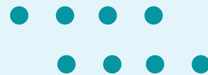


Trauma Care

Stop the Bleed, Spinal Immobilization, Splinting, and more

By Nicole and Kaveri

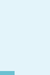
Agenda

1. Scenario 1: 21 YOM Scooter Collision
2. Scenario 2: 24 YOF, Fall from Ladder
3. Kahoot

What we need to cover

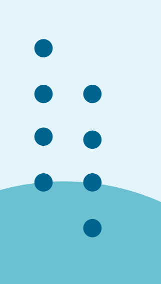
- Defining Trauma, Minor to Moderate to Severe
  - ALCO Protocol on yellow vs red patient
- Scene Safety
  - Recognizing threats to yourself, your partner, and your patients
  - Car crashes, downed power lines, natural disasters, etc
- Trauma Assessment
  - XABCD
  - Mechanism of injury, Kinetics of Trauma
    - Collisions
    - Blunt vs Penetrating
    - Axial Loading
  - Rapid Head to Toe Assessment
  - **When to use vs when not to use a backboard (emphasize c-spine)**

- Trauma Treatment
  - Types of Skin Wounds
    - Laceration, evisceration, avulsion, contusion, abrasion
  - Ortho Injuries **(emphasize SPLINTING)**
    - Fractures, Breaks, Bone Bruises, Dislocations,
  - **Stop the Bleed & Bleeding Management**
    - Tourniquet vs Wound Packing vs Occlusive Dressing
    - Use of Hemostatic Gauze and Contraindications
  - Concussion / TBI / Neurological
    - Coup - Contrecoup
    - S&S of a Concussion vs Contusion



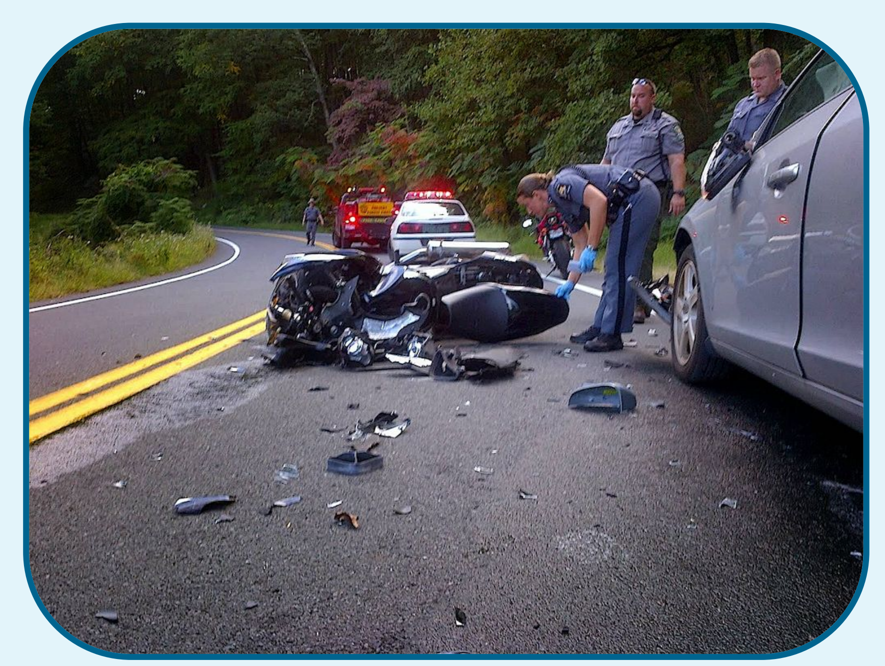
Scenario #1: 21 YOM scooter collision

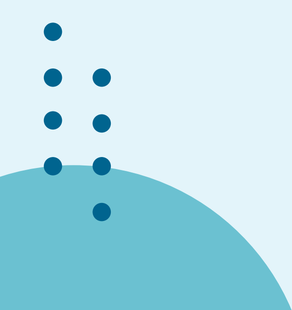
What should you ensure before walking up to the patient?



