basic to the advanced aspects of SHD imaging. It begins with a comprehensive masterclass in 3D imaging to educate attendees on the various applications of 3D imaging for SHD. Additional workshops cover safety and staffing models, along with comprehensive education regarding imaging for interventions including transseptal puncture, mitral valve, tricuspid valve, aortic valve and left atrial appendage. Workshops include didactic lectures and case-based and panel discussions.

Consciousness, Cognition, and Compassion

Course Directors: Balachundhar Subramaniam, MD, MPH, and Sepideh Hariri, PhD
October 26–27, 2023
Course Overview: This two-day in-person conference provides a comprehensive view of consciousness as it is understood by physicists, psychologists, neurologists and anesthesiologists to originate within the brain. Eastern traditions, on the other hand, propose the brain as an intermediary organ for increasing consciousness. New York University's David Chalmers proposed that the difficult problem of consciousness is to explain the first-person experience. At this conference, experts from various fields presented their perspectives on this topic. The second day focused on the social impact of conscious leadership and environmental practices. Since leaders influence a large number of people, there was an in-depth examination of leadership qualities from a consciousness perspective that can pave the way for inclusivity, vision and integrity to emerge as essential leadership qualities. Also, the conference explored the importance of a conscious approach to the environment and how this approach connects to the entire person's health and soil.

Post Graduate Education for Faculty

Several faculty members in the Critical Care Division have completed the **Program in Clinical Effectiveness** offered at the Harvard School of Public Health. This course is a summer program providing clinical investigators with fundamental training in clinical epidemiology and biostatistics, and junior staff members gain the quantitative and analytic skills needed for clinical research. Recently, Drs. Shahzad Shaefi, Somnath Bose and Brian O'Gara completed the Program in Clinical Effectiveness as well as their master's degrees in public health.

The Silverman Institute for Health Care Quality and Safety at BIDMC offers a Physician Leadership Development Program, a training program that aims to develop leadership skills in physicians through customized training that emphasizes reflection and leadership action. Drs. Todd Sarge, Sara Neves and Akiva Leibowitz, Lindsay Rubenstein, and Daniel Walsh have completed this program to date.

Departmental Conferences and M&Ms

Our weekly grand rounds on Wednesday mornings feature a variety of speakers who lecture on topics related to our department's work, values and mission. These speakers are experts and leaders in their fields and often world renowned for their groundbreaking work. We also feature speakers from our department to provide updates on their work as well as reviews of specific clinical and educational topics. In addition to Grand Rounds and M&Ms, the department participates in quarterly combined interdisciplinary safety grand rounds. Faculty are expected to participate and give clinical lectures and hands-on sessions throughout the academic year. Faculty are also expected to attend at least 75% of the grand rounds and morbidity and mortality (M&M) presentations given by the department, with exceptions for certain excused absences (post call, LOA, etc.). Department members also participate in periodic hands-on ultrasound didactics.

Administration

Dawn Ferrazza, MA

Chief Administrative Officer

Overview and Organization

The administrative group, led by chief administrative officer (CAO) Dawn Ferrazza, provides foundational support for all functions of the Department of Anesthesia, Critical Care and Pain Medicine. Two administrative directors report to the CAO and are responsible operationally for the Harvard Medical Faculty Physicians (HMFP) and Associated Physicians of Harvard Medical Faculty Physicians (APHMFP). The administrative group provides administrative oversight for ten functional areas (specialties) including finance, professional affairs (credentialing/privileging/enrollment/academic appointments), communications, Justice/Equity/Diversity/Inclusion (JEDI), education, research, quality/safety/innovation (QSI), information technology, scheduling, and clinical/pain medicine. Each administrative director is partnered with a vice chair and all specialties support both HMFP and APHMFP operations. The specialties and their leadership are listed below.

Vision and Opportunities

Administration's vision is to provide exceptional results that accelerate the department's missions by cultivating synergistic partnerships, leading strategic and operational initiatives and driving process innovation. Opportunities to achieve this vision include close alignment with the administrative leads in their support of the vice chairs and regular refinement of administrative processes. This has included consolidation to a single scheduling platform for all locations, the use of tracking systems for provider credentialing, and the employment of team-focused systems in the development and maintenance of department finances. By embracing modern tools and processes, the efficiency of the group continues to improve even though the demand for anesthesia services continues to grow each year.

