



Trauma Care

Stop the Bleed, Spinal Immobilization, Splinting, and more

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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: 26 YOM in Single-Vehicle

Accident

Enter scene to find your patient unconscious in a smoking car in the middle of the road at night during heavy rain - What do you do first?

Scene Safety! Ensure you & partner are wearing reflective vests & freeway is blocked off by highway patrol from oncoming vehicles. Especially in these low visibility conditions, you don't want to become a 2nd patient!

What next?

Rapid extrication from smoking car if you determine it is safe for you to do so. THEN hold manual cervical stabilization and perform primary assessment once away from the hazard.

One partner should perform primary assessment and rapid head to toe trauma assessment, while the other partner comforts and gets information from the patient's sister

Scene Safety

Scene Safety in Emergency Response

Before providing care, responders must ensure the **scene is safe for themselves, their partner, and the patient!**

Why Scene Safety Matters

- Prevents **additional injuries to responders**
- Allows responders to **provide effective care**
- Ensures **EMS resources are not overwhelmed**

Examples of Scene Hazards

Motor Vehicle Accidents

- Traffic
- Fuel leaks
- Unstable vehicles
- Broken glass or debris

Environmental Hazards

- Downed power lines
- Fire or smoke
- Hazardous materials

Other Situations

- Natural disasters
- Violent or unsafe environments



Rapid Head to Toe Physical Exam

Expose, Palpate & Assess for DCAP-BTLS

Head	<ul style="list-style-type: none">• Pupils equal, round, reactive to light (PERRL)	Genitalia	<ul style="list-style-type: none">• assess based on chief complaint
Neck	<ul style="list-style-type: none">• jugular vein distention• tracheal deviation• spinal step off	Legs	<ul style="list-style-type: none">• circulation, motor function, sensation
Chest	<ul style="list-style-type: none">• auscultate lung sounds	Arms	<ul style="list-style-type: none">• circulation, motor function, sensation
Abdomen	<ul style="list-style-type: none">• soft & tender in 4 quadrants	Back	
Pelvis		SAMPLE	
		Focused Assessment (OPQRST)	
		Vital Signs	

- One EMT does entire Trauma assessment bc each partner assesses differently
- Do rapid assessment at scene, even if load-&-go patient
- Should take 60-90 seconds

- Run through entire assessment, noting any pain/deformity, & ONLY stop to treat life-threats
- Strip & flip if unconscious, only expose areas of concern if conscious



Skin wounds to check for during a trauma

- D: Deformities
- C: Contusions
- A: Abrasions
- P: Punctures
- B: Burns
- T: Tenderness
- L: Lacerations
- S: Swelling

MAKE SURE TO GO HEAD TO TOE!!

- Always treat severe bleed first if there is one



Scenario 1: 26 YOM in Single-Vehicle Accident



What is your field impression for the major life-threatening injury?

- Irregular respirations - cycles of rapid & shallow breathing followed by short periods of apnea
- Slow Heart Rate
- Negative PEARL
- Widened Blood Pressure

Traumatic Brain Injury → Increased Intracranial Pressure!



Traumatic Brain Injuries

Traumatic insult to the brain capable of producing physical, intellectual, emotional, social, & vocation changes

Primary Injury = immediate from bruising or penetrating objects

Secondary Injury = from hypoxia or lack of perfusion to the brain

Coup-Contrecoup injury - damage occurs at the direct point of impact AND on the opposite side due to the brain moving and striking the skull

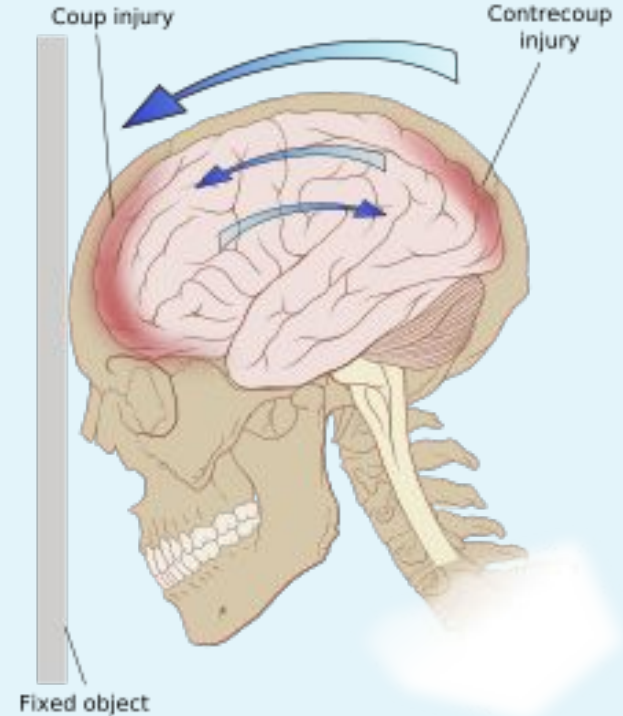
- Most common cause is due to Motor Vehicle Accidents
- Result = contusions (bleeding) and swelling within both sides of the skull

