Calipered Kinematically Aligned Total Knee Replacement

Patient Education Guidebook

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ALEXANDER J. NEDOPIL, MD, PhD


Adventist
Health
Lodi
Memorial

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Section 1: Overview of Adventist Health Lodi Memorial

Introduction

We are delighted you chose Adventist Health Lodi Memorial for your calipered kinematically aligned total knee replacement surgery. Our staff will provide you with a personalized experience designed to meet your needs and exceed your expectations. Please review the information in this Patient Education Guidebook as it is intended to:

- Prepare you, family members and caregivers for your knee replacement surgery.
- Introduce Adventist Health Lodi Memorial and the resources available to you.
- Educate you about preparations needed at home before surgery, what to expect during the day of surgery and how to prepare for discharge home.
- Reduce anxiety by reviewing proven methods for managing nausea, discomfort and constipation.
- Provide a list of equipment for use at home.
- Instruct you on activities and exercises, managing swelling, and safe techniques for moving your knee while walking, dressing, bathing and climbing stairs.
- Provide a convenient place to store all handouts received during pre-surgery appointments.

Visit DrSteveHowell.com or LodiMemorialOrthopedics.org to download an electronic version of the guidebook to your computer, tablet or mobile device and easily share it with family and friends who will take care of you.

Directions and contact information

ADVENTIST HEALTH LODI MEMORIAL

Medical Center

975 S. Fairmont Ave., Lodi, CA 95240
Main phone number: 209-334-3411

Directions to Medical Center:

From the North on CA-99: Follow CA-99 south toward Fresno. Take Exit 264B. Turn right on Kettleman Lane. Drive 2 miles and turn right on Ham Lane. The hospital is less than a mile on the right.

From the North on I-5: Follow I-5 south towards Lodi. Exit CA-12 east to Lodi and turn left onto Hwy. 12 after exiting the freeway. Drive 5.9 miles and make a left on Ham Lane. The hospital is less than a mile on the right.

From the South on CA-99: Follow CA-99 north toward Lodi. Take Exit 264A. Turn left on Kettleman Lane. Drive 2 miles. Turn right on Ham Lane. The hospital is less than a mile on the right.

From the South on I-5: Follow I-5 north toward Lodi. Exit CA-12 and turn right onto Hwy. 12 after exiting the freeway. Drive 5.9 miles and make a left on Ham Lane. The hospital is less than a mile on the right.

Sacramento Office – Orthopedics

Adventist Health Physicians Network
Medical Office – Orthopedics
8120 Timberlake Way, Suite 112
Sacramento, CA 95823
Dr. Howell: 916-689-7370

Lodi Office – Orthopedics

Adventist Health Physicians Network
Medical Office – Vine Orthopedics & Sports Medicine
1235 W. Vine Street, Suite 22
Lodi, CA 95240
Dr. Nedopil: 209-334-8520

CONTACT INFORMATION

Pre-Admitting Nurse _____ 209-339-7502
Patient Financial Services ____ 209-339-7543
Orthopedic Nurse Navigator __ 209-339-7870

To register for the pre-surgery educational class on kinematically aligned total knee replacement, please call 209-339-7870.

ADDITIONAL LODI MEMORIAL SERVICES/RESOURCES

Adult Day Services _____ 209-369-4443
Home Care Services _____ 209-333-3131
(after hours _____ 209-334-3411
Outpatient Rehabilitation Services
Physical, Occupational,
Speech Therapy _____ 209-333-3136

HOTELS NEAR THE HOSPITAL

Wine and Roses
4-star hotel 2.9 miles (9 min) from the hospital
2505 W. Turner Road
Lodi, CA 95242
209-334-6988

Fairfield Inn & Suites – Lodi
2-star hotel 2.5 miles (8 min) from the hospital
262 Rocky Lane
Lodi, CA 95240
209-268-7500

Hampton Inn & Suites – Lodi
3-star hotel 2.2 miles (8 min) from the hospital
1337 S. Beckman Road
Lodi, CA 95240
209-369-2700

Candlewood Suite Hotel
2-star hotel 2.4 miles (8 min) from the hospital
1345 E. Kettleman Lane
Lodi, CA 95242
209-333-3355

Holiday Inn Express – Lodi
2-star hotel 2.4 miles (8 min) from the hospital
1341 E. Kettleman Lane
Lodi, CA 95240
209-210-0150

Upon booking your reservation, please ask for the Adventist Health Lodi Memorial special rate.

Your orthopedic team

Hospital

At Adventist Health Lodi Memorial, we are committed to providing the best care and experience for you and your family. Our care team is dedicated to making your stay pleasant and the transition home as smooth as possible.

Orthopedic surgeons

Stephen M. Howell, MD, is a board-certified orthopedic surgeon and world-renowned expert in the treatment of arthritic disorders of the knee and developed calipered kinematic alignment in 2006. He will work with you to provide the most advanced care. Learn more about Dr. Howell at DrSteveHowell.com

Alexander J. Nedopil, MD, PhD, is a fellowship-trained orthopedic surgeon specializing in primary and complex hip and knee reconstruction. He cares for patients with osteoarthritis, sports injuries, failed arthroplasty and more. He has published more than 15 studies on calipered kinematically aligned total knee replacement.

Physician assistants

Vanessa Ferrario, PA-C, is a board-certified physician assistant who works alongside Dr. Howell and Dr. Nedopil in the operating room and office. She assists in surgery and helps care for you during and after your surgery.

Hannah E. Keller, MSN-PA-C, FNP-C, is a board-certified physician assistant trained in orthopedic surgical care. She provides physical exams and assists with surgery for those who need treatment for knee arthritis and more.

GAIL RODRIQUES

TINA ROBINSON

Orthopedic nurse navigators

Our navigators, Gail Rodriques, RN, and Tina Robinson, RN, will coordinate your care journey from pre-surgery through recovery, including education, therapy and other services. They can be reached at 209-339-7870.

Nursing team

During your hospital stay, our nursing staff will be there to meet your needs 24 hours a day. Nurses will assist with your recovery and work with the rest of the team to ensure your stay is as pleasant as possible.

Chaplain

Our chaplains are specially trained to serve your spiritual needs, as well as those of your family, regardless of your denomination. A chaplain is available upon request.

Anesthesiologist

Your anesthesiologist will consult with you before surgery and manage any discomfort, medical conditions and vital functions during surgery and in the recovery room.

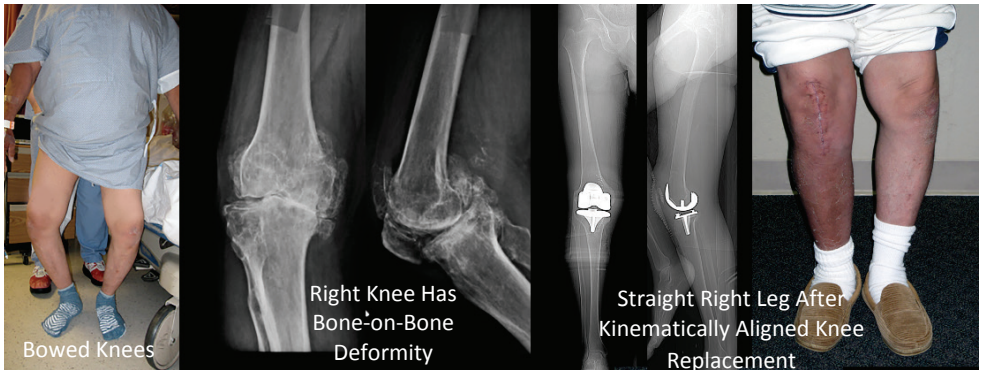
Physical and occupational therapists

Our therapists will instruct and assist you with mobility and exercises for bending and straightening your knee after surgery, provide tips for safely performing daily activities and managing swelling of the knee.

