

# FRACTURE MANAGEMENT IN THE PRIMARY CARE SETTING

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## When to Refer to Orthopedics

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# WHO SHOULD BE HERE TODAY?

- Family Practice Providers
  - Can be in the VA or Private practice
    - Can be Physicians
    - Can be Physician Assistants
    - Can be Nurse Practitioners
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# PRIMARY CARE

- The Purpose of this talk today is to consider the process of Adult fracture evaluation and initial management and whether to treat or refer for advanced care.
  - How do we make to process smooth?
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# ORTHOPEDIC RELATED VISITS TO PRIMARY CARE PROVIDERS

- Orthopedic problems are over 10 % of all Primary Care visits.
- 1.6% of all visits to any physician are fracture related.
- 16% of all fracture care is handled by family physicians.
- 70% of all fracture care by Orthopedist

Fracture Management for Primary Care, 2<sup>nd</sup> Edition, 2003

# FRACTURES SEEN BY FAMILY PRACTICE

FRACTURE MANAGEMENT FOR PRIMARY CARE, 2<sup>ND</sup> EDITION, 2003

Fracture	Eiff	Hatch	Alcoff
Finger	17%	18%	12%
Metacarpal	16	7	5
Radius	14	10	16
Toe	9	9	1
Fibula	7	7	7
Metatarsal	6	5	4
Clavicle	5	6	7

# KEEP OR REFER? OBJECTIVES

- Sort fractures by cause and describe by classification.
  - Why the Healing Process is important to us?
  - Acute Fracture Management.
  - The Referral, Treatment Options and Complications of treatment.
  - Review Common fractures
  
  - Words of Wisdom
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# DESCRIBE FRACTURE BY:

- **Cause** – Fracture Secondary to
    - Trauma
      - Macro Trauma – Single incident
      - Micro Trauma – Repetitive incident
    - Pathology - Tumor, Osteoporosis, infection
  - **Classification System**
-

# FRACTURE BY CAUSE

- **Trauma - Macro**                      Single Incident
    - Majority of Fractures – Our talk today
      - Accidental falls
      - MVA
      - Sports injury or Work injury,
      - Physical Abuse-Adult/Child
      - Military wartime gunshot/ explosion injuries
-



# FRACTURE BY CAUSE

- **Trauma - Micro**                      Repetitive Incident
- Stress Fracture                      Mostly Legs/Feet

runners, military marches.

Calcaneus, fibula, talus, navicular, with metatarsal bones being the most common.

# FRACTURE BY CAUSE

- **Pathology**

- Tumor, Osteoporosis, Infection, Charcot (painless)
    - Fracture with low energy incident
    - Patient may have pain to the area before fracture occurs.
    - Patient may not have pain, but foot looks swollen and red.
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# FRACTURE

