Supplemental Guide: Adult Reconstructive Orthopaedic Surgery

ACGME

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Adult Reconstructive Orthopaedic Surgery Milestones. This is not designed to indicate any specific requirements for each level, but to provide insight into the thinking of the Milestone Work Group.

Included in this document is the intent of each Milestone and examples of what a Clinical Competency Committee (CCC) might expect to be observed/assessed at each level. Also included are suggested assessment models and tools for each subcompetency, references, and other useful information.

Review this guide with the CCC and faculty members. As the program develops a shared mental model of the Milestones, consider creating an individualized guide (Supplemental Guide Template available) with institution/program-specific examples, assessment tools used by the program, and curricular components, including rotation mapping.

Additional tools and references, including the Milestones Guidebook, Clinical Competency Committee Guidebook, and Milestones Guidebook for Residents and Fellows, are available on the Resources page of the Milestones section of the ACGME website.

Patient Care 1: History and Physical Examination, Imaging Interpretation, and Diagnosis **Overall Intent:** To develop a comprehensive differential diagnosis based on complete history, physical examination, and diagnostic testing.	
Milestones	**Examples**
Level 1 *Obtains appropriate medical history and performs basic orthopaedic examination, with guidance* *Identifies diagnostic testing for common adult reconstructive conditions* *Develops a basic differential diagnosis pertinent to common orthopaedic conditions, with guidance*	● Asks pertinent questions regarding sensations that were experienced in the injured joint (pop, snap, etc.) ● Asks questions regarding joint swelling onset ● Identifies appropriate x-ray views as common diagnostic testing ● Develops appropriate differential diagnosis based on patient history and physical exam
Level 2 *Obtains history of the condition or injury and performs an orthopaedic examination for common adult reconstructive conditions* *Interprets diagnostic testing for adult reconstructive conditions, with guidance* *Develops a basic differential diagnosis pertinent to adult reconstructive conditions, with guidance*	● Asks appropriate history questions for a patient with shoulder pain ● Orders appropriate x-ray views to assess joint injury (shoulder instability, hip arthritis, etc.) ● Develops appropriate differential diagnosis based on patient history and physical examination commonly seen in the specific population
Level 3 *Obtains history of the condition or injury, performs an orthopaedic examination, and recognizes complex or high-risk adult reconstructive conditions* *Orders and interprets diagnostic testing for complex adult reconstructive conditions, with guidance* *Develops a comprehensive differential diagnosis based on the history and physical examination finding, with guidance*	● Asks appropriate history questions for a patient with arthritis and contributing comorbid conditions (e.g., multiple sclerosis (MS), Parkinson's) ● Interprets the x-rays and other advanced imaging findings in tandem to create a diagnosis ● Interprets physical exam and specialized imaging to create appropriate treatment plan
Level 4 *Independently obtains history of conditions or injuries and consistently performs*	● Recognizes the subtlety of midflexion instability versus patella-femoral instability

complex examinations of adult reconstructive conditions *Independently interprets diagnostic testing for complex adult reconstructive conditions* *Independently develops a comprehensive differential diagnosis based on history and physical examination finding*	● Identifies osteonecrosis on magnetic resonance imaging (MRI) scan ● Develops timing framework to utilize advanced imaging after metal-on-metal arthroplasty ● Finalizes treatment plan based on physical exam and specialized imaging
Level 5 *Develops and publishes on a new physical examination maneuver* *Develops a novel diagnostic technique or tool*	• Creates population health recommendations for preoperative management for patients with comorbid conditions ● Recognizes patient-specific peri-operative risks and makes recommendations to mitigate risk
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Bonnaig N, Dailey S, Archdeacon M. Proper patient positioning and complication prevention in orthopaedic surgery. J Bone Joint Surg Am. 2014;96:1135-1140. https://pubmed.ncbi.nlm.nih.gov/24990979/. 2021. ● Noordin S, McEwen JA, Kragh JF, Aiesen E, Masri BA. Surgical tourniquets in orthopaedics. J Bone Joint Surg Am. 2009;91A(12):2958-2967. https://ecommons.aku.edu/cgi/viewcontent.cgi?article=1017&context=pakistan_fhs_mc_surg_orthop. 2021.

Patient Care 2: Non-Operative Management **Overall Intent:** To evaluate and develop a treatment plan for adult reconstructive conditions	
Milestones	**Examples**
Level 1 *Generates a basic treatment plan for common adult reconstructive conditions, with direct supervision* *Manages patients with basic adult reconstructive conditions (e.g., knee injection, bracing, physical therapy prescription), with direct supervision*	● Develops a treatment plan for evaluation and management of hip and knee arthritis with direct attending supervision ● Prescribes devices or durable medical equipment to assist in the relief of hip and knee pain and understands the role of physical therapy
Level 2 *Generates a basic treatment plan for common adult reconstructive conditions, with indirect supervision* *Manages patients with basic adult reconstructive conditions, with indirect supervision*	● Develops a treatment plan for hip and knee joint arthritis, with indirect supervision ● Understands the risks, benefits, and alternatives of intra-articular injectables (e.g., corticosteroids, viscos supplementation, platelet-rich plasma) ● Directs or performs intra-articular injections of the hip and knee joints
Level 3 *Generates and modifies a treatment plan for complex adult reconstructive conditions, with guidance* *Independently manages patients and adapts the management plan for basic adult reconstructive conditions*	● Develops a treatment plan for patients with post-traumatic and/or septic arthritis ● Establishes a plan for the evaluation and treatment for infection following hip and knee replacements ● Establishes a treatment plan for patients with hip and knee joint instability following replacements
Level 4 *Independently generates and modifies individualized treatment plans* *Independently manages patients and adapts the management plan for complex adult reconstructive conditions*	● Develops an individualized plan for patients with complex hip and knee conditions requiring joint replacement (e.g., hip dysplasia, post-traumatic and post-septic arthritis) ● Develops and individualized plan for patients with failed hip and knee replacements (e.g., management of bone defects and ligament deficiencies) ● Has a good understanding of the published data to make complex clinical decisions (e.g, The need for resection/amputation/non-operative management)
Level 5 *Develops and/or disseminates a novel treatment protocol*	● Designs a new device or develops a new technique or protocol for management of hip and knee arthritis and arthroplasty

	● Publishes, presents, or is recognized as an expert in adult reconstructive conditions of the hip and knee joints
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Rees HW, Barba M. AAOS Clinical Practice Guideline: Management of Osteoarthritis of the Hip. *J Am Acad Orthop Surg*. 2020 Apr 1;28(7):e292-e294. ● Weber KL, Jevsevar DS, McGrory BJ. AAOS Clinical Practice Guideline: Surgical Management of Osteoarthritis of the Knee: Evidence-based Guideline. *J Am Acad Orthop Surg.* 2016 Aug;24(8):e94-6. ● Parvizi J, Della Valle CJ. AAOS Clinical Practice Guideline: diagnosis and treatment of periprosthetic joint infections of the hip and knee. *J Am Acad Orthop Surg*. 2010 Dec;18(12):771-2.

