MEMORIAL HERMANN ORTHOPEDIC & SPINE HOSPITAL

Table of Contents

DIRECTOR'S LETTER

Dear esteemed colleagues,

At Memorial Hermann Orthopedic & Spine Hospital, we're celebrating another year of high-quality, low-infection outcomes, in spite of COVID-19. We work in collaboration with the Department of Orthopedic Surgery at McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth) and Memorial Hermann-Texas Medical Center, which is ranked No. 7, with five stars, among all academic medical centers that participate in Vizient benchmarking services. Our length of stay and patient satisfaction metrics are among the best in the United States.

During this past academic year, we opened the Center for Orthopaedic Research, Innovation and Training (CORIT), where researchers are finding solutions to problems that can arise in joint replacement. They're also pursuing new knowledge in sports medicine and our other specialty areas: care for spine, foot and ankle, hand and upper extremity, shoulder, hip preservation, pediatric orthopedics and orthopedic oncology. Through our research at CORIT, which is embedded in the Department of Orthopedic Surgery at McGovern Medical School, we're finding solutions to orthopedic problems and at the same time providing a venue to develop students, trainees and faculty into world leaders in orthopedic knowledge and practice.

Our commitment to education and training through UTHealth sets us apart from other providers in the region and allows us to hone our skills through teaching and gain new perspectives from our students and trainees. In addition to residency training, we match postgraduates to four ACGME-approved fellowships in foot and ankle surgery, adult reconstruction, orthopedic sports medicine and shoulder, and orthopedic trauma. Fellows treat a high volume of patients, including athletes from all levels of competition who require diagnostic, surgical and non-surgical treatment, as well as patients who come in through the Level I Trauma Center, the Memorial Hermann Red Duke Trauma Institute, one of the busiest trauma centers in the nation.

We're proud of our entire team of affiliated orthopedic and spine surgeons, who do their best daily to help patients and never stop looking for ways to do things better. At Memorial Hermann Orthopedic & Spine Hospital, we don't believe in trying—we believe in accomplishment.

Kenneth B. Mathis, MD
ASSOCIATE PROFESSOR
DEPARTMENT OF ORTHOPEDIC SURGERY
MCGOVERN MEDICAL SCHOOL AT UTHEALTH

MEDICAL DIRECTOR
MEMORIAL HERMANN ORTHOPEDIC & SPINE HOSPITAL

SENIOR VICE PRESIDENT'S LETTER

I have the great pleasure of working with an extraordinary leadership team to envision the future of Memorial Hermann Orthopedic & Spine Hospital: Dr. Kenneth Mathis, associate professor in the Department of Orthopedics at McGovern Medical School at UTHealth and medical director of Memorial Hermann Orthopedic & Spine Hospital; Greg Haralson, CEO of Memorial Hermann-TMC; and Heath Rushing, senior vice president of the Memorial Hermann Orthopedic Service Line. We share the same vision of creating the premier destination for orthopedic and spine care.

To accomplish that, we bring together the renowned physician faculty at McGovern Medical School and accomplished independent orthopedic surgeons and physicians across Houston. They truly collaborate with us to deliver the best possible outcomes, and based on our quality metrics, we are leading the way in many areas.

When we closed temporarily in the spring of 2020 to protect our physicians, staff and patients from COVID-19, we asked two questions: how do we keep our facility virus-free and emerge from this challenge with new energy to create innovative models of holistic orthopedic care? We have accomplished that by working together.

More than ever, we see ourselves as a team. If you're an orthopedic surgeon who shares that vision, we welcome you to join us.

Teal Holden, MBA, MS-HA
SENIOR VICE PRESIDENT
AMBULATORY AND POST-ACUTE CARE SERVICES
MEMORIAL HERMANN-TEXAS MEDICAL CENTER

About Memorial Hermann Orthopedic & Spine Hospital

Memorial Hermann Orthopedic & Spine Hospital* is the destination orthopedic and spine hospital for the region. Affiliated physicians specialize in elective orthopedic surgery, neurosurgery for spine-related conditions, pain management for orthopedic and spine conditions and sports-related spine and orthopedic conditions and injuries. They are fellowship trained and highly experienced, using a team approach to care for patients and their families. Nurses, physical therapists and support staff are trained in orthopedics and understand that each patient's needs are unique, from pre-surgical education to surgery, and from post-surgery rehabilitation to at-home recovery. Nurse Navigators offer individualized assistance to patients, families and caregivers to facilitate communication, while providing education and emotional support. Memorial Hermann Orthopedic & Spine Hospital serves as a one-stop shop for consultations, imaging, treatment, surgery and physical therapy.

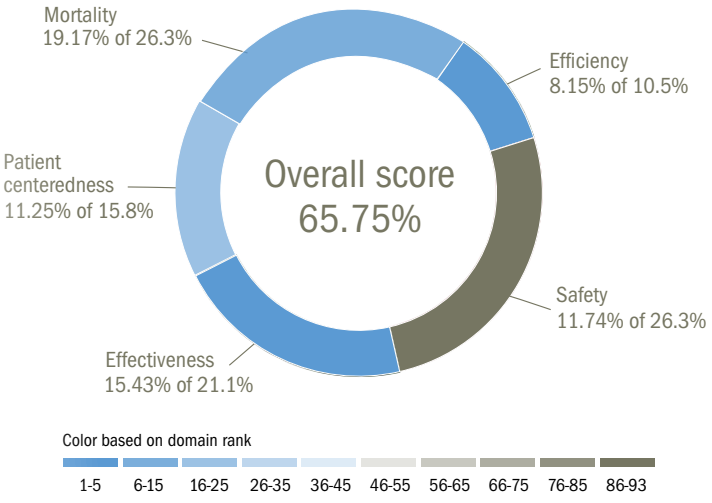
The staff is dedicated to helping patients through inpatient and outpatient procedures that restore or improve function, allowing them to return to active lifestyles. The hospital's small size and convenient location in central Houston makes it ideal for outpatient surgery and services, including knee, shoulder and hip replacement, as well as pain management and rehabilitation.

Memorial Hermann Orthopedic & Spine Hospital is located minutes from The Galleria, an upscale mixed-use urban development and shopping mall in Houston's Uptown District. Free parking and valet options are available for patients, and there are comfortable waiting rooms for family and friends.

2019 Comprehensive Academic Medical Center Quality and Accountability
Memorial Hermann-Texas Medical Center Performance Scorecard

Star rating	Overall rank	Overall score
★★★★★	7	65.75%

Domain performance



*Memorial Hermann Orthopedic & Spine Hospital is a campus of Memorial Hermann-TMC

"Best hospital that I have ever been to, and I'm 78 years old. I have been to several. Personnel very helpful and make you feel comfortable and relaxed."

The Patient Experience

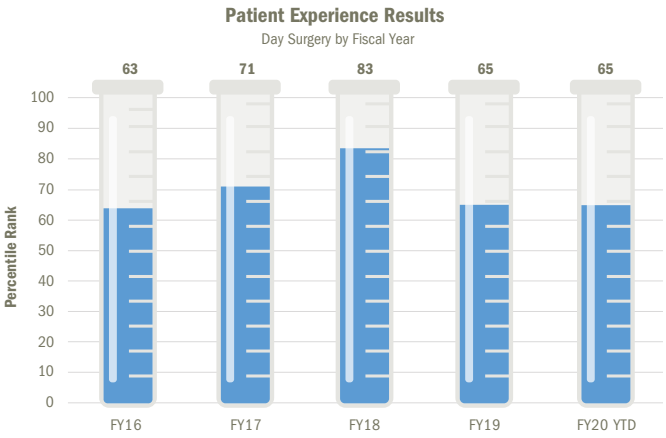
Because Memorial Hermann Orthopedic & Spine Hospital was designed as a dedicated orthopedic and spine facility, the building accommodates mobility-impaired patients, with extra-wide doors and corridors and extra-large bathrooms for wheelchairs and walkers. All 64 spacious, beautifully furnished patient rooms are private, and a luxurious waiting room for friends and family is located adjacent to 10 state-of-the-art surgical suites. The hospital also offers eight two-room VIP suites and interpretation services by trained medical interpreters.

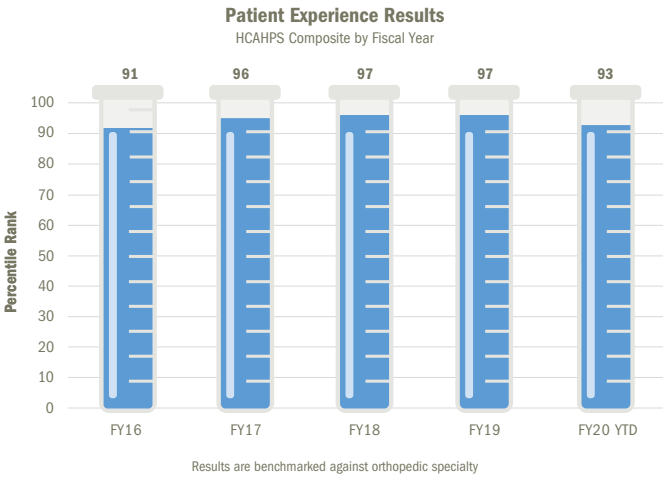
Over the past 5 years, Memorial Hermann Orthopedic & Spine Hospital has ranked above the 90th percentile on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, the first national standardized, publicly reported survey of patients' perspectives of hospital care.

