TRAUMA EMERGENCIES

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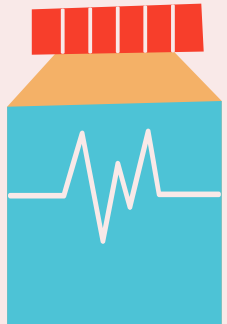
01 Defining Trauma

02 Scene Safety

03 Trauma Assessment

04 Trauma Treatment



01

Defining Trauma

What is Trauma?

- A physical injury
  - Ranges from minor to severe
  - Minor trauma
    - EMS not Required
  - Moderate
    - Think Code 2
    - Urgent/needs to the hospital
  - Severe
    - Think Code 3
    - Needs to get to the hospital yesterday

Yellow vs Red Patient according to ALCO

Yellow

Ejection of patient
Car intrusion
- 12 inches or more at occupied seat
- 18 inches or more at any seat
- Need for extrication

- Death of another passenger
- Unsecured Child
- Fall of over 10 feet
- EMS judgment
  - Falls for extremely young/old patient
  - Pregnancy
  - ETC

Red

- Penetrating injuries
- Skull deformities
- Spinal Injuries
- Unstable Chest Wall
- Bone fracture
- Pulseless extremity
- Amputation
- Active bleeding requiring a tourniquet
- Unable to Follow Commands
- GCS<14
- SBP<110

02

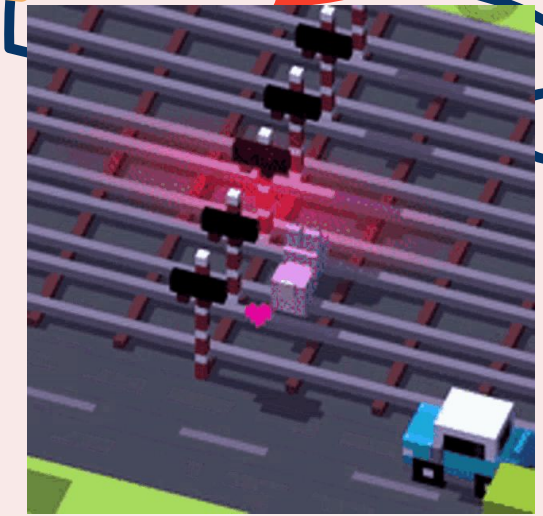
Scene Safety

BSI Scene is Safe?

Watch out for Threats!

Things to watch out for

- Active Shooter
- Chemical Spill
- Unstable Terrain
- Falling Debris
- Fire
- Oncoming Traffic
- Downed Power Lines
- Drunk/intoxicated patients and bystanders
- ETC



