PART IX

EMERGENCY MEDICINE

092 Primary Assessment

Whether they are the result of urban or natural disaster or mass violence, catastrophic events with multiple victims strain the limits of our comprehension. Even civilians trained in basic first-aid may be at a loss when it comes to a response. But if you're lucky enough to survive a mass casualty scenario unscathed, or to arrive late enough to bypass the event, following a triage protocol once you've called 911 is the most effective way for you to help.

Determine Level of Consciousness

Start by determining the victims' levels of consciousness. Announce your name, then call out a simple series of commands: "I'm here to help. Get up and come toward me if you can. If you can't, raise your hand or shout."

No rule of triage is ironclad, but generally, victims who are ambulatory should be treated after those who are conscious but unable to move. Unconscious or unresponsive victims are your last priority. If one victim is bleeding out and another is unconscious, staunching the blood loss is the most effective use of your time.

On the other hand, though your first instinct may be to run to the victim who's audibly screaming for help and spend the bulk of your time attending to him or her, the ability to scream demonstrates an ability to breathe. There may be someone nearby with a chunk of debris lodged in his or her throat, minutes away from a herniation of the brain.

Use the ABC Method

Check to see if a victim who is not alert can respond to the sound of your voice. If not, prod the victim to see whether he or she can

respond to sensory stimuli. If there is no response, the victim is unconscious.

Difficult decisions like these are the reason triage protocol has responders use the ABC (airways, breathing, circulation) method. To employ, check airways immediately after determining level of consciousness (LOC), followed by breathing and circulation.

Assess Airway: Assess the victim's airway by listening for breath. If you don't hear breath, use your hand to open the victim's mouth. Look for any visible obstruction that could be preventing airflow; if you spot something, carefully attempt to remove the object; if not, use your index finger to do a shallow sweep (too deep and you'll engage the gag reflex).

Assess Breathing: Assess breathing by observing the movement of the lungs. Are both lungs moving? Does one move less than the other? Put your ear to the person's chest and see if you can hear the breath moving in and out of the chest cavity. Simultaneously, you can assess blood pressure by placing your index and middle fingers just to the left or right of the person's Adam's apple. A pulse at the neck is good, a pulse at the wrist is very good, and a pulse behind the knee indicates excellent circulation.

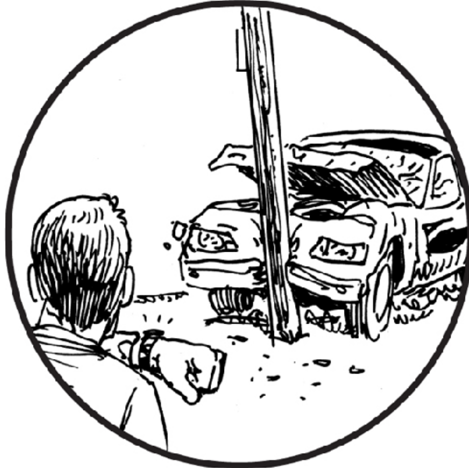
Assess Circulation and Control Bleeding: Once you've assessed the airways and lungs, move on to circulation. Identify serious wounds and apply pressure or a tourniquet (see page 238) to stanch blood flow.

Mouth-to-mouth and CPR can be lifesaving methods of resuscitation, but in a mass casualty scenario, a generalized triage must take precedence over techniques that will tie first responders down to the least responsive victims for long periods of time. Following triage best practices will enable you to help more people, as well as provide valuable information to the first emergency workers to arrive on the scene.

No. 092: Primary Assessment

CONOP: Properly assess an injured or unconscious person.

COA 1: Call 911. Ensure the situation is safe.
Note exact time.



SAFE

NOT SAFE

COA 2: Determine level of consciousness (LOC).

A. ALERT

Injured and alert

B. VERBAL STIMULI

Injured, response to voice commands

C. PAINFUL STIMULI

Unconscious, response to pain

D. UNRESPONSIVE

Unconscious, no response to stimuli

COA 3: Assess airway.

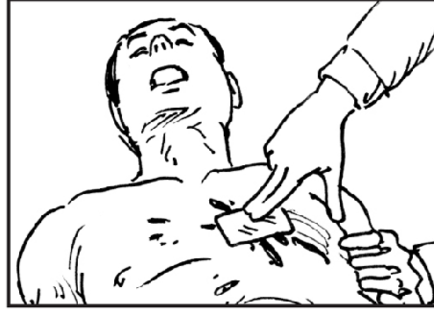
A. Listen for five to ten seconds.

B. Open airway.

C. Inspect and sweep for obstructions.

COA 4: Assess breathing.

A. Observe chest for rise and fall.



B. Occlude anterior chest wounds.

C. Occlude posterior chest wounds.

COA 5: Assess circulation.

