



Denver Health Orthopedic Resident Manual: Common Orthopedic Trauma Scenarios and Inpatient Protocols

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Disclaimer: This handbook offers guidance in patient care and patient management for DHMC orthopedic surgery residents. Clinical management guidelines represent a safe and preferred approach based on our institutional and personnel capabilities. However, it must be recognized that individual patient circumstances may warrant deviating from these guidelines. Ultimately, the clinician's judgment should determine the course of action.

Documentation: Documentation is key!!! Not only to protect yourself but, most importantly, for patient care and communication with the patient's care team. You **MUST** document ANY interaction with a patient or patient's family (physical exam, phone conversation, consent process, etc). If it is not documented, then it did not happen. This is extremely important.

When in doubt, always remember the 5 rules of the CU Orthopedics Residency:

1. **Trust no one (not even yourself)**
2. **Do it yourself**
3. **Check it twice (see rule #1)**
4. **Expect sabotage (see rule #1)**
5. **Show no weakness**



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Trauma Alert/Activation Criteria

Criteria:

A. Trauma Alert:

- Open or depressed skull fracture, penetrating skull injury
- Pelvic fracture confirmed or suspected by physical exam
- Stab wound to neck, torso or groin
- Two or more long bone fractures with polytrauma mechanism
- Open long bone fracture with polytrauma mechanism
- Positive FAST exam in the setting of trauma
- New focal neurologic deficit with mechanism attributed to trauma
- Environmental hypothermia requiring active rewarming
- Significant trauma with age > 70
- High risk mechanism by EM MD discretion (i.e. ejection, high speed auto-ped)
- High energy electrical injury
- Burn > 10% BSA
- Drowning requiring resuscitation and/or field intubation
- EM MD or trauma surgeon discretion (high risk patients should be alerted prior to hospital arrival)

B. Trauma Activation:

- Glasgow Coma Score (GCS) less than nine (9) with mechanism attributed to trauma
- Respiratory compromise, obstruction, and/or intubation with mechanism attributed to trauma
- ANY trauma with a confirmed systolic blood pressure (SBP) less than 90 mmHg, or comparable level of hypotension in a child
- Mechanically unstable pelvic injury (open or obvious on physical exam)
- Gunshot Wound (GSW) penetrating the neck, chest, abdomen, or extremity proximal to elbow or knee
- Amputation proximal to the ankle or wrist
- Fall greater than or equal to 30 feet
- Transfer patients from other facilities receiving blood en route
- Environmental hypothermia with a temperature less than 30 degrees Celsius
- The EM attending or chief surgical resident suspects the patient is likely to require urgent operative intervention

C. Adult vs Pediatric:

- Under 15 years old in the DECC
 - However, pediatric patients of any age with penetrating trauma meeting Trauma Team Activation criteria are triaged to the Adult Emergency Department for proximity to the OR.
- 15 years old and over in the Adult ED

Consults and Collaboration with Other Teams

Consults:

- A. All consults associated with a trauma alert/activation need to be seen URGENTLY
 - Report to the charge nurse that orthopedics has arrived
 - Document time of page and time of arrival in the trauma bay in your note
- B. All non trauma alert/activation consults should be seen in a reasonable time
 - Ideally within one hour
 - This means the patient is seen and there is some communication with the Emergency Department (ED) about a course of action or temporary plan
 - This does not mean the note and final plan has to be completed within this time
 - Do not allow consults to stack up (more than 2-3 consults behind)
 - It is ok to ask for help in order to ensure consults are being managed efficiently
- C. See ALL consults!
 - There is no such thing as a “curbside consult”
 - We are either consulted or not
 - Make sure this is clear when working with the ED or other services
 - See ALL “unnecessary” consults from the ED or inpatient teams
 - You will be surprised how many times these turn into, “I’m glad I saw that!”
 - Realize they are consulting us because they do not have our training and would like our expertise
 - Many times these types of consults can be used as an educational opportunity to teach the other service
 - And potentially avoid a similar consult in the future
 - An intern should NEVER see a consult by themselves
 - An upper level should see the patient at some point during their care
 - The level of oversight is dependent upon the current experience of the intern and time of year
 - The upper level MUST either addend the intern’s note or document a note of their own
 - Always remember we are here for patient care and to learn!

Collaboration with Other Teams:

A. SICU/PICU:

- Patients in the SICU/PICU are under the primary management of the SICU/PICU teams
- A resident must accompany a SICU/PICU patient back to the unit after undergoing a procedure in the OR
 - Sign out should occur with the nursing staff and SICU/PICU resident regarding the procedure and postoperative orders and plan
 - This should also be clearly documented in the postoperative progress note
 - Confirm with the SICU/PICU resident who will be doing the postoperative orders
 - Never hurts to double check their orders
- Communicate with the SICU/PICU team when a patient is undergoing a procedure the day before (also ensure NPO status)
 - Subsequently, confirm that the patient is still able to proceed to the OR in the morning during rounds

B. When Orthopedics is not primary:

- All pediatric patients (18 years and younger) will be admitted to Pediatrics as the primary team
- ALWAYS stay in communication with the primary team
 - Inform the service when we plan to take a patient to the OR and the plan
 - Confirm NPO status with the team the day before
 - Discuss (either in person or by phone) the procedure performed and postoperative plan with the primary team after a patient comes out of the OR
 - WB status, antibiotics, DVT prophylaxis, pain control, diet, PT/OT, EBL, postoperative imaging, labs, etc
 - This should also be clearly documented in the postoperative progress note
 - Confirm with the team who will be doing postoperative orders
 - Never hurts to double check their orders

Common theme: COMMUNICATION IS KEY!!!

Compartment Syndrome

Etiology, Diagnosis, and Management:

A. Have high suspicion in the following scenarios:

- Fractures – Tibia, distal radius, both bone forearm
- Crush injuries
- Bleeding disorders
- Burns
- Post-ischemic swelling
- Gun shot wounds
- Tight cast/dressings

B. Symptoms:

- Increasing severe pain is typically the earliest sign (with increasing analgesics)
 - This can be unreliable, especially in the setting of trauma
- Pain with passive stretch, tight compartments
 - Also unreliable
 - Unfortunately symptoms can be vague and are poorly defined and require serial examination

C. Diagnosis:

- Early diagnosis is key
 - Delay may cause irreversible muscle/nerve damage
- Serial examinations required when suspicion is high
- Compartment syndrome is a clinical diagnosis
- Measure compartments in the intubated/sedated/intoxicated patient or patient with neurologic injury (spinal cord injury)
 - Diastolic differential pressure (Δp) < 30
- When in doubt discuss with senior resident or attending

D. Treatment:

- Emergent fasciotomy when diagnosed in timely manner
- If delayed diagnosis (>6 hours): Observation (equivocal topic)

References:

Mauser N, Gissel H, Henderson C. Acute lower-leg compartment syndrome. *Orthopedics*. 2013 Aug;36(8):619-24.

Prasarn ML, Ouellette EA. Acute compartment syndrome of the upper extremity. *J Am Acad Orthop Surg*. 2011 Jan;19(1):49-58.

Olson SA, Glasgow RR. Acute compartment syndrome in lower extremity musculoskeletal trauma. *J Am Acad Orthop Surg*. 2005 Nov;13(7):436-44

Acute Management of Open Fractures

A. Classification:

Table 1	
Short Version of the Gustilo Classification System of Open Fractures ^a	
Type	Description
I	Wound <1 cm, clean
II	Wound >1 cm, no extensive soft tissue damage
IIIA	Extensive soft tissue damage with adequate coverage
IIIB	Extensive soft tissue damage with inadequate coverage
IIIC	Arterial injury requiring repair
^a Data from Gustilo and Anderson ¹⁰ and Gustilo et al. ¹¹	

Table 2					
Expanded Version of the Gustilo Classification System of Open Fractures ^a					
Feature	Fracture Type				
	I	II	IIIA	IIIB	IIIC
Wound size, cm	<1	>1	>1	>1	>1
Energy	Low	Moderate	High	High	High
Contamination	Minimal	Moderate	Severe	Severe	Severe
Deep soft tissue damage	Minimal	Moderate	Severe	Severe	Severe
Fracture comminution	Minimal	Moderate	Severe/ segmental fractures	Severe/ segmental fractures	Severe/ segmental fractures
Periosteal stripping	No	No	Yes	Yes	Yes
Local coverage	Adequate	Adequate	Adequate	Inadequate	Adequate
Neurovascular injury	No	No	No	No	Yes
Infection rate	0%-2%	2%-7%	7%	10%-50%	25%-50%
^a Data from Gustilo et al., ³ Gustilo and Anderson, ¹⁰ and Gustilo et al. ¹¹					

B. Initial Management

- ATLS
- Physical exam and complete neurovascular exam
- Preliminary irrigation and debridement at bedside in the ED
- Wet-to-dry dressing (saline or dilute betadine) applied

C. Tetanus Prophylaxis

- Tetanus vaccine for incomplete/uncertain vaccination history
- Booster for vaccination history > 10 years or contaminated wounds with > 5 years
- Tetanus immune globulin for contaminated wounds with incomplete/uncertain history
 - Single intramuscular dose of 3,000-5,000 units

D. Antibiotics:

A. Timing: As soon as possible!

B. Duration

- Discontinue antibiotics 24 hrs after wound closure in type I and II open fractures
- In type III open fractures discontinue antibiotics 72 hrs after injury or 24 hrs after closure/coverage, whichever occurs **first**

C. Choice of antibiotics

- Cefazolin
 - 2 g in adult patients weighing less than 120 kg
 - 3 g in adult patients weighing 120kg or more
- Clindamycin – 900 mg

Recommended Systemic Antibiotic Prophylaxis	
Open Fracture Type (Gustilo and Anderson)	Recommended Systemic Antibiotic Prophylaxis
Type I	First-generation cephalosporin (cefazolin) Alternative: clindamycin with β lactam allergy
Type II	First-generation cephalosporin (cefazolin) Alternative: clindamycin with β lactam allergy
Type III	First-generation cephalosporin (or clindamycin with β lactam allergy) plus aminoglycoside (gentamycin) Alternatives: Third-generation cephalosporin (ceftriaxone or piperacillin/tazobactam)
Fecal or potential clostridial contamination	Consider addition of penicillin to above regimen (cefazolin/gentamicin)

References:

Halawi MJ, Morwood MP. Acute management of open fractures: an evidence-based review. *Orthopedics*. 2015 Nov;38(11):1025-33.

Carver DC, Kuehn SB, Weinlein JC. Role of systemic and local antibiotics in the treatment of open fractures. *Orthop Clin North Am*. 2017 Apr;48(2):137-153.

Unstable Pelvic Fractures

Protocol regarding initial management of patients with unstable pelvic fractures upon arrival in the emergency department.

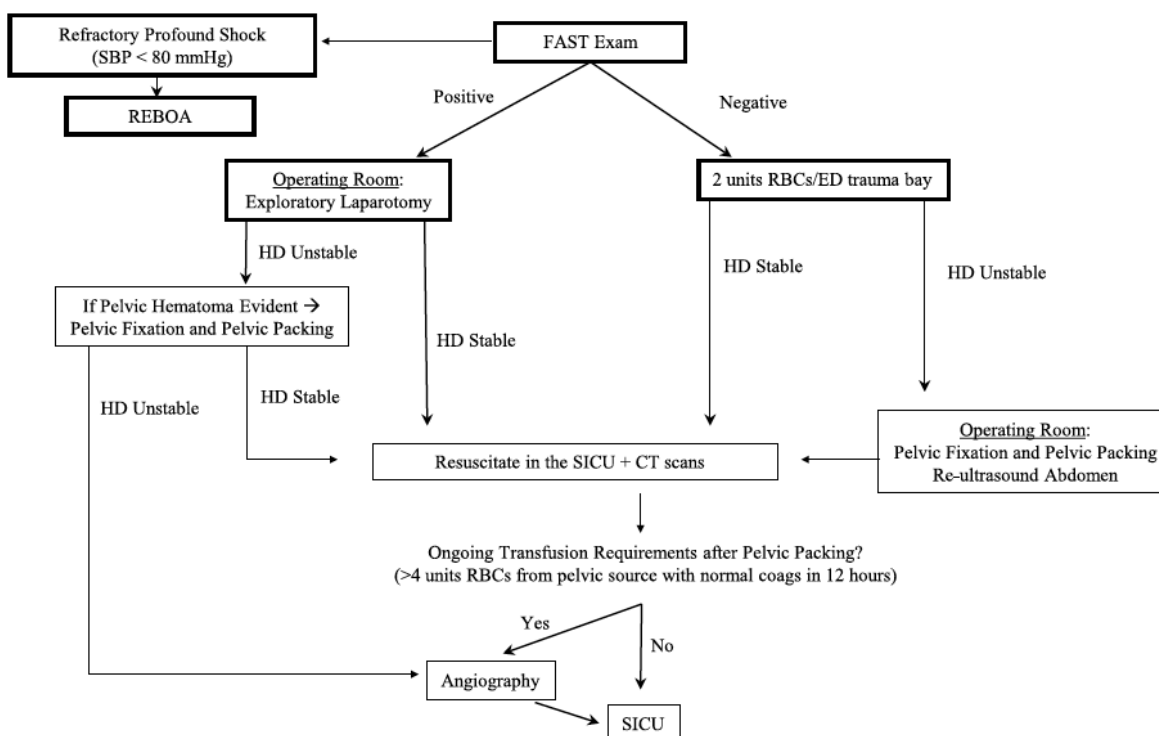
Denver Health Unstable Pelvic Fracture Management

Resuscitate with 2 L crystalloid – measure base deficit – rule out thoracic source – sheet the pelvis.

