The Ohio State University
Department of Orthopaedics

Residency Curriculum

Adult Reconstruction
**About This Curriculum**

- It is the responsibility of both the resident and the attending to go over the goals and guidelines included in this handbook
  
  o At the beginning of the rotation
  o At the conclusion of the rotation

- Additional materials and/or service handbooks may be provided by the attendings at the beginning of the rotation
Adult Reconstruction (Joints) Service Information

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Introduction
The Ohio State University Arthroplasty Service is designed to provide Residents with a comprehensive education in clinical and research concepts related to arthroplasty of the hip and knee. Residents are assigned to one of two services: I: Dr. Andrew Glassman; II: Other attendings Residents will rotate through each service for a one-month period. Knowledge of the items contained herein should be helpful in providing excellent care and fulfilling your educational goals. As required by the ACGME and the Residency Review Committee, core competencies and educational requirements will be clearly delineated.

The educational goals are well defined and the surgical experience progressive. One of the goals is for the resident to attain a continuous working relationship with their assigned faculty. This facilitates a successful educational experience and allows the resident to participate in all aspects of patient care without an over-emphasis on service.

At the completion of the rotation, there is a comprehensive evaluation that includes specific comments from Faculty. Mid-rotation, each Faculty member will discuss performance and skills in order to maximize the resident’s experience and education.

Specific Resident Educational Goals
PGY-2

The resident should be comfortable with the history and physical exam of the hip and knee in the arthroplasty patient and the general indications for different surgical procedures. They should be able to recognize the usual post-op course of a "standard" joint arthroplasty procedure. In depth knowledge of surgical anatomy is important. They should be able to describe the usual surgical approaches and recognize common complications of these procedures. This level resident should become competent with all aspects of peri-operative care including VTE and infection prophylaxis, bladder management, indications for transfusion, and routine wound care. A PGY-2 should be able to give a concise and accurate case presentation both in Morning Conference and while on Walk Rounds. This level Resident should understand the basics of X-Ray templating as part of planning for hip and knee replacement. Surgical skills should include proper positioning/draping, sterile technique, appropriate skin incisions, basic exposure methods, hemostasis, basic power saw and drill skills, drain management, and competent suturing techniques.

PGY-5 (Chief)

The Chief Resident should be able to perform primary joint arthroplasty and simple to complex revisions. He/She should be able to determine the surgical approach to be used and why it should be
used and to start any case independently. The PGY-5 should understand the pathogenesis of prosthetic failure including loosening, osteolysis, wear, infections and peri-prosthetic fractures and understand the choice of components used as well as basic biomaterials. This level Resident should be able to teach the specifics and concepts of X-Ray templating. Specific surgical skills should include proficiency in all aspects of cemented and cementless joint replacement, complex exposures including osteotomies, management of complex intra-operative situations including fractures, neurovascular injuries, and joint instability. The Chief Resident, in consultation with the Service Chief, is responsible all resident administrative activities on the Service.

An important principle of the Arthroplasty Service is that residents should never expect to substantially participate in surgery without thorough prior knowledge of a specific patient’s history, disease, physical exam and preoperative planning. Residents should always read any prior available notes. Because of the close working relationship between faculty and residents, there is ample time to review x-rays, history and preoperative planning in advance (several days). This interaction is one of the foundations of education in Arthroplasty and will be fostered.

Scheduled Conferences

All residents are required to attend the Arthroplasty Conferences. In addition, Residents must attend Grand Rounds and the Basic Science lectures.

Morning Teaching Conferences

Wednesday morning is our time dedicated to an educational conference from 6:00 to 6:45 AM, followed by pre-operative planning and templating from 6:45 until 7:30 AM. The educational portion of the conference may have one of various different formats. It may include a didactic presentation by Dr Glassman or another attending, focused upon a specific area of adult reconstructive surgery. At most meetings, 2-3 previously assigned journal articles will be discussed. The meeting may also be in the form of short presentations from the residents. The presentations are prepared with the assistance of attending staff. Topics will rotate and include complications of total joint arthroplasty, biomechanics, osteolysis, loosening of components, peri-prosthetic fractures, avascular necrosis, developmental dysplasia of the hip, SCFE and alternatives to total joint arthroplasty including osteotomies of the hip and knee. These lectures should compliment the lectures given during Core conferences.

Patient Care

Residents at both the PGY-2 and PGY-5 levels will be responsible for the comprehensive management of all patients, under the direct supervision of the attending physician(s) and with the assistance of the Physicians Assistant(s).

- The Clinic
- Rounds
- Orders
- Discharge
- Documentation
- Daily notes
- Operative dictation (at the attending’s discretion)
- Consults:
- H&P:
- Emergency Situations: In the case of large thrombi or pulmonary emboli, baseline PT, INR, PTT values are obtained STAT and consult with attending.

If sponge or instrument count is in error, call attending immediately. DO NOT rely only on x-ray to clear the field.
In event of patient death, contact attending immediately. Always check code status on every patient pre-op.
I. Resident Responsibilities for Patient Care

A. Office/ Clinic
Resident may be asked to perform the initial patient evaluation of either established or new patients. This may include obtaining a complete history and physical with emphasis on the adult reconstructive issue(s) at hand. The resident will review available ancillary studies (radiographs, MRI’s, laboratory tests). The resident will synthesize this information and present the patient to the attending physician in a succinct fashion, offer a provisional diagnosis and relevant differential diagnosis, and formulate a plan for further evaluation and/ or treatment. The resident will participate in patient education and be familiar with treatment alternatives, as well as their risks and benefits. The resident will document their historical and physical finding in the EMR. The resident may, from time to time, and with the attending’s approval, write prescriptions for medications or physical therapy. The resident will work in concert with the physician’s assistant where applicable, medical assistant(s) where applicable, and with the office staff. The resident will either assist in or actually perform minor office procedures such as suture/ staple removal, joint aspiration/ injection, minor wound debridement, and dressing changes.