A. Identify and control major bleeding.

B. Apply direct pressure to wound.

C. Apply pressure to pressure points.

D. Apply tourniquet.

BLUF: Ensure the scene is safe for you before you try to save a life.

093 Stop the Bleeding

Panic may be a natural response to the sight of major blood loss, but swift action can mean the difference between life and death. Any civilian who is witness to a catastrophic injury has the power to halt blood loss and stave off organ failure, using only his or her bare hands.

Direct pressure is the first line of action. Act quickly, particularly if the blood is bright red—arterial blood loss can quickly lead to organ failure. Immediately place the heel or palm of your hand directly on the wound and apply a significant amount of pressure. Use your body weight. Your goal is to choke off the artery by pressing it down against the bone. If the injured person isn't yet on the ground, help him or her down so that you aren't working against gravity.

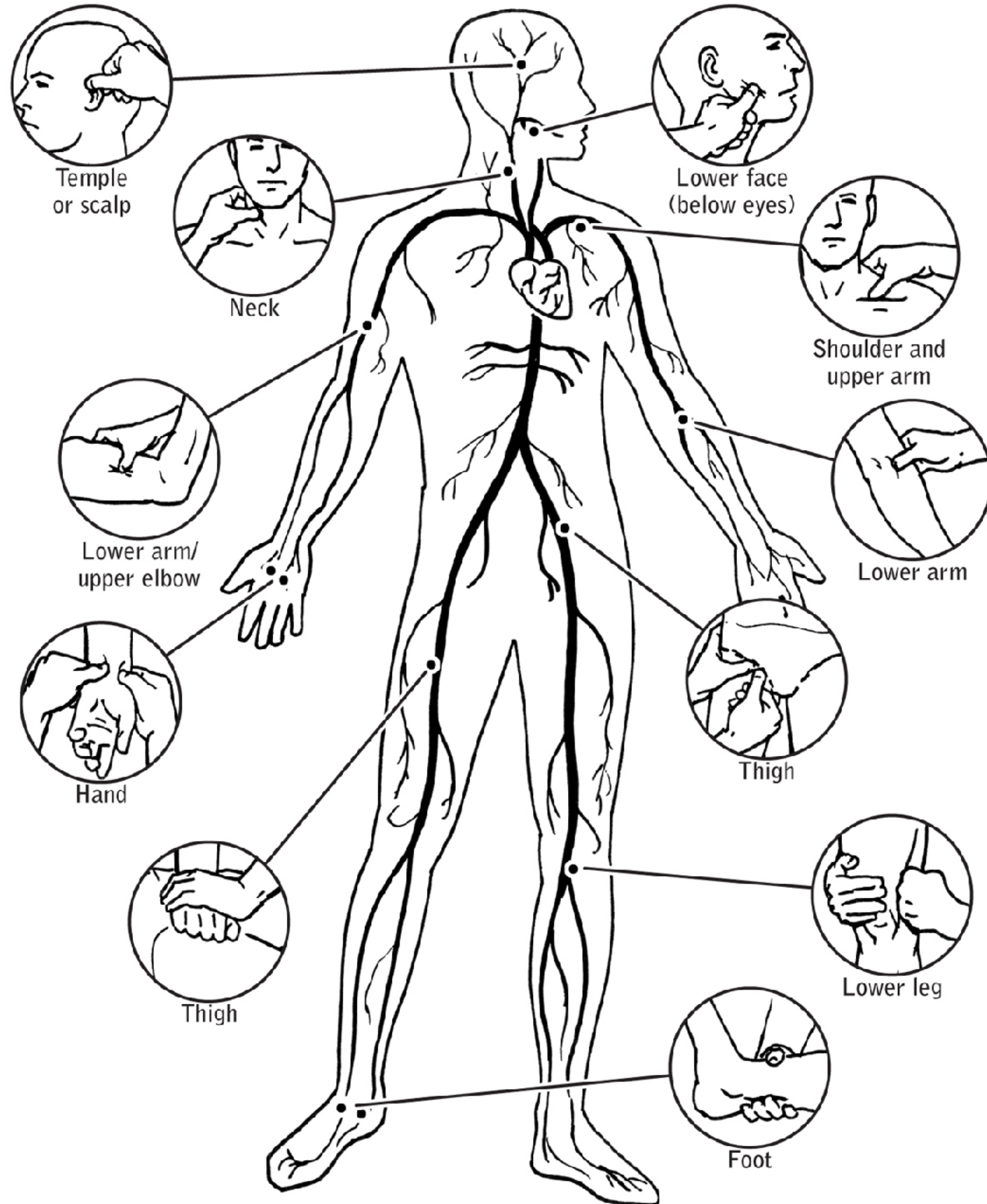
If you can't stop blood loss using direct pressure, try applying equally intense force to one of the vascular pressure points illustrated opposite. Choose the point just above the injury site. If you don't see an abrupt slowdown in blood flow, try again in the general vicinity. Use the heel or blade of your palm on large muscle masses or if the injured person is overweight.