Correct Answer:

- Scene Safety!
- Patient is in the middle of a busy road – call traffic control
    - PD, CHP, etc…

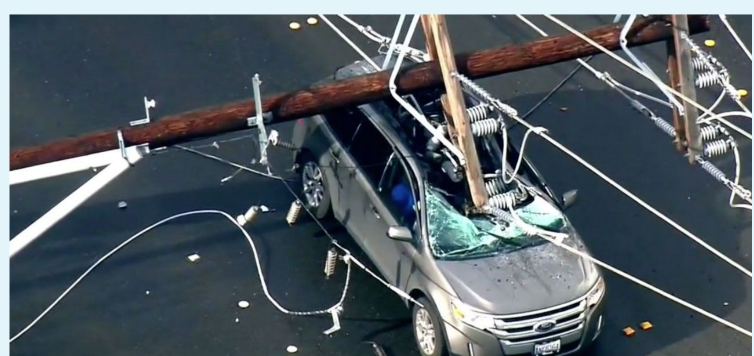




Scene Safety

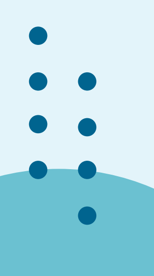
Always assess hazards before approaching the patient.

- Traffic hazards: position ambulance safely, wear high-visibility vest, watch moving vehicles
- Vehicle collisions: check for leaking fuel, unstable vehicles, undeployed airbags, broken glass
- Downed power lines: stay back, assume lines are live, wait for fire/utility clearance
- Fire, smoke, or hazardous materials: do not enter, request fire/HazMat
- Violence or unsafe persons: stage away and wait for law enforcement
- Environmental dangers: unstable structures, weather hazards, crowds, animals



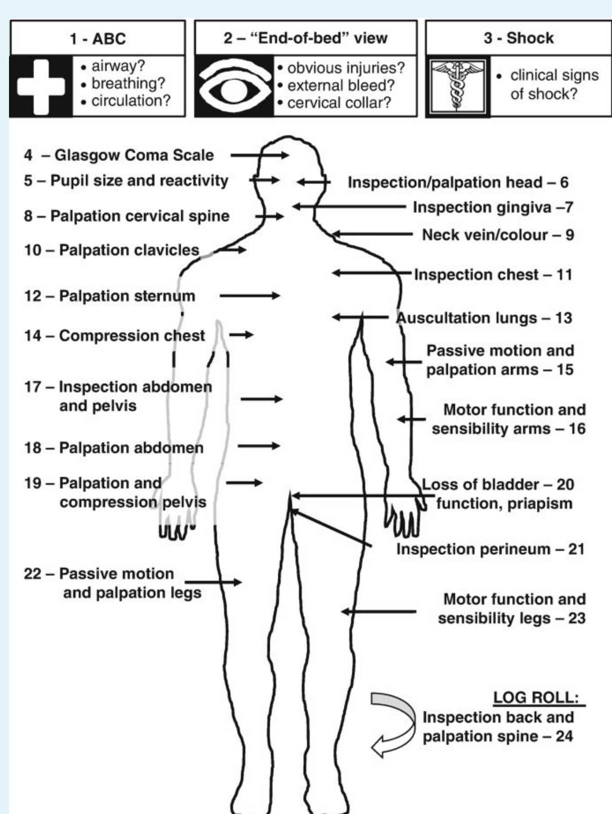
Scenario #1: 21 YOM scooter collision

What is your field impression?



- Hemorrhaging laceration on right thigh–HIGHEST PRIORITY!
- Fractured right arm

Do a rapid head to toe assessment to find other major injuries



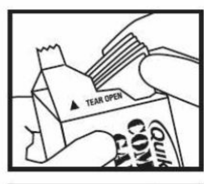
Stop the Bleed

1. **Direct Pressure**
2. If bleeding continues…
   - Junction (shoulder/groin) – Pack
   - Chest cavity – Seal w/ a 3-sided occlusive
   - **Extremity – Tourniquet**
     - 2-3 inches above the wound, and never on a joint!
     - Note down time tourniquet was applied
3. Rapid transport to prevent decompensated shock

Hemostatic Gauze

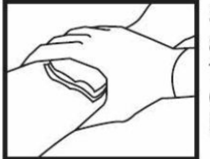
- Specialized dressing used to control severe, life-threatening bleeding that cannot be stopped by direct pressure alone
- Accelerates the body's clotting mechanism, often used in traumatic injuries like junctional wounds (groin, neck, axilla)
- CONTRAINDICATIONS: Should not be used in open chest or abdominal cavities, nor should it be placed directly into the eyes

DIRECTIONS FOR USE

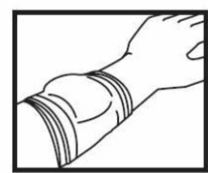


1. Open package and remove **Combat Gauze.** Keep the empty package.

2. Pack **Combat Gauze** into wound and use it to apply pressure directly over bleeding source. (More than one **Combat Gauze** may be required).



