

Cigna Medical Coverage Policies – Musculoskeletal Knee Replacement/Arthroplasty

Effective August 1, 2024



Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

CPT® (Current Procedural Terminology) is a registered trademark of the American Medical Association (AMA). CPT® five digit codes, nomenclature and other data are copyright 2024 American Medical Association. All Rights Reserved. No fee schedules, basic units, relative values or related listings are included in the CPT® book. AMA does not directly or indirectly practice medicine or dispense medical services. AMA assumes no liability for the data contained herein or not contained herein.

CMM-311: Knee Replacement/Arthroplasty

Definitions

General Guidelines

Partial Knee Replacement

Total Knee Replacement

Revision of Knee Replacement

Arthroscopic or Open Abrasion Arthroplasty Procedures of the Patella (without prosthesis), Femoral Condyles, or Tibial Plateau

Procedure (CPT®) Codes (CMM-311)

References (CMM-311)

Definitions

- **Kellgren-Lawrence Grading System:** a radiographic grading system describing osteoarthritic changes to the tibial-femoral joint of the knee. When used, the radiographic findings on plain x-rays are typically reported within one of the following categories:
 - ◆ **Grade I** – Doubtful narrowing of joint space and possible osteophytic lipping
 - ◆ **Grade II** – Definite osteophytes and possible narrowing of joint space
 - ◆ **Grade III** – Moderate multiple osteophytes, definite narrowing of joint space, some sclerosis, and possible deformity of bone contour
 - ◆ **Grade IV** – Large osteophytes, marked narrowing of joint space, severe sclerosis, and definite deformity of bone contour
- **Knee Arthroplasty:** an orthopaedic surgical procedure during which the articular surface of the knee joint is replaced, remodeled, or realigned.
- **Knee Replacement:** a form of arthroplasty that includes the surgical replacement of the knee joint with a prosthesis.
- **Modified Outerbridge Classification:** a system developed for judging articular cartilage injury to the knee. This system allows delineation of varying areas of chondral pathology, based on the qualitative appearance of the cartilage surface as viewed on MRI, and can assist in identifying those injuries that are suitable for repair techniques. The characterization of cartilage in this system is as follows:
 - ◆ **Grade I** – Softening with swelling
 - ◆ **Grade II** – Fragmentation and fissuring less than one square centimeter (1 cm²)
 - ◆ **Grade III** – Fragmentation and fissuring greater than one square centimeter (1 cm²)
 - ◆ **Grade IV** – Subchondral bone exposed
- **Non-Surgical Management** (with regard to the treatment of knee osteoarthritis): any provider-directed non-surgical treatment, which has been demonstrated in the scientific literature as efficacious and/or is considered reasonable care in the treatment of knee pain from osteoarthritis. The types of treatment involved can include, but are not limited to, the following: relative rest/activity modification; weight loss; supervised physiotherapy modalities and therapeutic exercises; prescription and non-prescription medications; assistive devices; and/or, intra-articular injections.
- **Outerbridge Classification:** a system that has been developed for judging articular cartilage injury to the knee. This system allows delineation of varying areas of chondral pathology, based on the qualitative appearance of the cartilage surface as viewed by direct visualization intraoperatively, and can assist in identifying those injuries that are suitable for repair techniques. The characterization of cartilage in this system is as follows:
 - ◆ **Grade I** - Softening with swelling
 - ◆ **Grade II** - Fragmentation and fissuring less than one square centimeter (1 cm²)
 - ◆ **Grade III** - Fragmentation and fissuring greater than one square centimeter (1 cm²)
 - ◆ **Grade IV** - Subchondral bone exposed
- **Partial Knee Replacement:** surgical reconstruction or replacement of one joint surface of the knee joint as a result of unicompartmental (e.g., medial, lateral, or patellofemoral) involvement.

- **Prosthesis:** an artificial device used to replace a structural element within a joint to improve and enhance function.
- **Revision of Knee Replacement (Partial or Total):** surgical reconstruction or replacement due to failure or complications of previous knee replacement.
- **Total Knee Replacement:** surgical reconstruction or replacement of the entire knee joint as a result of unicompartmental, bicompartamental, or tricompartmental involvement.

General Guidelines

Application of Guideline

- The determination of medical necessity for the performance of knee replacement (partial or total) is always made on a case-by-case basis.
- For the advanced imaging indications prior to knee replacement surgery refer to **MS-12: Osteoarthritis** and **MS-25: Knee**
- For advanced imaging indications following knee replacement surgery refer to **MS-16: Post-Operative Joint Replacement Surgery** and **MS-25: Knee**
- For indications and non-indications of lysis of adhesions refer to **CMM-312: Knee Surgery - Arthroscopic and Open Procedures**
- For indications and non-indications of trochleoplasty using CPT® 27442 for trochlear dysplasia in individuals with patellar instability refer to patellofemoral conditions in **CMM-312: Knee Surgery - Arthroscopic and Open Procedures**

Partial Knee Replacement

Partial Knee Replacement Indications

Partial Knee Replacement - Medial, Lateral, or Patellofemoral Unicompartmental

Partial knee replacement (medial, lateral, or patellofemoral unicompartmental) is considered **medically necessary** when **ALL** of the following criteria have been met:

- Imaging or arthroscopic findings show **EITHER** of the following:
 - ◆ Severe unicompartmental (medial, lateral, or patellofemoral) osteoarthritis as evidenced by **ANY** of the following:
 - Kellgren-Lawrence grade IV radiographic findings
 - Outerbridge Classification grade IV arthroscopic findings **AND** not a candidate for joint sparing procedure
 - Modified Outerbridge Classification grade IV MRI findings **AND** not a candidate for joint sparing procedure
 - ◆ Unicompartmental avascular necrosis (AVN) of the femoral condyles and/or proximal tibia
- Physical exam demonstrates **BOTH** of the following:
 - ◆ Knee stability
 - ◆ Knee arc of motion (full extension to full flexion) greater than 90°

- Symptoms include **BOTH** of the following:
 - ◆ Function-limiting pain at short distances (e.g., walking less than ¼ mile, limiting activity to two city blocks, the equivalent to walking the length of a shopping mall) for at least three (3) months duration
 - ◆ Loss of knee function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment
- Failure of at least three (3) months of provider-directed non-surgical management
 - ◆ **Criteria exception:** Provider-directed non-surgical management may be inappropriate. The medical record must clearly document why provider-directed non-surgical management is not appropriate.
 - ◆ **Note:** It is incumbent on the surgeon to preoperatively optimize reasonably modifiable medical and behavioral health comorbidities.

