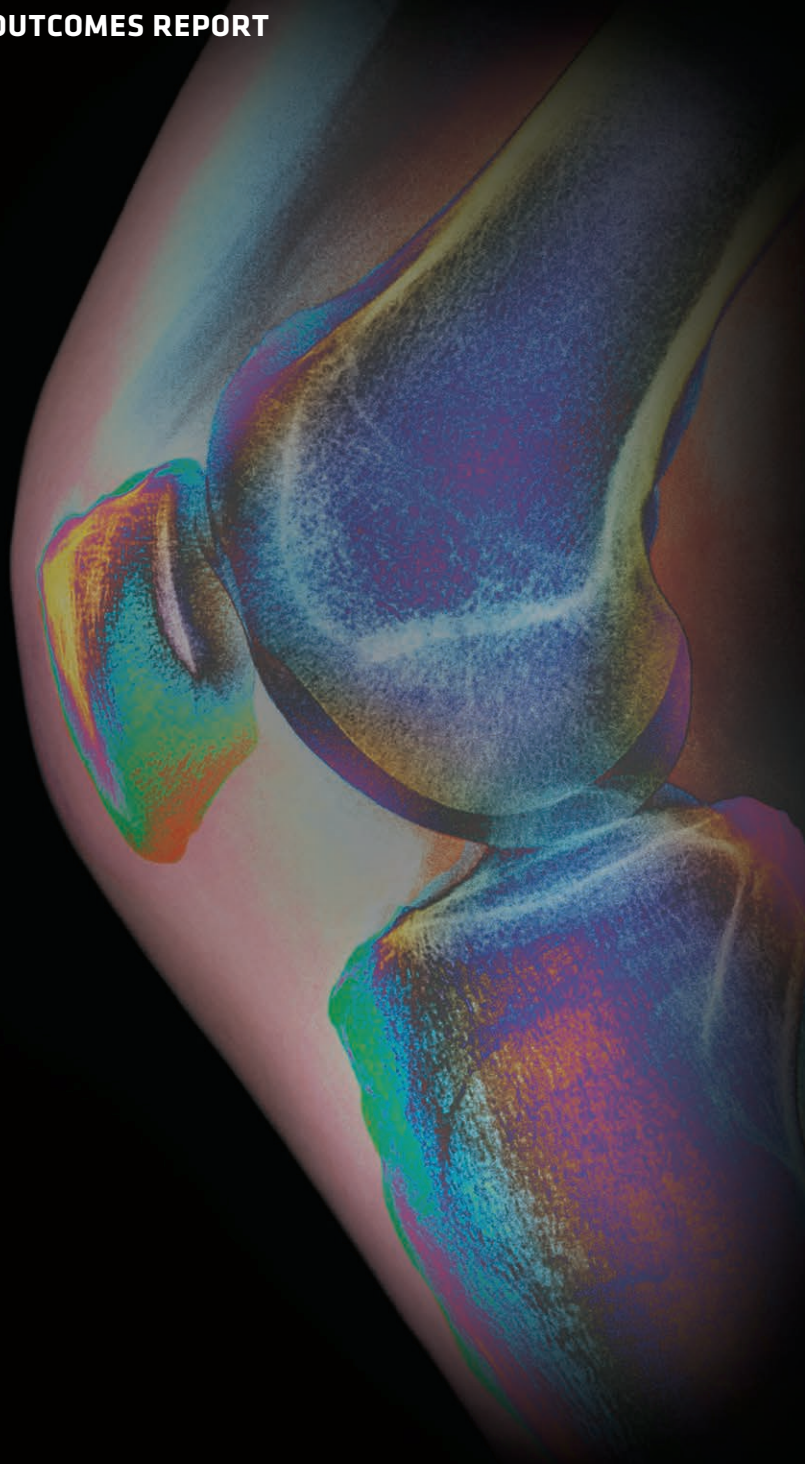
NYU Langone Health

Orthopedic Surgery

2019 QUALITY AND OUTCOMES REPORT



Developing Opioid-Sparing Pathways

Leading Outcomes Research

MESSAGE FROM THE CHAIRS

JOSEPH D. ZUCKERMAN, MD

Walter A.L. Thompson Professor of Orthopedic Surgery

Chair, Orthopedic Surgery

Surgeon-in-Chief, NYU Langone Orthopedic Hospital

JOSEPH A. BOSCO III, MD

Professor, Orthopedic Surgery

Vice Chair, Clinical Affairs, NYU Langone Orthopedic Hospital

On behalf of the faculty and staff of the NYU Langone Department of Orthopedic Surgery, we are pleased to present our 2019 Quality and Outcomes Report. This publication is an important part of our ongoing efforts to advance the quality and safety of musculoskeletal care for every patient.

In this year's report, we focus on research our faculty have recently conducted on key issues in orthopedic surgery. These studies result in improved patient outcomes and enhance the overall value of our care. Most importantly, this research is a product of our organization, NYU Langone Health, which is driven to provide healthcare of the highest quality.

This report describes our department's robust initiative to decrease and even eliminate the amount of opioids prescribed by our surgeons. The opioid epidemic's devastating effect in the United States is well documented. While there are no easy solutions, we believe that this problem is not insurmountable. We challenged each of our subspecialty divisions to examine their prescribing patterns and develop plans to reduce the amounts of opioids prescribed. These initiatives were supported by our department's robust quality and safety infrastructure. As a result, each division developed new opioid-sparing protocols that effectively manage pain while decreasing opioid consumption. We are delighted to share these protocols with you, our peers.

Additionally, this report describes our research efforts centered on joint preservation, cartilage restoration, the responsible evidence-based use of biologics, and the migration of traditionally performed inpatient surgeries to the outpatient realm. On behalf of our entire department, we thank you for your interest in our research and performance improvement initiatives. We look forward to partnering with our colleagues to solve our shared challenges, improve quality, enhance safety, and provide the highest quality musculoskeletal care to our patients.

Cover image: Illustration of knee cap.

RENDERING: GETTY IMAGES

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PHOTO: KARSTEN MORAN

Primer on Opioids in Orthopedic Surgery

Orthopedic surgeons are among the physicians most likely to prescribe narcotics.[1] In light of the current opioid epidemic, it is crucial that all physicians be mindful of their prescribing patterns and minimize narcotic use for different patient cohorts. The first step is to understand the evolution of the opioid epidemic and learn how governments and clinical leaders are responding to it.

Opioid use in orthopedic surgery
PHOTO: GETTY IMAGES

Evolution of the Opioid Epidemic

The dramatic rise in opioid use over the last 20 years has had a major impact on the U.S. healthcare environment. According to the Centers for Disease Control and Prevention, opioid prescribing *quadrupled* between 1999 and 2015.[2] And although narcotic prescriptions have declined since their 2010 peak, the amount of opioids prescribed in 2015 was still *triple* the 1999 level. This has led to many unforeseen consequences, including a higher risk of falls and fractures among elderly patients on narcotic pain control.[3] The increase in opioid prescriptions has also corresponded with an increase in opioid diversion to nonmedical users.

The overdose epidemic has occurred in three waves. The first wave began in the 1990s, and it was driven by increased use of prescription opioids (both natural and semi-synthetic) as well as methadone. The second wave hit in 2010 with the rapid increase in deaths involving heroin. The third wave began in 2013 with a significant increase in overdose deaths involving synthetic opioids such as fentanyl.

1. Ringwalt C, Gugelmann H, Garrettson M, et al. Differential prescribing of opioid analgesics according to physician specialty for Medicaid patients with chronic noncancer pain diagnoses. *Pain Research and Management*, 2014;19(4): 179–185.

2. Guy G Jr., Zhang K, Bohm M, et al. Vital signs: changes in opioid prescribing in the United States, 2006–2015. *Morbidity and Mortality Weekly Report*, 2017;66:697–704.

3. R Daoust R, Paquet J, Moore L, et al. Recent opioid use and fall-related injury among older patients with trauma. *Canadian Medical Association Journal*, 2018;190(16):E500-6.

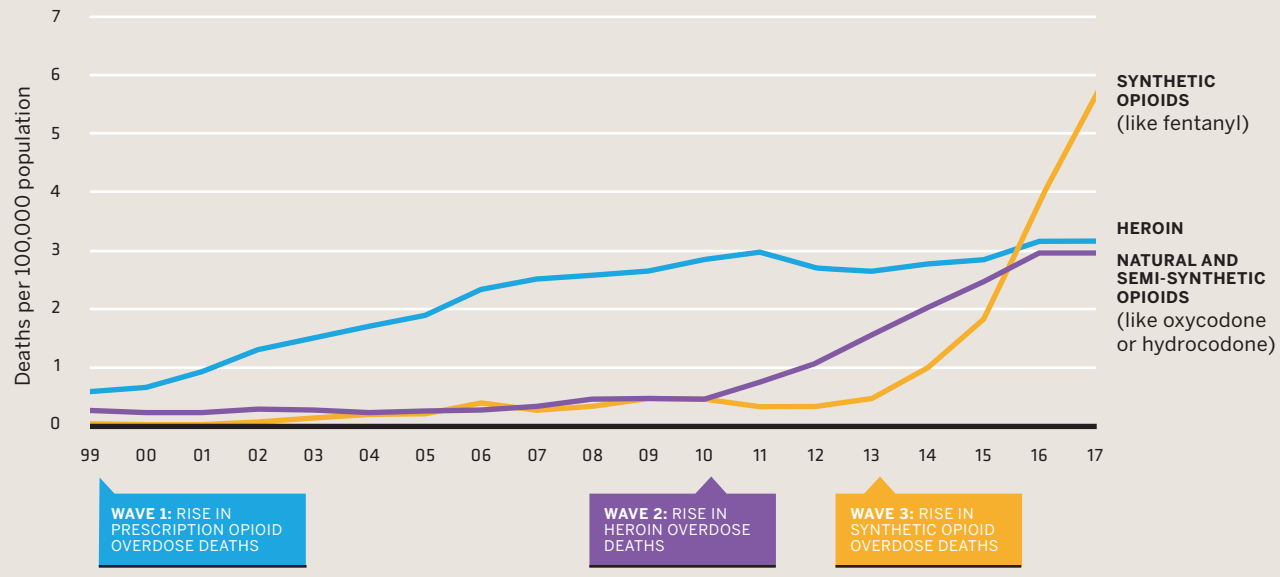
4. Payne-Riley L. Opioid data can be confusing – here's why. *Policy Map* (www.policymap.com), Sep. 10, 2018.