Concussion:

- temporary loss or alteration in brain function w/out physical damage
- May result in unconsciousness, confusion, amnesia
 - 90% of concussions do not experience LOC

Cerebral Contusion:

- Coup-Contrecoup bruising
- Bleeding & swelling that increases ICP



TBI Cont.

Space in the skull is fixed, so hemorrhage or swelling causes increased intracranial pressure leading to S&S of

- Headache
- nausea and vomiting
- Decreased responsiveness
- sluggish/nonreactive, dilated, or blown pupils
- **Cushing's Triad**
- Severe - posturing (decorticate or decerebrate)

Can lead to herniation bc blood levels displacing CSF in skull

Cheyne-Stokes Breathing

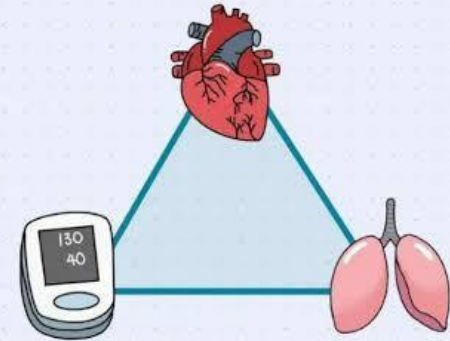
Rapid breathing followed by apnea



CUSHING'S TRIAD

Increased Intracranial pressure (ICP)

Bradycardia



Widened pulse pressure

Irregular respirations

Mechanism of injury - Kinetics of Trauma

Kinetics of Trauma: Study of how energy transfer causes injury

- Greater **speed, mass, and force** → **greater injury severity**
- Common in **motor vehicle collisions, falls, blasts**

Blast Injuries (Explosions)

- **Primary blast** → pressure wave damages lungs/ears
- **Secondary blast** → flying debris causes penetrating trauma
- **Tertiary blast** → person thrown into objects
- **Quaternary blast** → burns, inhalation injuries

Impact Phases in Trauma

Primary Impact

- Initial collision between **vehicle and object**
- Energy transferred to vehicle
- Example: car hits another car or wall

Secondary Impact

- **Patient's body hits interior of vehicle**
- Head → windshield
- Chest → steering wheel
- Knees → dashboard

Tertiary Impact

- **Internal organs strike inside the body**
- Brain against skull
- Organs against rib cage
- Can cause **internal bleeding or organ damage**

Scenario 1: 26 YOM in Single-Vehicle Accident



What indicates need for C-collar in this patient

Spinal Step-off (palpated during rapid head to toe assessment)

- Also head trauma causing altered level of consciousness

At what point should we apply C-collar to this patient?

AFTER treating XABCs in primary assessment & performing rapid head to toe trauma assessment



Spinal Motion Restriction



Manual Stabilization - for all traumatic injuries / blunt force trauma (do NOT release until c-collar)



C-Collar for Patients With:

- Midline neck or back pain/deformities, head trauma
- Numbness or weakness in any extremity
- Altered level of consciousness
- Distracting injuries that impair the patient's ability to contribute to a reliable examination

Once C-collar applied, manual stabilization only required when log-rolling patient

Then can place on backboard, scoop stretcher, vacuum mattress, or ambulance gurney

- Limit backboard utilization bc use can lead to additional/worse head, neck, back pain/injury, skin breakdown, or delays in care

NO SMR if

- penetrating trauma
- if life threatening XABC conditions not treated (SMR is secondary treatment)



SMR ALCO Protocols - Trauma severity

- **Minor trauma:**
 - ANO x 4
 - No spinal pain or neurological deficits
 - Ex: ground level fall
- **Moderate trauma (yellow patient)**
 - Concerning mechanisms or injuries
 - Patient stable but has pain or distracting injuries
 - Possible spinal injury
- **Severe trauma (Red Patient)**
 - High energy mechanism
 - Altered LOC
 - Neurological deficits
 - Spinal deformity or step off

