



**Weill Cornell
Medicine**

RESEARCH REPORT: 2020

Department of Anesthesiology,
Critical Care & Pain Management

Hospital for Special Surgery
Weill Cornell Medicine

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Mission Statement

Our goal is to conduct and publish high-quality research focused on improving the perioperative and postoperative care of patients with musculoskeletal disorders.

About

In 1986, Dr. Nigel Sharrock, then Director of the Department, began a quest to scientifically explore and promote the field of Regional Anesthesia. Dr. Sharrock built a team of CRNAs, RNs, anesthesia technicians, research staff and administrative support staff to gather data on a variety of techniques and systematically test hypotheses aimed to improve the entire perioperative experience.

In the operating room, they focused on regional anesthesia's impact on all metabolic systems: the brain, lungs, kidneys, heart, gastrointestinal systems and musculoskeletal systems. Data was gathered on outcomes including cognitive function, surgical blood loss, clot formation, renal function, pain, anesthetic management, patient functional outcomes and mortality. The results from these studies were revolutionary to both the anesthesiology and surgical communities.

When Dr. Thomas Blanck succeeded Dr. Sharrock as Director, a formalized research committee was created and a dedicated research team was identified. Dr. Jacques YaDeau was appointed as Director of Clinical Research and additional research staff were added to the growing Department. Under his watch, focused projects were undertaken to better understand anesthetic and regional block effects on patient outcomes. Dr. Gregory Liguori, our current Director of the Department, continued and expanded the research legacy at HSS. Refinement in protocols and implementation of pathways were linked to collaborative research endeavors. Dr. Christopher Wu took the reins as Director of Clinical Research in 2019.

Today, the Department of Anesthesiology, Critical Care & Pain Management at HSS is considered an international leader in the clinical practice of regional anesthesia and pain medicine, and is widely recognized for its prolific contributions to the field.

Letters From Our Leadership

From our Department Director

The Department of Anesthesiology, Critical Care & Pain Management at Hospital for Special Surgery/Weill Cornell Medicine is one of the leading international centers for the practice of regional anesthesiology and acute pain medicine for orthopedics today. Our anesthesiology faculty annually performs over 50,000 anesthetic procedures, over 90% of which are regional anesthetics.

Many of our anesthesiologists have additional experience in specialties within anesthesia including pediatric and cardiac anesthesia, as well as critical care and pain management. The attending anesthesiologists also teach techniques and patient care skills to fellows and residents, contributing to the education and specialization of the next generation of regional anesthesia and acute pain care providers.

One of the unique aspects of our practice that sets us apart from many other departments is our prolific research and focus on academic excellence. Our faculty are nationally and internationally recognized for their research and academic achievements. Faculty from HSS Anesthesiology/Weill Cornell Medicine have published in every top anesthesiology journal and have book chapters in every leading anesthesiology and pain medicine textbook today. Our faculty are represented in the editorial boards in almost every leading anesthesiology journal and have contributed to numerous national and international guidelines.



We have created this brochure to highlight and present the breadth and depth of our research and academic activities.

I am particularly indebted to the dedicated HSS anesthesiology faculty and staff who have tirelessly devoted their resources and efforts in making the Department of Anesthesiology, Critical Care & Pain Management at HSS/Weill Cornell Medicine leaders in regional anesthesia and pain medicine research.

In addition, I am thankful for our prior HSS Anesthesiology research directors, Drs. Nigel Sharrock and Jacques YaDeau, who have transformed HSS Anesthesiology into an internationally recognized center for excellence in research, and to Dr. Christopher Wu, our current research director who will most certainly expand on our prior successes.

I am also grateful to Dr. Hugh C. Hemmings Jr., the Joseph F. Artusio, Jr.

Professor and Chair of Anesthesiology at Weill Cornell Medicine for his continued efforts in supporting our Department. The HSS anesthesiology faculty fully understands that our dedication to academics and our alignment with Weill Cornell Medicine are essential to achieving our goal as the premier practice for regional anesthesia and pain management for orthopedics in the world.

Gregory A. Liguori, MD
Director, Department of Anesthesiology, Critical Care & Pain Management
Anesthesiologist-in-Chief
Hospital for Special Surgery

From our Academic Partner

The Department of Anesthesiology at Weill Cornell Medicine has a long history of research excellence since its founding in 1947, with an early focus on clinical pharmacology.

Our current researchers are internationally recognized for their contributions to clinical pharmacology, ion channel biophysics, and experimental neurosciences with a focus on mechanisms of anesthesia and pain, as well as clinical research in anesthetic pharmacology, outcomes, pain and cardiovascular physiology.

The department's world class research is supported by funding from the National Institutes of Health, National Science Foundation, Howard Hughes Medical Institute, and Foundation for Anesthesia Education, among others. The department currently ranks #12 in NIH funded research among US departments of anesthesiology.

The department is also dedicated to the development and training of the next generation of laboratory researchers and clinical scientists. We offer a competitive Van Poznak research scholarship to foster the development of outstanding physician-scientists

during residency training, and have received 10 mentored research training grants from FAER and NIH.

These research endeavors are greatly enhanced by collaborations with our academic partners including our unique relationship with the Hospital for Special Surgery. Our complementary clinical and research efforts contribute to a vibrant intellectual environment that facilitates leading research programs in orthopedic anesthesia and perioperative medicine.

Hugh C. Hemmings, Jr., MD, PhD, FRCA
Senior Associate Dean for Research
Joseph F. Artusio, Jr. Professor & Chair
Department of Anesthesiology
Professor of Pharmacology
Weill Cornell Medicine
Anesthesiologist-in-Chief
New York-Presbyterian Hospital
Editor-in-Chief
British Journal of Anaesthesia



“The research stories featured in this report reflect the extraordinary development of inspired ideas to improve patient outcomes. We are fortunate to have a corps of dedicated clinician scientists who ... are passionate about finding answers to clinical questions in the hopes of improving care for our patients.”

From our Director of Clinical Research

When I joined the HSS faculty in 2018, I was already aware of the position of HSS Anesthesiology as one of the world leaders in regional anesthesia and pain medicine research.

The preeminent position HSS Anesthesiology holds today began under the leadership of our prior research committee director Dr. Nigel Sharrock, who was succeeded by Dr. Jacques YaDeau. Both worked tirelessly to transform HSS Anesthesiology into a leader in regional anesthesia/pain medicine research, clinical care and education. Having been a successful researcher at the John Hopkins Medical Institution and the University of Rochester, I have been amazed to experience firsthand how HSS Anesthesiology champions research to achieve better outcomes for patients.

The research stories featured in this report reflect the extraordinary development of inspired ideas to improve patient outcomes. We are fortunate to have a diversity of research ideas and a corps of dedicated clinician scientists who, while carrying a nearly full clinical load, are passionate about finding answers to clinical questions in the hopes of improving care for our patients.



From inspiration to innovation to impact, HSS Anesthesiology continues to foster creativity in our faculty and staff to advance the science and practice of regional anesthesiology and pain medicine to improve patient outcomes.

Christopher L. Wu, MD
Director of Clinical Research
Department of Anesthesiology, Critical Care & Pain Management
Hospital for Special Surgery

Meet the Team

The Research Committee in the Department of Anesthesiology, Critical Care & Pain Management at Hospital for Special Surgery manages clinical research endeavors within the Department.

The Committee assists faculty in protocol development and reviews all protocols prior to submission to the institutional review board (IRB). In addition, the Committee, in conjunction with the Director of HSS Anesthesiology, shapes the research vision and direction for the Department.

Meet the Team

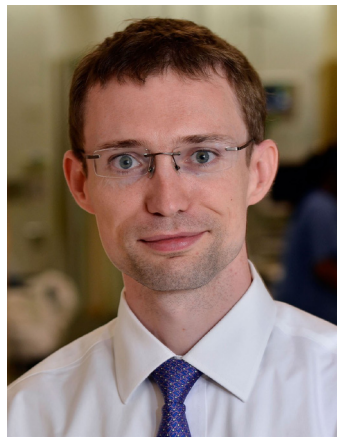


Christopher L. Wu, MD, (Director of Clinical Research) oversees the research committee. With a Google h-index of 64, Dr. Wu is a Clinical Professor of Anesthesiology and an internationally recognized expert in postoperative pain management and enhanced recovery after surgery. He has over 200 peer reviewed publications and book chapters and has published in top journals such as *JAMA*, *Lancet*, *British Medical Journal*, *Anesthesiology*, *Pain*, and *British Journal of Anaesthesia*. Dr. Wu is or has been on the editorial board of several journals including *Anesthesiology*, *Anesthesia & Analgesia*, *Regional Anesthesia & Pain Medicine*, *Journal of Clinical Pain*, and *Journal of Opioid Management*.

“The preeminent position HSS Anesthesiology holds today began under the leadership of our prior research committee director Dr. Nigel Sharrock, who was succeeded by Dr. Jacques YaDeau. Both worked tirelessly to transform HSS Anesthesiology into a leader in regional anesthesia/pain medicine research, clinical care and education.”