Specialty	Administrative Director	Vice Chair (Clinical Partner)
Administration Group	Dawn Ferrazza, MA CAO	Department Chair Executive Vice Chair
-HMFP Clinical, Critical Care, and Pain Medicine - Education	Brian Duckman, MBA/MHA Director, HMFP	VC Clinical Operations VC Critical Care VC Pain Medicine VC Education
APHMFP Clinical and Pain Medicine	Krystyna Prokopiuk Executive Dir. APHMFP	VC Network Anesthesia
Communications	Heather Derocher, MA	Executive Vice Chair Emeritus
JEDI	Jana Penders, MA	VC JEDI
Finance	Patricia Stevens, MBA	Department Chair
Professional Affairs	Susan Kilbride	VC Professional Affairs
QSI	Patricia Fitzgerald	VC QSI
Research	Alex Shtifman, PhD	VC Research
Scheduling	Joanne Grzybinski, MBA	VC Clinical Operations

Quality, Safety, Innovation and Informatics

Richard J. Pollard, MD

Vice Chair, Quality, Safety, Innovation and Informatics

Director, Neuroanesthesia Fellowship

Co-Director, Executive Scholar Program in Quality and Safety

Assistant Professor of Anaesthesia

Overview and Organization

The Division of Quality, Safety, Innovation and Informatics (QSII) was created in 2009 with the goals of centralizing and coordinating quality and safety activities in the department, ensuring representation at important hospital meetings, expanding the number of faculty involved in these activities and developing department safety initiatives, education programs and research. The division led by Vice Chair of QSII Dr. Richard Pollard, supports the delivery of safe and efficient patient care through processes directed at the site, division and individual level. The division's foundational arms aim to create more effective ways to modify both human and system drivers of quality and safety. The QSII team is also responsible for overseeing and assisting quality, safety and innovation efforts at the hospitals that make up the Beth Israel Lahey Health (BILH) system.

Clinical Quality

The QSII leadership group comprises site directors, quality leaders, IT experts, project managers and support staff who are actively engaged in developing quality and safety programs, as well as research and data visualizations for both process and outcome metrics relevant to our constituencies. This data-visualization engine combines data from multiple local and organizational databases that allow us to link processes of care with outcomes that matter to our patients, department and organization. Specific cross-departmental issues identified through threshold indicators are explored in depth through the Faculty Hour mechanism using multidisciplinary project teams. It is estimated that the combined efforts of these projects reduce hospital costs by several million dollars a year while enhancing patient safety. Our highly successful project management team supports clinical leadership in executing key interventions.

Clinical Safety

During the past several years, we have continued to use system-based Quality Assurance (QA) methods to enhance the quality and safety of clinical care. This philosophy is evident in our Morbidity and Mortality (M&M) structure, unveiled in 2019, that provides a standardized set of support tools to improve both individual and organizational learning from adverse events or close calls. Peer review is performed by the Professional Standards Committee and is designed to evaluate individual competence through Ongoing Professional Practice Evaluation standards and investigate concerns with standards of care or professionalism through Focused Professional Practice Evaluation.

In addition to event-based processes, the committee also tracks national safety indicators and compares these benchmarks to local instances. This process investigates threshold changes in concert with clinical leadership. The department performs more than 35,000 anesthetic procedures annually using an electronic anesthesia information system. Approximately 99% of the cases are associated with no adverse intraoperative events. Nearly 1% (or about 300 cases per year) do have one or more events. These cases are reviewed, and appropriate follow-up is determined. Major adverse events are presented at the twice-monthly multidisciplinary hospital Quality Improvement Directors Meeting for further review and potential reporting to state agencies.

Team Training and Projects

The division provides ongoing, robust training for faculty and CRNAs. More faculty members joined the safety committee in 2019 and have been trained as trainers for the Improving Root Cause Analyses and Actions to Prevent Harm, or RCA2, methodology, bringing the total number of trained faculty in the department to 14. They are mentoring residents in RCA2 projects currently and throughout the year.

Vision and Opportunities

Our innovation efforts aim to discover improvements that will positively impact healthcare delivery in the perioperative environment. This work involves both quality-improvement initiatives and rigorous research projects. The results influence areas such as team and organization design, communication pathways and transitions of care, information management systems and training and education. By virtue of being part of the Department of Anesthesia, Critical Care and Pain Medicine, we work across all phases of the perioperative environment (pre-, intra-, and post-operative). We also strive to work across departments, including Surgery, Orthopedics, Obstetrics/Gynecology, Perioperative Nursing, Pharmacy, as well as Healthcare Quality and Safety, to ensure our improvement and research efforts encompass the interdisciplinary nature of our perioperative work.

Areas of Excellence

The QSII division focuses on excellence in clinical care, education and research to further its goal of improving anesthesia care both at BIDMC and the allied hospitals of the Beth Israel Lahey Health (BILH) system.

- The unique postgraduate Executive Scholars Program in Perioperative Quality and Safety allows the department to focus more fully on practices to improve quality and safety both within the department and across the hospital system. This scholars program leads the drive to refine the QSII process through education and research.
- The activities of the Informatics Division allow a fuller visualization of quality and safety metrics to be analyzed for areas targeted for improvement. This allows the department to focus on excellence in clinical care.
- The creation of the Network Anesthesia Patient Safety Committee allows for a shared operational and mental model to improve quality and safety across the healthcare network. This will allow the BILH system to become a national leader in quality and safety.