If none of these options successfully control the bleeding, use a shirt, a pair of pants, or a belt as a tourniquet. Tie off the limb above the wound, as close to the wound site as possible, and get the injured person medical attention ASAP. Left on too long, a tourniquet will cause tissue death to healthy parts of the limb and may lead to amputation.

Once blood loss has been controlled, bandage the injury and elevate the injured area above the heart if possible. In all cases, get help immediately.

No. 093: Stop the Bleeding

CONOP: Use pressure points to control bleeding.



BLUF: If direct pressure to wound is unsuccessful, combine with pressure points.

094 Treat Gunshot Wounds

More than seventy thousand people are treated for gunshot wounds each year in the United States alone, yet most civilians know little to nothing about how to help a shooting victim before emergency workers have arrived. In the event that the victim is hit in a life-threatening location like the brain, heart, or lungs, fatality may result before medical intervention can be undertaken. But blood loss from wounds in other locations can sometimes be managed through the use of direct pressure, indirect pressure, or a tourniquet. (See page 238 for more detail on these techniques.)

In a pinch, combine direct pressure with the use of a shirt, a tampon, or a menstrual pad to slow the bleeding. Feminine hygiene products are designed to absorb large quantities of blood, and if you actually insert a tampon into the wound you may be able to clot bleeding at the source.

Internal trauma may be extensive, particularly if the bullet has hit organs or arteries. But again, there is little a bystander can do about internal injuries. What you *can* do is look for an exit wound, so that you're controlling the bleeding on both ends. Be thorough, as exit wounds may not appear in logical places. Bullets can bounce around inside body cavities and travel along bone, so that a gunshot to the knee results in an exit wound at the pelvis.

Don't be deceived by a small wound. Though a 9mm bullet may cause less cavitation (penetrating tissue trauma) than a round of buckshot, the latter has less velocity—and thus may be slightly less likely to have lethal consequences, depending on where it lands and the distance of the shooter.

Attempt to keep the victim calm. Gunshot victims frequently go into shock, their blood pressure dipping as their bodies enter a kind of emergency conservation mode. Cover the victim with a blanket to

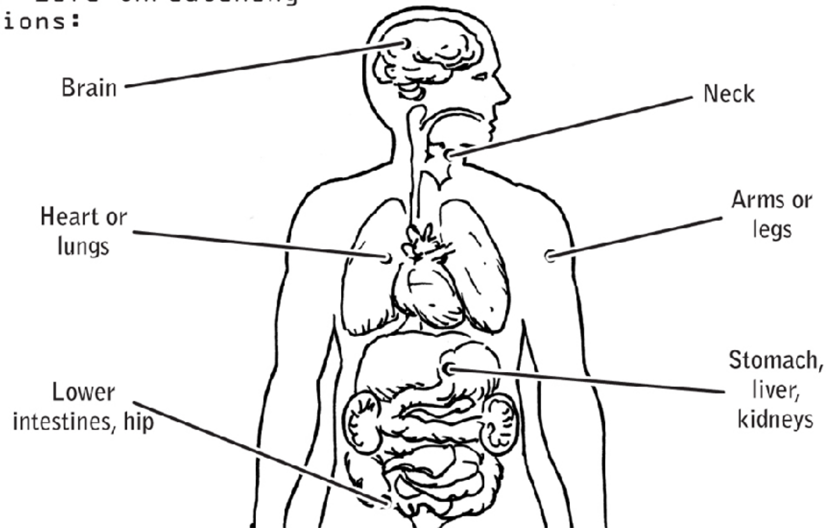
mitigate against heat loss. Do not attempt to move the victim if there is any chance of a spinal injury.

For gunshot wounds to the chest, see page 242.

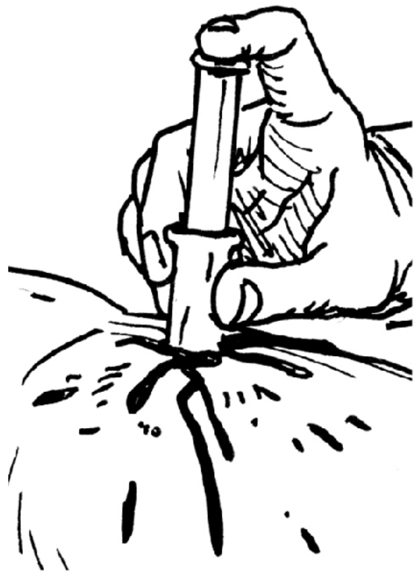
No. 094: Treat Gunshot Wounds

CONOP: Understanding and treating gunshot wounds.