B. Pre-operative planning conference
The resident is expected to attend pre-operative planning conferences and to be prepared to discuss planned surgeries, the planned surgical approach, the implants to be utilized, and any other adjunctive procedures that may be anticipated. The resident will understand the indications and contraindications for various arthroplasty procedures. The resident will become proficient at pre-operative templating, using both hard copy radiographs and digital templating techniques. The resident will learn to assess implant fixation and degrees of bone stock damage when planning revision surgery. The resident will understand the implications of pertinent co-morbidities in pre-operative planning. The resident will be aware of the pre-operative patient’s social history and any special needs or requirement that may be anticipated at the time of discharge.

C. Surgery
Whenever possible, the resident is expected to be present thirty minutes prior to the scheduled start time of any surgical procedure. If necessary, the patient’s history and physical as well as the pre-operative radiographs and the surgical plan will be discussed with the attending physician. The resident will introduce themselves to the patient if they have not already done so in clinic. The resident will explain that they will be participating in the operative procedure as well as in the patient’s post-operative care. The resident will be an active participant in the “time out” procedure. The resident will participate in and become proficient as positioning the patient, prepping, and draping. The resident will
demonstrate a thorough understanding of meticulous sterile technique and the measures necessary to minimize the risk of post-operative infection. The resident will, depending upon their level of training and the circumstances of the particular case, be prepared to perform certain portions of the operative procedure including the surgical exposure, the preparation of the bone, the removal of existing implant materials when necessary, implantation of the prostheses, and wound closure. The resident will demonstrate familiarity with a variety of surgical approaches to the hip and knee for primary, conversion, and revision arthroplasty, including their indications, technical details, advantages disadvantages, and potential complications. The resident will write post-operative orders.

D. Hospital rounds
The resident will, depending upon the circumstances and discussions with the attending physician, conduct daily post-operative rounds on all joint replacement patients, either in the accompaniment of the attending physician, the other resident(s), fellow, or students, or from time to time independently. The resident will document pertinent subjective and objective findings, including, but not limited to the patient’s level of pain and the effectiveness/ side effect of their post-operative pain management regimen, their vital signs, urine output, wound drainage, neurovascular status, and be able to clinically assess the patient for signs of thromboembolic disease. When appropriate, the resident will communicate and collaborate with the medical service following the patient. The resident will be familiar with the patient’s post-operative physical therapy protocol, including any restrictions. The resident will obtain and record daily laboratory and other test results. The resident will document their findings in the daily progress notes, discuss the findings with the attending physician and assist in formulating any changes in the patient’s treatment. Any proposed changes will be discussed with the attending physician prior to their implementation. The resident will assist in the formulation of a discharge plan with the attending physician, nursing, physical/ occupational therapy, case management, the patient, and their family. The resident will assist in the completion of the discharge documentation and prescription writing. From time to time, and depending upon the attending physician’s preference, the resident may be asked to dictate a discharge summary.

E. Education
The resident is expected to attend reading conferences and lectures prepared by the attending physician. From time to time, the resident may be asked to give a brief presentation regarding a particular topic relevant to adult reconstructive surgery. At the beginning of the rotation, the resident will identify an area of general interest and prepare a grand rounds quality presentation of 15-20 minutes duration to be presented to the attendings, residents, fellow, and medical students on the service. The resident will actively participate in the education of less senior residents, interns, and medical students.

II. Resident Level of Responsibility for Patient Care
Resident rotations are structured so that the residents have a one-on-one relationship with attendings. The level of responsibility given by the attending to the resident is determined by that attending, depending on the attending’s assessment of the resident’s knowledge
and skills, and the complexity of the procedure.

III. Resident Supervision
Attendings are responsible for the direct supervision of residents in both the clinic and the operating room, as well as in on-call situations. Attending physicians are available for consultation at all times. Senior residents (PGY4 and above) are also directly responsible for the supervision of junior residents (PGY1, PGY2, and PGY3). This applies to all of the above situations (i.e. on-call, in clinic, in the OR). Senior residents must be available for consultation at all times. Ultimately, chief residents (all PGY5’s) are responsible for the supervision of all residents, regardless of PGY year.

IV. Performance Feedback
Both attending staff members are available at any time if questions or concerns arise. At the end of each rotation, each attending on the service will evaluate each resident assigned to the service. A meeting should be scheduled at the conclusion of the rotation to discuss performance and provide written feedback on the rotation.
Goals and Objectives
Adult Reconstruction Rotation – PGY3

I. Core Competency Areas

By the end of the PGY3 rotation in Joints, the resident should demonstrate progress towards obtaining excellence in each of the following core competency areas.

- Ability to obtain a full history of the involved joint - Competency with the physical exam of the patient including specialized tests to evaluate for subtle hip and knee pathology.
- Ability to use appropriate terms during interpretation of basic x-ray findings found in arthritic joints.
- Mastery of the anatomy and approaches used for THA and TKA.
- Understanding of the basics of limb alignment for a well done total hip or knee arthroplasty as it affects the joint reaction forces.
- Recognition of the signs and symptoms of a periprosthetic infection.
- Mastery of basic surgical skills including soft tissue dissection, assessing for hemostasis, protection of critical structures as it relates to anatomy, and mastery of wound closure.
- Efficiency with the diagnosis and management of inpatient arthroplasty complications including infection, DVT, PE, and instability.