## CLASSIFICATION/DESCRIPTION

- Open vs closed fracture
  - Anatomic location of fracture (distal, mid, proximal) and if fracture is intra-articular
  - Fracture line pattern (transverse, oblique, spiral, comminuted)
  - Relationship of fracture fragments (angulation, displacement, dislocation)
  - Neurovascular status
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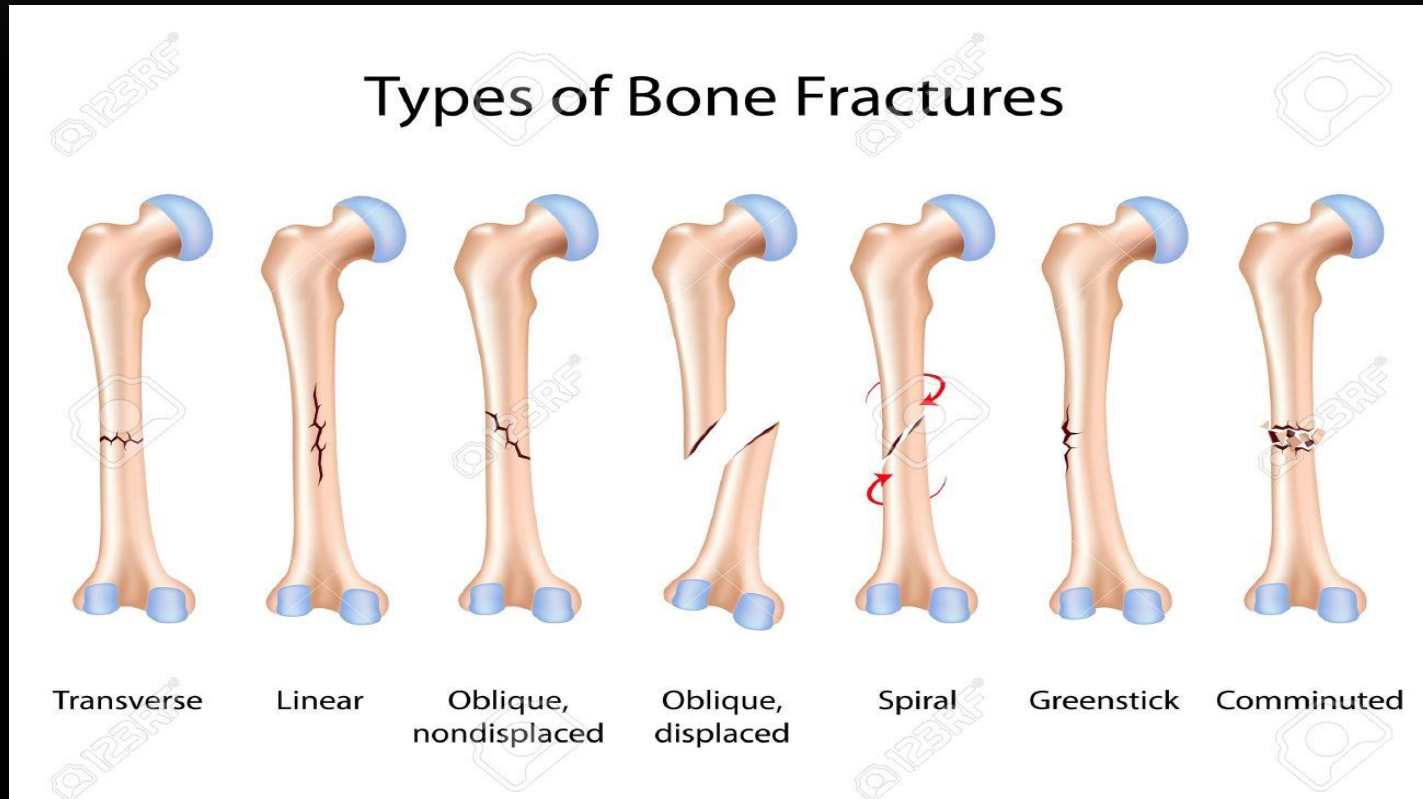
# FRACTURE CLASSIFICATION

Open versus closed

# FRACTURE CLASSIFICATION

- **Anatomic Location of fracture-**
  - which bone involved and location on bone
    - \*Rule of 3rds
    - \*Distal or proximal
    - \*Intra articular or extra articular
    - \*Diaphysis, Metaphysis, Epiphysis

# FRACTURE CLASSIFICATION



# FRACTURE CLASSIFICATION

## Fracture Line Pattern and force

- Oblique- other than 90 angle
- Transverse – 90 degree angle
- Spiral- twisting
- Green stick - 90 degree (child)
- Comminuted – longitudinal
- Segmental –
- Avulsion – by ligament or tendon

