Supplemental Guide: Orthopaedic Trauma

ACGME

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Orthopaedic Trauma 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. A theme in the creation of this version of the Orthopaedic Trauma Milestones was fundamentally asking the question of what differentiates traumatologists from general or non-trauma trained orthopaedists. Another theme is the desire for graduating fellows to be functioning predominantly at the oversight level of supervision by the end of the educational program. As such, the progression of several Milestones is more about the level of supervision than the specific tasks of a subcompetency. Finally, feedback from fellows regarding preparation for the long-term clinical management of patients has led to a specific Medical Knowledge subcompetency on “Decision Making for Complex Problems” germane to orthopaedic trauma.

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.

Some milestone descriptions include statements about performing independently. This is conditional independence, or the privilege of progressive authority and responsibility, as determined by the program director and faculty based on the needs of the patient and the skills of the fellow. The fellow must still be under the supervision of a faculty member. It is important to use this guide in conjunction with the ACGME specialty-specific Program Requirements. Specific language regarding levels of supervision has been included that is defined through the Program Requirements.

Levels of Supervision:

Direct Supervision
The supervising physician is physically present with the fellow during the key portions of the patient interaction.

Indirect Supervision
The supervising physician is not providing physical or concurrent visual or audio supervision but is immediately available to the fellow for guidance and is available to provide appropriate direct supervision.

Oversight
The supervising physician is available to provide review of procedures/encounters with feedback provided after care is delivered

The Milestones are not meant to be an inclusive list of knowledge or procedures a fellow may participate in. Both the ACGME and the Orthopaedic Trauma Association (OTA) have lists of core procedures. The OTA list can be found here. There is clearly some mapping of Milestones to certain procedures. For example, fasciotomy and open fracture debridement would be covered under “Patient Care 5: Soft Tissue”; femur/tibia/humeral shaft fractures under “Patient Care 2: Complex Diaphyseal Fractures”; pelvic and acetabular fractures under “Patient Care 4: Pelvic and Acetabular Fractures”; and distal femur/tibial plateau/tibial pilon/talus/calcaneus/periarticular elbow/distal radius under “Patient Care 3: Periarticular Fractures”. The overfall intent of any Patient Care or Medical Knowledge Milestone can be applied to the core procedures defined by the ACGME or OTA. Examples in the boxes below should help assist with that application.

Additionally, the subcompetencies for Systems-Based Practice, Practice-Based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills are carried over from the Orthopaedic Surgery Milestones for residents. As each learner is in a new context (generalist to specialist, new patient population, etc.) these skills and behaviors must still be addressed.

These milestones were created to allow for objective measurement of fellows during orthopaedic trauma fellowship. It is the intention of the Milestones group that the examiner should view these milestones as a progression of goals along a spectrum for their fellows, rather than distinct black-and-white criteria for success.”

Patient Care 1: Polytrauma (Care of Multiply Injured Patient) **Overall Intent:** To care for polytrauma patients, which requires patient assessment, laboratory, and image interpretation, understanding of patient physiology, communication with other providers and patients/family, and determining timing and degree of orthopaedic intervention	
Milestones	**Examples**
Level 1 *Identifies when a patient needs damage control during initial resuscitation, with direct supervision*	● Analyzes laboratory-based studies for when a patient does not meet early appropriate care criteria and needs damage control orthopaedics
Prioritizes management of polytrauma patients, with direct supervision	● Determines order of treatment for orthopedic injuries and discusses with general surgery and neurosurgery their plans for intervention ● Describes acute interventions necessary for resuscitation/stabilization of patient to patient/family
Counsels patients on acute diagnosis, with direct supervision	● Attending tells fellow to go talk to patient and tell them what is going to happen, fellow repeats recommendations verbatim to patient ● Discusses injuries with patient and family and prioritizes injury severity
Level 2 *Identifies when a patient needs damage control during initial resuscitation, with indirect supervision*	● Recognizes the need for damage control orthopaedics versus early appropriate care ● Applies laboratory-based criteria for early appropriate care criteria and damage control orthopaedics with remote discussion/coaching
Prioritizes management of polytrauma patients, with indirect supervision	● Determines appropriate order of interventions/procedures with exit points if patient condition changes
Counsels patients on acute diagnosis and expectations, with indirect supervision	● Discusses priority of interventions/procedures with consulting services, patient, and family to determine appropriate timing of orthopaedic intervention
Level 3 *Performs damage control procedures, with indirect supervision*	● Understands the application and options for damage control orthopaedics procedures ● Applies pelvic external fixation and other pelvic volume reducing interventions ● Applies external fixation to long bones or joint-spanning external fixation in critically injured patients
Determines timing for definitive management, with oversight	● Assesses patient's readiness (e.g., lab and physiological parameters) for open pelvic or acetabular surgery

Counsels patients on short-term prognosis, complications, and expectations, with oversight	● Counsels patients on risks of infection, nerve injury, venous thromboembolism for open acetabular surgery
Level 4 *Independently performs damage control procedures* *Independently prioritizes and manages complex polytrauma patients through interdisciplinary team care* *Independently counsels patients regarding long-term prognosis, potential complications, and need for additional procedure(s)*	● Goes into operating room with general surgery in the middle of the night to figure out a complicated/injured pelvis/mangled extremity ● Independently prioritizes and treats patients needing damage control orthopaedics management including, but not limited to, external fixation, pelvic binders, wound management ● Independently coordinates simultaneous or staged procedures with multiple services ● Counsels patients on risk of infection, post-traumatic arthritis, heterotopic ossification, and secondary procedures after acetabular surgery
Level 5 *Independently anticipates changes in patient condition and plans and implements contingencies* *Independently counsels patients regarding long-term prognosis, potential complications, and need for additional procedure(s); cites the evidence for each*	● Effectively communicates with anesthesia and switches from one plan to another intra-operatively as patient condition changes ● Cites literature when explaining to patients, points to evidence for the fellow's actions and decisions ● Counsels patient about expected recovery course and likely outcome for each treatment option with data driven recommendations
Assessment Models or Tools	● Cadaver lab dissection ● Case based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	● Orthopaedic Trauma Association (OTA) Evidence-Based Medicine Article: https://ota.org/education/evidence-based-medicine-resource-list/general#toc9