Between 1999 and 2016,

350,000+

people in the U.S. died from an overdose involving any opioid, including both prescription and illicit drugs.[4]

3 WAVES OF THE RISE IN OPIOID OVERDOSE DEATHS



Source: National Vital Statistics System Mortality File.

A Public Health Response

The opioid epidemic is a complex problem that calls for a multi-pronged public health solution. The challenges include entrenched prescribing practices among physicians, the high cost and low availability of medication-assisted treatment, and policy approaches that present substantial barriers to care.

Kirk A. Campbell, MD
PHOTO: NYU LANGONE STAFF

Federal Response: Changing the Role of Pain in Patient Satisfaction Scoring

In 2001, the Joint Commission rolled out new Pain Management Standards based on the perception that pain was undertreated. Pain was considered the "Fifth Vital Sign" and healthcare providers were encouraged to ask every patient about their level of pain. Pain management scoring later became a component of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient satisfaction survey. Eventually, pain management questions were factored into value-based reimbursement rates for hospitals. In retrospect, these trends may have contributed to the opioid crisis. Research has found that opioid users are more likely to report high satisfaction with care, and this association is stronger with moderate and heavy opioid usage.

Recently, the federal government has responded by making several changes to quality and payment formulas. In November 2016, the Centers for Medicare & Medicaid Services (CMS) removed pain management and opioid prescribing questions from reimbursement formulas. In addition, in 2018 the HCAHPS pain management questions were reformulated. Previously, the survey asked, "During this hospital stay, how often was your pain well controlled?" The new HCAHPS survey includes questions like, "During this hospital stay, how often did hospital staff talk with you about how to treat your pain?"

State Response: New York Opioid Prescribing Initiatives

Over the last few years, New York State has launched several initiatives aimed at fighting the opioid epidemic by addressing opioid prescribing patterns.

- **October 2015**
  Electronic prescribing of controlled substances becomes mandatory
- **July 2016**
  A new state law limits opioid prescriptions for acute pain to seven days or fewer
- **July 2017**
  All opioid prescribers must complete three hours of education on pain management, palliative care, and addiction

Research Helps to Develop Opioid-Sparing Pathways for Orthopedic Surgery

Orthopedic surgeons are among the physicians most likely to prescribe narcotics. In light of the current opioid epidemic, it is crucial that all physicians be mindful of their prescribing patterns and minimize narcotic use for different patient cohorts.

Physicians have a moral obligation to manage patients' pain without putting them at heightened risk for future addiction. Therefore, a comprehensive program to combat the opioid crisis must include both educational reform for physicians and supplementary tools to decrease the use of narcotic drugs. This includes monitoring opioid dosing for avoidable usage and encouraging greater prescribing of naloxone for high-risk patients on chronic opioids.

Doctors at NYU Langone Orthopedic Hospital have been at the forefront of developing pain management protocols that minimize patient exposure to opioids wherever possible. Recently, the Department of Orthopedic Surgery completed an analysis of its opioid prescribing patterns by physician and by procedure type. Based on these analyses, our teams have begun to implement new protocols for reducing opioid prescribing. Following are several examples of this initiative.

Roy I. Davidovitch, MD

PHOTO: KARSTEN MORAN

Opioid-Prescribing Patterns among Upper Extremity Surgeons

Physicians in the Division of Hand Surgery conducted a retrospective review of opioid prescribing patterns for common upper extremity procedures performed at NYU Langone Orthopedic Hospital between January and December 2016. The procedures included carpal tunnel release (CTR), trigger finger release, de Quervain's release, closed reduction and percutaneous pinning (CRPP) of finger fractures, open reduction internal fixation (ORIF) of distal radius fractures, and flexor tendon repairs. For each case, researchers determined the number of pills and type of opioid prescribed.

After excluding multi-procedure cases, the study included a total of 1,014 cases, with the average number of opioid tablets prescribed for these procedures as noted in the chart below.

The highest number of tablets prescribed for a case was 80, for a trigger finger release and, separately, for an ORIF of distal radius fracture. The lowest number of tablets prescribed was five, for a trigger finger release, a CTR, and a CRPP of finger fracture. The greatest variance in the number of tablets prescribed for a specific procedure was for trigger finger releases.

The study revealed that surgeons prescribe opioids in a highly variable manner, and there are no set guidelines for prescribing pain medication after common hand procedures. Inconsistent prescribing patterns increase patient exposure to opioid medications and risk of opioids dependency for nonmedical use.

PROCEDURE	NUMBER OF CASES	OPIOID TABLETS (AVG)
Open Reduction Internal Fixation (ORIF) of Distal Radius Fracture	502	35.79
Trigger Finger Release	199	32.57
Flexor Tendon Repair	31	32.5
de Quervain's Release	26	26.5
Closed Reduction and Percutaneous Pinning (CRPP) of Finger Fracture	5	21.22
Carpal Tunnel Release (CTR)	251	20.58

Mara Karamitopoulos, MD
PHOTO: KARSTEN MORAN

Standardization of Pain Management Protocols in Pediatric Orthopedic Surgery

Physicians in the Division of Pediatric Orthopedic Surgery conducted research on the variability in opioid prescription patterns among faculty. This research revealed that in the past there was a large discrepancy in the amount and duration of opioid prescriptions for pediatric orthopedic patients. The research also found that for most orthopedic procedures, children do not actually use large doses of opioids. In response, the division established a standardized pain management protocol for pediatric fractures and commonly performed pediatric orthopedic surgeries. The researchers have found that this protocol ensures patient comfort and increases patient safety.

Opioid-Sparing Pain Management Protocol Following Total Hip Arthroplasty

The national volume of total hip arthroplasty (THA) cases will increase dramatically over the next 10 years. It is essential that hospitals develop pain management protocols that minimize opioid exposure for this growing surgical population.

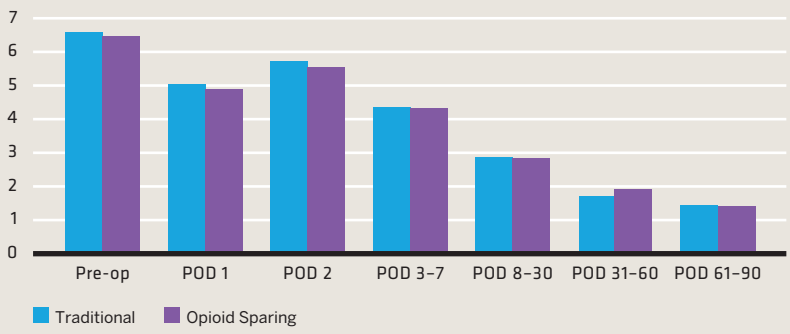
NYU Langone implemented a novel opioid-sparing pain management protocol for same-day discharge THA. After using the protocol for 15 months, the team conducted a retrospective study to assess outcomes. Patients were divided into two cohorts, those who received a traditional pain management protocol and those who received the opioid-sparing protocol. The two cohorts were compared in terms of opioid usage, pain levels, and functional outcomes for the 90-day period of care. The Hip Disability and Osteoarthritis Outcome Score for Joint Replacement (HOOS, JR) was used to assess functional outcomes, a visual analog scale (VAS) was used to assess pain severity, and opioid usage was quantified in terms of morphine milligram equivalents (MMEs).

No statistically significant difference was observed in HOOS, JR scores between the two cohorts at any time point ($p > 0.05$). While there was a significant decrease in pain scores over time ($p < 0.01$), there was no statistically significant difference in the rates of change between the two pain management protocols at any time point ($p = 0.463$). Inpatient opioid consumption was significantly lower for the opioid-sparing cohort than the traditional cohort (14.6 ± 16.7 MME/day vs. 25.7 ± 18.8 MME/day, $p < 0.001$). Similarly, the opioid-sparing cohort received significantly less opioids than the traditional cohort during the post-discharge period (13.9 ± 24.2 MME vs. 80.1 ± 55.9 MME, $p < 0.001$).

The study found that compared to a traditional opioid-based pain regimen, an opioid-sparing protocol can provide THA patients with equivalent pain control and functional outcomes during the 90-day period of care. This protocol may enable hospitals to decrease opioid usage for the THA population. It could also help decrease the risk of adverse events associated with postoperative opioid use.

VAS PAIN SCORES

Mean VAS Pain scores are presented for both the opioid-sparing protocol and the traditional pain management protocol cohorts evaluated preoperatively and on POD 1, 2, 3–7, 8–30, 31–60, and 61–90.