QSII Education Activities

The division successfully integrated an expanded quality and safety training program for postgraduate residents, fellows and faculty over the last two years. The intern QA week is now a fully mature, immersive program with lectures from nationally renowned experts in quality, safety, informatics, operations and human factors. Our interns presented two projects focused on neuromuscular transmission monitoring and inflectional control measures around airway management. Starting in 2019, this program has hosted exceptional students from England through the Meghana Pandit Safety Scholarship, a collaboration with the University Hospitals of Coventry and Warwickshire.

Under the course directorship of Dr. Krish Ramachandran along with Dr. Sara Neves and the QSI executive scholars, the division has completed five full years of RCA2 training for the third postgraduate year (PGY-3) class. Our residents have completed over 15 RCA2s over the last four years. Through this program, residents and faculty trainers are employing industry-standard techniques endorsed by the Institute for Healthcare Improvement and the National Patient Safety Foundation. We also defined the Implementation Science Training Curriculum for the PGY-4 (CA-3) residents. The goal is to train our residents in the approach and methodology for influencing and implementing changes in healthcare environments. The program was developed through collaboration with Dr. James Bagian and Joseph Derosier, PE, CSP, two pre-eminent leaders in patient safety, internationally renowned for their work in the National Center for Patient Safety and their authorship of the RCA2 methodology.

Fellowship

A two-year PGY-5 Executive Scholar Program in Quality and Safety was approved as a Non-Accreditation Council for Graduate Medical Education (ACGME) program by the BIDMC Graduate Medical Education Committee and endorsed by the ABA in 2018. This program sponsors two exceptional international post-residency scholars each year. Scholars receive a Master of Science in Healthcare Quality and Safety from Harvard Medical School. A collaboration was finalized with the Royal College of Anaesthetists, the UK Association of Anaesthetists of Great Britain and Ireland, and the UK National Health Service (NHS) through the Safe Anesthesia Liaison Group, to host scholars at BIDMC through this mechanism. This provides a tremendous opportunity for us to develop internationally recognized leaders in healthcare quality. Visit https://www.salg.ac.uk/get-involved/salg-bidmc-fellowship.

QSII Research Activities

The QSII research group is led by Dr. Krish Ramachandran. The group studies issues that may impact healthcare quality and safety and promotes knowledge transfer using state-of-the-art methods. Their studies are focused on epidemiology, root causes, human factors, resilience, interventions, implementation and outcomes as they relate to the quality, safety and innovation of healthcare. Research topics examine both retrospective and prospective data to develop innovative solutions to healthcare quality and safety.

Over the past three years, we have engaged in human factors and cognitive systems engineering research to understand and mitigate safety and quality vulnerabilities for our individual providers, teams and systems. Currently, our research focuses on three areas: individual performance assessment and augmentation, simulation-based training and education, as well as system-level collaboration and resilience.

Our research in system-level collaboration and resilience currently focuses on understanding the complexity of managing OR floor operations, which is the work of the floor manager (FM). The FM coordinates interdisciplinary resources between multiple operating rooms (ORs) and procedure areas while managing the days OR schedule. He or she is required to make tradeoffs between competing organizational goals such as efficiency, frontline workload optimization, and quality and patient safety. Previous studies on OR floor management have largely taken a retrospective, deterministic approach to characterizing work. This approach may not fully reflect the adaptive nature of work on the frontline, which is marked by uncertainty and variability. Given the need for the FM to maintain a flexible and adaptive OR floor, we are studying OR floor operations using a resilience engineering approach. Our future work in this area will build on our current results by interviewing and surveying FMs and OR caregivers to gain a perspective on their performance. We will use the insights gleaned from this study to develop a measurement framework for FM performance.

Funded Research

Dr. Krish Ramachandran has received several research grants from industry sponsors and the Controlled Risk Insurance Company (CRICO). These grants are being used to improve quality, safety, and innovation at BIDMC.

Clinical Trials

Dr. Pollard is currently conducting a triple-blinded, placebo-controlled, randomized clinical trial on the effects of Dantrolene on patients after posterior lumbar spine surgery. The enrollment of patients is almost complete, and the team hopes to begin data analysis later this year. This study is funded by departmental internal funding.

Clinical Quality Initiatives

Faculty Hour, initiated in April 2010 through the leadership of Dr. Brett Simon, affords anesthesiologists, surgeons, nurses and others in the community the opportunity to meet every Tuesday at the start of the day to advance quality and outcomes for patients, accelerate learning and innovation and foster mutual joy in work. To facilitate this multidisciplinary opportunity, OR start time is set 30 minutes later, which demonstrates the tremendous endorsement and investment that BIDMC and the participating departments make in the Faculty Hour program.

In addition to our focus on improvement, the division also conducts cutting-edge applied research focused on enhancing our methods for evaluating and implementing solutions for both our quality and safety missions.