Section 2: Introduction to knee arthritis and calipered kinematically aligned total knee replacement

What is arthritis of the knee?

The cause of osteoarthritis of the knee is cartilage wear that often results in severe pain, stiffness, loss of knee motion, a bowed or knock-kneed deformity at the knee and a limp. The loss of cartilage narrows the space between the femur, tibia and patella and is referred to as "bone on bone" contact on X-ray. Knee replacement surgery restores a smooth joint surface by replacing worn surfaces with femoral, tibial and patella implants made of metal and plastic.



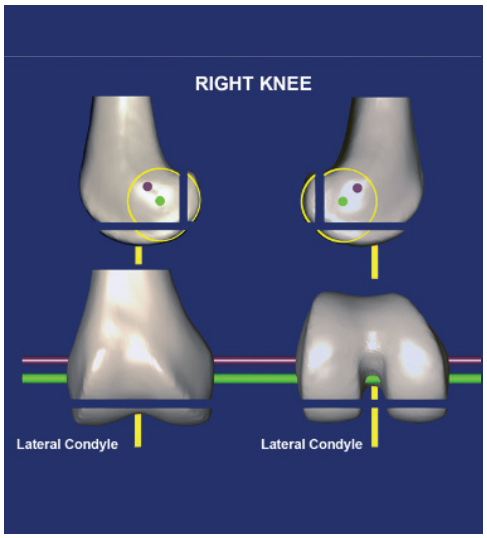
Who might benefit from a total knee replacement?

The goal of total knee replacement is to improve the patient's function in daily life. The ideal candidate is someone who has difficulty walking short distances, shopping, getting in and out of a car, ascending and descending stairs and participating in recreational activities such as gardening, tennis, golf, biking, bowling and hiking. Pain in the knee should be present for three months or more and persist after a trial of anti-inflammatory agents, weight loss, exercises, injections and/or use of a knee brace or cane. A patient who has knee pain for 1–2 months or walks 1–2 miles a day is not ready for total knee replacement.

Why should you consider a calipered kinematically aligned total knee replacement?

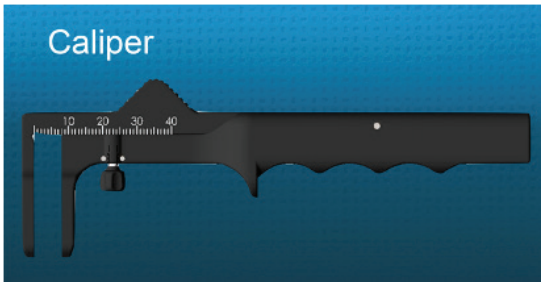
In 2006, Dr. Howell developed a personalized surgical technique known as calipered kinematic alignment, so patients would experience a quicker recovery and have a more normal feeling knee after total knee replacement than those treated with the one-size fits all technique called 'mechanical alignment'.[1] Mechanical alignment changes the patient's joint lines, which requires the release of perfectly normal ligaments and causes pain, stiffness and instability. [2,3] If you want to learn more about the technique, you may order the book from Amazon entitled: The Ten Commandments of Calipered Kinematically Aligned Total Knee Arthroplasty: A Primer for the Orthopedic Surgeon and an Introduction for the Discerning Patient.

Calipered kinematic alignment uses a series of intraoperative verification checks and caliper measurements of the small pieces of bone the surgeon removes to accurately fit the total knee replacement. These steps restore the patient's pre-arthritic joint surfaces within 0 ± 0.5 mm, making the technique more accurate than robotics and navigation instrumentation. The kinematic alignment of the prosthetic components with the three kinematic axes of the knee has the same beneficial effect on function as aligning new tires on the axles of a car to restore a smooth ride. [4-7]



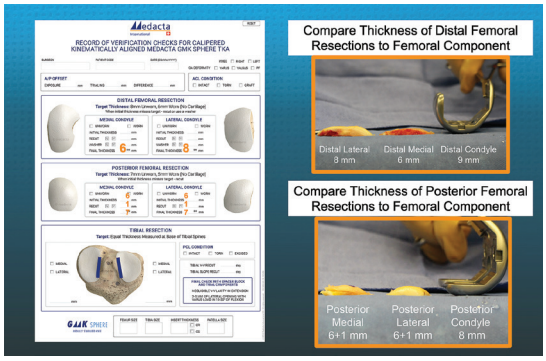
The schematic shows four views of the right femur and the three kinematic axes of the knee that are either parallel or perpendicular to the patient's pre-arthritic or native joint lines. The flexion axis of the tibia is the green line, the flexion axis of the patella is the magenta line and the longitudinal rotational axis of the tibia is the yellow line. The four resections separated from the femur are intraoperatively measured with a caliper and adjusted in thickness to match those of the prosthetic femoral component (bit.ly/DrHowell).

The most important tool in total knee replacement is the caliper, which measures the thicknesses of the small portions of bone removed from the femur. These are adjusted until they are within ± 0.5 mm of the thickness of the replacement parts and recorded as verifications. Dr. Nedopil's studies have shown the calipered technique restores the patient's joint lines more accurately than robotic surgery. [5,6]

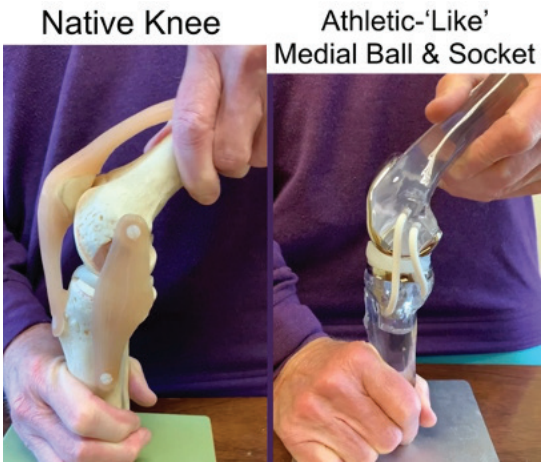


Ten randomized or case-control studies from around the world showed patients treated with Dr. Howell's calipered kinematic alignment technique experienced better results in terms of patient satisfaction, function, quicker recovery, fewer ligament releases and better motion and orientation of the components during weight-bearing than mechanical alignment. [8-16]

In 2017, Drs. Howell and Nedopil began using an 'athletic-like' knee prosthesis with a ball-in-socket designed to provide the stability of the ACL and function like a normal knee. [17,18] An Australian study reported the combination of Dr. Howell's kinematic alignment with a ball-in-socket prosthesis resulted in higher function, as measured by the Forgotten Joint Score than the use of traditional components that perform like a knee without an ACL and meniscus. [12] Collectively, Drs. Howell and Nedopil perform more than 600 calipered kinematically aligned total knee replacements each year with the 'athletic-like' prosthesis.