NSAID-Based Pain Regimen Reduces Opioid Use after Arthroscopic Shoulder Instability Repair

Mandeep S. Virk, MD
PHOTO: KARSTEN MORAN

A sports injury can be an introduction to opioid pain medications. To reduce the risk of addiction for injured athletes, surgeons in the Division of Sports Medicine are actively researching opioid-sparing pain regimens.

The team conducted a prospective, randomized control study of patients who underwent arthroscopic shoulder labral repair. The study included patients 18 to 65 years old. Following surgery, patients were prescribed one of two different analgesic regimens:

- **NSAID regimen:** ibuprofen (600 mg every 6 to 8 hours as needed) and 10 tablets of oxycodone/acetaminophen (5/325 mg as needed for breakthrough pain)
- **Opioid regimen**: 30 tablets oxycodone/acetaminophen (5/325 mg every 6 hours as needed)

The team used a patient questionnaire to evaluate medication usage, visual analog scale (VAS) pain scores, incidence of adverse events (nausea, vomiting, or constipation), and patient satisfaction. Subjects completed the questionnaire at 24 hours, 48 hours, 96 hours, and one week post-surgery.

The study enrolled 80 patients with a mean age of 34.3 years between December 2017 and December 2018. There were no significant differences in sex, VAS pain score, or patient satisfaction between the two groups at any time point. Patients in the opioid group had a significantly higher mean opioid consumption on postoperative day 4 (3.8 vs. 2.6 tablets, $p = 0.04$) and after one week (9.8 vs. 5.7 tablets, $p = 0.03$) compared to NSAID group patients. Within the opioid group, 50 percent of patients independently chose to add to their opioid medication with an over-the-counter anti-inflammatory to minimize opioid consumption. In the NSAID group, 17.5 percent of patients experienced adverse effects; in the opioid group, 31 to 35 percent experienced adverse effects.

Despite only one significant difference in pain levels at four days postop, patients prescribed opioids alone consumed significantly more opioids after one week. Otherwise, there were no differences in pain levels or satisfaction between patients prescribed NSAIDs with opioids for breakthrough pain and patients prescribed opioids alone. Both groups used only limited amounts of opioids to control postoperative pain, suggesting that opioids are being over-prescribed after arthroscopic shoulder labral repair.

ADVERSE EFFECTS EXPERIENCED POSTOPERATIVE DAY 0–7

	POD 0–1	POD 2–4	POD 5–7
NSAID GROUP			
Nausea	2	0	0
Nausea + Vomiting	2	0	0
Constipation	0	3	2
OPIOID GROUP			
Nausea	3	2	0
Nausea + Vomiting	2	0	0
Vomiting	2	2	0
Constipation	4	3	3

Surgical Case Volume

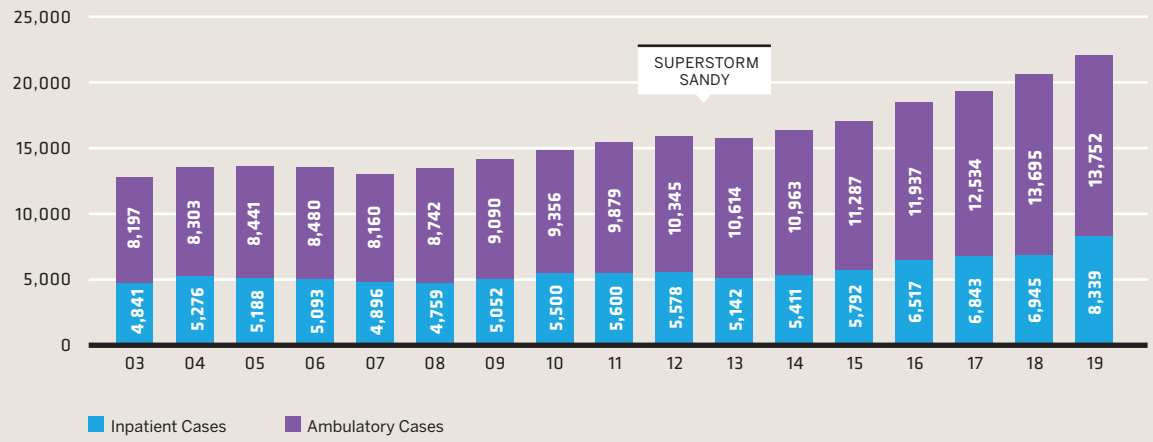
Research shows that high procedure volume is associated with better performance for both institutions and individual surgeons. The Department of Orthopedic Surgery is committed to leveraging our high case volumes to achieve better outcomes for our patients.

Themistocles Protopsaltis, MD
PHOTO: JULIANA THOMAS

Volume Helps Drive Outcomes

In 2019, the department performed more than 22,000 orthopedic surgery procedures. Our annual case volume has continued to grow steadily, with a more than 29 percent increase in inpatient and outpatient procedures since 2015.

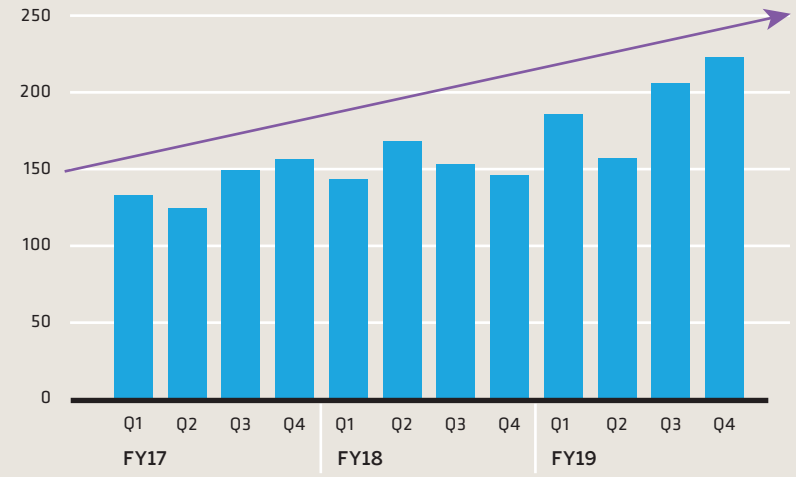
ORTHOPEDIC SURGERY PROCEDURE VOLUME



PROCEDURE VOLUME BY DIVISION (FY 2019)

DIVISION	INPATIENT	OUTPATIENT
Adult Reconstruction	4,098	1,557
Sports Medicine	178	3,616
Hand	36	3,194
Spine	1,289	854
Foot and Ankle	74	1,085
Trauma and Fracture	359	481
Shoulder and Elbow	190	634
Pediatric Orthopedic	137	337
Orthopedic Oncology	9	98

NYU LANGONE HOSPITAL–BROOKLYN ORTHOPEDIC TRAUMA BY THE NUMBERS



NYU Langone Hospital–Brooklyn Orthopedic Trauma

Designated as a Level 1 Trauma Center verification by the American College of Surgeons, NYU Langone Hospital—Brooklyn's Trauma Center is one of the busiest in New York, treating approximately 2,100 patients annually with serious traumatic injuries caused by motor vehicle and pedestrian injuries, industrial accidents, falls, contact sports, assaults, gunshots, and other accidents. Many of these trauma patients sustain significant orthopedic injuries and operative orthopedic trauma cases continue to rise.

As orthopedic trauma cases continue to grow within the hospital, so does the overall orthopedic inpatient volume, which experienced an eight percent increase in 2019.

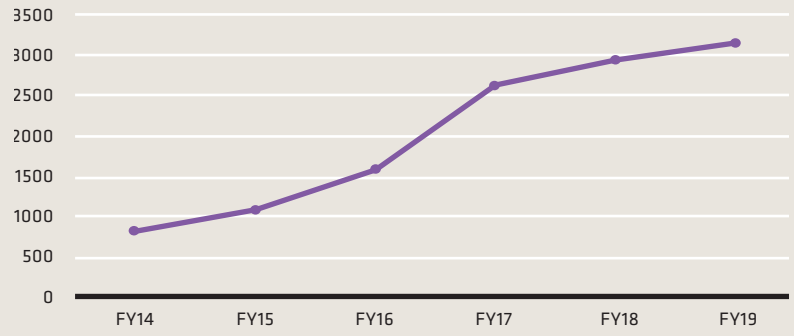
Multidisciplinary Care for a Unique Patient Population

At NYU Langone's Concussion Center, we know that this form of traumatic brain injury may lead to long-term consequences if not treated properly.

Staffed by a multidisciplinary care team of medical leaders in neurology, sports medicine, rehabilitation, and other experts, the center's staff works together to provide patients with a comprehensive rehabilitation plan. The center's 4,000-square-foot outpatient clinic in New York City is specially designed for the needs of this unique patient population. Since its opening in 2014, patient volumes at the Concussion Center have nearly quadrupled.

The team is also at the forefront of concussion research. Current research focuses on rapid sideline screening, the impact of a concussion on vision and brain processing, group therapy treatments, and better ways to use imaging to understand the pathology of concussion.

CONCUSSION CENTER – NUMBER OF COMPLETED VISITS



Quality, Outcomes, and Patient Safety

The Department of Orthopedic Surgery at NYU Langone uses every available tool to improve quality, safety, and patient outcomes—from innovative partnerships to original investigations.

Claudette M. Lajam, MD
PHOTO: NYU LANGONE STAFF

No Silos Here: Partnerships Drive the Success of Our Joint Replacement Program

A successful surgical procedure depends on effective care from many departments, nursing units, and post-acute facilities. Traditionally, these providers have acted independently with only minimal cross-disciplinary coordination. However, during these times of increasing regulation, challenging reimbursement models, and mandated outcome reporting, no single department can go it alone. To be successful in this environment, surgery programs must partner with other divisions, with other provider organizations, and especially with patients.

