

Riot Medicine: Field Guide

Håkan Geijer

2020-08-19

Table of Contents

Introduction	2
Allergies and Anaphylaxis	3
Asthma	4
Athletic Injuries	5
Basic Life Support	7
Blast Injuries	8
Brain Injuries	9
Burns	10
Cardiac Chest Pain	14
Compartment Syndrome	14
Dehydration	15
Dog Bites	16
Drug Overdoses	17
Flail Chest	21
Fractures and Dislocations	22
Frostbite	24
Gunshot Wounds	26

Handcuff Neuropathy	26
Heat Illness	27
Hematomas	29
Hyper- and Hypoglycemia	30
Hyperventilation	31
Hypothermia	32
Internal Bleeding	34
Lung Injuries	34
Non-Freezing Cold Injuries	36
Open Abdominal Wounds	37
Psychological Care	38
Pulmonary Embolism	39
Rib Fractures	39
Riot Control Agent Contamination	40
Scalp Injuries	42
Seizures	43
Serotonin Syndrome	44
Shock	45
Skull Fractures	46
Spinal Injuries	48
Stab Wounds	49
Stroke	49
Wound Management	50

Introduction

This book is a companion to the book *Riot Medicine* and is intended to be used as a field guide for riot medics. It does not cover theory, and it does not have detailed explanations or clarifications of terms or treatments. Reading this book without first reading

Riot Medicine can endanger patients. Neither this book nor *Riot Medicine* are substitutes for formal training.

This book is short and meant to be carried in your bag as a quick reference if you find yourself needing to double check signs, symptoms, or treatment. Ideally most of this information should be memorized.

Copyright

There is none. This book is in the public domain under a Creative Commons Zero license. Because this is not a standalone book, and because annotations can be distracting, attribution and references are only available in *Riot Medicine* itself.



Allergies and Anaphylaxis

Allergic reactions are caused by a hypersensitive immune system overreacting to harmless (or minimally harmful) substances. Anaphylaxis is a severe allergic reaction that has rapid onset, sometimes within minutes of exposure to the allergen.

Signs and Symptoms

- Mild to moderate reactions:
 - Hay fever:
 - * Runny nose and sneezing
 - * Red, watering, itchy eyes
 - Local allergic response:
 - * Redness of the skin, swelling, and itching
 - * Hives and welts:
 - Local after contact with allergen
 - May be global after ingestion of allergen
- Severe reactions and anaphylaxis:
 - Early signs are the signs of hay fever and hives

- Swelling of the airway, lips, and tongue
- Feeling a lump in one’s throat
- Shortness of breath
- Abdominal pain or cramps, nausea, vomiting, or diarrhea
- Decreased blood pressure
- Respiratory distress

Treatment



Figure 1: Epinephrine Injection

- Remove the allergen
- Apply a cold compress
- Consider administering antihistamines before the patient’s airway closes
- Consider use of an inhaler
- Monitor their airway
- For severe reactions:
 - Consider epinephrine (fig. 1)
 - Treat for shock
 - Evacuate to advanced medical care

Asthma

Asthma is a long term disease of the airways of the lungs that results in restricted airflow and difficulty breathing. To a medic, other

respiratory conditions such as COPD or ARDS are indistinguishable from asthma exacerbation, so for simplicity they are all treated the same.

Signs and Symptoms

- Early signs:
 - Shallow breathing, wheezing, and coughing
 - Complaints of chest tightness and constriction
- Late signs:
 - Prolonged expiration phase
 - Increased respiratory rate and heart rate
 - Use of accessory muscles during respiration or paradoxical breathing
 - Altered mental status, lethargy, or cyanosis

Treatment

- Move patient away from irritants and decontaminate
- Sit patient leaning forward with arms on knees
- Remove constrictive clothing
- Administer bronchodilators
- Coach the patient on breathing:
 - Inhale through the nose for 2 seconds
 - Exhale through puckered lips for 4 seconds
- Administer humid air
- Consider administering epinephrine
- Evacuate to advanced medical care

Athletic Injuries

Athletic injuries are injuries to muscle, tendon, and ligament caused either by trauma or overuse.

Sprains

A sprain is an overstretched or torn ligament.

Signs and Symptoms

- Pain and swelling:
 - Edema may occur rapidly due to broken blood vessels
- Audible popping or cracking sounds during injury
- Joint instability
- Loss of range of motion
- Inability to bear weight or load

Strains

A strain is an overstretched or torn muscle, tendon, or both.

Signs and Symptoms

- Pain and localized inflammation
- Loss of strength in affected muscle

Tendinitis

Tendinitis is the inflammation of a tendon, possibly caused by disease, injury, repetitive use, or overuse.

Signs and Symptoms

- Localized pain, redness, and warmth:
 - Pain is exacerbated by exercise and palpation

Treatment

Treatment for all athletic injuries is similar.

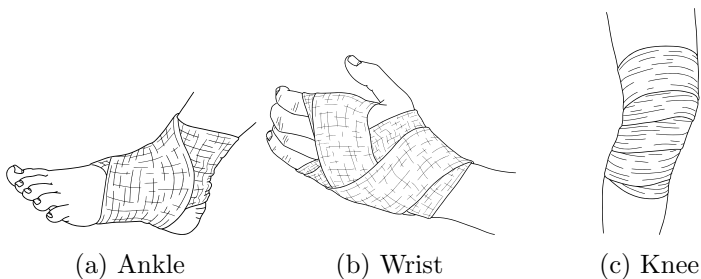


Figure 2: Wrapping Joints

- Consider wrapping and splinting:
 - Ankle: Figure 8's around angle (fig. 2a)
 - Wrist: Diagonal wraps with hand open and fingers spread (fig. 2b)
 - Knee: Diagonal wraps as close to the knee as possible (fig. 2c)
- Consider use of NSAIDs
- Use PRICE method
- Use No HARM method
- Consider evacuation:
 - Minor injuries should be sent home
 - Major athletic injuries require follow up by a physician
- Recommend light exercise after the first 24-48 hours

Basic Life Support

Basic life support (BLS) are the steps taken when a patient is either not breathing, has no pulse, or both. BLS is both artificial respiration and cardiopulmonary resuscitation.

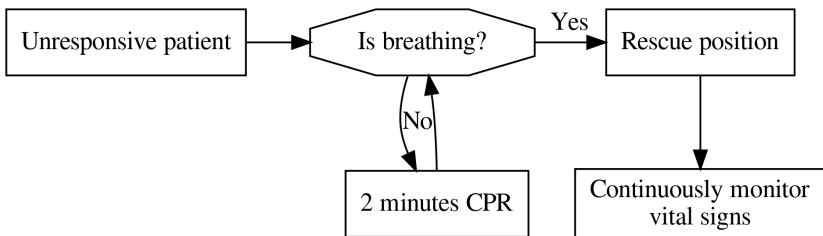


Figure 3: BLS Flowchart

Treatment

- Look, listen, and feel for signs of life for 10 seconds
- If the patient is conscious or breathing, place them in the rescue position

- If the patient is not breathing, call EMS and immediately begin CPR:
 - Deliver 30 chest compressions at 100 BPM followed by 2 ventilations
 - Every 2 minutes check if the patient is breathing
 - If two medics are present:
 - * Medic 1 (at the patient’s head):
 - Gives commands
 - Delivers ventilations
 - Prepares an AED, attaches electrodes, and delivers shocks
 - * Medic 2 (at the patient’s side):
 - Delivers chest compressions
- When the patient begins breathing, place them in the rescue position

Blast Injuries

Blast injuries are caused by explosions such as by explosive devices or high-voltage electrical shocks.