Transfuse fresh frozen plasma (FFP) and RBC 1:2; 1 apheresis unit of platelets for each 5 units RBCs; perform thromboelastography.

Place 7Fr Terumo catheter in the right common femoral artery

Immediate notification: Attending Trauma Surgeon, Attending Orthopedic Surgeon, Operating Room, Blood Bank



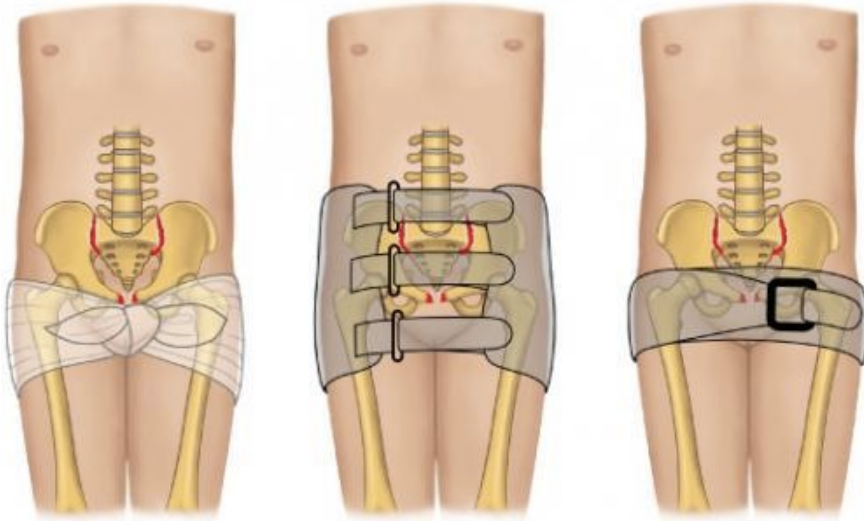
Pelvic Binders

A. Purpose

- Stabilizes pelvis, which subsequently decreases bleeding at the fracture site
- Diminishing pelvic volume also thought to tamponade venous bleeding
- Promotes clot formation
- Have found to decrease mortality and transfusion requirements
- Effective, easy application, cost-effective, and non-invasive

B. Types and Application of Binders

- Commercial binders and bed sheets
- To be applied over the greater trochanters of the proximal femur (not over the abdomen)
- Can also tape thighs and internally rotated feet together



C. Indications

- APC, vertical shear, LC III, and combined mechanism type pelvic ring injuries
- Typically applied in the pre-hospital setting or in the ED
- Evidence to support application if unstable pelvis on exam or found on radiographs
- To be used early and in a short term period
 - Support hemodynamically unstable patients until they receive external or definitive fixation of the pelvis

D. Contraindications

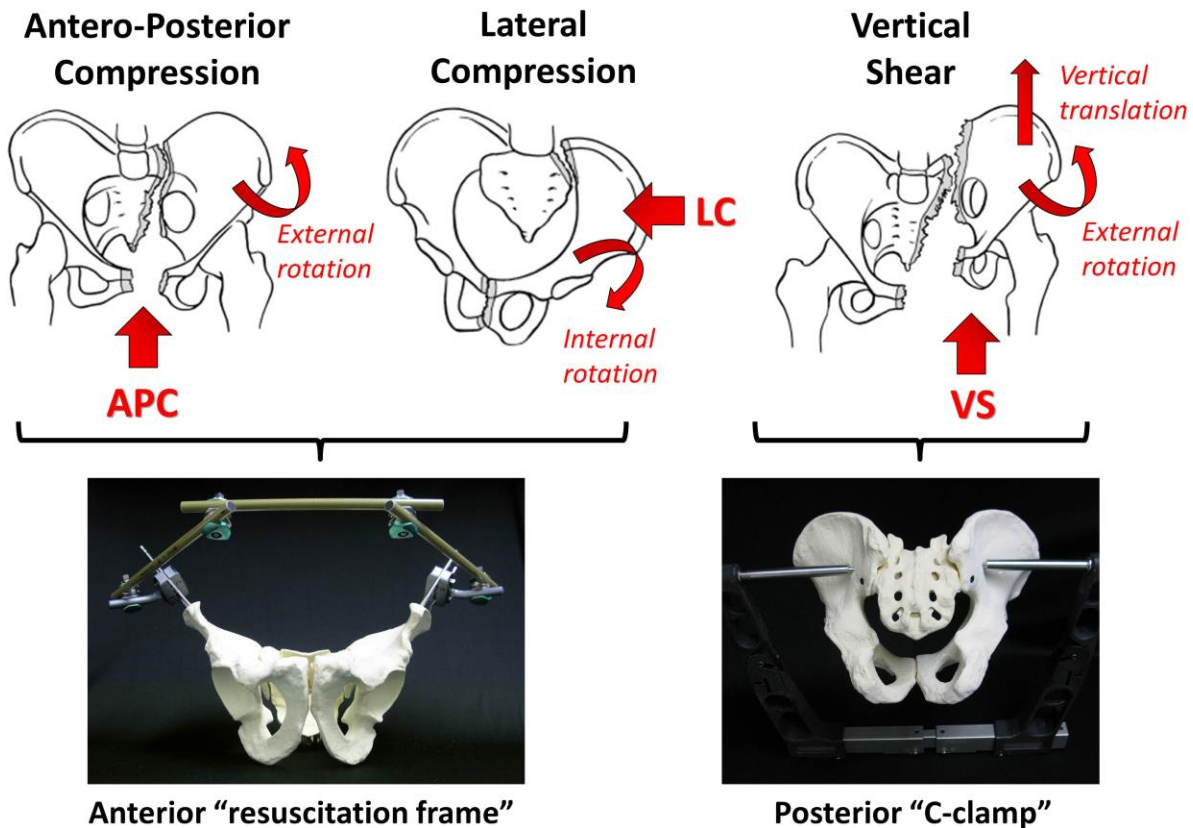
- LC I and LC II type pelvic injuries
- Soft tissue damage at binder site

E. Risks

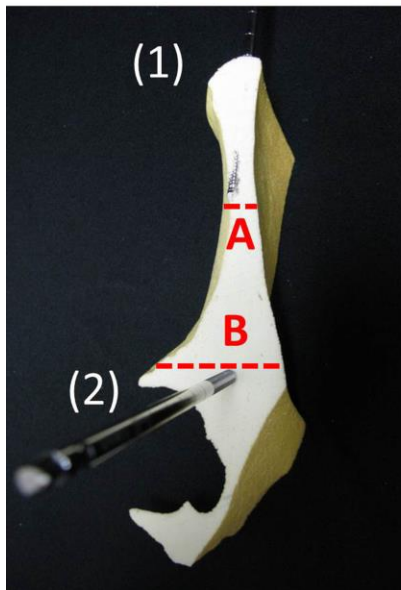
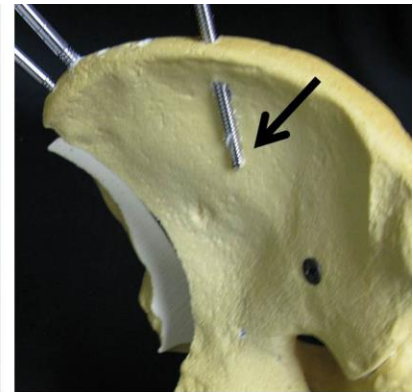
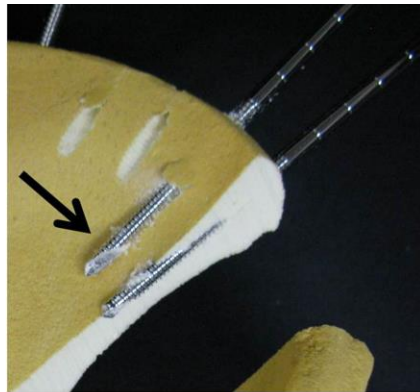
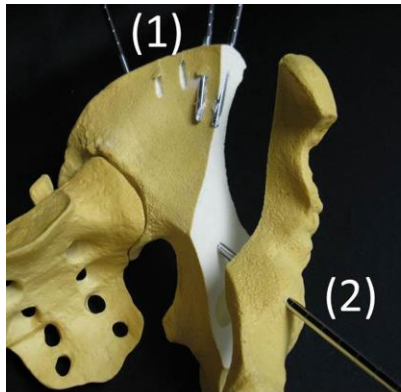
- Soft-tissue or skin damage if left on for too long
- Can give you a false sense of the severity of the injury if imaging taken after binder was placed
 - May require EUA in the OR for better understanding of the injury

External Fixation Indications and Techniques

- A. Decision making for acute external fixation of pelvic ring disruptions guided by the underlying injury mechanism.



- B. Technical options for anterior external fixation of pelvic ring injuries. Advantages and shortcomings of iliac crest versus supraacetabular modalities of pin placement.



(1) Iliac crest route

Pros: • Fast application for “damage control”

• No fluoroscopic guidance required

Cons: • Small surgical corridor (**A**)

• High incidence of pin misplacement (**arrows**)

• Multiple pins required due to poor purchase

• Higher risk of failure of fixation/reduction

(2) Supra-acetabular route

Pros: • Large surgical corridor (**B**)

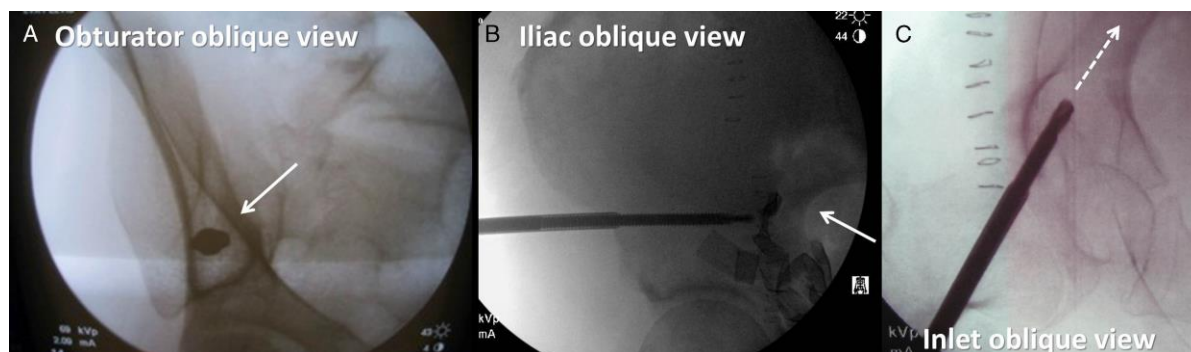
• Excellent purchase with low risk of failure

• Single pins are sufficient

• Low incidence of pin misplacement

Cons: • Fluoroscopy-guided, time consuming

- C. Fluoroscopy-guided supraacetabular external fixator application. Two oblique “Judet views” are required to ensure accurate and safe pin placement. While the obturator oblique view outlines the “teardrop” configuration (arrow in A), which reflects the “perfect” surgical corridor, the iliac oblique view denotes the sciatic notch (arrow in B), which must be protected from accidental perforation owing to the risk of neurovascular complications. In addition, the inlet oblique view is helpful for guiding the pin through the supraacetabular corridor (dotted arrow in C).



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Mauffrey C, Cuellar DO 3rd, Pieracci, et al. Strategies for the management of haemorrhage following pelvic fractures and associated trauma-induced coagulopathy. *Bone Joint J.* 2014 Sep;96-B(9):1143-54.

Burlew CC, Moore EE, Stahel PF, et al. Preperitoneal pelvic packing reduces mortality in patients with life-threatening hemorrhage due to unstable pelvic fractures. *J Trauma Acute Care Surg.* 2017 Feb;82(2):233-242.