There are many benefits from using calipered kinematically aligned total knee replacement, including more accurate implant alignment than robotic surgery, use of a minimally invasive surgical (MIS) exposure, low risk of infection from short anesthetic and surgical time (approximately 50 minutes), negligible risk of blood transfusion, same-day discharge for 97% of patients and a low risk of readmission within 30 days of surgery. [19] Implants survive a long time when placed with calipered kinematic alignment as only 1.5% of patients require another operation within 20 years. This means most patients 60 or older will likely not need a another operation on the same knee for a worn-out or loose implant in their lifetime. [20]



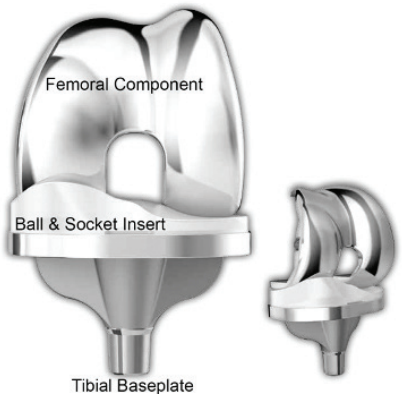
Section 3: Initial office visit

Assessment of the severity of arthritis

During the initial office visit, we will assess the severity of your limitations and disability based on your history, physical examination, treatments and a review of your X-rays. You will answer questions using an iPad that computes patient-reported function scores, including the Oxford Knee Score. These scores are used to measure the severity of your knee arthritis before surgery and the pace of recovery after surgery. We will educate you about calipered kinematically aligned total knee replacement and what to expect after surgery. This Patient Education Guidebook and other information found online at DrSteveHowell.com are comprehensive resources for learning about total knee replacement and sharing with family, friends and your personal coach.

Design and material of a total knee replacement

In the office, you will examine a life-size model of a normal knee and a knee with the ball-in-socket implants that will be used to replace your knee. The femoral component and tibial baseplate are made of stainless steel, and the ball-in-socket insert is made of high-density polyethylene plastic. The stainless-steel components are cemented onto the bone like a dentist cements a crown on a tooth. The insert, with a thickness that optimizes knee stability, is locked into the baseplate. A plastic button is cemented on the underside of the kneecap (not shown). The cement quickly sets in 10 minutes, which enables the patient to put full weight and walk on their knee within an hour after surgery. Because the implants are made of plastic and metal, they may occasionally click or make noise when they contact each other. Although a small amount of clicking is normal, the frequency becomes less as the swelling subsides in the knee and is not a sign of a loose implant.



The Oxford Knee Score: a reliable indicator of preoperative disability and pace of recovery after knee replacement

The Oxford Knee Score asks 12 questions, each worth four points, and is very helpful for assessing the satisfaction and function of your knee before and after total knee replacement. The score for a normal knee is 48 points. The range of scores of those patients needing a total knee replacement is between 0–30 points, with an average of 20 points. [2,7,15] Patients with an Oxford Knee Score of 30 points or lower may consider a total knee replacement. If your knee hurts, take the Oxford Knee Score online for free at drstevehowell.com/knee-quiz.

A postoperative Oxford Knee Score indicates the pace of your recovery after knee replacement. At six weeks, when you are 50% recovered, the Oxford Knee Score ranges between 28–36 points with a mean of 32. At this point, most patients walk without a cane and drive their car. [15] At three months, when you are 70% recovered, most patients enjoy recreational activities such as gardening, tennis, pickle ball, golf, biking, bowling and hiking. At six months, when you are 90% recovered, the Oxford Knee Score ranges from 36–48 with a mean of 43 points. [2,11]

The process for undergoing total knee replacement may be broken into four steps. These steps include preparing for knee replacement surgery, care the day of surgery, discharge home the day of surgery and care at home that enables rapid recovery.

Section 4: Preparing for knee replacement surgery

Scheduling the surgery

The timing of total knee replacement depends on the patient's needs. There is never a rush, as waiting a few months or even a year rarely affects the outcome. Surgery may be scheduled on the day of your initial visit or afterward by calling your surgeon's office. Scheduling surgery 6–8 weeks in advance increases the likelihood that your requested date will be available.

- Visit your family physician or internist as soon as surgery is scheduled. If you have a history of heart disease, also see your cardiologist. Instruct each office to fax:
    1. A form titled 'Assessment of Patient's Risk for Knee Surgery' signed by the physician.
    2. One copy of an EKG.
    3. A copy of the consultation to Dr. Howell's office at 916-688-5610 or Dr. Nedopil's office at 209-334-2109.
- We will give you a laboratory order for blood tests, which should be completed three to four weeks before surgery. When convenient, use an Adventist Health laboratory as the lab results are linked directly to your electronic health record. Call 209-339-7897 for locations and hours of operation.
- If you are taking anti-inflammatory medicine, you may continue until the day before surgery. If you routinely take aspirin, continue until the day before surgery.
- Stop all herbal supplements, weight loss or diet pills at least one week before surgery. Specific agents with known risks in the perioperative period include echinacea, garlic, ginkgo, ginseng, kava, St. John's Wort, valerian, fish oil and turmeric.
- For those patients who take a blood thinner or anticoagulant medication for atrial fibrillation or a history of blood clots, it is very important that your surgeon knows that you take that medication. A plan will be developed between your surgeon's office and the prescribing physician as to when you will stop that medication and how and when you will restart it. This plan will be communicated to you by one of the physician assistants. From the surgery perspective it is preferred to stop Eliquis® (apixaban), Xarelto® (rivaroxaban), Pradaxa® (dabigatran) or Pletal® (cilostazol) two days before surgery. Coumadin® (warfarin) a half dose before surgery for 5 days. Plavix® (clopidogrel) or Brilinta® (ticagrelor) seven days before surgery.
- If you take medication for rheumatoid arthritis, consult your rheumatologist about when to stop medication before surgery and when to restart after surgery.

Attend a pre-surgery educational class on calipered kinematically aligned total knee replacement

Contact the orthopedic nurse navigator's office at 209-339-7870 or email robinscm01@ah.org or rodriqgm@ah.org to register for a free, pre-surgery educational class on kinematically aligned total knee replacement. For your convenience, the class is held multiple times each month. When arriving at Adventist Health Lodi Memorial to attend the class, please bring your coach and enter through the main lobby, which faces Ham Lane. If you cannot find parking nearby, have your coach drop you off at the front entrance before parking. Check in at the information desk to the right, and you will be escorted to the classroom.

Items to purchase before surgery

You will need to purchase one box of dressings. Available through an online retailer like Amazon.com, or Walmart.com. "Primapore 8x4 dressings non-woven" or "Covidien telfa adhesive island dressing sterile 4x8". These are typically a box of 20-25, one box will be enough for your surgery.

You will need a front wheeled walker for after surgery. It can only be a front wheeled walker, these have two wheels on the front legs and stoppers, little skis, or tennis balls on the two back legs. It must not have a seat or basket in between the hand grips. If you are shorter than 5'1" you may need a junior sized walker. To tell if a walker will work for you stand in the walker, when resting your hands at your side the walker handles should be at your wrists, about where you would wear a watch.

You will need to have Extra Strength Tylenol ™ (acetaminophen) as well as whatever NSAID you prefer (Aleve®, Advil®, Ibuprofen) if you are able to take them. You will also need a stool softener (Colace®)

Adventist Health patient outcomes assessment tool

Approximately one month before surgery you will receive an email from 'Adventist Health Patient Outcomes (surgeon's name.)' You are encouraged to complete this electronic assessment, which is used to measure the quality of your recovery. We ask you to take the assessment before surgery, as it provides a baseline measurement of how you are functioning, and then repeat the assessment at three months and yearly after surgery. This enables us to compare the results and make sure you are recovering properly.