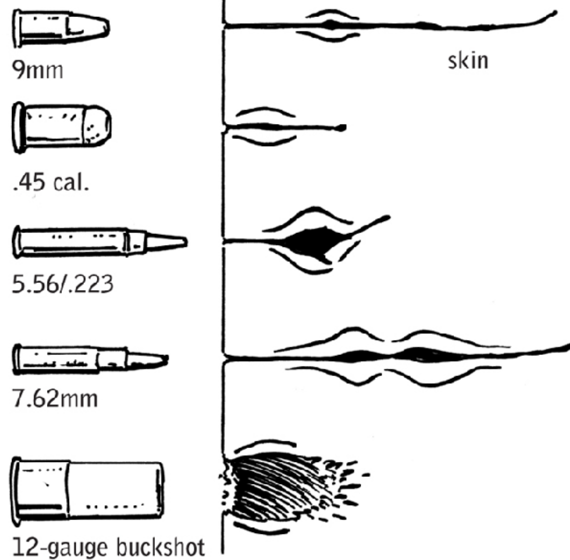
COA 1: Life-threatening locations:



COA 2: Apply Tampon.



COA 3: Understand cavitation caused by different bullets.



BLUF: Bullet path is unpredictable after initial impact-exit wounds could be anywhere.

095 Occlude a Sucking Chest Wound

Whether it's the result of unfortunate contact with a sharp piece of mechanical equipment or being at the wrong end of a knife or bullet, a puncture wound that lands anywhere near the chest cavity poses a grave risk not only to the heart, but also to the lungs. There is little a bystander can do about a wound to the heart other than perform CPR and call for help. While penetrating injuries to the heart don't necessarily result in death, they certainly do require a surgical team.

But a chest wound that threatens the lungs can be temporarily managed by a bystander waiting for emergency services to arrive, with a technique based on the standard operating procedures used by paramedics and military medics.

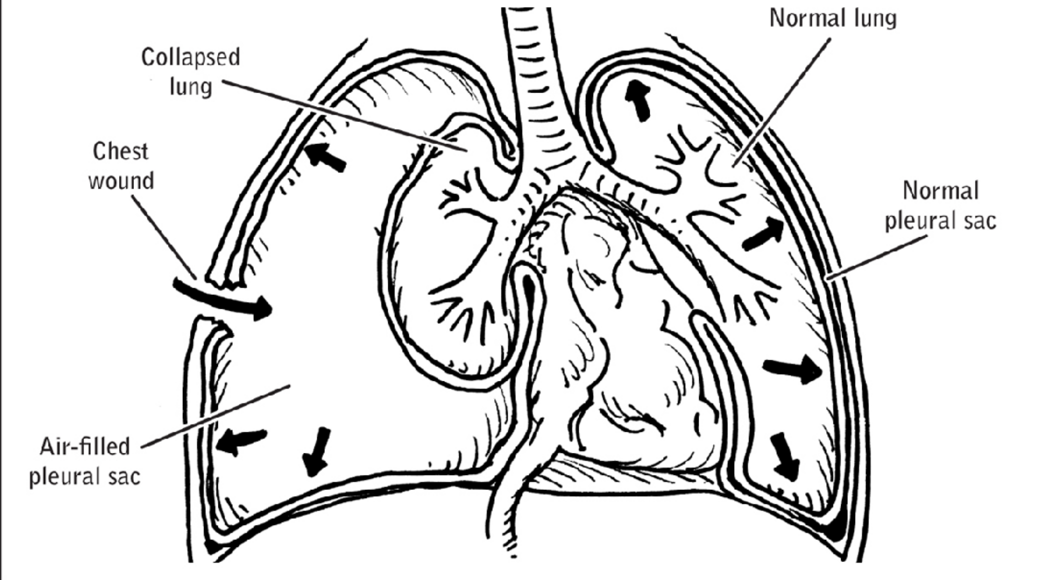
Rather than use bandages to stop the bleeding, the goal with any chest wound is to occlude (seal) the wound to prevent air from entering. Treat any chest wound as if it may have caused a "sucking chest wound," also known as a tension pneumothorax. The lungs are surrounded by a pleural sack, the thin membrane that protects organs from surrounding tissues and bones. If the pleural lining is punctured, air can enter the pleural sack through the wound site, putting pressure on the lung and preventing it from inflating. With every breath the victim takes, more air enters through the wound, and the lung is further compromised.

Use flat, impermeable materials such as credit cards or plastic wrap to create an occlusive seal over the wound, taping the seal down on only three sides so that you leave a flutter valve through which air trapped inside the pleural sack can escape. When the victim takes a breath, the chest's expansion will put pressure against the occlusive dressing, preventing air from entering at the wound site.

