Knee Arthroplasty, Unicompartmental

Indexing Metadata/Description

› Surgical intervention: Knee Arthroplasty, Unicompartmental
› Synonyms: Arthroplasty, knee, unicompartmental; unicompartmental knee arthroplasty; partial knee replacement; knee replacement, partial; UKA
› Anatomical location/body part affected: Most often, the articular surfaces of the medial tibial plateau and femoral condyle; less commonly, the lateral compartment of the knee may be affected
› Area(s) of specialty: Acute Care, Aquatic Therapy, Geriatric Rehabilitation, Home Health, Orthopedic rehabilitation

Description

• Knee arthroplasty categories(1)
  – Unicompartmental – the lateral or medial bone surfaces (condyles) are removed and prostheses are implanted
  – Bicompartmental – full tibial/femoral bone surfaces are removed and replaced with prostheses
  – Tricompartmental – the surface of the femur, tibia, and patella are removed and prostheses are implanted
• The prosthesis in a knee arthroplasty can be fixed to the tibial plateau (fixed bearing) or it can have freedom of rotation and/or translation (mobile bearing)

› ICD-9 codes
  • 81.54 total knee replacement; bicompartmental, tricompartmental, unicompartmental (hemijoint)
  • V43.65 knee joint replacement status

› ICD-10 codes
  • Z96.6 presence of orthopedic joint implant

(ICS codes are provided for the reader’s reference, not for billing purposes)

› G-Codes
  • Mobility G-code set
    – G8978, Mobility: walking & moving around functional limitation, current status, at therapy episode outset and at reporting intervals
    – G8979, Mobility: walking & moving around functional limitation; projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    – G8980, Mobility: walking & moving around functional limitation, discharge status, at discharge from therapy or to end reporting

  • Changing & Maintaining Body Position G-code set
    – G8981, Changing & maintaining body position functional limitation, current status, at therapy episode outset and at reporting intervals
    – G8982, Changing & maintaining body position functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    – G8983, Changing & maintaining body position functional limitation, discharge status, at discharge from therapy or to end reporting
• Carrying, Moving & Handling Objects G-code set
  – G8984, Carrying, moving & handling objects functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8985, Carrying, moving & handling objects functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8986, Carrying, moving & handling objects functional limitation, discharge status, at discharge from therapy or to end reporting

• Self-Care G-code set
  – G8987, Self-care functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8988, Self-care functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8989 Self-care functional limitation, discharge status, at discharge from therapy or to end reporting

• Other PT/OT Primary G-code set
  – G8990, Other physical or occupational primary functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8991, Other physical or occupational primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8992, Other physical or occupational primary functional limitation, discharge status, at discharge from therapy or to end reporting

• Other PT/OT Subsequent G-code set
  – G8993, Other physical or occupational subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8994, Other physical or occupational subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8995, Other physical or occupational subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

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<td>At least 1 percent but less than 20 percent impaired, limited or restricted</td>
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<td>CK</td>
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<td>CM</td>
<td>At least 80 percent but less than 100 percent impaired, limited or restricted</td>
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<tr>
<td>CN</td>
<td>100 percent impaired, limited or restricted</td>
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Source: http://www.cms.gov

› Reimbursement: No specific issues or information regarding reimbursement have been identified

› Presentation/signs and symptoms
  • Varies based on the amount of time that has passed since unicompartmental knee arthroplasty (UKA)
  • In the first week post surgery, the patient may present with pain during weight-bearing and range of motion (ROM), an anterior or anteromedial knee incision with sutures/staples, and knee effusion and erythema. The patient may require the use of a walker, cane, or crutches for ambulation. The operated knee will also be stiff with significant restriction in flexion/extension⁴⁴⁻¹
• In the subacute phase, edema and ROM restriction often persist, to a lesser degree. The patient is generally able to ambulate without an assistive device (AD) within 2 weeks depending on prior level of function

• In both phases, significant muscle weakness and decreased ROM may be present

**Surgical Indications, Contraindications, & Complications**

› **Indications**
  - UKA is not performed as commonly as total knee arthroplasty (TKA). UKA is used in patients who only have damage in either the medial or lateral compartment of the knee. If two or more compartments are damaged, TKA is more appropriate
  - Indications/considerations for UKA
    – Recovery after UKA is much quicker when compared to TKR
    – Patient should:
      - have unicompartmental knee disease only (e.g., be free from opposing knee compartment osteophytes)
      - have a properly functioning anterior cruciate ligament (ACL)
      - have varus < 10°
      - have at least 90° flexion
      - have flexion contractures < 15°
      - be free from knee laxity
      - be free from severe deformity
      - be free from inflammation
      - be free from knee laxity
      - Patients < 60 years of age or > 60 years of age but active are generally not good candidates for UKA due to high risk of early failure
      - not be obese
  - Examples of diseases that may lead to UKA
    – Osteoarthritis
    – Osteonecrosis
  - Other factors that can place a patient at higher risk for needing a UKA include history of trauma to the knee, previous knee surgery, obesity, and increased age