Additional Resources

- Fire
- Hazmat
- PG&E
- Police
- Paramedics
- ETC

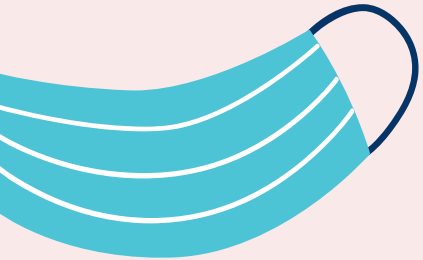
03

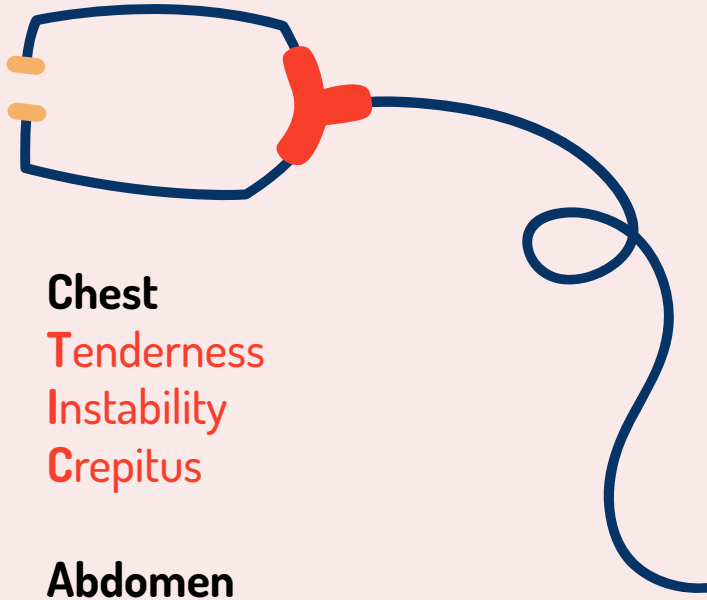
Trauma Assessment

Rapid Head to Toe

Deformities
Contusions
Abrasions
Punctures/Penetrations
Burns
Tenderness
Lacerations
Swelling

Instability
Crepitus





Chest
Tenderness
Instability
Crepitus

Abdomen
Tenderness
Rigidity
Distension

Head

- Frontal, Temporal, Parietal, Occipital
- Checking the ears, behind the ears, looking for fluids, Battle Signs
- Zygomatic Process, Orbitals, checking the eyes for PERRL, Nasal Bone, Maxilla, Mandible
- Check the mouth for any obstructions, potential airway compromise, or oral trauma

Neck

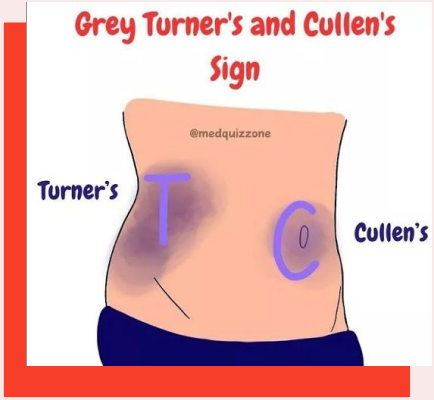
- Jugular Vein Distention, Tracheal Deviation, accessory muscle use

Chest

- Checking shoulders for stability, walk the clavicle, sternum chop, palpating chest, looking for TIC (Tenderness, Instability Crepitus), armpit sweep, looking for equal and bilateral chest rise and fall, lung sounds, looking for any medical devices, transdermal patches, etc.

Abdomen

- Palpating the four quadrants of the abdomen looking for TRD (Tenderness Rigidity Distention), looking for Grey Turner's Signs, Cullen's Signs

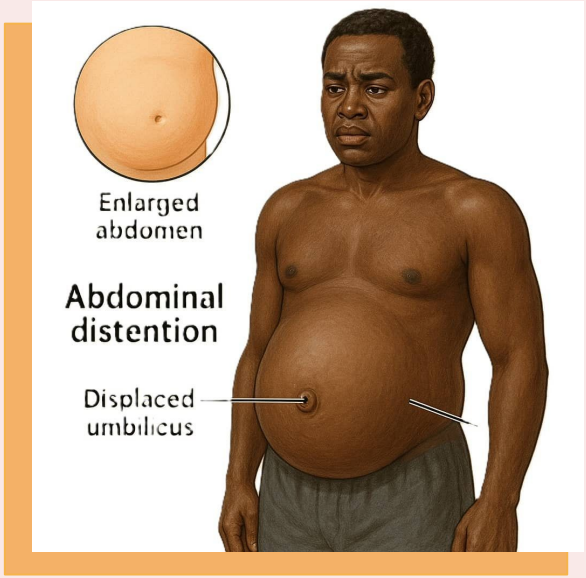


Pelvis

- Opening and closing the pelvis, looking for incontinence, priapism, or other abnormalities

Extremities

- Offsetting the femur, palpating the knee gently, offsetting tibia and fibula, checking Circulation, Sensory, and Motor (CSM) in the lower extremities
- Moving up, offsetting humerus, offsetting radius and ulna, checking CSM in the hands.



Back

- Turning the patient over, checking for step offs, walking C-Spine, Thoracic, Lumbar, Sacral, and Coccyx. Checking for any incontinence, blood, etc.

