Hand injuries			
Injury	MOI, Description	Splint, Management	
Tendon injuries			
Flexor tendon injuries	Associated with lacerations of FDS & FDP If only the FDS is cut, both joints will still flex	Dorsal splint, 30-degree wrist flex, 70degree MCP flexion, 30 to 40degree PIP flexion	"Jersey Finger" when FDP is avulsed from its insertion
Football jersey finger	Avulsion of the FDP tendon (+/- bony fragment) from its insertion @ palmer base of the distal phalanx	Dorsal splint as above	Ortho referral within 24hrs
Boutonniere deformity	MOI - Forced flexion @ PIP causes central slip extensor hood disruption @ PIP joint Lateral bands of extensor hood apparatus become flexors of PIP and hyperextensors of the DIP.	Dorsal Splint PIP in extension for 4-6 weeks	Deformity: PIP flexion & DIP extension: unable to fully extend PIP
Mallet finger	MOI – Forced flexion of the DIP causes complete rupture of the extensor tendon at the level of the distal phalanx Deformity: DIP joint is flexed & pt unable to extend DIP , +/- avulsion fracture	Dorsal Splint DIP in hyperextension for 6-8 wks	If untreated, progress to swan neck deformity (DIP flexion, PIP hyperextension)
Ligamentous Injuries			
Gamekeeper thumb or Skier thumb	Ulnar collateral ligament rupture (of the thumb MCP joint) MOI – forced radial abduction of the thumb Decrease pinch strength, pain and swelling at thumb MCP joint ulnar side	Thumb spica splint	Often the XR is normal Associated with fx in 30% More than 40degree radial angulation indicates complete rupture
Dislocations			
DIP joint dislocations	Usually dorsal	Closed reduction, immobilization in slight flexion with dorsal splint for 2 weeks. Note: tuft fx require no specific treatment – can consider temporary splinting.	An irreducible joint may be from an entrapped volar plate, profundus tendon or avulsion fx
PIP joint dislocations	Usually dorsal with rupture of volar plate	Closed reduction under digital block Dorsal Splint the joint in 30 degree flexion or buddy tape to adjacent finger (3-6 wks) Lateral dislocation results from rupture of one of the collateral ligaments.	An irreducible joint from an entrapped volar plate or complete ligamentous disruption
MCP joint dislocations	Usually dorsal and require surgical reduction due to volar plate entrapment	Attempt closed reduction Splint with the MCP joint flexed 70-90 degree.	
Thumb IP joint dislocation	Usually involve volar plate rupture	Attempt closed reduction and place in a Thumb spica splint	
Thumb MCP dislocation	Usually dorsal and involve volar plate rupture	Reduce by flexing and abducting the metacarpal and apply pressure directed distally to the base of the proximal phalanx. Place in a thumb spica splint	
Thumb CMC dislocation	Mostly dorsal from axial force on a flexed thumb	Reductaion and immobilization in extension and pronation	
Fractures			
Tuft Fx	A distal phalanx fx; often associated with subungual hematoma and nail bed laceration MOI – closed in a door or dropped heavy object	Volar or hairpin splint (Protective U shaped) to the DIP joint not immobilizing PIP If intraarticular > refer to ortho	
Proximal & middle phalanx Fractures	Stable/non displaced Fx of the base and neck > buddy taping.	Unstable/displaced: Place Radial/ulnar gutter splint with the MCP joint flexed at 90 degree, PIP joint flexed at 20degree., and the DIP joint flexed at 10 degree	Spiral midshaft fx or intraarticular often require surgical fixation.