Patellofemoral Unicompartmental Replacement Following a Total Knee Replacement

Patellofemoral unicompartmental replacement is considered **medically necessary** when **ALL** of the following criteria have been met:

- Procedure is performed to manage protracted anterior knee pain and/or mechanical symptoms attributed to the patellofemoral joint following a total knee replacement, during which patellar replacement was **NOT** performed at the time of the index knee replacement
- Physical exam demonstrates **BOTH** of the following findings:
 - ◆ Intact, stable ligaments
 - ◆ Knee arc of motion (full extension to full flexion) greater than 90°
- Symptoms include **BOTH** of the following:
 - ◆ Function-limiting pain at short distances (e.g., walking less than ¼ mile, limiting activity to two city blocks, the equivalent to walking the length of a shopping mall)
 - ◆ Loss of knee function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment
- Failure of at least three (3) months of provider-directed non-surgical management
 - ◆ **Criteria exception:** Provider-directed non-surgical management may be inappropriate. The medical record must clearly document why provider-directed non-surgical management is not appropriate.
 - ◆ **Note:** It is incumbent on the surgeon to preoperatively optimize reasonably modifiable medical and behavioral health comorbidities.

Partial Knee Replacement Non-Indications

Not Medically Necessary

- Partial knee replacement (medial, lateral, or patellofemoral unicompartmental) is considered **not medically necessary** for any other indication, condition, or when **ANY** of the following conditions are present:
 - ◆ When unicompartmental replacement is to be performed of the medial or lateral compartment:
 - Grade IV patellofemoral joint osteoarthritis involving the lateral patella facet and/or lateral trochlea as evidenced by **EITHER** of the following:
 - Kellgren-Lawrence grade IV radiographic findings
 - Outerbridge Classification grade IV arthroscopic findings

- ◆ When unicompartmental replacement is to be performed of the patellofemoral compartment:
 - Grade III or IV medial or lateral compartment osteoarthritis as evidenced by **EITHER** of the following findings:
 - Kellgren-Lawrence grade III or IV radiographic findings
 - Outerbridge Classification grade III or IV arthroscopic findings
 - Patellar malalignment syndrome identified by having **EITHER** of the following:
 - An increased Q angle (15° in males or 20° in females)
 - Tibial tuberosity-trochlear groove (TT-TG) distance 20 mm
- ◆ Tibial or femoral shaft deformity
- ◆ Radiographic evidence of medial or lateral subluxation
- ◆ Flexion contracture greater than 15°
- ◆ Varus deformity greater than 15°
- ◆ Valgus deformity greater than 20°
- ◆ Knee varus deformity of $\geq 10^{\circ}$ and sagittal tibiofemoral subluxation of ≥ 6 mm consistent with an ACL deficient osteoarthritic knee
- ◆ Charcot joint
- ◆ Inflammatory arthropathy
- ◆ Active local or systemic infection
- ◆ Vascular insufficiency defined as ankle brachial index of < 0.5 , significant muscular atrophy of the leg, or neuromuscular disease that is severe enough to compromise implant stability or post-operative recovery

Experimental, Investigational, or Unproven (EIU)

- Based on lack of scientific evidence of efficacy and safety, the following are considered **experimental, investigational, or unproven (EIU)**:
 - ◆ Bicompartamental knee arthroplasty (modular or monolithic/nonmodular)
 - ◆ Bi-unicompartmental knee arthroplasty
 - ◆ Focal resurfacing of a single knee joint defect (e.g., Arthrosurface[®] femoral condyle implant)
 - ◆ Unicompartmental free-floating (un-fixed) interpositional device (e.g., UniSpacer[®])

Total Knee Replacement

Total Knee Replacement Indications

Total knee replacement is considered **medically necessary** for **ANY** of the following conditions when **ALL** of the associated criteria have been met:

Fracture of Distal Femur

- Imaging shows a fracture of the distal femur
- Conservative management or surgical fixation is not considered a reasonable option

Osteoarthritis (OA) or Avascular Necrosis (AVN)

- Imaging or arthroscopic findings show **EITHER** of the following:
 - ◆ Severe unicompartmental (medial, lateral, or patellofemoral), bicompartamental, or tricompartmental osteoarthritis as evidenced by **ANY** of the following:
 - Kellgren-Lawrence grade III or IV radiographic findings
 - Outerbridge Classification grade IV arthroscopic findings **AND** not a candidate for joint sparing procedure
 - Modified Outerbridge Classification grade IV MRI findings **AND** not a candidate for joint sparing procedure
 - ◆ Avascular necrosis (AVN) of the femoral condyles and/or proximal tibia
- Symptoms include **BOTH** of the following:
 - ◆ Function-limiting pain at short distances (e.g., walking less than ¼ mile, limiting activity to two city blocks, the equivalent to walking the length of a shopping mall) for at least three (3) months duration
 - ◆ Loss of knee function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment
- Failure of at least three (3) months of provider-directed non-surgical management
 - ◆ **Criteria exception:** Provider-directed non-surgical management may be inappropriate. The medical record must clearly document why provider-directed non-surgical management is not appropriate.
 - ◆ **Note:** It is incumbent on the surgeon to preoperatively optimize reasonably modifiable medical and behavioral health comorbidities.

Total Knee Replacement Non-Indications

Not Medically Necessary

- Total knee replacement is considered **not medically necessary** for **ANY** other indication, condition, or when **ANY** of the following are present:
 - ◆ Joint instability (due to a lack of collateral ligament integrity) that is not amenable to surgical correction (e.g., specialized implant, constrained implant, or a hinge implant)
 - ◆ Greater than 30° of fixed varus or valgus deformity that is not amenable to surgical correction
 - ◆ Active local or systemic infection
 - ◆ Vascular insufficiency defined as ankle brachial index of <0.5, significant muscular atrophy of the leg, or neuromuscular disease that is severe enough to compromise implant stability or post-operative recovery

Experimental, Investigational, or Unproven (EIU)

- Based on lack of scientific evidence of efficacy and safety, the following are considered **experimental, investigational, or unproven (EIU)**:
 - ◆ Bicompartamental knee arthroplasty (modular or monolithic/nonmodular)
 - ◆ Bi-unicompartmental knee arthroplasty

Revision of Knee Replacement

Revision of Knee Replacement (Partial or Total) Indications

Revision of knee replacement includes any of the following: revision of a total knee replacement; revision of a medial, lateral, or patellofemoral unicompartmental replacement to another medial, lateral, or patellofemoral unicompartmental replacement; or, revision of a medial, lateral, or patellofemoral unicompartmental replacement to a total knee replacement.