Clinical Safety Initiatives

Central Line Insertion Checklist

Central line placement can be a source of harm to patients who require ongoing central venous access postoperatively. These issues can revolve around non-sterile techniques or poor technical performance of central line access. The QSII Anesthesia Quality and Safety working group created a consistent workflow surrounding observation of central line placement in the operating room. The program includes paper checklists with instructions on each central line kit. This checklist requires two witnesses to the completion of all steps in the placement of central lines before becoming a permanent part of the medical record.

Medication Safety

Medication safety continues to be an ongoing challenge in anesthesia practice, as anesthesiologists are solely responsible for obtaining, preparing, and administering potent medications in the operating room. The aim is to increase collaboration with the pharmacy to find additional systems-level interventions to reduce medication errors. Initial targets include expansion of pre-mixed, pre-filled syringes and IV infusions, pharmacy verification of epidural infusions and Omnicell drawer reconfiguration.

COVID-19 Perioperative Response

In response to redesigning care during the COVID-19 pandemic, the QSII team and collaborators in the Anesthesia, Nursing and Periprocedural Departments designed and implemented a training regimen for the management of COVID-19 patients. This included centralized resources for all providers of the best evidence-based recommendations for perioperative care. These resources were shared with multiple institutions in the region as well as across the country.

OR Anesthesia Emergency Manual Creation

In 2020, the QSI team published the BIDMC Emergency Manual, a compendium of cognitive aids to support crisis management in the operating room (OR). This program is intended to focus on team training around events directly relevant to anesthesia care and enhance in-situ performance of teams during actual crises. This manual is currently being modified and introduced to the affiliated hospitals of the Beth Israel Lahey Health medical system.

CONcISE In Situ Training Drills

The QSII team further advanced just-in-time (JIT) training delivered through in situ simulation to facilitate the rapid implementation of new crisis management techniques throughout the operating rooms of both BIDMC and affiliated hospitals. These techniques are used to implement crisis resource strategies and best practices with multidisciplinary groups. JIT training is an educational strategy that aims to refresh knowledge and skills for infrequently performed high-risk activities. Previously, in the healthcare setting, JIT training had been used to address a decline in procedural skills over time and to correct gaps in knowledge. It has also been proven to promote provider confidence in

performing specific tasks and facilitate urgent training when required and is usually delivered in close temporal and spatial proximity to the clinical encounter for which the skill is required. The QSII team took these processes and introduced a series of in situ exercises to improve patient care in challenging situations. These simulations are delivered within providers' actual work environment and can facilitate interprofessional training. It provides a means to implement change, error proof a process, reveal site-specific latent hazards and identify opportunities for improvement.

ICU Handoff Tool

Ineffective communication among healthcare providers frequently occurs during handoffs, defined by the Joint Commission as the "real-time process of passing patient-specific information from one caregiver to another, or from one team of caregivers to another, for the purpose of ensuring the continuity and safety of the patient's care." For all accreditation programs, National Patient Safety Goal 2E, in effect through 2009, stated that organizations should implement standardized and structured processes for handoff communications that include the opportunity for face-to-face questions and clarification. The Joint Commission's requirement for a standardized approach to handoff communications is now Element of Performance 2 ("The hospital's process for hand-off communications provides for the opportunity for discussion between the giver and receiver of patient information.") for Standard PC.02.02.01. In accordance with these mandates, the QSII team developed and introduced an ICU handoff tool to facilitate communication amongst providers. This simple process allows for clear communication between providers at the transfer of care from the operating room to the intensive care units.

Intraoperative Anesthesia Handoff Tool

In conjunction with the above clinical intervention, we also introduced an intraoperative handoff tool. This process is designed to maximize the continuity and safety of the patient's care during the transfer of responsibility from one provider to another.

CRICO Training

The Controlled Risk Insurance Company (CRICO) is the Harvard malpractice insurance provider for our department attendings, residents and fellows. The CRICO Premium Reduction Program has been credited with significant improvements in anesthesia safety, resulting in a four-fold reduction in premiums over the past few decades. Our premiums today are among the lowest in the United States. Although our certified registered nurse anesthetists (CRNAs), currently insured through a hospital nursing coverage mechanism, are technically outside the CRICO coverage, we intend to expand this program to include our CRNAs in the four-hour simulation activities going forward. CRICO's Premium Reduction Program provides guidelines for specific trainings that clinicians are expected to complete over a three-year period to realize a cost-savings on their malpractice insurance, and to learn teamwork best practices that enhance patient outcomes. To maximize these premium reductions and improve perioperative care, our QSII team designs and runs training programs for the department, including short drills and 4-hour simulation-based courses, in collaboration with our surgical and nursing colleagues.

Network Anesthesia Patient Safety

With the merger of Beth Israel Deaconess Medical Center and Lahey Health, new opportunities presented themselves to the QSII team. The quality and safety procedures for disparate hospitals could now be unified and improved. The QSII division has taken the lead in instituting the Network Anesthesia Patient Safety Committee, where we are able to improve the RCA and implementation processes across the system to improve patient care.