II. Patient Care

1. Demonstration of caring and respectful behaviors when interacting with patients and families
2. Procurement of thorough, logical, and concise patient histories with an emphasis on the musculoskeletal system
3. Responsiveness to the individual needs of patients and their families
4. Performance of physical examinations that are accurate, comprehensive, and directed to patient’s problems. This applies to the clinic, emergency department, and in-patient settings.
5. Integration of medical facts and clinical data as the basis for diagnosis
6. Evaluation of risks, benefits, and alternative treatments
7. Formulation and carry out of a complete and effective treatment plan (operative and non-operative)
8. Counsel of patient and family in treatment procedure, options, and potential outcomes
9. Dissemination of education and services to the patient that are aimed at preventing treatment complications and maintaining health
10. Understanding of and performance of medical procedures related to treatment plan
11. Ability to work well with entire team of healthcare professionals and be involved in care of the patient

III. Medical Knowledge

1. Demonstration of a fund of medical knowledge that is up-to-date and ability to cite literature appropriately
2. Investigation of topics as needed for clinical assignments
3. Understanding and use of basic science principles as related to medical practice
4. Practice-Based Learning
   A. Assessment of ones own patient management skills and ability to make appropriate changes in practice
   B. Integration of evidence from scientific studies in the care of patient’s problems
   C. Demonstration of knowledge of study designs and statistical methods in order to evaluate
scientific studies
D. Usage of available information technology to obtain and manage information
E. Willingness to take time to educate students and other health care professionals

IV. Interpersonal Skills
1. Fostering of a compassionate, therapeutic relationship with patients and their families
2. Ability to listen to patients and include them in treatment decisions
3. Ability to listen to information provided by other members of the health care team

V. Professionalism
1. Respectfulness of patient wishes and ability to provide adequate counseling, education, and informed consent instructions to patients
2. Demonstration of an ethically sound practice of medicine
3. Demonstration of sensitivity to cultural, age, gender, and disability issues among patients

VI. Systems-Based Practice
1. Knowledge of how to provide cost-effective care
2. Willingness to advocate for patients within the health care system
3. Referral of patient to appropriate practitioners and agencies within the health care system
4. Accessing of consultants appropriately and use of their assistance in the management of ongoing care

VII. Specialty Specific Knowledge
By the end of the PGY2 rotation in Joints, the resident should:
1. Based on a careful history and physical exam, be able to propose a rational approach to the evaluation of patients with pain at various intervals after a total hip replacement.
2. Be able to differentiate the bursal and soft tissue diseases about the hip/knee and then outline a treatment plan during office sessions, clinic and rounds.
3. Be able to distinguish other diseases predisposing to arthritis (Paget’s Disease, AVN, Charcot arthropathy, ochronosis) - optional.
4. Be able to obtain an accurate history and perform a thorough physical exam on patients with an inflamed hip or knee. They will be able to generate differential diagnosis of this condition with the pertinent positives and negatives of these disorders: rheumatoid arthritis, septic arthritis, acute/chronic osteomyelitis, primary/post traumatic, osteoarthritis, gout, pseudogout, SLE, Reiter’s disease, ankylosing spondylitis, PVNS, hemophilia, osteonecrosis. Must be able to formulate a plan for the work-up of these patients including laboratory and radiographic evaluation.
5. Be able to explain preoperative planning of standard total hip/knee replacement.
6. Understand the general principles and surgical technique for the cemented/cementless femoral and acetabular components.
7. Understand the classification of acetabular and femoral deficiencies
8. Understand the classification of tibial and femoral deficiencies about the TKA
9. Based on a careful history and physical examination, the resident will be able to formulate an approach to the evaluation of patients with pain at various intervals after a total hip and knee replacement.
10. Be able to explain the rationale for implant selection (type, size, configuration) for primary and revision THA/TKA cases
11. Understand basic biomaterials issues in total joint arthroplasty. Discuss the following materials and their use in orthopaedic implants: Ceramics, polyethylene, metals, and methylmethacrylate.
12. Understand the perioperative considerations for THA and TKA including: Preoperative medical evaluation; blood conservation; DVT prophylaxis; and rehabilitation 13. Understand the principles of femoral and pelvic osteotomies and be able to draw accurate preoperative plans for the procedure
VIII. Specialty Specific Psychomotor Skills

By the end of the PGY2 rotation in Joints, the resident should be able to:

1. Remove complex hardware around the hip and knee
2. Evaluate the painful total hip arthroplasty
3. Summarize the indications for hip/knee arthrodesis and illustrate the techniques commonly used.
4. Describe the indications for a resection arthroplasty, and for synovectomy of the hip
Goals and Objectives
Adult Reconstruction Rotation – PGY5

I. Core Competency Areas

By the end of the PGY5 rotation in Joints, the resident should demonstrate progress towards obtaining excellence in each of the following core competency areas.

• Understanding of the relationship of the pathology of inflammatory arthritis as it relates to the history and physical exam findings.
• Understanding of the relationship of spine disease to hip and knee symptoms. -Mastery of templating of a primary THA or TKA.
• Basic understanding of implant selection for a case as it affects the reconstruction of a hip or knee
• Mastery of the basic biomechanics behind the designs of various hips and knees
• Identification of the potential problems involved with revision THA or TKA
• Basic templating and implant selection for a revision THA or TKA
• Proficiency with the steps involved in a primary THA or TKA case with attending supervision.
• Understanding of the management of bony defects found in revision THA or TKA

II. Patient Care

1. Demonstration of caring and respectful behaviors when interacting with patients and families
2. Procurement of thorough, logical, and concise patient histories with an emphasis on the musculoskeletal system
3. Responsiveness to the individual needs of patients and their families
4. Performance of physical examinations that are accurate, comprehensive, and directed to patient’s problems. This applies to the clinic, emergency department, and in-patient settings.
5. Integration of medical facts and clinical data as the basis for diagnosis
6. Evaluation of risks, benefits, and alternative treatments
7. Formulation and execution of a complete and effective treatment plan (operative and non-operative)
8. Counsel of patient and family in treatment procedure, options, and potential outcomes
9. Dissemination of education and services to the patient which are aimed at preventing treatment complications and maintaining health
10. Understanding of and performance of medical procedures related to treatment plan
11. Ability to work well with entire team of health care professionals and be involved in care of the patient