Checklist of things to bring to the hospital

- Personal items — Glasses, dentures, hearing aids, insurance cards, photo ID and a detailed list of your medications Cell phones and charging cables are allowed
- Clothing items — Clean, loose-fitting pants or shorts with elastic waist and ability to view the knee, non-skid shoes with a back. (no flip-flops or slides)
- Specific medications, only if directed to do so
- Advance Healthcare Directive/Healthcare Power of Attorney, if you have one
- A front-wheeled walker
- This Patient Education Guidebook

PLEASE DON'T BRING: Bottles containing prescription medication (unless otherwise directed), jewelry, large amounts of money or keys. You may use a credit card or write a check for your co-pay on the day of admission.

Choose a personal coach

Select a family member, friend, or caregiver to be your personal coach to assist during your preparation and recovery from knee replacement surgery; your coach will play a vital role and need to attend class with you. On the day of surgery, your coach will need to be able to transport you to the hospital, stay with you to obtain pre-op education until you go into surgery. They will return to your bedside after surgery and be present for a few hours of education with nursing and therapy. They will then transport you home and help you get settled and comfortable. If your surgery includes an overnight stay, they will need to be able to return the next morning for education and training, then transport you home. You should have arrangements for them to stay with you the first 2 weeks following your surgery to help with cooking, driving, medication reminders exercise reminders, being present for bathing, and helping with dressing changes. You can have multiple people available to help.

Prepare your home

Purchase or prepare meals ahead of time. We will teach you to walk up and down stairs, so you can use a bedroom on the second floor. However, this is not encouraged for the first few weeks. Consider setting up a temporary bedroom on the first floor near a bathroom.

Checklist to reduce your risk of a fall at home

- ○ Check each room and conceal electric cords and store small objects on the floor that may be a tripping hazard.
- ○ Temporarily remove and store any throw rugs, or runners in hallways.
- ○ Place a phone or your cell phone in easy reach.
- ○ Install nightlights for trips to the bathroom at night.
- ○ Use a cushion to raise the seat of a low chair. A chair that sits higher, with a firm back and armrests, will help you stand more easily.
- ○ Consider installing handrails on stairs inside and outside your house.
- ○ Consider installing temporary or permanent grab bars in your shower.
- ○ If you have pets, consider boarding them for a few days after your return home.

Within the week prior to surgery

You will receive a phone call from one of the orthopedic nurse navigators to review readiness for surgery and receive instructions. Expect a phone call from a pre-admitting nurse at Adventist Health Lodi Memorial. The nurse will review and update your health history, medications, allergies and confirm the date and time of surgery. Have a detailed list of current medications, vitamins, and supplements that you take, including dosage, time of day you typically take them, and why you take them. Be prepared to take notes as the pre-admitting nurse reviews detailed instructions regarding medications and arrival time for surgery. Your physician or a physicians assistant will send prescriptions to your pharmacy several days before surgery. Make sure you pick those medications up prior to surgery. Also refill any of your regular medications that may run out around surgery day.

On the day before surgery, unless contraindicated for you, we suggest taking the following over-the-counter medications to assist with pain control after surgery: Naprosyn (Aleve®) one tablet (220 mg), one in the morning and one in the evening, OR Ibuprofen (Motrin®, Advil®) 400–600 mg once in the morning, afternoon and evening. Also take two 500 mg tablets (1000 mg) Acetaminophen (Tylenol® extra strength) once late morning and with dinner. This will also be your non-narcotic regimen starting the first morning after surgery at home. Following these instructions will reduce the number of narcotics needed after surgery. Also take a stool softener (Colace®), one tablet the evening before surgery. Take one tablet 2-3 times a day after surgery, until you establish normal bowel habits.

The nurse will instruct you to arrive at the hospital approximately two hours before surgery. The following list is helpful to review in advance of arrival:

- Have an accurate list of your medications, including the name, dose and frequency. Make a note of which medications you should stop taking before surgery.
- Remember the time you are told to arrive at the hospital.
- **Do not eat, drink fluid or chew gum beginning at midnight the night before surgery. Surgery is canceled when these instructions are not followed.**
- **You may have sips of water, no more than 4 ounces, until 5:30 a.m. the morning of surgery.**
- On the day of surgery, **take only the medications the nurse or physician instructed you to take** for hypertension, seizures, Parkinson's disease, indigestion, thyroid problems or depression with a sip of water **(no orange juice, coffee or food).**
- You will be instructed to drink 12 ounces of a carbohydrate rich drink such as Gatorade™ the morning of surgery just before arriving to the hospital. This is shown to improve readiness for therapy after surgery and decrease incidence of nausea, and low blood pressure after surgery.
- Most patients are discharged late afternoon the day of surgery. Some patients need to stay overnight for further monitoring and are discharged home the following morning.

Reduce the risk of infection with special cleansers five days before surgery

Most patients who develop a postoperative wound or knee infection have high concentrations of bacteria on their skin and in their nose and mouth before surgery. You will receive a cleaning kit when you attend the pre-surgery education class. This kit is to reduce the number of bacteria present on your body before surgery in order to reduce the risk of infection after surgery. The kit contains chlorhexidine (CHG) soap and five one-time use wash mittens for scrubbing your entire body during a shower, povidine iodine (PI) swabs or bactroban ointment for painting the inside of your nose, and antiseptic oral swabs for wiping your mouth and teeth. Let us know at your office visit if you have an allergy to any of these agents, and we will provide guidance regarding a different agent you can use.

Beginning five days before surgery, place clean sheets on your bed (only the first night is necessary), scrub your body, paint the inside of your nose, and swab your mouth and teeth with these antibacterial agents, per the instructions in the cleaning kit. Performing daily cleansing protocol reduces the risk of infection. After each shower, dry yourself with a clean towel and wear a fresh set of pajamas to bed each night. During these five days, do NOT shave the leg that is to be operated on and do not apply skin moisturizers, body lotions, perfumes or powders anywhere on your body.

Ways to reduce the risk of postoperative knee infection

- **Dental care:** Complete all dental work, including cleaning, before surgery. If dental problems arise prior to your surgery date, please call the surgeon's office.
- **Clean hands:** Hand hygiene is very important. You will notice caregivers use alcohol-based hand sanitizer when entering your room. We encourage the use of hand sanitizer by your visiting family and friends to reduce the spread of bacteria that cause infection.
- **Illness:** If you become ill with a fever, cold, sore throat, flu or any other illness, let the surgeon's office know as soon as possible so your procedure may be rescheduled.
- **Nutrition:** Healthy foods provide your body with the energy and nutrition it needs to fight off infections, accelerate healing and increase strength. Be sure to include assorted fruits, vegetables, good fats, dark leafy greens, protein and water in your diet. Even if you are not hungry, be sure you are getting adequate nutrition — try a smoothie loaded with fresh produce.
- **Skin rash:** Broken skin or rashes should be reported to your surgeon.
- **Stop smoking:** Not smoking for six weeks before surgery lowers the risks of infection. Smokers have a higher risk of developing postoperative infections and delayed wound healing because smoking deprives the body of the oxygen required to repair and build cells. Smoking cessation increases oxygen delivery, which is the foundation for healing the skin incision and deep tissues in the knee.
- **Manage your blood sugar:** If you are diabetic, monitor your blood sugar and keep your A1c below 8.0. The risk of wound complications is more than three times higher for patients with high blood glucose before and after surgery and for those with poor long-term diabetes control.
- **Shaving:** It is very important you do not shave your leg or use any hair removal products anywhere near the surgical area for FIVE days before surgery. Studies show an increased risk of surgical site infection associated with shaving. This is attributed to microscopic cuts in the skin that allow bacteria to enter. If necessary, we will use a clipper to remove hair from the skin in the preoperative area before surgery.
- **Special safety notice for pet owners:** Do not let your pet touch or lick your incision site. Avoid sleeping with your pet, and do not allow them onto your bedding for five days before surgery and until your first postoperative appointment. Always wash your hands after touching your pet and before touching the incision or bandage.