Combined Safety Grand Rounds

Each year the hospital puts on four combined safety grand rounds (CSGR) presentations. These are chosen to highlight specific patient safety concerns that BIDMC has identified. The division is actively involved in these presentations. The fall event each year is produced by the Anesthesia QSII team. This process involves a multidisciplinary group of anesthesiologists, surgeons and operating room staff who perform a root cause analysis of a selected case. This case is chosen to highlight a patient safety concern that needs to be approached in a multidisciplinary manner.

Informatics Initiatives

Innovation

Our innovation efforts are directed toward improvements that will positively impact perioperative healthcare delivery. This work involves both quality-improvement initiatives and rigorous research projects. The results influence areas such as team and organization design communication pathways and transitions of care, information management systems, and training and education. By virtue of being part of the Anesthesia Department, we work across all phases of the perioperative environment (pre-, intra-, and post-operative). We strive to work across departments—Surgery, Orthopedics, Obstetrics/Gynecology, Perioperative Nursing, Pharmacy, and Healthcare Quality and Safety—to ensure our improvement and research efforts encompass the interdisciplinary nature of our perioperative work.

Electronic Medical Records

As of June 1, 2024, BILH has migrated to the Epic platform.

Datamart

The Informatics and Data Management team conducted numerous projects directly supporting QI, research and operational goals. Starting in early 2020, the team architected, developed and tested a new Datamart for the collection and analysis of Talis data. In collaboration with the Hospital Business Intelligence team, the final product is almost complete and will soon be housed as part of the larger master data warehouse project currently in development by BIDMC Information Systems. Part of this initiative entails development of a data-integration plan in order to achieve a unified view of the data across both CompuRecord and Talis for reporting and analysis purposes. As a result of this work, we successfully built data models and dynamic visualizations for a variety of anesthesia-specific and interdisciplinary projects, including postoperative nausea and vomiting, personal scorecards, pharmacy-controlled substance surveillance, first case starts and a series of division director dashboards. This process will transition with the rollout of the new electronic medical record platform.

Dashboards

In collaboration with BIDMC administration, the Informatics Division has created surveillance dashboards looking at multiple data streams. These dashboards allow for departmental and hospital monitoring of metrics that can improve efficiency and patient safety.

One of the dashboards focuses on anesthesia operations. This dashboard allows real-time analysis of operating room metrics, including on-time starts, delayed cases, block time usage and case durations. These and other metrics allow the department to improve operating room efficiency.

Using metrics from the anesthesia information management systems, QSI dashboards were created for the anesthetizing locations and labor and delivery. This dashboard allows for the monitoring of anesthesia-specific quality and safety issues identified by the department. This data is then collated and reviewed by the QSI division to improve patient outcomes.

In collaboration with the hospital, the division created a controlled substance dashboard. This dashboard allows for the monitoring of opioid prescriptions and usage throughout the hospital. This can identify areas where protocols can be utilized to decrease narcotic usages.

Professional Affairs

Shahzad Shaefi, MD, MPH

Vice Chair, Professional Affairs

Medical Director of Venovenous Extracorporeal Membrane Oxygenation (VV ECMO)

Associate Professor of Anaesthesia

Overview and Organization

The Professional Affairs Division holds a distinctive position within the department. Professional Affairs is positioned foundationally to support our education, clinical and research missions. Its predominant focuses are recruitment, retention, wellness, community outreach, leadership development, academic promotion, and coordinating mentorship and sponsorship within the department. Additionally, a key function of the group is onboarding and credentialing clinical providers; we offer our full support as they liaise with the Massachusetts medical board and the medical staff offices at our sites. We also guide and support physicians in matters of immigration and visa procurement.

Scope

The Professional Affairs Division assumes a multifaceted and pivotal role within the department, overseeing a diverse array of responsibilities and functions. These areas of responsibility encompass:

Faculty and CRNA Recruitment for BILH Network (BIDMC and Community Sites): The division plays a crucial role in identifying and recruiting qualified faculty and CRNA candidates, both for the Beth Israel Lahey Health (BILH) network and its associated community sites. This involves comprehensive talent sourcing and selection processes.

Hiring and Onboarding for BILH Network Providers: The division manages the intricate process of hiring and onboarding healthcare providers within the BILH network. This includes guiding new recruits through the transition into their roles and ensuring a smooth integration into the network.

Credentialing and Re-credentialing for BILH Network Providers: Credentialing and re-credentialing of healthcare providers are essential components of the division's responsibilities. This encompasses the thorough evaluation of provider qualifications and the ongoing monitoring of their credentials to maintain compliance with regulatory standards.

Annual Reviews: The division oversees the process of conducting annual performance reviews of faculty and CRNAs, fostering accountability, and ensuring ongoing professional development.