Signs and Symptoms

- MOI is an explosive device or patient was in proximity to an explosion or high voltage electrical shock
- Obvious external trauma
- Pulmonary barotrauma with hypoxia, cyanosis, or reduced SpO₂

Treatment

- Treat trauma following standard procedures for wounds, burns, fractures, and lung injuries
- Treat for shock
- Monitor vital signs
- Evacuate all patients to advanced medical care

Brain Injuries

This chapter focuses primarily on traumatic brain injuries.

Signs and Symptoms

- Mild traumatic brain injury (MTBI):
 - Altered LOC, anything below A+O×4
 - Altered cognition:
 - * Mood changes
 - * Confusion
 - * Difficulty with thinking
 - * Anterograde or retrograde amnesia
 - Sensory disturbances such as seeing stars, seeing double, blurred vision, or tinnitus
 - Nausea and vomiting:
 - * Vomiting without nausea indicates increased ICP
 - Generalized unwellness:
 - * Headache or lightheadedness
 - * Dizziness or difficulty balancing
 - * Lethargy and fatigue
- Severe traumatic brain injury:
 - Any signs of a MTBI
 - Persistent or worsening headache or vision disturbances
 - Protracted nausea or vomiting
 - Pupil changes:
 - * One or both pupils dilating
 - * Pupils that do not respond to light
 - Severely altered cognition:
 - * Alternating periods of responsiveness and unresponsiveness
 - * Steadily decreasing LOC
 - * Progression from disoriented to irritated to combative to unresponsive
 - * Convulsions or seizures

- * Abnormal posturing in particular in response to a painful stimulus
- Altered vital signs:
 - * In particular Cushing’s Triad that indicates increased ICP:
 - Decreased heart rate
 - Decreased respiratory rate
 - Increased blood pressure
- Bleeding from the ears

Treatment

- Consider personal and patient safety with combative patients
- Monitor the patient for worsening signs:
 - Have them sit and relax
 - Converse with them to assess alertness and cognitive ability
 - Ask them to remember a word and ask them later
- Consider immobilization to for possible spinal injuries
- Use the rescue position for patients with degraded consciousness
- Evacuate:
 - To advanced medical care:
 - * Patients who lost consciousness
 - * Patients with any signs of a severe TBI
 - To home:
 - * Patients who fell below A+O×4, had confusion, or had other degraded cognitive functions
 - * Patients sent home should be monitored by a comrade for 24 hours

Burns

Burns are injuries to the skin and other tissue causes by heat, cold, chemicals, and radiation.

Signs and Symptoms

Table 1: Burn Classification

Classification	Characteristics
Major	Partial-thickness > 25% TBSA, age 10–50 Partial-thickness > 20% TBSA, age < 10 or > 50 Full-thickness 10% TBSA Burns to hands, face, feet, or groin; or crossing major joint Circumferential burns to an extremity Known inhalation injury Electrical burns Burns complicated by fractures or other trauma
Moderate	Partial-thickness 15–25% TBSA, age 10–50 Partial-thickness 10–20% TBSA, age < 10 or > 50 Full-thickness ≤ 10% Suspected inhalation injury No characteristics of a major burn
Minor	Partial-thickness < 15% TBSA, age 10–50 Partial-thickness < 10% TBSA, age < 10 or > 50 Full-thickness < 2% No characteristics of a major burn

Burns vary in severity depending on their size, depth, and location. Examples of burns at different depths can be seen in fig. 4. Classification guidelines are in tbl. 1.

- Burn depths:
 - Superficial:
 - * Skin is red, tender, painful, and blanches white when pressed
 - * **No** blisters
 - Superficial partial-thickness:
 - * Skin is red, tender, extremely painful, and blanches white when pressed
 - * Blisters
 - * Exposed dermis is red and moist

- Deep partial-thickness:
 - * Dermis is white to yellow and does not blanch white when pressed
 - * May not be painful, only feeling of pressure or discomfort
- Full thickness:
 - * Skin is stiff, white or brown, has a leathery texture, and may be charred
 - * Painless
- Inhalation injury:
 - Burns to the face
 - Singed facial hair
 - Constricted airway, coughing, wheezing, or stridor
- Carbon monoxide poisoning:
 - Headache, nausea, vomiting, lethargy, or weakness
 - Chest pain (angina pectoris) or shortness of breath
 - Ataxia, syncope, seizures, or coma

Treatment

- For chemical burns:
 - Brush off dry chemicals
 - Flush with large amounts of water
 - Remove the patient's contact lenses if contaminated
- For thermal burns:
 - Stop by the burning (stop, drop, roll, smother)
 - Rapidly cool the burns with water
- Remove jewelry and clothing:
 - **Do not** remove material melted to the skin
- Clean and irrigate the wounds:
 - **Do not** pop blisters

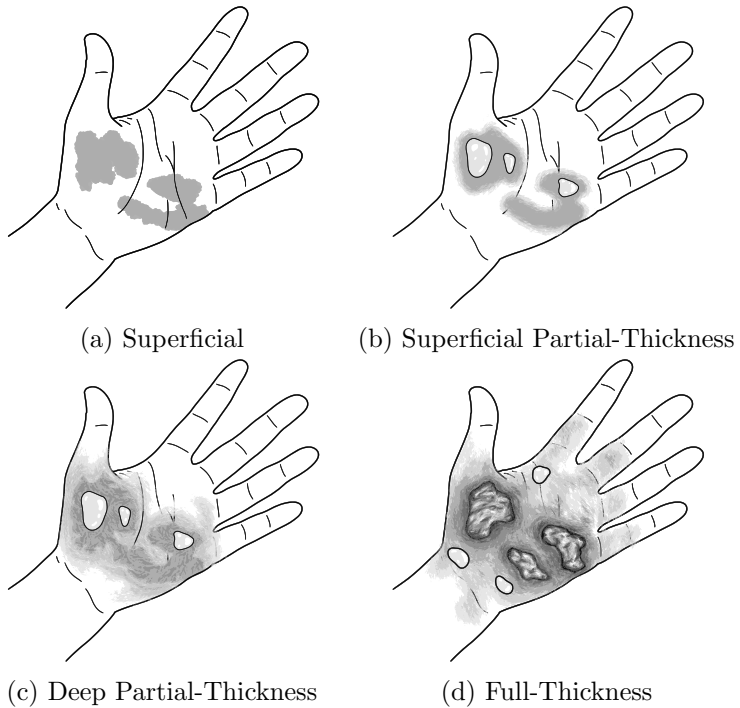


Figure 4: Burn Characteristics

- Apply antiseptic, and dress the wounds:
 - Burns $< 3\%$ TBSA: wet dressing
 - Burns $> 3\%$ TBSA: dry dressing
- Check for inhalation injury
- Treat for shock
- Consider advanced medical care:
 - Major burns: burn center
 - Moderate burns: hospital
 - Minor burns: sent home or to a family doctor

Cardiac Chest Pain

Chest pain can be cryptic, and in the worst case it suggests heart dysfunction.

Signs and Symptoms

There are no signs and symptoms that can rule out acute coronary syndrome (ACS) as a cause of chest pain. When in doubt, assume it is ACS and evacuate.