# FRACTURE CLASSIFICATION

## Types of Bone Fractures



Transverse



Linear



Oblique,  
nondisplaced



Oblique,  
displaced



Spiral



Greenstick



Comminuted

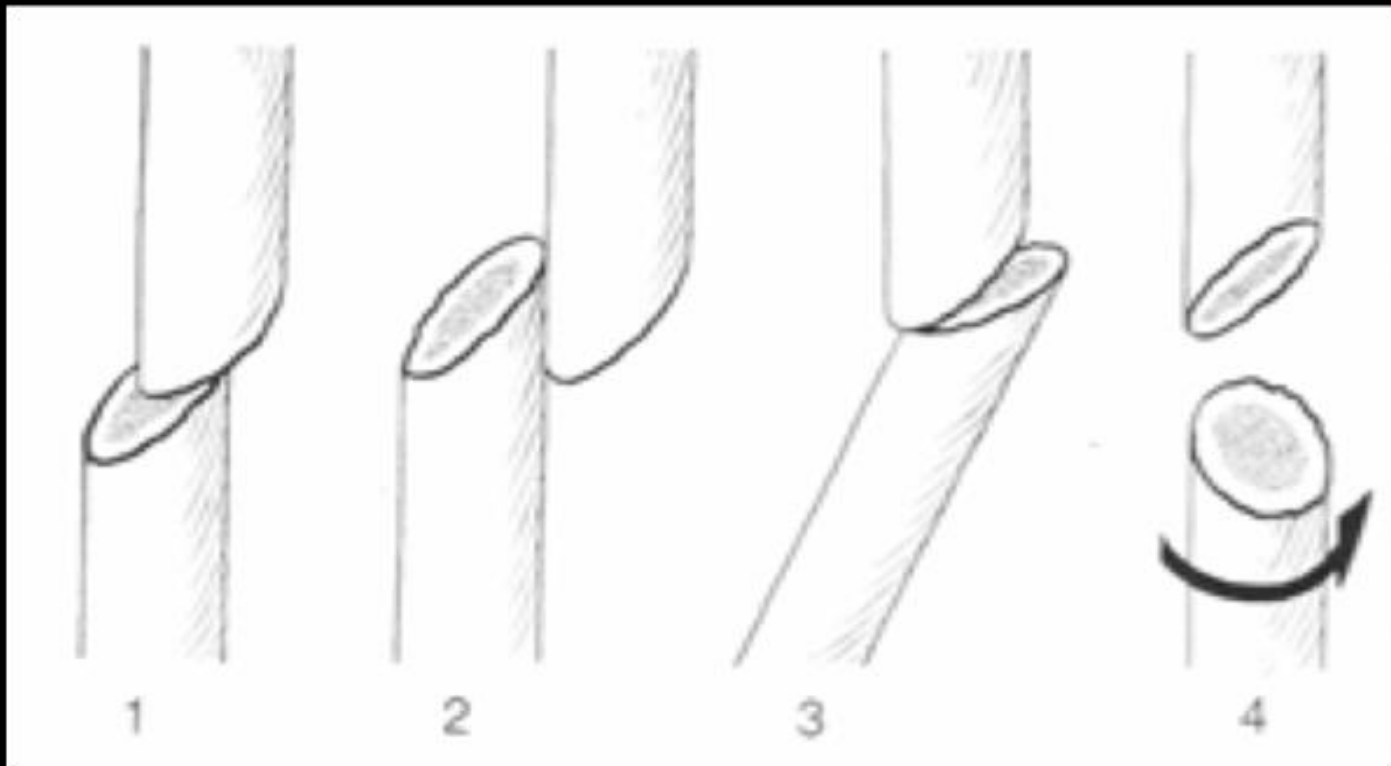


# FRACTURE CLASSIFICATION

- **Displacement** –
  - How much bone pieces have moved
    - Describe by the distal fragment to the proximal fragment
    - **Translation** – percentage of side ways movement compared to bone diameter – anterior , posterior, medial, lateral (Apposition)