› **Complications**
  - Common complication of UKA include metallosis (i.e., aseptic fibrosis or necrosis of the implanted device secondary to corrosion of the metal and release of debris caused by wear). The release of the debris particles leads to osteolysis and loosening of the prosthetic device, patellofemoral pain, polyethylene wear, and progressive arthritic changes in the remaining compartments of the knee
  - Short-term complications
    – UKA is associated with a low rate of mortality and of serious postoperative complications
    - Based on a study conducted in the United States of 1,000 consecutive UKAs in 828 patients
    - There were no deaths during the 90-day follow-up period
    - Fifteen knees required a second procedure during the 90-day follow-up period
    - Seven of these had a manipulation under anesthesia for limited ROM and arthrofibrosis
    - Eight patients had wound drainage or redness requiring an office visit for evaluation
    - Three patients underwent irrigation and debridement for hematoma
    - There was 1 case of deep vein thrombosis (DVT) requiring medical management
    - There was 1 postoperative infection in the entire study group during the 90-day postoperative period
    - This patient required a TKA after treatment with antibiotics and debridement for sepsis
  - Long-term complications/revisions
    – Authors of a systematic review of published studies of revisions from complications of the Oxford phase 3 prosthesis for UKA from 1998 to 2012 came to the following conclusions:
- A total of 2,683 patients (3,138 knees) from 17 studies were assessed
- Median age 62.5 years, median follow-up period 5.6 years
- Post-operative revision in 146 knees (4.6%)
- Weight-bearing dislocation was the single most common cause for a revision
- The rate of weight-bearing dislocation with the lateral Oxford unicompartmental knee replacement (OUKR) ranges from 1-6%, suggesting dislocation is influenced by surgical technique
- Prosthetic component alignment, fixation and soft tissue integrity are correlated with a risk of tibial component loosening
- A retrospective study was conducted on 23 patients in Italy who had cemented UKA. Two patients needed revisions secondary to a tibial component varus angle of 10 degrees which led to a misalignment and subsequent loosening. The authors concluded that a varus misalignment of greater than 5 degrees could lead to increased risk of loosening of the prosthetic tibial component
- Authors of a retrospective study in Germany reviewed 471 failed medial UKA between January 2000 and March 2012. The causes of failure were analyzed. The patients were converted to a TKA at the author’s orthopedic institution
- 53.9% failed within the first 5 years, 22.9% failed after 10 years
- Major reason for failure was the development of other compartment arthritis (39.5%), followed by aseptic loosening (25.4%)

**Overall Contraindications/Precautions**

- Contraindications for UKA include ACL deficiencies, rheumatoid arthritis (and other inflammatory disorders), and patellofemoral symptoms or arthritic changes in the patellofemoral joint or opposite compartment of the knee
- Following UKA, the incision should be kept clean and dry, with frequent monitoring for signs of infection (redness, erythema, warmth, odor, abnormal discharge)
- Signs and symptoms of DVT (e.g., presence of calf pain, tightness, warmth, erythema) warrant an urgent visit to the physician or emergency room for a diagnostic ultrasound
  - Many surgeons encourage the use of antiembolism stockings to prevent DVT
- Following UKA, patients should be advised to avoid pivoting on the affected lower extremity and to avoid high-impact activities
- Contraindications to UKA
  - Diagnosis of inflammatory arthritis
  - High level of physical activity
  - Pain at rest
  - Patellofemoral pain
  - Exposed bone in the patellofemoral joint or opposite compartment
- See specific Contraindications/precautions to examination and Contraindications/precautions under Assessment/Plan of Care

**Examination**

- Contraindications/precautions to examination
  - Confirm and ensure that patient adheres to weight-bearing orders and any other restrictions noted by physician prior to starting evaluation
  - Do not initiate any joint mobilization strategies until cleared by physician
- History
  - History of present illness/injury
    - Mechanism of injury or etiology of illness
      - What was the date of surgery?
      - Was the medial or lateral bone surface removed? Lateral compartment arthroplasty accounts for only 5-10% of all UKAs performed
      - Inquire about any complications during surgery or postoperatively and patient’s general medical status
Course of treatment