Patient Care 3: Arthroscopic Operative Skills **Overall Intent:** To plan and perform a primary arthroscopy and care for subsequent surgical complications	
Milestones	**Examples**
Level 1 *Develops a simple surgical plan, with indirect supervision*	● Develops plan for degenerative meniscus tear
Demonstrates basic surgical skills (e.g., wound closure) and assists with procedures	● Performs diagnostic arthroscopy of common joints (e.g., knee, shoulder), with direct supervision
Identifies and reports simple complications	● Identifies post-surgical bleeding and stiffness
Level 2 *Develops a surgical plan that includes identification of potential challenges and technical complexities, with guidance*	● Develops a surgical plan for meniscectomy ● Gains access and navigates the joint during surgery
Establishes portals and access and performs diagnostic knee and/or shoulder arthroscopy, with indirect supervision	● Performs complete diagnostic arthroscopy of the knee with meniscectomy and of the shoulder with debridement ● Recognizes need for ancillary portals
Identifies and manages simple complications, with guidance	● Recognizes common complications of surgery
Level 3 *Develops a surgical plan for complex procedures, including contingencies for complications, with guidance*	
Performs critical steps of knee and/or shoulder procedures, with guidance; establishes portals and access and performs hip and/or elbow arthroscopy, with indirect supervision	● Performs diagnostic arthroscopy of a partial or total knee replacement
Identifies and manages complex complications, with guidance	● Treats and manages post-operative complications of surgery
Level 4 *Independently develops a surgical plan for complex procedures, including contingencies for complications*	

Independently performs complex procedures with skill and confidence *Independently develops a plan for managing complex complications*	● Performs lateral release and excision of osteophytes, bony impingement, and patellar clunk fibrous tissue ● Recognizes, corrects, and avoids potential intra-operative complications
Level 5 *Develops novel surgical techniques* *Contributes to quality improvement initiative regarding complications at the institution*	● Acts as a primary referral to treat complex revision reconstruction procedures (e.g., shoulder with bone loss, revision femoroacetabular impingement debridement) ● Acts as a primary referral for complex osteoarticular problems ● Contributes to a patient registry for risk factors for recurrent shoulder instability
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● American Academy of Orthopaedic Surgeons Management of Osteoarthritis of the Knee (Non- Arthroplasty) Evidence-Based Clinical Practice Guideline. https://www.aaos.org/oak3cpg. Published 2021 Aug 31. ● Sequeira SB, Scott J, Novicoff W, Cui Q. Systematic review of the etiology behind patellar clunk syndrome. *World J Orthop*. 2020;11(3):184-196. Published 2020 Mar 18. doi:10.5312/wjo.v11.i3.184

Patient Care 4: Primary Knee and Primary Hip Replacement **Overall Intent:** To plan and perform a primary total knee/total hip replacement and care for subsequent surgical complications	
Milestones	**Examples**
Level 1 *Develops a simple surgical plan, with indirect supervision*	● Develops a surgical plan for primary total hip and knee arthroplasty, including the approach (anterior versus posterior from hip replacement and medial parapatellar arthrotomy for knee replacement)
Demonstrates basic surgical skills (e.g., wound closure) and assists with procedures	● Demonstrates basic surgical skills like making a medial parapatellar arthrotomy, broaching the femoral canal, using a saw in captured guides, and closing the capsule
Identifies and reports simple complications	● Identifies and recognizes simple complications like wound drainage and prosthetic dislocation on post-operative imaging
Level 2 *Develops a surgical plan that includes identification of potential challenges and technical complexities, with guidance*	● Develops, with guidance, a surgical plan with identification of potential difficulties (e.g., for knee replacement: fixed flexion contracture, valgus deformity; for hip replacement: dysplastic hip, significant leg length discrepancy)
Performs surgical approach, with indirect supervision	● Develops, with guidance, a surgical plan with identification of potential difficulties (e.g., for knee replacement: fixed flexion contracture, valgus deformity; for hip replacement: dysplastic hip, significant leg length discrepancy)
Identifies and manages simple complications, with guidance	● Identifies and manages complications such as post-operative total hip dislocations with closed reduction under sedation, aspiration of knee joint for ruling out peri-prosthetic joint infection
Level 3 *Develops a surgical plan for complex procedures, including contingencies for complications, with guidance*	● Develops a surgical plan for revision total knee and revision total hip arthroplasty with attention to anatomy and associated complications
Performs critical steps of procedures, with guidance	● Develops a surgical plan for revision total knee and revision total hip arthroplasty with attention to anatomy and associated complications
Identifies and manages complex complications, with guidance	● Develops a surgical plan for revision total knee and revision total hip arthroplasty with attention to anatomy and associated complications
Level 4 *Independently develops a surgical plan for complex procedures, including contingencies for complications*	● Independently develops plan for complex hip and knee arthroplasty (e.g., bone loss, soft tissue compromise, post-traumatic injury, prior fusion, peri-prosthetic joint infection, or prior hardware)

Independently performs complex procedures with skill and confidence *Independently develops a plan for managing complex complications*	● Independently performs complex arthroplasty of the hip (e.g., trochanteric osteotomy, hip dysplasia, bone loss requiring wedges/augments/cages) and knee (e.g., extensor mechanism reconstruction, soft tissue compromise, management of bone loss with cones/sleeves/stems) ● Independently develops plan/manages complex complications (e.g., acetabular or femoral fracture, peri-prosthetic joint infection, instability/dislocation, extensor mechanism deficiency)
Level 5 *Develops novel surgical techniques* *Contributes to quality improvement initiative regarding complications at the institution*	● Develops and implements a comprehensive perioperative multimodal pain medication protocol for total joint arthroplasty patients ● Develops a multidisciplinary approach for pre-operative work-up including evaluation and optimization of patients with history of mental health/substance abuse issues prior to undergoing total joint arthroplasty ● Independently performs a total femoral replacement using a unique technique to incorporate the abductor mechanism onto the prosthesis
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Mont, MA, Tanzer, M, AAOS Orthopaedic Knowledge Update 6 (Hip and Knee Reconstruction Sections 1,2,3,), AAOS, 2021. ● Lieberman, JR, AAOS Comprehensive Orthopaedic Review 3 (Section 9), AAOS, 2019

Patient Care 5: Knee and Hip Revision **Overall Intent:** To plan and perform a revision total knee/total hip replacement and care for subsequent surgical complications	
Milestones	**Examples**
Level 1 *Develops a simple surgical plan, with indirect supervision*	● Develops a surgical plan for aseptic loosening (total knee arthroplasty (TKA) and total hip arthroplasty(THA))
Demonstrates basic surgical skills (e.g., wound closure) and assists with procedures	● Demonstrates basic surgical skills like sawing, broaching, and reaming in a safe and effective manner
Identifies and reports simple complications	● Identifies and recognizes simple complications like maltracking, flexion/extension gap imbalance
Level 2 *Develops a surgical plan that includes identification of potential challenges and technical complexities, with guidance*	● Develop a surgical plan for straight forward single component revision for aseptic problems (e.g., loosening, instability)
Performs surgical approach, with direct supervision	● Performs surgical approach to obtain necessary exposure, with direct supervision
Identifies and manages simple complications, with guidance	● Identifies and manages simple complications such as wound issues or patellar maltracking
Level 3 *Develops a surgical plan for complex revision procedures, including contingencies for complications, with guidance*	● Develops a surgical plan for complex revision and extensile surgical approach
Performs surgical approach, with indirect supervision	● Performs critical portions of procedure including extensile surgical approach and removal of well-fixed cemented or uncemented components, with supervision
Identifies and manages complex complications, with guidance	● Identifies pre-operative peroneal nerve palsy, post-operative laxity, midflexion instability following total knee arthroplasty, with guidance
Level 4 *Independently develops a surgical plan for revision complex procedures, including contingencies for complications*	● Develops a surgical plan treatment of prosthetic joint infection or reconstruction for massive osteolysis
Performs critical steps of procedures, with guidance	● Independently performs extensile surgical approach or removal of well-fixed cemented or uncemented components

Independently develops a plan for managing complex complications	● Develops plan for managing bone loss in massive osteolysis
Level 5 *Independently performs complex revision procedures with skill and confidence* *Contributes to quality improvement initiative regarding complications at the institution*	● Independently performs extensile surgical approach or component removal and spacer placement for prosthetic joint infection ● Develops a clinical pathway for post-operative management of revision TKA/THA
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Mont, MA, Tanzer, M. *AAOS Orthopaedic Knowledge Update 6 (Sections 11 ,20, 34, 35),* AAOS, 2021. ● Sheth NP, Bonadio MB, Demange MK. Bone loss in revision total knee arthroplasty: evaluation and management. *Journal of the American Academy of Orthopaedic Surgeons*. 25(5):348-357. ● Sheth NP, Rozell JC, Paprosky WG. Evaluation and treatment of patients with acetabular osteolysis after total hip arthroplasty. *Journal of the American Academy of Orthopaedic Surgeons*. 27(6):e258-e267.

