Musculo-skeletal Injuries

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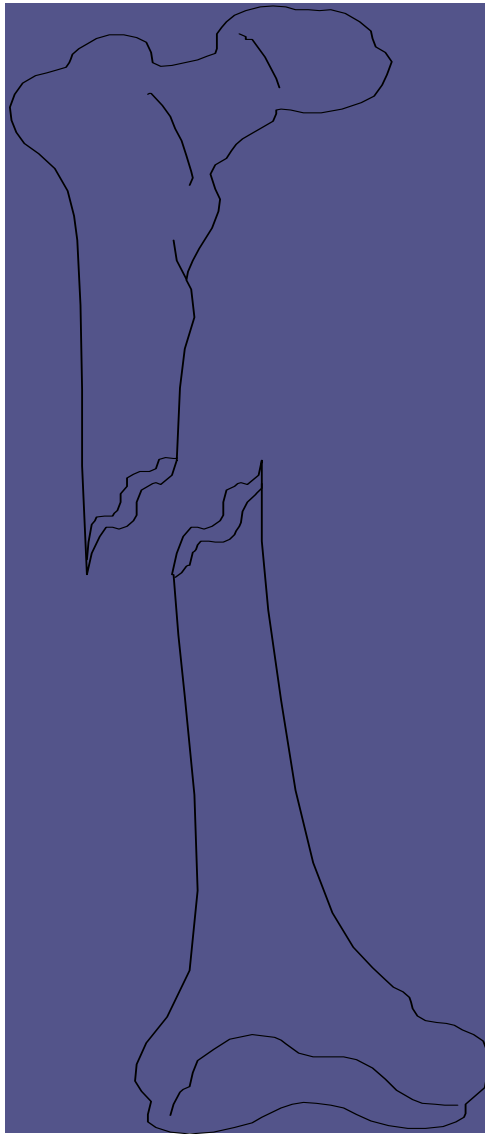
Bone Fractures

- **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

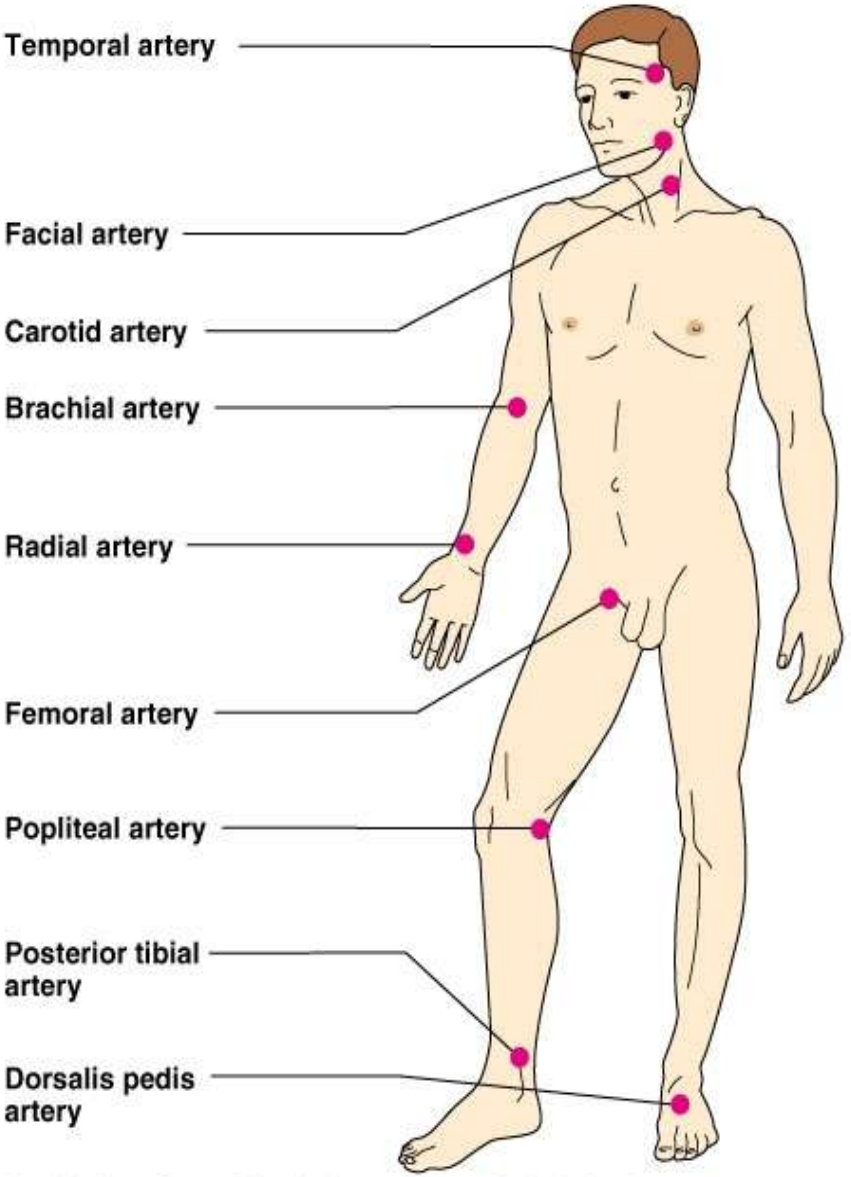
- Complication of fractures.