At the same time, surgical volumes have increased every year since 2015, when the hospital joined the Memorial Hermann Health System. Affiliated surgeons have performed more than 3,500 surgeries annually for the past 2 years.

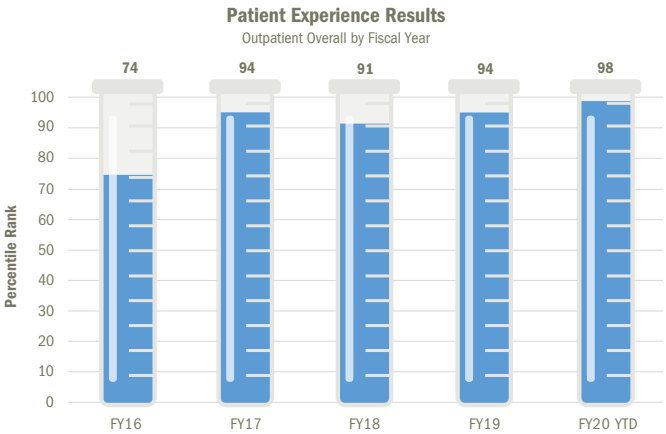
National Rankings and Collaboration with UTHealth

Memorial Hermann Orthopedic & Spine Hospital, a campus of Memorial Hermann-TMC, works in collaboration with the Department of Orthopedic Surgery at McGovern Medical School. Memorial Hermann-TMC is ranked No. 7 among all academic medical centers that participate in Vizient benchmarking services, with a five-star ranking. Vizient is the nation's leading healthcare performance improvement company, serving more than half of the healthcare organizations across the United States, from large integrated delivery networks and academic medical centers to community hospitals, pediatric facilities and non-acute care providers.





Results are benchmarked against orthopedic specialty



Scope of Services

Joint Replacement

Physicians affiliated with Memorial Hermann Orthopedic & Spine Hospital specialize in the non-surgical and surgical treatment of joint pain, offering the most advanced standard of care available. Memorial Hermann Orthopedic & Spine Hospital is the premier facility among seven Memorial Hermann Joint Centers located across the Greater Houston area. Affiliated physicians perform more than 3,000 hip and knee joint replacement procedures annually, more than any other hospital system in the region. They strive to achieve exemplary standards for patient safety, quality and excellence in joint replacement and are dedicated to the highest quality service, easy access and optimum patient outcomes.

Memorial Hermann Orthopedic & Spine Hospital has earned The Joint Commission's Gold Seal of Approval for Advanced Certification for Total Hip and Knee Replacement. It is the first hospital in Houston to earn this advanced certification, which is given to Total Joint Commission-accredited hospitals, critical access hospitals and ambulatory surgery centers seeking to elevate the quality, consistency and safety of their services and patient care. The advanced certification was developed in response to the growing number of patients undergoing total hip or total knee replacement surgery, as well as the increased focus on clinical evidence-based patient care as it relates to pain management, quality-of-life issues, functional limitation in mobility and the return to normal daily activities.

Memorial Hermann Orthopedic & Spine Hospital earned this distinction through our affiliated physicians' singular focus on helping patients achieve a fast and successful recovery. Our teams include some of the most experienced and highly trained orthopedic surgeons in the Houston area. They use a multidisciplinary approach to provide care, from pre-surgical education to surgery, and from postsurgical rehabilitation to at-home recovery. Nurses, therapists and support staff are specially trained to help patients restore or improve their functionality, enabling them to return to active lifestyles.

Thanks to the use of preemptive multimodal analgesia to block pain receptors before surgery, the majority of joint replacement patients are up and moving within an hour or two after surgery. Early mobilization results in dramatically improved outcomes, and most patient stays are less than 24 hours.

Sports Medicine

Sports injuries are common and can result from accidents, inadequate training, improper use of protective devices or insufficient stretching and warm-up exercises. The most common injuries are sprains and strains, fractures and dislocations. Physicians who specialize in sports medicine at Memorial Hermann Orthopedic & Spine Hospital are affiliated with the Memorial Hermann IRONMAN Sport Medicine Institute (The Institute), a comprehensive sports medicine clinic providing specialized care for athletes of all ages and skill levels. The Institute brings together highly trained specialists in sports science, orthopedics, orthopedic surgery, sports physical therapy, human performance, strength and conditioning and sports nutrition to help athletes of all ages and abilities prevent injury, recover from injury and improve performance to reach their personal athletic goals.

The Sports Medicine Program is led by Walter Lowe, MD, professor and chair of the Department of Orthopedic Surgery at McGovern Medical School, and Alfred Mansour III, MD, associate professor and director of pediatric orthopedics and director of the comprehensive hip preservation program at the medical school. Dr. Lowe is the team physician for the Houston Texans and the Houston Rockets; he and Dr. Mansour work together on cases of complex sports limb deformity, performing distal femoral and proximal tibial osteotomy combined with meniscal transplant and cartilage restoration surgery. These procedures restore normal anatomy to relieve knee pain and optimal joint congruency to prevent medium- and long-term degenerative deterioration of the knee. All sports surgeons affiliated with Memorial Hermann Orthopedic & Spine Hospital use the latest medical technology to provide patients with the best possible outcome.

Many sports injuries can be treated conservatively, while chronic injuries may require surgery. Physical therapy can be a highly effective alternative to medication and surgery for many conditions. When surgery offers the best solution, affiliated physicians use minimally invasive techniques for patients who are eligible.

The Memorial Hermann IRONMAN Sports Medicine Institute collaboration includes cross-sport research on human performance, injury prevention and injury recovery. Orthopedic research protocols examine endurance athletes to determine how their preparation and training regimens might benefit

Memorial Hermann Orthopedic & Spine Hospital has earned The Joint Commission's Gold Seal of Approval for Advanced Certification for Total Hip and Knee Replacement. It is the first hospital in Houston to earn this advanced certification, which is given to Total Joint Commission-accredited hospitals, critical access hospitals and ambulatory surgery centers seeking to elevate the quality, consistency and safety of their services and patient care.

athletes in all sports, including football, soccer and baseball. Other research underway in sports medicine at McGovern Medical School includes evaluation of return to play after anterior cruciate ligament (ACL) reconstructive surgery, MRI assessment of healing after ACL surgery and effects of PRP injection in conjunction with ACL and meniscal surgery.

Spine Program

Our goal at Memorial Hermann Orthopedic & Spine Hospital is to provide patients with the most advanced personalized back and neck pain treatment available with the best possible outcomes. Led by Mark Prasarn, MD, professor and director of spine surgery in the Department of Orthopedics at McGovern Medical School at UTHealth, physicians affiliated with the Spine Program specialize in conservative nonsurgical and minimally invasive surgical treatment of spinal pathologies.

Memorial Hermann Orthopedic & Spine Hospital gives patients who are having spine surgery the opportunity to share the experience in a group setting, from preoperative education classes through post-operative rehabilitation. The facility has beautifully furnished private patient rooms, with a group therapy gym conveniently located nearby. We encourage patients' families and friends to participate in all aspects of decision-making and care, as well as the rehabilitation process.

Physicians affiliated with Memorial Hermann Orthopedic & Spine Hospital use a multidisciplinary team approach in which each member of the spine care team works in concert for the benefit of the patient. Treatment begins with conservative approaches, and we use evidence-based medicine to ensure positive outcomes and provide an exceptional patient experience.

Dr. Prasarn and his team specialize in degenerative and traumatic conditions of the entire spine, with a particular interest in the cervical spine. They perform both minimally invasive and traditional open surgical procedures, depending on the pathology and the patient's particular problem. His main interest is in motion preservation procedures in the cervical spine, including artificial disc replacement and laminoplasty.

Physicians affiliated with the Spine Program are fellowship trained and experienced while nurses, therapists and support staff are specialized in caring for patients suffering from back and neck pain. The team views each patient's needs as unique. Nurse Navigators offer individualized assistance to patients, families and caregivers, advocating for them to help overcome barriers to care. Dr. Prasarn and his team perform over 300 surgical cases per year.

Research underway includes an investigation of the effects of e-cigarettes on bone healing and spine fusion, and measuring biomechanics and motion after cervical disc replacement in the lab.