- Revision of knee replacement is considered **medically necessary** for an individual who has previously undergone a partial or total knee replacement when **ANY** of the following post-operative conditions are present:
 - ◆ Fracture or dislocation of the patella
 - ◆ Aseptic loosening
 - ◆ Periprosthetic infection
 - ◆ Periprosthetic fracture
 - ◆ Implant fracture or component failure
 - ◆ Post-operative stiffness for more than 12 weeks when **BOTH** of the following criteria are met:
 - Manipulation is deemed unsafe by provider
 - Components are well-positioned, well-fixed, and appropriately-sized
 - ◆ Post-operative stiffness due to component sizing or positioning
 - ◆ Instability of the knee
 - ◆ Clinically significant, symptomatic limb malalignment due to existing component position
 - ◆ Greater than six (6) months of unexplained function-limiting pain at short distances (e.g., walking less than ¼ mile, limiting activity to two city blocks, the equivalent to walking the length of a shopping mall) that is unresponsive to provider-directed non-surgical management
 - ◆ If revising from a partial (unicompartmental) knee replacement to a total joint replacement: Kellgren-Lawrence grade IV radiographic findings in the non-replaced compartments (medial, lateral, or patellofemoral)

Revision of Knee Replacement (Partial or Total) Non-Indications

- Revision of knee replacement is considered **not medically necessary** for **ANY** other indication or condition.

Isolated Polyethylene Liner Exchange (IPE) Indications

Isolated polyethylene liner exchange (IPE) is considered **medically necessary** for **ANY** of the following conditions when **ALL** of the associated criteria have been met:

- Wear and Osteolysis with imaging studies confirming **BOTH** of the following findings:
 - ◆ Progressive osteolysis
 - ◆ Well-fixed implants in acceptable position

- Catastrophic polyethylene failure, (includes post-fracture, locking mechanism failure, and severe polyethylene wear) with **BOTH** of the following findings:
 - ◆ With, or at risk for, metallosis and polyethylene liner fracture
 - ◆ Without component loosening or malalignment
- An acute post-operative or hematogenous periprosthetic joint infection with well-fixed implants
- Stiffness following total knee replacement (flexion contracture of $>15^{\circ}$ with flexion limited to $<90^{\circ}$) with **BOTH** of the following:
 - ◆ Individual presents later than three (3) months from the index replacement procedure
 - ◆ Persistent restricted range-of-motion despite **BOTH** of the following treatments:
 - Physical therapy
 - Manipulation under anesthesia
- Instability without component malrotation or malalignment

Isolated Polyethylene Liner Exchange (IPE) Non-Indications

- Isolated polyethylene liner exchange (IPE) is considered **not medically necessary** for **ANY** other indication or condition.

Arthroscopic or Open Abrasion Arthroplasty Procedures of the Patella (without prosthesis), Femoral Condyles, or Tibial Plateau

- Arthroscopic or open abrasion arthroplasty procedures of the knee tibial plateau(s), patella, and/or femoral condyle(s), (with or without debridement and partial synovectomy) are considered **not medically necessary** for the treatment of symptomatic knee osteoarthritis.

Procedure (CPT®) Codes (CMM-311)

This guideline relates to the CPT® code set below. Codes are displayed for informational purposes only. Any given code's inclusion on this list does not necessarily indicate prior authorization is required.

CPT®	Code Description/Definition
27438	Arthroplasty, patella; with prosthesis
27440	Arthroplasty, knee, tibial plateau
27441	Arthroplasty, knee, tibial plateau; with debridement and partial synovectomy
27443	Arthroplasty, femoral condyles or tibial plateau(s), knee; with debridement and partial synovectomy
27445	Arthroplasty, knee, hinge prosthesis (e.g., Walldius type)
27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment
27447	Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or without patella resurfacing (total knee Arthroplasty)
27486	Revision of total knee Arthroplasty, with or without allograft; 1 component
27487	Revision of total knee Arthroplasty, with or without allograft; femoral and entire tibial component

This list may not be all-inclusive and is not intended to be used for coding/billing purposes. The final determination of reimbursement for services is the decision of the health plan and is based on the individual's policy or benefit entitlement structure as well as claims processing rules.

References (CMM-311)