Section 5: Day of surgery care

Check-in at Adventist Health Lodi Memorial

Arrive at the hospital at the time instructed by the pre-admitting nurse. Enter the building at the Outpatient Services entrance on Vine street between Ham Lane and South Fairmont avenue Park in the outpatient services lot in front of the entrance. If you require assistance, use the phone at the bottom of the entrance ramp. Check-in at the registration window, where you will be directed to the preoperative area. Please note: this entrance is locked between the hours of 5:30 p.m. and 5:30 a.m.

Preoperative care in the ambulatory procedure unit

You will be asked to wash your body with a warm cloth containing a special cleanser (chlorhexidine) and apply nasal and oral disinfectants. Within 1–2 hours of surgery, we will start an intravenous (IV) line and infuse two antibiotics to reduce the risk of infection. One of the antibiotics (Vancomycin) may cause itching or flushing of the upper body that is minimized by giving you IV Benadryl, which may make you a little sleepy. We will also give you IV Toradol for discomfort and IV Decadron to reduce nausea and an upset stomach. Sequential compression devices will be applied to compress the calf area of the lower legs to reduce the risk of blood clots. Your surgeon will ask you which knee is to be operated on, and they will draw the course of the skin incision and write their initials in large letters above the kneecap for everyone to see. You will be given a menu and asked to select your lunch.

Your anesthesiologist will visit you in the preoperative area. Your medical history will be reviewed, and the anesthetic options, benefits and risks will be discussed with you. Because the calipered kinematically aligned total knee replacement has a relatively short surgical time, the use of general anesthesia is preferred. Let the anesthesiologist know if you are prone to nausea or if you have had any difficulties with anesthesia in the past. They are experts at administering the right combination of medications to give you the best outcome possible.

Your surgeon and/or physician assistant will notify your coach when surgery is completed.

Your coach will get a call from your nurse about an hour after the surgeon or physician assistants call. This call will be asking them to return to your bedside for education. Coach will be with you from the time they arrive back until you discharge home.

Care in the operating room

We use a sequence of ten caliper measurements within 0.5 mm that accurately position the implants and balance the ligaments of the knee, which are shown in a video available online at drstevehowell.com/patient-education/total-knee-replacement. During the surgery and before applying the dressing, an antibiotic (Vancomycin 1 gm) is added to the cement that binds the implants to the bone to reduce the risk of infection. During your surgery, medications are injected into and around the knee to assist with managing pain (Ropivacaine and Toradol) after surgery. These medications help provide relief for 24–36 hours. Another medication is added to assist in reducing the risk of bleeding (Tranexamic acid.)

Postoperative care in the recovery room

You will stay in the recovery room for approximately one hour and be closely monitored by a specialized nurse as you recover from the effects of anesthesia. The nurse will monitor your blood pressure, heart rate, respiratory rate, oxygen saturation and assist with managing any discomfort you may experience. Oxygen may be administered through soft tubing placed in your nose. Compression devices will be used around the lower legs to reduce the risk of blood clots and ice therapy will be placed on the surgical area.

Postoperative care in the ambulatory procedure unit

After leaving the recovery room, you will return to the area where you were prepared for surgery. Your lunch should arrive soon after you do. The nurse will call your coach to come in to receive education with you. Your therapist will teach you how to ambulate with a walker, bend and straighten the knee, get in and out of the shower and car and walk up and down stairs. Your therapist and nurse will also review the handouts regarding postoperative care at home with you and your coach. Your coach is encouraged to be engaged and ask questions if they have any.

Discharge home

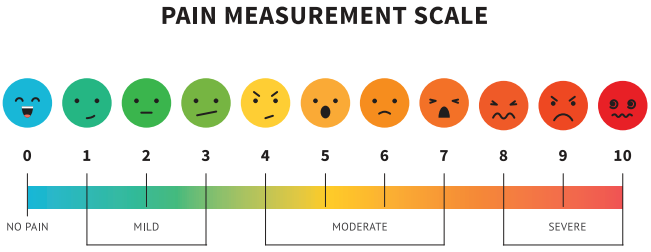
Once you are able to get in and out of bed, walk household distances, manage in the restroom, able to eat, vital signs are stable and coach has had questions answered, and you have received all instructions we will discharge you home. Often this is approximately four hours after surgery. In some circumstances you may need to spend the night in the hospital following surgery.

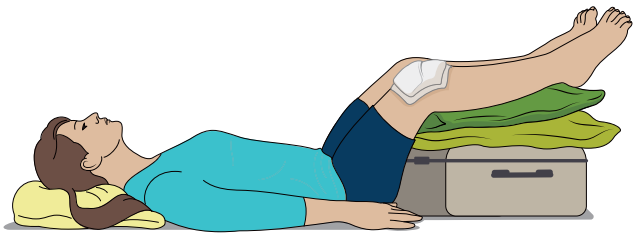
Section 6: Care after surgery

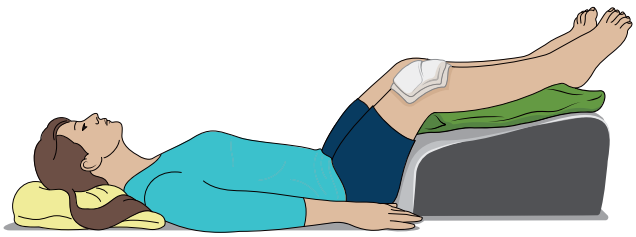
Managing discomfort

Our goal is to make you as comfortable as possible throughout recovery so you can walk and care for yourself. In the hospital, the nurse will ask you to rate your discomfort on a scale of 0–10, with ten being the worst. The nurse will assist with keeping any discomfort at your tolerable level. Many patients require minimal to no narcotics after they leave the recovery room. Always eat a little something when taking pain medication. Complete relief of discomfort has drawbacks as it may compromise breathing and nauseate you.

- During your stay you will receive intravenous doses of an anti-inflammatory medication called Toradol. Anti-nausea medicine may be requested if your stomach feels queasy.
- Discomfort in the upper thigh area of the operated leg is normal, and a result of the tourniquet used to prevent blood loss during the surgery. This thigh pain can sometimes be worse the first day or two after surgery. It will resolve itself within a week or so after surgery.
- Work with your coach and let them help you manage the discomfort at home. They could help you with repositioning, adjusting elevation, reminding you about timing of walking, help with and applying ice packs.
- You will receive education the day of surgery regarding using over the counter medications on a scheduled basis to help manage your discomfort. Take those regularly to help keep discomfort tolerable.
- Use the narcotic medication as needed to keep the discomfort tolerable.