Ejiro Gbaje, MPH



Robert S. Griffin, MD, PhD



Stephen C. Haskins, MD



Kethy M. Jules-Elysee, MD



Spencer S. Liu, MD



Stavros G. Memtsoudis, MD, PhD, MBA



Nigel E. Sharrock, BMedSci, MB, ChB



Alexandra Sideris, PhD



David H. Kim, MD



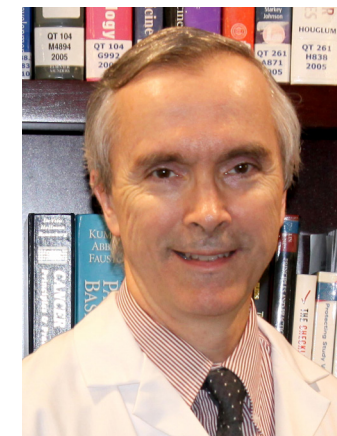
Meghan A. Kirksey, MD, PhD



Jiabin Liu, MD, PhD



Ellen M. Soffin, MD, PhD



Jacques T. YaDeau, MD, PhD

Research Staff

The research mission of the Department of Anesthesiology, Critical Care & Pain Management is supported by a team of research assistants, biostatisticians and coordinators who undertake a wide variety of tasks, including preparing research protocols for IRB approval, collecting patient data, answering investigator queries, assisting with manuscript preparation and assuming many other research-related responsibilities. All the research staff members are an integral part of the Department's research successes. We value our research staff and strive to facilitate their personal and professional growth, in part by having them present the research they have been involved with at meetings throughout the world.



Danya DeMeo, BS



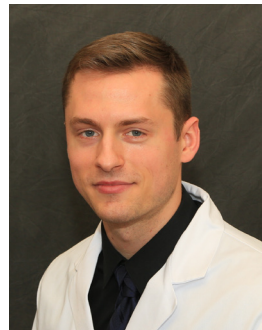
Ejiro Gbaje, MPH



George Go, BS



Ryan Goydos, MS



Justas Lauzadis, PhD



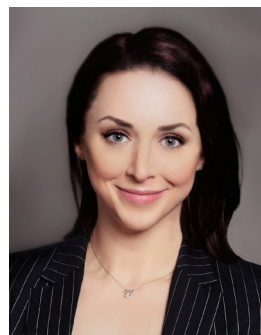
Marko Popovic, BS



Julia Reichel, BA



Valeria Rotundo



Marla Sharp, MPH, MA



Alexandra Sideris, PhD



Haoyan Zhong, MPA



As of March 2021, the Department welcomes **Marla Sharp, MPH, MA**, as the new Assistant Director of Research overseeing the research staff.

Marla Sharp is a clinical epidemiologist with expertise in research design, medical ethics, and population health policy. Her research has focused on topics including consent and competency assessment, end-of-life care policy development, and therapeutic enhancement for treatment-resistant conditions. In addition to holding certifications in performance improvement and Lean Six Sigma methodology, Marla is an avid member of the National Association for Healthcare Quality.

Students and others interested in volunteering for, collaborating with or joining the Clinical Research Division should contact Marla at sharpm@hss.edu.



The Department also congratulates **Alexandra Sideris, PhD**, in her new role as the **C.V. Starr Director of Pain Research**. Dr. Sideris received her PhD in neuroscience at the NYU School of Medicine, Sackler Institute of Graduate Biomedical Sciences.

Dr. Sideris has published in several journals including *Cannabis and Cannabinoid Research*, *Anesthesiology*, *Neuroscience*, *Molecular Pain*, and *Experimental Neurology*. In addition to being on the editorial board of *Regional Anesthesia & Pain Medicine*, she is an active mentor for high school women interested in pursuing a career in STEM fields.

More information about our Department's pain research funded by The Starr Foundation can be found on page 20.

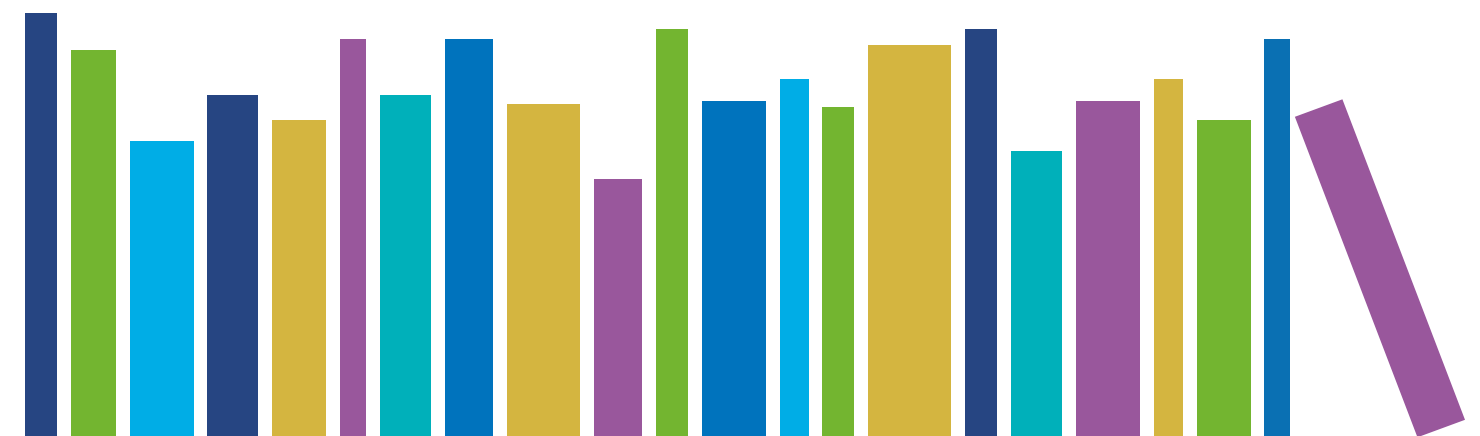
Manuscripts & Book Chapters

As one of the leading orthopedic anesthesiology research centers in the world, the Department of Anesthesiology, Critical Care & Pain Management at HSS is committed to sharing our clinical experiences and research findings with others. To achieve this goal, we strive to maintain the breadth and depth of high-quality publications (over 200 manuscripts from 2015-2018) in many top journals in the field.

Our faculty have published in *New England Journal of Medicine*, *JAMA*, *Lancet*, *British Medical Journal*, *Anesthesiology*, *British Journal of Anaesthesia*, *Anesthesia & Analgesia*, *Regional Anesthesia & Pain Medicine*, *PLoS One*, *Academic Medicine*, *Clinical Journal of Pain*, *JBJS*, *J Arthroplasty*, *CORR*, *Spine and Pain*. A list of publications in the most recent five-year period (2015-2019) can be found in the Appendix.

Our faculty have also contributed to almost every major anesthesiology and pain medicine textbook, including:

- *Miller's Anesthesia*
- *Barash's Clinical Anesthesia*
- *Bonica's Management of Pain*
- *Raj's Practical Management of Pain*
- *Sinatra's Acute Pain Management*
- *Cousins' Neural Blockade*
- *Benzon's Essentials of Pain Medicine*
- *Neal and Rathmell's Complications in Regional Anesthesia*



Leadership

Many of our clinician scientists are nationally and internationally recognized in their area of expertise. Our faculty members serve in a leadership capacity in national or international organizations, editorial boards, or guideline development committees.

Dr. Stavros Memtsoudis was the past President of the Society of Anesthesia and Sleep Medicine and serves on the Board of Directors for the American Society of Regional Anesthesia and Pain Medicine.

Previously, Drs. Christopher Wu and William Urmeý served on the Board of Directors for the American Society of Regional Anesthesia and Pain Medicine.



Several of our faculty members have been recognized for their contributions. Dr. Nigel Sharrock, a Clinical Professor of Anesthesiology and Weill Cornell Medical College Anesthesiologist-in-Chief Emeritus, was the recipient of the American Society of Regional Anesthesia and Pain Medicine's 2017 Gaston B. Labat Award. This award is presented each spring at the ASRA Annual Regional Anesthesiology and Acute Pain Medicine Meeting to an individual who has demonstrated outstanding contributions to the development, teaching and practice of regional anesthesia in the tradition of Gaston P. Labat, who was one of the founders of the original American Society of Regional Anesthesia in 1923.

Dr. Gregory Liguori was the recipient of the 2018 ASRA Distinguished Service Award, which is given to an individual who has made extraordinary contributions to the science, teaching or practice of regional anesthesia and/or pain medicine, and often have had an active involvement in ASRA.

In addition, Mary Hargett, Director of Education and Clinical Initiatives for the Department, was the recipient of the 2018 ASRA Distinguished Service Certificate. This award was presented only once at the 2018 World Congress in recognition of her support of fellow and resident events and activities at the ASRA spring and fall meetings. Mary is a co-author on all three versions of the Regional Anesthesiology Fellowship guidelines, as well as several additional peer-reviewed articles, many of which focus on education and training. Mary is the only non-physician ever to be recognized with this honor.



Dr. Nigel Sharrock receives the American Society of Regional Anesthesia and Pain Medicine's 2017 Gaston B. Labat Award.



Dr. Gregory Liguori receives the 2018 ASRA Distinguished Service Award.



Mary Hargett receives the 2018 ASRA Distinguished Service Certificate.