III. Medical Knowledge

1. Exhibition of a fund of medical knowledge that is up-to-date and ability to cite literature appropriately
2. Investigation of topics as needed for clinical assignments
3. Understanding and use of basic science principles as related to medical practice
4. Practice-Based Learning
   A. Assessment of ones own patient management skills and ability to make appropriate changes in practice
   B. Integration of evidence from scientific studies in the care of patient’s problems
   C. Demonstration of knowledge of study designs and statistical methods in order to evaluate scientific studies
   D. Usage of available information technology to obtain and manage information
   E. Willingness to take time to educate students and other health care professionals

IV. Interpersonal Skills
   1. Fostering of a compassionate, therapeutic relationship with patients and their families
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V. Professionalism
   1. Respectfulness of patient wishes and ability to provide adequate counseling, education, and informed consent instructions to patients
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   3. Demonstration of sensitivity to cultural, age, gender, and disability issues among patients

VI. Systems-Based Practice
   1. Knowledge of how to provide cost-effective care
   2. Willingness to advocate for patients within the health care system
   3. Referral of patient to appropriate practitioners and agencies within the health care system
   4. Accessing of consultants appropriately and use of their assistance in the management of ongoing care

VII. Specialty Specific Knowledge

Building upon the knowledge and skills acquired in the PGY2 Joint Replacement rotation, the resident at the end of the PGY5 rotation, should now be able to perform all of the Goals and Objectives for the both the PGY2 rotation, in addition to the following advanced Goals and Objectives:

1. Be able to organize a systematic evaluation of these disorders including radiographic, laboratory tests and appropriate ancillary studies. Based on information, the orthopaedic resident will be able to formulate a differential diagnosis and propose a treatment plan for these disorders: osteoarthritis (1o and 2o), rheumatoid arthritis, seronegative arthritis (AS, Reiters, psoriatic, IB related), septic arthritis, osteomyelitis, PVNS, hemophilic arthropathy, osteonecrosis and Charcot arthropathy
2. Be able to explain the indications for knee fusion and be familiar with various methods of fusion.
3. Be able to distinguish non-suppurative joint infections (fungal, tuberculosis, viral) and to recognize less common forms of secondary osteoarthritis (post-septic, Paget’s Disease, hemochromatosis)
4. Be able to describe the diagnostic criteria for Reflex Sympathetic Dystrophy Syndrome and plan appropriate treatment for each stage of the disorder.
5. Understand bone remodeling and its implications about the THA (eg. calcar resorption - cementless stem ingrowth) and TKA
6. Understand the biologic response to wear debris and be able to differentiate these from bone response to implants (osteolysis vs resorption)
7. Understand the tribology (wear issues) associated with total joint arthroplasty
8. Understand the design rational for THA and TKA implants as pertains to common complications (PF groove, elevated lip liners, anatomic vs straight stems, etc)
9. Understand the biomechanics of a TKA and osteotomy about the knee.
10. Be able to describe the pathogenesis of implant loosening (osteolysis, membrane formation, enzyme elevation) at the cement-bone and metal-cement interfaces.
11. Be able to evaluate and propose treatment for patients with anterior knee pain.
12. Be able to discuss the principles and biomechanics of osteotomies about the hip/knee.
13. Understand preoperative planning for revision total hip arthroplasty
14. Know how to evaluate patients with painful THA’s and make appropriate judgments based on data obtained from ancillary studies. The Senior Resident will be expected to present the problem, analyze the data and select a plan of action for these patients at grand rounds conferences.
15. Have a thorough understanding of the design rational for THA and TKA implants
16. Have a thorough understanding of the use and indications of the primary cementless femoral component including: cementless femoral components (modular); cementless femoral component (extensively coated); hydroxyapatite coated implants; proximal fixation of the noncemented stem; and the tapered femoral component.
17. Know the early complications after THA/TKA and their management.
18. Know the late Complications after THA/TKA and their management.
19. Be able to evaluate patients with painful total joint arthroplasty and make appropriate judgments based on history, physical exam and ancillary studies. The Senior Resident will be expected to be able to present the problem, analyze the data, and select a plan of action for these patients at Quality Assurance Conferences.
20. Understand the treatment options for the infected THA/TKA including two-stage reconstruction.
21. Understand and be able to do parts of removal of failed hip and knee components and retained cement mantel
22. Understand the application of allografts for THA/TKA surgery
23. Thoroughly comprehend the principles of THA including: offset, leg length, range of motion, stability, and templating
24. Understand the principles, exposure and techniques of complex THA/TKA reconstructions
25. Understand the indications and techniques for the adjunct procedures used to treat AVN (eg. bone graft, vascularized bone graft).
26. Know the indications for, and the techniques of, soft tissue releases and neurectomy about the hip.
27. Know the principles and the application of using autografts and allografts for the defects associated with THA/TKA.
28. Thoroughly comprehend arthroplasty complications and be able to formulate an approach to the treatment (and prevention) of these problems.
29. Understand the management and surgical approach to periprosthetic fractures about THA and TKA.
30. Understand the techniques for the surgical treatment of osteolysis about the primary THA and TKA.
31. Be able to state the principles of osteotomy for medial and lateral compartment arthritis. Should be competent in planning these cases and demonstrate proficiency in performing distal femoral or upper tibial osteotomies.
32. Should understand the principles of amputation surgery (perform parts of amputations) about the pelvis and hip and understand the concept and technique of internal hemipelvectomy
VIII. Specialty Specific Psychomotor Skills

Building upon the knowledge and skills acquired in the PGY3 Joint Replacement rotation, the resident at the end of the PGY5 rotation, should now be able to perform all of the Goals and Objectives for both the PGY3 rotation, in addition to the following advanced Goals and Objectives:

1. Preoperatively plan for a cemented or cementless THA/TKA, and be able to competently perform uncomplicated THA/TKA surgery.
2. Perform amputations about the knee pre and post arthroplasty.
3. Perform various parts of standard revision THA/TKA, complex THA/TKA, and revision of the septic THA/TKA procedures
4. Perform femoral allografting (intercalary or interpositional).
5. Reduce a dislocated hip and should know how to manipulate a hip under anesthesia to determine the stable range of motion.
6. Formulate an operative and non-operative plan of action to address the unstable THA.
7. Perform a complicated synovectomy about the THA/TKA.
8. Plan and carry out a successful cemented, hybrid, and cementless standard primary THA.
9. Preoperatively plan for and competently perform complicated THA surgery including: THA in the posttraumatic patient; complex primary acetabular replacement; complex primary femoral replacement; and hip fractures treated by arthroplasty.
10. Preoperatively plan for and competently perform complicated TKA surgery including: RA, flexion contractures, varus or valgus deformities
11. Perform soft tissue releases about the knee to correct severe varus/valgus deformities with TKA.
12. Have the surgical skill to balance the flexion and extension gaps during TKA.
13. Plan for revision THA/TKA (including 2 stage for sepsis) and should be able to perform parts of this surgery
14. Plan for and perform parts of revision of the femoral THA component utilizing cemented, uncemented, and extensively coated modular implants with or without bulk allografts and struts or impaction grafting techniques.
15. Plan for and perform parts of revision of the acetabulum by cementless acetabular reconstruction, structural grafting, bone packing and using cement with all polyethylene components and acetabular cages.
16. Perform a complete synovectomy in the revision THA/TKA.
17. Plan the approach for excision of heterotopic bone and carry out the procedure.
18. Plan for a femoral or pelvic osteotomy and be able to understand the approach and technique of this surgery.
19. Perform most of a hip/knee fusion.
20. Have developed not only competence in amputation surgery about the knee but also be able to discuss the rationale for amputation at various levels and the prosthetic options for this level.
21. Have and select the optimal flap to deal with soft tissue problems (eg. delayed healing, infection) after TKA.
ACGME MILESTONES FOR ORTHOPEDICS - Effective July 1, 2013

The milestones were designed by the ACGME for use only in evaluation of resident physicians in the context of their participation in ACGME-accredited residency or fellowship programs. The milestones provide a framework for the assessment of the development of the resident physician in key dimensions of the elements of physician competency in a specialty or subspecialty. They neither represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

Milestones were designed for programs to use in semi-annual review of resident performance and reporting to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME competencies organized in a developmental framework from less to more advanced. They are descriptors and targets for resident performance as a resident moves from entry into residency through graduation. The Ortho RRC will examine milestone performance data for each program’s residents as one element in the Next Accreditation System (NAS) to determine whether residents overall are progressing.

Milestones are arranged into numbered levels. Tracking from Level 1 to Level 5 is synonymous with moving from novice to expert. These levels do not correspond with post-graduate year of education. Selection of a level implies that the resident substantially demonstrates the milestones in that level, as well as those in lower levels (see the diagram on page v).

**Level 1:** The resident demonstrates milestones expected of an incoming resident.

**Level 2:** The resident is advancing and demonstrates additional milestones, but is not yet performing at a mid-residency level.

**Level 3:** The resident continues to advance and demonstrate additional milestones, consistently including the majority of milestones targeted for residency.

**Level 4:** The resident has advanced so that he or she now substantially demonstrates the milestones targeted for residency. This level is designed as the graduation target.

**Level 5:** The resident has advanced beyond performance targets set for residency and is demonstrating “aspirational” goals which might describe the performance of someone who has been in practice for several years. It is expected that only a few exceptional residents will reach this level.

Note that Level 4 is designed as the graduation *target* but does not represent a graduation *requirement*. Making decisions about readiness for graduation is the purview of the residency program director.

**The milestones which will be evaluated on the Adult Reconstruction rotation are as listed on the following pages:**
## Hip and Knee Osteo Arthritis (OA) – Medical Knowledge

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
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<tbody>
<tr>
<td>• Demonstrates knowledge of pathophysiology related to hip and knee arthritis</td>
<td>• Able to classify disease stage/severity and recognizes implications of disease processes (OA, Femoroacetabular impingement [FAI], inflammatory arthritis, osteonecrosis)</td>
<td>• Demonstrates knowledge of current literature and alternative treatments</td>
<td>• Understands controversies within the field</td>
<td>• Primary author/presenter of original work within the field</td>
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<td>• Correlates anatomic knowledge to imaging findings on basic imaging studies</td>
<td>• Understands the importance of comorbidities, thromboembolic prophylaxis, infection prevention and diagnosis</td>
<td>• Understands biomechanics</td>
<td>• Applies understanding of natural history to clinical decision-making</td>
<td>• Understands revision THR and TKR implants (e.g., metaphyseal vs. diaphyseal fixation, tapered vs. fully-porous implants)</td>
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<tr>
<td>• Demonstrates some knowledge of natural history of hip and knee arthritis</td>
<td>• Correlates anatomic knowledge to imaging findings on advanced imaging studies</td>
<td>• Understands alternative surgical approaches (e.g., non-arthroplasty: arthroscopy, osteotomy)</td>
<td>• Understands principles of failure mechanism of total hip replacement (THR) and total knee replacement (TKR) (e.g., loosening, fracture, infection, osteolysis, instability)</td>
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<td>• Demonstrates knowledge of hip and knee arthritis anatomy and basic surgical approaches</td>
<td>• Understands the effects of intervention on natural history of hip and knee arthritis</td>
<td>• Understands alternative implant choices/biomaterials (e.g., alternative bearings, unicompartmental approaches)</td>
<td>• Understands basic principles of revision THR and TKR</td>
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<td>• Demonstrates knowledge of non-operative treatment options and surgical indications</td>
<td>• Understands basic presurgical planning and templating</td>
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<td>• Understands basic implant choices (e.g., cement and uncemented fixation, levels of constraint)</td>
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**Comments:**

