

NORTHERN NEW JERSEY

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**Specialty Expertise
and Experience**
Advances Orthopedic and
Neurosurgical Care at
University Hospital



(L-R) Ira Goldstein, MD, FAANS, Director of Neurotrauma at University Hospital and Associate Professor of the Department of Neurological Surgery at Rutgers New Jersey Medical School (NJMS); Michael Vives, MD, Chief of the Spine Division in the Department of Orthopaedics at University Hospital and Associate Professor of Orthopaedic Surgery at Rutgers NJMS; and Sanjeev Sabharwal, MD, MPH, Chief of the Division of Pediatric Orthopaedics at University Hospital and Professor of Orthopaedics at Rutgers NJMS

Specialty Expertise and Experience Advances Orthopedic and Neurosurgical Care at University Hospital

BOARD-CERTIFIED ORTHOPEDIC AND NEUROSURGICAL TEAMS USE THE MOST INNOVATIVE TECHNOLOGIES TO TREAT THE FULL SPECTRUM OF MEDICAL- OR TRAUMA-RELATED SPINE CONDITIONS IN PEDIATRIC AND ADULT PATIENTS THROUGHOUT THE NORTHERN NEW JERSEY AREA

UNIVERSITY HOSPITAL LEVERAGES the expertise of fellowship-trained specialists to treat emergent spine trauma as well as chronic and acute back pain associated with degenerative spine, musculoskeletal or neuromuscular disorders that often require tailored treatment plans carried out by teams of multidisciplinary experts.

“The spine surgeons at University Hospital have years of experience treating the entire spectrum of spine-related problems, ranging from routine disc herniations, scoliosis and spinal stenosis caused by traumatic injuries from motor vehicle accidents, as well as complex tumors or severe infections,” says Michael Vives, MD, Chief of the

Spine Division in the Department of Orthopaedics at University Hospital and Associate Professor of Orthopaedic Surgery at Rutgers New Jersey Medical School (NJMS), who has served patients at the hospital for 14 years. “Patient-centered care and multidisciplinary treatment are vital when treating such a broad range of spine pathologies because each case presents unique challenges.”

Muscular dystrophy and spinal muscular atrophy exemplify the necessity for care coordination across the continuum of pre- and postoperative care, according to Sanjeev Sabharwal, MD, MPH, Chief of the Division of Pediatric Orthopaedics at University Hospital and Professor of Orthopaedics at Rutgers NJMS.

“These conditions often require extensive operations, so minimizing blood loss is important,” he says. “We use antifibrinolytics, such as tranexamic acid, that limit blood loss during extensive operations. Orthopedic surgeons, anesthesiologists and ICU staff work cohesively to guide patients through pre- and postoperative protocols to mitigate the risk of complications and standardize postsurgical protocols.”

Maximizing Surgical Benefit

Intraoperative pharmacotherapies are one tool in a vast armamentarium University Hospital surgeons use to reduce operative risks and optimize outcomes.

“We are a center of innovation,” says Ira Goldstein, MD, FAANS, Director of Neurotrauma at University Hospital and Associate Professor of the Department of Neurological Surgery at Rutgers NJMS. “University Hospital physicians use advanced surgical technologies that facilitate minimally invasive procedures, which decrease complications by reducing trauma to muscles, bones and joints.”

Minimizing such trauma also decreases the need for postoperative pain medications and speeds up the recovery process.

University Hospital’s surgeons use minimally invasive approaches to treat degenerative conditions of the spine, disc herniations and spinal stenosis for lumbar and cervical spine. For example, minimally invasive spine fusion procedures enable surgeons to place pedicle screws or interbody cages without disrupting as much proximal anatomy as in open surgery.

“Patients do better because of the less direct trauma of minimally invasive surgery,” Dr. Goldstein adds. “Several years after minimally invasive spine fusion, patient outcomes are better than those who underwent open surgery, because open fusion procedures can lead to degenerative disease at the vertebrae adjacent to where the surgery was performed.”