Our faculty currently hold editorial board positions in many of the top journals today including *British Journal of Anaesthesia*, *Anesthesia & Analgesia*, *Regional Anesthesia & Pain Medicine*, *Journal of Opioid Management*, and *Clinical Journal of Pain*. In our top primary subspecialty journal *Regional Anesthesia & Pain Medicine*, HSS faculty are well represented with editorial board members Drs. Stephen Haskins, Gregory Liguori, Spencer Liu, Jiabin Liu, Stavros Memtsoudis, Alexandra Sideris, Ellen Soffin, Jacques YaDeau, and Christopher Wu.

Clinical Guidelines

Our faculty has been instrumental in the development of national and international clinical guidelines, consensus statements and practice advisories which shape the way clinical care is delivered today. A number of these have been developed with our faculty acting in a leadership capacity.



Image courtesy of the BMJ

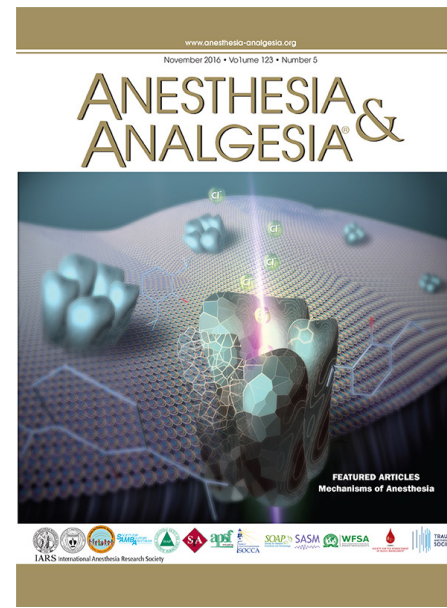


Image courtesy of Wolters Kluwer

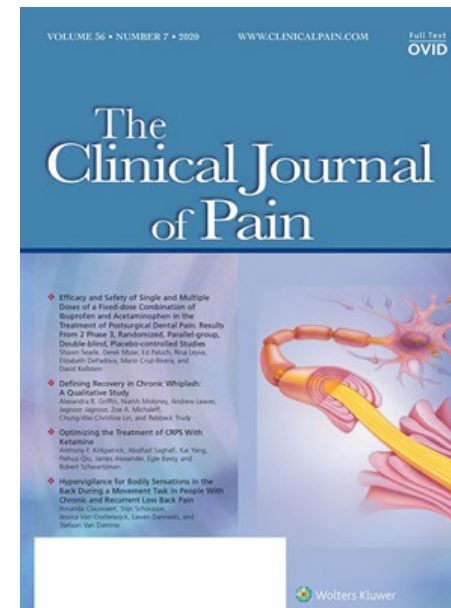


Image courtesy of Wolters Kluwer



Image courtesy of the Journal of Opioid Management



Image courtesy of the BJA



Dr. Stavros Memtsoudis hosts a Consensus Group meeting at HSS in 2018 to decide on recommendations for Anesthetic Technique in Total Joint Arthroplasty.

Clinical Guidelines, Consensus Statements and Practice Advisories

- Management of Postoperative Pain: A Clinical Practice Guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council
- American Society of Anesthesiologists Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques
- Regional Anesthesiology and Acute Pain Medicine Fellowship Directors Group. Guidelines for Fellowship Training in Regional Anesthesiology and Acute Pain Medicine



- Practice Guidelines for the Prevention, Detection, and Management of Respiratory Depression associated with Neuraxial Opioid Administration: an Updated Report by the American Society of Anesthesiologists Task Force on Neuraxial Opioids and the American Society of Regional Anesthesia and Pain Medicine
- Perioperative quality Initiative (POQI) I Workgroup. American Society for Enhanced Recovery (ASER) and Perioperative Quality Initiative (POQI) Joint Consensus Statement on Optimal Analgesia within an Enhanced Recovery Pathway for Colorectal Surgery
- Research Design Considerations for Single-dose Analgesic Clinical Trials in Acute Pain: IMMEDIATE Recommendations
- The ACTION-APS-AAPM Pain Taxonomy (AAPT) Multidimensional Approach to Classifying Acute Pain Conditions
- Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Bariatric, Colorectal, Gynecologic, Orthopedic (hip fracture, total knee arthroplasty, total hip arthroplasty) Surgeries
- Consensus Statement: Toward Opioid-free Arthroplasty: A Leadership Forum (HSS)

- Society of Anesthesia and Sleep Medicine Guidelines on Preoperative Screening and Assessment of Adult Patients With Obstructive Sleep Apnea
- Tranexamic Acid in Total Joint Arthroplasty: The Endorsed Clinical Practice Guides of the American Association of Hip and Knee Surgeons, American Society of Regional Anesthesia and Pain Medicine, American Academy of Orthopaedic Surgeons, Hip Society, and Knee Society
- Systematic Review and Consensus Definitions for the Standardised Endpoints in Perioperative Medicine (StEP) Initiative: Patient Comfort



- American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Perioperative Opioid Minimization in Opioid-Naive Patients
- The Third American Society of Regional Anesthesia and Pain Medicine Practice Advisory on Local Anesthetic Systemic Toxicity: Executive Summary 2017
- Consensus Statement from the Consensus Conference on Bilateral Total Knee Arthroplasty Group
- SOAP-ASRA Thrombocytopenia Taskforce
- Anaesthetic Care of Patients Undergoing Primary Hip and Knee Arthroplasty: Consensus Recommendations from the International Consensus on Anaesthesia-Related Outcomes after Surgery group (ICAROS) Based on a Systematic Review and Meta-Analysis



Emerging Academician Award

Our faculty has been instrumental in the development of national and international clinical guidelines, consensus statements and practice advisories which shape the way clinical care is delivered today. A number of these have been developed with our faculty acting in a leadership capacity.

Academic accomplishment is a critically important part of the Department's mission. Historically, we have encouraged faculty anesthesiologists to become recognized as national and international thought leaders in mission-related areas of achievement. Some attendings have found that dedicated academic time out of the operating room has greatly increased their productivity.

For this reason, the Department has long offered an "Emerging Academician Award" (previously known as the "Young Investigator Award") to faculty anesthesiologists (primarily aimed as those who recently finished training) who wish to spend one day a week pursuing research. The award, which provides a stipend, requires an application demonstrating a clear plan and progress reports highlighting accomplishments. These awards are granted for a duration of two years, with the possibility of renewal for up to a total of four years, contingent upon demonstration of productivity.

These awards have been phenomenally successful and have contributed to several faculty members becoming nationally and internationally recognized thought leaders in their areas of research. Many hold leadership positions in international societies and have been invited around the globe as visiting professors. Previous awardees include Drs. Stavros Memtsoudis, Meghan Kirksey, Ellen Soffin, and Jiabin Liu, and more recently, Drs. Mark Brouillette, Stephanie Cheng, and Mandip Kalsi.

\$3 Million Grant from The Starr Foundation

In late 2019, HSS received a \$3 million grant from the Starr Foundation to establish the C.V. Starr Endowed Chair in Pain Management. This grant will enhance existing pain management studies and fund new studies, with the goal of expediting the translation of research findings into practice, improving safe prescribing practices, and exploring alternatives to opioids.



Seth A. Waldman, MD, Director of the Pain Management Division in the Department of Anesthesiology, Critical Care & Pain Management, will be the inaugural holder of the chair.



The grant will fund a full-time PhD researcher, **Dr. Alexandra Sideris**, who will coordinate these studies across HSS.

Our Research

The Clinical Research Division oversees more than 50 active clinical trials at any given time, with additional studies continually in development. In addition to being superb clinicians, our anesthesiology faculty at HSS includes many of the world's top research experts on improving outcomes after orthopedic surgery and minimizing surgical opioid use through regional anesthesia and acute pain medicine. Our clinician-scientists have made significant contributions to the field of regional anesthesia and pain medicine and have published in many top journals both within and outside the field of anesthesiology including *New England Journal of Medicine*, *JAMA*, *Lancet*, *British Medical Journal*, *Anesthesiology*, *Anesthesia & Analgesia*, *Regional Anesthesia & Pain Medicine*, *Pain*, and *British Journal of Anaesthesia*.

Some of our prominent areas of investigation include:

Opioid-Sparing and Opioid-Free Anesthesia/Analgesia

Orthopedic surgery is commonly recognized as one of the surgical procedures resulting in the highest levels of postoperative pain. As a result, orthopedic surgical patients are often prescribed opioid analgesics, and recent studies suggest that approximately 5% of surgical patients may have persistent opioid use after surgery. As one of the leading centers of regional anesthesia and acute pain medicine in the world, the Department of Anesthesiology, Critical Care & Pain Management at HSS is widely known for its cutting-edge leadership in clinical care, research and education on minimizing the use of opioids after orthopedic surgery. In becoming leaders in opioid-sparing and opioid-free anesthesia/analgesia, our Department has focused on multimodal analgesia, enhanced recovery after surgery pathways, and regional anesthesia.

Multimodal Analgesia

Through the concurrent use of two or more non-opioid analgesics, multimodal analgesia techniques are being investigated across many replacement surgeries. Researchers from our department have investigated the analgesic efficacy of multiple non-opioid analgesics and demonstrated a positive correlation between the use of multimodal analgesia, decreased perioperative opioid use, and improved patient outcomes in orthopedic patients. Our researchers continue to investigate the optimal perioperative multimodal regimen including use of novel agents such as antidepressants as part of these regimens.