The Joint Replacement Program at NYU Winthrop Hospital is a case in point. NYU Winthrop provides inpatient and outpatient medical care to adults and children throughout NYU Langone's network of Long Island healthcare facilities. In recent years, the hospital's joint arthroplasty program has improved patient outcomes, minimized complications, decreased readmissions, reduced length of stay, and enhanced patient satisfaction. These successes were possible only through our many efforts to build effective partnerships across the continuum of care.

James D. Capozzi, MD

PHOTO: NYU LANGONE STAFF

Partnering with Patients

The Joint Replacement Program at NYU Winthrop has implemented several strategies for creating a strong partnership between the patient, the surgeon, and a multidisciplinary team of care providers.

PREOPERATIVE EDUCATION

Effective patient education is essential to improving patient outcomes. Our required preoperative education classes show patients and family members what they can do to ensure a successful procedure and an optimal recovery. The classes also introduce patients to key members of the interdisciplinary team—nurse navigators, physical therapists, pharmacists, case managers, home care nurses, and others. One of the main goals of our education program is to encourage ongoing communication between patients and their care team.

PREOPERATIVE HOME VISIT

Long before the day of surgery, the Transitional Level of Care (TLC) Program arranges a home visit with the patient and, if possible, their family. During the visit, a nurse navigator assesses the patient's home for safety issues and barriers to discharge. The nurse then works with the patient to plan successful strategies for safely returning home. The navigator also establishes a preoperative exercise program that is personalized for the patient's age, health restrictions, and environmental hazards.

For the nurse navigator, the home visit is an opportunity to mitigate the patient's fears and validate their beliefs, values, and preferences. Any issues or concerns are shared immediately with the surgeon and the clinical team. During the home visit, the nurse also completes a nursing assessment and develops a patient risk score. The overall goals of the home visit are to encourage shared decision making, set reasonable postoperative expectations, and empower the patient to participate in their own care. The home visit also initiates a relationship between the patient and the nurse navigator, who will be the patient's "point person" throughout their recovery.

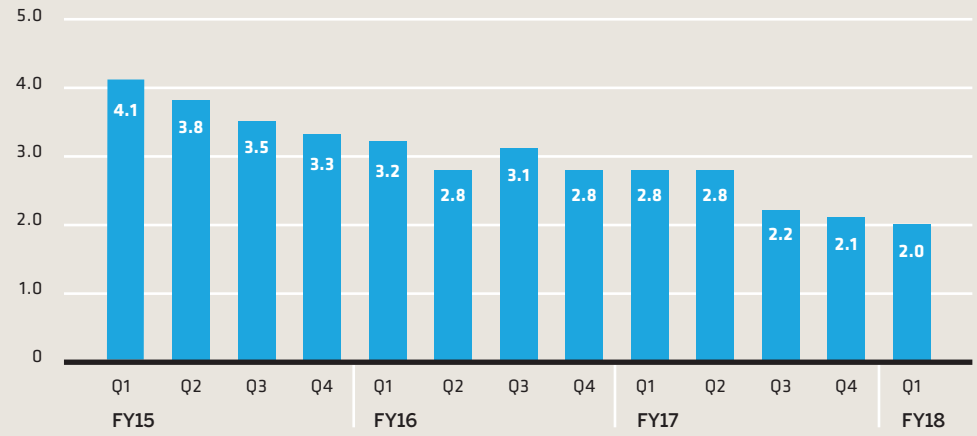
INDIVIDUALIZED CARE PLAN

After the home visit, the nurse navigator creates a pre-admission profile that includes information about the patient's home, their support system, obstacles to returning home, available equipment, current medications, and any special needs. The nurse then develops an individualized plan of care that includes plans for discharge. The care plan is disseminated to the entire joint replacement team to facilitate shared decision making. Preparing our patients for a safe and timely discharge is discussed well in advance of their surgery. This helps promote a smooth transition to home and gives patients the knowledge they need to ensure a successful recovery.

Partnering with Anesthesia

The joint replacement team at NYU Winthrop recently collaborated with the Department of Anesthesia to develop a Perioperative Surgical Home (PSH) program. The aim of this program is to provide complete coordination of care for joint replacement patients across the entire surgical episode. This patient-centered initiative was spearheaded by an interdisciplinary team of physicians and other providers. The team began by analyzing the complete patient experience from the first surgeon office visit to the final outpatient physical therapy session. The leadership team then created subcommittees to work on specific elements of the care pathway, including clinical protocols, clinical operations, and the patient experience. Through weekly meetings and short actionable projects, the committees standardized protocols, enhanced patient and staff education, developed consistent patient messaging, strengthened support services, and improved care delivery in sub-acute facilities. As a result, the Joint Replacement Program was able to further reduce length of stay, decrease readmissions, and increase patient satisfaction, all while discharging more patients to home, lowering costs, and improving outcomes.

MEDICARE – LENGTH OF STAY



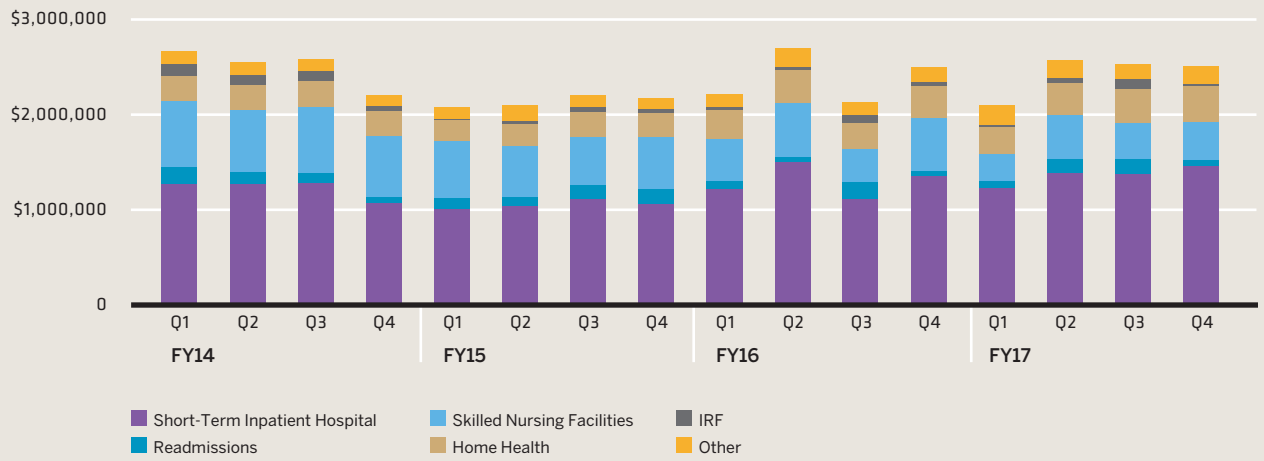
Partnering for Multidisciplinary Performance Improvement

The Joint Replacement Program at NYU Winthrop is driven by a multidisciplinary group of staff who represent the full range of expertise required to care for arthroplasty patients. The team comes together monthly to review performance and examine ways to improve quality and outcomes. During these meetings, the team highlights successful initiatives, discusses areas of concern, and identifies opportunities to improve. This process has enabled the program to standardize preoperative patient optimization practices, DVT prophylaxis, pain management, pre-admission testing orders, drain and dressing management protocols, and discharge-to-home guidelines.

The team recently initiated an Enhanced Recovery After Surgery (ERAS) program that includes a high-carbohydrate drink supplement prior to surgery. This facilitates wound healing and decreases postoperative nausea, which has enabled more patients to participate in physical therapy earlier.

In fact, most patients now ambulate in the recovery room. Overall, the ERAS program has led to reduced postoperative nausea and vomiting, a lower rate of thromboembolic disease, decreased average length of stay, and an increase in patient satisfaction scores.

MAJOR JOINT REPLACEMENT OF THE LOWER EXTREMITY QUARTERLY COST BY SETTING



Partnering with Skilled Nursing Facilities

As part of NYU Winthrop's bundled payment strategy, the Joint Replacement Program initiated partnerships with high-quality rehabilitation facilities in the local community. Together, hospital and facility leaders established goals for joint replacement patients discharged to skilled nursing facilities (SNFs), developed care protocols, and set expectations of quality. These partnerships have grown over the years and have developed into a preferred provider network for skilled nursing. Under these arrangements, NYU Winthrop physicians and support staff have been placed in partner SNFs to manage our patients during their stay. Provider-to-provider handoffs make the patient's transition from hospital to rehabilitation facility seamless. In addition, NYU Winthrop nurse navigators remain in contact with our SNF patients and coordinate their care with the entire Joint Replacement Program team.

Partnering with Home Care

NYU Winthrop Home Care is an integral part of the success of our Joint Replacement Program. Our visiting nurses and physical therapists work closely with joint replacement nurse navigators to optimize patient care and outcomes. They assist with preoperative home visits, help prepare patients and their homes for a successful recovery, and provide high-value care throughout the recovery phase.

HOME CARE SPECIALISTS CONSISTENTLY GO "ABOVE AND BEYOND" TO PROVIDE THE HIGHEST QUALITY CARE

The Centers for Medicare & Medicaid Services (CMS) gave NYU Winthrop Home Care a rating of 4.5 stars (out of 5) based on publicly reported outcome data and Home Health Care Consumer Assessment of Healthcare Providers and Systems Survey scores. The team has also received a Home Care Elite Award, a national recognition for high performance on quality, patient satisfaction, and other measures. In addition, New York State has ranked NYU Winthrop Home Care in the top 25 percent of Certified Home Health Agencies in terms of quality for six consecutive years.