Stahel PF, Mauffrey C, Smith WR, et al. External fixation for acute pelvic ring injuries: decision making and technical options. *J Trauma Acute Care Surg.* 2013 Nov;75(5):882-7.

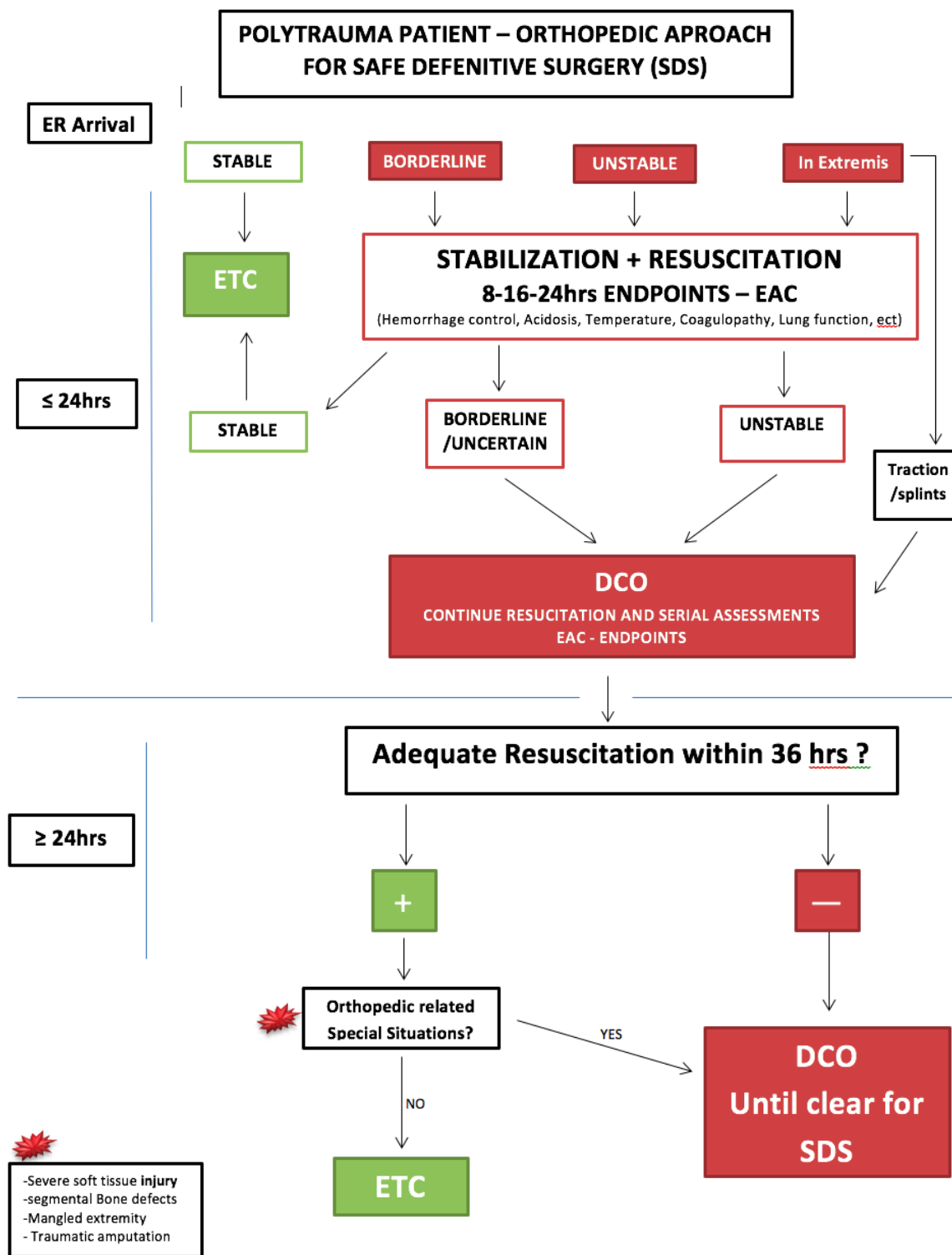
White CE, Hsu JR, Holcomb JB. Haemodynamically unstable pelvic fractures. *Injury.* 2009;40(10):1023-30.

Vaidya R, Roth M, Zarling B. Application of circumferential compression device (binder) in pelvic injuries: room for improvement. *West J Emerg Med.* 2016 Nov;17(6):766-774.

Morris R, Loftus A, Friedmann Y. Intra-pelvic pressure changes after pelvic fracture: A cadaveric study quantifying the effect of a pelvic binder and limb bandaging over a bolster. *Injury.* 2017 Apr;48(4):833-840.

Managing The Polytrauma Patient

Algorithm for the Polytrauma Patient: Damage Control vs Early Definitive Fixation



Early Appropriate Care (EAC) Protocol:

- A. Timing of definitive fracture fixation based on presence and severity of metabolic acidosis
 - Fractures of the femur, pelvis, acetabulum, and spine
 - Goal is to prevent deleterious reactive systemic inflammatory response
- B. Definitive fixation within 36 hours of resuscitated patient
 - Defined by at least one of the follow:
 - Venous lactate <4.0 mmol/L
 - BE > -5.5 mmol/L
 - or pH >7.25
- C. EAC protocol associated with fewer complications and shorter length of stay in the hospital
- D. Polytrauma patient:
 - Multiple procedures in the same surgical setting have been shown to be safe in the resuscitated patient
 - Additionally, definitive fixation in the same setting may reduce complications and hospital stay

References:

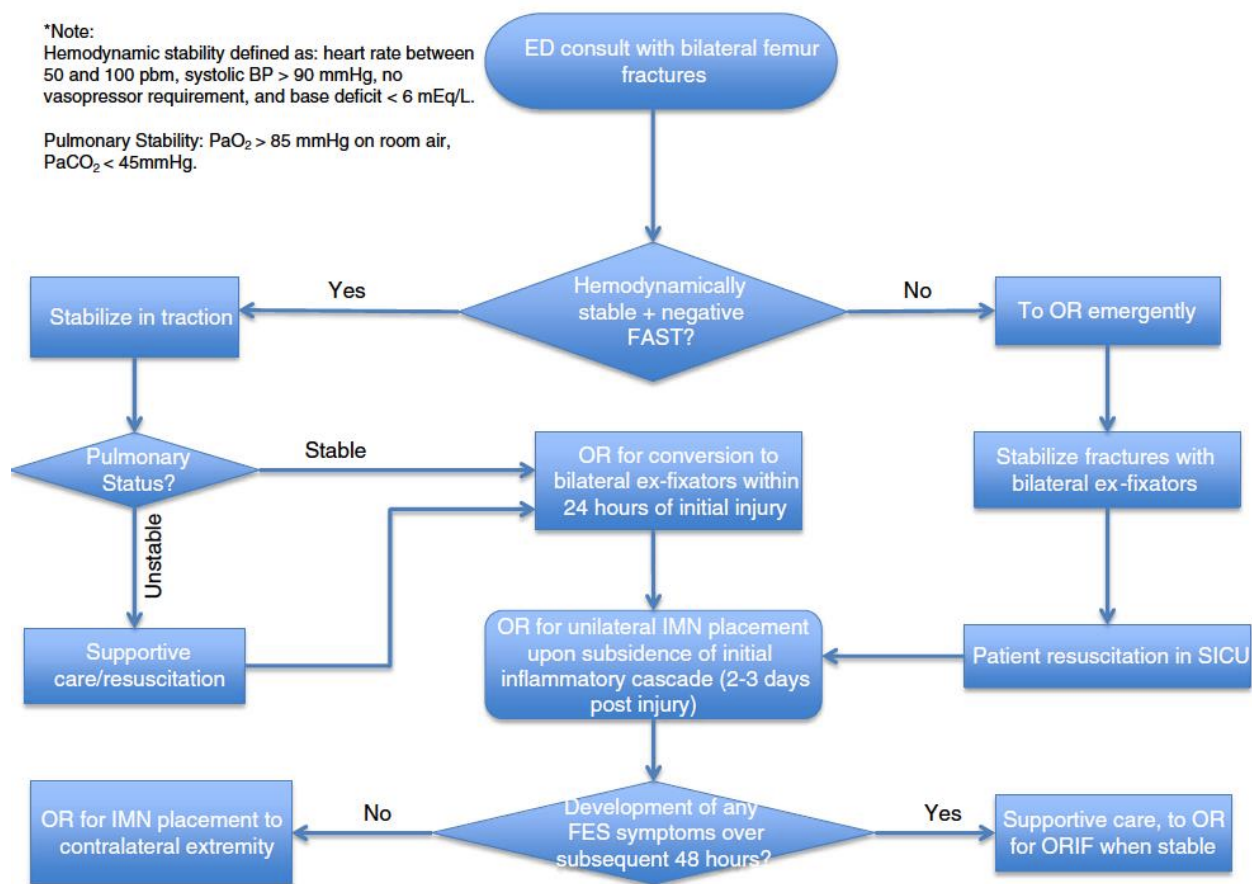
Vallier HA, Moore TA, Como JJ, et al. Complications are reduced with a protocol to standardize timing of fixation based on response to resuscitation. *Journal of Orthopaedic Surgery and Research*. 2015 10:155.

Childs BR, Nahm NJ, Moore TA, Vallier HA. Multiple procedures in the initial surgical setting: when do the benefits outweigh the risks in patients with multiple system trauma? *J Orthop Trauma*. 2016;30:420-425.

Pape HC, Pfeifer R. Safe definitive orthopaedic surgery (SDS): repeated assessment for tapered application of early definitive care and damage control?: an inclusive view of recent advances in polytrauma management. *Injury*. 2015 Jan;46(1):1-3

Bilateral Femoral Fractures

Treatment Algorithm for Bilateral Femoral Fractures:



Reference:

Dunn RH, Jackson T, Burlew CC, et al. Fat emboli syndrome and the orthopaedic trauma surgeon: lessons learned and clinical recommendations. *International Orthopaedics*. 2017 41:1729-1734.

Traction in the Acute Setting

Indications and Application of Traction:

A. Purpose:

- Stabilization/immobilization, restoring length/alignment/rotation, pain control, relieves muscle spasms, offloading of articular surfaces, allows tamponade of bleeding vessels
- Typically a temporizing measure

B. Indications:

- Unstable posterior wall acetabulum fractures after hip dislocation
- Medialization of the femoral head after acetabular fracture
- Subtrochanteric femur fractures
- Femoral shaft fractures
- Vertically unstable sacral/pelvic fractures (vertical shear injuries)

C. Traction weights

- Factors include age, bone quality, and body habitus
- Amount of traction applied must be less than the counter-traction weight

Types of Traction

A. Hare

- Portable device, quickly stabilizes femoral fractures
- Often used by emergency responders and the emergency department
- Provides distraction through the lower leg and counter-traction from the patient's ischium
- Often applied inappropriately
 - Causes pain to patient and skin breakdown
- Should be removed urgently for proper examination and imaging of the extremity
- Convert to Buck's or skeletal traction as necessary



B. Buck's

- Skin traction (pulling force is applied to the skin and soft tissue of the limb)
 - Usually through a soft boot
- Noninvasive and easy application
- Requires healthy soft tissue envelope, without open wounds or ligamentous compromise
- Can cause skin compromise and peroneal palsy when used for an extended amount of time
 - Especially in the elderly with frail skin/soft tissues
- Typically limited to **10 lbs** of weight and left in place for no more than **24 hrs**



C. Skeletal

- Direct pull on a bone through a placed pin/wire
- More invasive
- Able to use heavier weights compared to Buck's
 - Typically 15 to 30 lbs of weight depending on patient's body habitus
- Most common sites of placement
 - Distal femur, proximal tibia, and calcaneus
 - See Figures 1-3
- Pin should be parallel to any adjacent joint surface
- Post-traction radiographs often helpful for reassessing fracture and confirming pin placement.

Skeletal Traction Pin Set-up

- Traction Bow/Pin Set - OR storage (by OR 8)
- Synthes 4200 drill - OR storage
- Battery x2 - between OR 8 & 9
- Wire cutters - OR storage
- Traction cart with weights/equipment (ask ED faculty/nurse/tech)
- Other: End caps, 22ga spinal needle, 18ga needle, 20cc syringe, 1% lidocaine, Sterile gloves, Chux, Abd pads, 4x4s, Chloriprep, Skin marker, #15 blade, Sterile blue towels

D. External fixation pin care:

We recommend no pin site care for patients in external fixators beyond keeping them dry and clean.

Figure 1: Demonstrating anatomic landmarks for pin site insertion for distal femoral and proximal tibial skeletal traction. Pin placement should be from medial to lateral for the distal femoral traction.