- Medical management
  - Comparing UKA to TKA
    - In UKA \(^{(2)}\)
      - Cruciate ligaments are spared
      - Procedure is less invasive
      - Incision is smaller
      - Short-term complications are reduced
      - Recovery/rehabilitation is generally faster
    - TKA is associated with longer joint survivorship \(^{(2)}\)
    - UKA is associated with better postoperative function; based on a meta-analysis \(^{(9)}\)
    - UKA and TKA are associated with a similar level of pain and function in the long term \((\geq 2\) years\); based on analysis of results of a mail survey \(^{(10)}\)
      - In another study, patient-related outcome questionnaires assessing patient satisfaction regarding pain, ROM, daily living function, return to recreational activity and ability to kneel at a minimum of 3 years after surgery were collected
        - One hundred forty one UKA and 245 TKA patients were compared. Patients under age 55 rated their joint as good/excellent in 96% versus patients in the same age group with TKA in 81%. Overall, younger patients demonstrated higher satisfaction scores with UKA \(^{(24)}\)
  - Computer-assisted techniques
    - Computer-assisted minimally invasive UKA was associated with improved postoperative radiographic alignment compared to conventional minimally invasive UKA in a small randomized trial with 20 patients in Australia \(^{(11)}\) and in a retrospective cohort study of 42 patients (52 knees) in South Korea \(^{(12)}\)
    - In a randomized study conducted in Sweden, minimally invasive surgery did not improve outcome compared to conventional surgery \(^{(24)}\)
      - Minimally invasive procedure leaves the quadriceps muscles intact. Conventional UKA involves cutting/splitting the quadriceps tendon and dislocating and everting the patella
      - No statistically significant differences were found between a group of 20 patients receiving minimally invasive UKA and a group of 20 patients receiving conventional UKA \(^{(24)}\)
    - Following UKA, medical care generally includes but is not limited to:
      - Wound care and medications for pain management and DVT prophylaxis \(^{(5)}\)
      - Continuous passive motion (CPM) in acute and subacute setting
  - Medications for current illness/injury: Determine what medications clinician has prescribed; are they being taken? Are they effectively controlling patient’s symptoms?
  - Diagnostic tests completed: Usual tests for this condition are the following:
    - X-ray is often used to ensure proper placement of the prosthetic and to rule out complications, such as fracture and loose bodies in cases of atypical postoperative pain
    - Doppler ultrasound may be used to assess for the presence of DVT, and a complete blood count (CBC) may be obtained to assess hematocrit and hemoglobin levels
  - Home remedies/alternative therapies: Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether or not they help
  - Previous therapy: Document whether patient has had occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful (e.g., did the patient go to a rehabilitation hospital after surgery or have home-based physical therapy?)
  - Aggravating/easing factors (and length of time each item is performed before the symptoms come on or are eased):
    - Does activity aggravate joint swelling or any other symptoms? In the acute phase, pain will likely increase during activity
  - Body chart: Use body chart to document location and nature of symptoms
  - Nature of symptoms: Document nature of symptoms (constant vs. intermittent, sharp, dull, aching, burning, numbness, tingling)
  - Rating of symptoms: Use a visual analog scale (VAS) or 0-10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if pain is present now and how much)
– **Pattern of symptoms:** Document changes in symptoms throughout the day and night, if any (A.M., mid-day, P.M., night); also document changes in symptoms due to weather or other external variables

– **Sleep disturbance:** Document number of wakings/night, if any

– **Other symptoms:** Document other symptoms patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician (dizziness, bowel/bladder/sexual dysfunction, saddle anesthesia)

– **Respiratory status:** Is there any known respiratory compromise?

– **Barriers to learning**
  - Are there any barriers to learning? Yes__ No__
  - If Yes, describe _________________________

• **Medical history**
  – **Past medical history**
    - **Previous history of same/similar diagnosis**
      - Does the patient have a history of knee injury or trauma?
      - Did the patient have previous knee surgeries?
      - Has the patient had any other surgeries?
      - Is there any other pertinent medical history (e.g., severe arthritis in the opposite knee, hips; other lower extremity dysfunction)?
    - **Comorbid diagnoses:** Ask patient about other problems, including diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders, orthopedic disorders, etc.
    - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs)
    - **Other symptoms:** Ask patient about other symptoms he or she may be experiencing

• **Social/occupational history**
  – **Patient’s goals:** Document what the patient hopes to accomplish with therapy and in general
  – **Vocation/avocation and associated repetitive behaviors, if any:** To what leisure and sports activities does the patient hope to return? Does the patient work; if so, what are the patient’s work responsibilities?
  – **Functional limitations/assistance with ADLs/adaptive equipment:** Is the patient using an assistive device? Does the patient require assistance with ADLs at this time? What was the patient’s prior ADLs status? If patient is not in an acute or subacute care facility, is someone available to assist with ADLs? Has the patient resumed driving?
  – **Living environment:** Stairs, number of floors in home, with whom patient lives (e.g., caregivers, family members). Identify if there are barriers to independence in the home; any modifications necessary?