Patient Care 2: Complex Diaphyseal Fracture (e.g., Peri-Prosthetic, Open, Bone Loss, Proximal/Distal Thirds) **Overall Intent:** To care for patients with diaphyseal fractures, which requires patient assessment, image interpretation, fracture classification, choice and performance of approach, application of stable internal fixation, post-operative planning, and management of post-operative complications	
Milestones	**Examples**
Level 1 *Develops a surgical plan, with direct supervision*	● Describes techniques for determining appropriate length, alignment, and rotation of comminuted femoral shaft fracture with prompting
Demonstrates surgical skills (e.g., reduction and placement of nail) and assists with procedures	● Places K-wires/Shanz pins; drills in direction and locations necessary ● Uses clamp to reduce oblique fracture line, with guidance ● Obtains starting point for various nailing portals such as piriformis fossa versus greater trochanter
Manages peri-procedural complications, with indirect supervision	● Recognizes wound at risk and develops treatment plan, with indirect supervision ● Recognizes signs of pulmonary complication, orders appropriate evaluation, and discusses management with consulting services
Level 2 *Develops a surgical plan, with indirect supervision*	● Proposes plan to verify appropriate restoration of length, alignment, and rotation after long bone nailing
Performs critical steps of procedures, with direct supervision	● Critical steps include exposure, reduction, provisional fixation, and converting to definitive fixation
Manages peri-procedural complications with oversight	● Obtains reduction with verbal, but not physical, guidance on various techniques ● Recognizes wound at risk and develops treatment plan, with oversight
Level 3 *Develops a surgical plan for procedures, including identification of potential challenges and technical complexities, with oversight*	● Identifies and describes options to obtain adequate/additional fixation in peri-implant/peri-prosthetic fractures with limited remaining osseous corridors ● Manages open fractures and fractures with bone loss leading to segmental defects
Performs critical steps of procedures with indirect supervision	● Critical steps include exposure, reduction, provisional fixation, and converting to definitive fixation
Manages complex intra-operative complications with indirect supervision	● Identifies fracture propagation or displacement of previously non-displaced fracture line and alters surgical plan/sequence
Level 4 *Independently develops a surgical plan for procedures, including contingencies for complications*	● Performs appropriate debridement of open fractures including removing devitalized bone and alters plan based on inter-operative findings

Independently performs procedures *Independently manages complex intra-operative complications*	• Independently uses multiple strategies to obtain reduction and fixation in short segment nailing • Independently manages massive bone defects intra-operatively • Competent in the selection/performance of case-specific bone graft harvesting • Identifies fracture propagation or displacement of previously non-displaced fracture line and alters surgical plan/sequence independently
Level 5 *Independently plans complex procedures, including management of peri-operative complications* *Independently performs complex revision procedures* *Manages long-term complications in the outpatient setting*	• Plans and executes deformity correction procedure after diaphyseal malunion • Manages, evaluates, discusses treatment options, and indicates nonunion repair • Manages infection, nonunion/malunion, stiffness, post-traumatic osteoarthritis, and ongoing pain
Assessment Models or Tools	• Cadaver lab dissection • Case-based discussion • Direct observation
Curriculum Mapping	•
Notes or Resources	• The AO Foundation. Hip. AO Surgery Reference website. https://surgeryreference.aofoundation.org/orthopedic-trauma/periprosthetic-fractures/hip • The AO Foundation. Knee. AO Surgery Reference website. https://surgeryreference.aofoundation.org/orthopedic-trauma/periprosthetic-fractures/knee

Patient Care 3: Periarticular Fractures **Overall Intent:** To care for patients with periarticular fractures, which requires patient assessment, image interpretation, fracture classification, choice and performance of approach, application of stable internal fixation, post-operative planning, and management of post-operative complications	
Milestones	**Examples**
Level 1 *Develops a surgical plan, with direct supervision*	● Chooses patient position, surgical exposure, reduction, and fixation plan in conversation with faculty surgeon
Demonstrates surgical skills for simple periarticular fractures and assists with procedures	● Deploys methods for articular visualization (e.g., femoral distractor, external fixation, booking open fracture lines) ● Chooses appropriate fixation strategies for articular injuries (e.g., buttress plating for B type fractures)
Manages peri-procedural complications, with indirect supervision	● Identifies wound at risk and discusses perioperative wound management ● Orders venous thromboembolism scan ● Orders and interprets inflammatory labs when concerned for infection
Level 2 *Develops a surgical plan, with indirect supervision*	● Presents choice of patient position, surgical exposure, reduction, and fixation plan to faculty surgeon ● Addresses impact of patient factors on fracture treatment plan
Independently performs procedures for simple periarticular fractures	● Exposes, reduces, and fixates periarticular fractures with large joint pieces and no impaction
Manages peri-procedural complications, with oversight	● Discusses fixation failure with patient and treatment options ● Per Level 1, but with oversight instead of indirect supervision
Level 3 *Develops a surgical plan for procedures, including identification of potential challenges and technical complexities, with indirect supervision*	● Determines when osteotomy (e.g., olecranon, medial malleolus, lateral tibial plateau) is needed for complex periarticular fractures ● Adjusts surgical tactic based on soft tissue considerations ● Identifies appropriate weight bearing and range of motion recommendations and duration of immobilization for simple injuries
Performs critical steps of procedures for periarticular fractures with indirect supervision	● Critical steps include exposure, reduction, provisional fixation, and converting to definitive fixation ● Uses femoral distractor to obtain length and joint distraction for visualization when needed

Manages complex intra-operative complications with indirect supervision	● Performs alternative exposures to reach difficult fracture fragments (e.g., posterior tibial plateau exposures) ● Manages intra-operative fracture propagation and changes plan for severely poor bone quality
Level 4 *Independently develops a surgical plan for procedures, including contingencies for complications*	● Chooses approach to Glenoid based on fracture pattern ● Develops complex post-operative management plans (short- and long-term) ● Competent in the selection/performance of case-specific bone graft harvesting ● Recognized when weight bearing and range of motion protocols might be adjusted (e.g., relative delay for tenuous wounds, relative acceleration for simple splits with good fixation in health hosts)
Independently performs procedures for complex periarticular fractures	● Independently performs open reduction and internal fixation (ORIF) for C-type fracture of the distal femur, proximal tibia, or distal tibia ● Performs or refers for reverse total shoulder arthroplasty/total elbow arthroplasty in select proximal/distal humerus fractures
Independently manages complex intra-operative complications	● Recognizes, identifies, and appropriately consults for intra-operative nerve or arterial injury
Level 5 *Independently plans complex procedures, including management of peri-operative complications*	● Manages, evaluates, discusses treatment options, and indicates nonunion repair
Independently performs complex revision procedures	● Performs intertrochanteric osteotomy for nonunion repair of femoral neck ORIF ● Performs ankle fusion for pilon that has gone on to post-traumatic osteoarthritis
Manages long-term complications in the outpatient setting	● Performs revision nonunion repair for pilon that has had articular union, but meta-diaphyseal nonunion with hardware failure and deformity
Assessment Models or Tools	● Cadaver lab dissection ● Case-based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	● A surgical plan includes recommendations for weight bearing and range of motion ● Simple versus complex is along the lines of progressively increasing AO Trauma/Orthopaedic Trauma Association classification (e.g., A versus C or C1 versus C3) and other fracture attributes, such as open versus closed, bone loss, etc. There can still be very complicated cases that are, for example, closed A-type injuries, so these are guidelines for thinking and not absolutes

	● Apply this Patient Care subcompetency to distal femur/tibial plateau/tibial pilon/talus/calcaneus and glenoid/proximal humerus/periarticular elbow/distal radius.