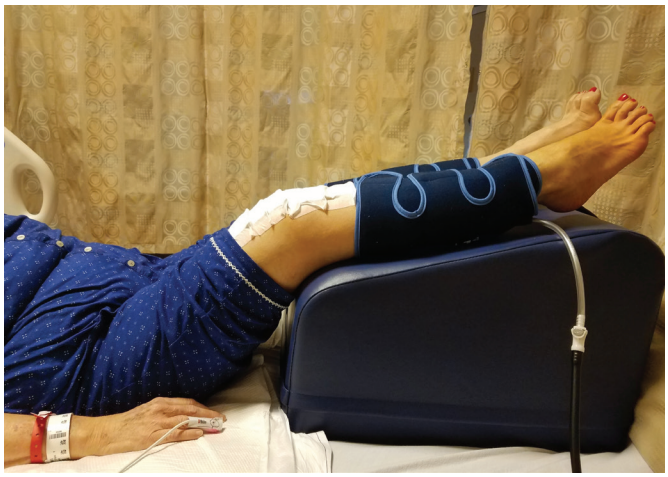






Managing constipation

Pain medication often causes constipation. Consider taking a stool softener, such as over-the-counter Colace ® or Metamucil ®, starting 1–2 days before surgery. There are a variety of remedies you may use at home. Continue the medication for constipation until your normal bowel habits return.



Managing swelling and reducing the risk of blood clots

While you are in the hospital your legs will be elevated on a bolster above your heart to decrease swelling and discomfort and promote bending and straightening of the new knee. When you get home, you will need to continue to elevate your knees 12-18 inches above your heart, and your foot above the knee. Start looking around your house for things you can use to elevate your knee. It is preferred if you can elevate both legs. This will be your resting position for the first two weeks after surgery during waking hours. If you are unable to sleep in this position, you may remove elevation and find a comfortable position for sleep; it is important you sleep at night.

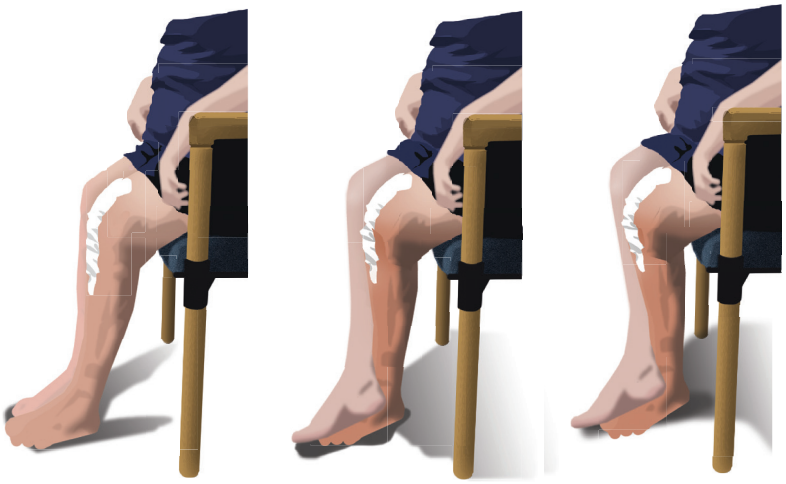
It will be important to you do a few things to reduce your risk of a blood clot. Keeping both your legs elevated is helpful. You will need to pump your ankles up and down while elevated. If you are on a prescription blood thinner medication, make sure you are restarting it according to the plan the physician assistant reviewed with you before discharge. If you are not on a prescription blood thinner you will be taking 81mg aspirin twice daily, one with breakfast and one with dinner for 30 days. Make sure you are getting up every hour while you're awake to take a short walk.

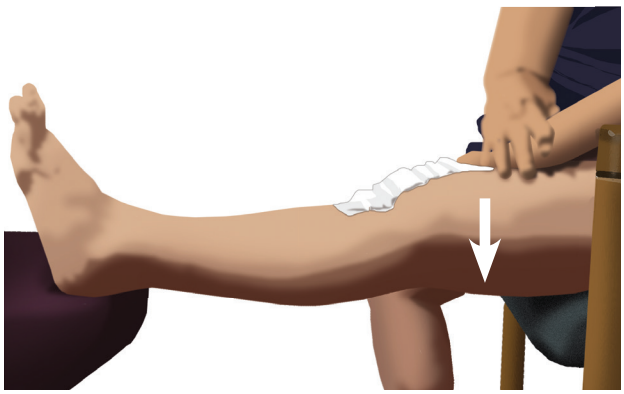
Section 7: Activities and exercises to rehabilitate your knee

It is important to begin rehabilitating your total knee replacement within a few hours after surgery. Because the implants are cemented to the bone, you may place all your weight on the new knee. Physical and occupational therapists will teach you how to get in and out of bed, straighten and bend your knee, walk down the hall with a walker, go up and down stairs and take care of yourself while recovering at home. Recovery is faster when you get out of bed.

Sitting exercise for bending the knee

1. Sit on the edge of a bed or chair.
2. Place the ankle of the non-surgical leg in front of the ankle of the surgical leg.
3. Use the non-surgical leg to bend the surgical knee until you feel a stretch and no discomfort.
4. Hold this bend while slowly counting to 10, pull a little more until you feel discomfort, but not a lot, and count to 10 again, then relax.
5. Repeat this cycle of stretches 10 times every time you walk.





Sitting exercise for straightening the knee

1. Sit on the edge of a bed or chair and place the heel of the surgical leg on a chair in front of you.
2. Push on the front of the thigh (arrow) to move the back of the knee down towards the floor.
3. Hold this position while slowly counting to 10 and then relax.
4. Repeat this stretch 10 times every time you walk.

Tips for getting out of bed

1. Use the non-surgical leg to shift your body to one edge of the bed. (Figure 1)
2. Use your elbows and hands to help you sit up. (Figure 2)
3. Bring your legs over the edge of the bed to sit up. (Figure 3)
4. Reverse these steps to get back into bed.

Figure 1

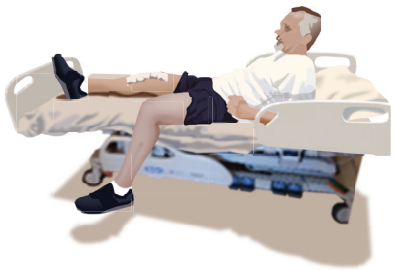


Figure 2

Figure 3

Standing up and walking with a walker

1. Use your arms to slide your body to the edge of the chair while keeping the surgical leg out in front of you. (Figure 1)
2. Push up using the armrests and the non-surgical leg for support. (Figure 2)
3. Transition hands from armrests to your walker, one at a time. (Figure 3)
4. Reverse this process to sit down, reaching back for the armrests and slowly lowering yourself.
5. When walking with a walker, first advance the walker, step forward with your surgical leg, then step forward with the other leg, supporting some of your weight with your arms on the walker as needed.

Figure 1

Figure 2

Figure 3

Figure 1

Figure 2

Figure 3

Figure 4

Climbing stairs

1. To climb stairs, grasp the railing and place the foot of the non-surgical leg on the next step and extend the knee. (Figures 1, 2)
2. Next, lift the foot of the surgical leg up to the same step. (Figures 2, 3)
3. When going downstairs, step down with the surgical leg then follow with the non-surgical leg. (Figure 4)
4. When no railing is available, use a cane in one hand for support.