Enhanced Recovery After Surgery (ERAS) Pathways

ERAS pathways are standardized multimodal perioperative care tracks based on best available medical science designed to achieve early recovery for patients undergoing major surgery. Implementation of ERAS pathways have been clearly shown to decrease length of stay, lower perioperative opioid use, and decrease perioperative morbidity. At HSS, our clinicians are recognized as international experts in ERAS pathways and have published numerous manuscripts in ERAS. HSS anesthesiology faculty are the lead anesthesiologists in creating guidelines for multiple ERAS pathways for a surgical quality improvement program headed by the American College of Surgeons (ACS)/Agency for Healthcare Research and Quality (AHRQ). The ERAS pathways developed by our faculty for this quality improvement program will support hospitals in implementing perioperative evidence-based protocols to meaningfully improve clinical outcomes, reduce healthcare utilization, and improve the patient experience in over 750 hospitals throughout the United States, Puerto Rico, and the District of Columbia.

Regional Anesthesia and Analgesia

Nationwide, only 20% of total-joint replacement surgeries are performed using regional anesthesia compared with 80% done at HSS. Clinically, our department is one of the few departments worldwide in which each of our clinicians are experts in the use of regional anesthesia, which has been associated with improved patient outcomes after orthopedic surgery. Our faculty is at the forefront of developing new regional techniques and researching the optimal anesthetic agents and additives to use for regional anesthesia. Our research helps determine the best use for regional anesthesia-analgesic techniques in the orthopedic setting in hopes of increasing its use nationwide to improve outcomes for orthopedic surgical patients.

Health Services Research and Perioperative Outcomes

Our faculty members are leaders in orthopedic-related health services research, a multi-disciplinary field that studies the performance, quality, effectiveness and efficiency of healthcare services related to perioperative outcomes and health problems of individuals, populations, and healthcare systems.

Examples of our research include:

- Implications of opioid-based postsurgical pain control on opioid-related adverse events and their impact on clinical and economic outcomes
- Use of critical care services among patients undergoing total hip and knee arthroplasty
- The influence of peripheral nerve blocks in shoulder arthroplasty on complications and length of stay
- Sleep apnea and total joint arthroplasty under various types of anesthesia
- Disparities in regional anesthesia for orthopedic surgery

Other studies investigate ways of minimizing the use of opioids, and strive to identify serum biomarkers and psychological stratification for patients at risk for developing post-operative pain.

Often, our faculty will utilize database research to understand trends and analyze potential links between perioperative care and the recovery process. Our faculty's manuscripts on health services research and perioperative outcomes have been published in top journals both within the fields of anesthesiology and orthopedics (*Anesthesiology, Anesthesia & Analgesia, Regional Anesthesia and Pain Medicine, Pain, British Journal of Anaesthesia, JBJS, Journal of Arthroplasty, CORR*) and outside these fields in widely read general medical journals (*New England Journal of Medicine, JAMA, Lancet, British Medical Journal*).

Physiology

Our physiology research aims to find a better understanding of the interactions between a patient's underlying physiology and anesthetic/surgical techniques. Our faculty have pioneered the use of hypotensive techniques for orthopedic surgical procedures. HSS has been at the forefront of using controlled hypotension to limit intraoperative blood loss and reduce blood transfusion. Our research has also revealed no strokes in a large cohort of ambulatory patients after regional anesthesia for shoulder surgery in the seated position despite frequent incidence of hypotension. In addition, our research demonstrates preservation of cerebral perfusion during stable systemic hemodynamic conditions in patients undergoing posterior spine procedures.

Pediatric Anesthesia

Researchers focus on the safety and efficacy of regional anesthesia in the pediatric orthopedic population. The pediatric patient volume at HSS provides a unique opportunity to measure outcomes such as side effects, rare complications and patient satisfaction. Two of our physician investigators are involved in the Pediatric Regional Anesthesia Network (PRAN), a multi-institutional tool dedicated to understanding trends into regional anesthesia for pediatric patients. Our pediatric anesthesia faculty have published one of the few articles investigating the incidence and severity of postdural puncture headaches in children undergoing surgical procedures.

Point-of-Care Ultrasound

Our faculty are internationally renowned for their clinical expertise and research on point-of-care ultrasound (PoCUS), which is becoming increasingly vital for critical care specialists and anesthesiologists. Our faculty are investigating the use and role of PoCUS on high-risk patients and on identifying patients who may be at an increased risk for postoperative pain after orthopedic procedures such as hip arthroscopy. In addition, our research focuses on the impact of incorporating point-of-care ultrasound education into resident and fellowship curricula. HSS PoCUS faculty recently published a groundbreaking series of PoCUS articles in *Regional Anesthesia and Pain Medicine*.



Clinical Research Division

For more information, visit the HSS anesthesiology clinical research website at:

<https://www.hss.edu/anesthesiology-pro-clinical-research.asp>

Clinical Research Division

Our researchers and staff continue to grow on the division's history as a leader in the fields of anesthesia and pain management research. Notably, our research into regional anesthesia for total joint replacement surgeries has contributed to an overall increase in regional anesthesia use throughout HSS. In 2017, more than 80 percent of our joint replacement cases were done under regional anesthesia compared to only 20 percent nationwide.

 6200+ Citations in high-impact research in 2019	 70+ Active studies managed in 2019	 85+ Articles published in 2019
Meet the Team	Clinical Research Initiatives	For Patients

Researcher Stories

The Department of Anesthesiology, Critical Care and Pain Management at HSS/Weill Cornell Medicine has a diverse portfolio of research ventures and researchers. We have selected a few researchers to highlight the depth and breadth of the research endeavors in our department. It is our hope that you will see the commitment and passion of our researchers as they seek answers to their questions all while maintaining a heavy clinical load.

Stephen C. Haskins, MD



Dr. Haskins is an internationally recognized expert in point-of-care ultrasonography (PoCUS) and Focus Assessed Transthoracic Echocardiography (FATE). He is a Clinical Associate Professor of Anesthesiology at Weill Cornell Medical College and his research focuses on PoCUS, which has been called the “stethoscope of the 21st century.”

He lectures and teaches PoCUS and FATE throughout the world, and has been named “HSS Teacher of the Year” several times by the Cornell-NYP Graduating Anesthesiology Residents.

Recently, Dr. Haskins published a series of review articles on the importance of point-of-care ultrasound for regional anesthesiologists and pain medicine specialists in *Regional Anesthesia and Pain Medicine*, the leading subspecialty journal in regional anesthesiology. He continues to advance the education and clinical use of PoCUS through his research and publications.

“My interest in non-cardiac PoCUS emerged from my visit to Denmark when I learned how to perform Lung Ultrasound and the Focused Assessment for Sonography in Trauma (FAST) exam. At that point, I realized that PoCUS was much more than FATE and that ultrasound can be truly used as the 21st Century version of a stethoscope.

“We’ve used PoCUS at HSS multiple times to help aid in the diagnosis of patients at the bedside that would have otherwise delayed management if we had to wait for formal testing, and I have heard countless stories of lives being saved after clinicians have taken the FATE course or have learned other PoCUS skills. I am always inspired when I hear about the ways these courses have had an immediate impact on patient care and outcomes.”

Stavros G. Memtsoudis, MD, PhD, MBA

With over 300 peer reviewed publications and a Google h-index of 56, Dr. Memtsoudis, a Clinical Professor of Anesthesiology, has published in top medical journals such as *New England Journal of Medicine*, *British Medical Journal*, *Anesthesiology*, *British Journal of Anaesthesia*, and *Pain*. Dr. Memtsoudis is an internationally recognized researcher for his database research on the effect of anesthesia on perioperative outcomes.

Dr. Memtsoudis mentors numerous research fellows at HSS and maintains a close relationship with the Paracelsus Medical University in Salzburg, Austria, where he also holds a professorship in anesthesiology. Dr. Memtsoudis is on the Board of Directors for the American Society of Regional Anesthesia and Pain Medicine, and was a past President of the Society of Anesthesia and Sleep Medicine. Dr. Memtsoudis has authored a number of perioperative guidelines and is widely considered one of the top world experts in the perioperative management of orthopedic patients.

“There are three main aspects to my passions as a researcher. One is that the research I do ultimately affects patient care. It extends my clinical reach from one patient at a time to potentially millions of patients. That is incredibly rewarding, knowing that I have influence over the entire continuum.

“The second thing I find rewarding about research is the independence of thought. To many people, research seems like a cookie-cutter process in which



you do an experiment and come up with a result, but it really requires imagination to come up with questions and design protocols in a way that will maximize the chance of you getting a result. And sometimes the result is negative, and that's okay. To me, it is equally important to find out that something does not have an effect than the opposite, because we practice many things in medicine today simply because we keep doing things the same way.

“I also really enjoy working with young researchers at the beginning of their careers: showing people that success is possible early in their career and that they can be an integral part of it. I provide the environment and the teaching, but it's their voice that comes from within that really matters, that they're passionate about trying again even after failing.”

Ellen M. Soffin, MD, PhD

Dr. Soffin is a Clinical Assistant Professor of Anesthesiology, Weill Cornell Medical College and national expert on enhanced recovery after surgery (ERAS) pathways and the role of the anesthesiologist/perioperative physician in the opioid epidemic.

She is the Chair of the Anesthesia Spine Service Workgroup and directs the Department's spine research program.