Thumb proximal phalanx		Thumb spica splint	
Base of thumb metacarpal fractures	Bennett Fx	Intraarticular fx at the base of thumb metacarpal with dislocation or sublaxation at CMC joint	Thumb spica splint
	Ronaldo Fx	Comminuted intra-articular fx at the base of the thumb metacarpal	Thumb spica splint
Metacarpal Fractures	Fx involve the 4th and 5th are the most common - Boxer's Fx – fx of the neck of the 5th metacarpal Immobilization: Head/ Neck/ Shaft >> Gutter splint Base >> Volar splint- wrist 30-degree extension; MCP free	Angulation more than 20degree in 4th MC, 40 in 5th MC, or 15 in 2nd or 3rd MC should be reduced Any rotation deformity or unacceptable angulation requires ortho evaluation	Ulnar gutter splint for fx of 4th and 5th MC Radial gutter splint for fx of 2nd or 3rd MC With the wrist extended at 20degree and the MCP joint flexed at 90, PIP left mobile
Digit amputation	Remove gross contamination by irrigation with NS – do not scrub or use antiseptics wrap in sterile saline-soaked gauze, place in plastic bag, place the bag in ice cold water		Immediate hand surgery consultation for reimplantation

Wrist injuries			
Injury	MOI, description	Splint, management	
Carpal bone fractures			
Scaphoid	FOOSH injury Pain with radial deviation and flexion, Snuff box tenderness, scaphoid tubercle tenderness, pain with axial compression of the 1st metacarpal (Watson's scaphoid shift test)	Thumb spica splint	Up to 10-15% of initial XR negative Major complication: Avascular necrosis of the proximal fx segment
Triquetrum	Avlusion fx – twisting of hand against resistence or hypertextension Body fx – direct trauma Dorsal wrist tenderness distal to ulnar styloid	Short arm sugar tong splint	2nd most common carpal bone fx Associated with perilunate and lunate dislocations
Lunate	FOOSH injury Tenderness over mid dorsal wrist	Thumb spica splint	Isolated lunate injuries are rare Complication: Kienbock's disease – lunate avascular necrosis
Trapezium	Direct blow to thumb; force to wrist while dorsiflexed and radially deviated Painful thumb movement and weak pinch strength and snuff box tenderness	Thumb spica splint	
Pisiform	Fall directed on the hypothenar eminence Tender pisiform, prominent at the base of the hypothenar eminence	Short arm volar splint in 30degrees of flexion and ulnar deviation	
Hamate	Interrupted swing of a golf club, bat or racquet Tenderness at the hook of the hamate, just distal and radial to the pisiform	Short arm, volar wrist splint with 4th & 5th metacarpal joints in flexion	
Capitate	Forceful dorsiflexion of the hand with radial impact Tenderness over the capitate just proximal to the 3rd metacarpal	Short arm volar wrist splint	
Trapezoid	Axial load onto the index metacarpal Tenderness over the radial aspect of the base of the index metacarpal	Thumb spica splint	
Ligamentous injuries	Typically from forceful dorsiflexion of the wrist		
Scapholunate dissociation	Tenderness dorsal proximal wrist & at Lister's tubercle XR: Terry Thomas or Dave Letterman sign – widening of the scapholunate joint space >3mm Signet ring sign: cortex appears as a ring due to rotary sublaxation & palmer tilt of the scaphoid	Radial gutter splint OR short arm volar posterior mold	Most common carpal ligamentous injury
Triquetrolunate ligament instability	Localized tenderness on the ulnar aspect of the wrist just distal to the ulna. Ballottement of the triquetrum may produce a painful clicking sensation Lateral XR: may reveal "volar intercalated segment instability"	Ulnar gutter splint OR short arm volar posterior mold	
Perilunate dislocation	From excessive hyperextension Palpable dorsal wrist fullness XR: Upright lunate but capitate is displaced, typically dorsally	Volar splint Emergency consultation for Ortho reduction	Commonly associated with scaphoid fracture