Foot and Ankle

At Memorial Hermann Orthopedic & Spine Hospital, patients of all ages and levels of activity benefit from the latest treatments and rehabilitation for sprains and fractures, as well as more serious conditions of the foot and ankle. The hospital is a regional center of excellence for reconstructive procedures that include total ankle replacement, flatfoot repair and correction of complex foot and ankle deformities, as well as reconstruction of post-traumatic and arthritis-related injuries after acute treatment.

Affiliated physicians treat sports-related injuries of the foot and ankle, including Achilles ruptures, Lisfranc injuries, turf toe injuries, ankle fractures, stress fractures of the foot, and ligament injuries that cause foot and ankle instability. In addition to sports-related injuries, they also treat chronic conditions of the foot and ankle such as plantar fasciitis, bone

spurs, bunions, claw toes, hammertoes, sesamoiditis and arthritis of the foot. They begin with options for nonsurgical treatment, including medical management, orthotics and physical therapy. Many conditions respond to physical therapy, and surgery is always a last resort for injuries that are severe or difficult to treat. When surgery is needed, affiliated orthopedic surgeons at Memorial Hermann Orthopedic & Spine Hospital routinely employ innovative, minimally invasive techniques for faster recovery. Arthroscopy is performed to treat cartilage injuries and is used to aid in the treatment of ankle fracture, instability, synovitis and arthritis.

Modern minimally invasive approaches are also employed to correct foot and ankle deformities such as bunions, hammertoes and flatfeet. Throughout the treatment process, the orthopedic team works closely with referring physicians to ensure a smooth transition back to the patient's regular care plan. Patients can expect personalized care, genuine compassion and excellent communication.

Physicians at Memorial Hermann Orthopedic & Spine Hospital have created a center of excellence for total joint replacement. Affiliated foot and ankle orthopedic surgeons focus on improving outcomes following total ankle replacement by implementing CT-based preoperative planning and using 3-D printing to provide patient-specific custom cutting guides. These techniques allow for increased accuracy of the implant placement, resulting in better long-term outcomes and implant survivorship.

All foot and ankle surgeons affiliated with Memorial Hermann Orthopedic & Spine Hospital are faculty members in the Department of Orthopedic Surgery at McGovern Medical School and certified by the American Board of Orthopedic Surgery. Led by Michael Greaser, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, the team includes William McGarvey, MD, associate professor; Richard Beaver, MD, assistant professor; and Taggart Gauvain, MD, assistant professor. They provide care for the athletic teams at the University of St. Thomas, Houston Baptist University, the University of Houston and multiple area high schools.

Research underway includes biomechanical studies to improve implant placement and recovery, as well as studies designed to improve care for Achilles tendon ruptures and other sports injuries. Dr. William McGarvey, current president of the American Orthopedic Foot and Ankle Society, was a key member of the team who developed the first revision total ankle replacement system approved by the FDA, which was made available in 2017. As part of the industry design team for foot and ankle replacements, he continues his work to improve implant hardware.

Hand and Upper Extremity

The Hand and Upper Extremity Service at Memorial Hermann Orthopedic & Spine Hospital provides elective and complex reconstruction procedures and care for various upper extremity conditions as well as 24/7 acute complex trauma care through its main licensed hospital, Memorial Hermann-TMC. Memorial Hermann Orthopedic & Spine Hospital is recognized throughout the Greater Gulf Coast area as the primary referral center for hand and upper extremity surgery. Patients come from across Texas and western Louisiana for care unavailable elsewhere in the region.

Led by Matthew Koepplinger, DO, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, orthopedic hand and upper extremity specialists at Memorial Hermann Orthopedic & Spine Hospital treat the entire range of hand and upper extremity injuries, from complex lacerations and fractures to congenital disorders and sports injuries, as well as reconstruction of nerves, joints and bones. They commonly treat lateral epicondylitis, medial epicondylitis, carpal and cubital tunnel, and various tendon disorders. They are the preferred upper extremity specialists for the Houston Rockets and the University of Houston athletes.

They also perform corrective procedures for neurologic disorders resulting from brachial plexus and spinal cord injuries, as well as from traumatic brain injuries. Many of these cases involve nerve transfer techniques. In addition, they work closely with Ernest "Chappie" Conrad, MD, professor in the Department of Orthopedic Surgery at McGovern Medical School, who heads the Orthopedic Oncology Program, to perform complex upper extremity reconstructions for patients with bone and soft-tissue cancers.

The hand and upper extremity team includes Kyle Woerner, MD, assistant professor in the Department of Orthopedic Surgery at

McGovern Medical School, who treats general upper extremity trauma and who is specialized in brachial plexus repair and reconstruction; Ashton Mansour, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, who also manages general upper extremity trauma and diagnoses and treats hand and upper extremity conditions in all age groups; Dean Smith, MD, Assistant Professor in the Department of Orthopedic Surgery at McGovern Medical School, an orthopedic hand and upper extremity surgeon who brings almost 20 years' experience to the group and handles many workers' compensation cases; and Danielle Melton, MD, associate professor in the Department of Orthopedic Surgery at McGovern Medical School, director of the limb-loss and orthotics and prosthetics program at TIRR Memorial Hermann, a national leader in rehabilitation medicine. Members of the Upper Extremity Service are pioneering surgical techniques to help patients with upper and lower extremity limb-loss pain and dysfunction.

Physicians on the team believe that physical therapy and occupational therapy are paramount to recovery from hand, wrist and elbow injuries. They work closely with the Memorial Hermann IRONMAN Sports Medicine Institute to help patients return to their daily routines through advanced physical and occupational therapy and specialty care at multiple locations across the Greater Houston area.

Current research includes production of various review and technique articles; biomechanical studies of operative fixation techniques; case series of nerve repair and transfer cases where polyethylene glycol is used as an adjuvant; various cost-analysis studies; and a study assessing correlation of vitamin D levels with associated tendinopathies.

Shoulder

Memorial Hermann Orthopedic & Spine Hospital is a regional leader in comprehensive care of the shoulder. Affiliated surgeons specialize in shoulder replacement surgery, shoulder arthroscopy for rotator cuff tears, frozen shoulder, shoulder instability, biceps rupture, damaged cartilage or ligaments, bone spurs and arthritis of the collarbone, to name just a few conditions. The Shoulder Surgery Program at Memorial Hermann Orthopedic & Spine Hospital is the only one in the region with fellowship-trained physicians who use computer navigation and 3-D modeling to pinpoint the correct location of shoulder implants for improved outcomes. Patients often experience less pain, with fewer complications, shorter hospital stays and faster recoveries.

Led by Robert Fullick, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, who is dual fellowship trained in sports medicine and shoulder replacement, the team of affiliated physicians includes James Gregory, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, who specializes in shoulder and elbow surgery, and Peter Sabonghy, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School, who is the medical director of the Memorial Hermann IRONMAN Sports Medicine Institute at Memorial City. Together they provide a comprehensive range of treatments that includes labral repair, operative and non-operative treatment of the overhead athlete, biceps tenodesis, anterior and posterior instability repair, bone transfer for instability, reconstructions, rotator cuff repair and muscle transfer for irreparable rotator cuff repairs, pectoralis major and latissimus dorsi repair, total and reverse shoulder replacement, revision shoulder surgery, lateral collateral ligament repair and reconstruction, medial and lateral epicondylitis repair, arthroscopic elbow surgery and total elbow replacement. All three surgeons are faculty in the Department of Orthopedic Surgery at McGovern Medical School at UTHealth and certified by the American Board of Orthopedic Surgery.

Research underway includes whether stem cell therapy used as an adjuvant treatment can improve healing in adhesive capsulitis of the shoulder and whether patient-directed care through telephone and telemedicine visits can help surgeons accurately diagnose shoulder problems in the COVID-19 pandemic setting. Additional studies examining bursal cell application to aid in the healing of rotator cuff repairs is also underway.

Hip Preservation

Memorial Hermann Orthopedic & Spine Hospital has grown into a high-volume regional center for hip preservation, where affiliated orthopedic surgeons diagnose and treat patients from around the country. Through a unique collaboration with McGovern Medical School at UTHealth and Memorial Hermann IRONMAN Sports Medicine Institute, orthopedic surgeons and the sports medicine team provide adolescents and young adults

Dr. Mansour (left) and patient Brittany Cariker (middle)

with the full range of surgical and nonsurgical treatments to restore and preserve natural hip function. The Comprehensive Hip Preservation Program team, led by Alfred Mansour III, MD, is at the forefront of surgery for hip impingement and hip dysplasia in adolescents and young adults.

Hip preservation overcomes the limitations of joint replacement by repairing or revising the patient's natural hip. The multidisciplinary team of surgeons, musculoskeletal imaging specialists, experienced hip physical therapists and other healthcare providers work collaboratively to accurately diagnose hip problems and tailor a personalized plan to treat both the symptoms and underlying causes of hip pain. The goal of treatment is to maximize the patient's natural hip function using the most effective, least invasive option. Some patients can be treated conservatively with activity modification, injections or physical therapy. If surgery is required, the team has the experience to perform the full spectrum of hip preservation surgeries, from minimally invasive hip arthroscopy to complex hip osteotomies. Surgeons use neuro monitoring in the OR to minimize the risk of nerve injury.