Dr. Soffin's research interests include improving outcomes after complex spine surgery, emphasizing opioid-sparing anesthesia and applications of regional analgesia to the spine surgery patient. She has published extensively on opioid-minimizing strategies for orthopedic surgery, as well as on the role of the anesthesiologist in curbing the opioid epidemic. Her work has been published in leading journals including the *British Journal of Anaesthesia*, *Anesthesia & Analgesia*, *Spine*, *European Spine Journal* and *Anesthesiology*.

“My passion as a researcher is to uncover new knowledge and new ways of doing things. The process is what keeps me engaged. Like many researchers, I have worked on a range of basic science



and clinical topics. I started in psychology, followed by PhD work on neuromuscular physiology, then a post-doctoral phase in drug discovery for big pharma, and now I focus on clinical research to improve outcomes after orthopedic surgery. The common ingredient is an understanding and enthusiasm for how research works, and the reward that comes with publishing and contributing to the academic community.”

Kethy M. Jules-Elysee, MD

Dr. Jules-Elysee is an expert on the perioperative inflammatory stress response and its effect on perioperative outcomes, with additional research interests in postoperative analgesia. She has published in many of the top journals in both anesthesiology and orthopedics including *Anesthesiology*, *Regional Anesthesia and Pain Medicine*, *British Journal of Anaesthesia*, *Anesthesia & Analgesia*, *JBJS*, *CORR*, and *Spine*. Prior to the COVID-19 pandemic, she actively participated in medical missions to Haiti approximately twice a year.

In addition to being board certified in Anesthesiology, Dr. Jules-Elysee, a Clinical Associate Professor of Anesthesiology at Weill Cornell Medical College, is a Diplomate of the American Board of Internal Medicine and Board Certified in Pulmonary Disease. Dr. Jules-Elysee is in the process of investigating the use of synthetic tetrahydrocannabinol (THC) agents for postoperative pain control after orthopedic surgery. Dr. Jules-Elysee is also an outstanding educator, having been the recipient of the “Teacher of the Year” Award three times while at Hospital for Special Surgery.

“I am passionate about both research and medical missions. Research keeps medicine interesting. You can apply what you have discovered to future patient care; you can contribute not only by taking care of patients directly, but also by discovering new things.



“In terms of medical missions, I went to Catholic school and college, and the nuns always said, “To whom much is given, much is expected.” My mother also brought me up in a way in which you have to give back, you have to acknowledge the people in need.

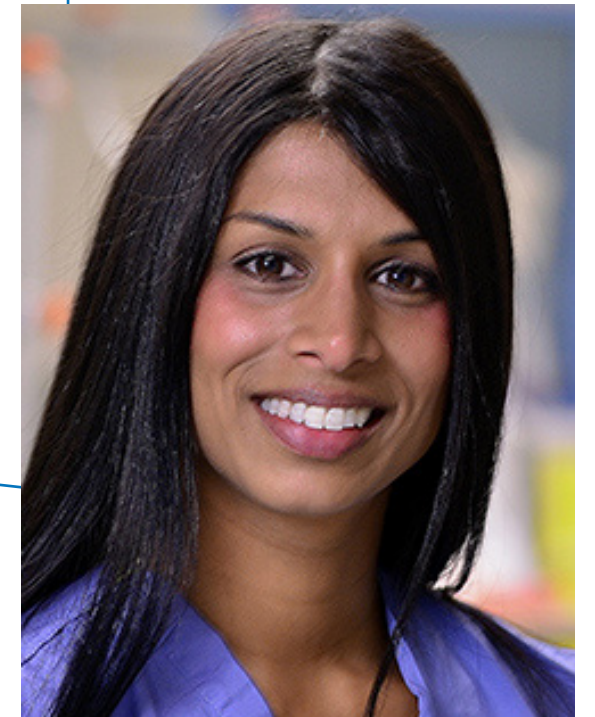
“I always feel that you have to really try for your patient, you have to fight for your patient. They may be near death, but when you revive them and they become normal again, it’s like a miracle. I always believe that you have to give your best and go over the limit to get the results you want in terms of patient care. That’s my philosophy.”

Swetha Pakala, MD

Dr. Pakala is a Clinical Assistant Professor of Anesthesiology, Weill Cornell Medical and well-recognized expert in the use of regional anesthesia in international health and limited resource settings. In 2012, Dr. Pakala founded the Global Health Initiative (GHI) to provide sustainable education to anesthesia providers in resource-limited settings around the world, with the aim of improving anesthesia care and decreasing perioperative morbidity.

For her work with the GHI, in 2019 Dr. Pakala was the first recipient of the Leon Root, MD Community Service Award. This award recognizes the outstanding leadership of those making significant contributions to the community through initiatives that improve the health and/or healthcare of vulnerable and underserved populations.

Dr. Pakala has been involved in several public health initiatives, short-term surgical missions, and sustainable teaching efforts in countries around the world including Ghana, Vietnam, Uganda, and India. Together with Dr. Mark Brouillette, she



has spearheaded the Design, Implementation and Assessment of a Global Regional Anesthesia Curriculum Engagement (GRACE) initiative, which has improved anesthesia care around the world. Her work has the potential to decrease perioperative mortality on a global scale.

“My passion is working to narrow the gap between resource-poor and resource-rich societies. To help improve standards of health care in low-resource and low-income countries. To perpetuate the ideology that health is a human right. I feel it is our responsibility with the resources and the opportunities we have to spread this wealth and knowledge to those who are less advantaged. Health is a human right, and all should be entitled to safe and effective healthcare.”

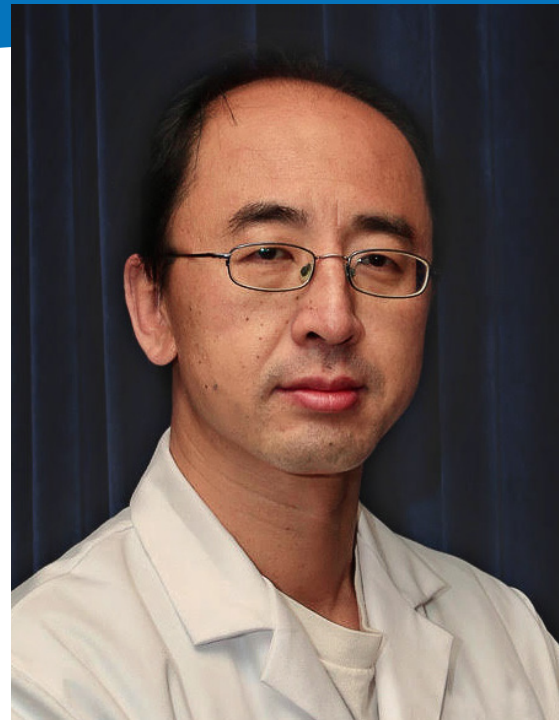
Jiabin Liu, MD, PhD

Dr. Jiabin Liu is a nationally recognized expert in perioperative outcomes and healthcare resource utilization in orthopedic patients. He has published seminal articles on this topic in *British Journal of Anaesthesiology*, *Regional Anesthesia & Pain Medicine*, and *Anesthesia & Analgesia*. He is an outstanding clinician and innovative clinical researcher who has been undertaking large studies with national databases. Some of Dr. Liu's seminal publications have influenced how we practice clinical anesthesiology today.

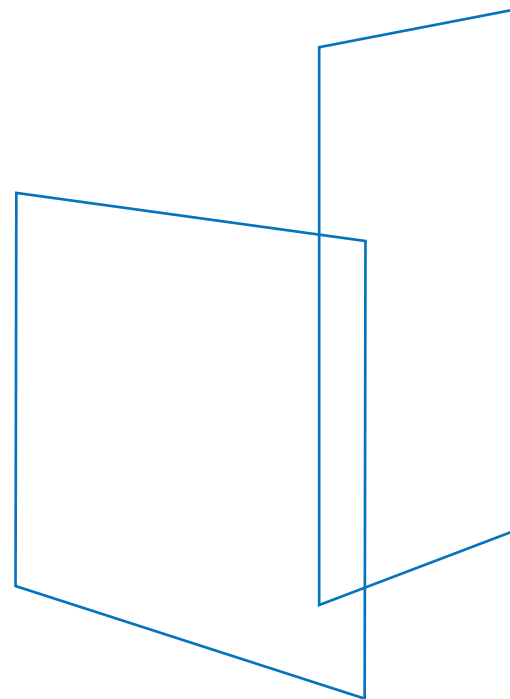
Dr. Liu is on the editorial boards for *Regional Anesthesia & Pain Medicine* and *Translational Perioperative and Pain Medicine*.

"Some of my most notable studies that have directly influenced patient care include a large database study that was the first to show BMI as a continuous variable that is positively correlated with complications in total knee and hip replacement. This study was selected as the cover story for the *Journal of Arthroplasty*.

"Another study is one I decided to conduct after noticing that the standard procedure of conducting staged bilateral total knee replacements one week apart seemed to lead to poor outcomes. This study changed the future practice of these surgeons.



"I have liked research ever since I started medicine; there are so many unanswered questions. My passion is to become an excellent clinician scientist, and to try to use the most relevant updated literature in patient care."