Lunate dislocation	Palpable volar wrist fullness Lunate dislocates volar to the radius, but the remainder of the carpus aligns with the radius. XR: spilled teacup sign on lateral view/ Triangular shape or Piece-of-pie sign on AP view	Volar splint Emergency consultation for Ortho reduction	Complication: acute carpal tunnel syndrome, median nerve injury, avascular necrosis

Forearm and Elbow Injuries			
Injury	MOI, description	Splint, management	
Distal Radius and Ulna Fxs	Involve the distal radius at the metaphysis		
Colles fracture	FOOSH injury; distal radius fx with dorsal displacement "dinner fork" deformity	Closed reduction & sugar tong splint	Associated ulnar styloid fx is common Complication: median nerve injury, early OA
Smith fracture "reverse Colles"	FOOSH injury; Distal radius fx with volar displacement "garden spade" defromity	Closed reduction & sugar tong splint	
Barton fracture	Intra-articular volar or dorsal rim fractures of the distal radius	Closed reduction & sugar tong splint	Dorsal rim fx more common Unstable fx require open reduction
Radial styloid fracture	From direct force along the radial aspect of the hand	Short arm splint of the wrist in mild flexion & ulnar deviation	Can produce carpal instability with scapholunate dissociation
Ulnar styloid fracture	Forced radial deviation, dorsiflexion or rotatory stress	Ulnar gutter splint with slight ulnar deviation	
Distal Radioulnar Joint Disruption	XR: either volar or dorsal displacement of the ulna, which is normally centered and overlapping the radius	Dorsal dislocation > splint wrist in supination Volar > in pronation	Generally seen with intraarticular or distal radial shaft fx (Galeazzi) or with both bones fx
Ulna fractures			
Isolated ulna fracture (nightstick fx)	Midshaft isolated ulnar fx – typically from direct blow	Long arm splint	Complication: radial nerve injury
Monteggia fx-dislocation	Ulnar fx (usually proximal third) with radial head dislocation XR: The radiocapitellar line is disrupted, and the apex of the ulna fx points in the direction of the radial head dislocation	Long arm splint Ortho consult - open reduction and int. fixation usually required in adults	Complication: radial nerve injury, compartment/ Posterior interosseous nerve lies in close prox to radial head > stretched> neurapraxia and inability to extend thumb or wrist
Radius fractures			
Galeazzi fx-dislocation	Distal radial shaft fx & distal radioulnar joint disruption XR: AP view widened radioulnar joint space/ Lateral view ulna displaced dorsally	Long arm splint or sugar tong Ortho consult - open reduction and int. fixation usually required in adults	Complication: ulnar nerve injury, compartment syndrome
Essex-Lopresti lesion	Radial head fx with disruption of the interosseous membrane & disruption of the distal radioulnar joint	Long arm splint	Suspect in FOOSH injury, severe wrist pain with negative wrist XR
Elbow dislocations	90% posterolateral XR: may show "Terrible triad" – elbow dislocation with radial head & coronoid fractures	Closed reduction & long arm splint with the elbow in slightly less than 90degree of flexion	Complications; injuries to brachial artery, ulnar nerve. Avulsion of triceps common in anterior dis. (link for injury in peds)
Nursemaid elbow	Sublaxation of the annular lig. over radial head	Closed reduction	
Elbow fractures	Distal humerus / Proximal Ulna/ Proximal Radius		
Supracondylar fractures	XR: Posterior fat-pad, large anterior fat-pad "sail" sign, anterior displacement of anterior humeral line	Long arm posterior splint with elbow in 90-degree flexion	Complication: brachial artery injury, radial & median nerve injuries, Volkmann's ischemic contracture (flexion contracture of hand & wrist due to untreated forearm compartment syndrome), AIN neurapraxia: can't make the OK sign)
Intercondylar fractures	Many classification systems (eg high & low T, Y, H, & medial and lateral lambda)	Long arm splint	