Appointments/Re-appointments and Promotions at HMS (BIDMC and Other Affiliated Sites as Directed): The division actively participates in the appointments, re-appointments and promotions processes at Harvard Medical School (HMS), encompassing BIDMC and other affiliated sites as directed.

Mentoring for Junior Faculty: The division provides valuable mentorship and support for junior faculty members to nurture their professional growth and development.

Performance Appraisal and Management: Performance appraisal and management are critical functions of the division, ensuring that all faculty and providers meet or exceed established performance standards. This includes addressing performance-related issues when necessary.

Faculty Development (Including Leadership Development): Faculty development initiatives, including leadership development programs, are orchestrated to enhance the capabilities and leadership potential of academic faculty members.

Academic Conference Management: The division is actively involved in organizing and facilitating Grand Rounds sessions and other formal academic conferences that provide a platform for academic discourse and knowledge dissemination.

Wellness and Wellness Events: The promotion of wellness and the organization of wellness events are integral components of the division's responsibilities that help foster a healthy and balanced work environment.

Urgent Peer Support: In critical situations, the division offers urgent peer support to faculty and providers, ensuring they receive the necessary assistance during challenging times.

Provider Records Management: The meticulous management of provider records is a core function of the division, encompassing documentation and recordkeeping to ensure compliance with regulations and standards.

Code of Ethics: Upholding a strong ethical framework within the department is paramount. The division is responsible for the implementation of and adherence by all staff to a robust code of ethics in the treatment of each other and our patients.

Community Site Support as Needed: The division extends its support to community sites affiliated with the department as required, ensuring consistent operational excellence across the network.

Areas of Excellence

Faculty and CRNA Recruitment: Over the past decade, the department has evolved into a significantly larger and more agile entity. However, rapid growth during this period has introduced fresh challenges, particularly in recruitment and retention. Our expanding clinical workforce, which has burgeoned from around 45 physicians and 10 certified registered nurse anesthetists to well over 200 physicians and more than 150 CRNAs, reflects a dramatic increase in its overall clinical capacity.

Mentorship and Sponsorship: The department has made significant strides in enhancing mentorship and sponsorship opportunities. Previously, mentorship largely thrived organically and individually with limited formal infrastructure to facilitate these crucial interactions. Sponsorship often relied on senior faculty members who wielded influence through high-visibility projects. To bolster and democratize these processes, we adopted a mentorship and sponsorship 2.0 model, incorporating key enhancements to facilitate widespread and objective mentoring for all department members.

Individual Development Plan (IDP): A noteworthy development within the Professional Affairs Division is the phased implementation of an annual Individual Development Plan (IDP) for each faculty member. In response to emerging trends in industry and medicine, we recognized the value of a separate process not tied to performance evaluations, employment continuation, promotion decisions or financial considerations.

Orientation Program: In recognition of the transition period for new faculty members, we have expanded our orientation program over the past few years.

Systematic Sponsorship: Guided by professional affairs, senior department members who can provide sponsorship are invited each year to identify opportunities for faculty members at local, regional, national and even international levels.

Formal Academic Conference Curation

International Speakers and Visiting Professors: Our commitment to a diverse and enriching learning environment is exemplified by enabling faculty, division directors, residents, admissions staff and various department members to invite esteemed colleagues from around the world for our weekly Grand Rounds. A distinctive facet of our perioperative environment is Faculty Hour, the dedicated time on Tuesday mornings when the start times of operating rooms are staggered to a later start. This deliberate scheduling allows for various essential meetings involving all stakeholders in

these processes. Traditionally, faculty members, allied surgeons, perioperative nurses and anesthesiologists converge to address high-priority projects and work collaboratively towards innovative solutions.

Joint Grand Rounds on Diversity, Equity and Inclusion (DEI): In support of the department's DEI mission, we have initiated several combined Grand Rounds sessions that bring together perioperative staff and colleagues from the surgery department. These sessions provide a platform for open dialogue, education and collective efforts to foster a more inclusive and equitable environment within our department and the broader healthcare community.

Credentialing and Onboarding: Under the leadership of Susan Kilbride, Director of Professional Affairs, our highly skilled credentialing team plays a pivotal role in overseeing the credentialing and re-credentialing processes for all anesthesia providers within the BILH network. Operating diligently behind the scenes, this team expertly navigates the increasingly complex terrain of credentialing at BIDMC and our network's community sites.

Support of Faculty Protected Time for Teaching and Research: The department has embraced a profound commitment to the provision of faculty-protected time for teaching and research endeavors. This ensures the cultivation and preservation of non-clinical and academic time, a practice that serves as the bedrock for many academic achievements.

Faculty-protected time has emerged as a linchpin in nurturing a robust research culture within our department. It empowers faculty members to immerse themselves in cutting-edge studies that propel the fields of anesthesiology, critical care and pain medicine forward. As a result, our department stands at the forefront of innovative research, with faculty actively engaged in endeavors that garner National Institutes of Health (NIH) funding and contribute significantly to the academic landscape.