- Pain:
 - Crushing and vice-like feeling of pressure in the chest
 - Aching, sharp, or stabbing pain in the chest, upper back, or shoulders
 - Pain radiating into the arms or neck
 - In women, pain may be in the upper abdomen and include nausea
- Shortness of breath
- Pale, cool skin
- Sweating
- Feelings of anxiety, great unwellness, or impending doom

Treatment

- Calm the patient
- Consider administering aspirin (160 to 325mg, chewed)
- Remind the patient to take heart medications such as nitroglycerin
- Treat for shock
- Evacuate the patient to advanced medical care

Compartment Syndrome

Compartment syndrome is increased pressure within a fascial space. This increased tissue pressure eventually leads to ischemia.

Signs and Symptoms

- Worsening pain and pain that is out of proportion with the original injury
- Pain that is worsened by passive stretching of muscles
- Pallor or cyanosis of tissue distal to the injury
- Absent pulse distal to the injury
- Sense of pressure in the compartment
- Compartment feels tense when palpated
- Principally identified by the 5 P's of critical limb ischemia
 - Pain, pallor, paraesthesia, paralysis, pulselessness

Treatment

There is no non-surgical treatment. Evacuate to advanced medical care.

Dehydration

Dehydration is a state of deficiency of the total amount of water in the body that may be caused by sweating, vomiting, diarrhea, or increased urination.

Signs and Symptoms

- Mild dehydration:
 - Thirst and a dry or sticky mouth
 - Dark yellow urine, headache, or muscle cramps
 - Skin that is dry and cool
- Severe dehydration:
 - Decreased or absent urine output, or very dark urine
 - Dizziness, increased heart rate, increased respiratory rate, sunken eyes, lethargy, and syncope
 - Hypovolemic shock
 - Seizures

Treatment

- If the patient can drink on their own, give them, water, sports drinks with electrolytes, or oral rehydration solution (ORS, tbl. 2)
 - Avoid soda and full-strength juice in patients with diarrhea
 - **Do not** use drinks containing alcohol, seawater, or urine
- **Do not** give patients solid foods until they are rehydrated

Table 2: Simplified ORS Recipe

Ingredient	Amount
Water	1L
Sodium chloride	3g (pinch)
Sugar	25g (small handful)

Dog Bites

Dogs are often trained to bite once and hold, but individuals may have multiple bites. Dog bites can lead to puncture wounds, lacerations, crushed bones, and damaged muscles, tendons, and nerves. The bacteria in a dog's mouth can lead to infection including MRSA.

Treatment

Treatment for the injuries follow like they would for puncture wounds or fractures not caused by dog bites. Additionally:

- **Do not** close wounds in immunocompromised patients
- Close wounds if:
 - They have simple characteristics
 - They are on the face or scalp
 - They do not extend into subcutaneous tissue
 - There is no underlying fracture

- Recommend patients see advanced medical care to prevent infection, to retain function, and for cosmetic reasons

Drug Overdoses

In the context of riot medicine, drug overdoses refer to accidental overdoses of recreational drugs.

General Treatment

Some treatment principles are general and can be applied to all types of overdoses.

- Deescalate to protect yourself, bystanders, and the patient
 - Deescalation minimizes police involvement
- Determine the drug(s) consumed:
 - Interview the patient and bystanders
 - Search their pockets and bags
- **Do not** give the patient food or drink unless the patient appears to be recovering and can eat and drink on their own
- **Do not** induce vomiting
- Place patient in the rescue position
- Calm bystanders and keep them away from the police

Alcohol Overdoses

In this chapter, alcohol refers to ethanol.

Signs and Symptoms

- Mild intoxication:
 - Euphoria and increased sociability
 - Impaired judgement, difficulty concentrating, impaired fine motor control
 - Flushed skin
- Moderate intoxication:
 - Delayed reactions and confusion

- Impaired senses and analgesia
- Ataxia, dizziness, and vomiting
- Severe intoxication:
 - Severe ataxia
 - Periods of unconsciousness
 - Anterograde amnesia
 - Decreased heart and respiratory rates
 - Pupils that do not respond to light and coma
- Patients may also have hypotension, hypothermia, or hypoglycemia

Treatment

There is no way to reverse alcohol intoxication, and most common treatments only alleviate the perception of intoxication.

- Monitor the patient and determine if they need advanced medical care
- Consider increased overdose risk if the patient has also used cocaine, barbiturates, benzodiazepines, or opioids
- Avoid letting them “sleep it off” as this can lead to death via aspiration or apnea

Opioid Overdoses

Opioids are natural and synthetic substances that are primarily used for pain relief and anaesthesia including opium, morphine, codeine, hydrocodone, heroine, and fentanyl.

- Effect peak:
 - Oral: 30-60 minutes (90 minutes for controlled release)
 - Nasal/Injection: Near instantaneous peak
- Effect duration: 1-6 hours

Signs and Symptoms

- Euphoria and reduction in anxiety
- Drowsiness, disorientation, and delirium
- Flush and warm skin
- Constricted pupils
- Analgesia, muscle weakness, and muscle spasms
- Nausea
- Decreased blood pressure, respiratory rate, and heart rates
- Seizures

Treatment

- Administer 2mg of naloxone every 2-3 minutes until the patient improves up to a maximum of 10mg:
 - Narcan typically comes in 4mg doses with 50% bioavailability when administered nasally
 - May need to re-administer the duration of action of naloxone is shorter than opioids
 - Watch for signs of withdrawal after administering
 - Beware of agitation and combativeness as the patient may be on multiple drugs
- Consider evacuation to advanced medical care for extended monitoring

Sedative-Hypnotic Overdoses

Sedatives are substances that have a calming effect, and hypnotics are substances that induce sleep. They include phenobarbital, diazepam (Valium), ketamine, and GHB.

Signs and Symptoms

General signs and symptoms across many sedative-hypnotics include the following:

- Euphoria and calmness
- Loss of coordination, slurred speech, muscle weakness, and difficulty concentrating

- Decreased blood pressure, respiratory rate, and heart rate
- Loss of consciousness

Treatment

- Consider placing the patient in the rescue position and monitor their ABCs
- Evacuate to advanced medical care
- Consider administering naloxone if opioids cannot be ruled out

Stimulant Overdoses

Stimulant is a broad classification of drugs that increase CNS activity or are found to be invigorating. Common recreational stimulants methamphetamine, MDMA, and cocaine.

Signs and Symptoms

- Feelings of happiness and elevated energy levels
- Agitation and paranoia
- The feeling of bugs on or under the skin
- Sweating:
 - Possibly accompanied by dehydration
- Dilated pupils
- Increased heart rate, blood pressure, and body temperature
- Psychosis at high doses:
 - Paranoia, feeling of persecution, anxiety, delusions, and hallucinations
- Acute coronary syndrome (ACS)

Treatment

- Consider treating for hyperthermia
- Consider evacuation for patients with signs of ACS or serotonin syndrome

Hallucinogen Overdose

Hallucinogens are not a distinct category. Classically they include LSD and psilocybin (mushrooms). Cannabis, MDMA, and ketamine are also hallucinogens.