› **Relevant tests and measures:** (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)

• **Anthropometric characteristics**
  – Usually, there is obvious edema following UKA that decreases gradually over the following months. Circumferential measurements can be taken and compared to the contralateral extremity. Joint line measurements can be utilized, and proximal and distal measurements can also be used, making sure to provide consistency through the use of landmarks or predetermined distances from the joint line (e.g., 6 cm proximal to joint line). It is expected that the edema may fluctuate, but will generally decrease over time
  – Assess for the presence of leg length discrepancy

• **Arousal, attention, cognition (including memory, problem solving):** Assess arousal and cognition as indicated

• **Assistive and adaptive devices:** In the first several weeks after UKA, especially in the acute setting, ADs may be appropriate (walker, cane, crutches). Adaptive equipment for ADLs may also be required (reachers, sock aids, shoe horns, raised toilet seats, grab bars/shower chairs, etc.) for safety and independence. (For information on assistive devices, see Clinical Review...Ambulatory Assistive Devices; Topic ID Number: T708914)

• **Balance**
  – Sitting balance and static standing balance should be assessed initially. Assess patient’s dynamic balance
  – In later stages of treatment and evaluation, more aggressive testing may be used (dynamic standing balance, Berg Balance Scale, Tinetti Balance Scale, single limb stance, Star Excursion Balance Test)

• **Cardiorespiratory function and endurance**
  – Assess vital signs before, during, and after activity
The 6-minute walk for distance test (6MWT), Borg Rating of Perceived Exertion (RPE), and other standardized tests may be used in the later phases of treatment to assess endurance and gait tolerance.

**Circulation:** Assess bilateral lower extremity pulses and compare.

**Functional mobility** (including transfers, etc.): Complete a functional assessment; ensure any restrictions or weight-bearing precautions are followed. Utilize such objective measures as FIM and the Timed Up and Go (TUG) test.

**Gait/locomotion**
- Confirm weight-bearing status with surgeon and assess type of AD required.
- Use the VAS to assess pain with gait.
- In the acute phase, assess for the ability to maintain prescribed weight-bearing status on the operated extremity.
- In later phases, gait abnormalities such as decreased terminal knee extension, absent or decreased heel strike, hip circumduction, decreased step length, increased base of support, and others may be identified.
- Utilize Dynamic Gait Index (DGI) to assess safety with ambulation.

**Joint integrity and mobility**
- The stability and proper alignment of the prosthesis will often be monitored by the surgeon through x-rays; ensure all reports are reviewed and the prosthesis remains intact.
- Assess knee joint and patella mobility (pending no restrictions set by physician).

**Muscle strength:**
- Assess strength of the entire lower extremity, especially the quadriceps and hamstrings. The use of manual muscle testing (MMT) is appropriate in the acute and subacute setting as tolerated by the patient, followed by dynamometry in outpatient care.

**Observation/inspection/palpation** (including skin assessment): In the initial phases of treatment, the incision should be monitored for infection (e.g., redness, warmth, discharge), as well as for wound dehiscence. Monitor for signs/symptoms of DVT.

**Palpation:**
- Assess for pitting edema, signs of infection, pesanserinus bursitis, and other deficiencies.

**Posture:**
- Note general posture and lower extremity alignment.

**Range of motion:**
- Goniometric assessment of knee flexion and extension for both active and passive ROM (AROM and PROM). A screen of the hip and ankle should also be performed. Assess flexibility throughout the lower extremity.

**Self-care/activities of daily living** (objective testing):
- Document current ADLs level; refer to occupational therapy as indicated.

**Sensory testing:**
- The dermatome scan should be performed to identify any nerve irritation or damage that may have occurred during surgery.

**Special tests specific to diagnosis**
- Generally performed in the outpatient setting, standardized tests, such as the UCLA activity level scale, Hospital for Special Surgery knee score, American Knee Society Score, Lower Extremity Functional Scale (LEFS), and 6MWT, can be used to evaluate function and monitor progress.\(^3\,13\)

**Assessment/Plan of Care**

**Contraindications/precautions**
- Only those contraindications/precautions applicable to this diagnosis are mentioned below, including with regards to modalities. Rehabilitation professionals should always use their professional judgment.
- Clinicians should follow the guidelines of their clinic/hospital and what is ordered by the patient’s physician. The summary presented below is meant to serve as a guide, not to replace orders from a physician or a clinic’s specific protocols.