ALCO Protocol Application

- **Yellow patient (moderate)**
 - Assess for midline spinal tenderness
 - Evaluate neurological symptoms
 - If positive findings → C-spine, spinal motion restrictions
- **Red patient (severe)**
 - Immediate manual spinal stabilization
 - Apply c-collar after XABCs
 - Perform full SMR
 - Prioritize life threats first

Scenario #1 application

Patient is classified as **RED trauma** because of:

- High energy mechanism
- Altered LOC
- Spinal step off on palpation

Action:

—> manual stabilization—> C -collar → Spinal motion restriction

Scenario 1: BMRC First-Aid Protocols



Immediate first aid

- **Control bleed**
 - Apply **direct pressure** to any open wounds
 - Use **gauze/bandaging** as needed
- **Maintain airway**
 - Ensure airway remains **open and clear**
 - Monitor for **vomiting or obstruction**
- **Support breathing**
 - Monitor **breathing rate and effort**
 - Place patient in **position that supports breathing if safe**

Injury management

- **Head injury care**
 - Monitor **level of consciousness**
 - Watch for signs of **worsening head injury**
- **Spinal precautions**
 - Maintain **C-spine stabilization**
 - Avoid unnecessary movement
- **Ongoing care**
 - Monitor **vital signs**
 - Reassess **mental status**
 - Keep patient **calm and still**
 - **Stay with patient until EMS arrives**



Scenario 2: Fallen 68 YOF w/ Bleeding + Fracture

Respond to a 68-year-old female, fallen from stool. Patient conscious but confused. Caller reports significant bleeding.

Scene Size Up

Patient lying on floor, eyes closed, pool of blood.

What should you do???

TRAUMA STRIP THAT PATIENT | Hold c-spine | Call ALS

Pool of blood → uncontrolled hemorrhage/significant bleeding → immediate life threat

Oh no! You find a 7 cm deep laceration on the right thigh with an arterial bleed.

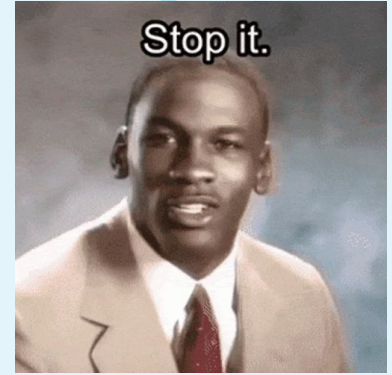
What should you do?



Scenario 2: Fallen 68 YOF w/ Bleeding + Fracture

STOP THE BLEEDING

First direct pressure (glove, gauze) → second direct pressure → tourniquet



Stop The Bleeding

Tourniquet

Indications

- Spurting blood (arterial)
- Severe extremity bleeding (arms or legs)
- Bleeding not controlled with direct pressure
- Large open fractures with major bleeding

Why is an arterial bleed worse than a venous bleed?

Placement

- 2-3 inches above wound
- Not over joints
- High and tight if location unclear
- Tighten until bleeding stops + no distal pulse

Contraindications

- Not for torso wounds
- Not for neck wounds
- Not for isolated minor bleeding

• Tourniquets are for life-threatening extremity hemorrhage, not minor bleeds.

If you happen to not have a tourniquet, what should you do?



Stop The Bleeding

Wound Packing

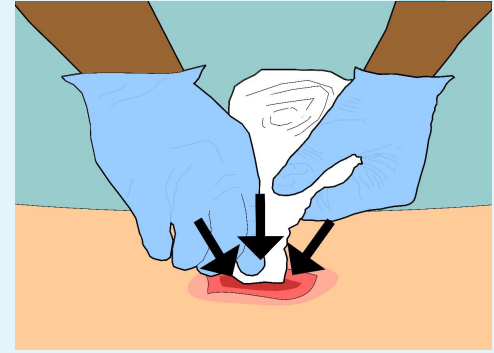
Indications

- Deep, tunneling wounds where bleeding source is further into the body
- When tourniquets cannot be applied
- When direct pressure does not stop bleeding