Figure 1

Figure 2

Figure 3

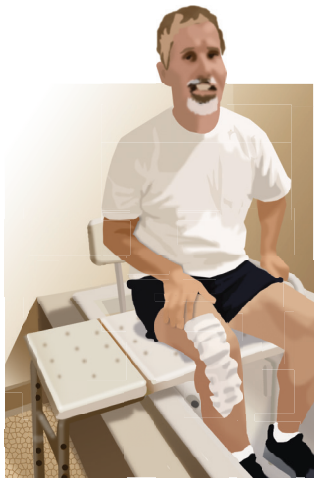


Figure 4

Transferring in and out of a bathtub

1. If you only have a tub/shower combo bathroom set-up, consider buying a bathtub bench — available from an online retailer for approximately $60-$90. (Figure 1)
2. Sit down on the bathtub bench with your back facing the bathtub. (Figure 2)
3. Pivot into the bathtub and lift each leg one at a time over the side of the bathtub. (Figures 3, 4)
4. Reverse these steps to get out of the bathtub.

Transferring in and out of a walk-in shower

1. If you have a walk-in shower at home, consider buying a shower chair. Available from an online retailer for approximately $40-$60.
2. Enter and exit the shower using a side-step technique. (Figures 1, 2)
3. Sit on the shower chair when washing your body.
4. Consider adding slip-resistant bath mats and wall-mounted grab bars for stability.

Figure 1

Figure 2

Figure 1

Figure 2

Figure 3

Figure 4

Going up and down a curb with a walker

1. When going up a curb step, get as close to the curb with the walker as possible.
2. Lift the walker and place it on top of the curb and check that the four legs of the walker are secure. (Figure 1)
3. Step up with your non-surgical leg, lean forward on the walker, then step up with the surgical leg. (Figures 2, 3)
4. Go down the curb by lowering the walker to the ground and step down with the surgical leg followed by the non-surgical leg. (Figure 4)

Figure 1

Figure 2

Figure 3

Figure 4

Getting in and out of a vehicle

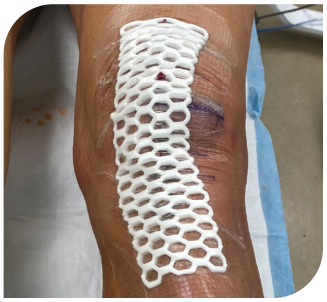
1. Park the car several feet away from the curb to allow entry from a level surface.
2. To maximize leg room, move the passenger seat as far back as it will go and recline the seat.
3. Back up to the car, reach back for the seat. (Figure 1)
4. Gently sit on the car seat while keeping your surgical leg straight and in front of you. (Figure 2)
5. Slide back, pivot into the seat and face forward bringing one leg at a time into the car. (Figures 3, 4)
6. Reverse these steps to get out of a vehicle.

Section 8: Learning what to do at home in the first six weeks after surgery

Discharge medications and instructions

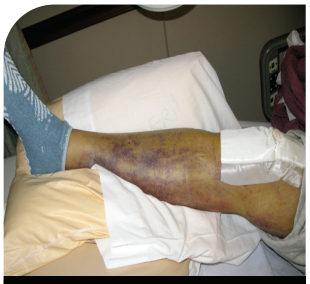
Before surgery, your surgeon or physician assistant will electronically send a prescription for pain medication to your pharmacy. The nurse will provide written and verbal discharge instructions and answer any questions you may have.

Bathing and wound care

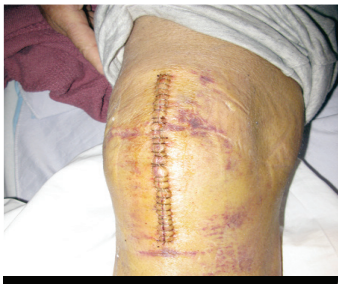


Remove the outer wrap 24 hours after surgery at home. Leave the honeycomb bandage in place for 7 days. You may shower and get the dressing wet as it is showerproof. If you continue to notice moderate drainage after surgery, call your surgeon's office. You will receive further instructions. Expect to see bruising, swelling, blistering, redness and warmth around the knee and leg for 5–6 weeks after knee replacement.

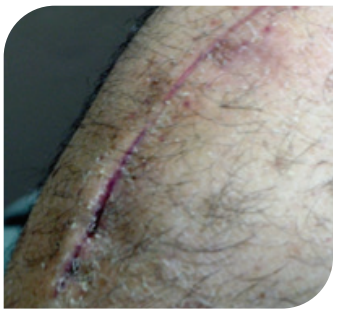
On the seventh day after surgery, you will shower first then remove the honeycomb dressing and replace with two of the island dressings in the pleated manner demonstrated in the education class and on the handout received at discharge. These dressings are not showerproof. You will be changing your dressing daily from this point until the staples are removed. If you have drainage present on your island dressings on the eighth day after surgery, you may not get the incision wet. Continue to change dressing daily until the dressing is clean and dry for two days in a row; then you may shower with no dressing. Let soapy water run over the incision, rinse with clean water and do not scrub incision. Pat the incision dry with a clean towel and place a new dressing after your shower. Do not soak the knee in a bathtub, hot tub or swimming pool until after staples are removed at 12–15 days following surgery.



Normal Bruising



Normal Swelling



At 12–15 days after surgery, you will return to the surgeon's office in Sacramento or Lodi to have your staples removed. You may be given a staple removal kit to allow for you to have staples removed by a local doctor if you live out of the area. If you received a staple removal kit, take it with you to your staple removal appointment. After removal, wait a day before swimming, soaking in a hot tub or applying lotions and creams on the incision.

If you see an uneven edge on the incision, please don't worry. This may occur from a shifting of the staples during motion of the knee. Nature will flatten the unevenness within 3–4 weeks.

Reducing the risk of blood clots

Patients who are able to take aspirin or anti-inflammatory medicines will be prescribed low-dose aspirin (81 mg) two times a day (one at breakfast and one at dinner) for 30 days after surgery to reduce the risk of blood clots.

Patients who are on anticoagulants (blood thinners) such as Pradaxa® (dabigatran), Xarelto® (rivaroxaban), Eliquis® (apixaban), Coumadin (warfarin), Pletal (cilostazol), Plavix (clopidogrel) or Brilinta® (ticagrelor) preoperatively will have adjustments to their medication after surgery that will be coordinated with the prescribing physician.

Patients who cannot take aspirin or anti-inflammatory medicines will be given one of the anticoagulants (blood thinners) listed above. Let your surgeon know if you cannot take aspirin before surgery so a plan can be developed prior to surgery.

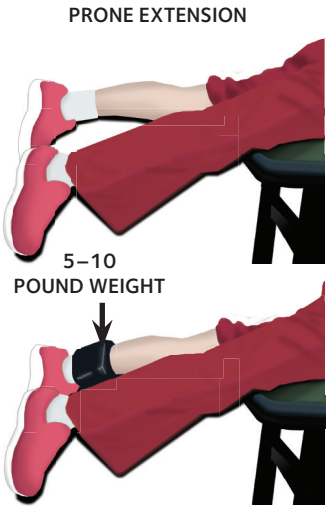
Guidelines for exercise and activities at home

During the first six weeks, your goal is to regain knee motion, reduce the degree of swelling and limit the use of strengthening exercises. Please follow the guidelines below as other exercises and activities may cause pain and be counterproductive.