Spinal Motion Restriction (SMR)

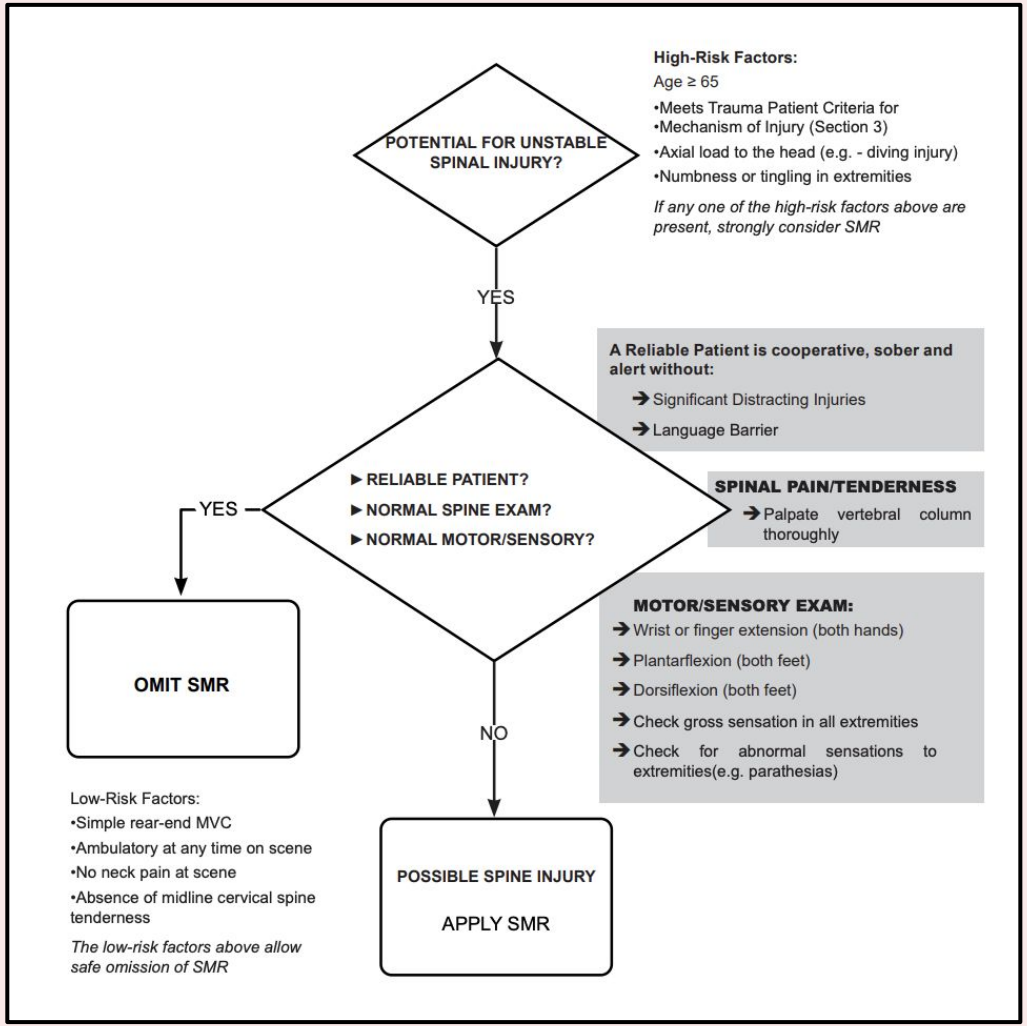
* According to Alameda County Protocol

► Alameda County EMS is supporting efforts to decrease unnecessary immobilizations in the field and reduce the risks and complications associated with this procedure

► If the immobilization process is initiated prior to assessment, STOP and perform spine injury assessment to determine best course of action

► Studies show that immobilizing trauma victims may cause **more harm than good** to the patient. **Penetrating trauma victims** benefit most from rapid assessment and transport to a trauma center without spinal motion restriction (SMR)

- Alameda County EMS Field Manual 2025



Link: **ALCO Field Manual 2025, pages 132-134**

SPECIAL CONSIDERATIONS

Patients with acute or chronic difficulty breathing: SMR limits respiratory function especially in geriatric and pediatric subjects restricted to a hard backboard.