Epicondylar fractures	Medial – usually in children and adolescents; "little league" elbow – repeated valgus stress Lateral – rare	Long arm splint w forearm in pronation (M)/ supination (L)	Extra-capsular – so no fat pad seen on XR
Condylar fractures	Usually involve articular and non articular surface; lateral condylar fx is more common; medial condylar fx seen in children	Long arm splint w forearm in pronation (M)/ supination (L)	
Articular surface fractures	Trochlea fx Capitellum fx Proximal ulna fx	Long arm splint	Nearly all proximal ulna fractures are considered intraarticular with the exception of a proximal olecranon chip fx
Coronoid fractures	Usually a/w posterior elbow dislocation	Long arm splint	
Olecranon fractures		Long arm splint	Complication: ulnar nerve injury (link for fx in Peds)
Radial head fractures	4 types: undisplaced/ minimal displacement/ communited/ fx with dislocation XR: may see large anterior fat-pad	Type I &II: Arm sling & range of motion exercises Long-arm posterior splint Type III & IV: Ortho consult	Most common adult elbow fx (link for fx in Peds)
Elbow soft tissue injuries			
Biceps rupture	Vast majority proximal	SLING, ice, analgesia & ortho referral	
Triceps rupture	Almost always distally		
Lateral epicondylitis	Aka tennis elbow	Above + counterforce brace; +/- corticosteroids injections	
Medical epicondylitis	Aka golfer's elbow		
How to diagnose traumatic open joint	Don't probe a wound in a proximity to a joint XR may reveal air in the joint Definitive diagnosis made by performing an arthogram: injecting saline combined with small amount of methylene blue into the joint to distend the joint (may need large amount), then inspect the wound for egress of the fluid, then withdraw the fluid from the joint		

Shoulder & Humerus Injuries			
Injury	MOI, description	Splint, management	
Sternoclavicular sprains and dislocations	Pain and tenderness localized to the joint, more sever in disloation. Consider septic arthritis in the non traumatic pt, esp in IVDUs CT is the imaging of choice. IV contrast if concerned for mediastinal injuries	Sprains and uncomplicated anterior dislocations > sling immobilization without attempted closed reduction Post dislocation > immediate ortho consult for open reduction	Sxs of hoarseness, dysphagia, dyspnea, upper ext paresthesias or weakness may indicate life-threatening injuries to mediastinal contents
Clavicle fx	3 types: medial 1/3, middle 1/3 (most common) or lateral 1/3	Sling immobilization preferred over figure of 8 brace Ortho consult for open fx, neurovascular compromise or persistent skin tenting (risk from turning into an open fx)	Distal third: possible coracoclavicular ligament injury
Scapular fx	Significant force	Vast majority treated non surgically with Sling Ortho consult for significant or displaced articular fx of the glenoid	Usually occurs in association with injuries to lung, ribs and shoulder gridle.
Acromioclavicular joint injuries	Classified into 6 grades: I- sprained AC lig/ II-AC lig disruption + sprained CC lig / III- AC lig + CC lig disruption, distance btw A&C increased by full width of clavicle/ IV-VI rare Obtain AC XR specifically because standard shoulder XR over penetrate the AC joint and small fx may be missed	Type I & II > sling immobilization Type III > controversial but trend favors sling Type IV – VI > operative	
Shoulder (Glenohumeral joint) dislocation			
Anterior	Subcoracoid (>90%), Subglenoid, Sublavicular, Intrathoracic Arm abducted & externally rotated, "squared off " shoulder	Reduction, sling immobilization 10 shoulder reduction techniques http://youtu.be/HtOnreM7heg	Associated injuries: axillary nerve palsy, fx of the greater tuberosity, fx of the humeral neck, Bankart lesion, axillary artery disruption, Hill-Sacks deformity