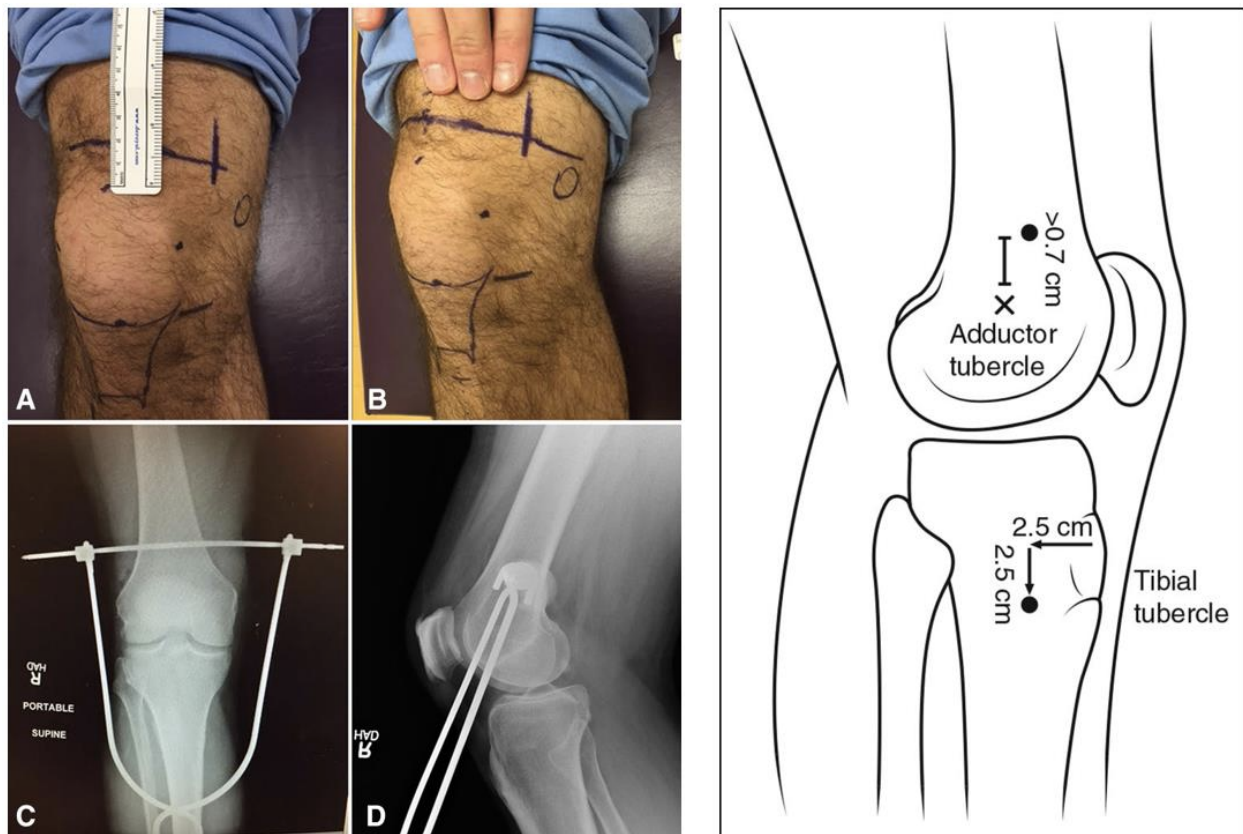


Figure 2: Demonstrating landmarks for pin placement for proximal tibia skeletal traction. Pin should be placed lateral to medial.

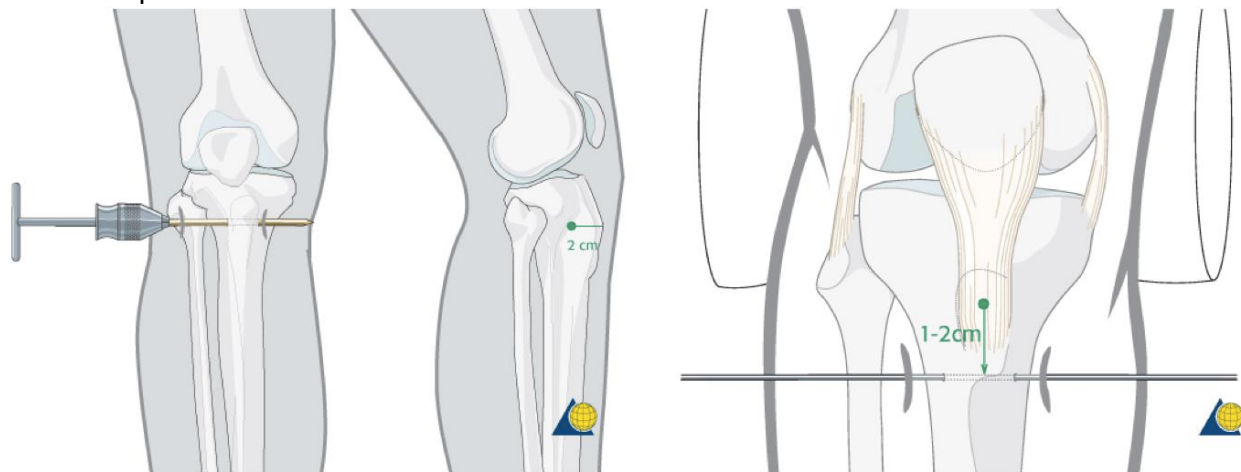


Figure 3: Demonstrating anatomic landmarks of calcaneal skeletal traction. Pin should be placed from medial to lateral.



References:

DeFroda SF, Gil JA, Born CT. Indications and anatomic landmarks for the application of lower extremity traction: a review. *Eur J Trauma Emerg Surg.* 2016;42:695-700.

Matullo KS, Gangavalli A, Nwachuku C. Review of Lower Extremity Traction in Current Orthopaedic Trauma. *J Am Acad Orthop Surg.* 2016;24:600-606.

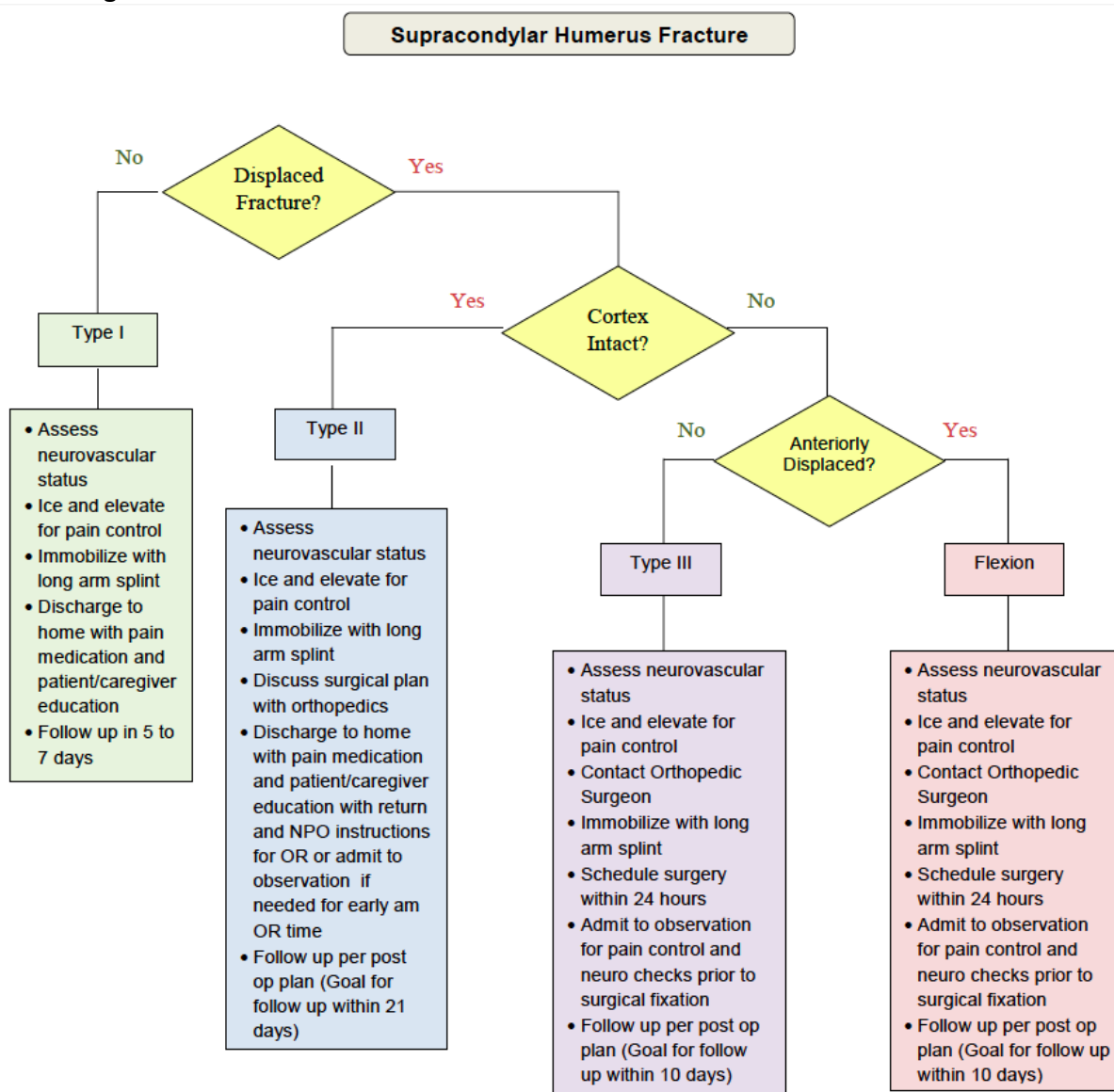
Colton C, Krikler S, Schatzker J. *AO Surgery Reference.* AO Foundation. <https://www2.aofoundation.org>. 2017

Supracondylar Humerus Fractures (Pediatric)

A. Key Principles:

- Identify fracture type and need for surgical fixation
- Immobilize in long arm posterior splint
- Hold in observation unit if concern for pain or swelling
- Oral or IV pain management
- Schedule type II and III fractures for surgery (goal: type II to OR within 7 days, type III to OR within 24 hrs)
- Discuss care plan with family
- Follow up goal: type II fractures within 21 days, type III fractures within 10 days

B. Algorithm



DVT Prophylaxis

Denver Health Deep Venous Thrombosis (DVT) Prophylaxis Protocol

- A. Mechanical prophylaxis: for all patients regardless of injury
 - This involves SCD's and daily ambulation
- B. Chemical prophylaxis: consists of subcutaneous **Lovenox 30 mg BID**
 - Inclusion criteria:
 - Any pelvic or acetabular fracture
 - All femur fractures (excluding isolated greater trochanteric avulsions treated non op)
 - Peri-knee injuries: knee dislocations and high-energy tibial plateau fractures
 - Bilateral non-weight bearing patients or temporarily immobilized patients who are not ambulating
 - Duration of chemical prophylaxis:
 - 14 days for all patients with the above injuries
 - EXCEPTION: chemical prophylaxis should be continued up until bilateral non-weight bearing patient is able to again ambulate
- C. **NEVER withhold morning dose of Lovenox** if patient is going to the OR
 - Unless there is a specific reason that is documented
 - This should be part of the "Time Out" process in the OR, confirming that anticoagulation has been given

Geriatric Fracture Protocol

Inclusion/Exclusion Criteria:

- A. Inclusion Criteria: ≥ 65 years with fragility fractures of the hip
- B. Exclusion Criteria: multiple trauma patients who are generally admitted to the Trauma Surgery service

Emergency Department Care:

- A. Emergency department physicians call the Orthopaedic surgery team on call as well as the Hospital Medicine Consult physician
- B. Baseline labs: CBC, BMP, PTT, PT/INR, Type and screen
- C. CXR
- D. 12 lead EKG
- E. Pain management with low dose opioid analgesics
- F. Patient is admitted to the Orthopedic Surgery service
 - Exceptions: Patient has another medical problem which necessitates ICU level care, or in discussion with the Medicine Consult attending and Orthopedic Surgery attending the patient cannot be safely managed on the Orthopedic Surgery service with Hospital Medicine co-management.