# FRACTURE CLASSIFICATION

## DISPLACEMENT

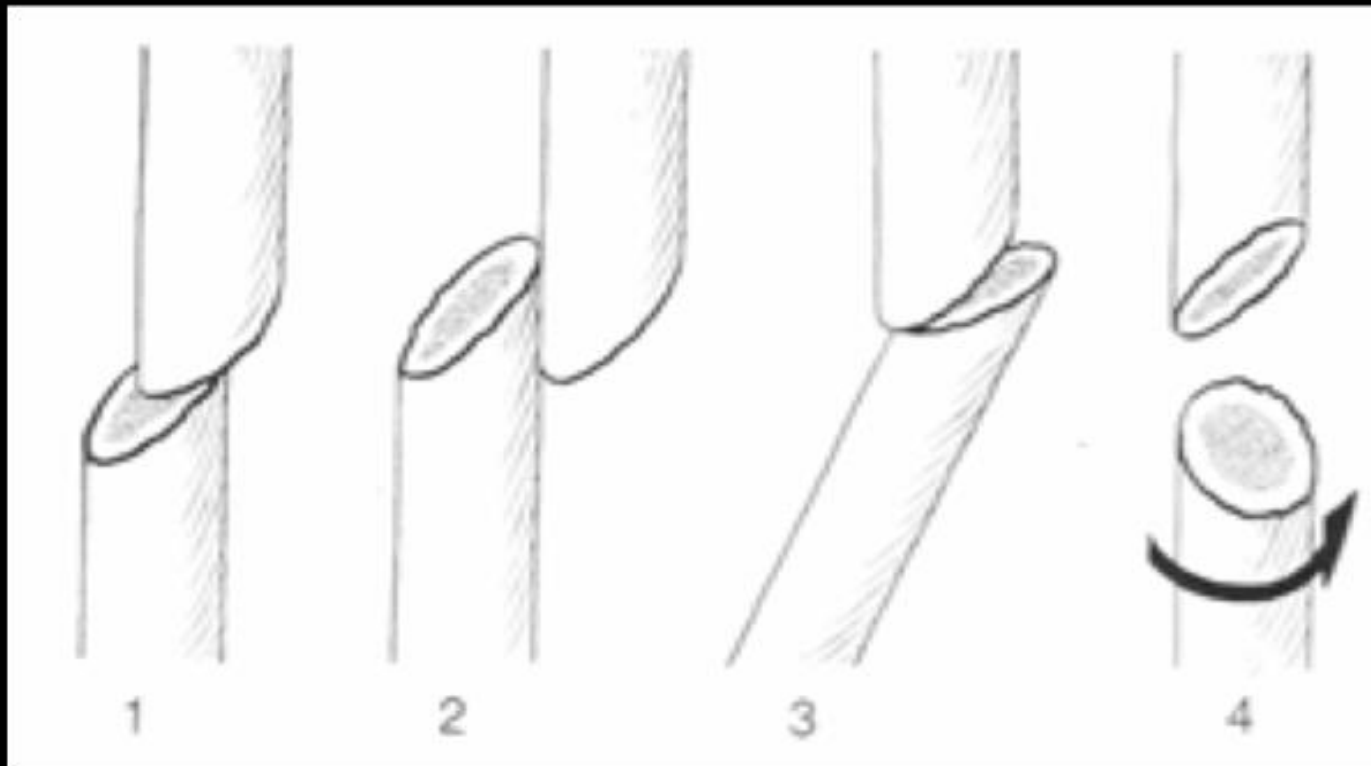


# FRACTURE CLASSIFICATION

- **Displacement**
  - **Shortening** – Amount the fracture is collapsed in Centimeters ( bayonet)
  - **Angulation** –Apex of the Angle - medial/lateral, anterior/posterior. Direction distal fragment- Varus/valgus. Wrist/hand fractures use volar/dorsal and ulnar/radial.
  - **Rotation** - for long bone and fingers

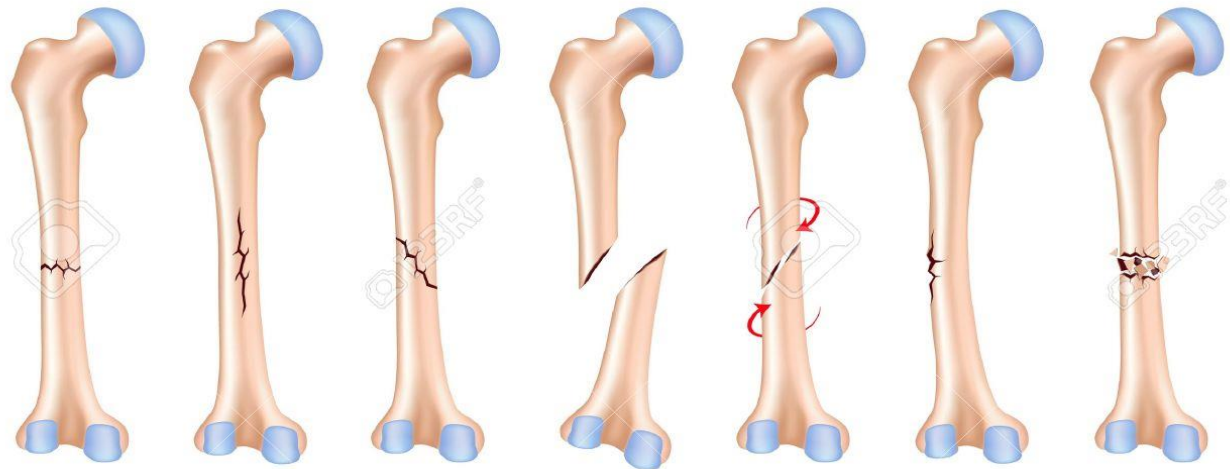
# FRACTURE CLASSIFICATION

## DISPLACEMENT



# FRACTURE CLASSIFICATION

## Types of Bone Fractures



Transverse

Linear

Oblique,  
nondisplaced

Oblique,  
displaced

Spiral

Greenstick

Comminuted

# FRACTURE CLASSIFICATION

- Being able to accurately describe the fracture helps the referral process.
- Closed mid shaft extra-articular transverse non-displaced right femur fracture

# BONE HEALING PROCESS

- **Primary** – healing without callus as with surgery with rigid fixation with plates and screws where the bone ends are abutted.
- **Secondary** – Healing with callus when there is no rigid fixation of the fractured bone ends non-surgically as with casts and splints, fracture braces, or surgically as with external fixation, bridge plates and intramedullary nailing.