Signs and Symptoms

- Physical changes:
 - Dry mouth
 - Mydriasis
 - Hypothermia or hyperthermia
 - Sweating
 - Increased heart rate
 - Seizures (rarely)
- Mental changes:
 - Detachment from reality
 - Auditory and visual hallucinations
 - Delusions
 - Apparent confusion and lack of focus
- “Bad trip”:
 - Panic, erratic behavior, and hyperventilation
 - Feeling trapped
 - Ego death

Treatment

- Calm the patient
- Attempt to alleviate claustrophobia or agoraphobia
- Remove excess stimuli such as bright lights and loud noises
- Help the patient ground themselves in reality by giving them an object to focus on

Flail Chest

Flail chest (unstable chest wall) is when multiple adjacent ribs have fractures with displacement in multiple places causing a segment of the thoracic wall to move independently of the rest of the chest.

Signs and Symptoms

- MOI involves large forces
- Pain at the site and tenderness when palpated
- Sharp, stabbing pain when breathing or coughing
- Paradoxical breathing (fig. 5)

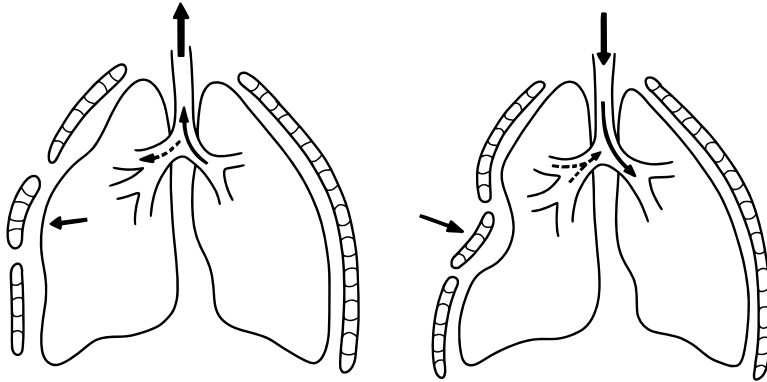


Figure 5: Paradoxical Breathing

Treatment

- Stabilize the chest wall using tape and bulky dressings
- Position the patient comfortably
 - Possibly reclined
 - Possibly laying on the injured side with bulky clothing held against the injury
- Treat for shock
- Consider administering NSAIDs in cases of prolonged evacuation
- Evacuate to advanced medical care

Fractures and Dislocations

A fracture is a break in the continuity of a bone. A dislocation is the abnormal separation of the bones of a joint.

Signs and Symptoms

- Pain and tenderness
- Discoloration (bruising or redness)
- Unnatural movement of the appendage or joint
- Stiffness, loss of range of motion, or loss of strength
- Weak or absent distal pulse

Treatment

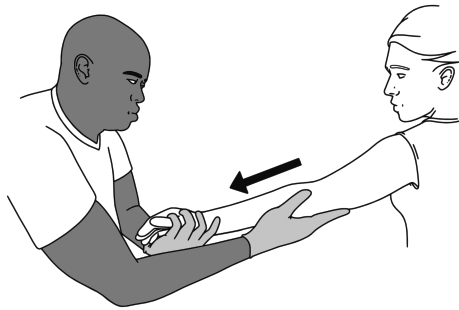


Figure 6: In-Line Traction

- Remove tight clothing or jewelry
- Consider in-line traction (fig. 6) or reduction to ease pain and aid splinting:
 - Prefer transporting the injury as is without traction/reduction
- Immobilize the injury using a splint:
 - Splint the injury in position of function if possible
 - Sling and swathe clavicle fractures (fig. 7)
- Check CSM during evacuation:
 - Loosen splints if there is absent CSM
- Consider treating for shock
- Consider compartment syndrome:
 - Look for 5 P's of critical limb ischemia

- * Pain, pallor, paraesthesia, paralysis, pulselessness
- Compartment syndrome requires immediate evacuation
- Use the PRICE method if evacuation is delayed
- Consider evacuation:
 - Fractures to the femur, fracture to the pelvis, compartment syndrome, and absent CSM require immediate evacuation

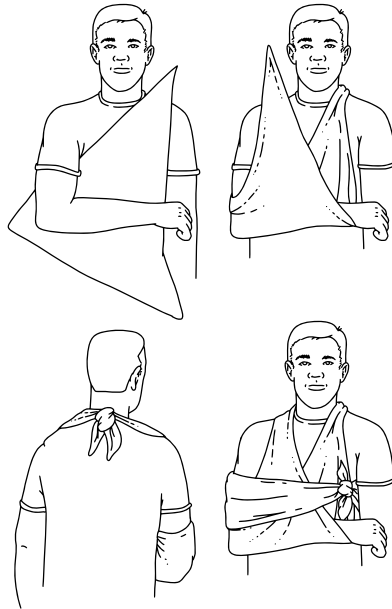


Figure 7: Sling and Swathe

Frostbite

Frostbite is the freezing of tissue that typically occurs in the fingers, toes, and face.

Signs and Symptoms

Frostbite is classified based off the apparent depth and amount of tissue damage after rewarming. This is difficult to estimate prior to warming.

- Pale, waxy, and mottled skin
- Skin is cold to the touch and if exposed may have frost on it
- Tingling, numbness, or pain in the body part
- Estimated classification:
 - First degree: the skin is soft
 - Second degree: the skin feels hard, but deeper tissues feel soft
 - Third and fourth degree: the body part feels frozen solid

Treatment

- Frostnip can be quickly treated in the field
 - Place hands under the armpits
 - Cup the hands and breath warm air on to the face
- Other frostbite requires evacuation and thawing
- Protect the frozen body part and avoid use during evacuation
- Prevent additional swelling with NSAIDs
- **Do not** thaw the body part until you reach definitive care
 - However, **do not** skip treating hypothermia even if this would cause early thawing
- **Do not** use dry heat (fire, lamps, heat packs) or rubbing to thaw the body part
- Thaw the body part using warm water (37 to 39 °C)
- Dry the body part
- **Do not** pop blisters
- Administer fluids
- Wrap the body part with gauze, leaving room for swelling

Gunshot Wounds

Gunshot wounds are traumatic injuries caused by projectiles shot from firearms.

Treatment

Treatment for gunshot wounds follows principles for the underlying wounds such as hemorrhage, pneumothorax, fracture, and shock.

- Control bleeding, in particular:
 - Use hemostatic gauze for abdominal injuries
 - Use a tourniquet for extremities
 - Consider use of a vented chest seal for chest
- Search for and control bleeding of both entry and exit wounds
- **Do not** remove bullets or bullet fragments
- Splint and stabilize fractures
- Treat for shock
- Evacuate to advanced medical care

Handcuff Neuropathy

Handcuff neuropathy is neuropathy of the hand caused by compression of nerve of the hand and wrist.

Signs and Symptoms

- Tingling and numbness
- Weakness of the hands
- Possible edema and redness

Treatment

- Remove watches, jewelry, and other things that compress the wrist
- Apply cold compresses to reduce swelling
- Consider administering NSAIDs
- Recommend follow up with a physician for persistent symptoms

Heat Illness

Heat illness is a range of illnesses caused by exposure to hot environments.

Heat Edema

Heat edema is heat-induced swelling of feet, ankles, and hands. It is not dangerous. Treatment is to elevate the body part and apply compression stockings.

Heat Rash

Heat rash occurs when sweat glands become plugged and rupture causing vesicles to form under the skin.

Signs and Symptoms

- Small, red, itchy rashes that possibly include white bumps
- May not be sweaty
- May appear to be herpes zoster (shingles)

Treatment

Symptoms resolve on their own when the patient is removed from a hot environment.

- Apply calamine lotion to reduce itching
- Scrub the affected area with salicylic acid

Heat Cramps

Heat cramps are painful, involuntary muscle spasms typically in the calves but may be in the shoulders or thighs.