Pre and Postoperative care:

- A. Use admission order set
 - Ortho Geriatric Fracture Admission
- B. General:
 - Admit to surgical tower B when possible
 - Consider room close to nurses' station
 - Consider need for bed alarm, chair alarm, and/or patient safety monitor
 - Consider requesting pharmacist evaluation for patients at high risk for fall and/or delirium to identify potential contributory medications.
- C. Nursing Care:
 - Foley catheter to gravity
 - Complete bed rest
 - Ice to fracture site as needed
 - Incentive spirometry every hour while awake
 - CMS checks every shift
 - Assess for fall risk every shift with appropriate interventions
 - Assess for skin breakdown every shift with appropriate interventions to prevent skin breakdown and pressure ulcers
 - Reposition every two hours while in bed

C. Nursing Care (cont'd):

- Avoiding delirium:
 - Excess opiate medications can precipitate delirium.
 - No benzodiazepines, diphenhydramine (Benadryl), hydroxyzine, sedative/hypnotic medications (Ambien, temazepam, etc), skeletal muscle relaxants and other anticholinergics (i.e. scopolamine).
 - Exception: Patient takes these medications at home and they are ordered by hospitalist.
 - Frequent reorientation as necessary.
 - Ensure use of hearing aids or glasses while patient awake.
 - Adequate pain control with scheduled acetaminophen and low dose opiates.
 - Delirium screen performed every shift (CAM assessment tool). If positive, notify hospitalist.

D. Pain control: The goal is to provide sufficient relief of fracture-related pain using low dose opiate pain medication and scheduled non-opiate pain medication.

- Scheduled acetaminophen and low dose opioid medications
- Adult Bowel Protocol.

E. DVT prophylaxis: all patients with hip fractures are at high risk for venous thromboembolism.

- DVT prophylaxis should begin on admission.
- Pharmacologic prophylaxis
 - Recommend formulary LMWH unless:
 - Patient will be going to surgery within 24 hours then prophylaxis starts immediately post-op.
 - GFR <30 then use subcutaneous unfractionated heparin.
 - Pharmacologic prophylaxis should continue for a minimum of 14 days after surgery.
- Mechanical DVT prophylaxis: sequential compression devices and Ted hose for entire hospital stay.

Preparation for operative care:

- A. Patients who undergo surgery for fragility fractures of the hip within the first 24 hours have lower one-year mortality and fewer short-term complications than those patients whose surgery is delayed. All patients will be seen and optimized for surgery by a hospitalist and have a preoperative evaluation by a provider in the Anesthesia department.
- B. Goal is for operative fixation to take place within 24 hours. If the patient is admitted in the morning the goal is for the patient to have surgery sometime that afternoon. If the patient is admitted in the afternoon, evening or nighttime, the goal is for the patient to go to the OR the next morning.

- C. Patient is seen by hospitalist for perioperative medical assessment the day of admission if admitted during daytime hours or by the next morning if admitted during nighttime hours.
- Medical optimization includes evaluation for active cardiac conditions, reversing anticoagulation to goal $INR \leq 1.5$ (or per surgeon preference), and evaluating for any other conditions which would unduly increase perioperative mortality.
 - If the hospitalist believes it necessary to delay surgery it will be standard for that physician to call orthopedic surgeon scheduled to operate on that patient to discuss the case and the delay. If it is unclear per the OR schedule which surgeon will be operating, the orthopedic surgeon on call should be contacted.

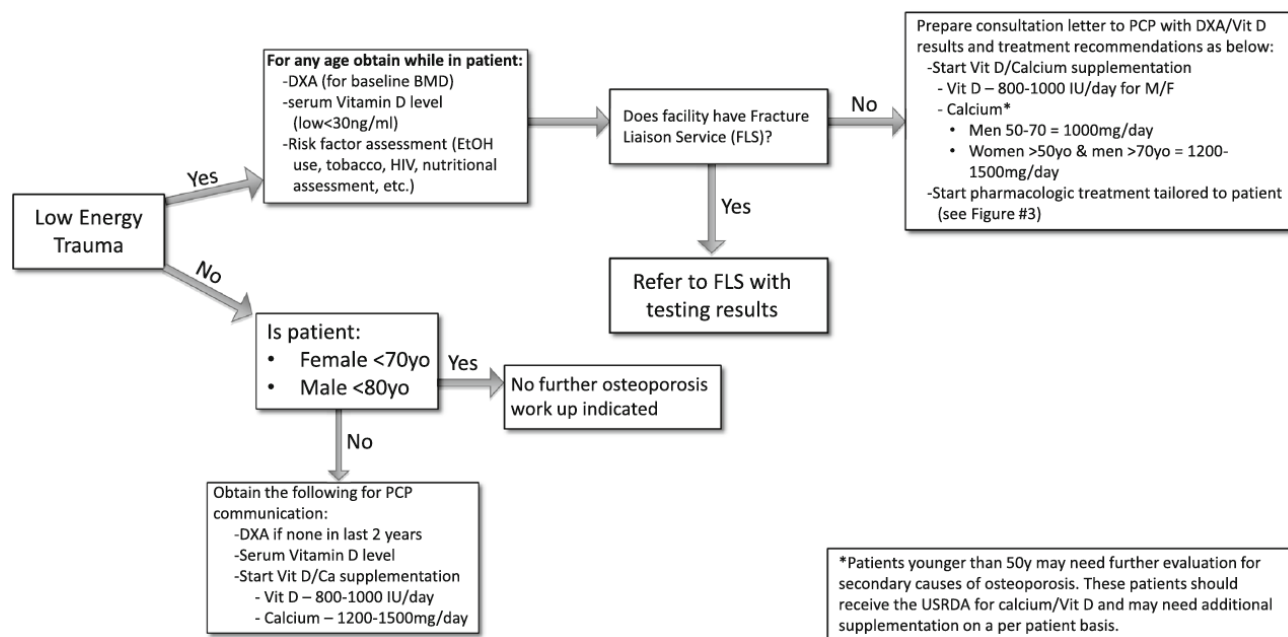
Discharge planning:

- Discharge planning will begin at admission.
- Social worker to meet with patient and family on hospital day #1 to discuss potential need for subacute rehab placement post-operatively.

Additional postoperative care:

- Use post-op order set
 - Ortho Geriatric Fracture Admission: Post-op
- Nursing:
 - Foley catheter discontinued on POD#1.
- Activity/Rehab:
 - PT/OT consult for mobilization and recommendation of placement on all patients. Order placed immediately following surgery.
 - Patient is mobilized within 24 hours after surgical repair.
- Osteoporosis management: Treatment of osteoporosis after a fragility fracture is imperative to decrease the patient's risk of a subsequent fracture. Every patient will have osteoporosis management started in the hospital and recommendations made to the patient and primary care physician regarding future management of their osteoporosis.
 - Calcium/Vitamin D supplementation
 - Check vitamin D level
 - 25-hydroxy vitamin D blood test (ng/mL):
 - Start high dose vitamin D replacement if indicated
 - ≥ 30 : No supplementation necessary
 - 20-29: Cholecalciferol 2,000 units/day x 6 weeks
 - < 20 : Cholecalciferol 2,000 units/day and Ergocalciferol 50,000 units/day x 6 weeks
 - Counsel on smoking cessation if applicable
 - All patients should be referred to Geriatric Fracture Clinic for follow up
 - Dr. Robin Yasui
 - See Algorithm in Figure 4

Figure 4. Work up of a patient with a primary fragility fracture and treatment algorithm.



References:

Farmer RP, Herbert B, Cuellar DO, et al. Osteoporosis and the orthopedic surgeon: basic concepts for successful co-management of patients' bone health. *Int Orthop*. 2014 Aug;38(8):1731-8

**Post-Operative Management for Adult and Pediatric Microvascular
Revascularization/Replantation Protocol**

Guidelines for adults and children who underwent a microvascular replantation or revascularization procedure:

- A. After a successful replantation or revascularization is finished, the patient will be transferred to recovery room.
- B. The patient will be admitted to the ICU or the ward at the discretion of the Hand/Microvascular attending based upon the patient's physiology and extremity reconstruction.
- C. Use order sets:
 - Replant/Revascularization (Adult) - or - PED Replant/Revascularization
- D. For patients admitted to the ICU, temperature and clinical checks of the replanted part are initiated hourly at admission for the first 24 hours, continued every 2 hours for the second postoperative day, every 4 hours for the third post-operative day, and every 8 hours after the fourth post-operative day. This is considered the minimum practice and should be followed unless otherwise ordered. It is very important during the first 72 hours of neurovascular checks to recognize any decrease in temperature of the replanted part. The decreasing temperature is an indication of a vascular failure either at the level of the arteries or veins.
 - Assess the temperature of the non-affected digit for a baseline normal temperature reading and then assess the temperature of the replanted (affected) digit according to the schedule listed above.
 - The temperature of a successful replantation is usually 31-36 degrees C. Any decrease in temperature below 30 degrees C or a drop of 2 degrees C or more in the replanted digit must be immediately reported to the hand surgery team.
 - Temperature measurements are to be taken with an infrared thermometer at the affected finger, as well as any uninjured neighboring finger. The latter is to have a base line temperature recorded to be compared with the replanted finger. In case of a hand replantation, the base line comparative temperature measurements are to be taken from the contralateral hand.
- E. During the patient's hospitalization, anti-thrombosis prophylaxis will be administered per the Hand/Microvascular attending order in adults. In pediatrics, replantation orders will be placed only by pediatricians or the hand surgeon. Pediatric aspirin dosing is weight based.
 - Patients weighing less than 16 kg will be discharged home with 40.5 mg aspirin once a day for one month.
 - Patients weighing between 16 and 50 kg will be discharged home with 81 mg aspirin once a day for one month.
 - Patients weighing greater than 50kg will be discharged home with 325 mg aspirin once a day for one month.
- F. The patient will be seen in the Hand/Microvascular specialty clinic 7 to 10 days after discharge

Soft Tissue Abscess Management

Denver Health Abscess Protocol for the Main ED and the AUCC

- A. This will help better streamline the care of patients with simple cutaneous (typically shooter's) abscesses in the ED and AUCC. This includes specific recommendations by our Infectious Disease group based on current available data from the peer-reviewed literature and evidence-based guidelines.
 - Of note, this protocol does not apply to the management of cellulitis, suspected nec. fasciitis, septic patients, etc.!
- B. For outpatients with bedside I&D:
 - No request for labs (ESR, CRP, WBC)!!!
 - Adjunctive Xrays as needed.
 - No i.v. Abx (not even single shot)
 - D/C with wet-to-dry change of dressing and a 5 day course of p.o. Abx, using one of the following 3 options (listed by priorities): Bactrim DS 1 tab p.o. bid
 - In case of Sulfa allergy: Doxycycline 100mg p.o. bid
 - Last option: Clindamycin 450mg p.o. tid
- C. For inpatients admitted for formal I&D in OR:
 - Adjunctive Labs as needed (ESR, CRP, WBC).
 - Initiate i.v. Vancomycin
 - Don't the use Unasyn, Augmentin, etc. due to inadequate antimicrobial spectrum.
- D. ED patients with upper extremity cellulitis:
 - Adjunctive Labs as needed (ESR, CRP, WBC).
 - Initiate i.v. antibiotics
 - Can no longer observe in the ED. Must be admitted to the orthopedic service for observation

Surgical Site Infection Prevention

Preoperative Measures for Surgical Site Prevention

Figure 5: Summary of measures implemented or initiated during the preoperative period and related WHO recommendations for the prevention of surgical site infections (see below):

Intraoperative and Postoperative Measures for Surgical Site Infection

Figure 6: Summary of the WHO recommendations for intraoperative and postoperative measures to prevent surgical site infections (see below):

References:

Allegranzi B, Bischoff, de Jonge Stijn, et al. New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective. *Lancet Infect Dis*. 2016;16:e276-87.

Allegranzi B, Zayed B, Bischoff P, et al. New WHO recommendations on the intraoperative and postoperative measures for surgical site infection prevention: an evidence-based global perspective. *Lancet Infect Dis*. 2016;16:e288-303.