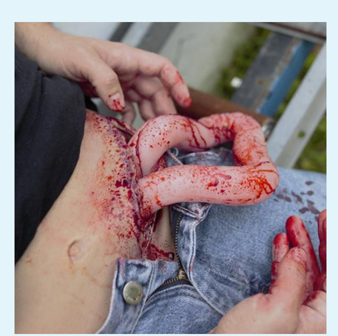
3. Continue to apply pressure for 3 minutes or until bleeding stops.



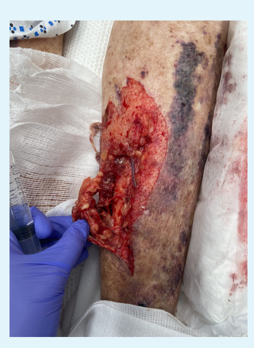
4. Wrap and tie bandage to maintain pressure. Seek medical care immediately. Show PRODUCT REMOVAL directions on package to medical personnel.

Types of Skin Wounds

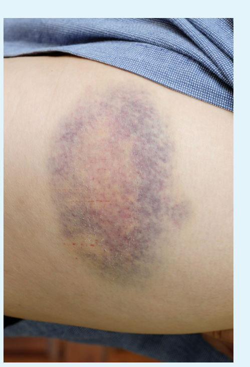
Laceration - a deep, irregular tear in the skin caused by blunt or sharp force



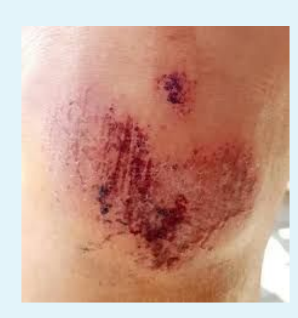
Evisceration: internal organs protruding through an open wound



Avulsion: tissue forcibly torn completely or partially away from the body



Contusion: a bruise; bleeding under the skin without a break in the skin



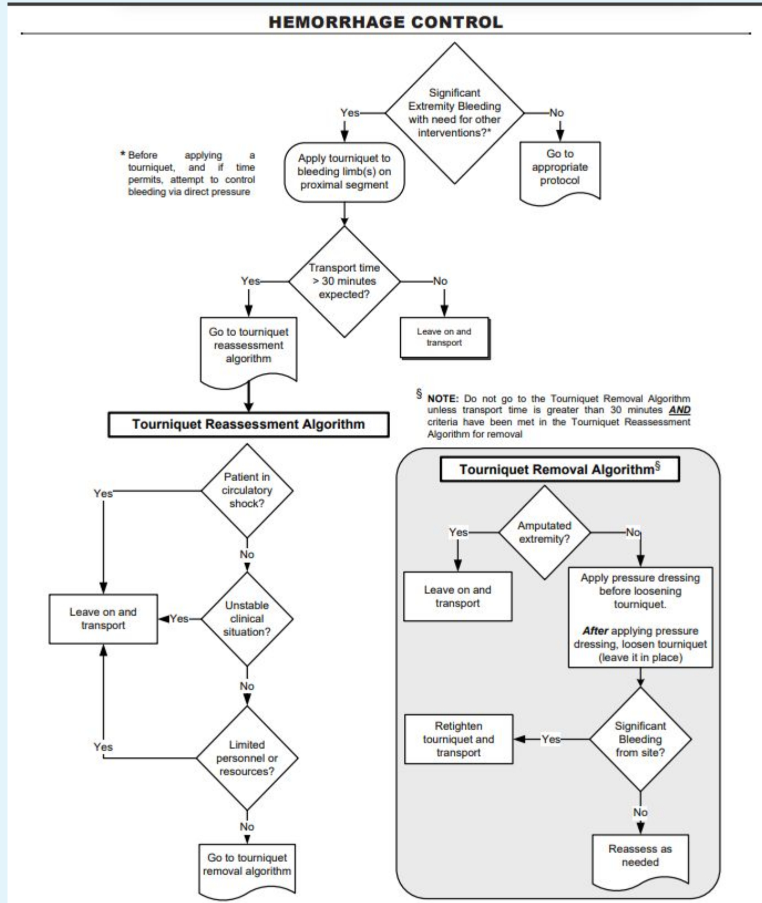
Abrasion: superficial scraping of the outer skin layer

DCAP BTLS

DCAP BTLS is a mnemonic that can help your physical exam (rapid trauma head to-toe) to identify soft tissue and structural injuries.
It is often used during rapid trauma assessments or secondary surveys!