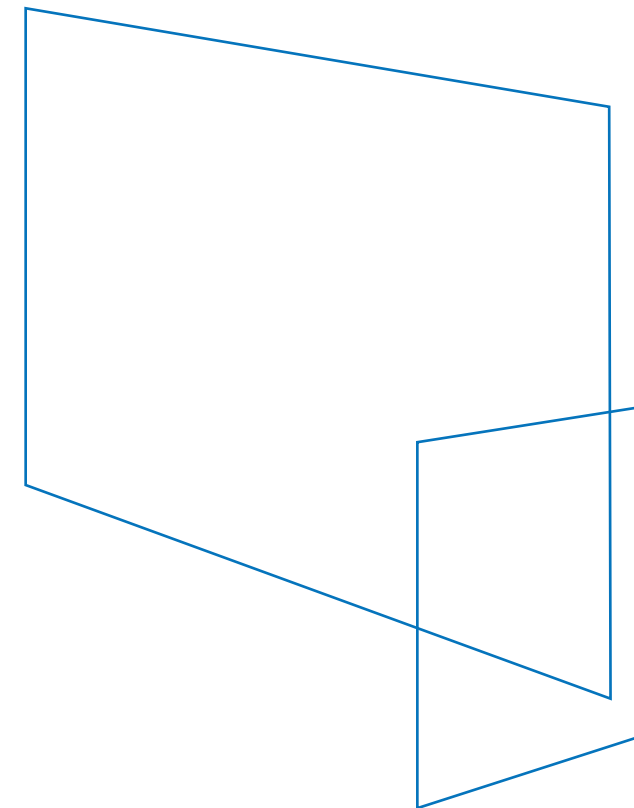


David H. Kim, MD

Dr. Kim is the prototypical clinician researcher. While carrying a full schedule of clinical duties, Dr. Kim has designed and undertaken several high-quality randomized controlled trials to assess the analgesic efficacy of novel peripheral nerve blocks. He is seen as a clinical innovator in introducing new peripheral nerve blocks into clinical practice at HSS.

Dr. Kim is nationally recognized for his work in this area and has recently published his work in top anesthesiology journals including *Anesthesiology*, *Anesthesia & Analgesia*, and *Regional Anesthesia & Pain Medicine*.

"HSS is a strong academic institution but its core has always been to promote superb clinical quality. I believe it is important for our anesthesia practice to validate our effectiveness and prove our value within such a premier institution. I have witnessed many innovative changes among surgical techniques over the past decade. It is important that our department also continues to strive to be innovative."



Meghan A. Kirksey, MD, PhD



With her subspecialty training in critical care medicine at Columbia University Medical Center and PhD from The Rockefeller University, Dr. Kirksey is actively involved in clinical and database research to elucidate physiologic and clinical determinants of postoperative outcomes.

Dr. Kirksey, along with HSS co-investigator Alexander McLawhorn, MD, was the recipient of the competitive OREF Perioperative Surgical and Medical Home Patient Safety Research Grant, which provides funding for clinical research to advance breakthroughs in orthopedic patient safety. Their study examined the impact of consistent surgical team staffing on patient outcomes following total joint arthroplasty.

Funding was provided by OREF and the American Society of Anesthesiologists (ASA), the Foundation for Anesthesia Education and Research (FAER), the Anesthesia Patient Safety Foundation (APSF), the American Academy of Orthopaedic Surgeons (AAOS) and the Cigna Foundation.

“As an anesthesiologist and ICU physician, I am particularly interested in identifying patients at increased risk for complications after surgery and improving their outcomes. I find myself asking big-picture questions about what pre-existing illnesses impact outcomes at a population level. Meanwhile, on the microscopic side, I am exploring individual

differences between patients at the DNA/RNA and protein levels that may cause people who otherwise appear similar to respond differently to surgery.”

Stephanie Cheng, MD, DABMA



In addition to being a board certified anesthesiologist, Dr. Stephanie Cheng is one of the few anesthesiologists who has board certification in Medical Acupuncture for Physicians. She has several ongoing randomized controlled trials investigating the use of intraoperative auricular electro-acupuncture for postoperative analgesia.

In light of the opioid epidemic, the use of complementary/alternative medicine will become an integral part of perioperative care, and Dr. Cheng’s research will provide new insights on how to optimally integrate these new modalities into the care of our surgical patients.

Dr. Cheng is also a well-respected educator who is the Director of the HSS Fellowship Integrative Medicine Clinical Elective and HSS Anesthesiology Residency Rotation. She has received the “HSS Teacher of the Year” award two years in a row from the 2019 and 2020 Cornell-NYP Graduating Anesthesiology Residents.

“The human body is very resilient, and its ability to heal itself is fascinating. For me, an important research

goal is finding non-pharmaceutical ways to enhance the body’s natural defenses and its innate ability to heal itself—specifically using acupuncture, but also other techniques as well. I am especially interested in ways to accomplish this in the perioperative period. From decreasing anxiety and pain to increasing range of motion with physical therapy, enhancing the body as a whole, rather than just the part being operated on, is beneficial for patient recovery.”

Faye Rim, MD, FAAPMR

Dr. Rim is a board-certified physiatrist and pain management specialist, and is Medical Director of Presurgical Chronic Pain Management at Hospital for Special Surgery. Prior to joining HSS, she served as Chief of Pain and Palliative Medicine at Metropolitan Hospital. Dr. Rim oversees the hospital's Preoperative Pain Optimization Program, where she works on and studies improving preoperative screenings to ensure optimal pain management for all orthopedic patients.

Preliminary results from her research suggest that decreasing the amount of opioids a patient takes prior to surgery may be correlated with an improvement in postoperative outcomes.

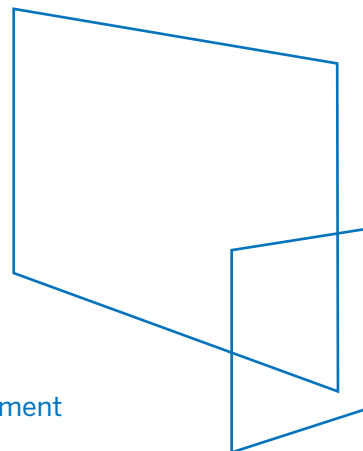
"My current focus on opioid research began after I had been in practice for a couple of years. I felt there was a disconnect between what I saw in practice and what was in the medical literature at that time. I went back to academic medicine and worked at Mount Sinai/James J Peters VA Medical Center in the Bronx and New York Medical College/Metropolitan Hospital before coming to HSS. I wanted to see a better bridge between the reality of pain medicine and clinical research.

"My focus is on translational research—a systematic effort to convert basic research into practical applications. It takes into concern scientific discoveries, changes in treatments, practices and



health policies. I want to have a practical impact in real world settings.

"It's been interesting to see the current trends in pain management and opioid use. I have always advocated for a more holistic approach, minimizing pain medication usage and looking at functional status rather than a pain score. It's rewarding when patients thank you for eventually making them come off their high dose pain meds."



Kathryn (Kate) DelPizzo, MD

As head of Pediatric Anesthesiology, Dr. DelPizzo has been conducting research on the perioperative use of regional anesthesia with a special interest in pediatric regional anesthesia and perioperative pain control for children. She recently completed one of the few studies on postdural (spinal) headaches in teenage patients.

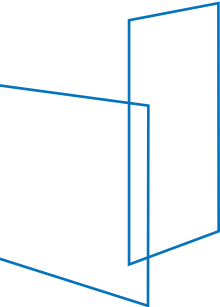
"In 2012, a patient experienced a very severe spinal headache that was resistant to all the standard treatments. At that point, I had been at HSS for six years, and I started to notice that teenagers got more headaches after spinal anesthesia than adults.

"We published an article in *Anesthesia & Analgesia* showing that teenagers have a higher risk than the rest of the population—however, the risk is still low; the headaches are not severe. I think this can ease the fears of the healthcare community that even though teenagers have a higher risk of headache after spinal surgery, often the problem is solved by having the patient lie down and take fluids.



"I'm very interested in adolescents; I think they're a fascinating population. The teenage girl who had a headache for a very long time—it changed her life. She is now an expert in headaches and wants to be a doctor studying this field.

"Recently I have become more interested in adolescent addiction. The opioid crisis is terrifying, but I think we can learn a lot from it. Teenagers are a great subject because they have developing brains. They are at very high risk for addiction."



Highlighted Articles

With over 250 published manuscripts over the past 5 years, the faculty in the Department of Anesthesiology, Critical Care and Pain Management at HSS have been extremely productive academically. The quality and quantity of the Department's publications is impressive when considering the modest size of the Department and that, as a private practice, each of our faculty carry a nearly full clinical load in addition to numerous other administrative responsibilities. The following pages contain detailed examples of just a few articles illustrating the depth, breadth and impact of our work.

Association of Multimodal Pain Management Strategies with Perioperative Outcomes and Resource Utilization: A Population-based Study

Memtsoudis SG, Poeran J, Zubizarreta N, Cozowicz C, Morwald EE, Mariano ER, Mazumdar M. Association of multimodal pain management strategies with perioperative outcomes and resource utilization: a population-based study. *Anesthesiology*. 2018;128:891-902.

A multimodal approach to pain management has been touted as one of the pillars in providing postoperative analgesia, especially in context of the opioid epidemic. However, data for this approach in improving patient outcomes is lacking.