University Hospital specialists perform the gamut of minimally invasive spine procedures, including arthroplasty, cervical or lumbar fusion, microendoscopic discectomy, kyphoplasty, nucleoplasty, stereotactic spine

COMBINING ORTHOPEDIC AND NEUROSURGICAL EXPERTISE

UNIVERSITY HOSPITAL'S TEAM of orthopedic and neurosurgical specialists includes:

- + **Folorunsho Edobor-Osula, MD, MPH:** A fellowship-trained pediatric orthopedic surgeon, Dr. Edobor-Osula completed an orthopedic surgery residency at North Shore-Long Island Jewish Medical Center and a pediatric orthopedic surgery fellowship at the Hospital for Special Surgery in New York City. Dr. Edobor-Osula is an attending physician at University Hospital and an Assistant Professor of Orthopaedic Surgery at Rutgers New Jersey Medical School (NJMS), specializing in cerebral palsy, pediatric trauma and sports medicine, as well as limb-lengthening and deformity-correction surgery.
- + **Ira Goldstein, MD, FAANS:** A fellowship-trained, board-certified neurosurgeon, Dr. Goldstein completed fellowship training in complex and minimally invasive spine surgery at the University of Pittsburgh School of Medicine. Dr. Goldstein joined Rutgers NJMS in 2004 and is currently Director of Neurotrauma at University Hospital and Associate Professor of Neurological Surgery at Rutgers NJMS. His expertise is in minimally invasive operations for lumbar fusion, cervical spine surgery, resection of spinal column and spinal cord tumors, and surgical correction of spinal deformities. His clinical research focuses on the utilization of endoscopy for less invasive surgical techniques and the use of novel devices to enhance spinal fusion. He is a reviewer for *The Spine Journal* and frequent surgical instructor for surgeon training courses.
- + **Robert Heary, MD, FAANS:** A board-certified, fellowship-trained neurosurgeon, Dr. Heary completed a neurosurgery residency at NJMS and an orthopedic spine surgery fellowship at Thomas Jefferson University in Philadelphia. He earned a medical degree from the University of Pittsburgh School of Medicine. Dr. Heary is Director of the Spine Center of New Jersey at University Hospital and Professor of Neurosurgery at Rutgers NJMS. His areas of interest are revision spine surgery, minimally invasive spinal surgery, spine and spinal cord injury and tumors, spinal deformity, and spinal biomechanics.
- + **Antonios Mammis, MD:** A board-eligible neurosurgeon, Dr. Mammis earned a medical degree from Columbia University College of Physicians and Surgeons and completed a neurosurgery residency at NJMS. His clinical focus lies in movement disorders, pain syndromes, spasticity and general neurosurgical pathology. Dr. Mammis has advanced training in functional and restorative neurosurgery. He has published prolifically on the topics of movement disorders, pain syndromes and Parkinson's disease. Dr. Mammis is Director of Functional and Restorative Neurosurgery at University Hospital.
- + **Sanjeev Sabharwal, MD, MPH:** A board-certified and fellowship-trained pediatric orthopedic surgeon, Dr. Sabharwal completed his combined fellowship in pediatric orthopedics and scoliosis at Children's Hospital Los Angeles and Shriners Hospitals for Children-Los Angeles. Dr. Sabharwal received

further training at the International Center for Limb Lengthening in Maryland. He is Professor of Orthopaedics at Rutgers NJMS, and his research interests include limb-lengthening surgery and pediatric elbow and spine deformities. Dr. Sabharwal is Deputy Editor for the *Journal of Bone and Joint Surgery* and *Clinical Orthopaedics and Related Research*.

- + **Michael Vives, MD:** Board-certified in orthopedic surgery, Dr. Vives is Chief of the Spine Division in the Department of Orthopaedics at University Hospital and Associate Professor of Orthopaedic Surgery at Rutgers NJMS. He has extensive experience in the operative and nonoperative treatment of a wide range of spinal disorders, including disc herniation, scoliosis, spinal stenosis, spinal trauma and spine tumors. He serves on the advisory or editorial boards of *The Spine Journal*, *Journal of Spinal Cord Medicine* and *SpineLine*. He has published more than 60 peer-reviewed journal articles and book chapters. His research interests include the biomechanics of cervical injuries and their treatment constructs and the biology of spinal fusion.



Drs. Goldstein (L) and Vives utilizing the StealthStation for intraoperative navigation that shows the location of the navigated power drill Dr. Goldstein is holding relative to the position of the patient's neck on the intraoperative CT scan taken with the O-arm, seen in the background.

SPINE CONDITIONS TREATED BY UNIVERSITY HOSPITAL'S ORTHOPEDIC AND NEUROSURGICAL TEAMS

- + Ankylosing spondylitis
- + Basilar invagination
- + Causalgia
- + Cerebral palsy
- + Cervical spine disorders
- + Failed back surgery syndrome
- + Flat back deformity
- + Herniated discs
- + Kyphosis
- + Lumbar spine disorders
- + Muscular dystrophy
- + Myelopathy
- + Neuromuscular disorders
- + Rheumatoid arthritis
- + Scheuermann's disease
- + Scoliosis
- + Spasticity
- + Spinal cord tumors (metastatic and primary)
- + Spinal deformities
- + Spinal infections
- + Spinal stenosis
- + Spine trauma
- + Spondylolisthesis
- + Spondylosis
- + Syringomyelia
- + Tethered spinal cord
- + Thoracic spine disorders

Dr. Vives holds the Stealth navigation probe to demonstrate the physicians' position at the back of the patient's neck.



radiosurgery, and transforaminal lumbar interbody fusion.