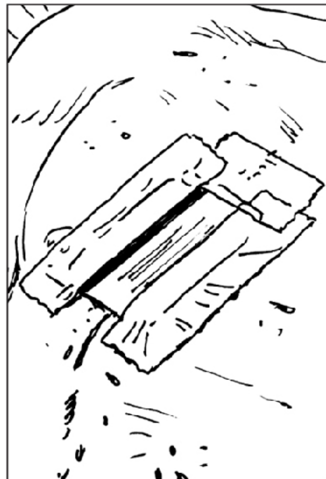
No. 095: Occlude a Sucking Chest Wound

CONOP: Treat a sucking chest wound and prevent a tension pneumothorax.

COA 1: Identify a tension pneumothorax.

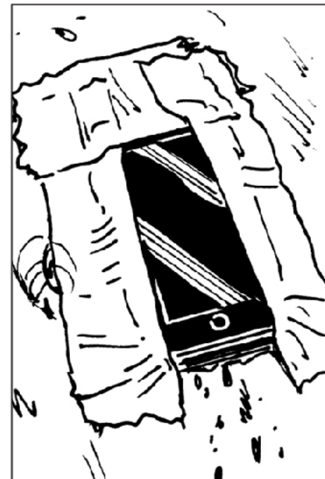


COA 2: Prevent air from entering chest cavity.



Credit card directly over hole: duct-tape three sides

Plastic wrap over hole: duct-tape three sides



Cell phone over hole: duct-tape three sides

BLUF: All chest injuries require immediate medical attention.

096 Treat Foreign Object Impalements

Never, ever attempt to remove a sizable foreign object that has penetrated the skin to a significant depth or may have struck near major arteries, vessels, or organs. This misguided attempt to play good samaritan could result in severe tissue damage or worse. If the foreign object has breached a vessel or artery, its removal could cause sudden and profuse bleeding. Even in the case of an impalement to the foot, the very common result of the mishandling of kitchen knives or other sharp implements, the foreign object should never be removed on site. Removing the object without proper medical equipment and knowledge can cause further tissue, vascular, or arterial damage.

If the victim has impaled him- or herself on a large or fixed object and adequate tools are available, cut the victim free. Fire trucks are stocked with electric saws, so wait for emergency services to arrive if you can't free the individual safely.

If the object is anywhere near the chest cavity, the most useful thing a bystander can do, after calling 911, is create a seal around the impalement. Chest impalements risk puncturing a lung—a "sucking chest wound" or tension pneumothorax being the life-threatening result. Air that enters the chest cavity through the wound depresses the lung, preventing the victim from taking a full breath. With every exhale, more air enters through the wound, further decreasing the victim's lung capacity. To prevent air from entering the wound site, seal the area around the object with a combination of credit and ID cards and duct tape.

Once the impalement has been sealed, brace the object to prevent it from moving around or slipping further inside the body. Surround the protruding end of the object with a pyramid of rolled up gauze or

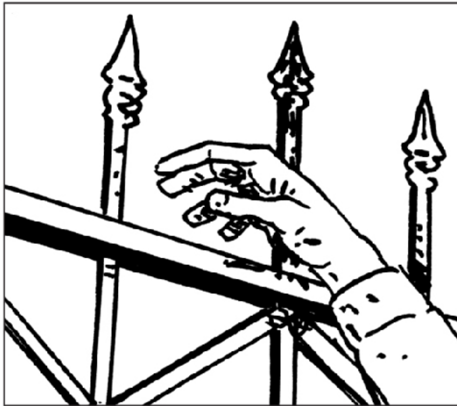
socks, then tape down. For more detail on how to manage a sucking chest wound, see page 242.

No. 096: Treat Foreign Object Impalements

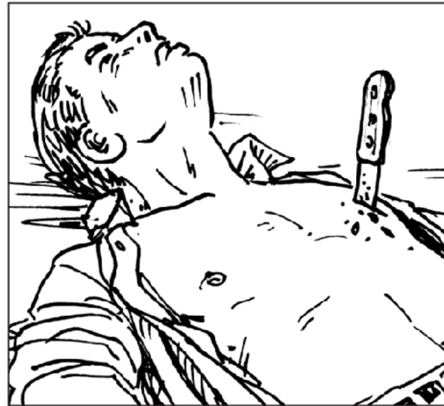
CONOP: Properly treat and secure impaled objects.