Medical Knowledge 1: Orthopaedic Clinical Decision Making **Overall Intent:** To understand the effects of patient anatomy, complex clinical conditions, and implant design on treatment choices	
Milestones	**Examples**
Level 1 *Articulates a methodology for clinical reasoning* *Identifies resources to direct clinical decisions*	● Presents a patient complaining of hip/knee pain, including relevant musculoskeletal symptoms and activity history after interviewing the patient ● Investigates medical record for ancillary treatments including physical and/or occupational therapies, bracing, injections ● Orders appropriate basic imaging studies for the involved hip/knee
Level 2 *Demonstrates clinical reasoning to determine treatment goals* *Selects and prioritizes relevant resources based on the scenario to inform decisions*	● Prioritizes common-to-rare differential diagnoses for hip/knee pain relevant to patient history ● Interprets plain radiographs to determine presence of acute and/or chronic conditions ● Relates the potential findings seen on plain radiographs (e.g., osteonecrosis, subchondral sclerosis, malalignment, unicompartmental versus tricompartmental arthritis) ● Orders indicated advanced imaging studies and related the potential findings noted on MRI or computerized tomography (CT) scan ● Applies the appropriate use criteria to an individual patient
Level 3 *Synthesizes information to make clinical decisions for straightforward conditions* *Integrates evidence-based information to inform diagnostic decision-making for straightforward conditions*	● Prioritizes a broad differential diagnosis for the presentation of hip/knee pain to include hip and spine pathology, infection, and inflammatory etiologies ● Orders appropriate adjunct plain radiographs (e.g., stress views, hip-to-knee, weight bearing, lumbar films) to inform comprehensive diagnosis ● Describes the appropriate clinical practice guidelines to guide non-operative and surgical decision making for hip/knee pathology ● Uses the clinical and radiological findings to make a preliminary diagnosis of hip and knee arthritis and a preliminary treatment plan
Level 4 *Efficiently synthesizes information and integrates reflection to make clinical decisions for complex conditions* *Integrates evidence-based information to inform diagnostic decision-making for complex conditions*	● Adjusts surgical plan to incorporate treatment of malalignment, medial collateral ligament/lateral collateral ligament deficiency, acetabular dysplasia, and bony deformities ● Considers patient factors in timing and reconstruction options for a total knee arthroscopy versus unicompartmental knee arthroscopy ● Incorporates clinical practice guidelines into clinical/radiologic findings to develop a comprehensive surgical and rehabilitation plan

	● Uses current evidence and other resources to decide most appropriate implant choice (e.g., posterior stabilized versus cruciate retaining, cemented versus cementless, primary versus revision components)
Level 5 *Incorporates clinical reasoning to improve care pathways*	● Demonstrates knowledge of the interlinked effects of biologic materials, surgical treatment, and rehabilitation protocols, and applies them to appropriate patient populations and specific patient needs ● Understands the methodology for applying appropriate-use criteria
Assessment Models or Tools	● Case-based discussions ● Multisource feedback ● Medical record (chart) audit ● Preceptor encounters ● Reflection
Curriculum Mapping	●
Notes or Resources	● McGrory BJ, Weber KL, Jevsevar DS, Sevarino, K. Surgical management of osteoarthritis of the knee: evidence-based guideline. *Journal of the American Academy of Orthopaedic Surgeons*. 24(8):e87-e93. doi: 10.5435/JAAOS-D-16-00159 ● Sanders JO, Murray J, Gross L. Non-arthroplasty treatment of osteoarthritis of the knee. *Journal of the American Academy of Orthopaedic Surgeons* 22(4):256-260. doi: 10.5435/JAAOS-22-04-256 ● Rees, HW. Management of osteoarthritis of the hip. *Journal of the American Academy of Orthopaedic Surgeons*. 28(7):e288-e291. doi: 10.5435/JAAOS-D-19-00416

Medical Knowledge 2: Basic Science: Gross Anatomy, Biomechanics, Tribology, Implant Design, and Pathophysiology **Overall Intent:** To understand the effect of gross anatomy, physiology, biomechanics, tribology, and implant design on surgical planning, potential complications, and outcomes	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of regional gross anatomy*	● Demonstrates knowledge of gross anatomy, particularly extremity anatomy ● Correlates anatomic knowledge to imaging findings on basic imaging studies (plain radiographs) ● Demonstrates knowledge of normal joint anatomy and natural history of joint arthritis
Demonstrates knowledge of basic biomechanics, material properties, implant design, wear, and prosthetic joint infection	● Understands the importance of post-operative complications following total joint arthroplasty (e.g., wound healing complications, infections, venous thromboembolism, instability, neurovascular injury, stiffness) ● Understands basic implant choices
Level 2 *Demonstrates knowledge of surgical anatomy and pathophysiology*	● Demonstrates knowledge of intermuscular and internervous planes for surgical approaches and can identify structures at risk during a surgical approach ● Correlates anatomic knowledge to imaging findings on advanced imaging studies (e.g., MRI, CT, nuclear medicine) ● Demonstrates knowledge of the pathophysiology of joint arthritis, current literature, and treatment options
Demonstrates knowledge of diagnostic modalities for implant-related complications	● Demonstrates knowledge of diagnostic modalities for implant related complications (e.g., metal-on-metal reaction, trunionosis, osteolysis, acute versus chronic periprosthetic joint infection ● Demonstrates general understanding of differences in implant design including bearing surface options, fixation method, and material properties ● Demonstrates ability to appropriately work-up a periprosthetic joint infection
Level 3 *Applies knowledge of anatomy and pathophysiology to explain the effects of surgical or non-surgical treatment on patient outcomes for straightforward conditions*	● Applies knowledge of anatomy and pathophysiology to understand the principles of implant biomechanics and failure ● Understands differences in common approaches to the hip and the knee and anticipates factors that should alter approach consideration in a primary situation
Applies knowledge of diagnostic modalities for implant-related complications	● Applies knowledge of anatomy and pathophysiology to appropriate component positioning in primary total hip arthroplasty and balancing in primary total knee arthroplasty ● Understands basic pre-surgical planning and templating