Radiologists specialized in reading hip imaging studies formulate protocols that minimize radiation doses and maximize effectiveness. They work hand in hand with orthopedic surgeons and physical therapists dedicated to hip rehabilitation at the Memorial Hermann IRONMAN Sports Institute. The team has a track record of returning high-level athletes—professional, collegiate, high school and weekend warriors—to their sports. The affiliated physician team treats femoroacetabular impingement (FAI), hip dislocation, hip dysplasia, labral tears and avascular necrosis. They use various techniques, including periacetabular osteotomy (PAO), surgical hip dislocation, femoral osteotomy, and hip arthroscopy.

Research underway in the Comprehensive Hip Preservation Program includes studies of the effects of femoral anteversion, femoral morphology and evaluation, prospective outcomes after combined hip arthroscopy and PAO, and the results of capsular management, including capsular reconstruction or the treatment of iatrogenic hip instability.

Pediatric Orthopedics

Memorial Hermann Orthopedic & Spine Hospital offers a multidisciplinary approach to the non-operative and operative management of pediatric and adolescent orthopedic injuries and disorders, from minor fractures to complex conditions. Led by Alfred Mansour III, MD, the affiliated team of orthopedic surgeons is dedicated to offering the most comprehensive care available.

Treatment is available for complex congenital orthopedic malformations, pediatric foot and limb deformities, sports injuries, musculoskeletal problems and spinal deformities, including scoliosis. Pediatric orthopedic surgeons perform arthroscopy of the shoulder, knee, elbow, ankle and hip; hip preservation; bone and soft-tissue tumor surgery; comprehensive pediatric fracture care; limb reconstruction; and nonsurgical treatment of sports injuries, including physical therapy. Patients are cared for by an experienced team of nurses, therapists and affiliated physicians who deliver subspecialized inpatient and outpatient care to children of all ages, with special focus on the adolescent age group. For patients with complex long-term needs, the pediatric orthopedic team offers continuity of care throughout childhood, with a smooth transition to an adult provider when needed.

This year marks the opening of the Comprehensive Pediatric Scoliosis and Spinal Deformity Clinic, a one-stop center for scoliosis care, including bracing, therapy, advanced imaging and surgery. Memorial Hermann Orthopedic & Spine Hospital also is adding an EOS® system, which provides ultra low-dose, full-body, stereo-radiographic images of patients in a functional position.

Pediatric scoliosis surgeons affiliated with the program are all faculty in the Department of Orthopedic Surgery at McGovern Medical School at UTHealth. They include Shiraz Younas, MD, associate professor; Lindsay Crawford, MD, assistant professor; Timothy Borden MD, assistant professor; Surya Mundluru, MD, assistant professor; and Shah-Nawaz Dodwad, MD, assistant professor. The team uses state-of-the-art technology to offer minimally invasive care when possible.

Pediatric surgeons affiliated with the program are all faculty in the Department of Orthopedic Surgery at McGovern Medical School at UTHealth. They include Shiraz Younas, MD, associate professor; Lindsay Crawford, MD, assistant professor; Timothy Borden MD, assistant professor; Surya Mundluru, MD, assistant professor; and Shah-Nawaz Dodwad, MD, assistant professor. The team employs the latest technology to offer minimally invasive care when possible.

The Orthopedic Oncology team diagnoses and treats all major types of musculoskeletal tumors.

Orthopedic Oncology

A diverse team of skilled medical, radiation and surgical oncologists provides effective, compassionate cancer treatment at Memorial Hermann Orthopedic & Spine Hospital. The Orthopedic Oncology program is led by Ernest “Chappie” Conrad, MD, professor in the Department of Orthopedic Surgery at McGovern Medical School at UTHealth. Dr. Conrad has a well-established international reputation for the surgical treatment of sarcomas, and before joining Memorial Hermann and UTHealth, he helped set standards for the world in assessing risk and response in sarcoma patients using PET imaging at the University of Washington in Seattle, as well as standards in limb-salvage surgery for adults and children. He has a strong interest in patient advocacy and sits on the board of directors of the Sarcoma Alliance for Research through Collaboration, a national group that seeks to achieve breakthroughs in research that will help improve patient outcomes.

Since Dr. Conrad’s arrival 3 years ago, Memorial Hermann’s orthopedic oncology caseload has increased 100 percent annually. He leads a multidisciplinary sarcoma tumor board that meets weekly. The program offers immediate access to an experienced team, including same-day appointments. The team works closely with the Department of Orthopedic Surgery’s Biomechanics Laboratory to improve skeletal fixation techniques for cancer patients.

Bone and soft-tissue cancers can impact patients of any age, from infancy to the elderly. The Orthopedic Oncology team diagnoses and treats all major types of musculoskeletal tumors, including Ewing sarcoma, osteosarcoma, liposarcoma, leiomyosarcoma, myxofibrosarcoma, peripheral nerve sheath, fibrosarcoma, chordoma and chondrosarcoma. The team also treats skeletal dysplasias, including fibrous dysplasia, hereditary multiple exostoses, Paget’s disease and benign bone and soft-tissue tumors, such as osteochondroma, osteoma, non-ossifying fibroma, bone cysts, exostoses, lipomas, fibromas and vascular hemangiomas.

Successful treatment of orthopedic cancer depends on early diagnosis and relies on primary care providers who know what to look for when performing a routine examination. Bone cancers usually present as a break in the bone or as acute pain, while soft-tissue cancers often present as soft, painless masses in a muscle, on the skin or near a joint.

Effective treatment depends on the stage, grade and size of the tumor at diagnosis. Bone and soft-tissue cancers typically are treated with an aggressive combination of chemotherapy, surgery and radiation therapy. Treatment plans generally span 3 to 6 months, with follow-up for 5 years. Survival rates for sarcoma patients who receive adequate care can be as high as 60 percent, depending on the tumor grade, size response to treatment and presenting stage at diagnosis. The Orthopedic Oncology team achieves best results when malignant tumors are diagnosed early, within the first 3 to 4 months after they appear.

Clinical research underway includes an investigation of ways to map sarcomas more precisely using the results of pathology and molecular studies, with the goal of delivering better care.

The Affiliated Physician Team

"I loved the dynamic aspect of fixing problems and alleviating pain. In sports, if you want to be outstanding, you stay focused on one sport, and the same is true of medicine. I wanted to be really good at what I do."

Kenneth B. Mathis, MD

Associate Professor, Department of Orthopedic Surgery
McGovern Medical School at UTHealth

Medical Director, Memorial Hermann Orthopedic & Spine Hospital

Dr. Ken Mathis has focused his entire medical career on hip and knee replacement and currently performs between 600 and 700 joint replacements each year. As a youngster, he kept a copy of Time-Life's "How Things Work: Engines" next to his bed. Growing up, he built model airplanes and rockets and later became fascinated with how the human body worked. In medical school at UT Southwestern Medical Center in Dallas, he was drawn to surgery, and during residency training at Louisiana State University in Shreveport, he discovered that orthopedic surgery fit well with his childhood interest in working with his hands and fixing things. He went on to complete a fellowship in adult reconstruction and total joint arthroplasty at Baylor College of Medicine in Houston. "Ultimately, the one thing that really interested me was joint replacement," says Dr. Mathis, who is certified by the American Board of Orthopedic Surgery and an innovator in joint-replacement techniques. "I loved the dynamic aspect of fixing problems and alleviating pain. In sports, if you want to be outstanding, you stay focused on one sport, and the same is true of medicine. I wanted to be really good at what I do. With the advances we've made in joint replacement, people come into my office in a wheelchair or using a cane, and after surgery they leave the hospital walking, usually the same day they came in. Very few things in life are that dramatic."

Eric F. Berkman, MD
Assistant Professor, Department of Orthopedic Surgery
McGovern Medical School at UTHealth

Certified by the American Board of Orthopedic Surgery, Dr. Eric Berkman specializes in total joint reconstruction and treatment of injuries and arthritic conditions of the shoulder and knee. He developed an interest in orthopedics after his first knee surgery at age 16 and went on to complete medical school at the Long School of Medicine at UT Health San Antonio. He completed residency training at Louisiana State University Medical School in Shreveport, followed by a fellowship at University Hospital Basel in Switzerland. Dr. Berkman participated in sprint triathlons until his final revision anterior cruciate ligament surgery. He gives back to the community through an annual golf tournament in which he has participated for the past 23 years, an annual fishing tournament for Camp Hope and one mission trip a year to either El Salvador or Guatemala. Both he and his wife are involved in fundraising for nursing scholarships awarded through the Good Samaritan Foundation, as well as in providing support for Faith in Practice and Warrior Weekend. “Our entire office team takes time with patients to understand their specific injury or issue,” he says. “We give 110 percent to every patient who entrusts us with their care.”