Figure 5

Key research question	Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved)	Notes for implementation in low-income and middle-income countries
(1) Perioperative discontinuation of immunosuppressive agents	Should immunosuppressive agents be discontinued perioperatively and does this affect the incidence of SSI?	Conditional recommendation (very low)	To be applied in patients on immunosuppressive medication only; not resource demanding
(2) Enhanced nutritional support	In surgical patients, should enhanced nutritional support be used for the prevention of SSIs?	Conditional recommendation (very low)	Additional costs involved; need for pharmacy and dietitian support; staff training; limited product availability
(3) Preoperative bathing	Is preoperative bathing using an antiseptic soap more effective in reducing the incidence of SSIs in surgical patients compared with bathing with plain soap; and are CHG-impregnated cloths more effective than bathing with antiseptic soap?†	Conditional recommendation (moderate)	Availability of and access to clean water may be limited in rural areas; antimicrobial soap may be an additional cost for the health-care facility or patients
(4) Decolonisation with mupirocin ointment with or without CHG bodywash in nasal carriers of <i>Staphylococcus aureus</i> undergoing cardiothoracic and orthopaedic surgery	Is mupirocin nasal ointment in combination with or without a CHG bodywash effective in reducing the number of <i>S aureus</i> infections in nasal carriers undergoing cardiothoracic and orthopaedic surgery?	Strong recommendation (moderate)	Evidence of cost-effectiveness in high-income countries; nasal mupirocin ointment availability is low and is an additional cost for the health-care facility or patients; requires technical laboratory capacity and extra resources for the screening process
(5) Decolonisation with mupirocin ointment with or without CHG bodywash in nasal carriers of <i>S aureus</i> undergoing other types of surgery	Is mupirocin nasal ointment in combination with or without a CHG bodywash effective in reducing the number of <i>S aureus</i> infections in nasal carriers undergoing other types of surgery?	Conditional recommendation (moderate)	Nasal mupirocin ointment availability is low and is an additional cost for the health-care facility or patients; requires technical laboratory capacity and extra resources for the screening process
(6) MBP with the use of oral antibiotics	Is MBP combined with oral antibiotics effective for the prevention of SSI in colorectal surgery?	Conditional recommendation (moderate)	It may require organisational resources for appropriate administration and possible additional costs; the oral antibiotics commonly used for MBP are inexpensive

(Table continues on next page)

Key research question	Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved)	Notes for implementation in low-income and middle-income countries
(Continued from previous page)			
(7) MBP without the use of oral antibiotics for the prevention of SSI in colorectal surgery?	MBP alone (without the administration of oral antibiotics) should not be used in adult patients undergoing elective colorectal surgery	Strong recommendation (moderate)	It may require organisational resources for appropriate administration and possible additional costs; the oral antibiotics commonly used for MBP are inexpensive
(8) Hair removal	Does hair removal affect the incidence of SSI; and what method and timing of hair removal is associated with the reduction of SSI? ⁵	Strong recommendation (moderate)	Clipper availability is low and their use is an additional cost for the health-care facility. If reused, appropriate cleaning and decontamination of clipper heads are crucial
(9) Optimal timing for administration of SAP	How does the timing of SAP administration affect the risk of SSI?	Strong recommendation (low)	Cost, feasibility, and equity were not identified as significant issues; however, organisational resources and staff training are needed for implementation
(10) Precise timing for administration of SAP	What is the precise optimal timing?	Strong recommendation (moderate)	Cost, feasibility, and equity were not identified as significant issues; however, organisational resources and staff training are needed for implementation
(11) Surgical hand preparation	What is the most effective type of product for surgical hand preparation to prevent SSI; and what is the most effective technique and the ideal duration of surgical hand preparation?	Strong recommendation (moderate)	Surgery should not take place without surgical hand preparation; evidence of alcohol-based hand rub cost-effectiveness exists, including in low-income and middle-income countries; however, availability of and access to clean water can be poor in rural areas; alcohol-based hand rub availability may also be limited and its use may represent an additional cost to the health-care facility; local production should be encouraged
(12) Surgical site preparation	In surgical patients, should alcohol-based antiseptic or aqueous solutions be used for skin preparation and, more specifically, should CHG or povidone-iodine solutions be used?	Strong recommendation (low to moderate)	Availability of alcohol-based antiseptic solutions based on CHG is low and their use can be an additional cost for the health-care facility; local production should be encouraged
(13) Antimicrobial skin sealants	In surgical patients, should antimicrobial sealants (in addition to standard surgical site skin preparation) versus standard surgical site skin preparation be used for the prevention of SSI?	Conditional recommendation (very low)	Avoidance of unnecessary costs

Figure 6

Key research question	Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved†)	Notes for Implementation in low-income and middle-income countries
(1) Perioperative oxygenation	How safe and effective is the perioperative use of high fraction of inspired oxygen in reducing the risk of SSI?	Adult patients undergoing general anaesthesia with endotracheal intubation for surgical procedures should receive 80% fraction of inspired oxygen intraoperatively and, if feasible, in the immediate postoperative period for 2–6 h	Oxygen availability is low; oxygen and high-flow masks are an additional cost for the health-care facility or patient
(2) Maintaining normal body temperature (normothermia)	In surgical patients, should systemic body warming vs no warming be used for the prevention of SSI?	Warming devices are suggested for use in the operating room and during the surgical procedure for patient body warming	Availability of warming devices is low, particularly in low-resource settings; they are an additional cost for the health-care facility and require maintenance; simple blankets might function as efficiently as electrical devices
(3) Use of protocols for intensive perioperative blood glucose control	Do protocols aiming to maintain optimal perioperative blood glucose concentrations reduce the risk of SSI; and what are the optimal perioperative glucose target concentrations in diabetic and non-diabetic patients?	Protocols are suggested to be used for intensive perioperative blood glucose control for both diabetic and non-diabetic adult patients undergoing surgical procedures	Monitoring blood glucose adequately and treating hypoglycaemic events might be hard as medical staff training is required; availability, purchase, and storage (refrigerator) of insulin might cause financial burden
(4) Maintenance of adequate circulating volume control (normovolaemia)	Does the use of specific fluid management strategies during surgery affect the incidence of SSI?	Goal-directed fluid therapy is suggested for use intraoperatively	Some types of intravenous fluids might not be available; expertise in anaesthesia and medical staff training are required for the management of goal-directed fluid therapy and are often unavailable
(5) Disposable non-woven vs reusable woven drapes and gowns	Is SSI incidence affected by the use of disposable non-woven drapes and gowns vs reusable, woven drapes and gowns?†	Either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns can be used during surgical operations	Availability of disposable drapes and gowns may be low and costs might cause a high financial burden, whereas labour costs for reprocessing reusable items may be less of an issue; the ecological effect of the additional clinical waste generated by use of single-use drapes and gowns should also be considered
(6) Adhesive incise drapes	Does the use of disposable adhesive incise drapes reduce the risk of SSI?	Plastic adhesive incise drapes with or without antimicrobial properties should not be used	This recommendation avoids inappropriate resource allocation, because plastic adhesive incise drapes (in particular with antimicrobial properties) usually have an increased cost and they are not readily available in low-income and middle-income countries
(7) Wound-protector devices	Does the use of wound-protector devices reduce the incidence of SSI in open abdominal surgery?	Consider the use of wound-protector devices in clean-contaminated, contaminated, and dirty abdominal surgical procedures	Wound-protector device availability is low and it is an additional cost for the health-care facility or patients; staff training is required; conflicting results exist from cost-effectiveness studies
(8) Incisional wound irrigations with an aqueous povidone-iodine solution	Does intraoperative wound irrigation with an aqueous povidone-iodine solution reduce the risk of SSI?	Consider the use of irrigation of the incisional wound with an aqueous povidone-iodine solution before closure, particularly in clean and clean-contaminated wounds	Availability of sterile products might be low; pulse pressure devices are scarce and have high costs, including purchase, waste disposal, procurement, energy, and machine maintenance

(Table continues on next page)

Key research question		Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved†)	Notes for implementation in low-income and middle-income countries
(Continued from previous page)				
(9) Incisional wound irrigation with antibiotics	Does intraoperative wound irrigation with antibiotics reduce the risk of SSI?	Antibiotic incisional wound irrigation before closure should not be used	Conditional recommendation (low)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance
(10) Prophylactic negative-pressure wound therapy	Does prophylactic negative-pressure wound therapy reduce the incidence of SSI compared with the use of conventional dressings?	Prophylactic negative-pressure wound therapy on primarily closed surgical incisions is suggested in high-risk wounds, while taking resources into account	Conditional recommendation (low)	Prophylactic negative-pressure wound therapy device availability is low and is an additional cost for the health-care facility or patients (also because it can prolong hospital stay); however, evidence of cost-effectiveness in gynaecological patients has been shown; could construct a non-portable, locally made device at low cost
(11) Antimicrobial-coated sutures	Are antimicrobial-coated sutures effective to prevent SSI; if yes, when should they be used?	Triclosan-coated sutures are suggested to be used in all types of surgery	Conditional recommendation (moderate)	Antimicrobial-coated suture availability is low and they are an additional cost for the health-care facility or patient
(12) Laminar airflow ventilation systems in the context of the operating room ventilation	Is the use of laminar airflow in the operating room associated with the reduction of overall or deep SSI; does the use of fans or cooling devices increase incidence of SSI; is natural ventilation an acceptable alternative?¶	Laminar airflow ventilation systems should not be used for patients undergoing total arthroplasty surgery	Conditional recommendation (low to very low)	In particular for the construction of future health-care facilities, this recommendation will reduce costs
(13) Antimicrobial prophylaxis in the presence of a drain	In the presence of drains, does prolonged antibiotic prophylaxis prevent SSI?	Perioperative surgical antibiotic prophylaxis should not be continued because of the presence of a wound drain for the purpose of preventing SSI	Conditional recommendation (low)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance
(14) Optimal timing for wound drain removal	When using drains, how long should they be kept in place to minimise SSI as a complication?	The wound drain should be removed when clinically indicated; no evidence was found to make a recommendation on the optimal exact timing	Conditional recommendation (very low)	This recommendation has the potential to reduce costs because of a shortened hospital stay as a result of early drain removal
(15) Wound dressings	In surgical patients, should advanced dressings vs standard sterile wound dressings be used for the prevention of SSI?	No type of advanced dressing should be used over a standard dressing on primarily closed surgical wounds	Conditional recommendation (low)	This recommendation avoids inappropriate resource allocation, because advanced dressings are expensive and poorly available in low-income and middle-income countries
(16) Surgical antibiotic prophylaxis prolongation	Does continued postoperative surgical antibiotic prophylaxis reduce the risk of SSI compared with preoperative and (if necessary) intraoperative prophylaxis only?	Surgical antibiotic prophylaxis administration should not be prolonged after completion of the operation	Strong recommendation (moderate)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance

OR Case Request Procedure

When booking OR cases the table below will give appropriate times to use in the case request. When improper times are placed this prevents proper time coordination of cases and hampers our team from efficiently operating on patients. If an outpatient ankle ORIF is booked for 4 hours then the next patient won't have an OR time until 4 hours after the start of the ankle instead of 60-90 minutes which would be more accurate. Please adhere to the table unless told to do otherwise by your attending.

Procedure	Approx OR Time (min)	Notes
ORIF Ankle (lateral/medial malleolus only)	45-60	
ORIF bimalleolar ankle fracture	60-90	
ORIF trimalleolar ankle fracture	60-90	
Ankle spanning ex-fix	30-45	
Open repair of Achilles tendon	60-90	
Intramedullary Nail Tibia	45-60	
ORIF pilon fracture	90-120	60 if all percutaneous
ORIF tibial plateau	90-120	60 if all percutaneous or 180 if complex
ORIF patella fracture	60-90	
Open patellar tendon repair	45-60	
ORIF clavicle	60-75	
Below Knee Amputation	60-75	
Irrigation and debridement knee	30-45	
Retrograde Intramedullary Nail Femur	60-90	
ORIF distal femur	90-120	
Antegrade Intramedullary Nail Femur	60-75	
Cephalomedullary Nail Subtroch Fracture	90-120	
Cephalomedullary Nail Intertroch Fracture	60-90	
CRPP Femoral Neck Fracture	45-60	
Hip Hemiarthroplasty	90-120	
Percutaneous SI screws	45-60	
Pelvic Column Screws	90-120	
ORIF Anterior Pelvis	90-150	
Supra-acetabular Ex-Fix Pelvis	30-45	
ORIF Acetabulum	90-180	
ORIF distal humerus	120-180	
ORIF distal radius	60-75	
ORIF both bone forearm fracture	60-90	
ORIF olecranon	60	
Carpal tunnel release open	10	
Cubital tunnel release	30	

Ganglion excision	20
Trigger finger release single	10
Trigger finger release multiple	30
Wrist arthroscopy	60

Fracture Conference Teaching Lecture Series

Background:

The Department of Orthopaedics at Denver Health Medical Center runs a daily fracture conference that serves several well-defined purposes:

1. Quality control component
2. Patient safety component
3. Educational component
4. Research component (enrollment of patients in our ongoing prospective studies)

Our fracture conference takes place Mondays, Tuesdays, Thursdays and Fridays from 7am to 8 am.

Structure of the Conference:

> 7:00 am to 7:15 am: Review of all consults that came in through referrals from an outside facility or through our ED (Quality control, educational component and research). Each consult is reviewed and discussed for appropriateness, surgical indication, pearls and pitfalls of such fracture, indications for non surgical treatment and techniques of non surgical treatment

> 7:15 am to 7:30 am: Review of all previous 24 hours fractures postoperative X-rays (Quality control, educational component and research). Each postoperative case is reviewed and reduction and fixation strategies are discussed, alternative treatment options and postoperative protocols.