# BONE HEALING PROCESS

- Healing includes
    - a Hematoma/inflammatory phase,
    - a reparative phase with callus, and
    - a remodeling phase
  - The Phases are not distinct, they overlap
-



# BONE HEALING PROCESS

- Inflammatory Phase with Hematoma
    - starts immediately
    - shortest of the 3 phases –  
total time - about 2 weeks
    - Strength at fracture site is the weakest
    - Best time to surgically reduce the fracture.
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# BONE HEALING PROCESS

- Repair Phase
    - by 2-3 weeks after injury
    - Soft callus – primarily cartilage
    - Hard callus – bone replaces the cartilage
    - Fracture strength is more than the inflammatory phase but not as strong as normal bone.
    - Clinical healing occurs with lack of fracture movement with pain relief and with radiographic healing changes.
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# BONE HEALING PROCESS

- Remodeling Phase

woven bone replaced by lamellar bone,  
excess callus reabsorbed

- Starts about 6 weeks post injury, can last several years.
  - This is when the fracture healing will be the strongest.
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# BONE HEALING PROCESS

## Factors affecting Bone Healing

- Age
  - Hormone balance and nutrition
  - Medications – NSAIDS, corticosteroids, ABX
  - Smoking
  - Diabetes
  - Weight bearing
  - Patient non-compliance of above.
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# BONE HEALING PROCESS

- What may improve bone healing
    - Encourage Patient Compliance
    - Balanced diet with sufficient Vitamin D3, Calcium and protein intake.
    - Reduce or eliminate smoking and alcohol while healing.
    - Avoid NSAIDS, study results mixed.
    - Bone stimulators using electromagnetics or ultrasound. Results are mixed.
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# BONE HEALING PROCESS

## Why discuss the Bone Healing Process

- You can tell your patients that
    - Most Fractures heal in about 8 weeks
    - 3 months before they feel normal
    - Up to a year for swelling to resolve
  - Surgery best done as close to 2 weeks as possible.
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# ACUTE FRACTURE MANAGEMENT

- **Initial Assessment –**
    - DON'T HAVE TUNNEL VISION, LOOK AT THE WHOLE PATIENT!
    - History
      - Mechanism of Injury (MOI)
      - Other injuries besides the obvious
      - Previous injuries of the affected side
      - PMHX, Medications and Allergies
-

# ACUTE FRACTURE MANAGEMENT

- **Initial Assessment**
  - Physical Exam - TOUCH THE PATIENT!
    - ABCs – Life threatening issues
    - Neurovascular status, skin breaks
    - Palpate the entire bone and joints above and below the fracture site for tenderness.
    - Mechanism of Injury(MOI) dictates what x-rays to order.



# ACUTE FRACTURE MANAGEMENT

- Radiographic Studies:
    - LOOK AT THE XRAYs YOURSELF!
    - DON'T WAIT FOR THE REPORT. LEARN TO READ X-RAYS!
    - If unsure, call the radiologist or Orthopedics if in the VA system to review online with them.
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# ACUTE FRACTURE MANAGEMENT

- **Radiographic Studies:**
    - Do at least 2 x-rays of the fracture that differ by 90 degrees.
    - Include the entire bone unless the physical exam eliminates the need.
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# ACUTE FRACTURE MANAGEMENT

- **Radiographic Studies:**
  - Get more x-rays if exam suggests fracture even with normal exam.
  - Reserve CT scans and MRIs for the specialist to use for fracture status or surgery planning.