1. Abdel MP, Bonadurer III GF, Jennings MT, et al. Increased Aseptic Tibial Failures in Patients with a BMI \geq 35 and Well-Aligned Total Knee Arthroplasties. *J Arthroplasty*. 2015;30:2181-2184.
2. Abdel MP, Ast MP, Lee Y, et al. All-Cause In-Hospital Complications and Urinary Tract Infections Increased in Obese Patients Undergoing Total Knee Arthroplasty. *J Arthroplasty*. 2014;29:1430-1434.
3. Ackroyd CE, Newman JH, Evans R, et al. The Avon patellofemoral arthroplasty: Five-year survivorship and functional results. *J Bone Joint Surg Br*. 2007;89(3):310-315.
4. Adams A, Kazarian G, Lonner J. Preoperative Patellofemoral Chondromalacia is Not a Contraindication for Fixed-Bearing Medial Unicompartmental Knee Arthroplasty. *J Arthroplasty*. 2017;32(6):1786-1791. doi: 10.1016/j.arth.2017.01.002.
5. Adhikary SD, Liu W, Memtsoudis SG, et al. Body Mass Index More Than 45 kg/m² as a Cutoff Point Is Associated With Dramatically Increased Postoperative Complications in Total Knee Arthroplasty and Total Hip Arthroplasty. *J Arthroplasty*. 2016;31:749-753.
6. Adrados M, Samuel LT, Locklear TM, Moskal JT. Institutional Adherence to the American Association of Hip and Knee Surgeons Body Mass Index Guidelines Lowers Perioperative Emergency Department Visits in Primary Total Knee Arthroplasty. *J Arthroplasty*. Published online February 2023. doi: 10.1016/j.arth.2023.02.034.
7. Al-Hadithy N, Patel R, Navadgi B, et al. Mid-term results of the FPV patellofemoral joint replacement. *Knee*. 2014;21(1):138-141. doi: 10.1016/j.knee.2013.08.010.
8. Altman, R, et al. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. *Arthritis Rheum*. 2000;43(9):1905-1915.
9. Altman R, Lim S, Steen RG, Dasa V. Hyaluronic Acid Injections Are Associated with Delay of Total Knee Replacement Surgery in Patients with Knee Osteoarthritis: Evidence from a Large U.S. Health Claims Database. *PLoS ONE*. 2015;10(12):e0145776. doi:10.1371/journal.pone.0145776.
10. Altman R, Fredericson M, Bhattacharyya S, et al. Association between Hyaluronic Acid Injections and Time-to-Total Knee Replacement Surgery. *J Knee Surg*. 2016;29:564-570.
11. Alvi HM, Mednick RE, Krishnan V, et al. The Effect of BMI on 30 Day Outcomes Following Total Joint Arthroplasty. *J Arthroplasty*. 2015;30:1113-1117.
12. American Academy of Orthopaedic Surgeons (AAOS). *AAOS clinical guideline on osteoarthritis of the knee*. 2nd ed. 2013. Available at: <http://www.aaos.org/Research/guidelines/TreatmentofOsteoarthritisoftheKneeGuideline.pdf>.
13. American Academy of Orthopaedic Surgeons (AAOS). *Surgical Management of the Knee Appropriate Use Criteria*. AAOS. 2016. Available at: https://www.orthoguidelines.org/go/auc/auc.cfm?auc_id=224986.
14. Amit P, Singh N, Soni A, Bowman N, Maden M. Systematic Review of Modular Bicompartamental Knee Arthroplasty for Medio-Patellofemoral Osteoarthritis. *J Arthroplasty*. 2020;35(3):893-899.e3. doi: 10.1016/j.arth.2019.09.042.
15. Bailie A, Lewis P, Brumby SA et al. The Unispacer knee implant: Early clinical results. *J Bone Joint Surg Br*. 2008;90(4):446-450.
16. Baker RP, Masri BA, Greidanus NV, et al. Outcome After Isolated Polyethylene Tibial Insert Exchange in Revision Total Knee Arthroplasty. *J Arthroplasty*. 2013;28(1):1-6.
17. Beard D, Davies L, Cook J et al. The clinical and cost-effectiveness of total versus partial knee replacement in patients with medial compartment osteoarthritis (TOPKAT): 5-year outcomes of a randomised controlled trial. *Lancet*. 2019;394(10200):746-756. doi: 10.1016/s0140-6736(19)31281-4.
18. Bedard NA, Pugely AJ, Elkins JM, Duchman KR, Westermann RW, Liu SS, Gao Y, Callaghan JJ. The John N. Insall Award: do intraarticular injections increase the risk of infection after TKA? *Clin Orthop Relat Res*. 2017;475(1):45-52.
19. Berend KR, Berend ME, Dalury DF, et al. Consensus statement on indications and contraindications for medial unicompartmental knee arthroplasty. *J Surg Orthop Adv*. 2015;24(4):252-256. doi: 10.3113/JSOA.2015.0252.
20. Berend KR, Lombardi AV Jr, Adams JB. Obesity, young age, patellofemoral disease, and anterior knee pain: identifying the unicondylar arthroplasty patient in the United States. *Orthopedics*. 2007;30(5, suppl):19-23.
21. Berger Y, Ftaita S, Thienpont E. Does Medial Patellofemoral Osteoarthritis Influence Outcome Scores and Risk of Revision After Fixed-bearing Unicompartmental Knee Arthroplasty?. *Clin Orthop Relat Res*. 2019;477(9):2041-2047. doi: 10.1097/corr.0000000000000738.
22. Bing MR, Di Cesar's PE. Stiffness after total knee arthroplasty. *J Am Acad Orthop Surg*. 2004;12:164-171.
23. Boissonneault A, Pandit H, Pegg E et al. No difference in survivorship after unicompartmental knee arthroplasty with or without an intact anterior cruciate ligament. *Knee Surg Sports Traumatol Arthrosc*. 2013;21(11):2480-2486. Epub 2012 Jul 11. doi: 10.1007/s00167-012-2101-8.
24. Borus T, Thornhill T. Unicompartmental knee arthroplasty. *J Am Acad Orthop Surg*. 2008;16(1):9-18.
25. Bradbury T, Fehring TK, Taunton M, et al. The fate of acute methicillin resistant Staphylococcus aureus periprosthetic knee infections treated by open debridement and retention of components. *J Arthroplasty*. 2009;24(6):101-104. doi: 10.1016/j.arth.2009.04.028.