Patient Care 4: Pelvic and Acetabular Fractures **Overall Intent:** To care for patients with pelvic and acetabular fractures, which requires patient assessment, image interpretation, fracture classification, choice and performance of approach, application of stable internal fixation, post-operative planning, and management of post-operative complications	
Milestones	**Examples**
Level 1 *Develops a surgical plan, with direct supervision*	● Obtains an accurate history and physical examination ● Discusses plan for approach (including dealing with structures at risk), reduction, and fixation of elementary acetabular fracture pattern ● Discusses plan for approach, reduction, and fixation of anteroposterior compression type-2 (APC-2) pelvic ring injury
Demonstrates surgical skills for simple pelvic and acetabular fractures, and assists with procedures	● Performs key and critical steps of the Kocher-Langenbeck approach ● Interprets pelvic fluoroscopy and inserts S1 iliosacral screw in patient without dysmorphism under direct supervision
Manages peri-procedural complications, with indirect supervision	● Identifies pertinent post-operative complications related to the surgery and approach (e.g., sciatic nerve injury with foot drop) and relays information to faculty members; discusses plan for treatment (e.g., ankle foot orthosis)
Level 2 *Develops a surgical plan, with indirect supervision*	● Appropriately assesses soft tissue status ● Accurately interprets imaging studies ● Presents/articulates detailed plan for approach, reduction, and fixation of elementary acetabular fracture patterns without communication ● Presents/articulates plan for approach, reduction, and fixation of lateral compression 1/2 or APC1/2 pelvic ring injury
Performs procedures for simple pelvic and acetabular fractures, with indirect supervision	● Performs Kocher-Langenbeck approach, reduces elementary fracture patterns, and applies internal fixation with indirect supervision ● Performs anterior pelvis/acetabular exposures (e.g., ilioinguinal, Stoppa, lateral window) ● Independently sets up and interprets pelvic fluoroscopy, plates pubic symphysis, and inserts ilioscral screws in patient without dysmorphism ● Understands clamp placement and in pelvic/acetabular work ● Obtains correct fluoroscopic views to evaluate reduction and implant placement
Manages peri-procedural complications, with oversight	● Identifies pertinent post-operative complications related to the surgery and approach (e.g., sciatic nerve injury with foot drop) and manages complications (orders ankle foot orthosis)

Level 3 *Develops a surgical plan for procedures, including identification of potential challenges and technical complexities, with oversight*	● Recognizes marginal impaction, comminution and articulates need for strategies to address them ● Presents/articulates detailed plan for approach, reduction, and fixation of associated acetabular fracture patterns without communication ● Presents/articulates plan for approach, reduction, and fixation of lateral compression or APC type 3 pelvic ring injuries
Demonstrates surgical skills of complex pelvic and acetabular fractures, and assists with procedures	● Performs extensile exposures to acetabulum (e.g., greater trochanter osteotomy, anterior superior iliac spine (ASIS) osteotomy/soft tissue release) ● Utilizes appropriate intra-operative imaging and inserts sacroiliac (SI) screws in patients with dysmorphism or trans-iliac trans-sacral screws in patients without dysmorphism ● Applies clamps using safe corridors and effectively uses clamps to achieve reduction ● Correctly interprets fluoroscopic views to evaluate reduction and implant placement
Manages complex intra-operative complications with indirect supervision	● Controls bleeding from corona mortis with systematic approach (e.g., standard ligation, temporary packing, hemostatic agents)
Level 4 *Independently develops a surgical plan for procedures, including contingencies for complications*	● Plans front back approaches for complex acetabular injuries ● Plans progression for complex pelvic ring injuries from attempted closed reduction and percutaneous fixation thru open reduction and internal fixation
Independently performs procedures for complex pelvic and acetabular fractures	● Performs ORIF of associated acetabular fracture patterns using extensile or combined approaches as needed ● Open reduces and fixates SI joint, anteriorly or posteriorly ● Safely inserts trans-iliac trans-sacral screws in patient with dysmorphism ● Performs nonunion surgery for failed healing in the anterior pelvic ring (e.g., ramus nonunion) ● Effectively masters the application of clamps and other reduction aides for reduction in and around the pelvis/acetabulum
Independently manages complex intra-operative complications	● Recognizes and promptly coordinates care of a critically injured/bleeding patient by understanding when to abort procedure and get vascular/interventional radiology consultation for hemorrhage control; discusses such complications with the patient's family
Level 5 *Independently plans complex procedures, including management of peri-operative complications*	● Obtains and constructs three-dimensional plans/models for pelvic deformities and develops surgical tactic for their correction

	● Plans combined pelvic ring and acetabular injuries and discusses pros and cons of fixation sequences
Independently performs complex revision procedures	● Recognizes magnitude of pelvic ring malunion correction, such as need to prepare for front-back/back-front exposures and attendant blood loss ● Performs conversion total hip arthroplasty for post-traumatic osteoarthritis after acetabular fracture ● Performs hardware removal and SI joint fusion for failed pelvic ring fixation
Manages long-term complications in the outpatient setting	● Understands that pelvic ring injuries can have residual sequelae for years or permanently and manages patient's expectations through counseling and literature support ● Refers and coordinates care with general surgery for hernias, urology for bladder/erectile dysfunction, or pain management when other methods have been exhausted
Assessment Models or Tools	● Cadaver lab dissection ● Case-based discussion ● Direct observation
Curriculum Mapping	
Notes or Resources	● Simple versus complex along the lines of elementary versus associated types for acetabular fractures and along the lines of progressively greater number in the Young-Burgess classification for pelvic rings. There can be very difficult and complicated cases that are, for example, elementary acetabular fractures or LC-1 pelvic ring injuries, so these are guidelines for thinking and not absolutes. ● The AO. Acetabulum. AO Surgery Reference website ○ https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/acetabulum ○ https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/pelvic-ring ● Orthopaedic Trauma Association Evidence-Based Medicine Articles: ○ https://ota.org/education/evidence-based-medicine-resource-list/pelvis ○ https://ota.org/education/evidence-based-medicine-resource-list/pelvis#toc4