Our home care specialists are an essential part of our program's success with patients.

Implementing a Preferred Single-Vendor Program for Total Joint Arthroplasty Implants

Implant costs are a major component of total spending on total joint arthroplasty. Variation in implant use can be driven by vendor relationships, surgeon preference, and technological advancements. To reduce costly variation in implant use, our institution developed a preferred single-vendor program for primary hip and knee arthroplasty. The goal was to decrease implant costs without compromising performance on quality metrics.

After consultation with the arthroplasty surgeons, the program negotiated a preferred vendor contract with a single supplier of hip and knee replacement implants. While use of preferred vendor implants was encouraged for qualifying procedures, surgeons retained flexibility in implant choice. To assess the impact of this program on implant use, surgeons compared preferred vendor utilization during the 12 months before contract implementation (September 2016 thru August 2017; n = 3,586 cases) and the 12 months after contract implementation (September 2017 thru August 2018; n = 4,246 cases). Per-case implant costs were compared using means and independent-sample t-tests. In addition, multivariable-adjusted regression models were used to compare performance on quality metrics, including 30-day readmission, 30-day surgical site infection (SSI), and length of stay (LOS).

After the preferred vendor program was launched, utilization of preferred vendor implants increased from 50 percent to 69 percent ($p < 0.001$). Preferred vendor utilization was greater for knee implants than for hip implants; however, significant growth was seen for both (from 62 percent to 81 percent for knee, $p < 0.001$; and from 38 percent to 58 percent for hip, $p < 0.001$). Adoption of preferred vendor implants was greatest among low-volume surgeons (from 22 percent to 87 percent, $p < 0.001$) and lowest among very high-volume surgeons (from 61 percent to 62 percent, $p = 0.573$). For cases in which preferred vendor implants were utilized, the mean cost per case decreased 23 percent in the program's first year ($p < 0.001$). Among all cases, there were no significant changes with respect to 30-day readmission ($p = 0.449$) or SSI ($p = 0.059$), while mean LOS decreased in the program's first year ($p < 0.001$).

The creation of a preferred single-vendor program for hip and knee arthroplasty implants led to significant cost savings within the program's first year. It also decreased cost variability. Higher-volume surgeons were less likely to modify their implant choice than were lower-volume surgeons. Despite the potential learning curve associated with changes in surgical implants, there were no differences in short-term quality metrics.

William Macaulay, MD
PHOTO: NYU LANGONE STAFF

CHANGE IN COST PER CASE IN POST-CONTRACT PERIOD

	Change †		
	Mean	SD*	*P* Value
Preferred vendor			
Hip and knee	–23%	–11%	<0.001
Hip	–37%	–30%	<0.001
Knee	–13%	–7%	<0.001
All vendors			
Hip and knee	–17%	+8%	<0.001
Hip	–25%	+11%	<0.001
Knee	–6%	+11%	0.013

* SD = standard deviation.
† Relative difference compared with the pre-contract period.

Research Reports: From Patient Outcomes to Cost Control

To raise the quality of orthopedic care for all patients, doctors at NYU Langone Orthopedic Hospital conduct patient safety and outcomes research, with a particular interest in understanding the factors that drive healthcare value. Here are some highlights of recent efforts designed to identify the most effective strategies for treating orthopedic diseases, optimizing patient safety and outcomes, and controlling total costs.

James D. Slover, MD, and Ran Schwarzkopf, MD
PHOTO: NYU LANGONE STAFF

Does Same-Day Discharge for ACDF Increase Unplanned Admissions?

A growing number of anterior cervical discectomy and fusion (ACDF) surgeries are being performed in the outpatient setting. Various studies have demonstrated that outpatient ACDF surgery is both safe and effective and has comparable complication, reoperation, unplanned admission, and mortality rates to inpatient ACDF. In addition, outpatient ACDF is typically more cost-effective. It is estimated that widespread adoption of this approach could lead to annual national savings of up to $140 million. For all these reasons, it is likely that insurance companies will create incentives that convert the majority of ACDFs to outpatient procedures in the near future. As a result, it is paramount that hospitals develop protocols to ensure that same-day ACDF is carried out safely.

At NYU Langone, a multidisciplinary task force developed a protocol for same-day discharge (SDD) ACDF. The protocol utilizes strict inclusion criteria, multiple assessments, and structured observation to ensure safe discharge of ACDF patients on postoperative day zero. The team hypothesized that using the protocol to identify ACDF patients for SDD would result in a non-inferior unplanned admission rate compared to traditional same-day admission (SDA).

According to the new protocol, SDD is only open to patients indicated for primary one- or two-level ACDF. In addition, the patient must be younger than 65; have a BMI less than 35 and an American Society of Anesthesiologists' (ASA) score of less than three; and have no history of cerebrovascular accident (CVA), transient ischemic attack (TIA), coagulopathy, or bleeding diathesis. The patient's operative time must have been less than 180 minutes without complications. Eligible patients are monitored in the post-anesthesia care unit (PACU) for a minimum of four hours and must be without any complications or concerns from the anesthesia, nursing, and surgical teams prior to discharge.

To evaluate the protocol, the team performed a retrospective chart review of 434 patients who underwent one- or two-level ACDF from March 2016 to March 2017. The review excluded patients who underwent cervical disc replacement, a hybrid procedure, surgery at three or more levels, corpectomy, or a posterior or revision procedure. Data extracted included age, gender, body mass index, date of surgery, discharge date, surgical procedure, surgical time, and recovery room time.

Of the patients reviewed, 126 were discharged on the day of surgery and categorized as SDD while 308 patients were admitted to the hospital immediately after surgery and categorized as SDA. Once admitted, 77 percent were discharged on postoperative day one, with the average length of stay being 1.48 days.

Overall, only three patients experienced an unplanned admission or readmission to the hospital. In each of the SDD and SDA groups, one patient was admitted or readmitted within the 30-day postoperative period. In the SDA group, one patient was readmitted within the 30-to-90-day postoperative period. Other statistics include the following:

- **SDD unplanned admission within 30 days:** One patient was admitted for dysphagia. The patient was treated with a steroid taper and a soft diet and was discharged home after two days.

- **SDA readmission within 30 days:** One patient was readmitted for orthostatic hypotension and syncope. The patient was treated with fluid resuscitation, but the orthostatic hypotension persisted. Further cardiac work-up (including echocardiography) was normal, and the etiology was deemed to be vasovagal syncope in the context of valsalva.

The criteria for same-day discharge for ACDF surgery include the following:

- age less than 65 years
- BMI less than 35kg/m^2
- ASA score less than 3
- no history of coagulopathy or bleeding diathesis
- no history of CVA or TIA
- surgery on 1 or 2 spinal levels
- primary (not revision) surgery
- operating room time of less than 180 minutes
- no operative complications
- no immediate postoperative wound complications
- no significant postoperative dysphagia
- hemodynamically stable in the PACU without uncontrolled hypertension
- no need for high-dose analgesics
- no respiratory alarm signs in the PACU, which may include:
  - difficult airway per anesthesia
  - inability to wean supplemental oxygen
  - witnessed obstructive apnea / hypopnea
  - escalating pain medication requirements
  - pain versus sedation mismatch

- **SDA readmission within 30 to 90 days:** One patient was readmitted for recurrence of symptoms and underwent a revision cervical surgery.

There was no significant difference in unplanned admission or readmission rates for the SDD and SDA groups, either the 30-day admission rate (0.8 percent vs. 0.3 percent,) or the overall admission rate (0.8 percent vs. 0.6 percent, p = 0.86).

This study demonstrated that ACDF patients who are discharged on the day of surgery according to well-designed guidelines do not experience higher unplanned admission rates. As outpatient ACDF becomes more common, these protocols can be used to help ensure safety for a growing number of patients.

Charla R. Fischer, MD

PHOTO: NYU LANGONE STAFF

Total Inpatient Morphine Milligram Equivalents Can Predict Long-Term Opioid Use after Transforaminal Lumbar Interbody Fusion

The aim of this study was to assess the thresholds for postoperative opioid consumption, which are predictive of continued long-term opioid dependence.

The specific sum total of inpatient opioid consumption as a risk factor for long-term use after transforaminal lumbar interbody fusion (TLIF) has not been previously studied.

Charts of patients who underwent a one-, two-, and three-level primary TLIF between 2014 and 2017 were reviewed. Total morphine milligram equivalents (MME) consumed were tabulated and separated into three categories based on receiver operating characteristic (ROC) curve analysis of opioid utilization at 6-month follow-up. Multivariate binary regression analysis assessed these MME dosage categories. A further subanalysis grouped patients on the basis of whether they had used opioids preoperatively.