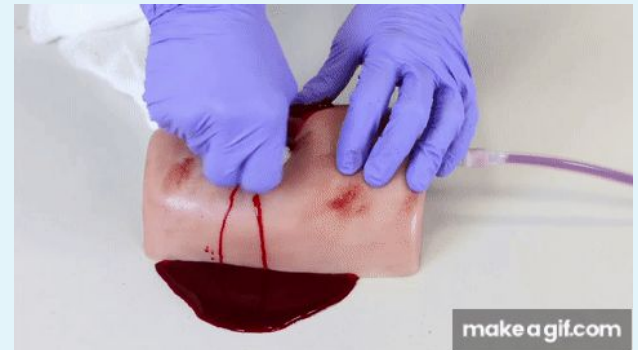
Placement → junctional areas: Groin, axilla, shoulder

- Locate bleeding source
- Pack wound with gauze/hemostatic gauze
- Keep direct pressure

- Contraindications: wound in chest/abdominal cavity, packing
- in neck can lead to obstruction of airway
-
-
- Make sure to pack to the source, not just the top.
-



Hemostatic gauze: gauze with clot-promoting agents that help accelerate coagulation at the bleeding site.



Stop The Bleeding

Occlusive Dressing

Indications

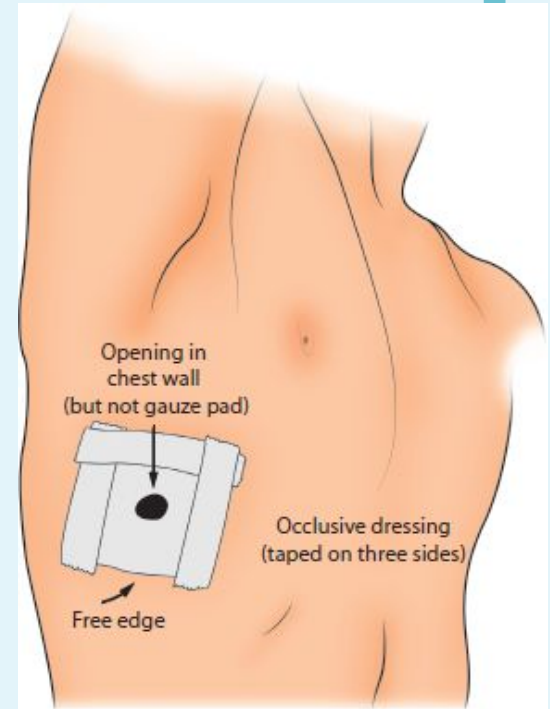
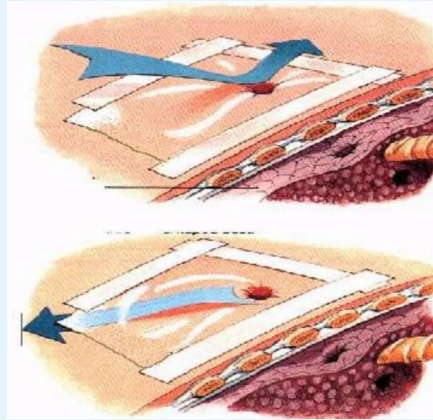
- Open chest wounds (sucking chest wound)
- Open abdominal evisceration (moist sterile dressing + occlusive cover)
- Open neck wound (with caution)

Placement

- Place dressing over wound
- Tape 3-sides → one-way valve

Why do we tape only 3 sides and not close off the wound?

Occlusive dressings manage air movement, not major extremity hemorrhage.



Source: Jesse B. Hall, Gregory A. Schmidt, John P. Kress: *Principles of Critical Care*, 4th Edition: www.accessmedicine.com Copyright © McGraw-Hill Education. All rights reserved.

Stop The Bleeding

A patient has a deep stab wound to the upper inner thigh (groin area). Blood is flowing heavily from a deep cavity. The wound is proximal.

Question: What bleeding control method would you use?

- A) Tourniquet
- B) Wound packing
- C) Occlusive dressing

Answer: Wound packing with hemostatic gauze + pressure dressing

Why?

- Junctional area
- Tourniquet cannot be placed
- Deep cavity that needs packing



Stop The Bleeding

A patient was stabbed in the chest. There is a 2-inch open wound on the left chest. You hear a sucking sound when the patient breathes.

Question: What bleeding control method would you use?

- A) Tourniquet
- B) Wound packing
- C) Occlusive dressing

Answer: Occlusive dressing (3-sided)

Why?