26. Browne J, Casp A, Cancienne J, Werner B. Peritoneal Dialysis Does Not Carry the Same Risk as Hemodialysis in Patients Undergoing Hip or Knee Arthroplasty. *J Bone Joint Surg.* 2019;101(14):1271-1277. doi: 10.2106/jbjs.18.00936.
27. Burger J, Kleeblad L, Laas N, Pearle A. The Influence of Preoperative Radiographic Patellofemoral Degenerative Changes and Malalignment on Patellofemoral-Specific Outcome Scores Following Fixed-Bearing Medial Unicompartmental Knee Arthroplasty. *J Bone Joint Surg.* 2019;101(18):1662-1669. doi: 10.2106/jbjs.18.01385.
28. Center for Disease Control and Prevention (CDC). Defining adult overweight and obesity. Updated June 16, 2016. <https://www.cdc.gov/obesity/adult/defining.html>.
29. Chalmers BP, Mehrotra KG, Sierra RJ, Pagnano MW, Taunton MJ, Abdel MP. Reliable outcomes and survivorship of unicompartmental knee arthroplasty for isolated compartment osteonecrosis. *Bone Joint J.* 2018;100-B(4):450-454.
30. Chewy VA, Foran JRH, Paxton RH RT et al. Arthrofibrosis associated with total knee arthroplasty. *J Arthroplasty.* 2017;32:2604-2611.
31. Chotanaphuti T, Courtney PM, Fram B, et al. Hip and knee section, treatment, algorithm: proceedings of international consensus on orthopedic infection. *J Arthroplasty.* 2019;34:S393-S397. doi: 10.1016/j.arth.2018.09.024.
32. Confalonieri N, Manzotti A, Cerveri P, De Momi E. Bi-unicompartmental versus total knee arthroplasty: A matched paired study with early clinical results. *Arch Orthop Trauma Surg.* 2008.
33. Cooper H, Moya-Angeler J, Bas-Aguilar M, Hepinstall M, Scuderi G, Rodriguez J. Isolated Polyethylene Exchange With Increased Constraint Is Comparable to Component Revision TKA for Instability in Properly Selected Patients. *J Arthroplasty.* 2018;33(9):2946-2951. doi:10.1016/j.arth.2018.04.042.
34. D'Apuzzo M, Novicoff W, Browne J. The John Insall Award: Morbid Obesity Independently Impacts Complications, Mortality, and Resource Use After TKA. *Clin Orthop Relat Res: CORR®.* 2014;473(1):57-63. doi: 10.1007/s11999-014-3668-9.
35. Davies AP. High early revision rate with the FPV patella-femoral unicompartmental arthroplasty. *Knee.* 2013;20(6):482-484.
36. Deshmukh R, Hayes J, Pinder I. Does body weight influence outcome after total knee arthroplasty? A 1-year analysis. *J Arthroplasty.* 2002;17(3):315-319.
37. Dewan A, Bertolusso R, Karastinos A, Conditt M, Noble PC, Parsley BS. Implant Durability and Knee Function After Total Knee Arthroplasty in the Morbidly Obese Patient. *J Arthroplasty.* 2009;24(6)(Suppl 1):89-94. doi: 10.1016/j.arth.2009.04.024.
38. Deyle G, Allen C, Allison S et al. Physical Therapy versus Glucocorticoid Injection for Osteoarthritis of the Knee. *NEJM.* 2020;382(15):1420-1429. doi: 10.1056/nejmoa1905877.
39. Deyle GD, Allison SC, Matekel RL, et al. Physical Therapy Treatment Effectiveness for Osteoarthritis of the Knee: A Randomized Comparison of Supervised Clinical Exercise and Manual Therapy Procedures versus a Home Exercise Program. *Phys Ther.* 2005;85(12):1301-1317.
40. Dowsey MM, Brown WA, Cochrane A, Burton PR, Liew D, Choong PF. Effect of Bariatric Surgery on Risk of Complications After Total Knee Arthroplasty. *JAMA Network Open.* 2022;5(4):e226722. doi: 10.1001/jamanetworkopen.2022.6722.
41. Dowsey MM, Liew D, Stoney JD, et al. The impact of pre-operative obesity on weight change and outcome in total knee replacement. *J Bone Joint Surg Br.* 2010;92-B:513-520.
42. Dy CJ, Franco N, Ma Y, et al. Complications after patella-femoral versus total knee replacement in the treatment of isolated patella-femoral osteoarthritis. A meta-analysis. *Knee Surg Sports Traumatol Arthrosc.* 2012;20:2174-2190.
43. Ennis H, Phillips J, Jennings JM, Dennis DA. Patellofemoral Arthroplasty. *JAAOS.* 2023;31(19):1009-1017. doi: 10.5435/jaaos-d-23-00022.
44. Escobar A, Quintana J, Bilbao A. et al. Effect of patient characteristics on reported outcomes after total knee replacement. *Rheumatology.* 2007;46(1):112-119.
45. Ethgen O, Bruyère O, Richy F, et al. Health-related quality of life in total hip and total knee arthroplasty. A qualitative and systematic review of the literature. *J Bone Joint Surg Am.* 2004;86-A(5):963-974.
46. Farshad M, Burgstaller JM, Held U, et al. Do preoperative corticosteroid injections increase the risk for infections or wound healing problems after spine surgery? *Spine.* 2018;43(15):1089-1094.
47. Fillingham Y, Della Valle C, Bohl D et al. Serum Metal Levels for Diagnosis of Adverse Local Tissue Reactions Secondary to Corrosion in Metal-on-Polyethylene Total Hip Arthroplasty. *J Arthroplasty.* 2017;32(9):S272-S277. doi: 10.1016/j.arth.2017.04.016.
48. Fitzsimmons SE, Vazquez EA, Bronson MJ. How to Treat the Stiff Total Knee Arthroplasty? A Systematic Review. *Clin Orthop Relat Res.* 2010;468:1096-1106.
49. Franklin PD, Rosal MC. Can Knee Arthroplasty Play a Role in Weight Management in Knee Osteoarthritis? *Arthritis Care Res.* 2013;65(5):667-668.
50. Friedman RJ, Hess S, Berkowitz SD, et al. Complication Rates After Hip or Knee Arthroplasty in Morbidly Obese Patients. *Clin Orthop Relat Res.* 2013;471:3358-3366.