	● Identifies implants at risk of unique complications and understands appropriate work-up for such complications ● Demonstrates ability to differentiate between acute and chronic periprosthetic joint infection ● Acknowledges controversies within the field (e.g., implant options, approach options, technology options)
Level 4 *Applies knowledge of anatomy and pathophysiology to explain the effects of surgical or non-surgical treatment on patient outcomes for complex conditions* *Applies knowledge of implant design and selection based on the pathology*	● Applies knowledge of anatomy and pathophysiology to anticipate alterations in surgical approach, develop treatment strategies, and develop post-operative protocols (e.g., applies understanding of joint reactive forces) in complex/revision situations ● Demonstrates ability to pre-operatively plan for complex cases (e.g., implant selection, implant position) ● Demonstrates foresight into potential complications in complex cases and has back-up plan available
Level 5 *Develops and/or disseminates knowledge of adult reconstructive topics*	● Presents at a regional conference on the use of biologics ● Presents at a national conference for epidemiology and treatment options for knee injuries ● Primary presenter/author on original work related to anatomy/approach, biomechanics, tribology, infection or implant design
Assessment Models or Tools	● Direct observation ● E-module multiple choice tests ● Hospital safety report audit ● Multisource feedback ● Presentations (M and M, QI) ● Reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● Croskerry P. Achieving quality in clinical decision making: Cognitive strategies and detection of bias. *Academic Emergency Medicine*. 2002;9(11):1184-1204. https://onlinelibrary.wiley.com/doi/abs/10.1197/aemj.9.11.1184?sid=nlm%3Apubmed. 2021. ● Norman GR, Monteiro SD, Sherbino J, Ilgen JS, Schmidt HG, Mamede S. The causes of errors in clinical reasoning: Cognitive biases, knowledge deficits, and dual process thinking. *Acad Med*. 2017;92(1):23-30. https://journals.lww.com/academicmedicine/Fulltext/2017/01000/The_Causes_of_Errors_in_Clinical_Reasoning_.13.aspx. 2021.

Systems-Based Practice 1: Patient Safety and Quality Improvement (QI) **Overall Intent:** To engage in the analysis and management of patient safety events, including relevant communication with patients, families, and health care professionals; to conduct a QI project	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of common patient safety events* *Demonstrates knowledge of how to report patient safety events* *Demonstrates knowledge of basic quality improvement methodologies and metrics*	● Lists patient misidentification or medication errors as common patient safety events ● Identifies pain medication safety issues when cross referencing patient medications ● Reports lack of implementation of identifier (e.g., non-slip socks) or room door sign in geriatric patient population at risk for falls ● Describes how to report errors in the local clinical environment ● Knows the systems process for communicating potential medication errors ● Summarizes protocols resulting in fall reduction ● Summarizes common home issues to mitigate fall issues such as room carpets and grab bars
Level 2 *Identifies system factors that lead to patient safety events* *Reports patient safety events through institutional reporting systems (simulated or actual)* *Describes local quality improvement initiatives*	● Identifies geriatric patient characteristics contributing to fall risk ● Correctly applies a Plan Do Study Act (PDSA) QI project to help eliminate narcotic dependency in a trauma-injured patient ● Describes root cause analysis process
Level 3 *Participates in analysis of patient safety events (simulated or actual)* *Participates in disclosure of patient safety events to patients and their families (simulated or actual)* *Participates in local quality improvement initiatives*	● Prepares for morbidity and mortality (M and M) presentations ● Communicates, under supervision, with patients/families about a medication error ● Participates in protocol with risk management to disclose medication errors
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)*	● Collaborates with a team to conduct the analysis of fall occurrences and can effectively communicate with patients/families about those events

Discloses patient safety events to patients and their families (simulated or actual) *Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project*	● Participates in a QI project to decrease frequency of falls within the practice
Level 5 *Actively engages teams and processes to modify systems to prevent patient safety events* *Role models or mentors others in the disclosure of patient safety events* *Creates, implements, and assesses quality improvement initiatives at the institutional or community level*	● Assumes a leadership role at the departmental or institutional level for patient safety ● Conducts a simulation for disclosing patient safety events ● Recognizes the need for and completes a QI project to decrease fall risk in the geriatric population in collaboration with the county health department and shares results with stakeholders
Assessment Models or Tools	● Direct observation ● E-module multiple choice tests ● Hospital safety report audit ● Multisource feedback ● Presentations (M and M, QI) ● Reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● Institute of Healthcare Improvement. http://www.ihi.org/Pages/default.aspx. 2021.

Systems-Based Practice 2: System Navigation for Patient-Centered Care **Overall Intent:** To effectively navigate the health care system, including the interdisciplinary team and other care providers, to adapt care to a specific patient population to ensure high-quality patient outcomes	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of care coordination* *Identifies key elements for safe and effective transitions of care and hand-offs*	● Identifies the primary care provider for a geriatric patient after hip arthroplasty, including home health nurse, physical therapist, and social workers as members of the team ● Lists follow-up of labs, testing, new medications, and consults as essential components of a sign-out
Level 2 *Coordinates care of patients in routine clinical situations effectively using the roles of interprofessional team members* *Performs safe and effective transitions of care/hand-offs in straightforward clinical situations*	● Coordinates transition of care with rehabilitation facility at the time of discharge from the hospital ● Uses a systematic institutional process during routine sign-out
Level 3 *Coordinates care of patients in complex clinical situations effectively using the roles of interprofessional team members* *Performs safe and effective transitions of care/hand-offs in complex clinical situations*	● Coordinates complex care with the social worker for a homeless patient to ensure appropriate medical aftercare ● Uses institutional protocol when transferring a complex patient to the intensive care unit (ICU)
Level 4 *Role models effective coordination of patient-centered care among multidisciplinary teams* *Role models and advocates for safe and effective transitions of care/hand-offs*	● Leads team members during inpatient rotations in appropriate consultation with care coordination in disposition of homeless patient with mobility impairment ● Plans for cross-coverage in case of unanticipated absence of a team member
Level 5 *Analyzes the process of care coordination and leads in the design and implementation of improvements* *Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes*	● Leads a community outreach program to design and implement a quality improvement project for home rehabilitation ● Develops a protocol (care pathways for various orthopaedic conditions) to improve transitions to long-term care facilities
Assessment Models or Tools	● Direct observation ● Multisource feedback

	● Objective structured clinical examination (OSCE) ● Quality metrics and goals mined from electronic health records (EHR) ● Review of sign-out tools, use and review of checklists
Curriculum Mapping	●
Notes or Resources	● Centers for Disease Control. Population health training. https://www.cdc.gov/pophealthtraining/whatis.html. 2021. ● Hospitals in Pursuit of Excellence. Preventing Patient Falls: A Systematic Approach from the Joint Commission Center for Transforming Healthcare Project. http://www.hpoe.org/Reports-HPOE/2016/preventing-patient-falls.pdf. 2021. ● Skochelak SE, Hawkins RE, Lawson LE, Starr SR, Borkan JM, Gonzalo JD. *AMA Education Consortium: Health Systems Science*. 1st ed. Philadelphia, PA: Elsevier; 2016. https://commerce.ama-assn.org/store/ui/catalog/productDetail?product_id=prod2780003. 2021.

Systems-Based Practice 3: Physician Role in Health Care Systems **Overall Intent:** To understand the physician's role in the complex health care system and how to operate effectively within the system to improve patient care	
Milestones	**Examples**
Level 1 *Describes basic health payment systems, including government, private, public, and uninsured care, as well as different practice models*	● Articulates the differences between home care, skilled nursing, and long-term care facilities ● Takes into consideration patient's prescription drug coverage when recommending medical treatment of osteoarthritis
Level 2 *Describes how working within the health care system impacts patient care, including billing and coding*	● Identifies coding requirements for clinical documentation ● Explains that improving patient satisfaction potentially improves patient compliance ● Recognizes that appropriate comorbidity documentation can influence the severity of illness determination upon discharge ● Understands the impact of health plan coverage on prescription drugs for individual patients
Level 3 *Analyzes how personal practice affects the system (e.g., length of stay, readmission rates, clinical efficiency)*	● Ensures compliance with care pathways to optimize length of stay ● Understands the role of patient education in decreasing readmission rates
Level 4 *Uses shared decision-making in patient care, taking into consideration costs to the patient*	● Ensures proper documentation of qualifying hospital stay prior to discharging a patient to a skilled nursing facility for physical therapy ● Works collaboratively to improve patient assistance resources for a patient with a recent amputation and limited resources ● Tailors treatment decisions to patient resources/insurance status (e.g., prescribing a brace versus applying a splint)
Level 5 *Participates in advocacy activities for health policy*	● Improves informed consent process for non-English-speaking patients requiring interpreter services ● Performs clinical research that effects health care barriers
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Patient satisfaction data ● Portfolio
Curriculum Mapping	●
Notes or Resources	● Agency for Healthcare Research and Quality (AHRQ). Measuring the quality of physician care. https://www.ahrq.gov/talkingquality/measures/setting/physician/index.html. 2021. ● AHRQ. Major physician Measurement Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. 2021. ● Dzau VJ, McClellan MB, McGinnis JM, et al. Vital directions for health and health care: Priorities from a National Academy of Medicine initiative. *JAMA*. 2017;317(14):1461-1470.