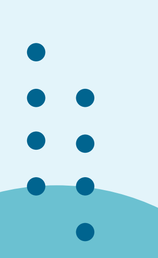
ALCO PROTOCOL

- Identify life-threatening bleeding immediately
- Apply direct pressure with dressing/gauze
- Pack deep or junctional wounds if bleeding persists
- Apply tourniquet for severe extremity bleeding (high & tight)
- Reassess bleeding and add second tourniquet if needed
- Treat for shock & transport rapidly to trauma center



Splinting

1. Assess CSM
    - Circulation (pulses, cap refill)
    - Sensation (can Pt feel touch)
    - Motion (ask Pt to wiggle their fingers)
2. Stabilize injury
3. Secure splint in position found unless loss of CSM
4. Assess CSM after splinting



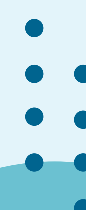
ALCO PROTOCOL - Splinting

EXTREMITY INJURY

1. **ASSESSMENT:**
   - 1.1 Routine Medical Care
   - 1.2 Document mechanism of injury
   - 1.3 Document past medical history including history of previous injuries
   - 1.4 Check for deformity, open wounds, swelling, shortening, and/or rotation
   - 1.5 Document range of motion, pulses, sensation, and color of the extremity
   - 1.6 Assess severity of pain (1-10 scale)
   - 1.7 Assess for other associated injuries
2. **GENERAL CARE:** (all patients)
   - 2.1 Control any external bleeding with direct pressure
   - 2.2 Elevate and apply cold packs
   - 2.3 Splint injured extremity. Hand injuries should be positioned in the "safe position"
   - 2.4 Cover open wounds with sterile dressings
   - 2.5 Provide Pain control – see Pain Management **page 43** (Adult) or **page 74** (Pediatric)
   - 2.6 Remove rings or other possibly constricting items

Position of function

3. **FRACTURE/DISLOCATION:**
   - 3.1 If the extremity is pulseless, attempt to place it in normal anatomic position by gentle in-line traction
   - 3.2 If repositioning does not restore circulation, do not manipulate further, transport immediately.



Immediate First Aid

Ensure scene safety

- Control traffic and ensure safe access to patient
- Use PPE and request additional resources if needed

Control massive bleeding

- Apply direct pressure to right thigh wound
- Apply tourniquet when bleeding does not stop
- Note tourniquet application time

Spinal precautions

- Maintain manual C-spine stabilization
- Limit unnecessary patient movement

Airway and Breathing

- Maintain airway
    - Monitor ability to speak, protect airway, and respiratory rate / effort

Injury Management

Extremity injury care

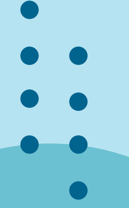
- Assess circulation, sensation, movement (CSM)
- Splint left forearm deformity
- Reassess CSM after splinting

Shock management

- Recognize signs of hypoperfusion (pale, cool, diaphoretic)
- Place patient in position of comfort if tolerated
- Keep patient warm with blanket

Scenario #2: 24 YOF, Fall from Ladder

What is the very first priority upon approaching this patient?



- **C-Spine Stabilization** (Spinal Motion Restriction/SMR)
  - Why?
    - the mechanism of injury (a 10ft fall) suggests **axial loading** and potential spinal trauma

Axial Loading

- **Axial loading**: a vertical force travels through the spine
  - examples: falling on your feet or head

- EMT's goal: prevent secondary injury to spinal cord
  - backboard should be used to safely extricate patient
  - always take C-spine precautions