Houston Braly, MD
Assistant Professor, Department of Orthopedic Surgery
McGovern Medical School at UTHealth

Dr. Houston Braly specializes in hip and knee replacements, management of complex reconstruction and management of chronic infections. His practice also encompasses the treatment of orthopedic developmental disorders in patients of all ages. The son of a busy orthopedic surgeon, he grew up accompanying his father on weekend rounds, fascinated by photos of anatomy and surgery, and appreciative of the satisfaction physicians gain through helping patients achieve their goals. He received his medical degree at McGovern Medical School and completed residency training there. He completed a fellowship in adult total joint reconstruction at Duke University prior to joining the medical staff at Memorial Hermann Orthopedic & Spine Hospital. Certified by the American Board of Orthopedic Surgery, Dr. Braly was named Physician of the Year at Memorial Hermann Orthopedic & Spine Hospital in 2019. His patients consider him down to earth, funny and genuine. “In addition to my father, I was inspired by my grandmother, who ran a working cattle ranch until she was 96 and would not have been able to continue supervising the cowboys without a hip and knee replacement that kept her mobile,” he says. “I think her longevity was due in part to being able to stay active.”

Ernest "Chappie" Conrad, MD
Professor, Department of Orthopedic Surgery
McGovern Medical School at UTHealth

Dr. Chappie Conrad has a well-established international reputation for the surgical treatment of sarcomas. At the University of Washington in Seattle, he paved the way and set standards for the world in assessing risk and response in sarcoma patients using PET imaging, as well as in limb-salvage surgery for adults and children. Dr. Conrad received his medical degree at the University of Virginia School of Medicine and completed residency training at the Hospital for Special Surgery in New York City. Shortly after completing his fellowship at The Hospital for Sick Children in Toronto, he joined the faculty of the University of Washington School of Medicine. He moved to Memorial Hermann Orthopedic and Spine Hospital and McGovern Medical School to build a strong Musculoskeletal Oncology Service that combines surgery with medical oncology, radiation oncology, pathology and radiology. "The natural history of sarcoma is the same as that for most high-grade tumors—the chance of survival is 50 percent," says Dr. Conrad, who is certified by the American Board of Surgery. "More than half a million new patients are diagnosed with musculoskeletal malignancies every year in the U.S. I have a great sense of urgency to further knowledge of sarcoma and other musculoskeletal malignancies through clinical research. The treatment potential is enormous.

Robert K. Fullick, MD
Assistant Professor, Department of Orthopedic Surgery
Director of Shoulder Reconstructive Surgery
McGovern Medical School at UTHealth

Dr. Robert Fullick specializes in sports medicine and reconstructive shoulder surgery, with a special interest in shoulder replacement using computer navigation and a rotator-cuff-sparing approach to speed recovery and improve long-term outcomes. He became interested in orthopedic surgery at the age of 10, when his younger brother was hit by a car and transported to Memorial Hermann-TMC, where he underwent several orthopedic surgeries. The care his brother received inspired in him a love of medicine and surgery. A former Texas A&M Baseball First Team Academic All American, Dr. Fullick earned his medical degree at McGovern Medical School and completed residency training in the Harvard Combined Orthopedic Program in Boston. He is dual fellowship trained in sports medicine at MedStar Union Memorial Hospital in Baltimore and in reconstructive shoulder surgery at the Alps Surgery Institute in Annecy, France. His research interests include rotator cuff repair, shoulder arthroplasty, adhesive capsulitis and other clinical pathologies. An avid golfer, he enjoys coaching his children's sports teams, as well as weight training and gym time. Dr. Fullick has suffered multiple injuries related to sports and lifting that help him relate to his patients. "By getting to know my patients, I can closely tailor care to their wishes and goals and set appropriate expectations for recovery after injury and surgery," he says. "It's very rewarding to get people back to a high level of function."

Michael C. Greaser, MD

Assistant Professor, Department of Orthopedic Surgery
McGovern Medical School at UTHealth

Dr. Michael Greaser's practice is focused on the treatment of foot and ankle conditions, particularly in sports medicine. He serves as a team physician for the University of Houston, Houston Baptist University and the University of St. Thomas and as a consultant for the Houston Dynamo and Houston Roughnecks. He became interested in orthopedic surgery as a child playing with a skeleton, fascinated by how the bones fit together. Growing up in Sumatra and Indonesia, he traveled in Southeast Asia and saw adults and children with congenital and post-traumatic lower-limb deformities that limited their function.

As a young athlete, he suffered orthopedic injuries and admired the ability of his surgeons to get him back on the field quickly. These experiences gave him an appreciation of advanced orthopedic techniques and technology. Dr. Greaser graduated from McGovern Medical School and completed residency training at UT Southwestern Medical Center in Dallas. He completed fellowship training at OrthoCarolina Foot & Ankle Institute in Charlotte and is certified by the American Board of Orthopedic Surgery. "I provide treatment at the forefront of foot and ankle orthopedic surgery," he says. "Being able to return athletes to the activity that gives them so much joy is very rewarding."

Alfred A. Mansour III, MD

Associate Professor, Department of Orthopedic Surgery
Director of Pediatric Orthopedics
Director of the Comprehensive Hip Preservation Program
McGovern Medical School at UTHealth

Dr. Alfred Mansour's main clinical interest is comprehensive adolescent and young adult hip preservation, specifically open and arthroscopic treatment of non-arthritic hip impingement, hip dysplasia and congenital hip deformity. He also has a strong interest in acute leg deformity correction in active adolescents and young adults with sports-related intra-articular knee damage and malalignment. Dr. Mansour was drawn to orthopedics through his personal exposure to injury and recovery in athletics and by early mentors who demonstrated their love of caring for young patients. While at Texas A&M, he was a seven-time NCAA All-American swimmer. He went on to receive his medical degree at Louisiana State University Health Sciences Center in New Orleans and completed residency training at Vanderbilt University Medical Center in Nashville. He completed a fellowship in pediatric orthopedic surgery at Children's Hospital Colorado and an additional fellowship in sports medicine at Steadman Hawkins Clinic Denver. Certified by the American Board of Orthopedic Surgery with a certificate of added qualifications (CAQ) in sports medicine, he is one of a handful of surgeons in the U.S. who uses both arthroscopic and open surgical techniques, including periacetabular osteotomy for complex hip problems such as femoroacetabular impingement and hip dysplasia. He also specializes in fractures and growth plate injuries of the extremities, patellar instability, osteochondritis dissecans, ACL ruptures, corrective osteotomies at the knee and cartilage injuries of the elbow, hip, knee and ankle. "I really enjoy connecting with patients and families and walking with them through the entire healthcare journey, both as their doctor and advocate for lifelong health," he says.

Mark L. Prasarn, MD
Professor, Department of Orthopedic Surgery
Director of the Spine Trauma Service
McGovern Medical School at UTHealth

Dr. Prasarn specializes in spine trauma and sports injuries. He specializes in the surgical care of complex spine disorders and orthopedic trauma with an emphasis on tumors, degenerative spinal disorders, revision spinal surgery, complex fractures and non-unions. As a child, Dr. Prasarn discovered a talent for fixing mechanical problems. He was inspired to pursue spinal surgery by the experience of his brother, who suffered a major spinal cord injury. Like many orthopedic surgeons, he was an athlete himself, playing college football. Dr. Prasarn received his medical degree at New York University School of Medicine and completed residency training at the University of Miami / Jackson Memorial Medical Center. He is dual fellowship trained in trauma and in spine surgery at the Hospital for Special Surgery in New York City and the University of Rochester School of Medicine, respectively. Dr. Prasarn is certified by the American Board of Orthopedic Surgery. Because of his interest in spinal cord injuries, he also works with TIRR Memorial Hermann, a national leader in rehabilitation medicine. “My past and current interests in nutrition and exercise help me get patients back to the playing field or the gym,” he says. “My brother’s spinal cord injury gave me great empathy for people with spinal cord injuries and a desire to improve care for people like him.”

Navin Subramanian, MD
Orthopedic Surgeon
Orthopedic Associates, LLP

Dr. Navin Subramanian specializes in orthopedic surgery of the spine and has a strong interest in minimally invasive surgery in appropriate patients. As a child, he knew he wanted to be a surgeon and was drawn to orthopedic surgery by his interest in the human musculoskeletal system and ways to improve form and function after injury. Born and raised in Chicago, Dr. Subramanian relocated with his family to Louisiana in his early teenage years. He completed medical school at Louisiana State University Health Sciences Center in Shreveport and residency training in orthopedic surgery at Baylor College of Medicine in Houston. Dr. Subramanian went on to complete a fellowship in spine surgery at Beth Israel Medical Center in New York City. Board certified in orthopedic surgery, he is interested in all areas of spine pathology, including trauma, deformity, degenerative disorders, pathologic conditions and minimally invasive and microscopic spine surgical techniques. An avid golfer, Dr. Subramanian also enjoys mountain biking, snowboarding and travel. “I always use a personal touch when I talk with patients,” he says. “I try to relate to them on a personal level and explain treatment and recovery in ways they can understand. When surgery is necessary, I use the least invasive technique available to accomplish the surgical goals.”