  Nerves and vessels usually run together in flexor surface of major joints

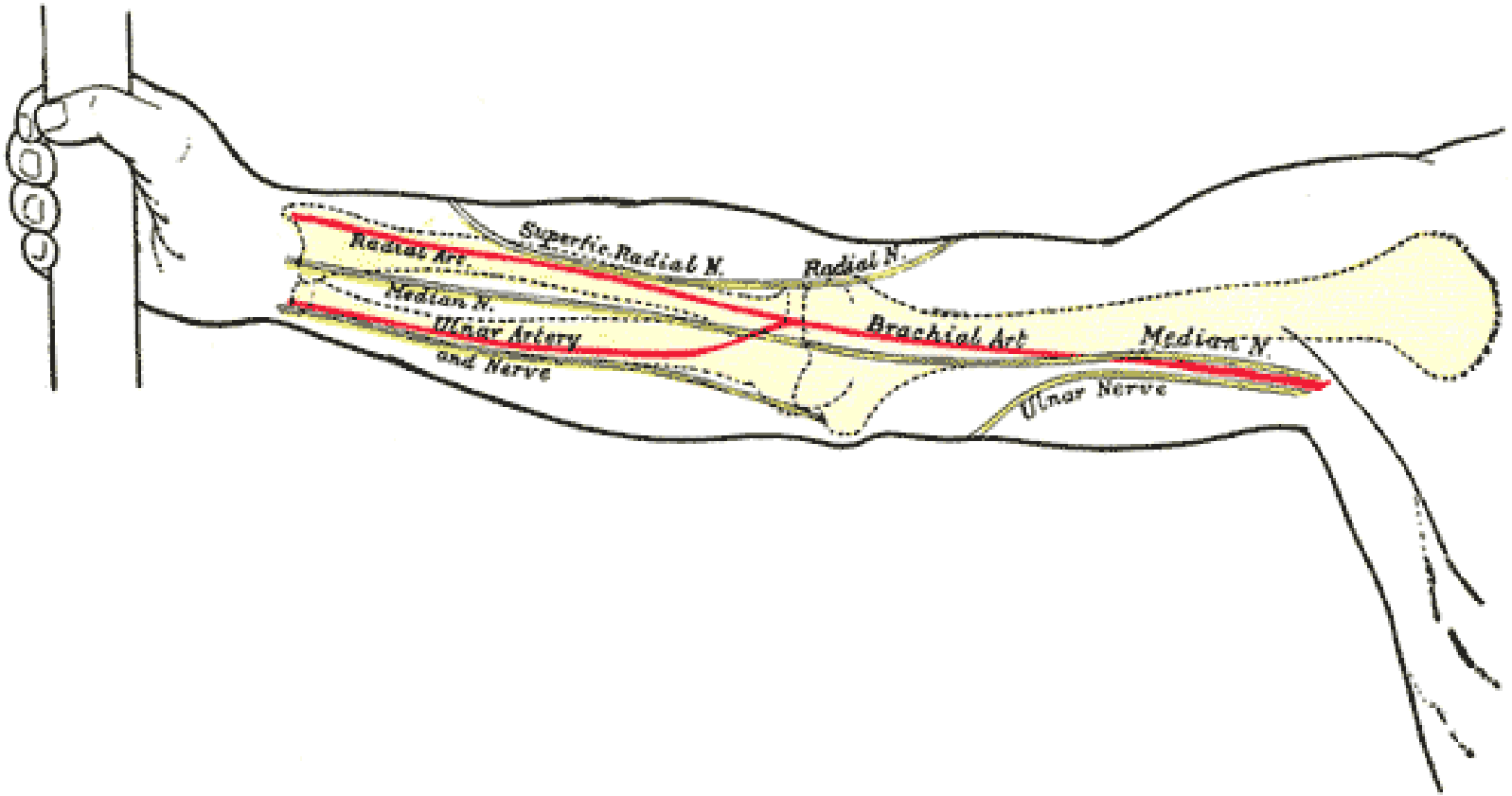
- Femoral Triangle
- From medial to lateral : Lymphatics; Vein; Artery; Nerve