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<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
</table>
| • Obtains history and performs basic physical exam  
• Appropriately orders basic imaging studies  
• Prescribes non-operative treatments (e.g., NSAIDs, physical therapy, assistive devices)  
• Provides basic peri-operative management (e.g., pre- and post-operative assessment)  
• Lists potential complications (e.g., infections, dislocations, thromboembolic disease, peri-prosthetic fracture, neurovascular compromise)  
• Obtains focused history and performs focused exam  
• Appropriately interprets basic imaging studies  
• Manages non-operative treatment (e.g., NSAIDs, physical therapy, assistive devices, injections)  
• Completes pre-operative planning with instrumentation and implants (e.g., implant templating, instruments needed)  
• Capable of performing one basic surgical approach to the hip and knee  
• Provides post-operative management and rehabilitation (e.g., orders appropriate peri-operative medications and mobilization)  
• Capable of diagnosis and early management of complications (e.g., infections, dislocations)  
• Assesses for risk of thromboembolic disease  
• Appropriately orders and interprets advanced imaging studies (e.g., MRI, CT, nuclear medicine imaging, and advanced radiographs views)  
• Appropriately recommends surgical intervention  
• Completes comprehensive pre-operative planning with alternatives  
• Modifies and adjusts post-operative treatment plan as needed  
• Capable of surgically treating simple complications (e.g., closed reduction, irrigation, and debridement)  
• Provides prophylaxis and manages thromboembolic disease  
• Capable of performing alternative surgical approaches to the hip and knee arthritis  
• Capable of performing primary THR and TKR  
• Capable of treating complications both intra- and post-operatively (e.g., peri-prosthetic fractures, infections, instability)  
• Competently performs two or more approaches to the hip and knee  
• Capable of performing complex primary and simple revision THR and TKR (e.g., hip dysplasia, hip protrusio, valgus knee, loose components, uniarthroplasty)  
• Develops unique, complex post-operative management plans (e.g., infections, dislocations, neurovascular compromise)  
• Surgically treats complex complications (e.g., peri-prosthetic fractures, knee instability) |

**Comments:**

**Not yet rotated**

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Compassion, integrity, and respect for others as well as sensitivity and responsiveness to diverse patient populations, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation. Knowledge about respect for and adherence to the ethical principles relevant to the practice of medicine, remembering in particular that responsiveness to patients that supersedes self-interest is an essential aspect of medical practice – Professionalism

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
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<th>Level 5</th>
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</thead>
<tbody>
<tr>
<td>• Consistently demonstrates behavior that conveys caring, honesty, and genuine interest in patients and families</td>
<td>• Demonstrates an understanding of the importance of compassion, integrity, respect, sensitivity, and responsiveness while exhibiting these attitudes consistently in common and uncomplicated situations</td>
<td>• Exhibits these attitudes consistently in complex and complicated situations</td>
<td>• Develops and uses an integrated and coherent approach to understanding and effectively working with others to provide good medical care that integrates personal standards with standards of medicine</td>
<td>• Demonstrates leadership and mentoring regarding these principles of bioethics</td>
</tr>
<tr>
<td>• Recognizes the diversity of patient populations with respect to gender, age, culture, race, religion, disabilities, sexual orientation, and socioeconomic status</td>
<td>• Consistently recognizes ethical issues in practice; discusses, analyzes, and manages in common and frequent clinical situations including socioeconomic variances in patient care</td>
<td>• Recognizes how own personal beliefs and values impact medical care</td>
<td>• Consistently considers and manages ethical issues in practice</td>
<td>• Manages ethical misconduct in patient management and practice</td>
</tr>
<tr>
<td>• Recognizes the importance and priority of patient care, with an emphasis on the care that the patient wants and needs; demonstrates a commitment to this value</td>
<td></td>
<td>• Knowledgeable about the beliefs, values, and practices of diverse patient populations and the potential impact on patient care</td>
<td>• Consistently practices medicine as related to specialty care in a manner that upholds values and beliefs of self and medicine</td>
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</tbody>
</table>

Comments:

Not yet achieved Level 1
### Accountability to patients, society, and the profession; personal responsibility to maintain emotional, physical, and mental health – Professionalism

<table>
<thead>
<tr>
<th>Level 1</th>
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<tbody>
<tr>
<td>• Understands when assistance is needed and willing to ask for help</td>
<td>• Recognizes limits of knowledge in common clinical situations and asks for assistance</td>
<td>• Consistently recognizes limits of knowledge in uncommon and complicated clinical situations; develops and implements plans for the best possible patient care</td>
<td>• Mentors and models personal and professional responsibility to colleagues</td>
<td>• Develops organizational policies and education to support the application of these principles in the practice of medicine</td>
</tr>
<tr>
<td>• Exhibits basic professional responsibilities, such as timely reporting for duty, being rested and ready to work, displaying appropriate attire and grooming, and delivering patient care as a functional physician</td>
<td>• Recognizes value of humility and respect towards patients and associate staff</td>
<td>• Assesses application of principles of physician wellness, alertness, delegation, teamwork, and optimization of personal performance to the practice of medicine</td>
<td>• Recognizes signs of physician impairment and demonstrates appropriate steps to address impairment in colleagues</td>
<td>• Practices consistent with the American Academy of Orthopaedic Surgeons (AAOS) Standards of Professionalism</td>
</tr>
<tr>
<td>• Aware of the basic principles and aspects of the general maintenance of emotional, physical, mental health, and issues related to fatigue/sleep deprivation</td>
<td>• Demonstrates adequate management of personal, emotional, physical, mental health, and fatigue</td>
<td>• Seeks out assistance when necessary to promote and maintain personal, emotional, physical, and mental health</td>
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</tbody>
</table>

**Comments:**

Not yet achieved Level 1
**Self-Directed Learning – Practice-based Learning and Improvement**

1. Identify strengths, deficiencies, and limits in one’s knowledge and expertise.
2. Assess patient outcomes and complications in your own practice.
3. Set learning and improvement goals.
4. Identify and perform appropriate learning activities.
5. Use information technology to optimize learning and improve patient outcomes.