Posterior	Classically from seizure, fall or high speed MVC Arm adducted & internally rotated XR: Rifle barrel & light bulb signs, vacant glenoid sign, Posterior rim sign (space btw anterior rim of glenoid & humeral head > 6mm		Associated injuries: fx of post glenoid rim, fx of the humeral head (reversed Hill-Sacks deformity), fx of the lesser tuberosity
Inferior = Laxatio erecta)	Forearm locked over forehead – due to forceful hyperabduction of shoulder	Modified Hippocratic technique	Associated injuries: rotator cuff tear, neurovascular compression injuries, fx of proximal humerus, severe soft tissue injuries
Hill sacks deformity	Depression fx of the posterolateral surface of the humeral head that results from compression of the dislocated head by the lower glenoid rim. The presence of these lesions do not change ED management		
Bankart lesion	Fx of the anterior aspect of the inferior glenoid rim; occurs in 10-20% of traumatic anterior dislocations		
Humerus fx			
Proximal humeral fx	Neer classification system: 4 parts – articular surface of the humeral head, greater tubercle, lesser tubercle, and diaphysis of the humerus.	Non displaced or "one-part" fx > sling & swathe immobilization All others > ortho consult	There can be multiple fragments, but if non e of the fragments are displaced >1cm or are angulated >45 degrees, the proximal humerus fx is termed "one-part" fx
Humeral shaft fx	Fall, MVC, blow to arm	Non displaced fx > sugar tong splint + sling & swathe Hanging cast usually used for humerus fx that are grossly displaced or comminuted	Radial nerve injury is the most common nerve injury seen after humeral shaft fx. The injury is usually a neuropraxia and resolves spontaneously in most pts.

Pelvic Injuries			
If a pelvic fracture is found, assume associated intraabdominal, retroperitoneal, gynecologic, or urologic injuries exist until proven otherwise			
Injury	MOI, description	Splint, management	
Avulsion & single Bone fx			
Iliac wing (Duverney) fx		Analgesia, NWB until hip abductors pain-free	
Single ramus of pubis or ischium fx		Analgesia, crutches	
Ischium body fx		Analgesia, bed rest, donut-ring cushion, crutches	
Sacral fx		Analgesia, bed rest/ surgery may be needed for displaced fx or neurologic injury	Ortho consult mandatory
Coccyx fx		Analgesia, bed ret, stool softeners, donut-ring cushion	Surgical excision of fracture fragment if chronic pain
ASIS avulsion fx	Forceful Sartorius muscle contraction (sprinters)	Analgesia, bed rest for 3-4 wks with hip flexed and abducted, crutches	
AIIS avulsion fx	Forceful rectus femoris muscle contraction (soccer players)	Analgesia, bed rest for 3-4 wks with hip flexed, crutches	
Ischial tuberosity avulsion fx	Forceful contraction of hamstrings	Analgesia, bed rest for 3-4 wks in extension, external rotation, crutches	
Pelvic Ring fractures	-Lateral Compression fx – Type I-III -AP Compression fx – Type I-III -VS fx -Mixed patterns	Stabilize the pelvis with a bed sheet or pelvic binding device (over greater trochanters) Treatment occurs after the associated injuries have been addressed. With the exception of later compression type I and APC type I injuries, all other pelvic ring fx require ORIF	
Acetabular fx	5 types and nearly all are associated with hip dislocations	Early othro consult and admit Non displaced fx may be treated with bed rest and analgesia	Risk of Sciatic nerve injury

Hip and Femur injuries			
Injury	MOI, description	Splint, management	
Proximal femur fx			
Femoral head fx	High energy trauma, Isolated fx rare, seen in 6-16% of hip dislocations	Admit - ortho consult; emergent closed reduction of dislocation; ORIF if closed unsuccessful	Risk of AVN
Femoral neck fx	Fall or trauma, Common in older patients with osteoporosis	Admit to ortho; ranges from non operative to total hip arthroplasty	Risk of AVN
Greater trochanteric fx	Direct trauma; avulsion in young pts due to contraction of gluteus medius	Analgesia, protected weightbearing	