Patient Care 5: Soft Tissue **Overall Intent:** To respect soft tissue injury in acute orthopaedic trauma and post-traumatic recovery and to identify and provide appropriate care for emergent conditions (e.g., open fracture, vascular injury, compartment syndrome, mangled extremity)	
Milestones	**Examples**
Level 1 *Performs standard surgical approaches with compromised soft tissue, and adjusts as needed*	● Recognizes when surgical incisions should not be made and applies external fixation for soft tissue management ● Avoids incisions thru compromised soft tissue, selecting alternative exposure or minimally invasive plate osteosynthesis ● Diagnoses compartment syndrome and posts patient for emergent fasciotomy
Recognizes urgent/emergent soft tissue concerns (e.g., acute compartment syndrome, vascular injury, mangled extremity) and acts/consults appropriately, with oversight	● Recognizes vascular compromise and consults vascular surgery ● Recognizes when a mangled extremity can lead to systemic compromise (i.e., “life over limb”)
Level 2 *Performs comprehensive debridement of an open fracture and incorporates soft tissue status in fracture management, with indirect supervision*	● Performs systematic debridement/irrigation of open fracture ● Considers external fixation (e.g., rings) as definitive treatment for some fractures with substantial soft tissue injury
Performs procedures for urgent/emergent soft tissue concerns (e.g., fasciotomy) or impending soft tissue compromise and acquires appropriate consultations, with oversight	● Performs leg and forearm fasciotomies ● Obtains plastic surgery consultation for wounds that might need soft tissue coverage ● Coordinates with vascular surgery the sequence of events for a fracture or dislocation with vascular injury ● Recognizes need for wound vacuum, bead pouch, or other method of soft tissue management for wounds that are not closable
Level 3 *Performs comprehensive debridement of an open fracture and incorporates soft tissue status in fracture management, with oversight*	● Per Level 2, but with oversight instead of indirect supervision
Recognizes chronic soft tissue concerns, with oversight	● Discusses adjusting surgical tactic based on chronic soft tissue changes ● Identifies failure of wound healing in outpatient clinic and develops plan for care (e.g., nutrition assessment, wet-to-dry dressing changes, wound care clinic referral, plastics consultation) ● Recognizes chronic post-operative conditions and challenges with wound healing (e.g., lymphedema, previous burn, or incisions) ● Understands implications of chronic soft tissue damage on the management of nonunion

Level 4 *Independently obtains adequate soft tissue coverage for complex injuries (e.g., through plastic surgery consultation)* *Independently designs procedures and acquires consultation for patients with chronic soft tissue concerns*	● Designs surgical tactic for infected nonunion with compromised soft tissue which may include alternative exposures (e.g., posterolateral bone grafting for tib-pro-fib) or discussion with patient about likely need for flap and providing referral to plastic surgery ● Performs split thickness skin graft or rotational muscle flaps ● Coordinates with plastic surgery for timely coverage of Type IIIB open fractures
Level 5 *Independently performs skin graft and local flap procedures* *Independently performs and coordinates for procedures in patients with chronic soft tissue concerns*	● Independently performs split thickness skin graft, rotational muscle flaps, or bipedicle advancement flaps ● Carries out surgical tactic for infected tibial nonunion with compromised soft tissue
Assessment Models or Tools	● Cadaver lab dissection ● Case-based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	● The OTA. General. Orthopaedic Trauma Association Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/general#toc2 ● The OTA. Knee Dislocation. Orthopaedic Trauma Association Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/knee-dislocation

Medical Knowledge 1: Polytrauma (Care of Multiply Injured Patient) **Overall Intent:** To apply knowledge of pathoanatomy, pathophysiology, indications, and biomechanics to treatment options	
Milestones	**Examples**
Level 1 *Discusses the basic pathophysiology of the multiply injured patient and identifies appropriate endpoints of resuscitation* *Discusses absolute surgical indications and types of fixation*	● Discusses hemodynamics (blood pressure, heart rate) and pH/base excess/lactate as measures of resuscitation ● Understands how head and lung injuries play into care of polytrauma patient ● Discusses role of ex-fix or plating open fractures in damage control orthopaedics cases ● Lists associated injury patterns (e.g., vascular injury with knee dislocation, femoral neck/shaft) ● Demonstrates basic knowledge of the literature regarding polytrauma
Level 2 *Discusses the spectrum of instability of the multiply injured patient and recognizes indications for damage control orthopaedics (DCO) versus early appropriate care (EAC)* *Discusses relative surgical indications and types of fixation*	● Chooses damage control orthopaedics when patient is unstable or in extremis ● Chooses early appropriate care when patient is stable ● Understands the contribution of pelvic injury to hemodynamic status ● Discusses controversies in management of the borderline polytraumatized patient
Level 3 *Demonstrates knowledge of complex pathophysiology of the multiply injured patient and discusses intra-operative markers of patient resuscitation* *Adapts absolute and relative surgical indications to a patient's condition and types of fixation*	● Discusses use of thromboelastography (TEG), urine output, vital signs, presser requirements, vent status, as intra-operative markers ● Appropriately orders and interprets the use of lactic acid and hemodynamic markers to guide surgical planning and decision making
Level 4 *Triages order of injuries to be treated and titrates care based on patient resuscitation and surgical burden* *Anticipates long term sequela of surgical interventions and types of fixation*	● Prioritizes pelvis and long bone fractures in polytrauma patients ● Understands pathophysiology of adult respiratory distress syndrome ● Demonstrates comprehensive knowledge of current and classic literature
Level 5 *Leads discussion about the nuances of polytrauma and functions in the "grey area"*	● Recognizes there is not a one-size-fits-all approach to the care of polytrauma patients ● Understands the role of orthopaedic physicians in the trauma team and in trauma systems protocol development ● Performs original research on the management of polytrauma
Assessment Models or Tools	● Case-based discussion

	• Direct observation
Curriculum Mapping	•
Notes or Resources	• The OTA. General. Orthopaedic Trauma Association Evidence-Based Medicine Reference List. https://ota.org/education/evidence-based-medicine-resource-list/general#toc9 • The OTA. Pelvic Ring. Orthopaedic Trauma Association Evidence-Based Medicine Reference List. https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/pelvic-ring

Medical Knowledge 2: Complex Diaphyseal Fracture (e.g., Peri-prosthetic, Open, Bone Loss, Proximal/Distal Thirds) **Overall Intent:** To apply knowledge of pathoanatomy, pathophysiology, indications, and biomechanics to treatment options	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of surgically relevant normal anatomy and interprets imaging* *Discusses absolute surgical indications and types of fixation*	● Identifies length, alignment, and rotation as the goals of diaphyseal fracture care ● Identifies and classifies periprosthetic femur fractures ● Identifies safe zones for external fixation pins for provisional stabilization ● Understands normal and abnormal axial alignment ● Understands causes of pathologic fractures (e.g., infection, osteoporosis) ● Understands bone healing
Level 2 *Demonstrates knowledge of basic surgical approaches based on fracture pattern needs* *Discusses relative surgical indications and types of fixation*	● Identifies surgical options (bridging versus absolute stability constructs) in the care of diaphyseal fracture patterns and appropriately considers risks of both ● Describes pros and cons of and anatomy at risk for various surgical approaches for reduction and fixation of humeral shaft fractures ● Knows fracture and soft tissue classifications (both open and closed) ● Demonstrates basic knowledge of the literature regarding diaphyseal fractures
Level 3 *Correlates imaging to surgical anatomy and selects surgical approach* *Adapts absolute and relative surgical indications to a patient's condition and types of fixation*	● Correlates imaging studies (computerized tomography (CT), x-ray, magnetic resonance imaging (MRI)) to plan potential surgical challenges, and optimize surgical planning ● Chooses approach based on best available reduction assessment ● Understands difference in surgical morbidity and peri-operative risk in Vancouver B2 fractures in medically ill patients between revision arthroplasty and ORIF and discusses with patient/family ● Understands the work-up and treatment of pathologic fracture ● Demonstrates knowledge of treatment options for bone loss/defect
Level 4 *Demonstrates knowledge of advanced surgical approaches based on fracture pattern needs* *Anticipates long-term sequela of surgical interventions and types of fixation*	● Appreciates and identifies the use of hybrid fixation techniques (e.g., nail-plate combos) ● Appreciates the role of dynamization, static locking, and adjuncts to treatment to reduce sequela and need for revision fixation/intervention ● Demonstrates comprehensive knowledge of current and classic literature