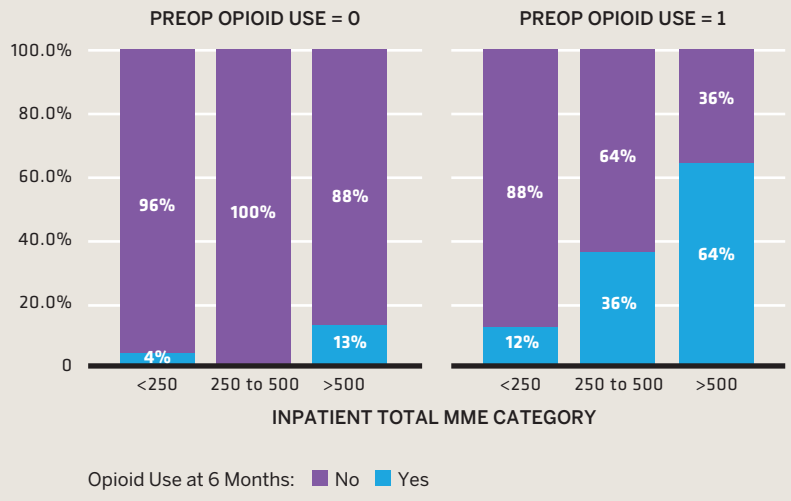
One hundred seventy-two patients met the inclusion criteria and were separated into the following 3 groups:

- less than 250 total inpatient MME (44 percent)
- between 250 and 500 total inpatient MME (26 percent)
- greater than 500 total inpatient MME (27 percent)

Patients undergoing a TLIF who received less than 250 total MME in the immediate postoperative period had a 3.73 (odds ratio) times smaller probability of requiring opioids at 6-month follow-up (p=0.027, 95 percent CI 0.084-0.86), while patients who received more than 500 total MME had a 4.84 times greater probability (p=0.002, 95 percent CI 1.8-13) of requiring opioids at 6-month follow-up.

Exceeding the threshold of 500 total MMEs in the immediate postoperative period after a TLIF is a significant risk factor that predicts continued opioid use at 6-month follow-up, particularly among patients with a history of preoperative opioid utilization.

PREOP OPIOID USE ASSOCIATED WITH POSTOP OPIOID USE AT 6 MONTHS



Osteochondral Lesions of the Talus: Early Failure of Allograft Compared to Autograft in Osteochondral Transplantation

For patients with osteochondral lesions of the talus (OLT), both osteochondral autograft transplantation (OAT) and osteochondral allograft transplantation (OCA) are viable treatment options. However, little research has been done to compare the early failure rates of the two approaches. In this study, surgeons at NYU Langone performed a retrospective analysis to assess early outcomes of OAT and OCA.

All patients in the study were given the option of OAT or OCA after a discussion of the risks and benefits of each procedure. Graft choice decisions were based on patient preference. Data was collected on patient age, patient gender, duration of symptoms, follow-up time, lesion size, lesion location, the presence of cyst in the lesion, previous ankle procedures (including bone marrow stimulation), and concomitant procedures. Clinical outcomes were evaluated using the Foot and Ankle Outcome Score (FAOS) and the Short-Form 12 Health Survey (SF-12) preoperatively and at final follow-up. These evaluations were performed by an author who was blinded to the surgical procedures and radiological analyses.

Postoperative MRI was evaluated using the Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score by a board-certified musculoskeletal radiologist who was also blinded to the surgical procedure and clinical outcome scoring. The rates of cyst occurrence, graft degradation, graft failure, and revision surgeries were evaluated.

The OAT procedure provided significantly stronger clinical and MRI outcomes than the OCA procedure. The rate of chondral wear on MRI was higher with OCA than with OAT. In addition, OCA had a higher incidence of failure than the OAT procedure. These results raise concerns about the biological potential of osteochondral allograft transplantation for the treatment of OLT.

CLINICAL OUTCOME SCORES AND MODIFIED MOCART SCORES

	Autograft (OAT)	Allograft (OCA)	*P* Value
FAOS	N=25	N=16	
Preop, mean	46.1 ± 8.0	43.2 ± 8.1	0.345
Postop, mean	81.9 ± 8.5	70.1 ± 13.1	**0.006***
SF-12			
Preop, mean	39.8 ± 9.9	41.4 ± 11.4	0.713
Postop, mean	74.7 ± 9.4	66.1 ± 10.1	**0.021***
MOCART	N=23	N=15	
Postop, mean	87.1 ± 6.4	75.5 ± 10.1	**0.005***
Follow-up time, mo, mean	21.8 ± 11.1	20.0 ± 7.0	0.628

Quantitative variables expressed as mean ± standard deviation
* Statistically significant difference.

MRI DATA OF CYSTIC CHANGE FOLLOWING SURGERY

	Autograft (OAT) (N=23)	Allograft (OCA) (N=15)	*P* Value
Patients with cysts, n (%)	10 (43.5%)	10 (66.7%)	0.162
Cysts, n	13	19	
Number of cysts, mean	1.3 ± 0.5	1.9 ± 0.8	0.079
Cyst diameter, mean	3.8 ± 1.1	6.0 ± 4.2	0.166
Cyst location			
Graft	1 (7.7%)	9 (47.4%)	**0.017***
Inferior	4 (30.8%)	2 (10.5%)	0.150
Peripheral	8 (61.5%)	8 (42.1%)	0.280

Quantitative variables expressed as mean ± standard deviation
* Statistically significant difference. n: number.

John G. Kennedy, MD
PHOTO: NYU LANGONE STAFF

DATA OF ADDITIONAL SURGERIES

	Autograft (OAT) (N=25)	Allograft (OCA) (N=16)	*P* Value
Total, n(%)	1 (4.0%)	7 (43.1%)	**<0.001***
Failure, n(%)	0	5 (31.3%)	**<0.001***
	N/A	3: Arthroscopic debridement, BioCartilage, RD 2: OAT for nonunion of the graft	
Graft unrelated	1 (4.0%)	2 (12.5%)	0.308
	1: hardware removal	1: Arthroscopic debridement for scar tissue 1: Delayed union of medial malleolar osteotomy	

* Statistically significant difference. RD: retrograde drilling

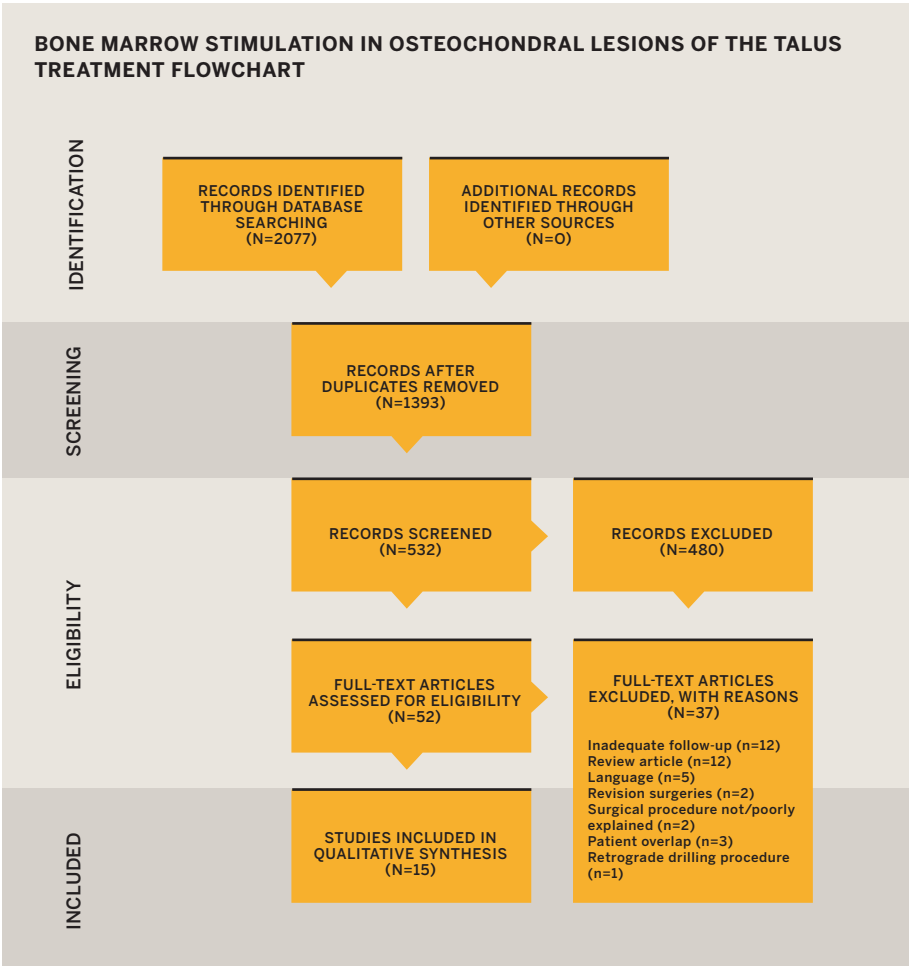
Midterm Outcomes of Bone Marrow Stimulation for Primary Osteochondral Lesions of the Talus

Arthroscopic bone marrow stimulation (BMS) is the most common reparative surgical intervention for the treatment of small osteochondral lesions of the talus (OLT). This procedure has shown favorable short-term clinical outcomes, but the evidence on longer-term success rates is inconclusive. While good mid- to long-term outcomes following BMS have been reported, several recent studies have shown less satisfactory results due to post-procedure deterioration of fibrocartilaginous repair tissue. There is still a lack of evidence on the success rates of BMS at midterm and long-term follow-up.

NYU Langone researchers performed a systematic search of the MEDLINE, Embase, and Cochrane Library databases in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search identified 15 studies containing 853 patients (858 ankles) with a weighted mean follow-up time of 71.9 months. The average patient age was 35.3 years, and the weighted mean lesion size was 110.5 mm. Reported data was variable.

