

Arthroplasty and Joint Preservation

Leadership



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Knee and hip replacement surgeries are the second and third most common surgery in Canada, respectively. The Canadian healthcare system spends over \$1 billion annually on joint replacement surgery. The McMaster Arthroplasty Collaborative was formed in 2018 to address high-impact questions in hip and knee arthroplasty and to spark collaboration between McMaster University and the arthroplasty services of St. Joseph's Healthcare Hamilton and Hamilton Health Sciences Juravinski Hospital together with the Hamilton Arthroplasty Group. We have chosen three key areas of focus: 1) non-opioid pain management and psychosocial factors, 2) innovations in surgical technology and robotics, and 3) surgical infection control. In addition, Dr. Wilson's research focuses on biomechanical and statistical modeling of human movement mechanics in osteoarthritis development, progression, and end stage treatment with knee arthroplasty. Dr. Khan is also partnering with academic and industry sponsors to lead clinical studies on joint preservation.

Current Studies – Methods Centre

Oral Cannabis Trial

Approximately 20% of patients develop persistent post-surgical pain after undergoing total knee arthroplasty (TKA), and higher pre-surgery and acute post-operative pain are associated with this outcome. Medicinal cannabis has anti-inflammatory and analgesic properties and may reduce peri-operative pain and the rate of PPSP following TKA. We will recruit 40 patients undergoing TKA and randomize them to receive oral cannabidiol (CBD; derived from cannabis) to assess whether oral CBD helps decrease persistent post-surgical pain. We are partnering with the Centre for Medicinal Cannabis Research and the Institute for Pain Research and Care at McMaster to complete this trial.

TOPIKS Trial

Physicians and the public have become concerned about the amount of opioids being used in healthcare because of the risks of serious adverse effects including overdose, addiction, and death. We hypothesize that topical cannabidiol (CBD) in addition to standard pain management will result in better pain control and a reduction in opioid use compared to standard care alone and will have a preferable safety profile compared to other commonly used pain medications (e.g. opioids and oral NSAIDs). We also hypothesize that topical CBD and topical diclofenac

together will have improved effects on pain relief over topical CBD or topical diclofenac alone. The **TOPIKS Trial** is a pilot randomized factorial trial of 80 patients undergoing knee replacement surgery. We are assessing topical CBD, topical diclofenac, topical CBD+diclofenac, and placebo. We are partnering with the Centre for Medicinal Cannabis Research and the Institute for Pain Research and Care at McMaster to complete this trial.

IMPART Trial

Opioid pain medications have recently drawn the attention of the public and medical professionals for their modest benefits coupled with growing awareness of the harmful effects. Oral NSAID pain medications are a common alternative to opioids, but they have harmful side effects as well, including gastrointestinal and cardiovascular risks. Alternatives and adjuvants to opioids and oral NSAIDs can have potential positive advantages for the patient. Topical pain relievers could be safer than oral medications because the medications mostly stay in the local area where they are applied, and very little of the medication is distributed systemically. In the **IMPART Trial** we are investigating the effectiveness of a multimodal topical pain relief cream for patients who have undergone total knee arthroplasty in this randomized trial.

Outpatient Joint Replacement Program

HHS Juravinski Hospital implemented an outpatient hip and knee replacement program in mid-2019. For patients who are relatively healthy, have someone to help them out at home immediately after surgery, and who prefer to recover at home, Juravinski surgeons can offer same-day discharge where the patient has their surgery in the morning and can go home later that same day. Our outpatient joint replacement research aims to evaluate this program and to make it better for future patients.

<https://www.hamiltonhealthsciences.ca/share/same-day-joint-replacement-surgery/>

SPOC Study

Knee arthroplasty is a common surgical procedure to replace weight-bearing surfaces of the knee joint in order to relieve pain and improve functioning; however, many patients report persistent pain and poor functional outcome after surgery. **The SPOC Study** aims to capture the incidence of persistent post-surgical pain and poor satisfaction at 6 months after knee arthroplasty, and also look at physical and psychological determinants of long term outcomes. We will conduct this prospective cohort study in collaboration with the Department of Anesthesia.

RoboKnees Trial

St. Joseph's Healthcare Hamilton is the first institution in Canada to obtain an orthopaedic surgical robot to assist with joint replacements. The **RoboKnees Trial** is a pilot randomized controlled trial of 64 patients to give us preliminary evidence of whether we can use the robotic technology to perform better partial knee replacements to improve functional outcomes, return to activities, implant survival, and patient satisfaction in a cost-effective manner.

Knee PRP Trial

The **Knee PRP Trial** is a randomized controlled trial evaluating the impact of procedural awareness on outcome of patients undergoing platelet rich plasma (PRP) treatment for knee osteoarthritis.

Mobility Limitations Study

Knee osteoarthritis is one of the largest contributors to disability and loss of mobility worldwide. It is estimated that more than 10 million Canadians will have knee osteoarthritis by 2040. Ultimate treatment of the end stages of knee osteoarthritis is total joint replacement surgery, with the goals of removing pain and improving patients' function and mobility. Joint replacement surgery is known as a 'successful' surgery in that it provides relief and improvements for many patients. However, the reality is that mobility and joint function is very rarely restored, and continued disability and lack of mobility after surgery plagues many patients. This hinders their ability to live independently and to participate in society. Our team of researchers thinks that we can do better than this, but innovation in this space will only happen when we begin to collect objective data on function and use them to improve our understanding of why some patients have better outcomes than others. Our research will focus on developing a clinical tool that will collect important information on pain, symptoms, mobility and joint function before and after surgery. This information will be used to understand if there are different groups of patients who may differ on the benefit from different strategies for surgery and rehabilitation. The ultimate goal of the research will be to improve mobility outcomes for patients by using patient-specific data gathered in the orthopaedic clinic before and after surgery.

Current Studies – Clinical Program

Bilateral Knee Replacement Trial

The **Bilateral TKA trial** aims to determine whether patients with bilateral end-stage knee osteoarthritis benefit from replacing both knees at the same time (simultaneous) or replacing one at a time (sequential).

Local Principal Investigator: Dr. Vickas Khanna

FitJoints Trial

The **FitJoints Trial** is investigating whether a multi-modal fitness and nutrition program before joint replacement surgery helps frail elderly patients have better outcomes after surgery.

Local Principal Investigators (HHS Juravinski Site): Dr. Justin de Beer, Dr. Mitch Winemaker, Danielle Petruccelli

Local Principal Investigator (St. Joseph's Site): Dr. Anthony Adili

PRESERVE

The **PRESERVE Trial** is a multicentre randomized trial of patients with bone marrow lesions of the knee who require arthroscopic treatment for a meniscal tear. 134 participants will be randomized 2:1 to receive the Subchondroplasty Procedure (Zimmer Biomet) plus arthroscopy or arthroscopy alone.

Local Principal Investigator: Dr. Moin Khan

NovoCart 3D

NOVOCART® 3D is an autologous chondrocyte transplantation system developed to treat articular cartilage defects of the knee. This large randomized controlled trial is being conducted to determine whether NOVOCART® 3D can improve outcomes versus microfracture which is the standard therapy. Participants will be randomized to one of the two study arms.

Local Principal Investigator: Dr. Moin Khan