- Open chest wound
- Air movement is the priority



Stop The Bleeding

A 28-year-old male was involved in a motorcycle crash. He has a deep laceration to his mid-thigh. Bright red blood is spurting and pooling rapidly on the ground. Direct pressure briefly slows it, but bleeding continues heavily.

Question: What bleeding control method would you use?

- A) Tourniquet
- B) Wound Packing
- C) Occlusive dressing

Answer: Tourniquet

Why?

Severe extremity bleeding

Spurting (arterial)

Life-threatening

Located on limb where tourniquet can be applied



Scenario 2: Fallen 68 YOF w/ Bleeding + Fracture



Primary Assessment

AVPU → Verbal A&O X 2 (-) time, (-) event

A - patent, no obstruction/stridor, speaking in short/weak responses

B - tachypneic, shallow, slightly labored, equal chest rise/fall, clear lungs bilaterally

C - pale, cool, clammy, weak, rapid radial pulse, cap refill >3 sec

→ skin shows signs of shock and poor circulation/perfusion

→ pulse implies reduced blood flow, low blood pressure, or poor cardiac output

→ cap refill → impaired peripheral perfusion indicates low blood flow

The body is not receiving adequate blood flow based on skin signs, weak pulse, and a long cap refill.

- We already know the patient is AMS, showing signs of shock, and has experienced significant blood loss. What do you think is happening to the patient?

Hypovolemic Shock

Hypovolemic shock: a state of inadequate tissue perfusion due to decreased circulating blood volume.

1. Blood loss ↓
2. Circulating volume decreases
3. Cardiac output drops
4. Tissues receive less oxygen
5. Body compensates:
 - a. ↑ Heart rate
 - b. ↑ Vasoconstriction (↑blood pressure)
 - c. ↑ Respiratory rate

If untreated → decompensation → hypotension → organ failure.

Compensated or decompensated shock?

Decompensated (AMS, hypotension, weak pulse) → GET MOVING



Scenario 2: Fallen 68 YOF w/ Bleeding + Fracture



Secondary Assessment

SAMPLE → Medications – Warfarin

What kind of medication is Warfarin? And how does that relate to our scenario?

→ anticoagulant (blood thinner), prevents clot formation

Patient has traumatic bleeding → more severe, harder to control, longer-lasting.

Warfarin increases the risk of severe hemorrhage and worsening hypovolemic shock.

-
- Minor cuts and lacerations w/ blood-thinners → can be a big deal
-
- DCAP BTLS
- 2 cm laceration left forearm (direct pressure) + D, T, S on left thigh → closed femur fracture (traction splint)

Ortho Injuries + Splinting

Types of splints:

- Rigid (cardboard)
 - Suspected **fractures of arms or legs**
 - Used to **immobilize long bones** (radius, ulna, tibia, fibula)
 - Common for **forearm or lower leg injuries**
- Vacuum
 - **Irregular shaped injuries** or joints
 - Good for **ankle, wrist, or lower leg fractures**
 - Provides **custom immobilization and padding**
- Sling & Swathe
 - **Shoulder injuries**
 - **Clavicle fractures**
 - **Upper arm (humerus) injuries**
 - Used to **immobilize the arm against the body**
 -
- Traction Splint - only use for isolated midshaft femur fx
- Pelvic Binder

Stabilize in as close to anatomical position as possible (realign, DON'T reduce)

- Do NOT realign if open fx
- Assess CMS before & after splint
- Joints - splint long bones above & below
- Long bones - splint joints above & below



Scenario 2: Fallen 68 YOF w/ Bleeding + Fracture



Overall treatment

Bleeding control → tourniquet on right thigh (immediate)

Blood thinners → make sure to take care of smaller bleeds (2 cm laceration, left forearm)

Shock → NRB ~15 LPM, keep warm, transport supine

Traction splint

Stabilize → CMS → apply manual traction

→ apply splint device → recheck CMS

Contraindication:

→ open femur fracture

Load and go to nearest trauma center



Scenario #2 First Aid BMRC protocol

1. Scene Safety & Initial Actions

- BSI / PPE (gloves)
- Scene size up
- Identify **life-threatening bleeding**

2. Stop Life-Threatening Bleeding

- **Direct pressure** with gauze or dressing
- If bleeding continues → **apply tourniquet 2–3 inches above wound**
- If wound is deep/junctional → **pack wound with gauze + pressure**

3. Airway & Breathing

- Ensure **airway is open**
- Monitor breathing

4. Circulation & Shock Management

- Look for **pale, cool, clammy skin**
- Control bleeding immediately
- **Lay patient supine**
- **Keep patient warm**

5. Stabilize Injuries

- Suspected femur fracture → **manual stabilization**
- Assess **CMS**

6. Rapid Transport

- Patient showing **signs of hypovolemic shock**
- **Call ALS**

Thank you!
Questions?