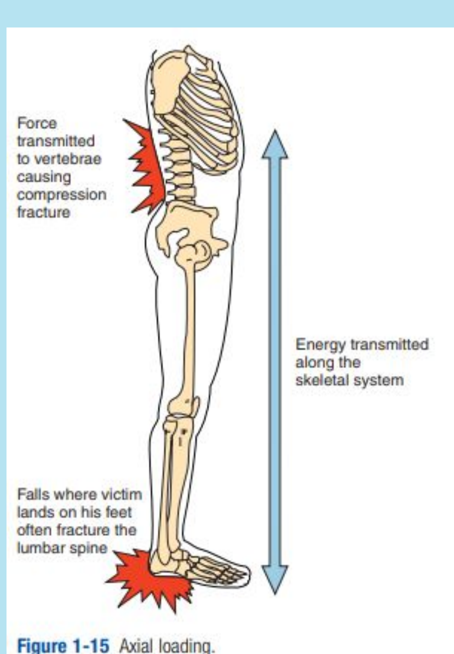
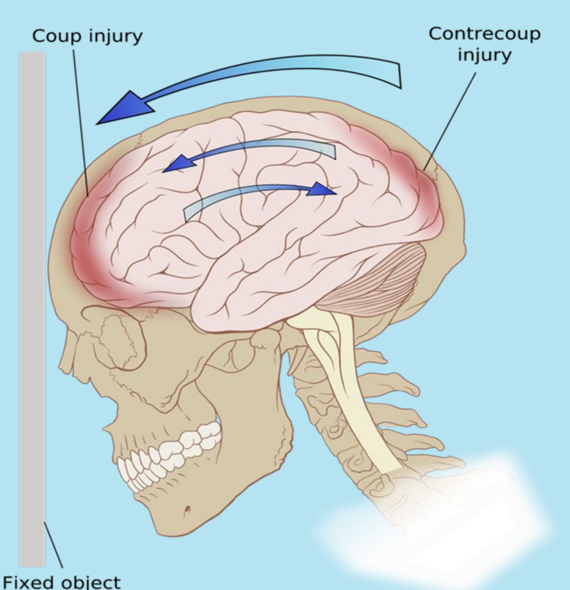


Figure 1-15 Axial loading.

Traumatic Brain Injuries



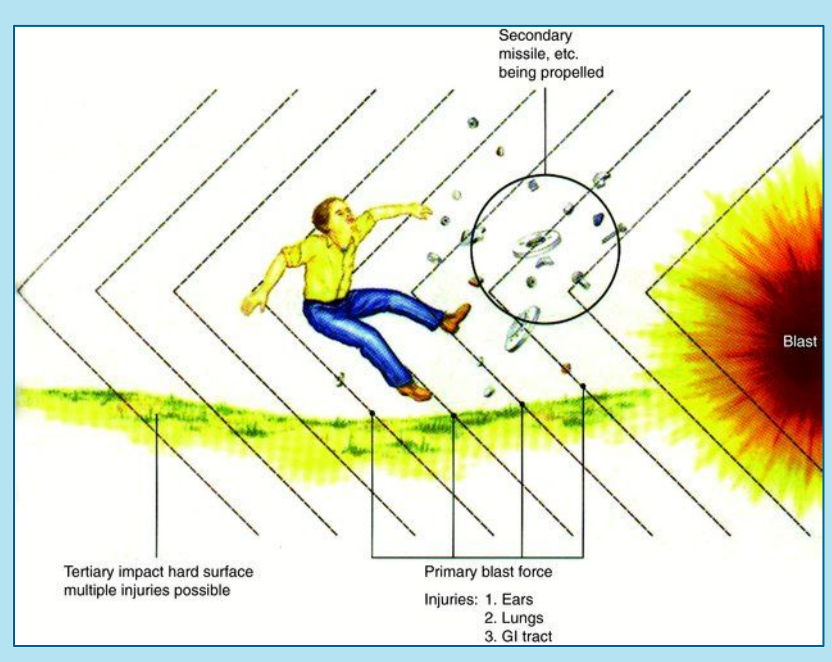
primary injury: physical damage to brain that occurs at moment of impact (ex: lacerations, hemorrhages)

secondary injury: after-effects that evolve after initial trauma (ex: cerebral edema (swelling), increased ICP, hypoxia)

- **coup-contrecoup injury**: dual-point injury where the brain strikes the skull at the site of impact (coup) and then rebounds to strike the opposite side (contrecoup)
- **concussion**: temporary loss or alteration of part or all of the brain's ability to function without actual physical damage to the brain structure
- **cerebral contusion**: "bruise" of brain tissue; more serious than a concussion, it involves physical damage and bleeding of brain tissue