Treatment

- Move the patient to a cool location
- Administer isotonic or hypertonic fluids
- Slowly and gently stretch the muscle
- **Do not** massage the muscle
- Discourage exercise to prevent re-cramping

Heat Syncope

Heat syncope is dizziness and fainting due to hyperthermia. It is caused by hypotension as a result of systemic vasodilation and the pooling the blood in the legs.

Signs and Symptoms

- Headache, tunnel vision, or malaise
- Sudden syncope

Treatment

- Treat for heat stress
- Consider checking BG and treating for hypoglycemia
- Watch for additional syncope when the patient stands up

Heat Stress

Heat stress (heat exhaustion) is a syndrome of non-specific symptoms caused by heat exposure that is generally characterized by malaise. It is itself not dangerous, but it is a precursor to heat stroke and should be preemptively treated.

Signs and Symptoms

- Any of the symptoms of heat cramps, heat syncope, and dehydration
- Nausea, headaches, malaise, dizziness, orthostatic hypotension, and increased heart rate
- Core temperature may be normal or elevated, but is typically not above 40 °C
- **No** altered mental status like in heat stroke

Heat Stroke

Heat stroke is characterized by a core temperature over 40 °C and a altered mental status.

Signs and Symptoms

- All of the signs and symptoms of heat stress.
- Patient **may** or **may not** stop sweating

- Altered mental status: ataxia, irritability, confusion, hallucinations, delirium, abnormal posturing, seizures, and coma
- Seizures may occur while cooling the patient

Treatment

Neurological damage from hyperthermia is a function of maximum temperature reached as well as duration of hyperthermic temperature.

- Remove the patient from the source of the heat
- Remove excess clothing
- Cool the patient:
 - Douse them with cool water and fan them
 - Fill bags with ice and a small amount of water and cover the patient with them
- If the patient's LOC allows it, rehydrate them
- **Do not** administer antipyretics
- For suspected heat stroke, evacuate to advanced medical care

Hematomas

A hematoma is a collection of blood outside of the blood vessels. A contusion (bruise) is a type of hematoma characterized by the leakage plasma or blood into the surrounding tissue caused by damaged capillaries.

Signs and Symptoms

- Localized pain, swelling, and discoloration

Treatment

- Apply ice or a cold-pack to minimize swelling
- Check for underlying fractures
- Consider immobilizing the limb if the hematoma is particularly painful
- Instruct patient to use a warm compress after the first 12 hours to aid in fluid reabsorption

- Suggest the patient seek advanced medical care to drain large hematomas with pooled blood

Hyper- and Hypoglycemia

Hyper- and hypoglycemia are typically found in patients with diabetes.

Table 3: Normal and Target Blood Glucose Levels

Individual	Fasting BG	Post-Meal BG
Non-diabetic	4.4–5.5 mmol/L (80–100 mg/dL)	4.4–7.7 mmol/L (80–140 mg/dL)
Diabetic	4.4–7.2 mmol/L (80–130 mg/dL)	4.4–10.0 mmol/L (80–180 mg/dL)

Hyperglycemia

Hyperglycemia is abnormally high blood sugar, over 11.1 mmol/L (200 mg/dL).

Signs and Symptoms

- Nausea, vomiting, increased thirst, and increased volume of urine output
- Signs of dehydration such as flushed, dry skin
- Headache, blurred vision, or fatigue
- Altered mental status or appearing “drunken”
- Seizures or coma

Treatment

- **Do not** administer insulin:
 - If the patient is alert, allow them to self-administer
- Administer fluids
- **Do not** remove or adjust insulin pump
- If you are unsure if the patient has hyper- or hypoglycemia, administer glucose like for hypoglycemia
- Treat for shock
- Evacuate the patient to advanced medical care

Hypoglycemia

Hypoglycemia is abnormally low blood sugar, below 3.9 mmol/L (70 mg/dL).

Signs and Symptoms

- Hunger, fatigue, or weakness
- Irritability or anxiety
- Dizziness or headaches
- Sweating or shaking
- Pallor or skin that is cool and clammy
- Mental changes including confusion and disorientation
- Diabetic coma

Treatment

- Orally administer glucose (dextrose), common sugar (sucrose), or simple carbohydrates:
 - **Do not** use artificially sweetened food or drink
 - In unconscious patients, rub a small amount of glucose on the patients gums, cheeks, and under their tongue
- **Do not** remove or adjust insulin pump
- Recommend evacuation to their home if the patient has minor mental changes
- Evacuate to advanced medical care patients with reduced consciousness or unexplained low BG

Hyperventilation

Hyperventilation is increased respiratory rate or tidal volume that eliminates carbon dioxide from the blood faster than the body generates it.

Signs and Symptoms

- Patient is panicked, stressed, or anxious
- Increased respiratory rate or increased respiratory rate and depth

- Feeling of light headedness or suffocation despite normal SpO₂
- Tingling feeling in hands or mouth
- Cramping and contraction of the hands and feet
- Stabbing chest pain
- Syncope

Treatment

- Calm the patient
- Coach the patient on breathing
 - Inhale for 7 seconds, exhale for 11 seconds
- **Do not** use bag rebreathing

Hypothermia

Hypothermia is a core temperature below 35 °C often caused by a cold environment, failed thermoregulation, or heat loss due to evaporation.

Signs and Symptoms

Classification of hypothermia is principally determined by the presence and absence of shivering and vital signs (tbl. 4). Other signs and symptoms are:

- Impaired muscular performance
- Mental deterioration such as clumsiness, irritability, and confusion
- Decreased blood pressure, heart rate, and respiratory rate
- Increased urination

Table 4: Hypothermia Classification

Severity	Symptoms	Est. Core Temp.
Mild	Mildly impaired consciousness, shivering	35 to 32 °C
Moderate	Noticeably impaired consciousness, not shivering	< 32 to 28 °C
Severe	Unconscious, not shivering, vital signs present	< 28 to 24 °C
Profound	No vital signs	<24 °C

Treatment

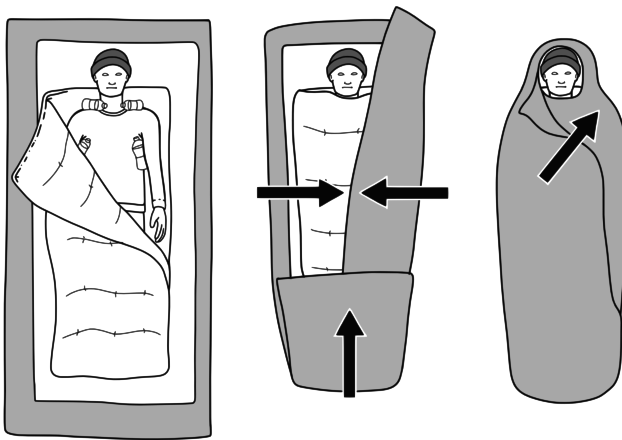


Figure 8: Hypothermia Wrap

- Dress the patient in warm, dry clothing
- Wrap the patient in emergency blanket
- Feed and hydrate the patient
- Make a hypothermia wrap (fig. 8)
- **Do not** use a warm bath
- Have the patient avoid exercise

- For moderate or worse hypothermia:
 - Avoid jarring movements
 - Evacuate to advanced medical care
- Modify BLS:
 - Check ABCs for 1 minutes
 - 10–15 minutes of artificial ventilation before transport
 - Consider “scoop and run”
 - Do sets of at least 5 minutes of CPR followed by no more than 5 minutes of transit
 - **Do not** pronounce the patient as dead

Internal Bleeding

Internal bleeding is when damage to blood vessels causes blood to leave the circulatory system and pool in body cavities.