51. Gaulton TG, Fleisher LA, Neuman MD. The association between obesity and disability in survivors of joint surgery: analysis of the health and retirement study. *Br J Anaesth*. 2018;120(1):109-116.
52. George J, Piuze NS, Ng M, et al. Association Between Body Mass Index and Thirty-Day Complications After Total Knee Arthroplasty. *J Arthroplasty*. 2018;33:865-871.
53. Glassman, Andrew, Lachiewicz, et al. Chapter 9: Unicompartamental, Patellofemoral and Bicompartamental Arthroplasty. *Orthopaedic Knowledge Update: Hip and Knee Reconstruction*. 4th ed. 2011;107 & 109.
54. Goh GS, Schwartz AM, Friend J, et al. Patients who have Kellgren-Lawrence Grade 3 and 4 Osteoarthritis Benefit Equally From Total Knee Arthroplasty. *J Arthroplasty*. Published online April 2023. doi: 10.1016/j.arth.2023.03.068.
55. Griffen T, Maddern G, Rowden N, et al. *Unicompartamental knee arthroplasty for unicompartamental osteoarthritis: A systematic review. ASERNIP-S Report; 44*. North Adelaide, SA: Royal Australasian College of Surgeons, Australian Safety and Efficacy Register of New Interventional Procedures (ASERNIP)-Surgical; 2005.
56. Griffin T, Rowden N, Morgan D, et al. Unicompartamental knee arthroplasty for the treatment of unicompartamental osteoarthritis: A systematic study. *ANZ J Surg*. 2007;77(4):214-221.
57. Gwynne-Jones J, Wilson R, Wong J, Abbott J, Gwynne-Jones D. The Outcomes of Nonoperative Management of Patients with Hip and Knee Osteoarthritis Triaged to a Physiotherapy-Led Clinic at Minimum 5-Year Follow-Up and Factors Associated with Progression to Surgery. *J Arthroplasty*. 2020;35(6):1497-1503. doi: 10.1016/j.arth.2020.01.086.
58. Hamilton T, Pandit H, Maurer D et al. Anterior knee pain and evidence of osteoarthritis of the patellofemoral joint should not be considered contraindications to mobile-bearing unicompartamental knee arthroplasty. *Bone Joint J*. 2017;99-B(5):632-639. doi: 10.1302/0301-620x.99b5.bjj-2016-0695.r2.
59. Hawker G, Guan J, Croxford R, et al. A prospective population-based study of the predictors of undergoing total joint arthroplasty. *Arthritis Rheum*. 2006;54(10):3212-3220.
60. Heaps B, Blevins J, Chiu Y, Konopka J, Patel S, McLawhorn A. Improving Estimates of Annual Survival Rates for Medial Unicompartamental Knee Arthroplasty, a Meta-Analysis. *J Arthroplasty*. 2019;34(7):1538-1545. doi: 10.1016/j.arth.2019.02.061.
61. Heyse T, Chong L, Davis J, Haas S, Figgie M, Potter H. MRI Diagnosis of Patellar Clunk Syndrome Following Total Knee Arthroplasty. *HSS Journal*[®]. 2012;8(2):92-95. doi: 10.1007/s11420-011-9258-4.
62. Hoorntje A, Witjes S, Koenraadt KLM, Aarts R, Weert T, van Geenen RCI. More Severe Preoperative Kellgren-Lawrence Grades of Knee Osteoarthritis were Partially Associated with Better Postoperative Patient-Reported Outcomes in TKA Patients. *J Knee Surg*. 2019;32(3):211-217. doi: 10.1055/s-0038-1635114.
63. Hutt J, Sur A, Sur H, Ringrose A, Rickman M. Outcomes and early revision rate after medial unicompartamental knee arthroplasty: prospective results from a non-designer single surgeon. *BMC Musculoskel Disord*. 2018;19(1). doi: 10.1186/s12891-018-2099-2.
64. Inoue D, Yazdi H, Goswami K, Tan T, Parvizi J. Comparison of Postoperative Complications and Survivorship of Total Hip and Knee Arthroplasty in Dialysis and Renal Transplantation Patients. *J Arthroplasty*. 2020;35(4):971-975. doi: 10.1016/j.arth.2019.10.038.
65. Jacofsky DJ, Della Valle CJ, Meneghini, et al. Revision Total Knee Arthroplasty: What the Practicing Orthopaedic Surgeon Needs to Know. *J Bone Joint Surg Am*. 2010;92:1282-1292.
66. Jamali AA, Scott RD, Rubash HE, et al. *Am J Orthop*. 2009;38(1):17-23.
67. Jennings JM, Kleeman-Forsthuber K, Bolognesi MP. Medial unicompartamental arthroplasty of the knee. *J Am Acad Orthop Surg*. 2019;27:166-176. doi: 10.5435/JAAOS-D-17-00690.
68. Jones C, Beaupre L, Johnston D, Suarez-Almazor ME. Total joint arthroplasties: current concepts of patient outcomes after surgery. *Rheum Dis Clin North Am*. 2007;33(1):71-86.
69. Jones C, Voaklander D, Johnston D, et al. The effect of age on pain, function, and quality of life after total hip and knee arthroplasty. *Arch Intern Med*. 2001;161(3):454-460.
70. Joseph M, Achten J, Parsons N, Costa M. The PAT randomized clinical trial. *Bone Joint J*. 2020;102-B(3):310-318. doi: 10.1302/0301-620x.102b3.bjj-2019-0723.r1.
71. Jurgensmeier K, Jurgensmeier D, Kunz D, Fuerst P, Warth L, Daines S. Intra-articular Injections of the Hip and Knee With Triamcinolone vs Ketorolac: A Randomized Controlled Trial. *J Arthroplasty*. 2021;36(2):416-422. doi: 10.1016/j.arth.2020.08.036.
72. Kahn TL, Soheili A, Schwarzkopf R. Outcomes of Total Knee Arthroplasty in Relation to Preoperative Patient-Reported and Radiographic Measures. *Geriatr Orthop Surg Rehabil*. 2013;4(4):117-126. doi: 10.1177/2151458514520634.
73. Khanna G, Levy B. Oxford unicompartamental knee replacement: Literature review. *Orthopedics*. 2007;30(5 Suppl):11-14.
74. Kikuchi K, Hiranaka T, Kamenaga T, Hida Y, Fujishiro T, Okamoto K. Anterior Cruciate Ligament Deficiency is Not Always a Contraindication for Medial Unicompartamental Knee Arthroplasty: A Retrospective Study in Nondesigner's Japanese Hospital. *J Arthroplasty*. 2021;36(2):495-500. doi: 10.1016/j.arth.2020.08.024.