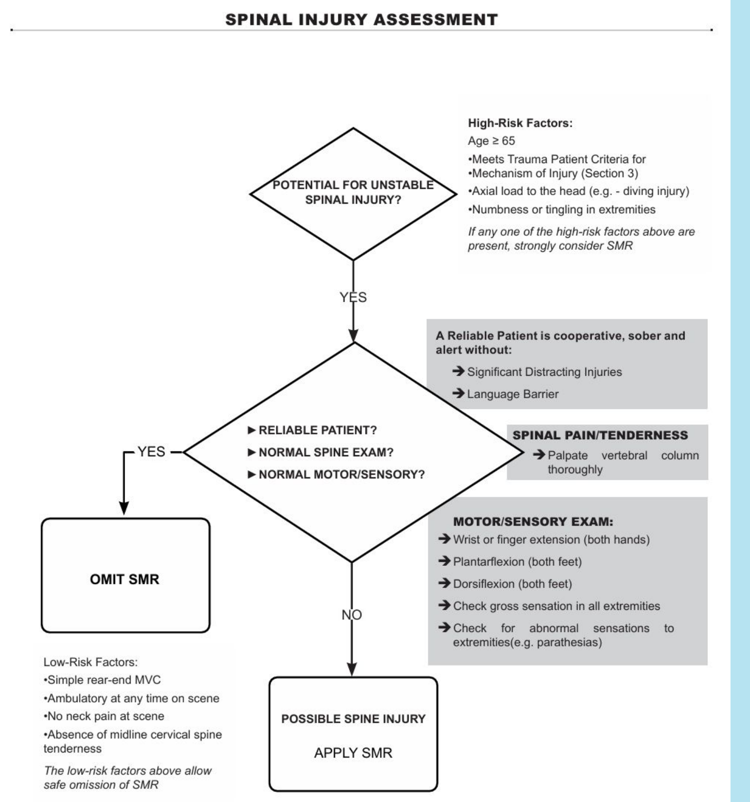
Kinetics of Trauma/MOI

- **primary**
  - caused by blast wave
  - primarily affects hollow, air-filled organs (eardrums, lungs, GI tract)
- **secondary**
  - caused by flying debris propelled by the blast
  - results in penetrating or blunt force trauma
- **tertiary**
  - victim is physically thrown
  - results in fractures, blunt trauma, head injury



*not relevant to scenario, just another mechanism of injury that stems from an explosion

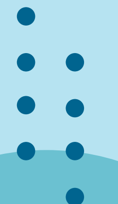
ALCO Protocol: Spinal Injury Assessment



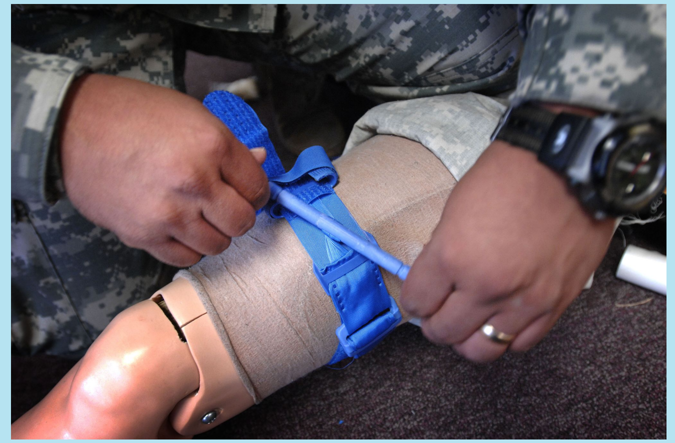
Scenario #2: 24 YOF, Fall from Ladder

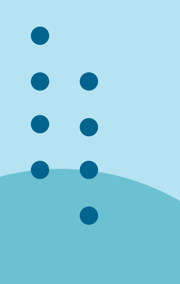
You find an **arterial** bleed on the right forearm that is soaking through a standard dressing.

What is the next step in bleeding management?



- Apply a tourniquet (XABCD!)
  - used for life-threatening extremity hemorrhage where direct pressure is insufficient





Bleeding Control

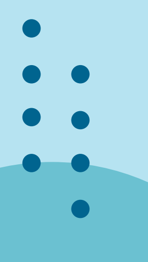
1. Direct Pressure
2. Tourniquet
   - 2-3 inches above wound
   - never on a joint
3. Hemostatic Gauze
   - accelerates clotting
   - used for "junctional" wounds (groin/neck/axilla) where tourniquets won't fit

Scenario #2: 24 YOF, Fall from Ladder

Bonus Question: Based on ALCO trauma triage, is this a Red or Yellow patient?