- Checking "PMS":
  - Pulses
  - Motor function
  - Sensory function

Pulse check sites



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)

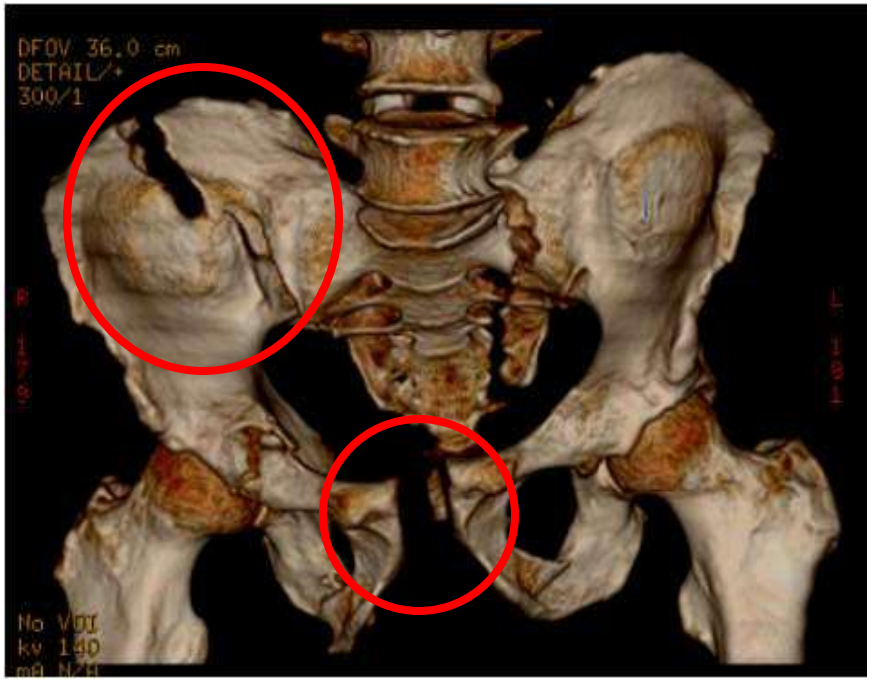
- Cover open wounds
  with moist, sterile dressing before splinting.
- Proper splinting involves immobilizing one joint above and 1 joint below the area of injury
  - Pad splint
- Cover exposed bone with sterile, moist saline gauze!
- Splint en route
  with life-threatening injuries
- Splint before transport if patient is stable

Pelvic fractures

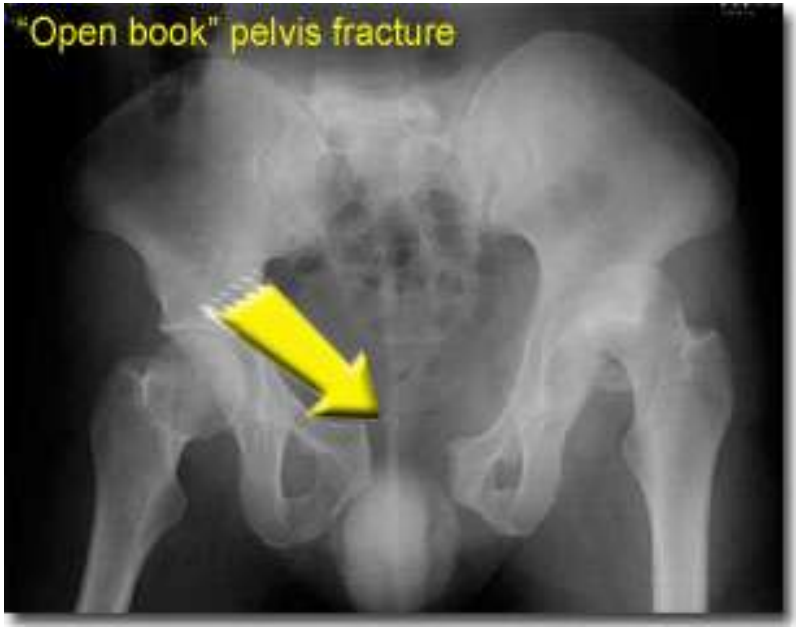
- Potential for **severe** hemorrhage
  - can lose 2-20 units blood
  - (1 unit PRBC = 300ml x 20 units = 6000ml = 6L)
  - risk for hypovolemia, bladder laceration, internal organ damage
- Treatment
  - Spinal immobilization
  - Rapid transport, IVs en route
  - Pelvic binder system

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 3rd** (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 microorgansims.
  - 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. nmemonic
- 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

