Bone Fractures

- **Simple** - no disruption of skin
- **Compound** - skin disrupted

**Signs/Symptoms**
- bruising
- pain and tenderness
- deformity and shortening
- angulation
- crepitus
- instability

- Bone injuries can bleed profusely
Neuro-vascular Compromise

• Complication of fractures.
  Nerves and vessels usually run together in flexor surface of major joints

• Femoral Triangle
• From medial to lateral: Lymphatics; Vein; Artery; Nerve

• Checking “PMS”:
  • Pulses
  • Motor function
  • Sensory function
Pulse check sites

- Temporal artery
- Facial artery
- Carotid artery
- Brachial artery
- Radial artery
- Femoral artery
- Popliteal artery
- Posterior tibial artery
- Dorsalis pedis artery
A.V.N. Intertwined Harmony!
The Five “P”s of extremity injury assessment

- **Pain:**
  - location & severity scale
- **Pulse:**
  - presence, absence
- **Paresthesia-**
  - abnormal sensation
- **Paralysis-**
  - from peripheral nerve damage
- **Pallor-**
  - check color, temperature, capillary refill
Manipulating Fractures: Indications

- **Pulseless** extremity
- **Absent** distal sensation
- **Extended** transport time
- **Inability to transport** because of patient position
Sprains and Strains

- **Sprain**: a injury to ligaments (*bone to bone*)
  - pain and tenderness
  - edema
  - discoloration

- **Strain**: injury to tendon or Muscle (*muscle to bone*)
  - acute, tearing pain at onset of injury
  - pain on movement
  - muscle spasm
  - weakness or loss of function
Principles of splinting

- Cut open clothes as necessary to visualize part
- Always evaluate & report “PMS’ before and after splinting
- Can apply gentle traction to severely angulated or pulseless extremity
  - not to exceed 10 pounds of pressure
  - If resistance, splint as it lies
  - can easily lacerate vessel/nerve with bone part
Principles of splinting (cont)

- **Cover open wounds**
  with moist, sterile dressing before splinting.

- Proper splinting involves immobilizing **one joint above**
  and **one joint below the area of injury**
  - Pad splint

- **Cover exposed bone with sterile, moist saline gauze!**

- **Splint en route**
  - with life-threatening injuries

- **Splint before transport** if patient is stable
Pelvic fractures

- Potential for **severe** hemorrhage
  - can lose 2-20 units blood
  - (1 unit PRBC = 300ml x 20 units = 6000ml = 6L)
  - risk for hypovolemia, bladder laceration, internal organ damage

- Treatment
  - Spinal immobilization
  - Rapid transport, IVs en route
  - Pelvic binder system
Pelvic Fracture

“Open Book” pelvic fracture on MRI

“Open Book” Fx on x-ray
Securing device: many types available

T-pod pelvic binder

Binder in place on body
Femur fractures

- Subtle or marked deformity given maturation of Quadriceps
- Risk for
  - Hypovolemia from mod. bleeding into thigh
  - fat embolus (PE evolution)
  - neurological impairment
Treatment for femur fracture

- Traction splint—when more time available
- Either Sager or Hare Traction splint
- With any splinting document Pre & Post distal PMS
Hare Traction Splint
Sager Splint
Indications for a traction splint:

*Long bone fracture of the lower extremity*

- **mid shaft** femur
- OR… **proximal and middle 3rd** of the tibia or fibula with neuro-vascular compromise.
Contraindications of a traction splint:

- Pelvic fracture
- Hip injury
- Knee injury
- Lower 3\textsuperscript{rd} (near ankle) of a lower leg injury
- Ankle and foot fractures
- Distal end of femur fracture
- Partial amputation or avulsion of the leg
- More than one fracture of the same extremity
Hip Fractures

- Especially elderly
  - may not c/o pain
  - check distal pulses/capillary refill
- Shortened limb, Externally rotated limb
- Support knee with pillows
- Backboard
- Can splint legs together with pillow between
Hip dislocation