**Patients with UKA may be at risk for falls; follow facility protocols for fall prevention and post fall-prevention instructions at bedside, if inpatient.** Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall-prevention strategies. Discharge criteria should include independence with fall-prevention strategies.

**Contraindications/precautions to use of modalities\(^14\)**
- There is no consensus as to whether ultrasound treatment is contraindicated following arthroplasty.
- Precautions for using continuous or pulsed ultrasound include over plastic or cemented implants.
- Ultrasound is contraindicated in cases where methyl methacrylate cement was used in the arthroplasty, since this cement absorbs heat rapidly and may become overheated, causing damage to surrounding tissue.

- Cryotherapy contraindications
  - Cold intolerance.
- Raynaud’s disease or phenomenon
- Cryoglobulinemia
- Cold urticaria
- Paroxysmal cold hemoglobinuria
- Over a circulatory compromise
- Over an area of peripheral vascular disease
- Over a regenerating peripheral nerve

**Cryotherapy precautions**
- Thermoregulatory disorders
- Hypertension
- Hypersensitivity to cold
- With individuals with poor cognition
- In the very young and the very old
- With persons with an aversion to cold
- Over an open wound
- Over an area of poor sensation
- Over superficial nerves

**Therotherapy contraindications**
- Over areas with a lack of intact thermal sensation
- Over areas of vascular insufficiency or vascular disease
- Over areas of recent hemorrhage or potential hemorrhage
- Over areas of known malignancy
- Over areas of acute inflammation
- Over infected areas where infection may spread
- Over areas where liniments or heat rubs have recently been applied
- In any situation deemed unreliable by the practitioner

**Electrotherapy contraindications**
- Over the trunk or heart region in patients with demand-type pacemakers and implantable cardioverter defibrillators (ICDs)
- Over the pelvic, abdominal, lumbar or hip region of a pregnant woman
- Over the carotid bodies
- Over the phrenic nerve, eyes, or gonads
- Over areas of known peripheral vascular disease
- Over areas of active osteomyelitis
- Over areas of hemorrhage

**Electrotherapy precautions**
- With patients without intact sensation
- With patients who cannot communicate
- With patients with compromised mental ability
- With cardiac dysfunction (uncontrolled hypertension or hypotension, irregular heartbeat)
- Over active or previous neoplasms
- Over compromised skin, unless treating wound specifically
- Over tissues that are vulnerable to hemorrhage
- Cervical region in patients with history of stroke or seizures
- Do not use within 5 yards of a diathermy unit or other source of electromagnetic radiation

› **Diagnosis/need for treatment:** Functional impairments related to ROM, strength, gait, and balance deficiencies; increased pain, edema, and stiffness
› **Rule out:** N/A
› **Prognosis**
  • UKA was associated with excellent results in patients with spontaneous osteonecrosis of the knee in one study identified in a systematic review(7)
  • Reports of survivorship of UKAs have generally been good with only a few studies not having favorable results
Ten-year survival rates of the knee implant are generally in the mid-90% range, with one study showing 10-year survival rates at 94-95% and 15-year rates at 93%\(^{(15)}\).

In a case series of 38 patients (49 knees) in the United States who had UKA, clinical and radiographic outcomes were reported to be excellent in the majority of knees evaluated at follow-up of ≥ 10 years\(^{(16)}\).

- Reported findings at final follow-up
  - Mean Hospital for Special Surgery knee score increased from 55 points preoperatively to 92 points
  - Thirty-nine knees (80%) had an excellent result, 6 (12%) had a good result, and 4 (8%) had a fair result
  - Component loosening was not observed on radiographs, and there was no evidence of periprosthetic osteolysis

Fifteen-year survivorship was 93% and 20-year survivorship was 90% in a series of patients with fixed-bearing cemented UKAs\(^{(25)}\).

- Based on a research study in the United States
- There were no cases of failure due to wear or loosening, and the survivorship was similar to what is reported for TKA
- UKAs have demonstrated poorer long-term survivorship when compared to TKAs due to the frequency for revisions\(^{(23)}\).
- Based on data obtained from the Finnish Arthroplasty Register involving 4,713 patients undergoing UKAs who had surgical revisions (between the years 1985 and 2011) and 83,511 patients undergoing TKAs who had surgical revisions in the same period
- Revision frequency for UKAs was much higher than for TKAs. Survivorship for UKAs was 89.4% at 5 years, 80.6% at 10 years, and 69.6% at 15 years. For TKAs, survivorship was 96.3%, 93.3%, and 88.7%, respectively

- Studies indicate that a high degree of patient satisfaction can be achieved in terms of sporting activity
  - In a study with 76 patients conducted in the United Kingdom, 93% of patients were able to resume prior sporting or physical activities\(^{(13)}\)
  - In a study with 131 patients conducted in Germany, 80.1% of patients returned to their pre-level of sports after surgery\(^{(26)}\)