Orthopedic Fellowships at McGovern Medical School

Foot and Ankle Surgery Fellowship

McGovern Medical School's Foot and Ankle Surgical Fellowship accepts two fellows each year and has been training exceptional orthopedic surgeons for more than 20 years. William McGarvey, MD, directs this dynamic fellowship, which offers in-depth experience in foot and ankle surgery with high patient volumes in clinical practice and a vast array of hands-on training in the operating room, covering a range of surgical procedures. Dr. McGarvey is an associate professor and residency program director in the Department of Orthopedic Surgery at the medical school.

As fellows rotate with each of the six foot and ankle fellowship-trained attending physicians, they treat a diverse patient population that encourages development of diagnostic and surgical decision-making skills. They remain active in clinic and in the operating room, gaining firsthand exposure to flatfoot and cavovarus reconstruction, hindfoot /midfoot /ankle arthrodesis, total ankle arthroplasty, Taylor spatial frame application, trauma and fracture care and diabetic foot problems, including Charcot arthropathy; forefoot reconstruction; tendon pathology and treatment; sports injury; and many other pathologies and treatments.

The academic experience emphasizes a scholarly approach to clinical problem solving, self-directed study, teaching, development of analytic skills and surgical judgment, and research. The operative experience ensures the ability of the fellow to perform the procedures required for the practice of foot and ankle orthopedics skillfully, as outlined in the evolving American Orthopaedic Foot and Ankle Society-approved Fellowship Curriculum. The mission of the fellowship is to train orthopedic surgeons to treat complex multifactorial surgical and nonsurgical issues in the foot and ankle surgical subspecialty. We graduate highly competent, confident foot and ankle surgeons who go on to be outstanding members of their surgical communities.

Adult Reconstruction Fellowship

McGovern Medical School's Adult Reconstruction Fellowship is open to three fellows each year. It offers an extensive 1-year experience in the clinical care of patients undergoing primary and revision hip and knee arthroplasty. Based at an academic tertiary-care referral center in the Texas Medical Center, the program ensures sufficient patient volume and complexity of primary and revision hip and knee procedures.

Directed by Kenneth B. Mathis, MD, an associate professor in the Department of Orthopedic Surgery and past president of the American Association of Hip and Knee Surgeons, the fellowship offers comprehensive training in primary hip and knee replacement; complex hip and knee revision; direct anterior, anterior-based muscle-sparing and mini-posterior total hip approaches; medial parapatellar, quadriceps-sparing (subvastus) and lateral total knee approaches; Mako robotic-arm-assisted total hip arthroplasty, total knee arthroplasty and unicompartmental knee arthroplasty; treatment of periprosthetic fractures; treatment of prosthetic joint infection; preoperative planning; and clinical evaluation and non-operative care.

Fellows also have the opportunity to participate in medical mission trips, including Operation Walk in El Salvador and Faith in Practice in Guatemala. They have close interaction and teaching opportunities with residents and medical students and can expect to participate in and perform more than 600 cases during the course of their fellowship.

Orthopedic Sports Medicine and Shoulder Fellowship

The Orthopedic Sports Medicine and Shoulder Fellowship at McGovern Medical School is a 1-year ACGME-accredited post-graduate sports medicine fellowship. Fellows in the multidisciplinary program interact closely with other medical specialties, including athletic training, physical therapy, sports concussion, and basic and clinical science research. Each year's class includes four fellows, whose education is overseen by five full-time faculty and nine additional faculty. Steven Flores, MD, an assistant professor in the Department of Orthopedic Surgery, is director of the program, which provides in-depth experience in orthopedic sports medicine and is designed to provide fellows with the skills and knowledge to develop into excellent physician-surgeons.

Fellows treat a high volume of patients, including athletes from all levels of competition who require diagnostic, surgical and non-surgical treatment. The philosophy of the program is to develop and promote orthopedic sports medicine through patient care, education and research. Fellows in this extremely active clinical fellowship have exposure to ACL reconstructions, meniscal transplants, osteochondral transplants, PCL reconstructions, multi-ligament reconstructions, UCL reconstructions, rotator cuff repairs, labral repairs, total shoulder, arthroplasty, hip preservation, hip arthroscopy, hip labral repairs and hip injections. They rotate 2 days in clinic and 2.5 days in surgery, with half a day set aside for research and administrative responsibilities.

The fellowship provides extensive orthopedic education and operative experience. Sports surgical procedures of the knee, shoulder and hip are the primary focus, and fellows gain extensive exposure to routine as well as complex primary and revision cases.

Fellows are expected to complete at least one hypothesis-driven research project; about 50 percent are presented nationally and/or published. Many also will be the senior author on a review article or a book chapter.

Under the direction of Walter Lowe, MD, professor and Edward T. Smith, MD, Chair of Orthopedic Surgery, the Orthopedic and Sports Medicine Fellowship has built an internationally acclaimed faculty that includes national and international specialists in all fields of orthopedic surgery.

Orthopedic Trauma Fellowship

The Orthopedic Trauma Service, a collaboration between McGovern Medical School and the Level I Trauma Center at Memorial Hermann Red Duke Trauma Institute at Memorial Hermann-TMC, provides treatment for the full spectrum of orthopedic trauma. Fellowship-trained traumatologists specialize in the treatment of common and complex procedures for traumatic orthopedic events and injuries. The elite team serves the community 24/365, specializing in orthopedic fracture care, polytrauma and treatment of the multiply injured patient.

Physicians affiliated with the service are engaged in innovative research, the education of future orthopedic surgeons and a commitment to clinical excellence. The faculty includes surgeons and physicians who specialize in orthopedic fracture care and polytrauma and are supported by physician assistants, residents and fellows. We accept four fellows each year, who complete a 1-year course of study.

While honing each fellow's skills to manage all aspects of orthopedic trauma, the fellowship places special focus on building expertise in pelvic and acetabular reconstruction. Under the direction of Timothy Achor, MD, an associate professor in the Department of Orthopedic Surgery, the Orthopedic Trauma Fellowship program has attracted a world-renowned faculty that includes national and international specialists in the field of orthopedic traumatology. They pride themselves on excellence and on ensuring the best trauma training possible.

Gladys and Steve Willis
Walking Without Canes Again

Stephen Willis was walking with a cane by the time he saw Kenneth Mathis, MD, associate professor in the department of Orthopedic Surgery at McGovern Medical School at UTHealth, medical director of Memorial Hermann Orthopedic & Spine Hospital and a renowned specialist in hip and knee replacement.

"Over a period of 4 years, I saw several neurosurgeons and neurologists who focused on a herniated disk as the source of my pain," Stephen Willis says. "I took cortisone injections to ease the pain, but it got progressively worse. Finally, the last neurologist I saw said, yes, you have a compression in your spine, but it looks like your hip may be causing the pain."

Stephen did some research and found Dr. Mathis. "The word was pretty clear at Memorial Hermann and UTHealth that he was the top hip person around. He did an X-ray, and it was obvious that my right hip joint was deformed," says Stephen. "I'm not clinical at all, but looking at it I could tell that the joint looked like a pin instead of a ball. He thought I was a prime candidate for hip replacement."

"There is a lot of overlap between back and hip problems," says Dr. Mathis, an associate professor in the Department of Orthopedic Surgery at McGovern Medical School. "One easy way to determine the cause is to inject the hip with novocaine and ask the patient to walk around. If the pain is gone, it's the hip. If it doesn't help, then maybe we should focus on the back."

> "Dr. Mathis said as long as I was doing the exercises at home, I wouldn't have any problem, and I didn't. My experience with him was outstanding."
>
> — **GLADYS WILLIS**

Dr. Mathis took Willis to surgery in 2016. "I was out of the hospital the next day and pretty well recovered within 6 weeks," Willis says. "I had exercises to do at home, and Dr. Mathis said walking is the best way to recover."

Three years later, in November 2019, Stephen's wife, Gladys Willis, was in Dr. Mathis' office, considering a hip replacement after having tried conservative treatments for a couple of years.

"I suffered for a long time and had all the conservative treatment you can get, trying to avoid surgery," she says. "Finally I was using a cane, and I really didn't want to be walking around with that cane."

"We've made advances since Stephen's recovery 4 year ago," Dr. Mathis says. "His recovery was typical for the time, but most of my current patients don't even have to spend the night in the hospital."