COA 1: Types of Impalements

Type 1: Moving body, immobile object

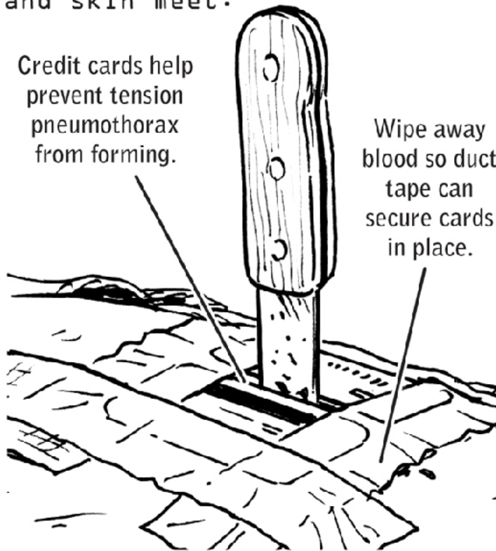


Type 2: Moving object, immobile body



Do not attempt to remove objects! May cause further damage to tissue, nerves, and bone. The object may be plugging its own holes; removing could cause fatal bleeding.

COA 2: Chest impalements require a "seal" where object and skin meet.



COA 3: Brace the object to prevent further penetration or movement.

BLUF: Do not attempt to remove impaled objects!

097 Suture a Cut

If you're within hours of a hospital, cleaning and tightly bandaging a cut should provide sufficient protection against infection. But if the nearest medical facility is more than twenty-four hours away and adequate materials are available, temporarily suturing a cut that is over a quarter inch in length may be advisable. Avoid attempting to suture messy nonlinear wounds, crater-like injuries, or extremely deep lacerations. These complex wounds are likely to require deep cleaning and possibly skin grafting. Avoid closing up a wound you can't adequately clean with boiled, cooled water and/or alcohol—sealing contaminating agents into a closed environment is even more likely to breed infection than leaving a wound open to the external environment.

While the notion of piercing the epidermis or skin with a needle and thread will be off-putting to most civilians, the skill is achievable by anyone with even minimal sewing experience.

To determine what type of stitch to use, consider its placement and shape (see illustrations). Interrupted stitches are time-consuming and may be challenging to those with thicker or less dexterous fingers, but they provide a tight seal and can be adapted to jagged lacerations. Continuous stitches are the fastest and easiest option, but they can leave gaps in a wound or loosen up over time. Lock-stitch sutures, in which the needle is looped upward through the preceding stitch after each horizontal loop, are a step more secure than continuous stitches but tend to scar.

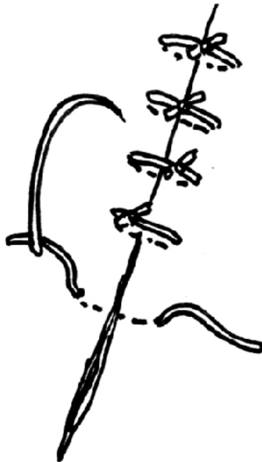
Because the skin of the scalp is thin and stretched very tight, stitching it will prove difficult to impossible. Instead, a viable improvised suture can be made by knotting pieces of hair together over the wound and super gluing the knots.

Medical tape can be used to bypass the needle altogether. Butterfly the tape by pinching pieces at their center to protect the oozing portion of the wound. Secure tape on either side of the wound.

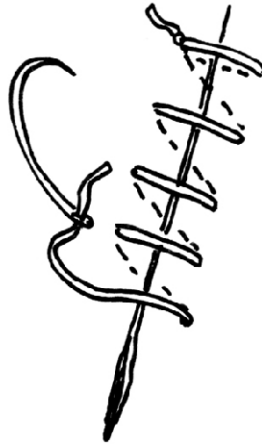
No. 097: Suture a Cut

CONOP: Use everyday material to suture a wound.

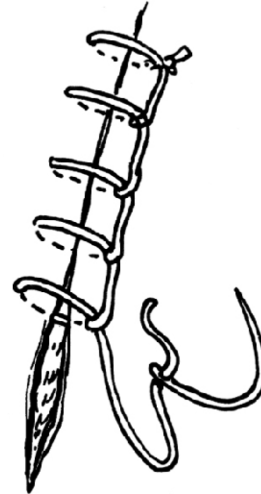
COA 1: Types of Suture Knots



Over-and-over sutures (interrupted)

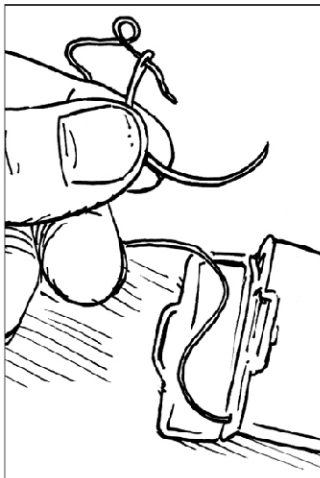


Over-and-over sutures (continuous)



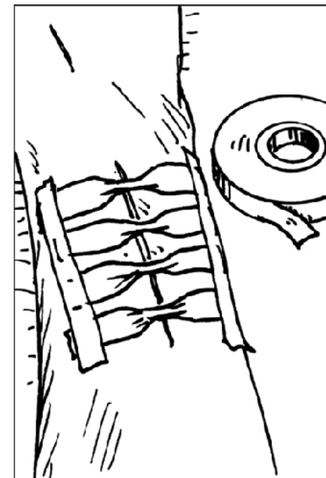
Lock-stitch sutures

COA 2: Improvised Suture Material



1. Dental floss and bent sewing needle

2. Super glue



3. Tape

BLUF: All bleeding eventually stops.