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
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</thead>
<tbody>
<tr>
<td>• Acknowledges gaps in personal knowledge and expertise, and frequently asks for feedback from teachers and colleagues</td>
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<tr>
<td>• Demonstrates computer literacy and basic computer skills in clinical practice</td>
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<tr>
<td>• Continually assesses performance by evaluating feedback and assessments</td>
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<tr>
<td>• Develops a learning plan based on feedback with some external assistance</td>
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<tr>
<td>• Demonstrates use of published review articles or guidelines to review common topics in practice</td>
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<tr>
<td>• Uses patient care experiences to direct learning</td>
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<tr>
<td>• Accurately assess areas of competence and deficiencies and modifies learning plan</td>
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<tr>
<td>• Demonstrates the ability to select an appropriate evidence-based information tool to answer specific questions while providing care</td>
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<tr>
<td>• Performs self-directed learning without external guidance</td>
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<tr>
<td>• Critically evaluates and uses patient outcomes to improve patient care</td>
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<tr>
<td>• Incorporates practice change based upon new evidence</td>
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Comments:

Not yet achieved Level 1
### Locate, appraise, and assimilate evidence from scientific studies to improve patient care – Practice-based Learning and Improvement

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>• Describes basic concepts in clinical epidemiology, biostatistics, and clinical reasoning</td>
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<td>• Categorizes the study design of a research study</td>
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<td>• Ranks study designs by their level of evidence</td>
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<tr>
<td>• Identifies bias affecting study validity</td>
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<td>• Formulates a searchable question from a clinical question</td>
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<tr>
<td>• Applies a set of critical appraisal criteria to different types of research, including synopses of original research findings, systematic reviews and meta-analyses, and clinical practice guidelines</td>
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<tr>
<td>• Critically evaluates information from others: colleagues, experts, industry representatives, and patient-delivered information</td>
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<tr>
<td>• Demonstrates a clinical practice that incorporates principles and basic practices of evidence-based practice and information mastery</td>
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<td>• Cites evidence supporting several common practices</td>
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<tr>
<td>• Independently teaches and assesses evidence-based medicine and information mastery techniques</td>
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</table>

Comments:

Not yet achieved Level 1 ☐
| Systems thinking, including cost-effective practice – Systems-based Practice |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|
| Level 1                          | Level 2          | Level 3          | Level 4          | Level 5          |
| • Describes basic levels of systems of care (e.g., self-management to societal) | • Gives examples of cost and value implications of care he or she provides (e.g., gives examples of alternate sites of care resulting in different costs for individual patients) | • Orders and schedules tests in appropriate systems for individual patients balancing expenses and quality | • Effectively manages clinic team and schedules for patient and workflow efficiency | • Leads systems change at micro and macro level (e.g., manages operating room [OR] team and patient flow in a multi-case OR day) |
|                                 |                  |                  |                  |                  |
| Comments:                       |                  |                  |                  |                  |

Not yet achieved Level 1 ☐
### Resident will work in interprofessional teams to enhance patient safety and quality care – Systems-based Practice

<table>
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<tr>
<th>Level 1</th>
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<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
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</thead>
<tbody>
<tr>
<td>• Recognizes importance of complete and timely documentation in teamwork and patient safety</td>
<td>• Uses checklists and briefings to prevent adverse events in health care</td>
<td>• Participates in quality improvement or patient safety program and/or project</td>
<td>• Maintains team situational awareness and promote “speaking up” with concerns</td>
<td>• Develops and publishes quality improvement project results</td>
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<td>• Leads local or regional quality improvement project</td>
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</table>

**Comments:**

Not yet achieved Level 1

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### Uses technology to accomplish safe health care delivery – Systems-based Practice

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
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<th>Level 5</th>
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</thead>
<tbody>
<tr>
<td>• Explains the role of the Electronic Health Record (EHR) and Computerized Physician Order Entry (CPOE) in prevention of medical errors</td>
<td>• Appropriately and accurately enters patient data in EHR</td>
<td>• Reconciles conflicting data in the medical record</td>
<td>• Contributes to reduction of risks of automation and computerized systems by reporting system problems</td>
<td>• Recommends systems re-design for faculty computerized processes</td>
</tr>
<tr>
<td></td>
<td>• Effectively uses electronic medical records in patient care</td>
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</table>

**Comments:**

Not yet achieved Level 1
### Communication – Interpersonal and Communication Skills

<table>
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<tr>
<th>Level 1</th>
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<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Communicates with patients about routine care (e.g., actively seeks and understands the patient’s/family’s perspective; able to focus in on the patient’s chief complaint and ask pertinent questions related to that complaint)</td>
<td>- Communicates competently within systems and other care providers, and provides detailed information about patient care (e.g., demonstrates sensitivity to patient— and family—related information gathering/sharing to social cultural context; begins to engage patient in patient-based decision making, based on the patient’s understanding and ability to carry out the proposed plan; demonstrates empathic response to patient’s and family’s needs; actively seeks information from multiple sources, including consultations; avoids being a source of conflict; able to obtain informed consent [risks, benefits, alternatives, and expectations])</td>
<td>- Communicates competently in difficult patient circumstances (e.g., able to customize emotionally difficult information, such as end-of-life or loss-of-limb discussions; supports patient and family; engages in patient-based decision making incorporating patient and family/cultural values and preferences)</td>
<td>- Communicates competently in complex/adversarial situations (e.g., understand a patient’s secondary motivations in the treatment of his or her care—drug seeking, disability issues, and legal cases; able to sustain working relationships during complex and challenging situations, including transitions of care—treatment of a metastatic pathologic fracture; able to manage conflict with peers, subordinates, and superiors)</td>
<td>- Demonstrates leadership in communication activities (e.g., coaches others to improve communication skills; engages in self-reflection on how to improve communication skills)</td>
</tr>
</tbody>
</table>