- After at least one hour of elevation, get up and walk a few minutes.
- After the walk, sit on the sofa, chair or end of bed and perform the bending and straightening exercises described in Section 7 for 3–5 minutes.
- When not walking, lie on the bed or sofa and elevate your leg 1–2 feet above your heart using a bolster or pillows as described in Section 7.
- Practice proper elevation before your surgery, so you are prepared when you go home. Ideas of household items that can help with elevation are discussed at pre-surgery education class.
- **For the first two weeks limit sitting and standing.**
- When you overdo it, elevate the leg, ice the knee and rest for the remainder of the day.
- After two weeks, increase activity when the knee bends easily to a right angle or 90 degrees.
- When you can walk safely with a normal gait without the walker, discard it.

Prone exercise for straightening your knee after removal of staples

1. Apply a 5–10 pound weight around the ankle of the surgical leg.
2. Turn on your stomach and slide toward the edge of the bed.
3. Hang your kneecap over the edge and lower leg off the bed.
4. Let gravity straighten the surgical knee and hold for 1–2 minutes.
5. When discomfort is felt, flex the knee 10 degrees.
6. Repeat straightening and bending of the knee 20 times.
7. Repeat this cycle three times per day until your limp disappears.



Managing discomfort and constipation

Continue to take the over-the-counter medications like Ibuprofen (Motrin®, Advil®) or, Naproxen (Aleve®) and Acetaminophen (Tylenol®) regularly following the guidelines you received before leaving the hospital. When your discomfort is not tolerable with the over-the-counter medications alone add the prescribed narcotics as needed.

Before taking the narcotics, always reposition your knee or if it has been an hour since your last walk consider taking your 5 minute walk. Fifty percent of the time the discomfort will subside or become tolerable with repositioning or walking.

As the pain becomes more tolerable stop the narcotic medication first. Slowly decrease the over-the-counter medications as the discomfort lessens.

Continue to take the over-the-counter stool softener (Colace™) to reduce the risk of constipation. Narcotics and immobility are causes of constipation. If needed you may also add prunes, Metamucil, or Milk of Magnesia. Make sure your bowels are moving by the third day after surgery.

Follow-up visit at six weeks to assess the pace of recovery

The following are signs of a good pace of recovery at 5–6 weeks:

- Straightening the knee close to 0 degrees
- Bending the knee from 90 to 110 degrees
- Walking without a walker or cane
- Climbing stairs
- Driving the car

At 5–6 weeks, expect your recovery to be 50% and your Oxford Knee Score should be 28–32 points. [15] It is normal to still sense some swelling, redness, warmth, stiffness, soreness and numbness on the outside of the incision. Patients with difficulty straightening and bending their knee before surgery take longer and must work harder to regain motion than patients who had full motion. You may return to recreational activities such as gardening, tennis, golf, biking, bowling and hiking when you and your new knee feel up to it. At three months, recovery is about 70%. At six months, recovery is about 90%. You should assess your pace of recovery by comparing improvements month-to-month rather than day-to-day.

Section 9: Answers to frequently asked questions

Q: How long does a total knee replacement last?

A: There is a 90% chance that the original parts we put in your knee will continue to work for 20 years without another operation.

Q: When can I drive a car?

A: You may drive a car when you are not taking any narcotics and feel safe behind the wheel. If you get into an accident, the cause should be a judgment error and not an inability to maneuver the car.

Q: When can I play golf?

A: You may return to golf at your own pace. Begin putting and chipping, progress to short irons and then to the driver.

Q: Does the feeling of stretching when bending the knee ever cause the wound to split open?

A: No, the wound is closed in three layers with three sets of sutures and staples. Feel confident when straightening and bending that the knee with the wound is secure.

Q: When will the swelling and pain disappear in my knee?

A: Swelling is normal and will gradually subside over 3–4 months. Elevation and short frequent exercises for a few minutes are the best way to manage swelling. Forceful exercising for extended periods of time will keep the knee swollen, even with elevation. You are the best person to determine what your knee will let you do. Once the swelling subsides, the pain will too.

Q: When will the warmth and redness disappear?

A: Warmth and redness in the knee is normal and will gradually subside over 3–4 months. It does not indicate an infection and is caused by increased blood supply, which brings a high concentration of nutrients to help heal the knee.

Q: Why is there occasionally a clicking or noise in the knee when I use it?

A: Contact between the metal and plastic tibial and femoral implants causes clicking and is more frequent when the knee is swollen. It does not indicate parts are loose or broken. The frequency and loudness of the noise becomes less as the swelling of the knee subsides.

Q: Will my total knee replacement set off the metal detectors at airports, stadiums and government buildings?

A: Yes, it will. Expect to be patted down. Presenting a card showing you have had a knee replacement does not help.

Q: Is a total knee replacement like a normal knee?

A: About 30% of patients report their knee with the kinematically aligned total knee replacement feels normal, while others notice a difference. Those who notice a difference do sense the knee is better than before surgery.

Q: Can I kneel on my knee to do household chores and garden?

A: Kneeling will not hurt the knee. However, without practice it may cause your knee to hurt. Try kneeling on a foam pad for support. Patients who kneel frequently have less pain.

Q: Is it true I might need antibiotics if I have dental work or other surgical procedures?

A: The American Dental Association **no longer recommends** the routine prophylactic use of antibiotics before dental procedures according to the following ADA chairside guide. Here is the link to the 2019 Key Points on Antibiotic Prophylaxis: ada.org/en/member-center/oral-health-topics/antibiotic-prophylaxis.

Management of patients with prosthetic joints undergoing dental procedures

Clinical Recommendation:

In general, for patients with prosthetic joint implants, prophylactic antibiotics are not recommended prior to dental procedures to reduce the risk of prosthetic joint infection. As this is a recommendation and not a hard rule there are some dentists who believe giving you an antibiotic is in your best interest and they will prescribe them for you.

For patients with a history of complications associated with their joint replacement surgery who are undergoing dental procedures that include gingival manipulation or mucosal incision, prophylactic antibiotics should only be considered after consultation with the patient and orthopedic surgeon.* To assess a patient's medical status, a complete health history is always recommended when making final decisions regarding the need for antibiotic prophylaxis.

Clinical Reasoning for the Recommendation:

- There is evidence that dental procedures are not associated with prosthetic joint implant infections.
- There is evidence that antibiotics provided before oral care do not prevent prosthetic joint implant infections.
- There are potential harms of antibiotics including risk for anaphylaxis, antibiotic resistance, and opportunistic infections like *Clostridium difficile*.
- The benefits of antibiotic prophylaxis may not exceed the harms for most patients.
- The individual patient's circumstances and preferences should be considered when deciding whether to prescribe prophylactic antibiotics prior to dental procedures.

ADA Center for Evidence-Based Dentistry™

* In cases where antibiotics are deemed necessary, it is most appropriate that the orthopedic surgeon recommend the appropriate antibiotic regimen and when reasonable write the prescription.

Sollecito T, Abt E, Lockhart P, et al. The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: Evidence-based clinical practice guideline for dental practitioners — a report of the American Dental Association Council on Scientific Affairs. JADA. 2015;146(1):11-16.

Section 10: Our commitment to you

Our care is motivated by the powerful forces of integrity, compassion, respect and excellence.

During your stay we promise to:

Tell you who we are and what we are doing

Partner with you to plan your care

Listen and respond to your needs

Round on you hourly

Safely control your pain

Respond to your call button in a timely manner

Wash or sanitize our hands

Explain your medications

Section 11: References

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Section 12: Notes

Blank space is provided for the purpose of taking notes.

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Revised April 2023

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