- Nine studies used the AOFAS Ankle-Hindfoot Scale. Among these studies, the weighted mean postoperative AOFAS score was 89.9.
- Six studies showed both preoperative and postoperative AOFAS scores. Among these studies, the weighted mean AOFAS score improvement was 24.5.
- Four studies used the Visual Analog Scale (VAS). In these studies, the weighted mean preoperative and postoperative VAS scores were 7.2 and 2.4, respectively.
- Three studies measured postoperative MRI results at midterm using the Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) system. These studies showed 48 percent complete filling, 74 percent complete integration, 76 percent surface damage, and 78 percent inhomogeneous repair tissue.
- Across all studies, there was a complication rate of 3.2 percent and a reoperation rate of 6 percent following BMS at midterm.

This systematic review found strong clinical outcomes following BMS in the treatment of primary OLT at midterm follow-up based on the AOFAS score. The midterm complication rates were relatively low, and the data showed a reoperation rate of 6 percent at midterm. However, radiological and MRI outcomes did not show similarly positive results, which may suggest recurrence and reoperation in the long term.



Michael J. Alaia, MD
PHOTO: NYU LANGONE STAFF

The Impact of Socioeconomic Factors on Outcomes Following Anterior Cruciate Ligament Reconstruction

Research has shown that socioeconomic variables can affect patient outcomes for several surgical procedures. The purpose of this study was to assess the impact of socioeconomic factors on one of the most common orthopedic surgeries—anterior cruciate ligament reconstruction (ACLR).

A team of researchers conducted a retrospective query of patients who underwent primary ACLR surgery at NYU Langone from 2011 to 2015 and had a minimum of two years of follow-up. Patient demographics, insurance type, worker's compensation status, surgical variables, International Knee Documentation Committee (IKDC) score, and failure were recorded from chart reviews. Education level and income were obtained via phone interviews. Inclusion criteria included ACLR with or without meniscus pathology. Exclusion criteria included revision surgery, additional ligament surgery, osteotomy, or refusal to provide socioeconomic data. Statistical analysis across socioeconomic subgroups was performed for patient demographics, surgical variables and outcome using t-tests, ANOVA with pairwise analysis, and linear regression.

A total of 266 patients fulfilled the study criteria. Patients were predominantly male (n = 168) with a mean age of 31.9 (± 10.2) years. Medicaid patients had a greater duration between time of initial knee injury and surgery compared to the non-Medicaid group (12.0 [± 16.7] months vs. 6.1 [± 16.5] months, $p < 0.001$). The mean follow-up time was 3.1 (± 0.7) years after surgery. The mean IKDC score at the time of follow-up was 81.3 (± 15.3). There was no statistically significant difference in IKDC scores between the Medicaid group and non-Medicaid group. When controlling for age, sex, body mass index, and the duration between injury and surgery, each income bracket was associated with a significant increase in IKDC score compared to the lowest income bracket.

Socioeconomic variables correlate with significant differences in short-term outcome following primary ACLR. NYU Langone faculty are working closely with public health officials to identify and eliminate the etiologies of outcome disparities related to resource inequality.

Risk Factors for Recurrent Instability or Revision Surgery Following Arthroscopic Bankart Repair

While recurrent instability has been associated with arthroscopic procedures, arthroscopic stabilization remains widely used in the treatment of primary and recurrent glenohumeral instability. One study reported a failure rate of 19 percent following arthroscopic Bankart repair—even with the utilization of modern techniques. As a result, there has been renewed interest in open surgery for glenohumeral instability, particularly for treating patients who are considered high risk for recurrent instability. The study, conducted at NYU Langone, was to identify factors that predispose patients to recurrent instability and revision procedures after arthroscopic Bankart repair.

The team conducted a query of New York state's Statewide Planning and Research Cooperative System (SPARCS) database to identify patients with anterior glenohumeral instability who underwent isolated arthroscopic Bankart repair from 2003 through 2011 and who were followed for a minimum of three years. In addition to baseline demographic data, the team collected data on the number of ipsilateral closed reductions prior to initial arthroscopic Bankart repair, evidence of instability of contralateral shoulder, and further surgery to the ipsilateral shoulder.

During the study period, which included 5,719 patients, the number of isolated arthroscopic Bankart repair procedures performed increased by 342.9 percent, from 233 in 2003 to 1,032 in 2011. The mean patient age was 24.9 (± 9.3) years, and 70.2 percent were male (4,013/5,719). A total of 461 patients (8.1 percent) underwent an additional procedure involving the ipsilateral shoulder for instability at a mean of 31.5 (± 23.9) months after the original procedure. The most common successive surgical procedure was revision arthroscopic Bankart repair, which accounted for 64.8 percent of the subsequent procedure. Significant risk factors for recurrent instability were as follows:

- age < 19 years (odds ratio of 1.86 in comparison to older patients)
- Caucasian ethnicity (hazard ratio of 1.42)
- evidence of bilateral instability (hazard ratios of 2.17)
- history of closed reduction(s) prior to initial repair (hazard ratio of 2.45)

In addition, revision arthroscopic Bankart repair had a higher rate of continued instability than revision procedures managed with open stabilization (12.4 percent vs. 5.1 percent, $p = 0.041$).

Previous research about the causes of failure after arthroscopic Bankart repair has been inconclusive. This study determined that younger age, Caucasian race, bilateral glenohumeral instability, and closed reduction(s) prior to initial repair were independent risk factors for the requirement of a further instability procedure.

Nirmal C. Tejwani, MD
PHOTO: NYU LANGONE STAFF

MULTIVARIATE ANALYSIS FOR RISK FACTORS ASSOCIATED WITH THE NEED FOR A FURTHER PROCEDURE FOR INSTABILITY

	ODDS RATIO	95% CI*	P-VALUE
Age: younger vs older	1.86	1.53 to 2.26	<0.001
Gender: male vs female	1.19	0.96 to 1.48	0.119
Race: Caucasian vs other	1.42	1.14 to 1.76	0.001
Evidence of bilateral shoulder instability: yes vs no	2.17	1.48 to 3.20	<0.001
Prior CR* vs no prior CR before initial repair	2.45	1.90 to 3.15	<0.001

* CI: confidence interval; CR: closed reduction

Integrated Quality and Safety Initiatives

Quality and patient safety depend on teamwork. The Department of Orthopedic Surgery is committed to engaging every member of our care team in our quality and safety initiatives and to developing unique partnerships that support better patient care.

Joseph A. Bosco III, MD; Ariana Lott, MD; and Lorraine Hutzler, MPA
PHOTO: NYU LANGONE STAFF

Medical Education That Puts Quality at the Center of Care

Residents and medical students are often reluctant to speak up about potential safety issues. That is why faculty within the Department of Orthopedic Surgery regularly lecture on quality and safety. The goal is to instill a strong sense of obligation to continually enhance patient safety and improve overall quality. This approach helps to build a culture of safety in which every member, regardless of years of service, feels comfortable reporting quality issues without fear of retribution. In addition, involving students and residents in patient safety is key to teaching quality and safety concepts to the next generation of physicians.

Quality and Patient Safety Concentration

The Department of Orthopedic Surgery's unique academic concentration for medical students provides a strong foundation in quality and patient safety principles, with a focus on musculoskeletal care. The concentration covers five topic areas: patient safety, patient satisfaction, quality indicators, public policy, and quality improvement strategies. Students learn how to utilize tools for planning, implementing, and measuring quality and patient safety initiatives. In addition, all participants are required to submit a research abstract on a quality or safety topic. More than 30 medical students have participated in the Quality and Patient Safety concentration since its launch in 2015.

Resident Involvement in Quality Research

One of the best ways to teach safety and quality concepts to new physicians is to involve them in research. In recent years, the Department of Orthopedic Surgery has involved residents in more than 150 patient safety and quality research projects. In addition, the department collaborates with leaders across NYU Langone Health to develop new strategies for improving safety and quality education. Department faculty participate actively in the Task Force on GME Patient Safety and Quality Curriculum, which helps ensure residents receive strong core training in quality and safety across all education programs and departments.

NYU Langone Orthopedic Center turnover team

PHOTO: KARSTEN MORAN

Our Nursing Partners: Magnet 4x

Quality in orthopedic surgery cannot exist without a high-quality nursing organization. In 2019, NYU Langone Health received Magnet® recognition for excellence in nursing for the fourth time. Awarded by the American Nurses Credentialing Center (ANCC), Magnet recognition is an honor achieved by only 8 percent of all hospitals in the United States, with fewer than 1 percent receiving this award four or more times—an astounding feat and testament to the skill and dedication of our nurses.

Kenneth A. Egol, MD
PHOTO: KARSTEN MORAN

Collaboration with NYU Wagner

The Department of Orthopedic Surgery at NYU Langone Health has developed a mutually supporting relationship with NYU Wagner Graduate School of Public Service. The partnership has several ongoing initiatives.

SPORT TRACK FOR RESIDENTS

An educational track for orthopedic surgery residents, which focuses on healthcare strategy, policy, and advocacy. SPORT participants attend national and state orthopedic meetings geared towards advocacy and health policy. Residents are required to develop a publishable project on a policy or advocacy topic. Participants earn an Advanced Certificate in Health Policy from NYU Wagner.

INTERNSHIP FOR HEALTHCARE MANAGEMENT STUDENTS

An internship in Quality, Patient Safety, and Healthcare Management gives NYU Wagner students a strong foundation in quality and patient safety principles, with a focus on healthcare operations and management. Students learn practical strategies for planning, implementing, and measuring quality and patient safety initiatives. They also meet with orthopedic program managers to gain a greater understanding of key management roles and viable career paths within healthcare management. All internship students are required to conduct research on a quality, safety, or healthcare management topic and submit it for publication.