098 Treat Minor Burns

You may think you're already familiar with the basics of burn treatment and fire safety. Stop-drop-and-roll if you catch on fire, smother the affected party in a blanket if you're a bystander. But if you've ever applied an ice pack to a burn wound in search of relief, a review of fundamentals is in order—ice can cause frostbite to recently burned skin and also prohibits healing.

Most burn care follows the same initial protocol, whether the burn is thermal (caused by direct contact with heat or flame), a scald (caused by exposure to hot liquid or steam), chemical (caused by contact with a corrosive chemical substance or weapon), or electrical (caused by exposure to a live electrical current).

Second- or third-degree burns of any type must be treated as emergencies—second-degree burns reach down to the deeper layers of the skin, and third-degree burns may cause severe, irreparable damage to ligaments, tendons, bones, and internal organs. Both render victims extremely susceptible to serious infection. Internal burns, whether to the lungs or the digestive system, must be treated by medical professionals; any time a corrosive substance is ingested, get the victim to the hospital or a poison control center as soon as possible. Chemical burns to the skin should also be treated immediately, though they may not produce symptoms or sensations until hours after contact.

Only first-degree burns, which affect just the epidermis, the most superficial layer of skin, can safely be treated at home. Run cold water over the affected area (or dip in a cold river or stream), then apply a pain-relieving antibiotic ointment or the time-tested home remedies of yellow mustard or soy sauce. Their effectiveness has not been proven by medical studies, but the anecdotal and experiential evidence is strong. Keep burns clean and dry to avoid infection.

For information on smoke inhalation and escaping a burning building, see page 204.

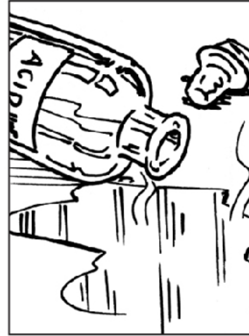
No. 098: Treat Minor Burns

CONOP: Understand and treat burns.

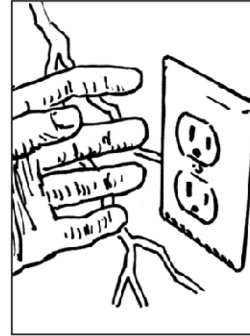
COA 1: Causes of Burns

1. Thermal

2. Scald

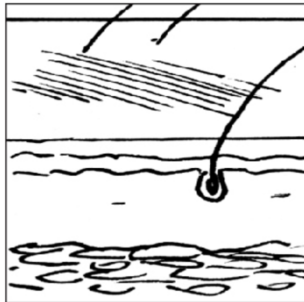


3. Chemical

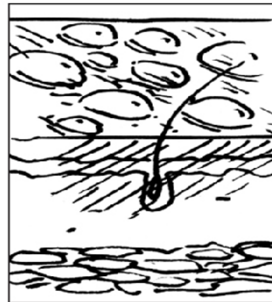


4. Electrical

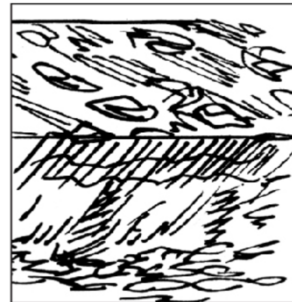
COA 2: Types of Burns



1. First degree



2. Second degree



3. Third degree

COA 3: Treatment of Burns

1. Stop the burning process.

2. Stop the swelling.

3. Stop the pain.

BLUF: Treat burns with cold water, not ice.

099 Splint Fractured Bones

Painful and slow to heal but generally not life-threatening, broken bones are among the most common of childhood injuries. But when they occur far from civilization or medical facilities, they can certainly become a threat to survival.

If your location means you'll be moving yourself or the victim of a broken bone to a medical facility on your own, splinting the bone will help reduce pain. More important, immobilizing the injured limb may prevent the jagged end of the bone from shredding tissue, arteries, or veins inside the body. The breaking of the bone itself can result in significant blood loss, as the blood marrow inside the bone is dispersed throughout the body, and in combination with broken vessels may be responsible for severe internal bleeding. For these reasons, any broken bone must be treated as soon as possible. Do not exert pressure on the fracture site.

The goal in splinting is to temporarily immobilize the broken bone by taping the length of the limb to a rigid, stabilizing object, the "splint." Splint the bone above and below joints on either side of the injury site. For a break at the shin, extend the splint from the ankle past the knee.