Referral to other disciplines
- Physician for lack of progress, suspected infection or DVT, etc.
- Occupational therapy for deficits with ADLs
- Social services for home services or equipment needs

Other considerations
- There is debate about the advantages and disadvantages of mobile bearing vs. fixed bearing UKA\(^{(22)}\)
  - Fixed bearing UKAs result in a flat tibial articulating surface that is less conforming as flexion occurs in the knee\(^{(31)}\)
  - Fixed bearing prosthesis in UKAs is more popular with surgeons in the lateral compartment secondary to a higher rate of mobile bearing dislocations in the lateral compartment\(^{(41)}\)
  - Mobile bearing UKAs allow for more confined surfaces and larger contact areas that produce lower contact stress and improve wear characteristics\(^{(31)}\)
  - Mobile bearing UKA is indicated for anteromedial osteoarthritis of the knee with intact ligaments, correctable varus, fixed flexion deformity less than 15˚, and full thickness cartilage in the lateral compartment
  - Due to potential for degeneration of the ligaments in elderly patients, the sustainability of mobile bearing implants in patients over the age 80 has been questioned

- Two-stage versus single-stage UKA for treating bilateral arthritis\(^{(32)}\)
  - Based on a retrospective study in China conducted between 2006 and 2010
  - Of the total 394 UKAs that were performed by the same surgeon, 76 were bilateral procedures
  - From the study, the researchers concluded the following:
    - The average length of stay for a bilateral single-stage UKA was 3.5 days, which was comparable to the institutional average of 2 days for a single UKA
    - A bilateral single-stage UKA can be performed with a low complication rate as no major complications were reported
    - A bilateral single-stage UKA has the advantage of involving one hospital admission versus two hospital admissions in the case of a two-stage UKA, thus reducing medical costs incurred by the medical facility

- Accelerated vs. conventional care programs
  - An accelerated care program may reduce length of hospital stay in patients having UKA compared to conventional care\(^{(18,19)}\)
Based on 2 small randomized trials
- Forty patients having UKA were randomized to accelerated care vs. conventional care\(^{(18)}\) in Denmark
  - Accelerated care included:
    - A preoperative information meeting
    - Perioperative intraarticular infiltration with bupivacaine and adrenaline
    - NSAIDs postoperatively
  - Conventional care included an epidural pain pump for 2 days postoperatively
  - All patients received opiates for breakthrough pain
  - When patients could climb stairs to the second floor within 5 minutes, they were able to be discharged
  - Comparing accelerated care vs. conventional care
    - Median length of stay was 1 day vs. 6 days
    - No significant differences in average pain on days 1 and 2, use of opioids, Knee Society scores, and level of satisfaction

Forty one patients having UKA were randomized to an accelerated recovery group vs. standard recovery group\(^{(19)}\) in the United Kingdom
- Accelerated recovery group included early mobilization postoperatively (within 2 hours of surgery, pending patient status) and goal of discharge within 24 hours
- Standard recovery group did not have the discharge urgency of the accelerated group but rather utilized standard discharge preparation
- Primary outcome measure was the Oxford Knee Assessment
- Comparing accelerated recovery group vs. standard recovery group
  - Average length of stay was 1.5 days vs. 4.3 days (accelerated recovery group associated with a cost savings of 27%)
  - No significant difference in the Oxford Knee Assessment at 6 months

Researchers determine the feasibility for a rapid recovery pathway for same day discharge of patients who underwent UKA\(^{(38,39)}\)

- In a retrospective study in Germany, 105 patients were discharged on the same day as surgery. No patients required readmission in the first week post-operatively. One patient required readmission secondary to a post-operative infection after week 1
- In a study in the United States, 160 patients (average age 65) were discharged day of surgery. Perioperative pain control included a femoral nerve block. Average recovery room time was 121 minutes with no overnight admissions secondary to uncontrolled pain or nausea. Researchers observed high patient satisfaction scores and significant improvements in Knee Society Clinical Rating System (KSCRS)
  - Maximum isometric knee extension was significantly reduced 1-2 weeks after UKA, suggesting that muscle weakness is due to central nervous system (CNS) inhibition\(^{(29)}\)
  - Motor imagery and mental practice are treatment options that can increase muscle strength due to enhanced cortical output signals