Correct Answer:

- Red (Immediate)



Red vs Yellow Triage

- **RED (Immediate)**:
  - physiological distress
  - systolic BP <90
  - RR <10 or >29
  - altered mental status (GCS <14)
- **YELLOW (Urgent)**:
  - high-energy mechanism (like a 10ft fall)
  - patient is stable (normal BP/awake)**
    - but our patient is unconscious and hypotensive

ALCO Protocol: Trauma Patient Triage

TRAUMA PATIENT CRITERIA

1. **INTRODUCTION:** The goal of the Alameda County trauma system is to transport confirmed patients meeting the various criteria below to a designated trauma center in a timely manner, bypassing non-trauma centers

2. **RED CRITERIA TRAUMA PATIENTS (High Risk for Serious Injury):**

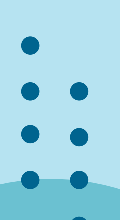
   2.1 A patient is identified as at high risk for serious injury when any of the following injury patterns or mental status/vitals signs listed below are present. These patients should be transported to a designated Trauma Center rapidly.

Injury Patterns	Mental Status & Vitals Signs
• Penetrating injuries to head, neck, torso,and proximal extremities • Skull deformity, suspected skull fracture • Suspected spinal injury with new motor or sensory loss • Chest wall instability, deformity, or suspected flail chest • Suspected pelvic fracture • Suspected fracture of two or more proximal long bones • Crushed, degloved, mangled, or pulseless extremity • Amputation proximal to wrist or ankle • Active bleeding requiring a tourniquet or wound packing with continuous pressure	**All Patients** • Total Glasgow Coma Scale ≤ 13 ***or***; Motor GCS < 6 (Unable to follow commands) • RR < 10 or > 29 breaths/min • Respiratory distress or need for respiratory support • Room-air pulse oximetry < 90% **Age 0–9 years** • SBP < 70mm Hg + (2 x age in years) **Age 10–64 years** • SBP < 90 mmHg or • HR > SBP **Age ≥ 65 years** • SBP < 110 mmHg or • HR > SBP

3. **YELLOW CRITERIA TRAUMA PATIENTS (Moderate Risk for Serious Injury):**

   3.1 In addition to above criteria, the following mechanisms of injury and EMS provider judgment of risk factors can be utilized to preferentially triage a patient to a trauma center. In general, these patients are transported code 2, however, differing field circumstances and/or patient condition may require a code 3 transport

Mechanism of Injury	EMS Judgment
• High-Risk Auto Crash – Partial or complete ejection – Significant intrusion (including roof) • >12 inches occupant site OR • >18 inches any site OR • Need for extrication for entrapped patient – Death in passenger compartment – Child (age 0–9 years) unrestrained or in unsecured child safety seat – Vehicle telemetry data consistent with severe injury • Rider separated from transport vehicle with significant impact (eg, motorcycle, ATV, horse, etc.) • Pedestrian/bicycle rider thrown, run over, or with significant impact • Fall from height > 10 feet (all ages)	**Consider risk factors, including:** • Low-level falls in young children (age ≤ 5 years) or older adult (age ≥ 65 years) with significant head impact • Anticoagulant use • Suspicion of child abuse • Special, high-resource healthcare needs • Pregnancy > 20 weeks • Burns in conjunction with trauma • Children should be triaged preferentially to pediatric capable centers • EMS Provider judgment - If concerned, take to a trauma center



pt considerations

Immediate First Aid

Ensure scene safety

- Confirm ladder and surroundings are stable
- Use PPE and request additional resources

Control massive bleeding

- Apply direct pressure to right forearm
- Apply tourniquet when bleeding persists
- Document tourniquet time

Spinal precautions

- Immediately stabilize C-spine manually
- Prepare for spinal motion restriction

Shock management

- Recognize signs of hypoperfusion (pale, cool, diaphoretic)
- Keep patient warm with blanket

Airway and Breathing

Open airway using jaw-thrust maneuver (avoid head tilt if spinal injury suspected)

- Ensure airway remains clear of obstructions
- Monitor breathing and airway sounds continuously
- Place patient in recovery position only if airway cannot be maintained and spinal movement is minimized

Injury Management

Head injury care

- Monitor level of consciousness
- Observe pupils and signs of worsening brain injury
- Suspect coup-contrecoup injury