“For each of these procedures, we work as a team to identify the most beneficial approach and tailor the treatment plan to meet the patient’s needs,” says Dr. Goldstein, who frequently collaborates with his colleagues, Antonios Mammis, MD, Director of Functional and Restorative Neurosurgery at University Hospital and Assistant Professor of Neurological Surgery at Rutgers NJMS; and Robert Heary, MD, Director of the Spine Center of New Jersey at University Hospital and Professor of Neurosurgery at Rutgers NJMS.

For example, minimally invasive surgical options may be particularly beneficial for older patients, who cannot endure open procedures, and athletes, who seek expeditious returns to their sports, Dr. Goldstein notes.

Surgical Innovations

The O-arm surgical image-guided system and StealthStation surgical navigation complement the experience and expertise of the orthopedic and neurosurgical clinicians of University Hospital to enhance precision and efficiency. These state-of-the-art devices offer the highest quality three-dimensional, high-definition imaging that optimizes workflow for simple, complex, minimally invasive or open spine surgeries.



Dr. Goldstein uses the navigated power drill for a posterior cervical spine procedure.

“Spine surgery is an art. Before you ever get into the operating room you must exhaust all nonsurgical therapies before proceeding with an operation.”

—Ira Goldstein, MD, FAANS, Director of Neurotrauma at University Hospital and Associate Professor of the Department of Neurological Surgery, at Rutgers New Jersey Medical School

The StealthStation surgical navigation system integrates surgical planning software with the O-arm for intraoperative imaging of anatomy and operative instrumentation to permit superior visualization for minimally invasive procedures.

“The O-arm is an intraoperative CT scan unit that projects real-time, three-dimensional images of the patient’s complex spine anatomy, and the StealthStation acts as a GPS device,” explains Dr. Goldstein. “During percutaneous and minimally invasive spine procedures, the spinal anatomy is not visible, and in open procedures, such as scoliosis corrections or revisions of prior fusions, the surface anatomy can be challenging. In such cases, the O-arm can be very helpful for placement of spinal instrumentation.

Compared to traditional intraoperative imaging systems, the O-arm/StealthStation technology significantly reduces the amount of radiation delivered to patients and the OR staff during surgery.

Pediatric Spine Care

University Hospital’s specialized spine care also extends to pediatric patients, who are treated by a multidisciplinary team led by Dr. Sabharwal.

“We provide the entire spectrum of pediatric spine care,” says Dr. Sabharwal, who specializes in treating pediatric spinal deformities and curvatures of the spine, including scoliosis, kyphosis and Scheuermann’s disease. “Not every child needs surgical correction, so we practice a multi-pronged approach that begins with observation.”

For children whose spinal curvature is less than 25 degrees, Dr. Sabharwal monitors the disease progression with X-ray imaging every six months. Curvature between 25 and 45 degrees often requires a brace, which Dr. Sabharwal collaborates with an orthotist to customize.

“Other spinal deformities, such as congenital scoliosis and Scheuermann’s disease, can be treated both non-operatively and operatively, depending on multiple factors, such as curve severity and remaining growth,” Dr. Sabharwal says. “The most common condition we see is adolescent idiopathic scoliosis which is more common in girls experiencing a growth spurt. To identify the most beneficial corrective measure, we assess skeletal maturity with additional X-rays to identify how much growth is remaining.

“For example, we treated a young female patient who had a 150-degree curve,” he says. “To safely correct the deformity, we deployed a staged surgical approach in which we initially performed a limited corrective procedure to implant a temporary rod and then operated again one week later to correct her to an acceptable degree.”

Coverage across the Continuum

To care for complex conditions such as brain stem lesions or tethered spinal cords that have neurological components, Dr. Sabharwal works in concert with University Hospital’s team of neurosurgeons. As many as 50 percent of tethered spinal cord cases require surgical correction, according to the American Association of Neurological Surgeons.

When cerebral palsy causes spasticity — a tightness or contracture of the muscles, often in the arms or legs — the team surgically inserts an intrathecal baclofen pump therapy system that, via an implanted catheter, delivers continuous pharmacotherapy directly into the spinal fluid to control involuntary spasms.

Because these conditions require lifelong treatment, Dr. Sabharwal and the team of University Hospital specialists monitor their patients’ progress as they age.