Treatment summary
- Pain management, strengthening, stretching, and balance and gait/stair training are the main physical therapy interventions recommended
  - In the acute setting, the focus is on bed mobility, transfers, and gait training, with the initiation of gentle ROM and strengthening exercises. Most patients have full weight-bearing status postoperatively\(^{(20)}\)
  - In the subacute phase, gait and stair training continue, along with more-intensive ROM, strengthening, and stretching
  - The outpatient phase is concentrated on ROM, strength, gait, balance, proprioceptive training, and return to prior level of function, although any remaining deficits in other areas should continue to be addressed
  - It has been shown that preoperative physical therapy intervention does not provide a significant benefit.\(^{(21)}\) However, preoperative education can be helpful to inform the patient about the surgery and rehabilitative process, so the patient knows what to expect and can be more prepared when the procedure is performed
- Physical therapy kneeling intervention was associated with improved kneeling ability in patients with UKA\(^{(22)}\)
  - Based on a small randomized trial in the United Kingdom
  - Sixty patients with medial compartment OA who had a UKA were randomized at postoperative week 6 to physical therapy kneeling intervention vs. routine care
  - Physical therapy intervention involved kneeling advice and education
- Routine care involved no kneeling advice or instruction given
–Postoperative reassessment after 1 year
–There was significant improvement in patient-reported kneeling ability in those receiving the kneeling intervention compared to routine care

- Accelerated rehabilitation program provides improved clinical outcomes following an Oxford UKA\(^{(30)}\)
–Oxford procedure allows the femur to always be in contact with the tibia. The polyethylene component is allowed to move slightly, allowing for more uniform contact between the components
–Retrospective study in the United Kingdom involving 106 patients (187 knees) who were followed for 5 years
–All patients received an accelerated rehabilitation program consisting of the following:
  - Evaluation by a physical therapist postoperative day 1 followed by gentle knee flexion and extension mobility with isometric quadriceps exercises
  - Full weight-bearing and ambulation were initiated using assistive devices
  - Postoperative day 2 activities included review of home exercise program (HEP), continuation of gait, and stair mobility training
  - Prior to discharge, instructions were given when to increase intensity level of exercises during the first 6 postoperative weeks
–Authors of this retrospective study found that patients following the accelerated program demonstrated improved health-related quality of life and improved functional and clinical outcomes

<table>
<thead>
<tr>
<th>Problem</th>
<th>Goal</th>
<th>Intervention</th>
<th>Expected Progression</th>
<th>Home Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain and edema</td>
<td>Reduce/resolve pain and edema</td>
<td><strong>Physical agents and mechanical modalities</strong></td>
<td>Physical agents should temporarily alleviate pain for the patient</td>
<td>Patient should be educated on proper use of cold/heat packs and the RICE concept</td>
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<td></td>
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<td>Cryotherapy may be used to treat pain and edema</td>
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<td></td>
<td><strong>Prescription, application of devices and equipment</strong></td>
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<td>Compression stockings to control edema</td>
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<tr>
<td>Complications, including adhesions,</td>
<td>Identify and address complications; refer to physician as indicated</td>
<td><strong>Therapeutic strategies</strong></td>
<td>N/A</td>
<td>Educate patient and caregivers on signs and symptoms to look for</td>
</tr>
<tr>
<td>arthrofibrosis of the joint, DVT, infection,</td>
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<td>Educate the patient on the importance of early mobility and ROM exercises and activities such as ankle pumps for the prevention of DVT</td>
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<td>rejection of the implant, and need for revision</td>
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<tr>
<td>Reduced knee ROM</td>
<td>Improve knee ROM</td>
<td><strong>Stretching exercises</strong></td>
<td><strong>Stretching exercises</strong></td>
<td>Patient can be provided stretches/ROM activities that can be done safely at home</td>
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<td>In the acute setting, supine heel slides using a sheet or strap for knee flexion, quad sets to emphasize extension</td>
<td>In the subacute setting, heel slides continue, with the addition of seated towel slides, lunges on a stool, and prolonged low-load flexion stretches</td>
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<td></td>
<td><strong>Manual therapy</strong></td>
<td><strong>Manual therapy</strong></td>
<td><strong>Other therapeutic strategies</strong></td>
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<td>PROM and joint mobilization to increase flexion and extension of the knee. Patellar mobilization to increase patellar mobility, as indicated (ensure approval from physician). Scar massage if adherence and decreased scar mobility is noted</td>
<td>In the outpatient setting, prolonged low-load flexion stretches and lunges continue with increased intensity and progressing flexion ROM. For extension, prolonged prone knee hanging or (in supine) positioning of heel on a towel with a light weight on the distal femur may facilitate improved extension</td>
<td><strong>Recumbent bike:</strong> Initially may be used to facilitate increased flexion ROM of the knee; once a full revolution is easily accomplished, progress to resistance to increase muscle strength and endurance, as well as cardiovascular endurance</td>
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<td></td>
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<td><strong>Other therapeutic strategies</strong></td>
<td><strong>Other therapeutic strategies</strong></td>
<td><strong>Physical agents/mechanical modalities</strong></td>
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<td></td>
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<td>CPM in acute and subacute setting as indicated and ordered by physician</td>
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<td>Moist heat pack to increase tissue elasticity prior to manual therapy and stretching exercise</td>
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<tr>
<td>Quadriiceps, hamstring, and generalized lower extremity muscle weakness or atrophy</td>
<td>Improve muscle strength and resolve atrophy</td>
<td><strong>Therapeutic exercise</strong></td>
<td><strong>Therapeutic exercise</strong></td>
<td>Home exercise program: Stretching and strengthening exercises, as appropriate</td>
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<td>In the acute phase, ankle pumps, quad sets, gluteal sets, active-assistive ROM long arc quads, short arc quads, AROM hamstring curls, and supine abduction-adduction are all appropriate. These exercises may begin with 2 sets of 10 and be increased, as tolerated by the patient</td>
<td>In the subacute phase, AROM and seated and standing (parallel bars) strengthening exercises, with progression from AROM to light ankle cuff weights, as tolerated by the patient</td>
<td>In the outpatient setting, progression of strengthening exercises to straight leg raises, side-lying abduction/adduction, and prone hip extension</td>
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<td><strong>Aquatic therapy</strong></td>
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<td>May be used to facilitate increased muscle strength with decreased compressive forces on the knee, AROM for all hip and knee movements, and pool walking</td>
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<td><strong>Physical agents/mechanical modalities</strong></td>
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<td>Neuromuscular electrical stimulation (NMES) to facilitate quadriceps strengthening, as indicated</td>
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<td>Impaired gait</td>
<td>Return to normal gait</td>
<td><strong>Gait and stair training</strong></td>
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<td>In acute phase, provide AD and instruction, as needed</td>
<td>In later phases, progress to less restrictive devices, then to no device. Follow the progression with ambulation in different directions and tandem walking</td>
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<td>Stair training with device and step-to-step pattern initially, progressing to no device and step-over-step, as the patient is able</td>
<td>Most patients can ambulate independently within 1 to 2 weeks postoperatively&lt;sup&gt;(20)&lt;/sup&gt;</td>
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</tbody>
</table>
| Impaired mobility and ADLs | Improve mobility and ADLs | **Bed mobility/transfer training**
In the acute phase, bed mobility and transfer training to assist patient in progressing to independent transfers, especially with supine to sit, getting the operated leg on and off the bed