Use SMR with caution with patients presenting with dyspnea and position appropriately

Pediatric patients:

- Consider use of padded pediatric motion restricting board
- Avoid methods that provoke increased spinal movement
- If choosing to apply SMR to patient in car seat, ensure that proper assessment of patient posterior is performed

Combative patients: Avoid methods that provoke increased spinal movement and/or combativeness

- Alameda County EMS Field Manual 2025

When/When not to consider SMR

Consider SMR for a patient who is suspected of having a traumatic unstable spinal column injury. Have high index of suspicion for pediatrics and patients with degenerative skeletal/connective tissue disorders (i.e. **osteoporosis, elderly, previous spinal fractures,** etc)

Victims of penetrating trauma (stabbings, gunshot wounds) to the head, neck, and/or torso **SHOULD NOT receive SMR unless there is one or more of the following:**

- Obvious neurologic deficit to the extremities
- Significant secondary blunt mechanism of injury (e.g.- fell down stairs after getting shot)
- Priapism
- Neurogenic shock
- Anatomic deformity to the spine secondary to injury

- Alameda County EMS Field Manual 2025

Pediatric Patients and Car Seats

Infants restrained in a rear-facing car seat may be immobilized and extricated in the car seat. **The child may remain in the car seat if the immobilization is secure and his/her condition allows (no signs of respiratory distress or shock)**

- Children restrained in a car seat (with a high back) may be immobilized and extricated in the car seat; however, **once removed from the vehicle, the child should be placed in SMR**
- **Children restrained in a booster seat (without a back)** need to be extricated and immobilized following standard SMR procedures
- **Helmet removal:** Safe and proper removal of the helmet should be done by two people following steps outlined in an approved trauma curriculum

- Alameda County EMS Field Manual 2025

Kinetics of Trauma

Energy ϵ Trauma

Work: force acting over a distance
(force * displacement)

Kinetic energy: energy of a moving object
(½ * mass * (velocity)^2)

Potential energy: energy of a falling object
(mass * force of gravity * height)

- Velocity contributes **more** than mass (think gunshot wound)
- These energies interconvertible

Newton's Laws of Motion

First Law: objects at rest remain at rest & objects in motion remain in motion unless acted on by some force

Second Law: force = mass * acceleration

Third Law: for every action, there is an equal and opposite reaction

- It is not the fall, but the sudden stop, that causes injury
- Period of deceleration
- Collapsed steering wheel

Mechanism of Injury (MOI) Profiles

Blunt Trauma

Vehicular Crashes

1. Car against other object (car, tree, etc.)
2. Passenger against interior of car
3. Passenger's internal organs against solid structures of the body

Car vs Pedestrian, Bicycle, Motorcycle

- ❖ Maintain high index of suspicion
- ❖ Bring helmet with you if possible

Falls

- ➢ >20ft (6m) is significant (10ft for peds)
- ➢ Consider syncope/medical cause
- ➢ Axial loading: upright landing position applies load along vertical axis of spine

Penetrating Trauma

Projectiles

- ❖ Cavitation: injury presents distant to bullet path
- ❖ Air resistance (drag) reduces energy of the bullet and depth of penetration
- ❖ Determine type of weapon if possible

Primary Assessment

General impression (consciousness, breathing, color); LOC (AVPU, A&O); CC

X E**x**sanguination - Bleeding control for life threatening hemorrhage

A **A**irway - Patent, open & clear? Suction, adjuncts (OPA/NPA), if necessary

B **B**reathing - Rate, rhythm, depth; bare the chest & palpate; lung sounds; O2 as needed

C **C**irculation - Rate, rhythm, quality; bilateral radial pulses (conscious) or carotid (unconscious); skin signs; treat for shock as needed (supine, warmth, O2)

D **D**isability - Check pupils, GCS (E4, V5, M6), A&O, CSM

E **E**xpose - Rapid trauma assessment as needed; treat additional life threats

Transport decision (stay and play or load and go)

Secondary Assessment

Vital Signs (HR, BP, SPO2, RR, T, BGL, EKG, Pain scale (1-10) or Wong-Baker FACES scale)