> 7:30 am to 8:00am: On Mondays we focus on the patient safety component reviewing complications from the previous week (M&M conference). On other days we run the AO foundation educational lecture series on fracture/trauma care covering a 2 months period.

Aim and Objectives of the Lecture Series on Fracture Care:

This lecture series is designed to provide the participant with a fundamental knowledge of operative treatment of fractures according to the AO principles. The four guiding AO principles of fracture fixation are:

1. Anatomic reduction of the fracture fragments, particularly in joint fractures
2. Stable fixation to ensure proper healing of the fracture allowing surrounding tissue to move and strengthen;
3. Atraumatic surgical technique to preserve the blood supply to the bone fragments and soft tissue;
4. Early, pain-free mobilization returning the patient to function as soon as possible. The course covers the concepts of absolute and relative stability, as applied in context, of the soft tissue injury for each limb segment's major fracture types. This course is the foundation for the AONA curriculum, which teaches the surgeon how to manage trauma and trauma reconstruction. The goal of this course is not to advocate the treatment of all fractures by surgical fixation, but rather to help ensure that when surgery is carried out, that it is done properly based upon principles, appropriate preoperative planning, and decision-making. Faculty members deliver the lecture series.

Attendance at Fracture Conference and Feedback/Evaluation:

All residents, fellows (Trauma, hand and joint reconstruction) as well as faculty from our department are encouraged to attend the lecture series. A sign-in sheet is distributed at every lecture and feedback forms are provided to each faculty delivering lectures at the end of each 2 months lecture series for evaluation of quality of delivery and content purposes.

An example of our rolling schedule is attached (September 2017 to February 2018 with date, topic and faculty).

Topics of lectures and questions pertinent to the topics are:

Humeral Shaft Fractures
Biology of Bone Health/Plate Design and Function
Spectrum of Stability
Surgical Reduction Techniques
Proximal Humeral Fractures
Tibial Plateau Fractures
Treatment Algorithms
Soft Tissue Injury and ACS
Tension Band Principles
Ex-Fix/Locked Plating Relative Stability
Ankle Fractures
Fractures of the Tibial Diaphysis
Bridge Plating/IMN Fixation
Open Fractures
Biology of Bone Healing
Principles of Diaphyseal Fractures
Radiation Safety
Distal Radius Fractures
Both Bone Forearm Fractures
Principles of Articular Fractures
Reduction Techniques of Articular Fractures
Pertroch and Intertrochanteric Femur Fractures
Acetabulum Fractures: Radiology Landmarks
Femoral Neck Fractures
How Not To Do AO
Pelvis Fractures: The A, B and C's
Basic Science Principles
QUIZ: All Topics

Denver Health Orthopedics Morbidity and Mortality Conference

- A. Occurs every week on Mondays (except the first Monday of the month)
- Every complication, defined below on the form, is reviewed
- B. All cases should be reported in real time to M&M coordinator via email with "safemail" as the subject of email
- Info should include attending name, patient MRN and complication
- C. Residents should prepare each patients on the M&M list including the grading and possible suggestions for root cause and loop closure which will need to be documented on the form or via an email and subsequently sent back to the M&M coordinator.

Name:		Admitted:	
Ortho M&M:	Ortho Team:	/	
MRN:	FIN:	Trauma #:	
Reported Event:			

I. Status ☐ A. Complication ☐ B. "Near miss" event ☐ C. "No harm" event ☐ D. Death ☐ E. Not a complication ☐ F. Not an Ortho complication II. Specific Complication ☐ A. Postoperative infection ☐ B. Failure of reduction/fixation ☐ C. Misplaced implant ☐ D. Fracture-Nonunion ☐ E. Wound healing issue ☐ F. Failure of flap or replantation ☐ G. Postop bleeding/hematoma ☐ H. Vascular injury ☐ I. Neurologic injury ☐ J. Medical complication ☐ K. DVT/PE ☐ L. Death ☐ M. Other: _____ ☐ N. Missed Injury III. Patient Harm 1. DHMCQSS ☐ QSS 1: "No harm" to patient ☐ QSS 2: "No harm", but increased risk of harm ☐ QSS 3: Harm requiring escalation of care ☐ QSS 4: Harm resulting in prolonged disability ☐ QSS 5: Life threatening or resulting in death IV. Contributing Root Cause ☐ A. Communication ☐ B. Supervision ☐ C. Indication ☐ D. Technique ☐ E. Treatment concept ☐ F. Judgment error ☐ G. Aftercare ☐ H. System issue ☐ I. Patient compliance ☐ J. Patient selection ☐ K. Co-morbidities ☐ L. Injury severity ☐ M. No root cause evident ☐ N. Other: _____	V. Corrective Action ☐ A. Education at QA Conference ☐ B. Guideline/protocol ☐ C. To PI Committee/Peer Review VI. Preventability ☐ 1. Preventable ☐ A. Disease Related ☐ 2. Potentially Preventable ☐ B. Provider-Related ☐ 3. Non-Preventable ☐ C. System-Related ☐ 4. Equivocal VII. Disclosure ☐ A. Occurred ☐ B. Did not occur - Reason: _____ Procedure Start: _____ Heparin Start: _____ Procedure End: _____ Antibiotics Start: _____ Last Heparin: _____ Total Tourniquet Time: _____ Loop Closure Comments: ☐ No deviation from standard of care ☐ See separate dictation ☐ Deferred loop closure to PI Committee 2. Revision Surgery ☐ None ☐ Yes - Planned Return to OR ☐ Yes - Unplanned return to OR
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Definitions:

Complication: Any event that deviates from an anticipated uneventful recovery from illness or surgery

"Near Miss" Event: An unplanned event with the potential of resulting in a preventable injury, which was recognized and aborted in time before inducing patient harm.

"No Harm" Event: An unplanned event which was not recognized or aborted in time, but did not result in patient harm, and did not meet the criteria for the definition of a "true" complication.

Unplanned Return to OR: Any return to the OR for an unanticipated event or complication

Preventable: Expected or unexpected sequela of procedure, disease or injury that is likely to have been prevented or substantially ameliorated by taking appropriate steps.

Non-Preventable: Expected or unexpected sequela for which reasonable and appropriate preventive steps had been taken

Potentially Preventable: Expected or unexpected sequela which had the potential to be prevented or substantially ameliorated.

Confidential Privileged Quality Management Document per C.R.S. § 25-3-109

Dictating Instructions

1. Dial **303-602-2222** or toll free **1-866-249-1553** Internal Extension: **2-2222**
2. Enter your **Denver Health User ID** followed by the # key.
3. Enter the **Work Type** followed by the # key.

2	H&P	14	Consultation
3	Progress Note	15	Outpatient Clinic Note
4	Interim Summary	16	Misc. Report
6	Procedure Note	18	HCG Book Report
10	ED Report	28	EEG
11	Operative Report	30	Ortho Outpatient Encounter
12	Discharge Summary	47	Short Stay Discharge Summary

4. Enter the **Medical Record Number** followed by the # key. Press 2 to dictate.
5. Please remember to dictate Date of Service, Attending Physician, Encounter number.

WHEN FINISHED:

- Press 5 to disconnect, or
- Press 8 to dictate another report

NOTE: Dictation Job ID number will be announced upon pressing 5 or 8.

Please make note of the Job ID# on discharge paperwork for retrieval if necessary.

FOR INFORMATION PLEASE CALL 303-602-8031

LISTEN INSTRUCTIONS

Dial Dictation Line

When prompted, enter your Denver Health User ID followed by the # key
Press * to enter "LISTEN" mode.

When prompted, enter the patient Medical Record Number.

Press 2 to begin listening, press 2 to pause.

Press 8 to skip to next dictation on same patient.

Press 5 to disconnect, or enter next patient MRN.

NOTE: The 2 key is the "PLAY" key in LISTEN mode.

DICTATION/LISTEN KEYPAD

KEY #	FUNCTION
2	DICTATE/PAUSE toggle (beeping tone will indicate pause mode – press 2 to resume dictation). In LISTEN mode, this will activate the playback and stop.
3	Short rewind/playback
4	Fast forward
5	Disconnect (Job Confirmation # playback)
6	STAT/Priority Press after dictation begins
7	Rewind to beginning
8	End current report/begin new (Job Confirmation # playback)
*7	Go to end of dictation
*2	Enter LISTEN mode after entering User ID

Dictating Format

OPERATIVE REPORT

- Dictating Physician Name and #

- PT Name, MR#, HFC#

- Date of Surgery

- Attending Physician

- Additional Physicians Involved

- Pre-Operative Diagnosis

- Post-Operative Diagnosis

- Procedure Performed

- Procedure Description

- Estimated Blood Loss

- Specimens Removed (as applicable)

Frequently Called Numbers

Gray Surgery	461-9970	Rads OD	281-3869	ED Trauma	28100
Blue Surgery	206-6882	CT Tech	24149	ED Med	23397
Purple Surgery	461-9980	IR	24150	ED ESU	23200
Surgery Consult	206-3459	MRI	24123	DECC	23300
Neurosurgery	461-6123	Nuc Med	24124	AUCC	22900
Orthopedic	855-4363	GI Lab	21085		
Spine Pager	206-6743	Social Work	67390	SICU Main	25800
Urology	See on call	SW Weekend	See on call	MICU	21460
OB/GYN	855-8844	PT/OT	27310	PICU	29460
				PEDS	29440
Anesthesia	123-102	Main Lab	25200	L&D	29365
OR Bridge	26016	Chemistry	25242	MB	29280
OR Room 210** ** is Room #	21001 - 21012	Hematology	25243	3SD/PCU	21425
		Microbiology	25205	3B	21420
Pre-op	21030	Pathology	25221	4B	21250
PACU	21020	Cntrl Supply	27999	4A/Psych	26890
		Bed Control	29245	5A	23810
ED Trauma SR	23395			6A	28900
ED Trauma JR	23396	Clinic	27609/27580	7A	27300
ED Medicine JR	23397	Clinic Appt	64949	8A	28800
		Peds Surgery Clinic	28340	9A	28700
Help Desk	63777	PACS	206-3173	CCMF	21700

Denver Health Gold Sign-out:

1. **Monthly schedule:** You get 1 golden weekend per month. The R3 on research rotation will cover Saturday and the Silver R2 will take your Friday night shift.
2. **General structure:**
 - a. **Gold:** Mauffrey & Fellow
 - b. **Silver:** Hak & Iams
 - c. If you are on call with King or Beardmore add patients to your list.
3. **Daily Schedule:**
 - a. **Sunday:** Round on Gold. Touch base with the Silver person to see who is rounding on Hand. If the Hand senior is on call with you, they will round. Conference with attending at 7am and then to OR. On call during the day.
 - i. ***** Order XR's for clinic. You will split the clinic list with your chief and order XR's*****
 - ii. Prepare to present the Gold M&M on Monday. (Staff meetings is on the 1st Monday of the month so typically no M&M). Email complications to: Carri.Cherney@dhha.org
 - iii. Add the poly traumas and consults that need surgeries w/o a plan to the consult folder to be re-presented on Monday.
 - b. **Monday:** Round on Gold. Then, clinic starts at 8:20. See the separate Residents Clinic Cheat Sheet for the particulars. Clinic notes are expected to be completed in 24 hours.
 - i. **Close the loop:** If there is a PCP linked to the chart, clinic "Communication" on the right hand side and send the notes to the PCP.
 - ii. **PT, suture/staple removal orders:** PT order is "P50" if you want PT to see patient in clinic. Place suture/staple removal orders in so the MA get paid!
 - iii. **Close encounter:** When you are finished with your note, go to the level of service box and click "Needs LOS" button and then close the encounter. Put Mauffrey as the co-signer.
 - iv. **Kelly Schmadeke kick ass:** She takes care of an insane amount of stuff behind the curtains. 317-753-7293.
 - c. **Tuesday:** Round on Gold. Conference at 7am, arrive early to setup the board. OR all day. This is your day to pick which room you would like to be in therefore the best opportunity to prep for cases.
 - i. Don't forget to pre-op elective cases. They theoretically should be in pre-op around 6:30.
 - d. **Wednesday:** Round on Gold. No conference. Make sure everyone is tee'd for the OR before you leave for conference. You are expected to be back at 1PM. If cases are still going, jump in the OR.
 - i. **Round on the to-follow list.** I usually get back a little early to do this.