Lesser trochanteric fx	Uncommon; avulsion due to forceful contration of illiopsoas	Analgesia, weightbearing as tolerated	Evaluate for possible pathologic fx in elderly
Intertrochanteric fx	Fall, high energy trauma	Admit; may need ORIF	
Subtrochanteric fx	Fall, high energy trauma	Admit for ORIF	
Hip dislocations			
Posterior	By posterior force through flexed knee Internally rotated and adducted	Should in reduced within 6 hours because delays in reduction correspond with higher incidence of AVN	Complications: sciatic nerve injury, femoral head AVN, acetabular fx
Anterior	Present in external rotation with groin mass		
Femoral shaft fractures	High energy trauma	Traction splint unless the patient has a sciatic nerve injury (splint only) or grossly contaminated open fx	

Knee injuries			
Injury	MOI, description	Splint, management	
Fractures			
Patellar fx	Direct blow or forceful contraction of quadriceps muscle	-Non displaced fx with intact extensor mechanism > knee immobilizer -Displaced > 3mm or with disruption of extensor mechanism > knee immobilizler + early referral for ORIF -Severely comminuted fx > ortho consult: surgical debridement of small fragments & suturing of quadriceps and patellar tendons. -Open fracture > irrigation, Abx, ortho consut	
Femoral condyles fx	Fall with axial load or a direct blow	Incomplete or non-displaced fx in any age group or stable impacted fx in the elderly > long leg splint Displaced fx or fx with any degree of joint incongruity > long leg splint, ortho consult for ORIF	Potential for popliteal artery injury and deep peroneal nerve injury (sensation btw 1st & 2nd toes, foot and toe dorsiflexion)
Tibial spines & tuberosity fx	Force directed against flexed proximal tibia in an anterior or posterior direction	Incomplete or non-displaced fx > knee immobilizer, ortho referral in 2-7 days Complete or displaced fx > ortho consult for ORIF	Usually result in Cruciate ligaments injur
Tibial tubercle fx	Sudden force to flexed knee with quadriceps contracted	Incomplete or small avulsion > knee immobilizer Complete avulsion > ortho consult for ORIF	
Tibial plateau fracture	Valgus or varus forces combined with axial load – leg hit by car bumper	Non displaced, unilateral fx > knee immobilizer with non-weightbearing, ortho referral in 2-7 days Depression or articular surface > ortho consult for ORIF	Associated with ligamentous injury in 1/3 cases; Anterior cruciate and MCL injuries are associated with lateral plateau fx, whereas posterior cruciate & LCL injuries occur with medial plateau fx
Dislocations			
Patella dislocation		Reduction followed by knee immobilizer: flex (mild) the hip and hyperextend the knee while pushing up and medially over lateral condyle	Result in significant ligamentous and capsular disruption. Multidirectional instability of the knee should raise suspicion for a spontaneously reduced knee dislocation
Knee dislocation	Requires at least 2 ligaments disruption to dislocate. Types (tibia in relation to the femur): anterior, posterior, medial, lateral, rotationl	Evaluate for neurovascular injury with ABI and angiography. Early reduction with documentation of pre- and post-reduction neurovascular status immediate ortho and vascular consultation	
Ligamentous injuries	ACL PCL MCL LCL	Knee immobilizer, rest, ice, analgesia and ortho referral in 7-10 days An avulsion fx of the lateral tibial condyle is a marker for ACL rupture = Segond fx O'Donohue's Terrible Triad = ACL & MCL tears with meniscal injury due to lateral blow to the knee with planted foot	Lachman test is the most sensitive test for ACL injury. MCL & LCL injuries are diagnosed with abduction (valgus) & adduction (varus) stress testing in 30 degrees flexion: laxity >1cm without a firm end point is diagnostic of complete rupture. If laxity is present with stress testing in extension, then this indicates injury to the cruciate lig and posterior or posterolateral capsule.