Level 5 *Leads advanced discussion around treatment nuances and controversies in management and techniques*	● Discusses proximity of neurovascular structures to common surgical landmarks (e.g., peroneal nerve to fibular head) and techniques to protect these structures ● Performs original research on the management of diaphyseal fractures
Assessment Models or Tools	● Case-based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	●

Medical Knowledge 3: Periarticular Fractures **Overall Intent:** To apply knowledge of pathoanatomy, pathophysiology, indications, and biomechanics to treatment options	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of surgically relevant normal anatomy and interprets imaging*	● Understands bone and cartilage healing ● Names and describes approaches to periarticular fractures (e.g., distal femur, tibial plateau, tibial pilon, proximal humerus, distal humerus, distal radius) ● Classifies fracture patterns based on well-known classification schemes
Discusses absolute surgical indications and types of fixation	● Discusses use of buttress, bridge, neutralization, and compression plate constructs as they might apply to periarticular injuries
Level 2 *Demonstrates knowledge of basic surgical approaches based on fracture pattern needs*	● Understands potential sequelae of bone and cartilage defects ● Identifies neurovascular structures at risk for named approaches and understands how to minimize injury to these structures ● Classifies fracture patterns based on AO Foundation and Orthopaedic Trauma Association (AO/OTA) system (A, B, C) and subclassifies C-type injuries; understands and describes lesser-known classification patterns
Discusses relative surgical indications and types of fixation	● Identifies and understands why certain approaches and modes of fixation may not be the best choice for the patient's specific fracture pattern ● Understands the mechanical requirements and implant choices to achieve stable constructs ● Discusses how some operative interventions might allow patient earlier function (e.g., earlier weight bearing) ● Demonstrates basic knowledge of the literature regarding periarticular fractures
Level 3 *Correlates imaging to surgical anatomy and selects surgical approach*	● Recognizes posteromedial shear injury in bicondylar tibial plateau fracture and elects for dual surgical approach (posteromedial and lateral) ● Chooses anterolateral approach for B-type pilon fracture with Chaput fragment
Adapts absolute and relative surgical indications to a patient's condition and types of fixation	● Identifies non-operative treatment for select pilon fractures in patients with pre-existing ankle osteoarthritis or non/minimal ambulators ● Understands implications of soft tissue injury on fracture care ● Understands the indications for staged treatment
Level 4 *Demonstrates knowledge of advanced surgical approaches based on fracture pattern needs*	● Understands nuances of proximal tibia or fibular osteotomy to access aspects of lateral tibial joint surface ● Recognizes and understands when periarticular nailing is a potential treatment in segmental fractures or compromised soft tissues

Anticipates long-term sequela of surgical interventions and types of fixation	• Recognizes arthroplasty as potential treatment for select periarticular fractures [e.g., reverse total shoulder arthroplasty or total elbow arthroplasty in proximal and distal humerus fractures, respectively] • Identifies and counsels patients about perioperative complications and outcomes of periarticular fracture surgery (e.g., stiffness and PTOA) • Recognizes implant prominence as a source of pain in post-operative period and employs strategies to mitigate this • Demonstrates comprehensive knowledge of current and classic literature
Level 5 *Leads advanced discussion around treatment nuances and controversies in management and techniques*	• Teaches junior learner complex approaches to the proximal tibia or distal tibia pilon (i.e., posteromedial approach to tibial plateau or pilon) • Understands and expounds on literature regarding periarticular injuries with relation to treatment strategies and discusses this with patients • Performs original research on the management of periarticular fractures
Assessment Models or Tools	• Case based discussion • Direct observation
Curriculum Mapping	•
Notes or Resources	• Orthopaedic Trauma Association. Distal Femur. Evidence-Based Medicine Resource List. • https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/distal-femur • Orthopaedic Trauma Association. Distal Tibia. Evidence-Based Medicine Resource List. • https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/distal-tibia • Orthopaedic Trauma Association. Femur. Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/femur#toc0 • Orthopaedic Trauma Association. Forearm. Evidence-Based Medicine Resource List https://ota.org/education/evidence-based-medicine-resource-list/forearm#toc4. • Orthopaedic Trauma Association. Foot. Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/foot • Orthopaedic Trauma Association. Humerus. Evidence-Based Medicine Resource List. • https://ota.org/education/evidence-based-medicine-resource-list/humerus • Orthopaedic Trauma Association. Proximal Tibia. Evidence-Based Medicine Resource List. • https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/proximal-tibia • Orthopaedic Trauma Association. Shoulder. Evidence-Based Medicine Resource List. • https://ota.org/education/evidence-based-medicine-resource-list/shoulder#toc3 • Orthopaedic Trauma Association. Tibia. Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/tibia • Orthopaedic Trauma Association. Wrist. Evidence-Based Medicine Resource List.

	• https://ota.org/education/evidence-based-medicine-resource-list/wrist

Medical Knowledge 4: Pelvic and Acetabular Fractures **Overall Intent:** To apply knowledge of pathoanatomy, pathophysiology, indications, and biomechanics to treatment options	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of surgically relevant normal anatomy and interprets imaging*	● Understands and interprets basic imaging studies with recognition of relevant anatomic landmarks ● Understands normal and abnormal pelvic ring alignment ● Classifies acetabular fracture patterns based on Letournel-Judet description ● Classifies pelvic ring injuries based on Tile and Young-Burgess descriptions
Discusses absolute surgical indications and types of fixation	● Understands the implications of bone fragility on pelvic and acetabular fractures ● Identifies basic fixation options for pelvic ring injuries (e.g., percutaneous SI screws) and how these are placed
Level 2 *Demonstrates knowledge of basic surgical approaches based on fracture pattern needs*	● Knows the steps of the Kocher-Langenbeck and anterior approaches (e.g., ilioinguinal, Stoppa plus lateral window) ● Describes osseous fixation pathways for percutaneous pelvic and acetabular fixation ● Understands the pertinent risks with each exposure
Discusses relative surgical indications and types of fixation	● Understands indications for operative and non-operative care ● Clearly describes how to place external fixation and Infix devices for pelvic ring injuries ● Demonstrates basic knowledge of the literature regarding pelvic and acetabular fractures
Level 3 *Correlates imaging to surgical anatomy and selects surgical approach*	● Recognizes need for anterior approach, posterior approach, or combined approach depending on fracture pattern, soft tissue injury, etc. ● Identifies safe osseous corridors for percutaneous screw fixation
Adapts absolute and relative surgical indications to a patient's condition and types of fixation	● Discusses controversy of fixation for pelvic ring injuries with associated bladder injury or open abdomen and how to mitigate risk ● Understands occult pelvic ring instability and steps to obtain a stress exam under anesthesia when warranted
Level 4 *Demonstrates knowledge of advanced surgical approaches based on fracture pattern needs*	● Describes greater troch osteotomy, ASIS osteotomy/soft tissue release, etc., as ways to increase exposure when needed ● Understands implications of extended iliofemoral versus combined approaches
Anticipates long-term sequela of surgical interventions and types of fixation	● Recognizes acute total hip arthroplasty as treatment option in select acetabular fractures (e.g., poor bone quality) ● Knows risk factors for post-traumatic osteoarthritis in acetabular fractures ● Discusses HO prophylaxis options and the pros/cons of different types