# ACUTE FRACTURE MANAGEMENT

- **Treatment** – regardless if you keep or refer
  - Immobilize acute fractures with a splint
    - stabilize fracture position,
    - protect blood vessels, nerves and muscles
    - provide pain relief.
  - Provide Initial Fracture treatment with
    - Analgesia – avoid NSAIDS, use Acetaminophen
    - Elevation and Ice – to avoid swelling.
    - Keep or refer

# ACUTE FRACTURE MANAGEMENT

- **Splinting**
    - Check neurovascular before / after splint
    - Apply dressing over skin breaks
    - Apply padding
    - Immobilize joint above and below fracture
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# ACUTE FRACTURE MANAGEMENT

- **Other conservative treatment and support options –**
    - casting, braces (hard soled shoes, fracture boots, wrist braces, Sarmiento brace)
    - Support fractures with slings(standard and cuff and collar), crutches(standard and forearm), wheel chairs with leg elevators, walker
    - Don't send patients away without proper support.
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# ACUTE FRACTURE MANAGEMENT

- **Supplies for Splinting**
  - Plaster gauze, fiber glass-backed padded roll Plus Stockinet sleeve, roll padding, tape, bandage scissors, water basin w room temperature water, Non-vinyl gloves and elastic bandages.

# ACUTE FRACTURE MANAGEMENT

- **Complications of Casts or Splints**
    - Compartment syndrome
    - Ischemia
    - Heat injuries
    - Pressure sores and skin breakdown
    - Infections, Dermatitis
    - Joint Stiffness and Neurologic injury.
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# ACUTE FRACTURE MANAGEMENT

- **Advantages of splinting**
    - Faster, easier to apply, allows for swelling, minimizes pressure complications.
    - Are easier to remove than cast for exam
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# ACUTE FRACTURE MANAGEMENT

- **Disadvantages of splinting**
    - Patients can remove
    - Unstable fractures not as immobilized.
    - Splints good for initial treatment but not good for definitive care.
    - Splints have high risk of complication if not applied correctly.
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# ACUTE FRACTURE MANAGEMENT

- Casts provide better immobilization but require training and skill to minimize complications.
  - BEFORE YOU APPLY CASTS OR SPLINTS BECOME TRAINED.
  - YOUR PATIENT WILL BENEFIT AND THE TIME AND MONEY WILL BE WELL SPENT.
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# REFERRAL DECISIONS

## Why refer?

- + Patient injury beyond provider experience.
- + complicated fractures
- + non-compliant patients

# REFERRAL DECISIONS

- Referral : When?
  - immediate – Now!
  - Within the week
  - Discuss with referring Orthopedist
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# REFERRAL DECISIONS

- Urgent referral – immediate – NOW!
- May Need Ambulance to the ER.  
Most patients will be seen in the  
Emergency Room.  
BUT don't be surprised by what walks  
in your office front door!
- Why by Ambulance?
  - For patient condition
  - For condition of Family/ Driver

# REFERRAL DECISIONS

## Urgent referral – immediate

- Significant soft tissue injury
- Life threatening injuries – hemorrhage, fat or pulmonary embolism, gas gangrene, tetanus.
- Arterial or Nerve injury
- Open fractures

# REFERRAL DECISIONS

- Urgent Referrals – Ambulance to ER
  - Compartment Syndrome – elevated pressures in rigid fascial muscle compartments.
  - 5 Ps – pain, pallor, paresthesia, **paralysis, pulseless – Late sign**
  - Tenting of skin - concern for open fracture



# REFERRAL DECISIONS

- Urgent Referral Ambulance to ER?
  - Complicated Fractures to refer
    - Fractures needing to reduce
    - Multiple Fractures
    - Intra articular fractures
    - Fracture Dislocations
    - Epiphyseal plate fractures
    - Fractures with tendon injuries

# THE REFERRAL

- When you have decided to refer to an orthopedist,
  - Learn the process to refer within the VA.
  - If outside of the VA, learn the referral process in your community. Get to know the orthopedists that you refer to.
  - Have the information gathered in your exam including history, medications, allergies, exam finding and changes, imaging CD and report and last I/O.

# IF YOU KEEP YOUR PATIENT

- Stabilize the fracture with a splint
  - Provide a written explanation of fracture care to patient including care of splint, use of ice, elevation, pain medication and avoidance of smoking and alcohol
  - Advise patient to look for sudden changes in pain, sensation loss and swelling and know who to call with questions.
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# IF YOU KEEP YOUR PATIENT

- Situations change, if you have to refer, explain why to the patient.
  - Consider braces, buddy taping, hard soled shoes, fracture boots.
  - Don't forget support appliances - slings, crutches, wheel chairs, knee walkers.
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# IF YOU KEEP YOUR PATIENT

- Schedule a Follow up in a week with x-rays
  - Consider cast if swelling under control.
  - Future follow up visit can be in 2 to 4 weeks if fracture is stable and patient is compliant.
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# IF YOU KEEP YOUR PATIENT