75. Kim YH, Park JW, Kim JS. 2017 Chitranjan S. Ranawat Award: does computer navigation in knee arthroplasty improve functional outcomes in young patients? A randomized study. *Clin Orthop Relat Res*. 2018;476(1):6-15. doi: 10.1007/s11999-0000000000000000.
76. King AH, Engasser WM, Sousa PL, et al. Patellar fracture following patellofemoral arthroplasty. *J Arthroplasty*. 2015;30(7):1203-1236.
77. Knifsund J, Hatakka J, Keemu H, Mäkelä K, Koivisto M, Niinimäki T. Unicompartamental Knee Arthroplasties are Performed on the Patients with Radiologically Too Mild Osteoarthritis. *Scand J Surg*. 2017;106(4):338-341. doi: 10.1177/1457496917701668.
78. Kolasinski S, Neogi T, Hochberg M et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. *Arthritis Care Res (Hoboken)*. 2020;72(2):149-162. doi: 10.1002/acr.24131.
79. Konan S, Haddad FS. Midterm Outcome of Avon Patellofemoral Arthroplasty for Posttraumatic Unicompartamental Osteoarthritis. *J Arthroplasty*. 2016;31:2657-2659.
80. König A, Walther M, Kirschner S, et al. Balance sheets of knee and functional scores 5 years after total knee arthroplasty for osteoarthritis: a source for patient information. *J Arthroplasty*. 2000;15(3):289-294.
81. Kulshrestha V, Datta B, Kumar S, et al. Outcome of Unicompartmental Knee Arthroplasty vs Total Knee Arthroplasty for Early Medial Compartment Arthritis: A Randomized Study. *J Arthroplasty*. 2017;32:1460-1469.
82. Lachiewicz PF, Soileau ES. Liner Exchange in Total Knee Arthroplasty. *J Surg Orthop Advan*. 2013;22(2):152-156.
83. Lim J, Chen J, Chong H et al. Pre-existing patellofemoral disease does not affect 10-year survivorship in fixed bearing unicompartmental knee arthroplasty. *Knee Surg Sports Traumatol Arthroscop*. 2018;27(6):2030-2036. doi: 10.1007/s00167-018-5169-y.
84. Lonner JH. Patellofemoral arthroplasty. *J Am Acad Orthop Surg*. 2007;15(8):495-506.
85. Luring C, Tingart M, Drescher W, et al. Therapy of isolated arthritis in the patellofemoral joint: Are there evidence-based options? *Orthopade*. 2011;40(10):902-906.
86. Lustig S. Patellofemoral arthroplasty. *Orthop Traumatol Surg Res*. 2014;100(1 Suppl):S35-S43.
87. Mancuso F, Hamilton T, Kumar V, Murray D, Pandit H. Clinical outcome after UKA and HTO in ACL deficiency: a systematic review. *Knee Surg Sports Traumatol Arthrosc*. 2016;24(1):112-122. Epub 2014 Sep 30. doi: 10.1007/s00167-014-3346-1.
88. Matzkin EG, Curry EJ, Kong Q, et al. Efficacy and Treatment Response of Intra-articular Corticosteroid Injections in Patients with Symptomatic Knee Osteoarthritis. *J Am Acad Orthop Surg*. 2017;25:703-714.
89. Martin JR, Jennings JM, Dennis DA. Morbid Obesity and Total Knee Arthroplasty: A Growing Problem. *JAAOS*. 2017;25(3):188-194.
90. McElroy MJ, Pivec R, Issa K, et al. The effects of obesity and morbid obesity on outcomes in TKA. *J Knee Surg*. 2013;26:83-88.
91. Meding J, Ritter M, Faris P, et al. Does the preoperative radiographic degree of osteoarthritis correlate to results in primary total knee arthroplasty? *J Arthroplasty*. 2001;16(1):13-16.
92. Meneghini M. Revision Total Knee Arthroplasty. In: Glassman AH, Lachiewicz PF, Tanzer M, eds. *Orthopaedic Knowledge Update: Hip and Knee Reconstruction*. 4th ed. 2011, American Academy of Orthopaedic Surgeons, Rosemont, IL.
93. Mohammed R, Syed S, Ahmed N. Manipulation under anaesthesia for stiffness following knee arthroplasty. *Ann R Coll Surg Engl*. 2009;91:220-223.
94. Moseley J, O'Malley K, Petersen N et al. A Controlled Trial of Arthroscopic Surgery for Osteoarthritis of the Knee. *NEJM*. 2002;347(2):81-88. doi: 10.1056/nejmoa013259.
95. Newman MT, Lonner JH, Ries M. Unicompartamental, patellofemoral, and bicompartmental arthroplasty. In: Glassman AH, Lachiewicz PF, Tanzer M, eds. *Orthopaedic Knowledge Update: Hip and Knee Reconstruction*. 4th ed. 2011. American Academy of Orthopaedic Surgeons, Rosemont, IL.
96. Niinimäki TT, Murray DW, Partanen J, Pajala A, Leppilahti JI. Unicompartamental knee arthroplasties implanted for osteoarthritis with partial loss of joint space have high re-operation rates. *Knee*. 2011;18(6):432-435. doi: 10.1016/j.knee.2010.08.004.
97. Ollivier M, Parratte S, Lino L, Flectch X, Pesenti S, Argenson JN. No benefit of computer-assisted TKA: 10 year results of a prospective randomized study. *Clin Orthop Relat Res*. 2018;476(1):126-134.
98. Ontario Ministry of Health and Long-Term Care, Medical Advisory Secretariat (MAS). *Total knee replacement. Health Technology Literature Review*. Toronto, ON: MAS. June 2005.
99. Pandit H, Beard D, Jenkins C, et al. Combined anterior cruciate reconstruction and Oxford unicompartmental knee arthroplasty. *J Bone Joint Surg Br*. 2006;88(7):887-892.
100. Pang H, Razak HR, Petis S, et al. The role of isolated polyethylene exchange in total knee arthroplasty. *EFFORT Open Rev*. 2017;2:66-71.
101. Parvizi J, Seel M, Hanssen A, et al. Patellar component resection arthroplasty for the severely compromised patella. *Clin Orthop*. 2002;(397):356-361.
102. Pennington D, Swienkowski J, Lutes W, Drake G. Lateral unicompartmental knee arthroplasty: Survivorship and technical considerations at an average follow-up of 12.4 years. *J Arthroplasty*. 2006;21(1):13-17.