**Comments:**

Not yet achieved Level 1
| Teamwork (e.g., physician, nursing and allied health care providers, administrative and research staff) – Interpersonal and Communication Skills |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| - Recognizes and communicates critical patient information in a timely and accurate manner to other members of the treatment team | - Supports and respects decisions made by team | - Able to facilitate, direct, and delegate team-based patient care activities | - Leads team-based care activities and communications | - Seeks leadership opportunities within professional organizations |
| - Recognizes and communicates role as a team member to patients and staff | - Actively participates in team-based care; Supports activities of other team members, communicates their roll to the patient and family | - Understands the Operating Room team leadership role and obligations | - Able to identify and rectify problems with team communication | - Able to lead/facilitate meetings within organization/system |
| - Responds to requests for information | *Examples*: Hand-offs, transitions of care, communicates with other health care providers and staff members | *Example*: Leads daily rounds, communicates plan of action with OR personnel | | |
| **Examples:** Lab results, accurate and timely progress notes, answers pages in a timely manner | | | | |

**Comments:** Not yet achieved Level 1
Physical Exam Competencies
Adult Reconstruction (Joints) Service: PGY3 and PGY5

By the end of the PGY3 rotation on the Adult Reconstruction service, the resident should be able to demonstrate proficiency in the key physical exam tests. The PGY5 rotation is an opportunity to polish these physical examination skills.

- Normal examination of hip and knee, including: Gait assessment
- Inspection
- Palpation:
  - Bony prominences
  - Muscles
  - Bursa
- Range of motion: active vs. passive
- Strength/neurovascular testing
- Limb Length Assessment:
  - True vs. apparent LLD
  - Pelvic obliquity
- Trendelenburg Test (Single-Leg Stance)
- Trendelenburg gait pattern
- Log Roll (Passive Supine Rotation)
- Straight Leg Raise (w/ and w/out resistance)
- Ober Test
- Piriformis Test
- FABER Test
- Impingement Test (FADIR test)
- McCarthy Test
- Thomas Test
- Homan’s sign
Surgical Competencies
Adult Reconstruction (Joints) Service: PGY3

Core Surgical Competencies:

- Identification of bony landmarks for placement of incision
- Management of soft tissues/planes of dissection
- Understanding of limb alignment to adjust bone cuts
- Correct placement of bone cutting jigs for primary THA/TKA
- Safe use of saw/drill with respect to anatomy at risk
- Independent with repair of arthrotomy/skin closure/suturing
The Ohio State University
Department of Orthopaedics
Orthopaedic Residency Program

Surgical Competencies
Adult Reconstruction (Joints) Service: PGY5

Core Surgical Competencies:

- Independent with multiple approaches to the hip and knee
- Placement of bone cutting jigs with minimal attending intervention
- Understanding of the placement of revision instruments for bone cuts
- Proficient at placement of augments/cages/cemented components
- Proficient with techniques for extensile approaches to the hip and knee
- Basic understanding of advanced soft tissue management including muscle flaps, STSG, and complex wound closures.
Adult Reconstruction Reading Lists


Knee:


3. Berger RA, Crossett LS, Jacobs JJ, Rubash HE. Malrotation causing patellofemoral


**General:**


# Orthopaedic Surgery Minimum Numbers (effective 2012-2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee arthroscopy</td>
<td>30</td>
</tr>
<tr>
<td>Shoulder arthroscopy</td>
<td>20</td>
</tr>
<tr>
<td>ACL reconstruction</td>
<td>10</td>
</tr>
<tr>
<td>THA</td>
<td>30</td>
</tr>
<tr>
<td>TKA</td>
<td>30</td>
</tr>
<tr>
<td>Hip fractures</td>
<td>30</td>
</tr>
<tr>
<td>Carpal tunnel release</td>
<td>10</td>
</tr>
<tr>
<td>Spine decompression/posterior spine fusion</td>
<td>15</td>
</tr>
<tr>
<td>Ankle fracture fixation</td>
<td>15</td>
</tr>
<tr>
<td>Closed reduction forearm/wrist</td>
<td>20</td>
</tr>
<tr>
<td>Ankle &amp; hind &amp; mid-foot arthrodes</td>
<td>5</td>
</tr>
<tr>
<td>Supracondylar humerus perc</td>
<td>5</td>
</tr>
<tr>
<td>Femur and tibia intramedullary fixation</td>
<td>25</td>
</tr>
<tr>
<td>All pediatric procedures</td>
<td>200</td>
</tr>
<tr>
<td>All oncology procedures</td>
<td>10</td>
</tr>
</tbody>
</table>

**CPT Codes in Each Category**

**Knee arthroscopy** (29850, 29851, 29855, 29856, 29866, 29867, 29868, 29870, 29871, 29873, 29874, 29875, 29876, 29877, 29879, 29880, 29881, 29882, 29883, 29884, 29885, 29886, 29887)

**Shoulder arthroscopy** (29805, 29806, 29807, 29819, 29820, 29821, 29822, 29823, 29824, 29825, 29826, 29827, 29828)

**ACL reconstruction** (29888)

**THA** (27130, 27132, 27134, 27137, 27138)

**TKA** (27442, 27443, 27445, 27446, 27447, 27487)

**Hip fractures** (27235, 27236, 27244, 27245)

**Spine decompression lumbar spine/posterior spine fusion thoracic or lumbar** (22612, 22630, 22800, 22802, 22804, 63005, 63012, 63017, 63030, 63042, 63047)

**Closed reduction forearm and wrist fractures** (25505, 25520, 25535, 25565, 25605, 25624, 25690, 25680, 25675)

**Ankle and hind and mid-foot arthrodeses** (27870, 28705, 28715, 28725, 28730, 28735, 28737)

**Supracondylar humerus percutaneous treatment** (24538, 24566, 24582)

**Femur and tibia intramedullary fixation** (27506, 27759)

*Please note: manipulations must recorded with procedures in the Case Log System*