- ii. Print an extra list for your chief and bring to conference.
- e. **Thursday:** Round on gold. Conference at 7am, arrive early to setup the board. There will be lots of consults and post-ops so keep your presentations short and move fast. You are on consults starting at 7am. The intern holds the pager and runs consults by you. This is the Silver resident's day to pick cases. You end up bouncing from OR to OR and it's difficult to predict which cases you will do.
 - i. Don't forget to pre-op elective cases.
- f. **Friday:** Round on gold. Conference at 7am, arrive early to setup the board. You are on call for 24 hours, during the day with the Ortho intern and night with the ED intern. This is the Silver clinic day so you have your pick of cases.
 - i. Don't forget to pre-op elective cases.
 - ii. **Gold weekend signout:** send to Mauffrey, Attending on call, Chief, Silver resident, and intern.
 - iii. Send a text to the Silver resident, attending, and chief in the evening and let them know which cases are added for Saturday.
 - iv. If it's King, Iams, or Beardmore on call, ask them if they are comfortable doing a case before adding it for Saturday. e.g. I had a distal intraarticular femur fracture that had to wait until Monday b/c the attending on call was not comfortable doing it.
 - v. **Dr. Wong** (972-322-2078) is a plastics only attending that is taking Hand call. She will staff and take to the OR any hand soft tissue injury e.g. lacerations, NV injury, tendon lac, infection ect, but will not do any bony work, even if there a fellow on call with her. She is typically on overnight and not the next day. If you have urgent operative cases, you can obs or admit them and talk to the hand attending the next day. If it's emergent e.g. replant I'M NOT SURE???
- g. **Saturday:** Round on Gold. Conference at 7am to go over overnight consults. Go home!!
 - i. Send 4:30 am text to Silver resident and intern with new add-ons and admits
 - ii. Send 6am text to Chief and attending with the cases added on overnight.
 - iii. Figure out which case is going to be first and ask attending for component/bed preference. Communicate this to the OR charge nurse. Don't forget to contact the rep.

4. Expectations in the OR:

- a. **Prepare for cases:** This is very difficult because you will often get shuffled into different rooms and patients will get moved around. Your best bet is to finish rounding around 6am and prep cases in the morning.
- b. Help out and do all that is needed. This means holding hook to doing your own cases. Typically, the senior's will walk you through the simple cases and they will do the more complex ones.
- c. **Expect perfect reductions and fixation.** You are expected to call the attending if you are unable to achieve this.

- d. **Getting patients off the ProFx table:** Disconnect the feet and slide patient proximally before taking the center post out. This prevents falls. Don't remove the post and move patient directly to their bed.
- e. **All pelvic and acetabulum fx need pre-op 3D recons and post op CT & flat plates**
- f. All long bone fractures get flat plates in PACU
- g. Dr. Mauffrey will expect you to talk to patients and family after the surgery. Explain post op course and plan. Other attending typically prefer to talk to the families.

5. House Keeping:

- a. **Adding cases:** Try and get as much detail from the attending as possible.
 - i. Book surgeries for the estimated times that are listed in the resident manual
 - ii. Include in the case request. Table, position, components, XR, and trays
 - iii. Contact the rep.
 - iv. Email Jason and be sure to mark "Contact patient"
 - v. If it's a clinic add-on, let Kelly know and include her on the e-mail as well.
- b. **Follow-up's:**
 - i. OR: Send a follow up email after each case
 - ii. Consults: The R2 is generally responsible for arranging follow-ups. Send the standard e-mail (DH PAV B ORTHO FRONT DESK and CC Beth Hjelle). Dr. Wong's follow up's should go to the gen surg scheduler (Kipenda Ritcherson).
- c. **Operative consults for King, Iams, and Beardmore:** Send these guys a separate email, along with the follow up request. Patient can slip through the cracks or be scheduled too far out.

6. Specific advice from Dr. Mauffrey:

- a. Read the resident book
- b. Do not over prescribe narcotics. Mauffrey is generally okay with NSAIDs
- c. Round with Mauffrey 2x/week in his office.
- d. Please finish all patient conversations with "Is there something else we can do for you today"
- e. PTO notification must be submitted 3 months in advanced to Dr. Mauffrey, as well as Kelly & Beth in clinic so they can cancel your patients.

Orthopedic Trauma Clinic Tips:

Please involve RN Kelly Schmadeke :

- Return to Work /FMLA / Disability paperwork (RN will **make copy** before returning originals).
- Perioperative Wound Vac (NPWT) needed for planned **outpatient** surgery
- Home Health plan of care updates / changes (advancing WB or ROM status, wound care, etc)
- Complex wound assessment / documentation (wound vac application or measurements, etc)
- **Surgery plans, ie. "SCOR" [Surgery Clearance for OR]**
 - o **Lack of Ride / 24 hr Support is typical. Review this need for same-day OR**, along with 12 a.m. NPO, etc. **especially with ED to OR patients**. They can self-pay transport (Uber/cab) IF they also have a responsible party accompanying them. Their support must check-in to surgery with them, or be directly available by phone to prevent OR cancellation.
 - o Relay date of surgery, procedure order/location, and provide RN with a patient sticker. Enter case request in Epic, check box for pre-op Anesthesia visit PRN.
 - o Please also relay to RN if you anticipate need for non-standard post-op visit (1 or 3 week); anticipated post-op obs- or inpatient stay; pre-anesthesia testing visit; NWB status; etc.
 - o RN will review standard pre-operative instructions and schedule their 2-week post-operative clinic visit before they leave clinic.

Please involve SW Daniele Araujo :

- Anticipate 6 months or more disability / time off work
- Respite bed request
- Assistance with Home Care
- Urgent SW needs include APS/CPS, Domestic Violence, Crisis management, respite requests, etc.

Please involve Patient Navigator, Ramiro Godina :

- Medicaid Ride Assistance
- Primary Care Provider connection

Please involve Jan Minifie, PT:

- Assess need for formal therapy
- Assistive device or brace use, etc.
- ROM or WB exercises / Home exercise plan

Please involve Medical Assistant (or RN as back up / complex need):

- cast/splint
- suture/staple removal
- dressing
- follow up visit/print visit summary
- scheduling

White Board

Please communicate the patient's plan of care on the white board (exam room door) upon exiting the room. Adjust flags as needed (see below). Then please enter applicable orders and updates in Epic (Plan > Meds & Orders; Wrap Up > Patient Instructions).

FLAG SYSTEM

Gray- Clean/Empty room

Yellow- **Physical Therapy** Eval in clinic (order "PT50", and ask MA /RN to page Jan PRN.)

Green- Needs **Interpreter**

Orange – Treatment / Check-Out **MA** task

Blue- awaiting **Physician**

Red – **RN** / Surgery **Pre-Op** "SCOR" – Surgery Clearance for OR

EPIC SCHEDULE VIEW

R-click, "Change Provider to Me" or select "Change Prov" button above Schedule if you are seeing a patient listed under another MD's template.

Review Schedule view for Room #; Ortho Status (in X-Ray, etc); Appointment notes.

Bottom of schedule view you can click arrow to show patient snapshot summary report with good info

After Visit Summary (AVS) / Wrap-Up before Patient Check-Out:

We can add education topics such as: Walking Boot, Crutches, RICE Therapy; ORIF or Immobilization Treatment and Care After for variety of different fractures. You can also free-hand any instructions in Patient Instructions box when in Wrap Up tab, and it will print on Visit Summary (so long as you Refresh or back out of tab and return to Wrap Up before RN or HCP prints off AVS)

If you have patients who seem to have trouble learning or retaining info, this is a great option to ensure the message is relayed re their plan of care, restrictions, etc. Instead of repeating yourself verbally in exam room, simply tell RN to please add any specific instructions to the AVS if you do not have time to yourself.

CLOSING THE LOOP

Eventually this will be done automatically... in the mean time, please review REFERRAL column on Schedule view for any (new) patients needing your visit note sent back to referring provider. This is a metric every Attending/clinic specialty is scored on in an attempt to become a Medical Specialty Home (increasing our reimbursement).

Ask RN or see cheat sheet card on some of the computers for assist on how to complete this loop closure.

DEETS DUDE DEETS! (Clinic Notes)

- Treatment / Plan
- WB status (**.weightbearing smartphrase** please! HAK pushed this initiation)
- X-Ray_Bone_on arrival *specify in or out of plaster in Comments (please enter order as well)
- Work Status *please refer patient to Social Work (Daniele Araujo) if out of work 6 mo. or more.

Updates or New Referrals to PT/OT :

- Enter new Ambulatory Referral to PT/OT", switch **Internal** default to **Outgoing**, as needed, and Enter "**Unknown**" as location if patient is willing to locate PT agency of their choice.
- If Outgoing referral, please include info on referral to prevent delays in patient care:
 - o Date of Injury/Surgery, Diagnos(es), Restrictions, WB precautions, Reason(s) or goals for therapy, Start date / Urgency of therapy initiation, any special needs.
- If Internal referral: always let Jan, PT know (for triaging/scheduling purposes).
- Internally we receive more referrals than we can accommodate, so if patient wants to start PT ASAP, they may get in sooner at another agency.

INSTRUMENTS

Please do NOT place any instruments that came out of sterile bubble packaging in exam room Sharps containers. We will sterilize and re-use them. There are small red Biohazard boxes to place supplies in and transfer to Soiled Utility room (when in doubt; MA or RN can assist)

XRAY ORDERS

Please scrub the schedule 1-2 days ahead and enter appropriate XR orders ahead of trauma clinic. Please prep your personal template AND the Attending template(s). Coordinate w/ other Resident PRN.

Please always enter XR order for next follow-up visit while writing current note / diagnosis. It is much quicker and easier to enter necessary XR details and Associate Diagnosis when patient is fresh in your mind.

Other Orders to enter during clinic:

- Any future Imaging or Procedure (O.R. case request; XR/MRI/C T; IR Consult)
- STAT Ultrasound - DVT V (then let HCP or RN know so we can coordinate)
- Cast Application and/or Removal
- Suture (Staple) Removal (if surgery was done OUTSIDE of Denver Health)
- DME / PT / OT Needs
 - o Enter "PT50" for any patient you want to see our in-clinic Physical Therapist, Jan Minifie.
 - o DME: Review with patient - check with insurance for coverage regarding scripts given.
- Medication (Refills)

- Consult or Referral to Non-Ortho Specialty Team/MD (Medical Rehab [PM+R]; General Surgery; etc)
- ED to OR Patients (s/p Fracture Conference)
- Please document a “Telephone Call”, or “Documentation” encounter in Epic when you speak to patients via phone, especially regarding updates in their plan of care. Please also review the *Encounter tab* for any future scheduled Ortho clinic visits, as patients may need their clinic visit re-scheduled to another date upon change in Surgery plans.
- ED or Inpatient Consults / Discharges
- Before signing off & sending a message to schedule Ortho follow-up, please review the patient’s banner in Epic and confirm a valid phone number is documented. Without this, we cannot contact patient to schedule appointment or surgery. If the patient does not have a phone, or anticipates phone issues, check Demographics tab for valid emergency contact and ph# listing.

THE “FAVER” APPROACH: RESPONDING TO INAPPROPRIATE PATIENT REQUESTS

F	Name your <i>feelings</i> about the patient’s request — anger, fear, sadness, annoyance, etc.
A	Analyze your thoughts about the request and what is fueling your feelings. Would fulfilling this request be: ▪ Poor medical care? ▪ Illegal, dishonest, or against policy?
V	View the patient in the best possible light. Don’t assume the patient knows that what he or she is requesting is “wrong.”
E	Explicitly state that the requested action would be: ▪ Poor medical care, ▪ Illegal, dishonest, or against policy.
R	Reestablish rapport. Use empathy and “I wish ...” statements.

What to say when the request is:

Poor care	"It would be poor care for me to prescribe that medicine. You do not come to see me for poor care. You come to see me for my best medical judgment."
	"It would be poor care for me to do X. Good care would be Y."
	"I understand that Dr. X has given that to you in the past. Doctors do not always agree. You come to see me for my best medical opinion, and I believe it would not be good care for you to take X."
Illegal, dishonest, or against policy	"I understand why you want to avoid jury duty. I wish I could help you, but it would be illegal for me to state things that are not true."
	"We could both end up in jail if we do X."
	"I am sorry you were not aware of those rules. We still have to follow them."

What to do or say when a patient threatens to:

Harm you or your staff	Consult your practice policy. Assess the immediacy of the threat. When safe, dismiss the patient from the practice.
Report you	"Even if you report me, I will not do what I believe is bad for you."
Leave your practice	"I will be sorry to lose you as a patient; however, I won't deliver poor care to keep you here."



FPM Toolbox To find more practice resources, visit <http://www.aafp.org/fpm/toolbox>.

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