Refer to occupational therapy as indicated | Progress each unique patient as appropriate and indicated | Incorporate activities into home program that address impaired mobility and ADLs

| Impaired balance and proprioception | Improve balance and proprioception | **Balance training**
In initial phases, standing reaching activities; progress in later phases to single limb stance activities with progressive challenges to balance

Sport- and activity-specific training, agility training | Progress as appropriate | May provide patient with simple exercises that can be done safely at home

### Desired Outcomes/Outcome Measures

- **Desired outcomes/Outcome measures**
  - Reduced pain
    - VAS
  - Reduced edema
    - Circumferential measurements
  - Improved knee ROM
    - Goniometric measurements
  - Improved muscle strength
    - Dynamometry, MMT
  - Returned to normal gait
    - TUG tests, DGI, 6MWT
  - Improved mobility and ADLs; returned to desired activities/sport
    - UCLA activity level scale, Hospital for Special Surgery Knee score, American Knee Society Score, Barthel Index, FIM, LEFS
  - Improved balance
    - Berg Balance Scale, Tinetti Balance Scale, Star Excursion test, Single Limb stance

### Maintenance or Prevention

- Home exercise program for maintenance of mobility and strength
Avoidance of high-impact activities to prevent premature wear of the replacement, resulting in need for revision

Patient Education


Note

Recent review of the literature has found no updated research evidence on this topic since previous publication on February 12, 2016.

Coding Matrix

References are rated using the following codes, listed in order of strength:

- **M** Published meta-analysis
- **SR** Published systematic or integrative literature review
- **RCT** Published research (randomized controlled trial)
- **R** Published research (not randomized controlled trial)
- **C** Case histories, case studies
- **G** Published guidelines
- **RV** Published review of the literature
- **RU** Published research utilization report
- **GI** Published quality improvement report
- **L** Legislation
- **PGR** Published government report
- **PFR** Published funded report
- **PP** Policies, procedures, protocols
- **X** Practice exemplars, stories, opinions
- **GI** General or background information/texts/reports
- **RU** Unpublished research, reviews, poster presentations or other such materials
- **CP** Conference proceedings, abstracts, presentation

References