- Discuss rehabilitation as part of the process.
  - Get to know your local VA Therapy department. **Central vs CBOC Therapy.**
    - OR
  - the Therapists in your area for Veterans with the Choice Program or if you are a Non VA provider.
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# IF YOU KEEP YOUR PATIENT OR NOT

- Treat Fractures according to your level of experience.
  - Remember, whether you Keep or Refer your patient, you are NOT alone.
  - Please contact the Orthopedics Department in the VA with questions. **Central or CBOC.**
  - Or Contact your local referral Orthopedist if unsure how to proceed.
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# THE REFERRAL

- **Don't forget the patient!**
  - Explain that you are referring him/her to an orthopedist to be evaluated for further treatment that may require surgery.
  - While transport to an orthopedist's office do not require ambulance transport, urgent patients transported to an ER may.
  - Your Orthopedist should provide guidance.
-



# COMMON FRACTURES

- **Clavicle Fracture**
  - Usually safe if mid clavicular shaft fracture
  - Lateral and medial shaft: concerning
  - Treat with sling and pain control
  - Consult if lateral or medial shaft fracture
    - Within a week
  - Consult if nonunion for surgery evaluation
    - With 12 to 16 weeks
  - Heals in 4 weeks, immobilize for 6 weeks

# CLAVICLE FRACTURE



# COMMON FRACTURES

- **Distal Radius**
  - Non/Min displaced
    - Splint/cast for 6-8 weeks
    - Follow up in 1 week for x-ray and cast
  - Displaced
    - Check Neuro/Vasc status – median nerve
    - Splint and refer within the 1<sup>st</sup> week.
    - Acute Carpal Tunnel Syndrome – emergency
    - Can also present late in healing process.
  - Healing 6 weeks Immobilize 6 weeks

# DISTAL RADIUS FRACTURE



# COMMON FRACTURES

- **Scaphoid Fracture** - Most common carpal fracture
  - Pain to snuff box with negative x-rays
  - thumb spica splint, x-ray in 10-14 days
  - If fracture on initial x-ray or follow up
    - Refer to Orthopedist even if still painful with negative x-rays. Consider CT or MRI.
  - Healing 8 weeks Immobilize - 12 weeks

# SCAPHOID FRACTURE



# COMMON FRACTURES

- **Metacarpal Fracture**
  - No significant angulation, dislocation or rotation
    - Splint with MCP joint at 70-90 degrees and fingers PIP/DIP joints flexed at 5-10 degrees
    - Transition to buddy taped fingers
  - With angulation, dislocation or rotation
    - Splint and refer for possible surgery
  - Heals in 5 weeks, splint 4 weeks then buddy tape for 2 weeks