- Is orthopedic emergency
- Requires reduction to prevent sciatic nerve injury and necrosis
- Prop with pillows in position of comfort
- Can splint with uninjured leg to prevent movement
- Backboard provides rigid stability
- **No traction splint!!**
Shoulder Dislocation

- Presents with deformity, decreased ROM
- Check distal PMS
- Position of comfort
- Splint arm as it lies
- Sling/swathe/pillows
- Ice
- Assess for other injuries
Other injuries

- Knee
  - If pulse absent, may need to straighten leg using gentle in-line traction
  - Proximal Tib /Fib dislocation can sever or occlude popliteal artery.
  - A true surgical emergency with acute distal cyanosis & severe pain

- Clavicle fx
  - deformity over clavicle
  - dropped shoulder (bent forward)
  - sling and swathe
  - ice
Other injuries

- **Elbow injury**-
  - immobilize in injured position with rigid splint
  - ice

- **Upper/lower arm/wrist**
  - splint in position of function
  - remove jewelry
  - ice
  - sling
  - check PMS
Dislocations

- **Symptoms**
  - rigidity or stiff joint
  - deformity of joint
  - pain and swelling
  - common in shoulder, kneecap, fingers

- **Risk for neurovascular compromise**
  - Check for “PMS”
  - before and after splinting
Amputations

- Crushing amputation
  - poor prognosis
- Partial amputation
  - 50% or more severed
  - may bleed profusely
- Complete
  - vessel spasm prevents blood loss
- Degloving
  - skin and adipose torn away
Management of Amputation stump

- Control hemorrhage with direct pressure
  - tourniquet are an option with uncontrolled bleeding
  - note time tourniquet applied
- Elevate stump
- Cover with moist saline, sterile dressing
- Do not complete amputation
  - even if hanging by small tissue piece
  - actually may provide blood flow or innervations
Management of Amputated Part

- Rinse with normal saline
- Wrap with sterile gauze
- Put in plastic bag and seal
- Place bag on ice
- Bring all parts found
- Part may be re-implanted (microsurgery)
- or used for grafts
- Cover proximal end with moist, sterile dressing
SOFT TISSUE INJURY
THE SKIN

- Four major functions of the skin
- Thermoregulation (AV anastamoses)
- Protection (largest Immune organ)
- Secretion (sweat, sebaceous oils)
- Sensory reception
- Touch, pressure, vibration, temperature, pain, wind via mvmt of hair follicles
SOFT TISSUE INJURY

- A disruption in the skin …
- can result in a disturbance in fluid, electrolyte levels, or temperature control.

- Loss of skin integrity provides entry for microorganisms.
  - Infection
SOFT TISSUE INJURY

- Abrasion
- Avulsion
- Degloving
- Contusion
- Laceration
- Puncture
Dramatic De-gloving
Dramatic De-gloving
Surgical approach to repair...dramatic
Questions?
Overuse syndrome

- If you rely on your hands to complete most of your work, you are more prone to overuse. Also repeated use.
- Primarily affects upper extremities & hands.
- Typists, Waiters, using wrenchs, hammers, drills, etc..
- Microtrauma occurs from small soft tissue tearing during overuse.
- Eventually your muscles and tissues become more traumatized and scar tissue can develop resulting in pain and loss of use.
- Treatment involves rest
- Utilize R.I.C.E. mnemonic
- Overuse can be avoided.
Preventing Overuse syndrome

- Conditioning is the key!
- Treat yourself like an athlete.
- Warm up your muscles with stretching exercises before you start your day.
- Take rest breaks after excessive use to repeat stretching exercises.
- After a long day at work, don't just stop using your hands!
- Would you run a marathon and just stop when you got to the finish line?
- You need to gradually cool down your over-worked muscles.
**Pain Assessment**

1. **Principle:**
   - All patients with any complaint of pain shall have an appropriate assessment and pain management.

2. **Guideline:**
   - An accurate and thorough assessment of pain requires that an initial assessment and ongoing assessment be performed and documented.