CAPSTONE PROJECT

As part of the degree program, every NYU Wagner student must plan and execute a Capstone Project — a real-world initiative designed to enhance outcomes in a critical area of public service. In 2019, a group of students partnered with the Department of Orthopedic Surgery to address key issues in the opioid epidemic. This Capstone team conducted a literature review of nationwide prescribing patterns in orthopedic surgery and successful interventions for reducing narcotic prescribing. The team also analyzed data on the department's recent opioid reduction initiatives to determine whether significant changes occurred. After synthesizing all findings, the Capstone team provided recommendations on policy revisions and potential next steps in the department's ongoing opioid reduction initiative.

Presentations

Selected Podium and Poster Presentations

American Academy of Orthopaedic Surgeons Annual Meeting (New Orleans, LA, March 6–10, 2018)

- Tourniquet Use Does Not Diminish Patient Satisfaction in Wide Awake Hand Surgery. Podium Presentation.
- Preoperative Bariatric Surgery Is an Independent Risk Factor for Readmissions Following Total Joint Arthroplasty. Podium Presentation.
- It's a Brave New World: Alternative Payment Models and Value Creation in Total Joint Replacement. Instructional Course Lecture.
- Incidence and Risk of Unplanned Hospital Transfers Following Ambulatory Orthopedic Surgery: An Analysis of 19,646 Consecutive Cases. Podium Presentation.
- Same Day Discharge Total Joint Arthroplasty Can Be Performed in Outpatient Centers: An Analysis of Disqualifying Conditions and the Frequency at Which They Occur. Podium Presentation.
- Preoperative Patient Reported Outcomes Are Poor Predictors for In-Hospital Pain Control Following Total Hip Arthroplasty. Poster.
- Pain Management Pathways in Total Hip Arthroplasty Eliminate the Need for Opioid-Based Patient-Controlled Anesthesia. Poster.
- Development and Validation of Machine Learning-Based Risk Models to Predict Short-Term Severe Adverse Events, Readmissions, and Mortality Following Elective Total Hip Arthroplasty. Poster.
- Derivation and Validation of Machine Learning Algorithms to Predict Discharge Destination and Unplanned Readmission Following Elective Primary Total Hip Arthroplasty. Poster.
- Skilled Nursing Facility Partnerships May Decrease 90-Day Costs in a Total Joint Replacement Bundled Payment Initiative. Poster.
- Variability of Patient and Surgeon Characteristics in a Single, Urban, Academic Total Knee Replacement Center. Poster.
- The Effect of Length of Stay and Discharge Disposition on Hospital Consumer Assessment of Healthcare Providers and Systems Scores in Orthopedic Patients. Poster.
- Wide Awake Hand Surgery: Current Concepts and Practical Considerations for Starting Your Own Program. Scientific Exhibit.
- The Value Proposition of Telemedicine in Total Joint Arthroplasty. Scientific Exhibit.

20th Annual IHI/NPSF Patient Safety Congress (Boston, MA, May 23–25, 2018)

- Access to Orthopedic Surgery After the Affordable Care Act (ACA) Mandated Medicaid Expansion. Poster.

2018 NYC Viral Hepatitis Research Symposium (New York, NY, May 24, 2018)

- The Cost-Effectiveness of Birth Cohort Hepatitis C Screening During Pre-Admission Testing for Elective Procedures at an Urban Orthopedic Hospital. Poster.

American Association of Hip and Knee Surgeons Annual Meeting (Dallas, TX, November 1–4, 2018)

- Physician Specific Variation in Inpatient Opioid Consumption Following Total Knee Arthroplasty: Analysis of 3,666 Cases at a Single Specialty Hospital. Poster.
- Inter-Physician Variability in Inpatient Opioid Consumption for Total Hip Arthroplasty: Analysis of 4,020 Cases at a Single Specialty Hospital. Poster.

American Academy of Orthopaedic Surgeons Annual Meeting (Las Vegas, NV, March 12–16, 2019)

- Higher Hospital Costs Do Not Result in Lower Readmission Rates Following Total Joint Arthroplasty. Poster.
- An Evidenced-Based Blood Management Protocol Decreases Transfusion Rates Following Total Joint Arthroplasty. Poster.
- Narcotic Prescribing Patterns among Orthopedic Surgeons in Upper Extremity Cases. Podium Presentation.
- Institution-Wide Blood Management Protocol Reduces Transfusion Rates Following Spine Surgery. Podium Presentation.
- Orthopedics and the Opioid Crisis: The Current Regulatory Environment and a Department-Wide Initiative toward Decreasing the Narcotic Burden of Postoperative Patients. Scientific Exhibit.
- Ethics of Pain Management: Opioids, Physicians, Patients, and Pharmaceuticals. Scientific Exhibit.
- Value Proposition of Blood Management in Total Joint Arthroplasty. Scientific Exhibit.

American College of Medical Quality (Bethesda, MD, April 11–13, 2019)

- The Association of Magnet Nursing Status with Hospital Performance on the Centers for Medicare and Medicaid Services Quality Metrics. Poster.
- Patient Satisfaction Surveys for Inpatient Orthopedic Care: A Critical Look at Result Reporting and Drivers of Satisfaction. Podium Presentation.
- Risk Optimization Contributes to Widening Disparity Gap in Orthopedic Surgery. Poster.

American Association of Hip and Knee Surgeons Annual Meeting (Dallas, TX, November 7–10, 2019)

- Decreased Doses of Aspirin Do Not Change Rates of Venous Thromboembolism in Patients Undergoing Primary Total Hip Arthroplasty: A Retrospective Cohort Study. Poster.
- Low-Dose Aspirin Is Safe in Preventing Thrombo-embolism in Patients Undergoing Primary Total Knee Arthroplasty: A Retrospective Cohort Study. Poster.
- Low-Dose Aspirin Is Safe in Preventing Thrombo-embolism in Patients Undergoing Primary Total Hip Arthroplasty: A Retrospective Cohort Study. Poster.

2019 Scientific Program and Sir Robert Jones Lecture (New York, NY, November 8, 2019)

- Decreased Doses of Aspirin Do Not Change Rates of Venous Thromboembolism in Patients Undergoing Primary Total Hip Arthroplasty: A Retrospective Cohort Study. Podium Presentation.

2019 Movement Is Life Caucus (National Harbor, MD, November 14–15, 2019)

- Same Day Discharge Requirement for Total Hip Arthroplasty: Impact on Health Disparities. Poster.
- The Impact of Race, Gender, and Congressional District on Quality Metrics after Elective Total Joint Arthroplasty at a Single Institution: An Analysis of 10,087 Cases. Poster.

United Hospital Fund 30th Annual Symposium on Health Care Services in New York: Research and Practice (New York, NY, November 19, 2019)

- State Regulations Decrease Duration and Amount of Postoperative Opioid Prescribed to Ambulatory Orthopedic Surgical Patients. Poster.

Selected Peer-Reviewed Publications

Aggarwal V, Suh Y, Hutzler L, Moscona L, Castaneda P. Total hip arthroplasty for secondary causes of arthritis an increase in time and money. *Bulletin of the Hospital for Joint Diseases* (2013). December 2019; 77(4): 233-237.

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Bookman J, Romanelli F, Hutzler L, Bosco J, Lajam C. The utility and cost effectiveness of immediate postoperative laboratory studies in hip and knee arthroplasty. *Bulletin of the Hospital for Joint Diseases* (2013). 2019; 77(2): 132-135.

Bosco J. Editorial commentary: Core muscle injury: The anatomy is enlightening. *Arthroscopy*. August 2019; 35(8): 2365.

Bosco J, Harty J, Iorio R. Bundled payment arrangements: Keys to success. *Journal of the American Academy of Orthopaedic Surgeons*. December 1, 2018; 26(23): 817-822.

Boylan M, Bosco J, Slover J. Cost-effectiveness of preoperative smoking cessation interventions in total joint arthroplasty. *Journal of Arthroplasty*. February 2019; 34(2): 215-220.

Boylan M, Chadda A, Slover J, Zuckerman J, Iorio R, Bosco J. Preferred single-vendor program for total joint arthroplasty implants: Surgeon adoption, outcomes, and cost savings. *Journal of Bone and Joint Surgery*. August 7, 2019; 101(15): 1381-1387.

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Day M, Qian E, Karia R, Hutzler L, Atallah R, Bosco J. Higher hospital costs do not result in lower readmission rates following total joint arthroplasty. *Journal for Healthcare Quality*. In press.

Day M, Qian E, Karia R, Hutzler L, Atallah R, Bosco J. Higher hospital costs do not result in lower readmission rates following total joint arthroplasty. *Bulletin of the Hospital for Joint Diseases (2013)*. March 2019; 77(2): 136-139.

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About Us

Department of Orthopedic Surgery

The Department of Orthopedic Surgery at NYU Langone Health is one of the largest and most accomplished orthopedic programs in the country. Under the leadership of Joseph D. Zuckerman, MD, the Walter A.L. Thompson Professor of Orthopedic Surgery and Surgeon-in-Chief at NYU Langone Orthopedic Hospital, our faculty has grown to more than 200 physician experts dedicated to excellence in orthopedic surgery. Our physicians provide world-class care in all orthopedic subspecialties, including adult reconstructive surgery, orthopedic trauma, spine surgery, sports medicine, hand surgery, musculoskeletal oncology, shoulder and elbow surgery, pediatric orthopedics, primary care sports medicine, and foot and ankle surgery.

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Department Administrator

For more information about our quality initiatives, please contact
Lorraine Hutzler, MPA
Associate Program Director
212-598-6048
Lorraine.Hutzler@nyulangone.org

DIVISION CHIEFS

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550 First Avenue, New York, NY 10016
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