Stephen's wife benefitted from the advancements in care. "My recovery was good," Gladys says. "The office gave me clear instructions on what to do and what not to do. We had one 4-hour class that was excellent. They tell you what to do before the surgery and how to maneuver afterwards. I went to the class 2 weeks before, so I had time to let it settle in my mind before the surgery. Dr. Mathis said as long as I was doing the exercises at home, I wouldn't have any problem, and I didn't. My experience with him was outstanding."

Grace Mosby **Overcomes Sarcoma and Graduates as Valedictorian**

Grace Mosby had been a dancer all her life. A top student in her class at Stratford High School, Mosby was also an officer on the school's drill team.

It's common for dancers to experience soreness, so Mosby powered through the pain she began to feel in her hip during her junior year of high school. She took a break from dancing during the summer of 2018, hoping she could start again in the fall. When Mosby's drill team director suggested the intense pain she was experiencing might not be caused by a dance injury, her family made an appointment to see Alfred Mansour III, MD, assistant professor in the Department of Orthopedic Surgery at McGovern Medical School and a pediatric orthopedic surgeon affiliated with Children's Memorial Hermann Hospital. After an MRI and blood work, he referred her to Chappie Conrad, MD, professor in the Department of Orthopedic Surgery at McGovern Medical School and an orthopedic oncologist, also affiliated with the hospital.

A biopsy confirmed that Mosby had Ewing sarcoma, a rare malignant tumor that grows in the bones or soft tissue near the bone, most often presents in teenagers. Dr. Conrad has extensive experience surgically treating sarcomas.

After relocating from Seattle to Houston, Dr. Conrad established a musculoskeletal oncology practice that combines surgery, medical oncology, radiation oncology, pathology and radiology to provide comprehensive care to patients.

Dr. Conrad told Mosby she would have to undergo chemotherapy, followed by surgery and more chemotherapy, then radiation. She would have to enroll in online home instruction during treatment.

"I don't think anyone is prepared for that kind of news," she says. "It came as a shock. There were all of these things my friends would experience that I wouldn't."

In September 2018, just before Mosby started her treatment, she attended her school's homecoming football game. The football team surprised her before the game with a bouquet of yellow roses symbolizing Childhood Cancer Awareness Month.

"It allowed Grace to go into treatment on an emotional high," says her mother Holly Mosby. "When we returned home after her first treatment, our neighbors had tied yellow ribbons to the trees in our neighborhood. Having that kind of support does so much for your attitude."

During her initial 12 weeks of chemotherapy, Mosby stayed up to date with her schoolwork. She underwent surgery with Dr. Conrad just before her 18th birthday in December 2018. He resected nearly half of her femur and replaced it with prostheses. She recovered quickly and resumed chemotherapy in January 2019.

After 4 months of chemotherapy and 6 weeks of radiation, Mosby attended her senior prom. She graduated as valedictorian of her class and is now attending The University of Texas at Austin.

"As new friendships develop, I've been able to share my story," Mosby says. "Childhood Cancer Awareness Month brings up a lot of emotions in me. I was diagnosed in September of last year, so when September came around this year, I had a lot of feelings to reflect on. I'm starting life in a new place, with a community I can lean on."

Kyle Martin-McGowan **Walks Again After Hip Surgery**

Kyle Martin-McGowan defeated leukemia, but the treatments that saved his life took a toll on his body. “A trial drug gave me a series of heart attacks and then heart failure,” Martin-McGowan says. “And I developed vascular necrosis from all the steroids I took, which caused my hips to collapse.”

Martin-McGowan’s hips deteriorated to the point that he needed a wheelchair to move. He needed hip replacement, but with his medical history, surgeon after surgeon said the procedure would be too risky. “I begged and begged for it,” he says. “I’ve got 21-month-old twins, and I needed this surgery. But no one would do it.”

When he was about to give up hope, Martin-McGowan was referred to orthopedic surgeon Houston Braly, MD, an assistant professor in the Department of Orthopedic Surgery at McGovern Medical School. Dr. Braly is affiliated with the Memorial Hermann Joint Centers and is also the father of a young child. He knew a successful hip replacement could be life changing for Martin-McGowan.

“I evaluated his medical risk factors and also factored in his young twins,” Dr. Braly says. “I was the father of a new baby girl at the time, and I couldn’t imagine not being able to get on the floor and play with her. That helped solidify the decision to perform the surgery.”

Dr. Braly performed the surgery at the Memorial Hermann Joint Center, one of seven locations in a hospital setting with multiple specialists on hand, including Martin-McGowan’s cardiologist. “He was there the day of surgery in case anything happened,” Dr. Braly says. “The surgery went well, and Kyle was up and walking the same day.”

Dr. Braly credits the Joint Center’s team approach for delivering successful outcomes like Martin-McGowan’s.

“It’s not just the surgeon; it’s a whole team educating the patient from the beginning,” he says. “It’s our Nurse Navigator calling the patient to answer any questions. I give patients my cell phone number and encourage them to call me if they have any questions. Our physical therapists are terrific, and the facilities are awesome.”

Advances in anesthesia and pain management help patients get back on their feet faster after hip and knee replacements. “The intra-articular anti-inflammatory injections we perform, a faster surgery, the implants—there are a whole mix of factors that we employ to help get the patient up and walking, usually within 4 hours of surgery,” Dr. Braly says. “Nowadays, many patients go home the same day.”

Martin-McGowan returned to regular daily activities within 5 to 6 weeks. “It was very speedy,” he says.

A cattle trader from Oklahoma, Martin-McGowan is now back on his ranch, herding his livestock and twins, thanks to his new hips. Asked what advice he would give people contemplating hip replacement surgery, he says, “The sooner the better. I put mine off, and I regret it because it’s more relief than you’ll ever know.”

Brittany Cariker **Returns to Activity After Hip Preservation**

Brittany Cariker didn't know how to react when her doctor recommended that she travel to Houston for the pain in her hip. Her orthopedist offered two options: hip replacement at an early age or an intense hip-preservation surgery that was readily available to her in Houston, an 8-hour drive from her home in Mississippi.

"My first thought was that I would just get the hip replacement," says Cariker, 31. "But my doctor told me I should reconsider." The pain in Cariker's hip started when she was pregnant with her daughter. Two years later she was still in pain. "If I did any kind of physical activity, I was miserable after," she says. "I wanted to be healthy, active and able to play with my daughter. If I was active, I paid for it."

Cariker was diagnosed with a labral tear and hip dysplasia, a congenital hip condition in which the hip joint did not form correctly. If hip dysplasia is diagnosed in children, it can be corrected surgically. Often the condition isn't diagnosed until adulthood, so symptoms and pain persist later in life, and many adults opt for hip replacement surgery. But, there are alternative surgical options.

Cariker's orthopedic specialist in Mississippi referred her to Alfred Mansour III, MD, a hip preservation and sports medicine specialist affiliated with The Institute and the director of the Comprehensive Hip Preservation Program at McGovern Medical School. He is one of the few surgeons in the southern United States who offers comprehensive hip preservation surgery, which helps patients overcome the limitations of joint replacement by repairing or revising their natural hips.

Cariker and her husband, Heath, made the drive to Houston to meet with Dr. Mansour in November 2017, and he walked them through the procedure and recovery. She needed a periacetabular osteotomy (PAO), a surgical procedure to treat

hip dysplasia. The procedure reduces pain, restores function and prevents further deterioration of the hip joint, increasing its life and postponing total hip replacement. Dr. Mansour also repaired the torn labrum.

Cariker's hip preservation procedure took place in August 2018. She was discharged from Memorial Hermann-TMC after a 3-night stay.

"Brittany's underlying hip dysplasia required specialized treatment," says Dr. Mansour. "You can have a great outcome from a difficult problem as long as it's taken care of appropriately. It's really more than just a surgery—it's a program of surgery and rehab that requires focus from start to finish. You have to leverage the strength of both to maximize the patient outcome."

A year after her procedure, Cariker was running 4 to 5 miles a day, multiple days per week. "It was a huge thing, as a working wife and a mom, to be limited after a big surgery for a long period of time," she says. "That being said, I'm mad at myself that I didn't do it sooner."

Research

Researchers at the Center for Orthopaedic Research, Innovation and Training (CORIT) which is part of UTHealth, are committed to are committed to discovering solutions to orthopedic problems and providing a venue to develop students, trainees and faculty into leaders in orthopedic knowledge and practice. Through this commitment, they serve the international orthopedic community and advance the diagnosis and treatment of musculoskeletal disease and injury. CORIT is embedded within the Department of Orthopedic Surgery at McGovern Medical School at UTHealth.

CORIT provides access for UTHealth students, residents, fellows and faculty to an array of investigational tools for research studies in orthopedics. Capabilities include customizable mechanical simulators and computational tools, 3-D motion capture and analysis, computer-assisted surgical training, and investigations in both animal and cadaveric models. Combining these technologies with in-depth surgical knowledge, surgeons and researchers develop new methods for the analysis of musculoskeletal function and characterization of orthopedic device performance. They are committed to providing unique insights and developing strategies that maximize the quality and value of the research studies performed within CORIT.