	● Demonstrates comprehensive knowledge of current and classic literature
Level 5 *Leads advanced discussion around treatment nuances and controversies in management and techniques*	● Understands steps to deal with pelvic nonunion/malunion ● Performs original research on the management of pelvic and acetabular fractures
Assessment Models or Tools	● Case-based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	● The AO. Acetabulum. AO Surgery Reference website. https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/acetabulum ● Orthopaedic Trauma Association Evidence-Based Medicine Articles: ○ https://ota.org/education/evidence-based-medicine-resource-list/pelvis ○ https://ota.org/education/evidence-based-medicine-resource-list/pelvis#toc4 ● Bishop JA, Routt ML Jr. Osseous fixation pathways in pelvic and acetabular fracture surgery: osteology, radiology, and clinical applications. *J Trauma Acute Care Surg*. 2012 Jun;72(6):1502-9. doi: 10.1097/TA.0b013e318246efe5. PMID: 22695413.

Medical Knowledge 5: Decision Making for Complex Problems (e.g., Fracture-Related Infection, Malunion/Nonunion, Peri-Prosthetic Fractures, Post-Traumatic Osteoarthritis, Soft Tissue Issues, Ongoing Pain) **Overall Intent:** To analyze and synthesize medical knowledge, to apply critical reasoning to clinical decision making, and to appropriately prioritizing diagnoses and use of diagnostic tests to develop a treatment plan	
Milestones	**Examples**
Level 1 *Identifies deviation from normal clinical course*	● Obtains an accurate history and physical examination ● Recognizes time frame of expected bony union (e.g., six months with lack of bony healing on tibia x-rays may become a nonunion) ● Understands local and systemic (e.g., smoking, nutrition) causes of fracture nonunion ● Describes Centers for Disease Control and Prevention (CDC) or fracture-related infection criteria for diagnosing orthopaedic infections ● Identifies lack of normal progression in range of motion
Level 2 *Orders and interprets laboratory and imaging findings*	● Names inflammatory, metabolic, and endocrine labs as elements of nonunion work-up ● Identifies white blood cell count (WBC), erythrocyte sedimentation rate, and C-reactive protein as classic markers of infection ● Orders CT scans to evaluate for abscesses or bone healing ● Recognizes and evaluates multiplanar limb deformity ● Demonstrates basic knowledge of the literature regarding post-traumatic sequelae
Level 3 *Synthesizes information to arrive at diagnosis and treatment plan*	● For peri-prosthetic fractures, recognizes implant stability and bone stock as playing into the treatment algorithm ● Understands need for non-traditional fixation for peri-prosthetic fractures (e.g., cables, periprosthetic screws, plate outriggers) ● When choosing arthroplasty for fracture treatment identifies the broken part is the complex side of the arthroplasty ● Makes diagnosis of infection with CT showing abscess despite normal inflammatory markers ● Given good clinical response in pain reduction with intra-articular steroid injection, recognizes arthroplasty or arthrodesis as treatment for post-traumatic osteoarthritis ● Implements strategies to optimize host status ● Understands non-operative methods to treat fracture nonunion
Level 4 *Applies best available evidence to diagnosis and treatment*	● Recognizes that untreated infection is risk for nonunion repair failure, and therefore obtains cultures at time of surgery ● Understands the controversy in “classic” markers for infection in terms of their diagnostic performance ● Knows fracture-related infection definition exists, but that validation work remains ● Understands bone stimulator

	● Articulates situations in which acute arthroplasty might be most appropriate treatment option ● Understands options for bone graft and substitutes ● Understands the socioeconomic impact of nonunions ● Demonstrates comprehensive knowledge of current and classic literature
Level 5 *Adjusts plan based on treatment outcomes*	● Chooses different treatment plan when implant retention and antibiotic suppression fails to treat infection ● Articulates different strategies for recalcitrant nonunion (e.g., resection and bone transport, amputation) ● Performs original research on the management of post-traumatic sequelae
Assessment Models or Tools	● Case-based discussion ● Direct observation
Curriculum Mapping	●
Notes or Resources	● The AO. Periprosthetic Fractures. AO Surgery Reference website. https://surgeryreference.aofoundation.org/orthopedic-trauma/periprosthetic-fractures ● Natoli RM, Harro J, Shirtliff M. Non-culture-based methods to aide in the diagnosis of implant-associated infection after fracture surgery. *Techniques in Orthopaedics* 2020; 35(2):91-99. ● Orthopaedic Trauma Association. General. Orthopaedic Trauma Association Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list/general#toc0

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*	● Lists patient misidentification or medication errors as common patient safety events
Demonstrates knowledge of how to report patient safety events	● Reports lack of sequential suppression devices on patient during surgery or post-operatively ● Describes how to report errors in the local clinical environment ● Knows the systems process for communicating potential patient safety events
Demonstrates knowledge of basic quality improvement methodologies and metrics	● Summarizes steps in a QI project ● Uses checklists and briefings to prevent adverse events in health care
Level 2 *Identifies system factors that lead to patient safety events*	● Identifies roles of supports staff members (e.g., medical assistants, clinic and operating room nurses, certified surgical technologists) and how their work contributes to overall patient care
Reports patient safety events through institutional reporting systems (simulated or actual)	● Correctly applies a Plan Do Study Act (PDSA) QI project to help minimize narcotic use in a trauma-injured patient
Describes local quality improvement initiatives	● Describes root cause analysis process
Level 3 *Participates in analysis of patient safety events (simulated or actual)*	● Prepares for morbidity and mortality (M and M) presentations
Participates in disclosure of patient safety events to patients and their families (simulated or actual)	● Communicates, under supervision, with patients/families about a medication error or surgical complication
Participates in local quality improvement initiatives	● Participates in protocol with risk management to disclose medication errors or surgical complications
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*	● Maintains team situational awareness and promotes “speaking up” with concerns ● Participates in a QI project to improve operating room efficiency
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 patient safety events in collaboration with the institutional administration 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. ● AMA Health Systems Science. Essentials of Quality Improvement: Health Care Quality. https://edhub.ama-assn.org/health-systems-science/interactive/17498793