LOS ANGELES COUNTY EMS AGENCY
MEDICAL CONTROL GUIDELINES

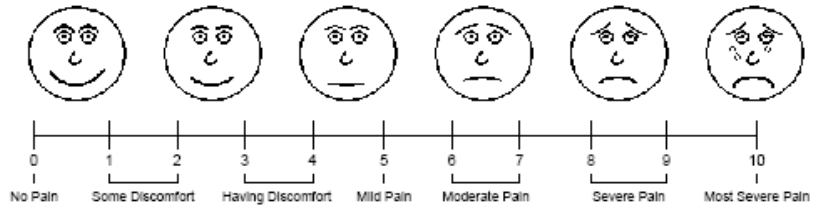
ASSESSMENT

PRINCIPLE:

1. All patients with any complaint of pain shall have an appropriate assessment and pain management.
2. 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.

GUIDELINE:

1. The initial assessment of pain shall include the following:
   - Onset
   - Provoked
   - Quality
   - Region/Location
   - Scale/Intensity
   - Time/Duration
2. Assess and document the numeric pain intensity scale of 0-10.
   (0 = no pain 10 = most severe pain)
3. If unable to use the "numeric pain intensity" scale, use the "facial expression" pain scale.



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…..

LA Co. DHS Medical Control Guideline: Pain Assessment

All patients with any complaint of pain shall have an appropriate assessment and pain management.

Barriers to Adequate Pain Assessment

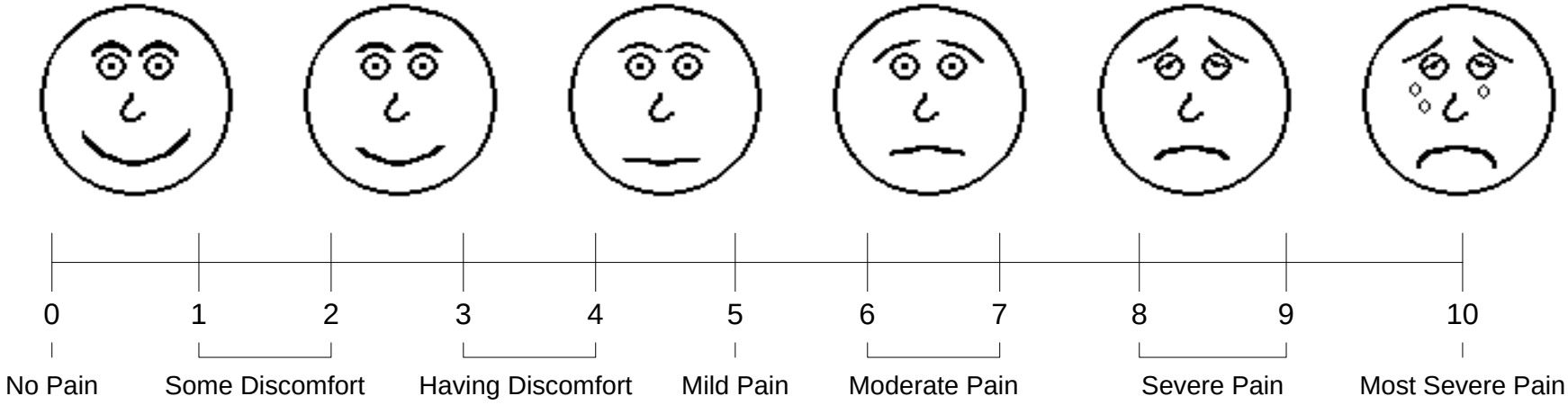
- Cognitively impaired patients
- Subjective nature of pain
- Language barriers
- Age related barriers- both ends of the spectrum
- Intensity of pain
- Cultural diversity
- Behavioral responses to pain
- "Short" transport times
- Machismo/stoic patients

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?)

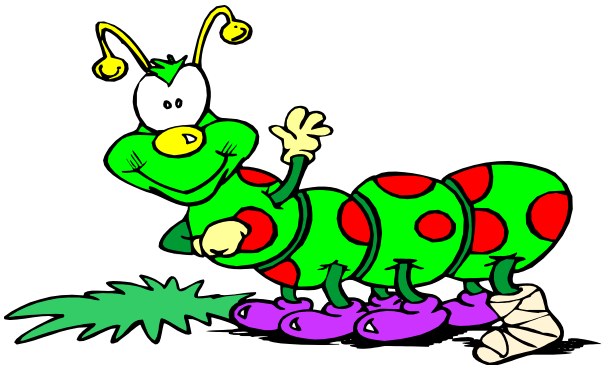
Medical Control Guideline
Pain Assessment Scales

- 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