Signs and Symptoms

- Signs of shock such as decreased blood pressure, weakness, pallor, and sweating
- Dizziness, weakness, or nausea
- Abdominal or chest pain indicates internal bleeding in the torso
- Tenderness and pain when palpated

Treatment

- Treat for shock
- Evacuate to advanced medical care

Lung Injuries

Chest trauma may cause injury to the lungs or pleurae. This may be caused by, among other things, fractured ribs tearing the pleurae or lungs or penetrating trauma.

Signs and Symptoms

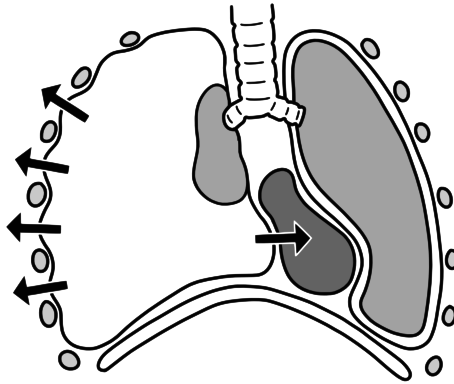


Figure 9: Tension Pneumothorax

- Shortness of breath with rapid, shallow breathing
- Chest pain and pressure
- Reduced signs of respiration
 - For pneumo- and hemothoraces, reduced movement of the chest wall on the affected side
- “Sucking chest wound”
- Signs of shock
- Signs of tension pneumothorax (fig. 9):
 - Tissue bulging from the ribs
 - Deviated trachea
- Coughing up blood

Treatment

- Consider treating for rib fractures or flail chest
- Lay the patient on the affected side
- Apply a vented chest seal to open wounds
- **Do not** use needle decompression unless qualified to do so
- Treat for shock
- Evacuate the patient to advanced medical care

Non-Freezing Cold Injuries

Non-freezing cold injuries are injuries that result from continuous exposure to cold, wet conditions that do not result in the freezing of tissue.

Trench Foot

Trench foot (cold water immersion foot) is a medical condition caused by prolonged exposure of the feet to cold, wet conditions.

Signs and Symptoms

- Numbness and tingling
- Wrinkly or pruney skin that is cool to the touch
- Possible edema
- Possible altered skin color (pallor, erythema, or cyanosis)
- Possible poor capillary refill time
- In later stages, foul odor due to necrosis

Chilblains and Pernio

Chilblains, sometimes called pernio, are redness, itching, and inflammation in the hands or feet caused by damaged to capillary beds.

Signs and Symptoms

- Burning, itching, or painful sensations in the affected extremities
- Possible blisters may develop
 - Long-term chilblains may develop dark crust on the blisters

Treatment

- Warm the affected extremity at room temperature (15 to 25 °C)
- Elevate the extremity to reduce swelling
- Consider administering NSAIDs

Open Abdominal Wounds

An open abdominal wound is a wound to the abdomen that cause the exposure or herniation of internal organs. Large lacerations or incisions may damage the abdominal wall exposing or allowing the herniation or organs, often the intestines.

Treatment

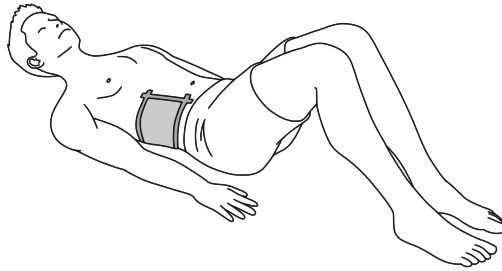


Figure 10: Open Abdominal Wound

- Control bleeding:
 - Consider use of hemostatic gauze
- **Do not** remove objects protruding from the wound or organs
- **Do not** remove clothing that is stuck to the organs:
 - Cut the rest of the clothing away leaving the clothing in contact with the organ in place
- **Do not** attempt to put the organs back into the body
- If you must handle the organs, do so very gently
- Cover the organs with gauze moistened with saline or water
- Place the patient's feet towards their pelvis so their knees are elevated (fig. 10)
- Treat for shock
- Evacuate the patient to advanced medical care

Psychological Care

Stress is a real or perceived threat to homeostasis, and it can lead to trauma. Trauma is a psychologically significant event that creates a rupture in a person's sense of self, worldview, or view of the future.

Treatment

Psychological first aid (PFA) is framework for providing supportive, emotional care to individuals who have experienced traumatic events.

- Introduce yourself
- Remove the patient from the source of trauma
- Separate the calm from the panicked
- Keep nosy bystanders away from patients
- Help the patient feel safe, calm, and comfortable:
 - Tell them you are there to help
 - Offer them food, drink, or tissues
 - Keep the focus on them (**not** on you)
 - **Do not** lie or misrepresent the situation
 - Consider physical contact (hand holding, a hug)
- Prompt the patient to speak
- Use grounding techniques:
 - Encourage them to breath slowly
 - Have them describe what they feel (physically) and what they see
- Enable the patient's self-sufficiency:
 - Help them determine their immediate needs
 - Help them create a plan to meet those needs
- Connect them to other support of mutual aid groups

Pulmonary Embolism

A pulmonary embolism is the obstruction of a blood vessel in the lungs by foreign matter such as a blood clot (thrombus) or gas bubbles.

Signs and Symptoms

- Sudden onset chest pain accompanied with difficulty breathing
- Chest pain may be focal to the location of the embolism
- Coughing
- Pain may increase during inspiration.
- They may go into shock; sweat; and have pale, cool, clammy skin
- They may develop respiratory distress and become cyanotic

Treatment

- Assist the patient with breathing, and monitor their ABCs
- Treat for shock
- Evacuate the patient to advanced medical care

Rib Fractures

Rib fractures may be simple and not require care from a physician, or they may have complications such as pneumothorax.

Signs and Symptoms

- Pain at the site and tenderness when palpated
- Bruising
- Sharp, stabbing pain when breathing or coughing
- Shallow breathing to compensate for the pain

Treatment

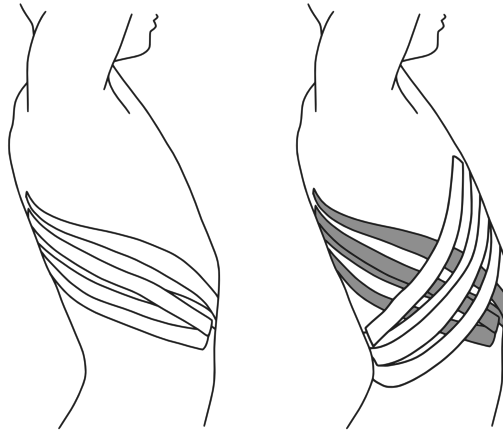


Figure 11: Taping a Fractured Rib

- Immobilize the rib
 - Use long strips of 5cm medical tape (fig. 11)
 - Sling the arm
- Consider administering NSAIDs
- Evacuate to advanced medical care patients with fractures from high-energy impacts or those with displacement

Riot Control Agent Contamination

Riot control agents (RCAs) lachrymators like tear gas and pepper spray. They are designed to temporarily incapacitate protesters.