103. Plancher K, Brite J, Briggs K, Petterson S. Patient-acceptable symptom state for reporting outcomes following unicompartmental knee arthroplasty. *Bone Joint J.* 2021;103-B(8):1367-1372. doi: 10.1302/0301-620X.103b8.bjj-2021-0170.r1.
104. Plancher K, Briggs K, Brite J, Petterson S. The Lawrence D. Dorr Surgical Techniques & Technologies Award: Patient Acceptable Symptom State (PASS) in Medial and Lateral Unicompartmental Knee Arthroplasty: Does the Status of the ACL Impact Outcomes?. *J Arthroplasty.* 2022;37(8):S710-S715. doi: 10.1016/j.arth.2022.01.081.
105. Pisanu G, Rosso F, Bertolo C, et al. Patellofemoral arthroplasty: current concepts and review of the literature. *Joints.* 2017;5:237-245.
106. Price AJ, Svard U. A second decade lifetable survival analysis of the Oxford unicompartmental knee arthroplasty. *Clin Orthop Res.* 2011;469(1):174-176.
107. Potter HG, Linklater JM, Allen AA, Hannafin JA, Haas SB. Magnetic resonance imaging of articular cartilage in the knee. An evaluation with use of fast-spin-echo imaging. *J Bone Joint Surg Am.* 1998;80(9):1276-1284. doi: 10.2106/00004623-199809000-00005.
108. Rajgopal V, Bourne RB, Chesworth BM, et al. The Impact of Morbid Obesity on Patient Outcomes After Total Knee Arthroplasty. *J Arthroplasty.* 2008;23(6):795-800.
109. Riddle DL, Perera RA, Jiranek WA, et al. Using Surgical Appropriateness Criteria to Examine Outcomes of Total Knee Arthroplasty in a United States Sample. *Arthritis Care Res.* 2015;67(3):349-357.
110. Rodríguez-Merchán E, Gómez-Cardero P. Unicompartmental knee arthroplasty. *EFORT Open Rev.* 2018;3(6):363-373. doi: 10.1302/2058-5241.3.170048.
111. Saldanha K, Keys G, Svard U, et al. Revision of Oxford medial unicompartmental knee arthroplasty to total knee arthroplasty - results of a multicentre study. *Knee.* 2007;14(4):275-279.
112. Saleh K, Dykes D, Tweedie R, et al. Functional outcome after total knee arthroplasty revision: a metaanalysis. *J Arthroplasty.* 2002;17(8):967-977.
113. Samson AL, Mercer GE, Campbell DG. Total knee replacement in the morbidly obese: a literature review. *ANZ J Surg.* 2010;80:595-599.
114. Sanders TL, Pareek A, Johnson NR, Stuart MJ, Dahm DL, Krych AJ. Patellofemoral arthritis after lateral patellar dislocation: a matched population-based analysis. *Am J Sports Med.* 2017;45(5):1012-1017.
115. Santaguida P, Hawker G, Hudak P, et al. Patient characteristics affecting the prognosis of total hip and knee joint arthroplasty: a systematic review. *Can J Surg.* 2008;51(6):428-436
116. Schrednitzki D, Beier A, Marx A, Halder A. No Major Functional Benefit After Bicompartamental Knee Arthroplasty Compared to Total Knee Arthroplasty at 5-Year Follow-Up. *J Arthroplasty.* 2020;35(12):3587-3593. doi: 10.1016/j.arth.2020.07.003.
117. Scott R. UniSpacer: Insufficient data to support its widespread use. *Clin Orthop.* 2003;(416):164-166.
118. Shohat N, Fleischman A, Tarabichi M, Tan T, Parvizi J. Weighing in on Body Mass Index and Infection After Total Joint Arthroplasty. *Clin Orthop Relat Res.* 2018;476(10):1964-1969. doi: 10.1007/s11999-0000000000000141.
119. Sisto D, Mitchell I. UniSpacer arthroplasty of the knee. *J Bone Joint Surg Am.* 2005;87(8):1706-1711.
120. Skou ST, Roos EM, Laursen MB, Rathleff MS et al. A randomized, controlled trial of total knee replacement. *NEJM.* 2015;373(17):1597-1606.
121. Springer B, Waldstein W, Bechler U, Jungwirth-Weinberger A, Windhager R, Boettner F. The Functional Status of the ACL in Varus OA of the Knee: The Association with Varus Deformity and Coronal Tibiofemoral Subluxation. *J Arthroplasty.* 2021;36(2):501-506. doi: 10.1016/j.arth.2020.08.049.
122. Stickles B, Phillips L, Brox W, et al. Defining the relationship between obesity and total joint arthroplasty. *Obes Res.* 2001;9(3):219-223.
123. Stout A, Friedly J, Standaert C. Systemic absorption and side effects of locally injected glucocorticoids. *Am Acad Phys Med Rehabil.* 2019;11:409-419.
124. Toms AD, Davidson D, Masri BA, et al. The management of peri-prosthetic infection in total joint arthroplasty. *J Bone Joint Surg.* 2006;88-B:149-155. doi: 10.1302/0301-620X.88B2.
125. Valenzuela GA, Jacobson NA, Buzas D, et al. Unicompartmental knee replacement after high tibial osteotomy. *Bone Joint J.* 2013;95-B:1348-1353.
126. van der List JP, Chawla H, Zulderbaan HA, et al. Survivorship and functional outcomes of patellofemoral arthroplasty: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* 2017;25:2622-2631. doi 10.1007/s00167-015-3878-z.
127. van der List JP, Chawla H, Villa JC, Pearle AD. Why do patellofemoral arthroplasties fail today? A systematic review. *Knee.* 2017;24(1):2-8. doi: doi.org/10.1016/j.knee.2015.11.002.
128. Villa J, Paoli A, Nelson-Williams H, Badr R, Harper K. Onlay Patellofemoral Arthroplasty in Patients With Isolated Patellofemoral Arthritis: A Systematic Review. *J Arthroplasty.* 2021;36(7):2642-2649. doi: 10.1016/j.arth.2021.02.054.
129. Wall C, Vertullo C, Kondalsamy-Chennakesavan S, Lorimer M, de Steiger R. A Prospective, Longitudinal Study of the Influence of Obesity on Total Knee Arthroplasty Revision Rate. *JBJS.* 2022;104(15):1386-1392. doi: 10.2106/jbjs.21.01491.
130. Ward DT, Metz LN, Horst PK, Kim HT, Kuo AC. Complications of morbid obesity in total joint arthroplasty: risk stratification based on BMI. *J Arthroplasty.* 2015;30(9)(Suppl):42-46. Epub 2015 Jun 3.

131. Warren J, George J, Anis H et al. Effects of Estimated Glomerular Filtration Rate on 30-Day Mortality and Postoperative Complications After Total Hip Arthroplasty: A Risk Stratification Instrument. *J Arthroplasty*. 2020;35(3):786-793. doi: 10.1016/j.arth.2019.10.001.
132. Wong KC, Lee M, Liow L, Lo NN, Yeo SJ, Chen J. Bone-on-Bone Contact on Radiograph is not a Prerequisite for Successful Outcome in Fixed-Bearing Medial Unicompartmental Knee Arthroplasty-A 10-Year Follow-Up Study. *J Knee Surg*. 2023;36(6):658-666. doi: 10.1055/s-0041-1740932.
133. Youlden DJ, Dannaway J, Enke O. Radiographic severity of knee osteoarthritis and its relationship to outcome post total knee arthroplasty: a systematic review. *ANZ J Surg*. 2020;90(3):237-242. doi: 10.1111/ans.15343.
134. Zaruta DA, Qiu B, Liu AY, et al. Indications and guidelines for debridement and implant retention for periprosthetic hip and knee infection. *Curr Rev Musculoskelet Med*. 2018;11:347-356. doi: 10.1007/s12178-018-9497-9.
135. Zhang W, Moskowitz R, Nuki G, et al. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage*. 2008;16(2):137-162.
136. Ziemba-Davis M, Caccavallo P, Meneghini R. Outpatient Joint Arthroplasty—Patient Selection: Update on the Outpatient Arthroplasty Risk Assessment Score. *J Arthroplasty*. 2019;34(7):S40-S43. doi: 10.1016/j.arth.2019.01.007.
137. Zusmanovich M, Kester BS, Schwarzkopf R. Postoperative Complications of Total Joint Arthroplasty in Obese Patients Stratified by BMI. *J Arthroplasty*. 2018;33:856-864.