“I often follow patients into adulthood,” Dr. Sabharwal says. There are a limited number of programs that complete the continuum of care for pediatric patients as they become adults, but we do.”

Multidisciplinary Collaboration: Cases in Point

University Hospital’s orthopedic and neurosurgical specialists emphasize the patient-centered care exemplified by the coordinated care efforts of Drs. Goldstein, Mammis, Sabharwal, Vives and Heary, as well as Folorunsho Edobor-Osula, MD, MPH,



“Specialists at University Hospital provide comprehensive care and utilize a team approach to leverage our collective expertise in pediatrics, orthopedics and neurosurgery to care for patients with muscular dystrophy and other neuromuscular disorders.”

—Sanjeev Sabharwal, MD, MPH, Chief of the Division of Pediatric Orthopaedics at University Hospital and Professor of Orthopaedics at Rutgers-New Jersey Medical School



Dr. Sabharwal (L) and Vives in front of the O-arm imaging monitor, which displays an instrumented spine.

attending physician at University Hospital and Assistant Professor of Orthopaedics at Rutgers NJMS.

“Dr. Sabharwal and I have worked together to treat patients with scoliosis for several years,” Dr. Vives says. “We developed a team-based approach that makes even fairly complex cases go smoothly.”

The multidisciplinary approach is especially effective when treating musculoskeletal tumors and tumors of the spine, notes Dr. Vives.

“A middle-aged female patient presented with back pain, and evaluation revealed a spine tumor,” he says. “After performing a minimally invasive biopsy, bone scans and blood work, our pathologists identified the tumor type, which enabled us to



Drs. Sabharwal (L) and Vives use a drill to retract tissue during scoliosis surgery.

determine the best strategy going forward. In the absence of metastatic spread, the best option for this patient was to take the tumor out in one piece, or ‘en bloc.’ This prevents residual tumor cells from being left behind. After Chirag Gandhi, MD, Director of the Endovascular Neurosurgery Fellowship Program at University Hospital, embolized the tumor to cut off its blood supply, we proceeded with complete surgical resection. To accomplish this, Michael Curi, MD, Chief of Vascular Surgery, mobilized the great vessels from the anterior surface of the spine. Postoperatively, our intensivists

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Academics for Clinical Application

University Hospital’s academic focus has established the facility on the forefront of clinical research.

“Not only do we operate and treat patients clinically, we also emphasize the research component to improve clinical results,” Dr. Sabharwal says. “This is a major benefit that stems from being in an academic environment. We recently completed a study on readability of online education materials for patients with spine problems, in which we scrutinized how the information is presented on spine care websites to improve the level of care patients receive.”

Dr. Sabharwal participates in clinical research and has published extensively on minimizing blood loss and using noninvasive ventilation in patients undergoing spinal deformity correction.

“Without noninvasive ventilation, some of these pediatric patients with neuromuscular disorders would have received a tracheotomy or breathing tube or been denied for surgical intervention due to compromised lung

function,” Dr. Sabharwal says. “Our team, which includes John Bach, MD, Department of Physical Medicine and Rehabilitation at University Hospital, has successfully treated several patients with limited lung or pulmonary reserve without the need for long-term intubation or a tracheotomy.”

University Hospital physicians also serve on editorial boards for spine research and clinical journals, as well as scientific program committees, which enables them to stay on the cutting edge of advances that may lead to more positive clinical results.

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Community Approach

Serving more than 80,000 patients annually from across northern New Jersey, University Hospital’s orthopedic surgeons and neurosurgeons provide the most advanced surgical and nonsurgical care to achieve the best possible outcomes.

“We have the privilege of serving patients from all different walks of life and treating all categories of disease,” Dr. Vives says. “The dedication of our physicians and staff permits us to perform procedures with high degrees of safety and low complication rates even in complex cases,” Dr. Vives says. “It can be a challenging case mix, but it is profoundly rewarding to be part of a team that serves our community in this manner.”

“We treat a multitude of patients with elective and emergency interventions and provide in-house consultations,” Dr. Goldstein adds. “No pathology is too challenging, and we work with local physicians to provide comprehensive spine care.”

For more information about orthopedic and neurosurgical care at University Hospital, visit uhnj.org.



Dr. Vives (Foreground) and Dr. Goldstein review a cervical spine CT scan on the Picture Archiving and Communication System.

“Because University Hospital is a regional trauma center for Northern New Jersey, all orthopedic cases are treated with the highest degrees of expertise. But despite the size of the medical center, we strive to deliver personalized care with a community hospital feel.”

—Michael Vives, MD, Chief of the Spine Division in the Department of Orthopaedics at University Hospital and Associate Professor of Orthopaedics at Rutgers New Jersey Medical School