	https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/. 2021. ● The Commonwealth Fund. Health system data center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. 2021. ● The Kaiser Family Foundation. www.kff.org. 2021. ● The Kaiser Family Foundation. Health reform. https://www.kff.org/topic/health-reform/. 2021.

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice **Overall Intent:** To incorporate evidence and patient values into clinical practice	
Milestones	**Examples**
Level 1 *Demonstrates how to access and use available evidence and incorporate patient preferences and values to the care of a straightforward condition*	● Compares evidence-based guidelines and literature review for treatment of hip and knee osteoarthritis to patient's preference for treatment while communicating and understanding options
Level 2 *Articulates clinical questions and elicits patient preferences and values to guide evidence-based care*	● Identifies and discusses potential evidence-based treatment options for a patient with a hip and knee osteoarthritis and solicits patient perspective on activity level and needs
Level 3 *Locates and applies the best available evidence, integrated with patient preference, to the care of complex conditions*	● Obtains, discusses, and applies evidence for the treatment of a patient with hip and knee osteoarthritis and co-existing obesity, diabetes, and coronary artery disease ● Understands and appropriately uses clinical practice guidelines in making patient care decisions while eliciting patient preferences for operative versus non-operative treatment
Level 4 *Critically appraises and applies evidence, even in the face of uncertainty and conflicting evidence, to guide care tailored to the individual patient*	● Accesses the primary literature to identify alternative treatments for hip and knee arthritis based on age, activity level, medical comorbidities, functional demands (e.g., high tibial osteotomy versus unicompartmental versus total knee arthroplasty) based on bone quality.
Level 5 *Coaches others to critically appraise and apply evidence for complex conditions and/or participates in the development of guidelines*	● Leads clinical discussion on application of evidence-based practice for treatment of hip and knee osteoarthritis ● Develops a patient optimization pathway to prevent perioperative complications following hip and knee surgery as part of a multidisciplinary team
Assessment Models or Tools	● Core conference participation ● Direct observation ● Oral or written examinations ● Presentation evaluation
Curriculum Mapping	●
Notes or Resources	● AO Foundation surgery reference. (national organization guidelines, e.g., American Osteopathic Association, American Academy of Orthopaedic Surgeons) https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/proximal-femur/femoral-neck-fracture-subcapital-displaced. 2021. ● Orthopaedic Trauma Association (OTA). Femoral neck fractures. https://ota.org/sites/files/2018-08/L02-Femoral%20Neck%20Fractures.pdf. 2021. ● Various journals (*Journal of the American Academy of Orthopaedic Surgeons, Journal of Orthopaedic Trauma, Journal of Arthroplasty*)

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth **Overall Intent:** To seek clinical performance information with the intent to improve care; reflects on all domains of practice, personal interactions, and behaviors, and their impact on colleagues and patients (reflective mindfulness); develop clear objectives and goals for improvement in some form of a learning plan	
Milestones	**Examples**
Level 1 *Accepts responsibility for personal and professional development by establishing goals* *Identifies the strengths, deficiencies, and limitations in one's knowledge and expertise*	● Let the attending know what areas of weakness or gaps in knowledge ● Reflects on feedback from patient care team members ● Identifies gaps in knowledge
Level 2 *Demonstrates openness to feedback and other input to inform goals* *Analyzes and reflects on the strengths, deficiencies, and limitations in one's knowledge and expertise to design a learning plan, with assistance*	● Integrates and responds to feedback to adjust clinical performance ● Assesses time management skills and how it impacts timely completion of clinic notes and literature reviews ● Develops individual education plan to improve study skills and knowledge base, with assistance
Level 3 *Responds to feedback and other input episodically, with adaptability and humility* *Creates and implements a learning plan to optimize educational and professional development*	● Uses feedback to modify personal professional development goals ● Creates a comprehensive personal curriculum to improve education, including monitoring and accountability for a study plan
Level 4 *Actively seeks feedback and other input with adaptability and humility* *Uses ongoing reflection, feedback, and other input to measure the effectiveness of the learning plan, and, when necessary, improves it*	● Asks for feedback from peers, faculty members, and ancillary team members ● Debriefs with the attending and other patient care team members after patient encounter to optimize future collaboration in the care of the patient and family
Level 5 *Role models consistently seeking feedback and other input with adaptability and humility* *Coaches others on reflective practice*	● Models and teaches practice improvement through focused study and reflective feedback ● Develops educational module for collaboration with other patient care team members
Assessment Models or Tools	● Core conference participation ● Direct observation ● Review of learning plan

Curriculum Mapping	●
Notes or Resources	● Burke AE, Benson B, Englander R, Carraccio C, Hicks PJ. Domain of competence: practice-based learning and improvement. *Academic Pediatrics*. 2014;14(2 Suppl):S38-S54. https://www.academicpedsjnl.net/article/S1876-2859(13)00333-1/pdf. 2021. ● Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. *Academic Medicine*. 2009;84(8):1066-1074. https://journals.lww.com/academicmedicine/fulltext/2009/08000/Measurement_and_Correlates_of_Physicians__Lifelong.21.aspx. 2021. ● Lockspeiser TM, Schmitter PA, Lane JL, Hanson JL, Rosenberg AA, Park YS. Assessing residents' written learning goals and goal writing skill: validity evidence for the learning goal scoring rubric. *Academic Medicine*. 2013;88(10):1558-1563. https://journals.lww.com/academicmedicine/fulltext/2013/10000/Assessing_Residents__Written_Learning_Goals_and.39.aspx. 2021.

Professionalism 1: Professional Behavior and Ethical Principles **Overall Intent:** To recognize and address lapses in ethical and professional behavior, demonstrate ethical and professional behaviors, and use appropriate resources for managing ethical and professional dilemmas	
Milestones	**Examples**
Level 1 *Identifies and describes inciting events for professionalism lapses* *Demonstrates knowledge of the ethical principles underlying patient care (e.g., informed consent, surrogate decision making, advance directives, confidentiality, error disclosure, stewardship of limited resources, and related topics)*	● Identifies fatigue, illness, increased substance/alcohol use and unmanaged stress as contributing factors to professional lapses ● Relates the importance of patient autonomy as it relates to informed consent including the role of surrogates and advance directives ● Understands the impact of disclosing errors in patient care and loss of patient confidentiality
Level 2 *Demonstrates insight into professional behavior in straightforward situations* *Applies ethical principles in straightforward situations and takes responsibility for lapses*	● Understands perceptions created by tone of voice, timing/place of feedback within the health care team during daily patient care activities ● Notifies appropriate people of personal mistakes; does not make excuses ● Accepts responsibility when supervising residents who do not provide appropriate instruction to learners (e.g., wrong labs, splint)
Level 3 *Demonstrates professional behavior in complex situations* *Integrates ethical principles and recognizes the need to seek help in complex situations*	● Does not attribute blame when discussing adverse outcome with family members or the patient ● Uses respectful, unemotional communication in discussions when resolving conflict within health care team ● Notifies site director or appropriate supervisor after noticing a colleague seems to be impaired
Level 4 *Recognizes situations that may promote professionalism lapses and intervenes to prevent lapses in oneself and others* *Recognizes and uses appropriate resources for managing and resolving ethical dilemmas (e.g., ethics consultations, literature review, risk management/legal consultation)*	● Acts in patient's best interest when collaborating with other health care services to determine appropriate admission service ● Responds to inappropriate microaggressions ● Elevates issues regarding limb amputation or other adverse outcomes to appropriate channels when family or other conflict is evident (e.g., Ethics Committee, legal counsel, risk management)
Level 5 *Coaches others when their behavior fails to meet professional expectations*	● Chooses appropriate setting and tone in discussions with others regarding suboptimal professional behavior

Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution	● Recognizes source of repetitive conflict between members of health care team and recommends institutional policy to resolve ● Devises materials to aid others in learning to provide informed consent
Assessment Models or Tools	● Direct observation ● Global evaluation ● Multisource feedback ● Oral or written self-reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● American Medical Association (AMA). Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. 2021. ● ABIM Foundation, ACP-ASIM Foundation, European Federation of Internal Medicine. Medical professionalism in the new millennium: A physician charter. *Perspectives*. 2002. https://abimfoundation.org/wp-content/uploads/2015/12/Medical-Professionalism-in-the-New-Millenium-A-Physician-Charter.pdf. 2021. ● Bynny RL, Paauw DS, Papadakis MA, Pfeil S. *Medical Professionalism Best Practices: Professionalism in the Modern Era*. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. http://alphaomegaalpha.org/pdfs/Monograph2018.pdf. 2021. ● Domen RE, Johnson K, Conran RM, et al. Professionalism in pathology: A case-based approach as a potential education tool. *Arch Pathol Lab Med.* 2017;141(2):215-219. https://meridian.allenpress.com/aplm/article/141/2/215/132523/Professionalism-in-Pathology-A-Case-Based-Approach. 2021. ● Levinson W, Ginsburg S, Hafferty FW, Lucey CR. *Understanding Medical Professionalism*. 1st ed. New York, NY: McGraw-Hill Education; 2014. https://accessmedicine.mhmedical.com/book.aspx?bookID=1058. 2021.

Professionalism 2: Accountability/Conscientiousness **Overall Intent:** To take responsibility for one's own actions and the impact on patients and other members of the health care team	
Milestones	**Examples**
Level 1 *Reliably arrives to clinical activities on time and describes strategies for ensuring timely task completion* *Responds promptly to requests or reminders to complete tasks and responsibilities*	● Completes work hour logs promptly ● Exhibits punctuality in conference attendance ● Completes end-of-rotation evaluations
Level 2 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in straightforward situations* *Completes tasks and responsibilities without reminders*	● Completes administrative tasks, documents safety modules, procedure review, and licensing requirements by specified due date ● Completes tasks before going out of town in anticipation of lack of computer access while traveling
Level 3 *Prioritizes tasks and responsibilities in a timely manner with appropriate attention to detail in complex situations* *Proactively completes tasks and responsibilities to ensure that the needs of patients, teams, and systems are met*	● Notifies attending of multiple competing demands on call, appropriately triages tasks, and asks for assistance from other residents or faculty members as needed ● Arranges coverage for assigned clinical tasks in preparation for being out of the office to ensure appropriate continuity of care
Level 4 *Recognizes barriers that may impact others' ability to complete tasks and responsibilities in a timely manner*	● Takes responsibility for inadvertently omitting key patient information during sign-out ● Recognizes personal deficiencies in communication with team members about patient care needs ● Recognizes when multiple residents are unavailable, the outpatient clinic will be negatively affected, and appointments delayed
Level 5 *Develops processes to enhance other's ability to efficiently complete patient care tasks and responsibilities*	● Leads interdisciplinary team to identify problems and specific solutions to develop a process to streamline patient discharges
Assessment Models or Tools	● Compliance with deadlines and timelines ● Direct observation ● Global evaluations ● Multisource feedback ● Self-evaluations and reflective tools ● Simulation

Curriculum Mapping	●
Notes or Resources	● AMA. Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. 2021. ● American Academy of Orthopaedic Surgeons (AAOS). Code of Ethics and Professionalism for Orthopaedic Surgeons. https://www.aaos.org/about/bylaws-policies/ethics-and-professionalism/code/. 2021. ● Code of conduct from fellow/resident institutional manual ● Expectations of residency program regarding accountability and professionalism

Professionalism 3: Well-Being **Overall Intent:** To identify, use, manage, improve, and seek help for personal and professional well-being for self and others	
Milestones	**Examples**
Level 1 *Recognizes the importance of addressing personal and professional well-being (e.g., physical, and emotional health)*	● Acknowledges own response to patient's poor outcome ● Receives feedback on missed emotional cues after a family meeting
Level 2 *Lists available resources for personal and professional well-being* *Describes institutional resources that are meant to promote well-being*	● Independently identifies and communicates impact of a personal family tragedy ● Lists graduate medical education (GME) counseling services, suicide hotline, and well-being committee representatives available at the institution
Level 3 *Discusses a plan to promote personal and professional well-being with institutional support* *Recognizes which institutional factors affect well-being*	● Develops a reflective response to deal with personal impact of difficult patient encounters and disclosures with the interdisciplinary team ● Identifies faculty mentors
Level 4 *Independently develops a plan to promote personal and professional well-being* *Describes institutional factors that positively and/or negatively affect well-being*	● Identifies ways to manage personal stress and responses to unexpected patient outcomes, independently ● Identifies initiatives within the fellowship program to improve well-being
Level 5 *Creates institutional-level interventions that promote colleagues' well-being* *Describes institutional programs designed to examine systemic contributors to burnout*	● Assists in organizational efforts to address clinician well-being after patient diagnosis/prognosis/death ● Implements a lasting initiative to improve fellow well-being within the program
Assessment Models or Tools	● Direct observation ● Group interview or discussions for team activities ● Individual interview ● Institutional online training modules ● Self-assessment and personal learning plan
Curriculum Mapping	●
Notes or Resources	● This subcompetency is not intended to evaluate a resident's well-being, but to ensure each resident has the fundamental knowledge of factors that impact well-being, the

	mechanisms by which those factors impact well-being, and available resources and tools to improve well-being. ● ACGME. “Well-Being Tools and Resources.” https://dl.acgme.org/pages/well-being-tools-resources. 2021. ● Ames SE, Cowan JB, Kenter K, Emery S, Halsey D. Burnout in orthopaedic surgeons: A challenge for leaders, learners, and colleagues: AOA critical issues. *J Bone Joint Surg Am.* 2017;99(14):e78. https://journals.lww.com/jbjsjournal/Abstract/2017/07190/Burnout_in_Orthopaedic_Surgeons__A_Challenge_for.12.aspx. 2021. ● Daniels AH, DePasse JM, Kamal RN. Orthopaedic surgeon burnout: Diagnosis, treatment, and prevention. *J Am Acad Orthop Surg*. 2016;24(4):213-9. https://www.researchgate.net/publication/294918464_Orthopaedic_Surgeon_Burnout_Diagnosis_Treatment_and_Prevention. 2021. ● Hicks PJ, Schumacher D, Guralnick S, Carraccio C, Burke AE. Domain of competence: Personal and professional development. *Acad Pediatr*. 2014 Mar-Apr;14(2 Suppl):S80-97. https://pubmed.ncbi.nlm.nih.gov/24602666/. 2021. ● Local resources, including Employee Assistance