In this article published in *Anesthesiology*, Dr. Memtsoudis and colleagues publish one of the first studies to determine how the number and type of analgesic modes is associated with reduced opioid prescription and complications. Using the Premier Perspective database, they examined total hip/knee arthroplasties (N=512,393 and N=1,028,069, respectively) and found that there was a stepwise modality number-associated decrease in opioid patient-controlled analgesia use, opioid prescriptions and some opioid-related side effects. The strongest association was for cyclooxygenase-2 inhibitors and nonsteroidal anti-inflammatory drugs.



Image courtesy of The Official Journal of the American Society of Anesthesiologists

Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Total Knee Arthroplasty

Soffin EM, Gibbons MM, Ko CY, Kates SL, Wick EC, Cannesson M, Scott MJ, Wu CL. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total knee arthroplasty. *Anesth Analg*. 2019;128(3):441-53.

Enhanced recovery after surgery (ERAS) pathways have been clearly shown to decrease length of stay, lower perioperative opioid use, and decrease perioperative morbidity.

The American College of Surgeons (ACS) in conjunction with the Agency for Healthcare Research and Quality (AHRQ) has launched a surgical quality improvement program to create multiple ERAS pathways with the intent to improve clinical outcomes, reduce healthcare utilization and improve the patient experience. These ERAS pathways will be implemented in over 750 hospitals throughout the United States, Puerto Rico, and the District of Columbia.

Dr. Wu, an international expert in ERAS pathways and postoperative pain management, is the lead anesthesiologist in creating the anesthesiology evidence reviews for the ACS/AHRQ ERAS program, which include colorectal, bariatric, gynecologic,

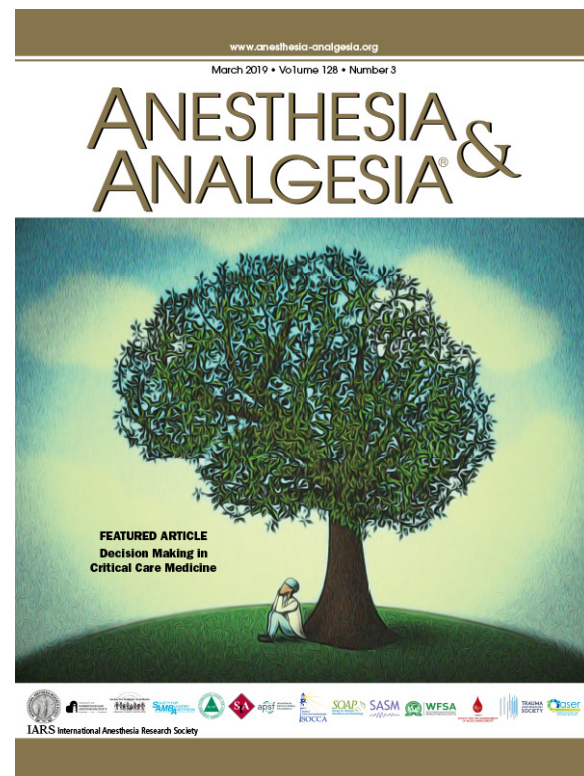


Image courtesy of Wolters Kluwer

exploratory laparotomy, hip fracture, total hip arthroplasty and total knee arthroplasty pathways.

The ERAS evidence review for total knee arthroplasty was published in the March 2019 issue of *Anesthesia & Analgesia*. The remaining reviews were published in *Anesthesia & Analgesia* and *Regional Anesthesia and Pain Medicine*.

Duloxetine and Subacute Pain after Knee Arthroplasty when Added to a Multimodal Analgesic Regimen: A Randomized, Placebo-controlled, Triple-blinded Trial

YaDeau JT, Brummett CM, Mayman DJ, Lin Y, Goytizolo EA, Padgett DE, Alexiades MM, Kahn RL, Jules-Elysee KM, Fields KG, Goon AK, Gadulov Y, Westrich G. Duloxetine and subacute pain after knee arthroplasty when added to a multimodal analgesic regimen: a randomized, placebo-controlled, triple-blinded trial. *Anesthesiology*. 2016;125(3):561-72.

Dr. YaDeau and colleagues perform a well-designed and high-quality study to examine the controversial issue of the use of antidepressants for postoperative pain. In this triple-blinded, randomized, placebo-controlled trial, patients received either duloxetine or placebo for 15 days in addition to a comprehensive multimodal analgesic regimen including neuraxial anesthesia-analgesia.

This study is an example of HSS anesthesiologists acting as true perioperative physicians, as the research focuses on treating pain after discharge from the hospital. Although there was no difference in other side effects, pain, or in anxiety and depression scores, the use of duloxetine, when included as a part of a multimodal analgesic regimen for knee arthroplasty, markedly decreased opioid consumption. An additional follow-up study is underway to further investigate the possible perioperative benefits of duloxetine.

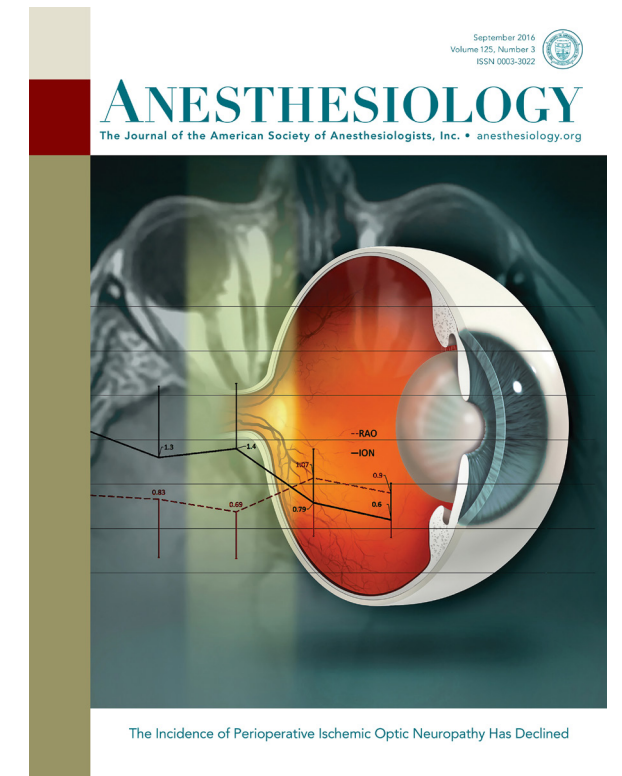
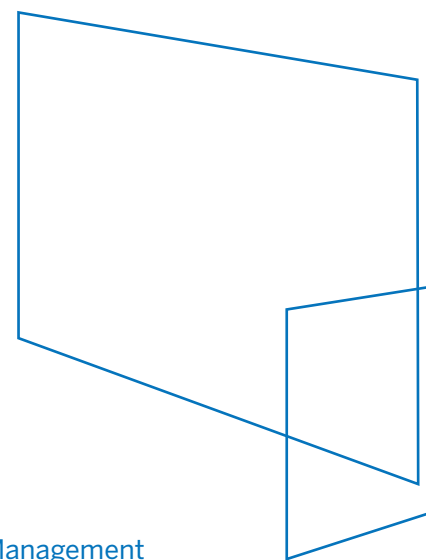


Image courtesy of The Official Journal of the American Society of Anesthesiologists



Opioid Prescription Levels and Postoperative Outcomes in Orthopedic Surgery

Cozowicz C, Olson A, Poeran J, Mörwald EE, Zubizarreta N, Girardi FP, Hughes AP, Mazumdar M, Memtsoudis SG. Opioid prescription levels and postoperative outcomes in orthopedic surgery. *Pain*. 2017;158(12):2422-30.

The current opioid epidemic has been fueled in part by the over prescription of opioids. In this article, Dr. Cozowicz, a research fellow working with Dr. Memtsoudis, investigated the associations between opioid prescription levels and postoperative outcomes using population-based data of orthopedic surgery patients. Multilevel multivariable logistic regression models measured associations between opioid dose prescription and postoperative outcomes, studied by quartile of dispensed opioid dose.

Overall, higher opioid prescription was associated with an increase in cost, length of stay, and most postoperative complications, with the strongest effect observed in thromboembolic, infectious and gastrointestinal complications. Increase in complication risk occurred stepwise, suggesting a dose-response gradient.