Considerations for this patient

Now you've explained whatever through the format of Scenario + question → question answer → broad teaching of answer for MULTIPLE questions (1-3) (ie scene safety, trauma assessment, etc)
Give a page of considerations for the patient in scenario 1.

Examples of considerations:

- Oxygen, immediate stopping the bleed, c spine, etc.

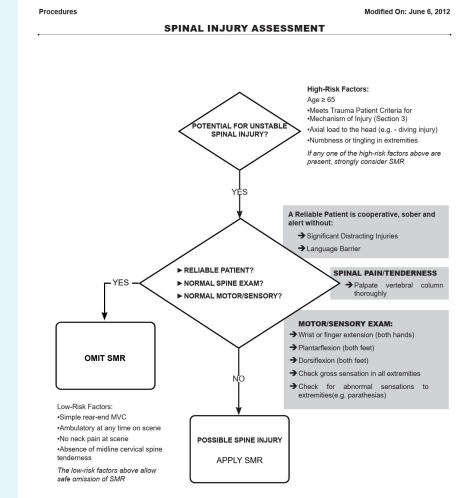
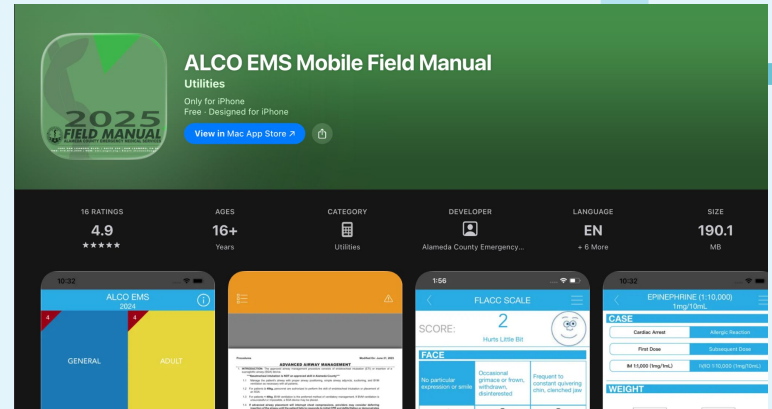
ALCO protocol

Now look up ALCO protocol regarding topics:

1. Use the app →
2. Or website

<https://ems.acgov.org/ClinicalProcedures/FieldTreatmentProtocols.page>
(a lot of trauma stuff is pg 25 and beyond)

Give the relevant protocol for the topic you're talking about.
IE if you spoke about cspine, put this pic:



BMRC First aid protocol

Unfortunately we are first aid scope so in addition to alco protocol do first aid. Use the [new member academy slides](#) as a reference, hmu if unsure:

Do's of First-Aid Scope

What you CAN do

- Supply of band aid, cold-packs
- Cardiopulmonary Resuscitation (CPR) with automated external defibrillator (AED)
 - Always bring AED to events!
- Interventions (e.g. heimlich maneuver) for patients who show signs and symptoms of choking
- Position patient to avoid further injury and provide comfort
- Measurement of vital signs, including but not limited to manual blood pressure, heart rate, and respiration rate
- Request of additional medical personnel and/or interventions, such as calling UCPD, 911, or poison control
 - YOU MUST BE THE ONE TO CALL 911



Don'ts of First-Aid Scope

What you CAN NOT do

- Administration of medication, including but not limited to oxygen, oral glucose, narcan, nitroglycerine, aspirin, and epinephrine (via EpiPen)
- Airway management and ventilation support through bag-valve mask (BVM) or supraglottic airway
- Using an automated blood pressure cuff or pulse oximeter
- Package/application of wound dressings
- Assessment and splinting of physical injuries such as broken bones
- Assessment and movement of patients with suspected spinal injuries
- Movement or transport of patients on backboard, gurney, or stair chair
- Restraints of patients when the patient pose threats to self or others

When in doubt, reach out to @MedOps!