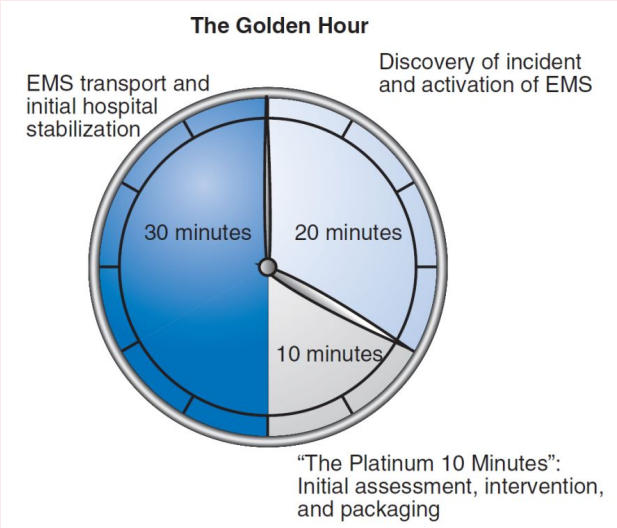
OPQRST (**O**nset, **P**rovocation/**P**alliation, **Q**uality, **R**adiation, **S**everity, **T**ime)

SAMPLE (**S**/S, **A**llergies, **M**edications & medication compliance, **P**ast Med Hx, **L**ast oral intake, **E**vents)

Focused (CC) exam + Detailed head-to-toe exam & manage additional wounds

Ongoing Assessment

- Reassess ABCDs
- Reassess V/S
- Reassess CC
- Assess response to treatment
- Repeat focused assessment

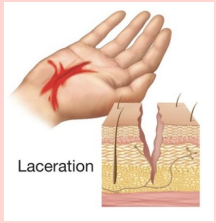


04

Trauma Treatment

Types of skin wounds &
Ortho injuries

Laceration



Mechanism: a tear or cut in the skin

Types of Bleeding:

- **Arterial:** bright red & spurting, most dangerous
- **Venous:** dark red, steady & slow but can be heavy
- **Capillary:** dark red, slow, usually minor

Arterial vs Venous

General Treatment Steps:

1. Direct pressure with gloved hand
2. Sterile gauze dressing
3. Differentiate by types

If it is arterial → necessary to control bleeding:

- Use hemostatic gauze dressing
- Tourniquet

If it is venous or capillary:

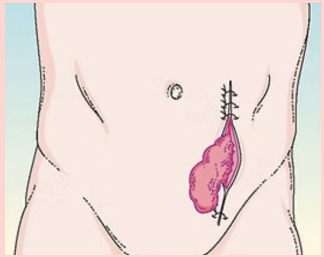
- Apply bandages

Evisceration

Mechanism: the protrusion of organs from a body cavity

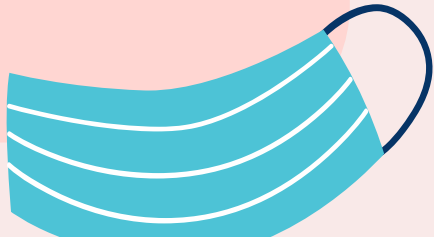
Common Organs Involved:

- Small & large intestines
- Stomach
- Liver
- Spleen



General Treatment Steps:

1. **DO NOT PUSH IT BACK IN!**
2. Wrap organs with **moist** sterile dressing
3. Cover with occlusive dressing to create a seal
4. Secure the dressing with tape or bandage



Avulsion

Mechanism: an injury where a body part is torn off (ex: a flap of skin is torn loose)

- **Amputation** is a severe form of avulsion!