3. **Measurement of a patient’s pain is subjective; therefore, the patient is the best determinant of the presence and severity of their pain.

4. **Recording a level of pain using a pain scale is the community standard of care and provides health care providers with a baseline against which to compare subsequent evaluations of the patient’s pain.

5. **The pain scales utilized in Los Angeles County are the numeric pain intensity scale and the “facial expression” pain scale.

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### ASSESSMENT

<table>
<thead>
<tr>
<th>Scale/Intensity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Pain</td>
</tr>
<tr>
<td>1</td>
<td>Some Discomfort</td>
</tr>
<tr>
<td>2</td>
<td>Having Discomfort</td>
</tr>
<tr>
<td>3</td>
<td>Mild Pain</td>
</tr>
<tr>
<td>4</td>
<td>Moderate Pain</td>
</tr>
<tr>
<td>5</td>
<td>Severe Pain</td>
</tr>
<tr>
<td>6</td>
<td>Most Severe Pain</td>
</tr>
</tbody>
</table>

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4. Reassessment of the patient’s pain shall be performed frequently and following any treatment and/or pain management. Document the pain scale/intensity in the “medication” section “result” box.
Definition of Pain

- Pain is a **sensory and emotional** experience associated with **actual or potential** tissue injury.

- Pain is a **subjective feeling** of discomfort that is impacted by
  - **Environment**,  
  - **cultural**  
  - and/or **personal factors**.
Current Pain Management Philosophy

- Pain relief may be one of the most important interventions EMS providers can provide for the majority of their patients.
- Pain should be assessed from the patient’s perspective.
- Pain may cause additional stress, which can exacerbate the underlying problem.
- Patients may be easier to manage if pain is treated.
- Pain and pain relief can be measured and quantified in the pre-hospital setting.
Clinical Signs of Pain

- Increased heart rate
- Increased respiratory rate
- Elevated blood pressure
- Facial expressions
- Tears
- Diaphoresis
- Verbal expressions (moaning, etc.)
- And Most importantly…..
All patients with any complaint of pain shall have an appropriate assessment and pain management.
Barriers to Adequate Pain Assessment

- Cognitively impaired patients
- Subjective nature of pain
- Language barriers
- Age related barriers - both ends of the spectrum
- Intensity of pain
- Cultural diversity
- Behavioral responses to pain
- “Short” transport times
- Machismo/stoic patients
Assessment of Pain

- **O – Onset**
  (What were you doing when the pain began?)
- **P – Provokes**
  (What makes the pain worse or better?)
- **Q – Quality** (What does the pain feel like?)
- **R – Radiating**
  (Where does it hurt and does it move?)
- **S – Severity**
  (Can you rate your pain on a scale of 1-10?)
- **T – Time** (How long have you had the pain?)
Medical Control Guideline
Pain Assessment Scales

- Numeric pain intensity scale
- Facial expression pain scale
Pain Management Interventions

- Splinting the injured limb
- Positioning
- Cooling (cold pack)
- Distracting measures
- Reassurance
- Medication
Who Should Receive Pain Medication

- Patients who have…
- an isolated traumatic extremity injury,
- burn,
- fractured hip,
- or chief complaint of pain.
- **Caution** with:
  - Head injuries (complicates LOC eval)
  - Multisystem trauma (contributes to hypotension)
  - Labor (decreases contractions, depresses RR in neonate)
  - Abdominal pain (can mask diagnostic symptoms)
  - Elderly (magnified responses)
Morphine Pain Management

Adults:

- **IV Dosage**: 2-10 mg slow IVP titrated to pain relief. May repeat to a max dose of 20mg.
- **IM Dosage**: 10mg IM one time dose.

IV is the recommended route.

*If unable to start an IV or patient does not require IV, IM is an option.*
Morphine Contraindications

- Respiratory rate < 12 per minute
- Allergy to MS
- Altered level of consciousness
- Hypovolemia/suspected volume depletion

Use with caution if systolic BP < 100
The End