Current Projects

Joint Biomechanics

- The contribution of capsular releases to femoral exposure during total hip arthroscopy performed via the direct anterior approach
- The effect of flatness of the tibial osteotomy on the stability of cementless tibial trays during functional loading
- Optimization of access to residual bone stock for fixation of acetabular cups in the face of severe bone loss

Prosthetic Infection

- Experimental measurement of airborne contamination of the surgical field during total joint replacement procedures
- Factors affecting airflow between the surgical suit and the sterile intraoperative environment
- Effect of using a UV disinfection unit on airborne contaminants

Periprosthetic Fractures: Prevention and Treatment

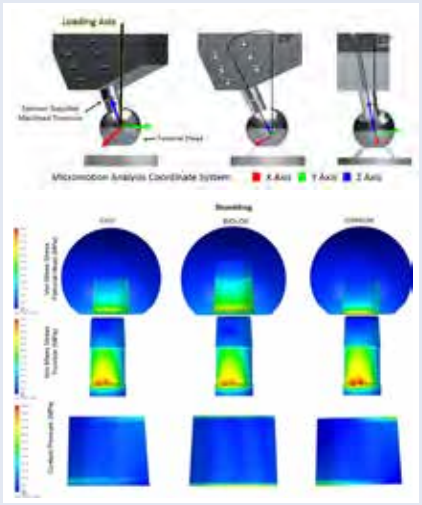
- Development of a predictive algorithm for treatment of periprosthetic femoral fractures
- The effect of varus implantation of blade-type femoral stems on bone stresses and implant stability after total hip replacement

Simulation of Knee Function During Functional Activities

CORIT has developed a knee activity simulator that enables reanimation of cadaveric knee joints to perform functional activities. Using this methodology, surgeons can study the effect of surgical procedures on the ability of the knee to perform demanding activities by measuring complex joint motion and stability before and after ligament reconstruction or joint replacement. The unique design of the activity simulator allows six degrees of freedom (6 DOF) at the knee joint during functional activities, including stair descent, squatting and lunging. Knee motion is captured by an independent, non-contacting motion capture (MoCap) system consisting of 12 high-resolution infrared cameras. The system is modular and can be used for measurements ranging from implant micromotion to gait.

Mechanical Testing and Finite Element Modeling (FEM)

CORIT's mechanical testing machines can be outfitted with specialized, custom fixturing and coupled with multiple high-level measurement systems to answer clinical research questions.



FEM is a sophisticated mathematical tool that enables researchers to predict the mechanical response of structures exposed to different external loads and constraints.

The research team at CORIT has developed several sophisticated finite element models to supplement and

advance the results of experimental studies. These models include an FEM of the lateral retinaculum of the knee for predicting the effect of total knee replacement devices on retinacular strains; an experimentally validated computer model of the knee joint for predicting strains in the collateral and cruciate ligaments during loading activities; and models of modular junctions used to assemble joint prostheses, which they have used to study the impact of design and loading factors on the occurrence of wear and corrosion within the body.

The Biolab: Growing Bone in a Bioreactor

Investigators at CORIT have developed a method for keeping bone alive for extended periods in organ cultures. This can serve as a platform for developing new implants and coating using 3-D printing. Using this tool, the researchers can assess cellular responses to changes made to implant geometry, topography or surface chemistry without using animal models.

Foot and Ankle Biomechanics

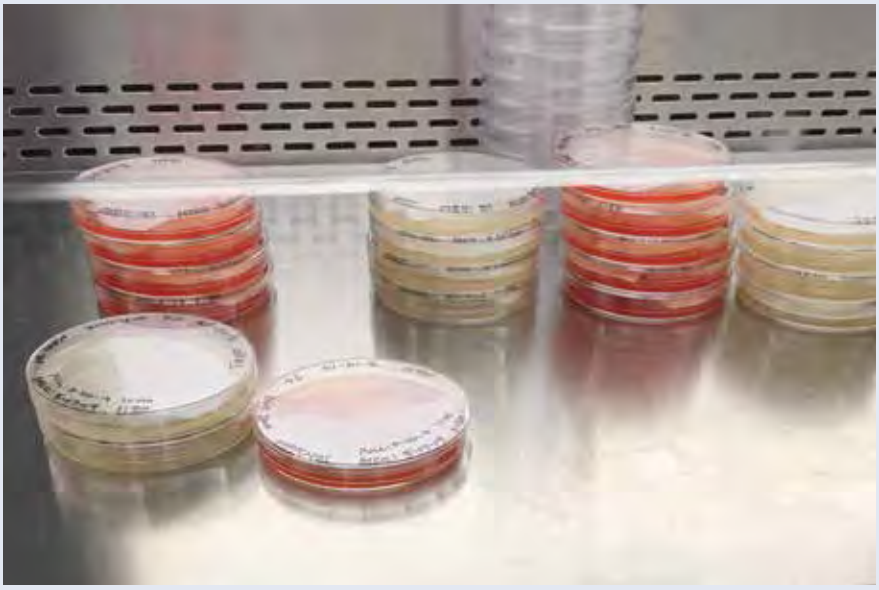
In the area of foot and ankle biomechanics, CORIT houses a foot gait simulator capable of producing physiologic loads throughout the entire gait cycle. The loading profiles and motion of the foot can be customized to simulate pathologies or activities of interest. Integrating the foot simulator with The Institute's motion capture system enables the collection of bony kinematics.

Features of the machine include an integrated six-axis force plate with 1,000-pound capacity. Four computer-controlled pneumatic muscle force actuators around the foot and a guide rail system designed using data from motion capture studies of gait. Experiments that require continuous loading over many gait cycles (100,000+) can be performed with minimal intervention, ideal for long-term testing of implant components and pathomechanics under realistic conditions. Research areas are evaluation of devices for foot arthroplasty and trauma, mechanisms leading to injury, kinematics of foot bones and biomechanical comparisons of surgical interventions.

Prevention of Prosthetic Joint Infections

Two projects are in progress in the area of infection control: surgical suit airflow evaluation and the effect of using a UV disinfection unit on airborne contaminants.

Some studies have shown that surface contamination rates from airborne particles are higher near the surgical suite than in other locations in the operating theater, suggesting that the operating team is a potential particulate source.



As orthopedic surgical dress has evolved into a somewhat positive pressure suit, researchers at CORIT are developing methods to evaluate potential exit points of contaminated air from within the suit to provide a means to compare different suit designs.

Researchers are also working on the effect of using a UV disinfection unit on airborne contaminants, a study that will be performed in the Memorial Hermann Orthopedic & Spine Hospital operating room (OR). One strategy to reduce airborne bacterial contamination in the OR is to adopt clean standards of allowable airborne particulate levels. This can be achieved using a mobile ultraviolet air disinfection unit within each OR during surgical procedures. Although the units are reported to lower the total concentration of particles within ORs, it has not been established how UV units affect contamination of the surgical site or exposed instruments through settling of airborne microorganisms. Investigators at CORIT are undertaking an experimental protocol within the ORs at Memorial Hermann Orthopedic & Spine Hospital to answer the questions:

- What are the optimal locations within the OR for placement of UV disinfection units?
- Is contamination of the surgical site reduced when optimally placed UV systems are in use?

UTHealth Clinical Joint Registry

The entire research thrust of CORIT is to reduce the variability of surgical outcomes and provide each patient with the best possible treatment, given their general and musculoskeletal health and the inherent limits of the options and materials available. The integrated teams of surgeons and researchers at CORIT are focused on personalized care and the process of predicting and optimizing the outcome of each individual patient.

In tracking the outcome of each patient undergoing joint replacement under the care of the surgeons at UTHealth, CORIT is developing a dedicated clinical joint registry containing data describing each patient's health and outcomes at every stage of their episode of care. Through analysis of the data collected in this registry, the clinical research team at CORIT will be able to monitor clinical results and investigate risk factors contributing to poor clinical outcomes (ICU admission and readmission), increased morbidity, and any adverse events. Patient data is collected in three stages: at each patient's preoperative appointment, immediately following the patient's surgical procedure, and at the patient's 6-week follow-up appointment. The registry will allow for monitoring the results of ongoing joint replacements on a daily basis, as well as, serving as a platform for future UTHealth Institutional Review Board-approved research studies.

Dr. Philip Noble is an adjunct professor in the Department of Orthopedic Surgery at McGovern Medical School and serves as a scientific consultant to the Center for Orthopaedic Research, Innovation and Training (CORIT) in the Department of Orthopaedic Surgery.

UTHealth®
The University of Texas
Health Science Center at Houston

McGovern
Medical School

MEMORIAL® HERMANN
Orthopedic & Spine
Hospital

5410 West Loop South
Bellaire, TX 77401

4413330