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication **Overall Intent:** To deliberately use language and behaviors to form constructive relationships with patients and family; identify communication barriers including recognizing biases and health care needs while respecting patient autonomy in communications; organize and lead communication around shared decision making	
Milestones	**Examples**
Level 1 *Demonstrates respect and establishes rapport with patients and their families (e.g., situational awareness of language, disability, health literacy level, cultural differences)*	● Introduces self and faculty member, identifies patient and others in the room, and engages all parties in health care discussion with sensitivities to patient and family dynamics
Communicates with patients and their families in an understandable and respectful manner	● Identifies need for trained interpreter with non-English-speaking patients ● Uses age-appropriate and health literacy-appropriate language
Demonstrates basic understanding of the informed consent process	● Outlines basic risks, benefits, and alternatives to surgery
Level 2 *Establishes a therapeutic relationship in straightforward encounters*	● Avoids medical jargon and restates patient perspective when discussing a diagnosis and treatment options for osteoarthritis
Identifies barriers to effective communication (e.g., health literacy, cultural differences)	● Uses patient-centered communication when answering questions during the informed consent process ● Recognizes the need for handouts with diagrams and pictures to communicate information to a patient who is unable to read
Answers questions about straightforward treatment plans, with assistance	● Discusses risks, benefits, and alternatives for treatment of osteoarthritis ● Uses of receptive body language, eye contact, and posture
Level 3 *Establishes a therapeutic relationship in challenging encounters (e.g., shared decision-making)*	● Acknowledges a patient's request for an inappropriate diagnostic study and respectfully redirects and initiates a treatment plan using only appropriate studies
When prompted, reflects on biases while attempting to minimize communication barriers	● Modifies a treatment plan to achieve a patient's goal of being able to run after hip replacement surgery even though the physician has biases about high-impact activities
Counsels patients through the decision-making process for straightforward conditions	● Discusses indications, risks, benefits, and alternatives during informed consent for a hip replacement including a discussion of patient functional outcomes

Level 4 *Facilitates difficult discussions with patients and their families, (e.g., explaining complications, therapeutic uncertainty)*	● Counsels representative family members in the care of a patient with dementia and a hip osteoarthritis when some family members desire surgery and others do not
Recognizes biases and integrates the patient's viewpoint and autonomy to ensure effective communication	● Discusses a middle-aged patient's goal to run a marathon after knee replacement surgery despite bias about high-impact activity on a knee replacement; includes identification of risks, benefits, and long-term effects of high-impact running, and a treatment plan to achieve the patient's goal
Counsels patients through the decision-making process for complex conditions	● Discusses indications, risks, benefits, and alternatives during informed consent for hip osteoarthritis with multiple medical conditions, dementia, and high risk of death associated with surgical or non-surgical treatment, including ambiguous outcomes
Level 5 *Coaches others in the facilitation of difficult conversations*	● Leads an OSCE for obtaining informed consent in hip arthritis patients with dementia
Mentors others in situational awareness and critical self-reflection	● Encourages others to take the Implicit Bias Test and leads a discussion about impact of bias in fellowship ● Observes interactions between residents and patients and offers constructive feedback ● Serves on a hospital bioethics committee
Counsels patients through the decision-making process for uncommon conditions	● Develops supplemental materials to better inform patients prior to total joint arthroplasty ● Counsels patient's family about treatment options for a failed hip arthroplasty
Assessment Models or Tools	● Direct observation ● OSCE ● Simulation ● Standardized patients ● Self-assessment including self-reflection exercises
Curriculum Mapping	●
Notes or Resources	● Laidlaw A, Hart J. Communication skills: an essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. *Med Teach*. 2011;33(1):6-8. https://www.tandfonline.com/doi/full/10.3109/0142159X.2011.531170. 2021. ● Makoul G. Essential elements of communication in medical encounters: The Kalamazoo consensus statement. *Acad Med*. 2001;76:390-393. https://pubmed.ncbi.nlm.nih.gov/11299158/. 2021. ● Project Implicit. https://implicit.harvard.edu/implicit/takeatest.html. 2021.

	● Symons AB, Swanson A, McGuigan D, Orrange S, Akl EA. A tool for self-assessment of communication skills and professionalism in residents. *BMC Med Educ*. 2009;9:1. https://bmcmededuc.biomedcentral.com/articles/10.1186/1472-6920-9-1. 2021.

Interpersonal and Communication Skills 2: Interprofessional and Team Communication **Overall Intent:** To effectively communicate with the health care team, including other care providers, staff members, and ancillary personnel, in both straightforward and complex situations	
Milestones	**Examples**
Level 1 *Recognizes the value and role of each team member and respectfully interacts with all members of health care team*	● Answers questions respectfully and patiently for ancillary staff regarding x-ray orders, injections, etc., understanding that this staff plays an important role in care of the orthopaedic patient ● Receives a consult for an arthritis patient or periprosthetic fracture and respectfully takes the patient information
Level 2 *Communicates in a professional and productive manner to facilitate teamwork (e.g., active listening, updates in timely fashion)*	● Communicates with the radiology tech the need for specialized x-ray views such as weight bearing or stress views and assists with limb positioning if requested by the tech ● Communicates with the medical team and subspecialists about appropriate clearances for arthroplasty patients
Level 3 *Actively recognizes and mitigates communication barriers and biases with the health care team*	● Communicates respectfully with pre-surgical testing as well as medical services about patients with multiple medical comorbidities requiring complex clearance issues (e.g., Hg A1C, smokers, narcotic abusers) ● Recognizes the need for respectful communication between services when a conflict arises regarding need for clearances, antibiotics in peri-prosthetic joint infection, joint aspirations, etc.
Level 4 *Facilitates respectful communications and conflict resolution with the multidisciplinary health care team*	● Initiates a multidisciplinary conversation to alleviate conflict around a shared care plan for a patient with a complex condition such as an infected total joint arthroplasty, substantial bone loss, etc. ● Attends medical rounds to review consult findings about the possible septic total joint arthroplasty and provides education of the medical team about evaluation of a septic total joint arthroplasty
Level 5 *Is an exemplar of effective and respectful communication strategies*	● Mediates a conflict resolution between different members of the health care team
Assessment Models or Tools	● Direct observation ● Global assessment ● Multi-source feedback ● OSCE ● Simulation ● Standardized patient
Curriculum Mapping	●
Notes or Resources	● Braddock CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. Informed decision making in outpatient practice: Time to get back to basics. *JAMA.* 1999;282(24):2313-2320. https://pubmed.ncbi.nlm.nih.gov/10612318/. 2021.

	● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. *MedEdPORTAL*. 2015;11:10174 http://doi.org/10.15766/mep_2374-8265.10174. 2021. ● Fay D, Mazzone M, Douglas L, Ambuel B. A validated, behavior-based evaluation instrument for family medicine residents. *MedEdPORTAL.* https://www.mededportal.org/doi/10.15766/mep_2374-8265.622. 2021. ● François, J. Tool to assess the quality of consultation and referral request letters in family medicine. *Can Fam Physician*. 2011 May;57(5), 574–575. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093595/. 2021. ● Green M, Parrott T, Cook G., Improving your communication skills. BMJ 2012;344. https://www.bmj.com/content/344/bmj.e357. 2021. ● Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: A review with suggestions for implementation. *Med Teach*. 2013 May; 35(5):395-403. https://pubmed.ncbi.nlm.nih.gov/23444891/. 2021. ● Lane JL, Gottlieb RP. Structured clinical observations: A method to teach clinical skills with limited time and financial resources. *Pediatrics*. 2000;105(4 Pt 2):973-977. https://pubmed.ncbi.nlm.nih.gov/10742358/. 2021. ● Roth CG, Eldin KW, Padmanabhan V, Freidman EM. Twelve tips for the introduction of emotional intelligence in medical education. *Med Teach*. 2019;41(7):746-749. https://pubmed.ncbi.nlm.nih.gov/30032720/. 2021.