Protected time also plays a pivotal role in mentorship and the development of early-career faculty members. It provides a conducive environment for these individuals to explore novel ideas, embark on educational journeys and carve out their own research trajectories. This mentorship and support are instrumental in fostering the next generation of investigators and educators who will shape the future of our field.

Leadership Development

In addition to our core mission of mentoring and sponsoring all faculty and anesthesia providers, our department recognizes the critical importance of identifying and cultivating emerging leaders. The landscape of academic medicine presents a unique set of challenges when it comes to finding leaders who not only excel in clinical, research and educational domains but also possess essential leadership and management skills. To address this, we have taken a multifaceted approach encompassing recruitment, identification, investment, coaching, empowerment and sponsorship of potential leaders from within our ranks.

Formal Training and Pathways: We have developed and matured various pathways to expertise within the realms of education, research, practice management and administration. These pathways involve formal training and educational programs designed to equip our faculty with the necessary skills and knowledge to excel in leadership roles. These structured programs provide a solid foundation for emerging leaders to thrive in the complex landscape of academic medicine.

Leadership Training: Our department offers a wealth of resources for faculty to access leadership courses at local, regional and national levels. Faculty members have completed certificates in academic leadership from Harvard Business School and/or the Harvard T.H. Chan School of Public Health. We actively encourage participation in national conferences and practice management courses offered by various professional societies and industries. Furthermore, we support a program that enables faculty to pursue a degree in business administration, fostering leadership with a business acumen.

Anesthesia Leadership and Executive Operations Fellowship (ALEOF): The ALEOF Program represents a one-year leadership pathway for experienced faculty members. Participants collaborate closely with executive mentors

to conceive and execute high-impact projects aligned with the department's strategic plan. This clinical leadership pathway spans diverse areas, including administration; clinical operations; diversity, equity and inclusion; education; research; and quality and safety. Multiple faculty members have followed this fellowship pathway.

Network-Wide Physician Leadership Program (PLP): Our department maintains a robust partnership with the network-wide Physician Leadership Program. This highly competitive 12-month program, sponsored by Lee Health, Illinois, is designed for early to mid-career physicians in leadership roles within the network. It provides an exceptional platform for emerging leaders to enhance their leadership skills and contribute significantly to the department's growth.

Appointments and Promotions: As part of our ongoing commitment to faculty development and support, we have made significant enhancements to the academic promotion process with Harvard Medical School (HMS). A central component of this initiative has been restructuring the Anesthesia Academic Promotion Committee, aligning it with the mission of professional affairs.

Wellness Initiatives

The department recognizes the importance of physical and emotional well-being among our staff, particularly due to recent global challenges, including the COVID-19 pandemic and broader socio-political crises. Healthcare workers have been subjected to unprecedented levels of stress, necessitating a comprehensive approach to employee wellness. Under the guidance of Dr. Scott Zimmer, Director of Wellness, our wellness events have undergone a transformation into virtual offerings, including Zoom exercise classes, yoga sessions, happy hours, hobby and book clubs, and more. This shift underscores the department's commitment to fostering well-being amidst challenging times.

Expanding the Wellness Mission: The heightened need for expanded support and a more encompassing wellness mission led to the inception of innovative programs aimed at bolstering employee well-being. These initiatives include the Heals Pager, the HOPE project and the formulation of a Department Code of Conduct.

The Wellness Fund: The Wellness Fund has emerged as a cornerstone in fortifying the health and morale of our clinicians and staff. This fund channels resources into a range of initiatives, including professionally led virtual exercise classes, department-wide social events, promotion of diversity and inclusion, and the successful launch of the HEALS pager. The inaugural significant contribution to the fund, made by a dedicated department member, symbolizes the collective recognition of the profound significance of wellness initiatives.

Peer Support Program: Under the stewardship of Dr. Scott Zimmer, our Wellness Committee has instituted a Departmental Peer Support Program. This program serves as a vital lifeline for clinicians and staff navigating challenging clinical and non-clinical situations. Historically, clinicians have sought peer support following severe adverse clinical events or emotionally taxing circumstances.

Mitigating Trauma through Peer Support: The Peer Support Program acknowledges the potential trauma that can affect clinicians after unexpected adverse clinical events. Empathetic peer support plays a pivotal role in alleviating acute stress and mitigating adverse outcomes. The program's objective is to identify colleagues who may have been affected by potentially traumatizing events and promptly deploy a trained peer support staff member to provide non-intrusive assistance.

The HEALS Pager: Under the leadership of Dr. Lindsay Rubenstein, the HEALS Pager (Hearing Each Other and Lending Support) complements the Peer Support Program. This pager system enables staff facing difficulties to connect with a supportive colleague for confidential conversations. Operating 24/7, the HEALS Pager offers a vital avenue for clinical and non-clinical department staff seeking empathetic and supportive discussions. It also serves as a gateway to guidance on more formal support options if necessary.