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 with a hip fracture home health nurse, physical therapist, and social workers as members of the team ● Identifies need for bone health in geriatric fractures and possible need for long-term osteoporosis management ● Identifies general surgery trauma, neurosurgical services, and anesthesiologist as integral components of the care of a poly-traumatized patient ● 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 with general surgery trauma, neurosurgical services, and anesthesiologist for the care of stable patients with traumatic orthopaedic injuries ● 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 orthopaedic trauma team's advanced practice providers and social workers/case managers for a homeless patient to ensure appropriate medical aftercare ● Coordinates with general surgery trauma, Neurosurgical services, and anesthesiologist for the care of unstable patients with traumatic orthopaedic injuries ● Coordinates with a patient's primary care physician or geriatrician to initiate osteoporosis management of fragility fractures ● 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 ● Participates in a code in the operating room and/or is the primary coordinator in the operating room for the treatment of an emergency polytrauma case ● 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 geriatric fall risk reduction plan • Formulates institutional protocols to minimize the risk of perioperative complications seen often in the multiply injured patient (i.e., standardized venous thromboembolism prophylaxis/treatment algorithm) • Develops a protocol (care pathways for various orthopaedic conditions) to improve transitions to different level of care (e.g., operating room to ICU, inpatient to long-term care facilities, rehab facilities to outpatient follow-up)
Assessment Models or Tools	• Direct observation • Multisource feedback • Quality metrics and goals mined from electronic health records (her) • Review of sign-out tools, use and review of checklists
Curriculum Mapping	•
Notes or Resources	• Centers for Disease Control and Prevention. Population health training. https://www.cdc.gov/pophealthtraining/whatis.html. Accessed 2021. • Hospitals in Pursuit of Excellence. Preventing Patient Falls: A systematic approach from the Joint Commission Center for Transforming Healthcare project. October 2016.http://www.hpoe.org/Reports-HPOE/2016/preventing-patient-falls.pdf. Accessed 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 prophylaxis for venous thromboembolism • Understands the economic challenges of patient care in the health care system
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 as well as reimbursement
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 and family education in decreasing readmission rates • Uses evidence-based guidelines for cost-effective care
Level 4 *Uses shared decision-making in patient care, considering 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 • Advocates for patient regarding socioeconomic challenges within the health care system • 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*	• Works with community or professional organizations to advocate for trauma systems • Improves informed consent process for non-English-speaking patients requiring interpreter services • Performs clinical research that affects health care barriers
Assessment Models or Tools	• Direct observation • Medical record (chart) audit • Patient satisfaction data
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. Accessed 2021. • AHRQ. Major physician measurement sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. Accessed 2021.

	● The Commonwealth Fund. Health system data center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. Accessed 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 Kaiser Family Foundation. Health reform. https://www.kff.org/topic/health-reform/. Accessed 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 a given fracture to patient's preference for treatment while communicating and understanding options ● Discusses the risks/benefits of nonoperative versus operative treatment with patients ● Categorizes the study design of a research study
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 given fracture and solicits patient perspective on activity level and needs (i.e., hemiarthroplasty versus total hip arthroplasty for a displaced femoral neck fracture)
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 a given fracture and medical comorbidities ● Understands and appropriately uses clinical practice guidelines in making patient care decisions while eliciting patient preferences for operative versus non-operative treatment (geriatric distal radius fractures)
Level 4 *Critically appraises and applies evidence, even in the face of uncertainty and conflicting evidence, to guide care tailored to the individual patient*	● Critically evaluates and uses patient outcomes and literature to improve patient care ● Critically evaluates information from others, including colleagues, experts, industry representatives, and patients ● Accesses and applies literature to identify alternative treatments for a given fracture based on clinical scenario (e.g., internal fixation versus arthroplasty versus amputation) ● Demonstrates a clinical practice that incorporates principles and basic practices of evidence-based practice and information mastery
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 fractures ● Develops and executes a peer-reviewed research project to address a gap in the literature ● Obtains a research grant for the institution
Assessment Models or Tools	● Conference participation ● Direct observation ● Presentation evaluation ● Research committee
Curriculum Mapping	●
Notes or Resources	● American Academy of Orthopaedic Surgeons. OrthoGuidelines. https://www.orthoguidelines.org/topic?id=1017&tab=all_guidelines

	● American Academy of Orthopaedic Surgeons. Quality Programs & Guidelines. https://aaos.org/quality/quality-programs/ ● The AO. Adult Trauma. AO Surgery Reference website. https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma. Accessed 2021. ● Orthopaedic Trauma Association. Evidence-Based Medicine Resource List. https://ota.org/education/evidence-based-medicine-resource-list ● National organization guidelines (e.g., American Osteopathic Association, American Academy of Orthopaedic Surgeons) ● Various journals (e.g., *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*	● Sets a study and research plan for the year in fellowship ● Reflects on feedback from patient care team members ● Identifies gaps in knowledge and what steps are needed to fill these gaps
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 ● Articulates professional development goals ● Assesses time management skills and how it impacts timely completion of clinical and academic responsibilities (e.g., education and research) ● 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 ● Incorporates time-management strategies and stress-reduction techniques (e.g., exercise) to satisfactorily complete all clinical/academic responsibilities ● 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 ● Designs, conducts, and completes a peer-reviewed research project ● 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 ● Demonstrates incremental growth from one feedback session to another using Ask-Discuss-Ask-Plan Together (ADAPT) model
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 ● Consistently teaches more junior learners while remaining a lifetime learner ● Develops educational module for collaboration with other patient care team members
Assessment Models or Tools	● Conference participation

	● Direct observation ● Review of learning plan
Curriculum Mapping	●
Notes or Resources	● Zelenski AB, et al. Beyond “read More:” an intervention to improve faculty written feedback to learners. *JGME* 2019;11(4)468-471. https://doi.org/10.4300/JGME-D-19-00058.1. ● University of Washington. Prepare to ADAPT: A Conversational Approach to Feedback. https://sites.uw.edu/uwgme/adapt/#:~:text=The%20%E2%80%9CPrepare%20to%20ADAPT%E2%80%9D%20feedback%20framework%20is%20a,creation%20of%20an%20intentional%20follow-up%20plan%20for%20improvement. ● 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. Accessed 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. Accessed 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 ● Understands 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 ● Consistently demonstrates behavior that conveys caring, honesty, and genuine interest in patients and families
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, assumes responsibility if oversights or errors are made by 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 assign blame when discussing adverse outcome or error with family members or the patient ● Recognizes how own personal beliefs and values impact medical care ● Uses respectful, unemotional communication in discussions when resolving conflict within health care team ● Recognizes ethical violations in professional and patient aspects of medical practice
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 ● Practices consistent with the American Academy of Orthopaedic Surgeons (AAOS) Standards of Professionalism ● Elevates issues regarding end-of-life decisions to appropriate channels when family or other conflict is evident (e.g., Ethics Committee, legal counsel, risk management) ● Notifies site director or appropriate supervisor after noticing a colleague seems to be impaired

Level 5 *Coaches others when their behavior fails to meet professional expectations* *Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution*	• Chooses appropriate setting and tone in discussions with others regarding suboptimal professional behavior • 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	• AAOS Standards of Professionalism - American Academy of Orthopaedic Surgeons https://www.aaos.org/about/bylaws-policies/ethics-and-professionalism/professional-compliance-program-main/standards-of-professonalism. • American Medical Association (AMA). Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 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. • 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. • 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.