Signs and Symptoms

- Red, itching, tearing, or burning eyes
- Increased mucous production
- Inability to open eyes
- Burning skin
- Coughing and difficulty breathing

- Gagging and vomiting
- Asphyxiation or pulmonary edema (from tear gas in enclosed spaces)

Treatment

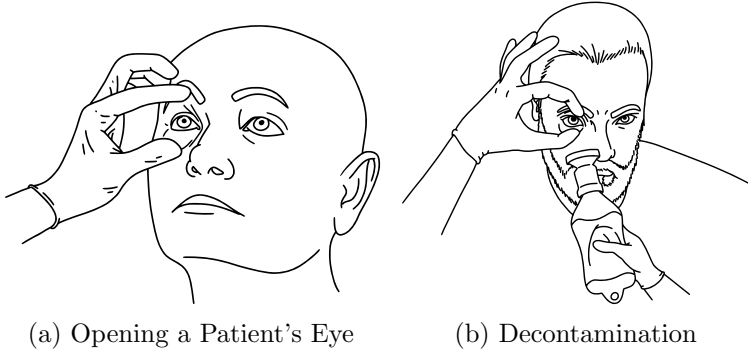


Figure 12: RCA Treatment

- Remove the patient from the RCA
- Remove their contaminated clothing, especially from the face
- If their eyes are effected, remove their contact lenses
- Keep them from touching the affected body parts
- Encourage coughing and sneezing
- Flush the affected body part with water or saline:
 - If a body part other than the eyes is covered with CR gas, brush it away and avoid water
 - Flush the eyes from a distance of 2–3cm for several minutes (fig. 12b)
- **Do not** use LAW, baby shampoo, milk, vinegar, citrus, oil, hydrogen peroxide, or lidocaine to treat RCA
- Use refrigerant spray on skin after flushing
- Consider use of an inhaler (salbutamol)
- If the patient removed clothing or is wet, consider treating for hypothermia

- Clean their contact lenses if they plan on putting them back in

Scalp Injuries

Scalp injuries are injuries to the soft tissue surrounding the neurocranium. Due to the structure of the tissues and large number of blood vessels, scalp injuries may bleed profusely.

Treatment



Figure 13: Applying Scalp Pressure

- Consider underlying skull fractures
- Control bleeding
 - Use indirect pressure with suspected depressed skull fractures (fig. 13)
- Consider irrigation of wounds
 - **Do not** irrigate open fractures
- Monitor for shock
- Consider evacuation for:
 - Large scalp injuries that require sutures
 - Suspected skull fractures
 - Associated traumatic brain injury

Seizures

A seizure is a period of disruption to normal brain function caused by a sudden surge of inappropriate electrical activity in the brain. A reactive seizure is one with causes such as trauma, electrical stimulation, and metabolic disturbances in individuals without epilepsy.

Signs and Symptoms

- Partial seizure:
 - Repetitive behavior such as gesturing, fiddling, or lip smacking
 - Repetitive speech or vocalizations
 - Sensory hallucinations
 - Changes in mood including paranoia, depression, or ecstasy
 - The patient may be able to continue what they are doing during a partial seizure
 - Partial seizures may precede generalized seizures
- Absence seizure (petit mal):
 - Short in duration (several seconds)
 - Altered LOC and may seem confused or withdrawn
 - They may retain normal posture or have some amount of slumping or jerking
 - They may cease their current activity
 - Their eyes may start twitching
 - They may urinate
 - They might not respond to voice or touch stimuli
 - When it ends, they may continue with their activity without realizing anything has happened
- Generalized tonic-clonic seizure (grand mal):
 - The patient becomes rigid and falls to the ground (tonic phase)
 - The patient has rhythmic (clonic) trembling

- They may vomit or urinate
- They may become apneic leading to hypoxia and cyanosis
- When they return to consciousness (after 60–90 seconds), they may be fatigued and confused for hours
- Status epilepticus:
 - A generalized seizure lasting for 5 or more minutes or two consecutive seizures without regaining consciousness

Treatment

- Move objects away from the patient to prevent injury
- **Do not** attempt to restrain the patient
- **Do not** place your fingers or adjuncts into the patient’s mouth during the seizure
- When possible, place them in the rescue position
- Open their airway and check for obstructions
- Evacuate:
 - Patients who had a reactive seizure or status epilepticus need advanced medical care
 - Patients who have other seizures should be sent home with a buddy due to risk of a second seizure

Serotonin Syndrome

Serotonin syndrome is a group of symptoms that appear in reaction to taking serotonergic drugs. It may occur in as a result of a single drug such in which case it often occurs after increasing the dosage of antidepressants. It may occur as a result of an overly large dose or the concomitant use of multiple serotonergic drugs.

Signs and Symptoms

The most common symptoms are altered mental status, hyperthermia, muscle rigidity, and myoclonus. Other symptoms include:

- Restlessness, anxiety, and agitation
- Altered LOC

- Hyperthermia and perspiration
- Increased heart rate and respiratory rate
- Dilated pupils
- Muscle rigidity, loss of coordination, hyperreflexia, tremors, and myoclonus

Treatment

- Consider recommending the patient cease taking serotonergic drugs:
 - This may be dangerous if the drugs are prescription medications
- Evacuate all patients to advanced medical care
- Suggest patients consult with their physician if they are taking serotonergic medications

Shock

Shock is a reduction in the ability to delivery oxygenated blood to the tissues of the body. Shock is caused by:

- Decreased blood volume (e.g., blood loss, dehydration)
- Decreased cardiac output (e.g., heart attack, cardiac tamponade)
- Decreased vascular tone (e.g., anaphylaxis, spinal injury)

Signs and Symptoms

There are variations depending on the cause of shock, but generally shock presents as:

- Pale, cool, clammy skin:
 - In neurogenic shock, skin may be red and warm
- Mottled skin (fig. 14)
- Weak pulse (systolic BP < 90mmHg)
- Increased heart rate (over 100 BPM) that may be irregular

- Signs of dehydration:
 - Dry mucous membranes
 - Reduced skin turgor
 - Distended jugular veins



Figure 14: Mottled Skin

Treatment

- Call EMS
- Treat critical injuries
- Position the patient in the rescue position or flat on their back
- Maintain normothermia:
 - On hot days:
 - * Remove their excess clothing
 - * Provide shade
 - * Actively cool them using fanning and cool water
 - On warm or cool days:
 - * Wrap them with an emergency blanket
- Consider administering small amounts fluids if the patient is oriented and can tolerate it

Skull Fractures

Skull fractures are not necessarily life-threatening, though some may be potentially lethal even if they do not visually appear to be

severe.