Meniscal injuries	Medical meniscus Lateral meniscus	Rest, ice, elevate, NSAIDs, ortho referral	Pt may complain of locked knee, poping, clicking or sensation of instability with activity
Quadriceps or Patellar tendon rupture	High riding patella may be seen in patellar tendon rupture	Ortho consult for surgical repair	
Osteochondritis dissecans	Rare – segment of articular cartilage and subchondral bone become partially or totally separated from the underlying bone.	Protective weightbearing if the epiphyses are still open. If the epiphyses are closed and the fragments are detached, will require arthroscopy or arthrotomy	
Patellar tendinitis	Aka jumper knee – pain over the patellar tendon worsened by running up hills and standing from seated position	Heat, NSAIDs and quadriceps strengthening excercises	

Leg injuries			
Injury	MOI, description	Splint, management	
Tibial shaft fx		Long leg splint from high above the knee with the knee at 5 degrees of flexion and the foot in slightly plantarflexion. Ortho consult	Risk of compartment syndrome
Proximal Third Tibia Fx	3 Types: simple, Wedge, Comminuted	Long leg splint (above knee to foot)	
Toddler's fx	Spiral fx fo the distal tibia – children under age of 5 yrs who has twisted the foot while planted on that leg	Long leg splint (above knee to foot)	Not all of these fractures are obvious on XR. Not related to child abuse.
Pilon fx aka Tibial Plafond	When axial force on the foot drives the talus into the articular surface of the tibia, grinding or crushing the distal tibia.	Ortho consult	May be accompanied by compartment syndrome or by vertebral body fx, particularly a fx of the L1
Triplane fx	Distal tibial fx at the growth plate; fx plane extends from the lateral side of the tibia through the growth plate until it reaches the already fused medial aspect of the physis. The resulting injuries can appear to be Salter III on AP view, and Salter II on lateral veiw	Ortho consult	The planes: at the growth plate, sagittal and coronal planes
Proximal fibula fx	Maisonneuve fx – external rotation force applied to the foot causing – medial malleolus injury and proximal fibular fx	Ortho consult	
Midshaft fibula fx		Short leg cast and crutches	
Stress fx	Runners typically sustain fx at the junction of the middle third and distal third of the tibia	Discontinuation of activity, a cast can be applied if significant pain	
Achilles Tendon Rupture	Typically middle age participates in strenuous activities on an occasional basis	Short leg cast with the ankle slightly plantarflexed.	Thompson test – positive; foot will not dorsiflex when the calf is squeezed US useful tool in diagnosis
Medial gastrocnemius muscle strain	Forceful plantar flexion of the foot while the knee is extended Immediate sharp pain, audible pop may be heard	Immobilization with the foot maximally plantarflexed	
Shin splints = Tibial stress syndrome	Pain over anterior leg; typically sudden increase in training activity; exercise induced pain over the medial aspect of the tibia	Cessation of activity that precipitated the pain	If severe pain, bone scan may be needed to exclude the possibility of stress fx

Ankle Injuries			
Injury	MOI, description	Splint, management	
Tendon injuries	Peroneal tendon injury from hyperdorsiflexion. Achilles tendon injury from sudden plantarflexion.	Achilles tendon rupture > splint in plantar flexion, non weight bearing	
Ligamentous injuries Low Ankle Sprain High Ankle Sprain	Ankle sprain – most commonly involves the anterior talofibular ligament (lateral ankle) 3 grades: I – no tearing of the ligaments, wt bearing is tolerated II- in complete tear, more painful, swelling and ecchymosis, difficulty with wt bearing III- complete tear, significant loss of function, inability to wt bear	If joint is stable, pt able to bear weight > PRICE – protection with elastic bandage of ankle brace, rest, ice, compression, elevation up to 72 hours. Joint stable, unable to bear weight > ankle brace Unstable joint > posterior splint/ CAM boot/ AO splint	Assessing the grade of the sprain is less important that the stability of the joint. Joint stability is the primary determinant of a treatment plan. Medial deltoid ligament injury usually associated with fibular fx (Maisonneuve fx) or syndesmotic ligament injury Check stability: perform anterior drawer test and inversion stress (talar tilt) test. A crossed-leg test can detect a syndesmotic sprain