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 and case logs promptly ● Exhibits punctuality in conference attendance ● Diligent with note writing and chart completion ● Completes end-of-rotation evaluations ● Understands when assistance is needed and is willing to ask for help
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 ● Follows up on pending results/requirements without prompting
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 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 fellows/residents or faculty members as needed ● Recognizes value of humility and respect towards patients and associate staff members ● Arranges coverage for assigned clinical tasks in preparation for being out of the office to ensure appropriate continuity of care; discusses patients with covering team members prior to being out of office ● Assesses application of principles of physician well-being, alertness, delegation, teamwork, and optimization of personal performance to the practice of medicine ● Demonstrates commitment to provide call coverage
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 ● Understands skill levels of the team to optimize and delegate level appropriate tasks to streamline care and task completion
Level 5 *Develops processes to enhance others' 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/. Accessed 2021. ● Code of conduct from fellow/resident institutional manual ● Expectations of fellowship 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 one's own response to a patient's poor outcome ● Identifies personal physical and emotional boundaries that may impact self or others ● Receives feedback on missed emotional cues after a family meeting ● Is aware of the basic principles and aspects of the general maintenance of emotional, physical, mental health, and issues related to fatigue/sleep deprivation
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 conflict ● Lists 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 ● Demonstrates adequate management of personal, emotional, physical, and mental health, and fatigue ● Identifies faculty mentors ● Identifies institutional processes and barriers to personal/professional well-being
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 ● Assesses application of principles of physician wellness, alertness, delegation, teamwork, and optimization of personal performance to the practice of medicine ● Identifies initiatives within the fellowship program to improve well-being ● Generates opportunities / tools that promote the well-being of the team or colleagues
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 ● Recognizes signs of physician impairment and demonstrates appropriate steps to address impairment in colleagues ● 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 fellow's well-being, but to ensure each fellow 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. Accessed 2022. ● 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. ● 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. ● 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 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	● Successfully communicates 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 of a simple fracture
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 to fixation of simple fracture and consults more senior learners or an attending if questions arise ● 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 patient's goal after a middle-aged patient states a desire to run a marathon despite previous complex periarticular fractures, even though the physician has biases about high-impact activity in early arthritis
Counsels patients through the decision-making process for straightforward conditions	● Discusses indications, risks, benefits, and alternatives during informed consent for a hip fracture 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 fracture when some family members desire surgery and others do not
Recognizes biases and integrates a patient's viewpoint and autonomy to ensure effective communication	• Discusses a middle-aged patient's goal to run a marathon after ORIF complex periarticular fracture; 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 fracture with multiple medical conditions, dementia, and high risk of death associated with surgical or non-surgical treatment, including ambiguous outcomes • Obtains consent in emergent situations, polytrauma patients and documents appropriately
Level 5 *Coaches others in the facilitation of difficult conversations*	• Leads an objective structured clinical exam (OSCE) for obtaining informed consent in hip fracture patients with dementia
Mentors others in situational awareness and critical self-reflection	• Encourages others to take the Bias Test (link in Resources) and leads a discussion about impact of bias in residency • Observes interactions between more junior 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 nonunion repair
Assessment Models or Tools	• Direct observation • OSCE • Simulation • Standardized patients • Self-assessment including self-reflection exercises
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. • 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.

	● 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/. ● Project Implicit. https://implicit.harvard.edu/implicit/takeatest.html. Accessed 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.

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 the health care team*	● Answers questions respectfully and patiently for radiology tech regarding x-ray orders understanding that the tech plays an important role in care of the orthopaedic patient ● Respectfully responds and evaluates nursing call related to post-operative pain
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 in an unstable fracture and assists with limb positioning if requested by the tech ● Communicates with the emergency department physician a diagnosis of evolving compartment syndrome and need for timely optimization and mobilization of the patient to the operating room
Level 3 *Actively recognizes and mitigates communication barriers and biases with the health care team*	● Communicates respectfully with trauma team the prioritization of stabilization in a polytrauma patient with an unstable pelvis fracture, femur fracture, and multiple visceral injuries ● Recognizes the need for respectful communication between services when a conflict arises regarding which service will admit the patient ● Understands the operating room team leadership role and obligations
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 unstable pelvis fracture, femur fracture, and multiple visceral injuries ● Attends medical rounds to review consult findings about the possible septic knee and provides education of the medical team about evaluation of a septic joint
Level 5 *Exemplar of effective and respectful communication strategies*	● Mediates a conflict resolution between different members of the health care team ● Develops communication tools for inter-specialty communication
Assessment Models or Tools	● Direct observation ● Global assessment ● Multi-source feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● 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. ● 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. ● 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/.

	● Green M, Parrott T, Cook G., Improving your communication skills. BMJ 2012;344. https://www.bmj.com/content/344/bmj.e357. ● 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/. ● 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/. ● 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/.

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 patients' personal health information*	● Documents relevant information accurately ● Shreds patient list after rounds; avoids talking about patients in the elevator ● Maintains Health Insurance Portability and Accessibility 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 peri-prosthetic hip fracture including risks, benefits, and alternatives ● Obtains outside records including prior implant records ● Updates and documents care plans in the chart which accurately reflects treatment plans ● 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 periprosthetic hip fracture including implant choices ● Triages and communicates time urgency of treatment of a polytruama 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 ● Gives grand rounds or resident lectures that includes care models/pathway utilization ● Actively participates in departmental and institutional committees focused on care policies and pathways.
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. ● 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. ● 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.

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: Care of multiply injured patient	PC1: Polytrauma
PC2: Complex Diaphyseal Fracture	PC2: Complex Diaphyseal Fracture
PC3: Complex Periarticular Fractures	PC3: Periarticular Fractures
PC4: Nonunion/Malunion	No match
PC5: Pelvic and Acetabular Fractures	PC4: Pelvic and Acetabular Fractures
No match	PC5: Soft Tissue
MK1: Care of multiply injured patient	MK1: Polytrauma
MK2: Complex Diaphyseal Fracture	MK2: Complex Diaphyseal Fracture
MK3: Complex Periarticular Fractures	MK3: Periarticular Fractures
MK4: Nonunion/Malunion	MK5: Decision Making for Complex Problems
MK5: Pelvic and Acetabular Fractures	MK4: Pelvic and Acetabular Fractures
SBP1: Systems thinking, including cost-effective practice	SBP3: Physician Role in the Health Care Systems
SBP2: Fellow will work in interprofessional teams to enhance patient safety, quality care, and safe health care delivery	SBP1: Patient Safety and Quality Improvement SBP2: System Navigation for Patient-Centered Care
PBLI1: Self-directed Learning	PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI2: cate, appraise, and assimilate evidence from scientific studies to improve patient care	PBLI1: Evidence-Based and Informed Practice
PROF1: Compassion, integrity, and respect for others, as well as sensitivity and responsiveness to heterogenouspatient populations, including a variety of age, culture, 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
No match	ICS3: Communication within Health Care Systems

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

Remediation Toolkit - https://dl.acgme.org/courses/acgme-remediation-toolkit

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