Justice, Equity, Diversity and Inclsusion

Overview and Organization

Josephine M. Hernández, MD

Vice Chair, Diversity, Equity and Inclusion

Instructor in Anaesthesia

Justice, Equity, Diversity and Inclusion (JEDI) was established in 2022 as a foundational element within the Department of Anesthesia, Critical Care and Pain Medicine, to promote fairness in access, opportunity, and advancement for all members of the department and to support equitable care for our patients. JEDI's position as the solid base on which the department stands emphasizes that the JEDI principles and efforts are the vital underpinning of all work in the department. Dr. Josephine Hernández, inaugural vice chair of JEDI, spearheads these efforts with Jana Penders, JEDI senior project manager and Gidget Hunter, JEDI's part-time administrative assistant.

Dr. Hernández formed a JEDI Committee in May 2022 that includes representation from across our network hospitals, spanning all positions in the department (faculty, residents, CRNAs, nurse practitioners, nurses, anesthesia technicians, research and administration). Including the collective voice of all staff allows us to devise policy and initiatives that support the entire department and establish a truly welcoming and inclusive environment. The JEDI Committee meets monthly and has helped develop our Mission Statement. Future tasks include the development of our strategic plan.

Vision and Opportunities

Justice, Equity, Diversity and Inclusion is the department's foundational element that:

- Is dedicated to the recruitment and mentorship of diverse faculty and medical staff.
- Strives to provide a welcoming environment robust with kindness and empathy for both our patients and colleagues.
- Upholds an environment in which our patients see their own values and concerns reflected in our community of caregivers who treat them first as humans.
- Supports a culture of equity, tolerance, respect, accountability and justice for our patients and each other.
- Works to achieve a world that is inclusive, where equal opportunities and equitable outcomes exist for all.

The desire to devise a roadmap and strategy for our work made evident the need to establish a baseline for Department demographics and culture through an equity audit. Grounded in our Mission Statement and best practices, along with equity audit data, we now seek to establish our vision to align with the department's five-year strategic plan. We will:

- Strive for an incremental increase in underrepresented groups (URIM) from year to year, with the goal of improving representation in all areas. Once we have better statistical data, we will suggest incremental yearly goals. (Long-term goal: 10% representation of underrepresented individuals by 2028 in each segment—faculty, leadership, residents, fellows, CRNAs, nurse practitioners, and technical staff).
- Establish mentorship program for diverse faculty and medical staff by 2025.
- Increase frequency of Bias Reduction, Awareness and Speak Up Training events yearly.
- Establish safe space(s)/allies in and around the department by 2026.
- Work with department to establish procedures to support victims of discrimination and harassment, and accountability for offenders.
- Broaden our efforts to collaborate with our department's Global Health Programs in Africa and Bolivia.
- Increase cultural celebration events yearly (build to five per year).
- Provide pronoun badges for all employees by 2024.

Education

JEDI educational efforts to raise awareness and understanding of issues affecting marginalized and underrepresented individuals directly impact the effectiveness and safety of our entire department. It is important for trainees and staff to understand these topics from the perspectives of both patients and healthcare providers. Education includes regular presentations at Grand Rounds and workshops for the trainees and staff.

Departmental Investment

Department leadership has demonstrated a strong and enduring commitment to the JEDI effort by strategically positioning JEDI as the department's foundational element. This emphasizes JEDI's important role to help guide and support operations across the department including recruitment and retention, education, clinical, research, administration and community involvement.

JEDI's significant accomplishment in 2023 was the Equity Audit. We hired a third-party consultant to design and implement the audit, which afforded us the ability to guarantee participant anonymity, boost participation rates, and leverage the expertise of the consultant to optimize our work. We analyzed the results and conducted a workshop with recommendations for departmental growth and improvement.

JEDI funding and support have also enabled Dr. Hernández and Ms. Penders to organize and host initiatives such as the Dillard University Summer Research Internship Program, JA Inspire, and the Brooke Charter Schools Anesthesia Workshop and Career Development Event. Funding also assisted with cultural awareness and other events such as Pride Week, Latino Encuentro and Hispanic Heritage Month. These events were well received, and department members have begun to actively realize and appreciate our diversity.

Dr. Hernández and Ms. Penders are included as JEDI representatives in biweekly departmental recruitment meetings and discussions. Dr. Hernández is a faculty leadership committee member for recruitment, hiring, and promotions, as well as resident recruitment.

As the JEDI group has expanded its efforts, it has become a strong, established presence in the department. Our essential position in the department as a pioneering foundational element is making meaningful change in JEDI issues, awareness and understanding. Importantly, it is a model for adoption and broader development across the Harvard system.

Selected Publications

June 2022 – June 2024

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