Dislocations	Posterior dislocations are most common	Reduce ankle dislocations -- immediately (without XR) if vascular compromise (absent pulses, dusky foot) or skin tenting is present-- followed by splint - AO splint	Usually results in in rupture of the tibiofibular ligaments or a lateral malleolus fx. Link to reducing technique
Fractures			
Fibular avulsion fx		Treated as ankle sprains when minimally displaced (<3mm) and no signs of medial ligamentous injury	
Unimalleolar ankle fx		Posterior short-leg splinting with stirrup splint, non wt bearing / CAM boot	Except for fibular avulsion fx, all ankle fx require immobilization by either cast alone or surgical repair and casting
Bimalleolar ankle fx		Posterior splint > ORIF	
Trimalleolar ankle fx	Fx of medial and lateral malleolus as well as the distal posterior aspect of the tibia (aka the posterior malleolus)	Posterior splint > ORIF	
Open fractures		Wet sterile dressing, splinting, tetanus, Abx (1st generation cephalosporin eg cefazolin 1g IV), immediate ortho consult	
Maisonneuve fx	Rupture of the deltoid ligament with associated proximal fibular fx Ankle eversion injury causes disruption of the tibiofibular syndesmosis	Ortho consult: often requires ORIF to stabilize the tibiofibular syndesmosis	

Indications for CAM boot use:

- Stable fx of the base of 5th metatarsal
- Undisplaced metatarsal shaft fractures (including jones fx)
- Minor avulsion type fx with severe symptoms
- Stable Weber A fx of the distal fibula
- Severe ankle (Grade III) strains or sprains

Foot injuries The foot is divided into the hindfoot, midfoot, and forefoot. The Chopart joint separates the hindfoot and midfoot, and the Lisfranc joint separates the midfoot and forefoot.			
Hindfoot			
Calcaneus fx	Commonly fall from height- lover's fx - Obtain Harris view - Measure Boehler angle is concerned for a cancaneal compression fx (<25% suggestive of a fx)	Posterior splint, strict elevation, non wt bearing, ortho consult	Can be associated with lumbosacral fx, extremity, GU and renal injuries
Talar avulsion fx		Posterior splint, ortho follow up	
Talar fx	Talar neck fx, body fx, subtalar dislocation	Posterior splint, Immediate ortho consult	High rate of AVN
Midfoot			
Lisfranc injury	Range from sprain to Fracture-dislocation - Often associated with a fx, especially at the base of the 2nd metatarsal. Greater than 1mm btw the bases of the 1st and 2nd metatarsals is considered unstable.	Non wt bearing splint If displaced > ortho consult in ED	Planter ecchymosis sign: bruising over the planter midfoot Fleck sign: 2nd metatarsal base avulsion fx Complications; dorsalis pedis artery injury, arthritis & chronic pain
Navicular, cuboid, cuneiform	Isolated injuries are rare	Posterior splint Displaced fx > ortho consult	
Forefoot			
Metatarsal fx	Non displaced metatarsal shaft fx – posterior splint or surgical shoe	Metatarsal shaft fx with >3-4mm displacement require surgical reduction	
5th Metatarsal base fx	Pseudo Jones fx – non displaced avulsion fx of the tuberosity of the 5th metatarsal (aka Dancer's fx)	Hard sole shoe, ankle stirrup splint or rocker walker	
	Jones fx – metaphyseal-diaphyseal junction fx of the 5th metatarsal	Non weight bearing cast and ortho f/u	
Phalangeal fx	Non displaced fx	buddy taping and a stiff-sole shoe	
	Displaced fx and dislocations	Digital block, reduction by manual traction and buddy taping	

For any corrections, suggestions or feedback, email abdhammoudi@gmail.com , THANKS