# METACARPAL FRACTURES





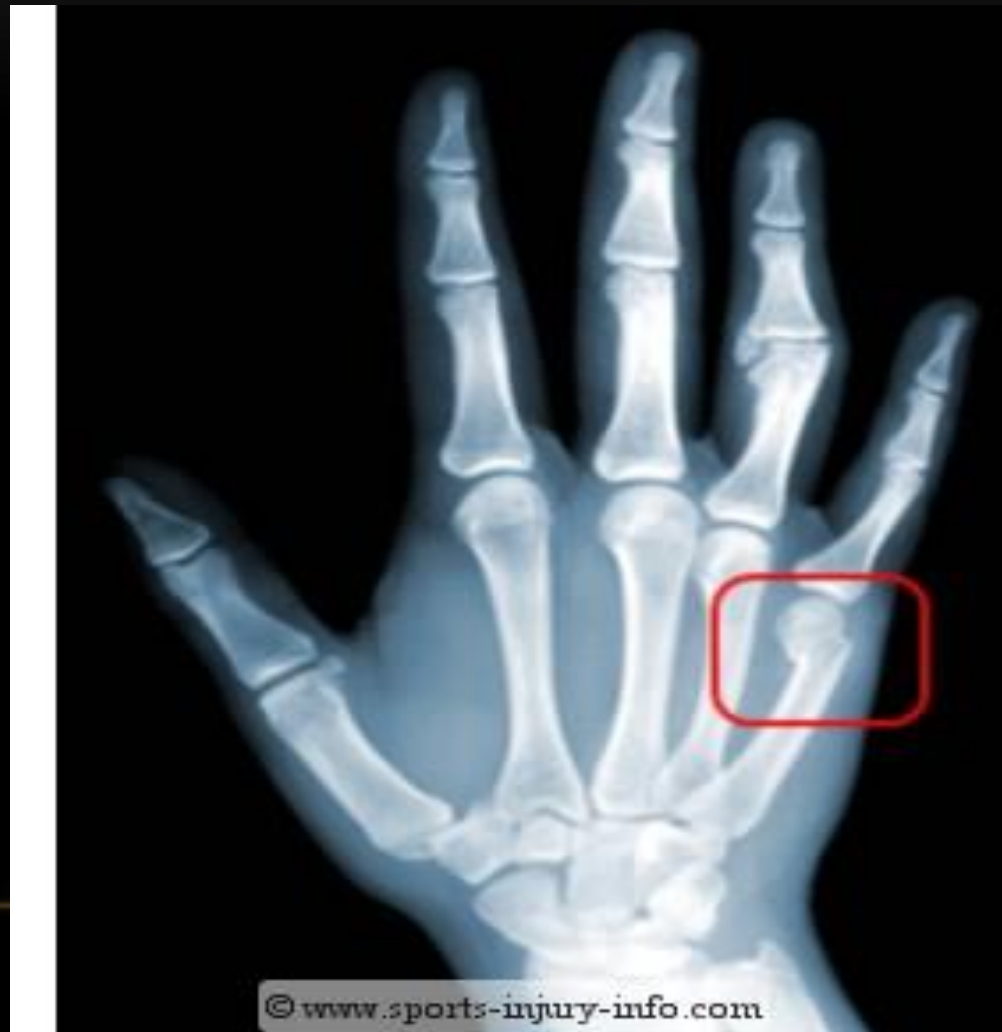
# COMMON FRACTURES

- Judging rotation for finger or Metacarpal fractures
    - Have patient slowly close fingers on both hand and compare.
    - Fingers should point to same spot of distal radius and should not overlap
-

# COMMON FRACTURES

- **Boxer's Fracture** – 5<sup>th</sup> Metacarpal fracture
  - Check rotation and fracture angle
  - Check for teeth marks and treat with
    - antibiotics if appropriate
    - Splint with ulnar gutter splint
  - With angulation, dislocation or rotation
    - Splint and refer for possible surgery
  - Heals in 5 weeks, splint 4 weeks then buddy tape for 2 weeks

# BOXER'S FRACTURE



# COMMON FRACTURES

- **Phalanx Fracture**
  - Check shaft – refer if rotation
  - Check joints – refer if displacement/ fx
  - Check Avulsion – refer
  - Splint in position to minimize tension on ligaments and tendons.
  - Refer hand fractures within 1 week for surgical evaluation
  - Healing of nondisplaced fracture  
4 weeks, immobilize for 3-4 weeks then buddy tape for 2-3 more weeks.

# PHALANX FRACTURE



# COMMON FRACTURES

- **Metatarsal / Phalange fractures** (Toes)
- Keep
  - Minimal/non displaced fractures
  - Short leg cast NWB Metatarsal fx
  - Fracture boot/hard sole shoe, buddy tape, WBAT, Toe fx
  - Toe heals 4 weeks immobilize 6 weeks
  - Metatarsal heals 6 weeks, immobilize 6

# METATARSAL FRACTURE



# SMALL TOE FRACTURE





# COMMON FRACTURES

- Metatarsal / Phalange fractures
- Refer
  - Lis Franc Injury, Jones Fracture
  - Displaced Metatarsal shaft fracture
  - Intra-articular fracture
  - Multiple fractures
  - Apply short leg splint NWB
  - Refer in a week

# LIS FRANC INJURY



# JONES FRACTURE

M / 43 years



# METATARSAL FRACTURES



# OTHER FRACTURES

- Refer the remainder of these fractures after initial evaluation, immobilization NWB and Immediate Orthopedic consult. Your Orthopedist will advise.
  - Calcaneus and Talus
  - Tibia Shaft
  - Femoral Shaft
  - Hip Fracture
  - Humerus
  - Ankle
-

# AND IF UNSURE

- Remember these Words of Advice.



# REFERENCES

- Eiff MP, et al. Fracture management for Primary Care, 2<sup>nd</sup> edition. Saunders. 2003.
- Anne S Boyd, MD, Holly J Benjamin, MD, Chad Asplund, Maj, MC, USA, Principles of Casting and Splinting, Am Fam Physician. 2009, Jan 1;79(1): 16-22