Interpersonal and Communication Skills 3: Communication within Health Care Systems **Overall Intent:** To effectively communicate across the health care system using the medical record	
Milestones	**Examples**
Level 1 *Accurately records information in the patient record while safeguarding patient personal health information*	● Documents relevant information accurately ● Uses appropriate protocols to protect patient information during research ● Maintains Health Insurance Portability and Accountability Act (HIPAA) compliance with all communications
Level 2 *Demonstrates accurate, timely, and efficient use of the electronic health record to communicate with the health care team* *Uses appropriate communication methods (e.g., face-to-face, voice, electronic)*	● Documents clinical reasoning in an organized manner that supports the treatment plan ● Develops documentation templates to avoid copy-and-paste errors ● Calls attending if care plan is urgent ● Uses institution-authorized methods when texting
Level 3 *Concisely reports diagnostic and therapeutic reasoning while incorporating relevant outside data* *Respectfully initiates communications about concerns in the system*	● Documents a clear rationale for surgical treatment of hip/knee arthritis or peri-prosthetic complications including risks, benefits, and alternatives ● Obtains outside records including prior implant records ● Tells more senior resident or attending about an order set in the EHR with a medication dosing that could result in an error ● Identifies and reports safety near-misses using the hospital reporting system
Level 4 *Independently communicates via written or verbal methods based on urgency and context* *Uses appropriate channels to offer clear and constructive suggestions to improve the system*	● Calls attending with assessment and recommends a plan for surgical treatment of a complex cases including implant choices ● Triages and communicates time urgency of treatment of a critically ill patient ● Works with information technology/sends a help desk ticket to improve an order set or dot phrase
Level 5 *Facilitates improved written and verbal communication of others* *Guides departmental or institutional communication around policies and procedures*	● Holds one-on-one teaching sessions with residents and medical students to improve documentation or gives a presentation (grand rounds or conference) that include care models/ pathways ● Gives grand rounds or resident lectures that includes care models/pathway utilization
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● Rotation evaluation
Curriculum Mapping	●

Notes or Resources	● Bierman JA, Hufmeyer KK, Liss DT, Weaver AC, Heiman HL. Promoting responsible electronic documentation: Validity evidence for a checklist to assess progress notes in the electronic health record. *Teach Learn Med.* 2017;29(4):420-432. https://www.tandfonline.com/doi/full/10.1080/10401334.2017.1303385. 2021. ● Haig KM, Sutton S, Whittington J. SBAR: A shared mental model for improving communication between clinicians. *Jt Comm J Qual Patient Saf*. 2006;32(3)167-175. https://www.ncbi.nlm.nih.gov/pubmed/16617948. 2021. ● Starmer AJ, Spector ND, Srivastava R, et al. I-PASS, a mnemonic to standardize verbal handoffs. *Pediatrics*. 2012;129(2):201-204. https://ipassinstitute.com/wp-content/uploads/2016/06/I-PASS-mnemonic.pdf. 2021.

To help programs transition to the new version of the Milestones, the ACGME has mapped the original Milestones 1.0 to the new Milestones 2.0. Indicated below are where the subcompetencies are similar between versions. These are not exact matches but are areas that include similar elements. Not all subcompetencies map between versions. Inclusion or exclusion of any subcompetency does not change the educational value or impact on curriculum or assessment.

Milestones 1.0	Milestones 2.0
PC1: Knee Arthritis	PC3: Arthroscopic Operative Skills PC4: Primary Knee and Primary Hip Replacement
PC2: Knee Revisions	PC5: Knee and Hip Revision
PC3: Hip Arthritis	PC3: Arthroscopic Operative Skills PC4: Primary Knee and Primary Hip Replacement
PC4: Hip Revisions	PC5: Knee and Hip Revision
PC5: Shoulder Arthritis	PC3: Arthroscopic Operative Skills
PC6: Shoulder Revisions	
PC7: Elbow Arthritis	PC3: Arthroscopic Operative Skills
	PC1: History and Physical Examination, Imaging Interpretation, and Diagnosis PC2: Non-Operative Management
MK1: Knee Arthritis	
MK2: Knee Revisions	
MK3: Hip Arthritis	
MK4: Hip Revisions	
MK5: Shoulder Arthritis	
MK6: Shoulder Revisions	
MK7: Elbow Arthritis	
	MK1: Orthopaedic Clinical Decision Making
	MK2: Basic Science: Gross Anatomy, Biomechanics, Tribology, Implant Design, and Pathophysiology
SBP1: Systems thinking, including cost-effective practice	SBP3: Physician Role in the Health Care Systems
SBP2: Works in interprofessional teams to enhance patient safety and quality care	SBP1: Patient Safety and Quality Improvement SBP2: System Navigation for Patient-Centered Care
SBP3: Use technology to accomplish safe health care delivery	ICS3: Communication within Health Care Systems

PBLI1: Self-directed Learning	PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI2: Locate, appraise, and assimilate evidence from scientific studies to improve patient care	PBLI1: Evidence-Based and Informed Practice
PROF: Compassion, integrity, and respect for others, as well as sensitivity and responsiveness to heterogenous patient populations, including but not limited to variety of age, culture, race, religion, disabilities, and sex.; 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	PROF1: Professional Behavior and Ethical Principles
PROF2: Accountability to patients, society, and the profession; personal responsibility to maintain emotional, physical, and mental health	PROF2: Accountability/Conscientiousness PROF3: Self-Awareness and Help-Seeking
ICS1: Communication	ICS1: Patient- and Family-Centered Communication
ICS2: Teamwork	ICS2: Interprofessional and Team Communication

Available Milestones Resources

Milestones 2.0: Assessment, Implementation, and Clinical Competency Committees Supplement, 2021 - *https://meridian.allenpress.com/jgme/issue/13/2s*

Milestones Guidebooks: https://www.acgme.org/milestones/resources/

- *Assessment Guidebook*
- *Clinical Competency Committee Guidebook*
- *Clinical Competency Committee Guidebook Executive Summaries*
- *Implementation Guidebook*
- *Milestones Guidebook*

Milestones Guidebook for Residents and Fellows: https://www.acgme.org/residents-and-fellows/the-acgme-for-residents-and-fellows/

- Milestones Guidebook for Residents and Fellows
- Milestones Guidebook for Residents and Fellows Presentation
- Milestones 2.0 Guide Sheet for Residents and Fellows

Milestones Research and Reports: https://www.acgme.org/milestones/research/

- *Milestones National Report*, updated each fall
- *Milestones Predictive Probability Report,* updated each fall
- *Milestones Bibliography*, updated twice each year

Developing Faculty Competencies in Assessment courses - https://www.acgme.org/meetings-and-educational-activities/courses-and-workshops/developing-faculty-competencies-in-assessment/

Assessment Tool: Direct Observation of Clinical Care (DOCC) - https://dl.acgme.org/pages/assessment

Assessment Tool: Teamwork Effectiveness Assessment Module (TEAM) - https://team.acgme.org/

Improving Assessment Using Direct Observation Toolkit - https://dl.acgme.org/pages/acgme-faculty-development-toolkit-improving-assessment-using-direct-observation

Learn at ACGME has several courses on Assessment and Milestones - https://dl.acgme.org/