Common Causes:

- Animal bites
- Motor vehicle accidents
- Industrial/ machinery accidents

General Treatment Steps:

1. **Flip the piece back into place** if it is still attached
2. Direct pressure with gloved hand if bleeding
3. 4x4 gauze dressing
4. Secure with bandage

Contusion

Mechanism: = bruise

Relative facts:

- Usually caused by **blunt force** trauma that damages small blood vessels under the skin
- **No break in skin**

General Treatment Steps:

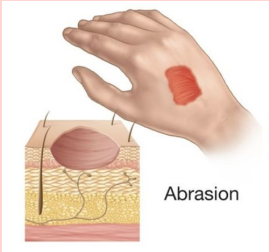
- **Monitor for complications**
  a. Expanding **hematoma** or numbness
  b. **Abdominal/ flank** bruising → **internal organ injury**
  c. **Head/ facial** bruising → watch for signs of **traumatic brain injury**

Abrasion

Mechanism: a superficial open wound where the top layers of skin are scraped or rubbed off

Relative Facts:

- **Common causes:** falls, motorcycle/ sports accidents
- **Infection risk is high!**



General Treatment Steps:

1. Direct pressure with sterile gauze if bleeding
2. Clean the wound
   a. Sterile saline
   b. Remove visible debris (**DO NOT SCRUB DEEPLY**)
3. Apply sterile dressing
4. Secure with bandage

Puncture

Mechanism: where a sharp, pointed object penetrates the skin and underlying tissue

High risk of hidden bleeding and infection!

General Treatment Steps:

1. Gloved hand over wound
2. Gauze dressing
3. Bandage

If Special Type - Impaled Object Is Involved:

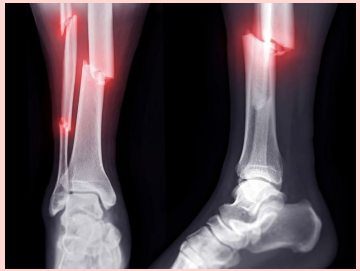
1. **Stabilize object in place** using dressings & bandages
2. **ONLY REMOVE** if it is blocking airway
    a. Or it will lead to severe bleeding, destabilization, air embolism risk (chest & neck)

Fracture

Mechanism: a broken bone

Main Types of Fractures:

- **Open/ compound** (bone pierces skin)
- **Closed** (skin intact)



If it is open/ compound:

1. Manual stabilization
2. Direct pressure with gloved hand if bleeding
3. 4x4 gauze dressing or bulking dressing if needed
4. Secure with bandage
5. Splint

If it is closed:

1. Manual stabilization
2. Splint
3. Pad voids

Dislocation

Mechanism: a bone is displaced from its normal position in a joint

Common Causes:

- Falls
- Sports injuries
- Motor vehicle collisions

Common Sites:

- Shoulder
- Elbow
- Knee
- Hip

General Treatment Steps:

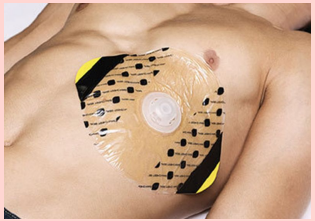
1. Manual stabilization
2. Splint
3. Pad voids

Sucking Chest Wound

Mechanism: a penetrating chest injury that allows air to enter the pleural space through the chest wall

General Treatment Steps:

1. Gloved hand over hole
2. Apply occlusive dressing or chest seal

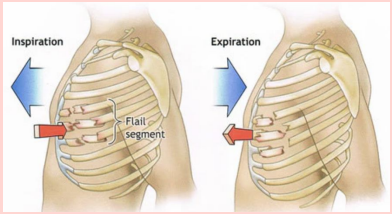


Flail Chest

Mechanism: two or more adjacent ribs are fractured in two or more places to cause paradoxical movement (broken segment moves inward when you inhale and outward when you exhale)

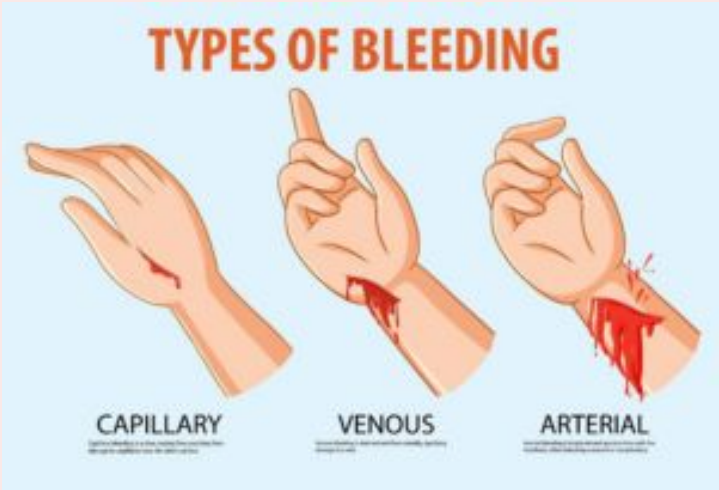
General Treatment Steps:

1. Cushion the chest using a pillow to stabilize and provide comfort
2. Maintain the airway and provide 02



Stop The Bleed: The Basics

- Hemorrhaging can kill incredibly quickly
  - Like very quickly
  - Like really really quickly
  - Fastest way a patient could die
  - Averaging from 2-5 mins, sometimes faster
- Hemorrhaging vs not hemorrhaging
  - Does it look like it might kill em?
  - Is blood spurting out of the wound?
  - Do they appear to have lost a lot of blood?
  - Is there a pool of blood underneath them?
- If potentially life-threatening
  - Treat AS QUICKLY AS POSSIBLE
  - Speed is life
  - Drive fast



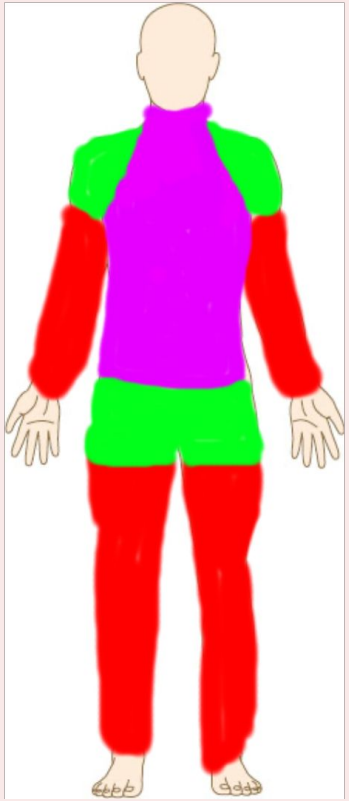
Stop The Bleed: Internal

- Limited in ability to treat in the field
  - Lie the patient down
  - Treat for shock
  - Oxygen
  - High flow DIESEL 🚑💨
  - Get them to the hospital ASAP

Tourniquet vs Packing vs Occlusive

- Tourniquette
  - For hemorrhaging on the extremities
  - Never remove
  - High and tight
- Packing
  - For use on junctions
    - Armpit
    - Groin
  - Neck wounds can be packed if it won't compromise the airway
- Occlusive Seal
  - For the chest, abdomen, and neck
    - Neck
      - Always 4 sided seals
    - Abdomen
      - Always 4 sided seals
    - Chest
      - Make sure there is one 3 sided seal

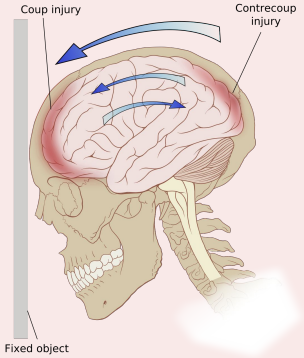
- Tourniquet
- Packing
- Occlusive seal



Hemostatic Gauze

- Uses
  - Treatment of life-threatening bleeds
    - Stabs, Gunshots, etc
  - Used where tourniquets or occlusives aren't
    - Used like any other gauze, just more effective at stopping severe bleeds
- Contraindications
  - Bleeding on the abdomen or chest
  - Open skull fractures

Neurological Injuries



- Coup and Contrecoup
  - Coup: brain injury at the point of trauma
  - Contrecoup: brain injury across from the point of trauma
- Concussion vs Contusion
  - Contusion
    - Localized injury
    - Bruising and bleeding
    - Is at a specific location
    - More severe
  - Concussion
    - Not localized
    - No gross tissue injury
    - Doesn't show up on imaging
    - Less severe

KAHOOT!

https://create.kahoot.it/my-library/kahoots/15ebc27d-a442-42df-9df1-2d5ad0c1fd5a