Signs and Symptoms

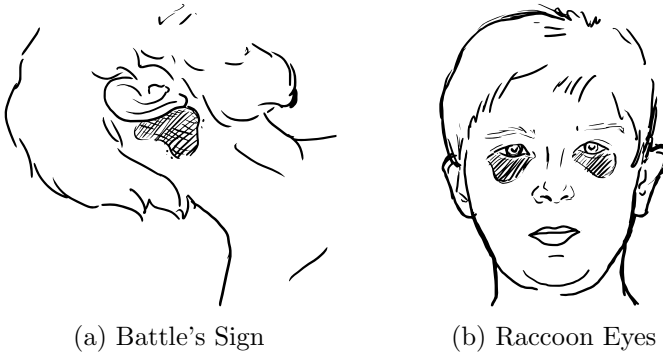


Figure 15: Signs of Basilar Skull Fracture

- High-energy MOI
- Noticeable indentation or displacement of the skull
- Spongy feeling skull
- Signs of a basilar skull fracture
 - CSF leaking from the nose or ears
 - Salty and metallic taste in the mouth
 - Later presentation of Battle's sign or raccoon eyes (fig. 15)

Treatment

- Control bleeding using indirect pressure
- **Do not** irrigate open fractures
- Dress open fractures
- **Do not** attempt to stop drainage of blood or fluid from the nose and ears
- Attempt to prevent the patient from coughing, sneezing, or doing other activity that increase ICP
- Position the patient sitting upright
- Evacuate all patients to advanced medical care

- If a patient does not consent to evacuation, ensure their buddy stays with them to monitor for signs of a basilar skull fracture or TBI

Spinal Injuries

A spinal cord injury (SCI) is an injury that causes temporary or permanent impairment of the spinal cord's ability to send and receive signals. The smaller vertebrae of the cervical spine are at greater risk for injury than that larger thoracic and lumbar vertebrae.

Signs and Symptoms

- Numbness, tingling, or loss of sensation
- Loss of strength or paralysis
- Incontinence
- Global vasodilation and neurogenic shock
 - Warm, flush skin

Treatment

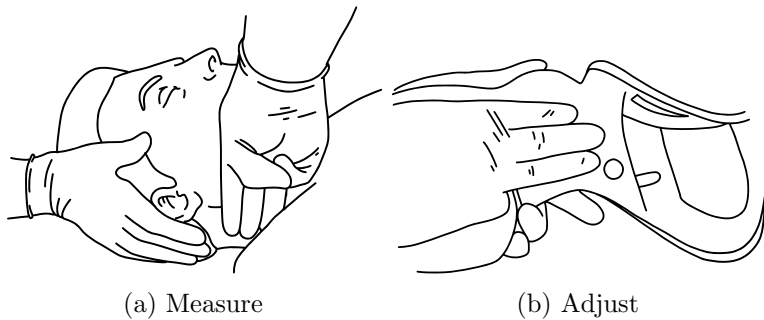


Figure 16: Cervical Collar Measurement

- Check the patient's ABCs
- Immobilize their spine with your hands or a medical device
 - Ensure proper adjustment of cervical collars (fig. 16)

- A bulky sweater or jacket can be as an improvised cervical collar
- Perform a focused spinal assessment:
 - Patient must be reliable: A+O×4 , unintoxicated, and not distracted
 - Patient has normal CSM in all four extremities
 - Entire spine if free of pain and tenderness when palpated
- Evacuate to advanced medical care all patients who cannot be cleared by a focused spinal assessment

Stab Wounds

Stab wounds are traumatic penetrating injuries caused by sharp objects such as knives or broken bottles.

Treatment

Treatment principles are the same as for puncture wounds.

- Treat the most severe wounds first
- **Do not** remove impaled objects
- Use hemostatic gauze to control arterial bleeding and on abdominal wounds
- Consider use of a tourniquet on extremities
- Consider use of chest seal for injuries to the thorax
- Treat for shock
- Evacuate to advanced medical care

Stroke

A stroke occurs when poor perfusion of the brain causes cell death. Strokes may be caused by a lack of blood flow or bleeding.

Signs and Symptoms

- Decreased ability to use body parts or paralysis, especially on one side of the body

- Problems understanding speech or speaking
- Loss of vision in one eye
- Dizziness or severe headache
- Failing the FAST test:
 - **F**: Facial droop (fig. 17)
 - **A**: Arm weakness or drift
 - **S**: Speech difficulty
 - **T**: Time to call EMS

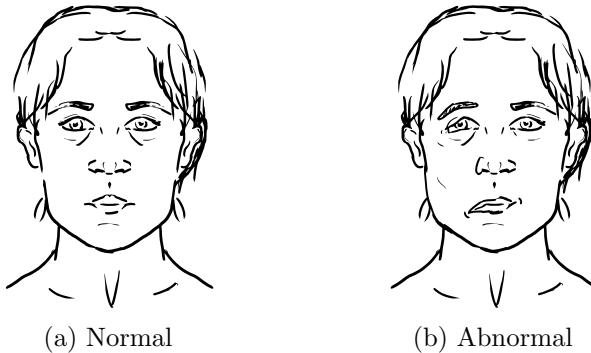


Figure 17: Testing for Facial Droop

Treatment

- Rapid evacuation to advanced medical care

Wound Management

Wound management is the basics of first aid. Wounds are damage to the skin such as scrapes, cuts, and penetrating trauma. Wound management involves controlling bleeding and bandaging wounds.

Estimating Blood Loss

A person who weighs 75kg has approximately 5L of circulating blood. A Class III hemorrhage (1500–2000mL blood loss) is approximately when hypovolemic shock begins. Estimation for blood loss can be done as follows:

- Blood pool diameter (on a hard surface)
 - 50cm is 500mL of blood
 - 75cm is 1000mL of blood
 - 100cm is 1500mL of blood
- 1/3 of a T-shirt soaked in blood is 250mL
- MAR method:
 - On a hard surface, the area under a closed fist is 20mL of blood
 - 36 fists is a Class III hemorrhage

Treatment

- **Do not** remove impaled objects
- Control bleeding:
 - Apply direct pressure:
 - * Place additional gauze pads on the original if blood soaks through
 - * For severe hemorrhages or abdominal wounds, consider use of hemostatic gauze
 - Elevate the wound
 - Use a pressure dressing (fig. 18a)
 - Occlude arterial blood flow:
 - * Use a pressure point
 - * On extremities, use a tourniquet:
 - Place the tourniquet proximal to the wound
 - Tighten the tourniquet until bleeding stops
 - Secure the tourniquet
 - **Do not** remove the tourniquet
 - **Do not** use pepper (black, cayenne, etc.) as a hemostatic agent
- Clean the wound:
 - Flush the wound with water, saline, or irrigation solution
 - **Do not** use hydrogen peroxide

- Ensure all foreign objects and debris are flushed out
- Use gauze to debride dead tissue
- Control bleeding again
- Bandage the wound:
 - Apply antiseptic to the wound
 - Consider applying wound closure strips every 3mm (fig. 18b)
 - Wrap the wound with a dressing
 - Secure dressings with bandages
- Treat for shock
- Locate amputated body parts:
 - Clean the body part with water or saline
 - Wrap it with moist gauze
 - Place the body part in a plastic bag, and place the bag atop ice
 - Ensure the body part stays with the patient

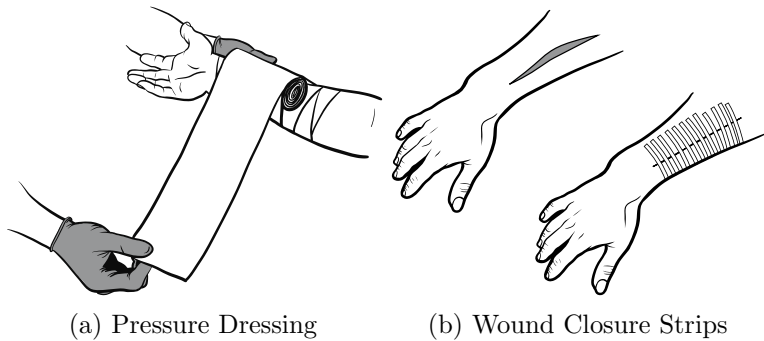


Figure 18: Wound Treatment