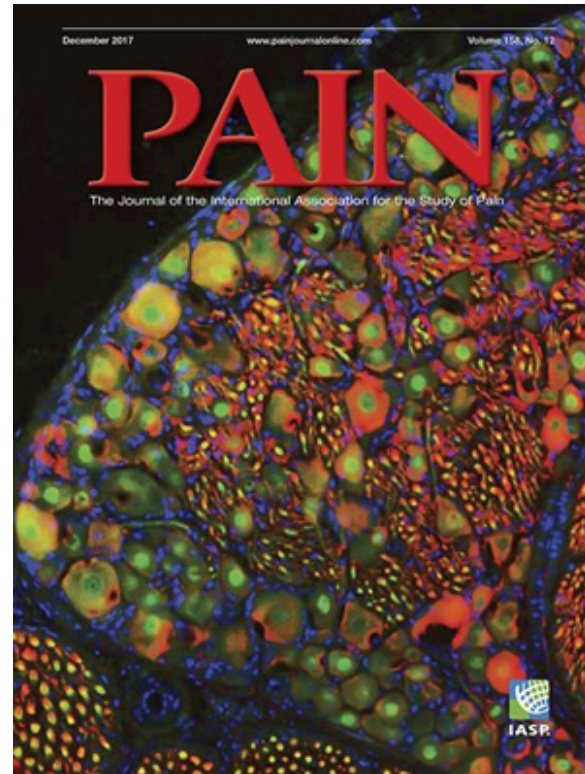
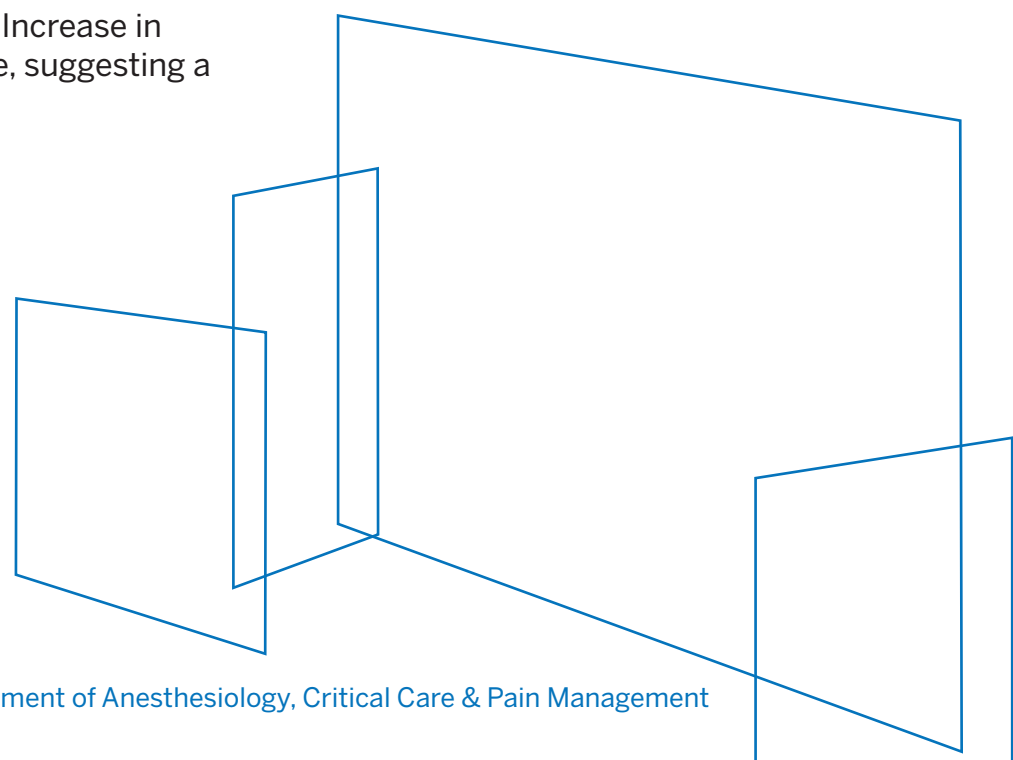


Image courtesy of The Journal for the International Association for the Study of Pain (IASP)



Addition of Infiltration Between the Popliteal Artery and the Capsule of the Posterior Knee and Adductor Canal Block to Periarticular Injection Enhances Postoperative Pain Control in Total Knee Arthroplasty: A Randomized Controlled Trial

Kim DH, Beathe JC, Lin Y, YaDeau JT, Maalouf DB, Goytizolo E, Garnett C, Ranawat AS, Su EP, Mayman DJ, Memtsoudis SG. Addition of infiltration between the popliteal artery and the capsule of the posterior knee and adductor canal block to periarticular injection enhances postoperative pain control in total knee arthroplasty: a randomized controlled trial. *Anesth Analg*. 2019;129(2):526-535.

As a leading center of regional anesthesia and acute pain management, we are always looking for innovative ways to improve our practice and to examine the effectiveness and efficacy of our current practice. In this study, Dr. David Kim examines a very clinically relevant question in our practice: Does adding an Adductor Canal Block (ACB) and Infiltration between the Popliteal Artery and Capsule of the posterior Knee block (IPACK) to periarticular injections (PAI) reduce pain on ambulation postoperatively compared with PAI alone? In this triple-blinded randomized controlled trial, patients who received an ACB and IPACK were more satisfied, had less opioid consumption, needed less intravenous opioids, and had a lower need for intravenous patient-controlled analgesia.

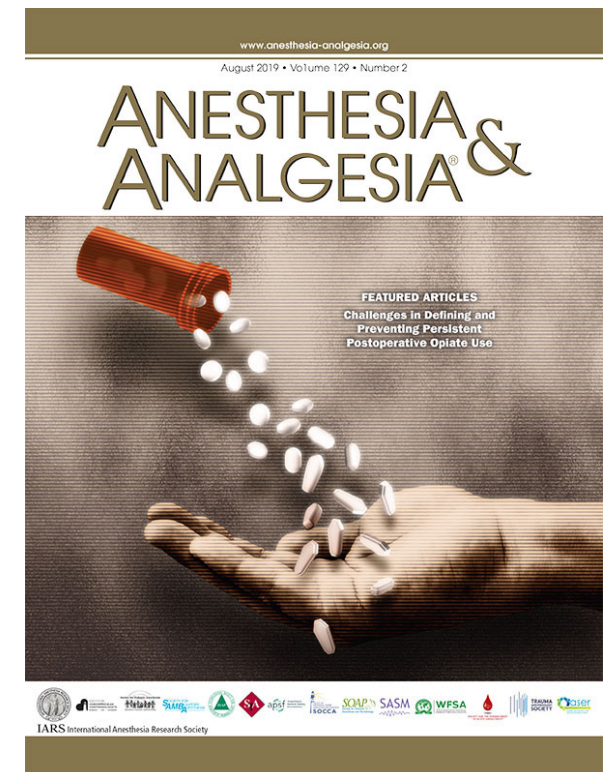
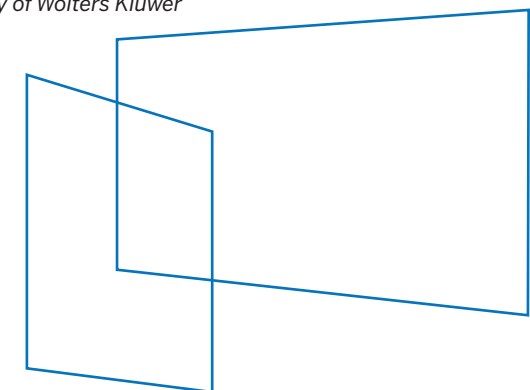


Image courtesy of Wolters Kluwer



Research on the Horizon

The Department of Anesthesiology, Critical Care and Pain Management at HSS endeavors to be on the leading edge of clinical care, education and research. As such, we have research initiatives in many high-profile areas including the opioid crisis, enhanced recovery pathways, population health, pain management, perioperative outcomes and critical care medicine.

Appendix: List of published manuscripts (2015-2019)

2019

1. Abdelaziz H, Citak M, Fleischman A, Gavrankapetanovic I, Inaba Y, Makar G, Memtsoudis SG, Soffin EM. General assembly, prevention, operating room - anesthesia matters: Proceedings of International Consensus on Orthopedic Infections. *J Arthroplasty*. 2019;34:S93-5.
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3. Ban KA, Gibbons MM, Ko CY, Wick EC, Cannesson M, Scott MJ, Grant MC, Wu CL. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for colorectal surgery. *Anesth Analg*. 2019;128(5):879-89.
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7. Bombardieri AM, Beckman J, Urban M, Go G, De Gaudio AR, Girardi FP, Ma Y, Memtsoudis SG. An observational study of cerebral blood flow velocity evaluation in the prone position during posterior lumbar surgery. *Anesth Analg*. 2019;129:487-92.
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13. Drenger B, Blanck TJJ, Piskoun B, Jaffrey E, Recio-Pinto E, Sideris A. Minocycline before aortic occlusion reduces hindlimb motor impairment, attenuates spinal cord damage and spinal astrocytosis, and preserve neuronal cytoarchitecture in the rat. *J Cardiothorac Vasc Anesth*. 2019;33:1003-11.
14. El-Boghdady K, Abdallah FW, Short A, Vorobeichik L, Memtsoudis SG, Chan VWS. Outcome selection and methodological quality of major and minor shoulder surgery studies: a scoping review. *Clin Orthop Relat Res*. 2019;477:606-19.
15. Eliasberg CD, Levack AE, Gausden EB, Garvin S, Russell LA, Kelly AM. Perioperative use of novel oral anticoagulants in orthopaedic surgery: a critical analysis review. *JBS Rev*. 2019;7:e4.
16. Elkassabany NM, Cai LF, Badiola I, Kase B, Liu J, Hughes C, Israelite CL, Nelson CL. A prospective randomized open-label study of single injection versus continuous adductor canal block for postoperative analgesia after total knee arthroplasty. *Bone Joint J*. 2019;101-B:340-7.
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Credits

WRITERS

Christopher Wu, MD
Barbara Wukovits, RN, BSN BC
Laura Stiles

EDITORS

Laura Stiles
Mary Hargett

LAYOUT

Laura Stiles

PHOTOGRAPHY

George Go

ADMINISTRATIVE LEADERSHIP

Susan Cardamone

LOGO CREDITS

Weill Cornell
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**535 EAST 70TH STREET
NEW YORK, NY 10021
212.606.1000
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