When combined with duct tape, folded-up newspaper, ski or hiking poles, sticks, and even pillows can be called into service as temporary splints. Once you've splinted the limb straight, further immobilize the injury site by taping or wrapping the limb against the body; arms should be nestled against the torso, legs pinned together.

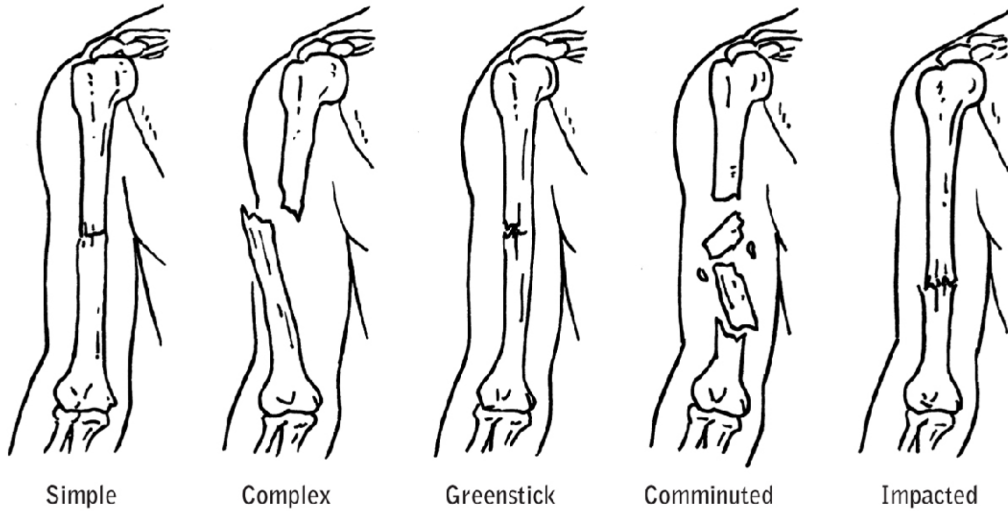
For hip fractures, tape the legs together at the thighs.

For broken ribs, gently attach the arm on the injured side to the body and avoid movement, as a broken rib in motion can puncture a lung.

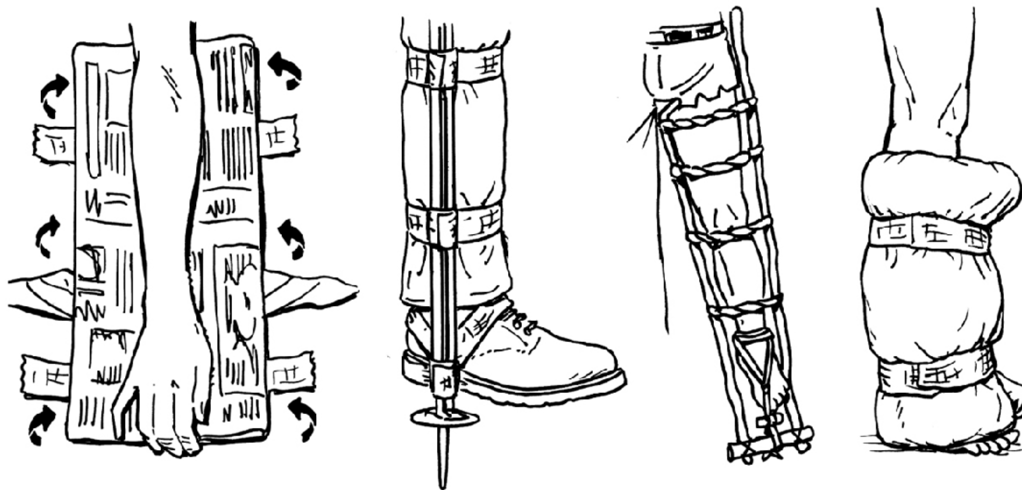
No. 099: Splint Fractured Bones

CONOP: Utilize everyday objects to splint broken bones.

COA 1: Types of Fractures



COA 2: Splinting Fractures



BLUF: Always splint above and below the fracture, from joint to joint.

100 Perform a Cricothyrotomy

Like many emergency medicine skills, a cricothyrotomy is only to be performed by an untrained bystander as a method of last resort. Creating an alternate airway by punching a hole through the cricothyroid membrane should be attempted only when a massive trauma such as a vehicular collision has mangled the victim's upper airway or a foreign object has lodged in his or her airway and cannot be removed—and after an attempt to sweep the airway and a Heimlich maneuver have both failed, emergency services have been contacted, and the victim has lost consciousness due to lack of airflow. Continue to attempt the Heimlich maneuver as long as the victim is gasping, choking, wheezing, or displaying any other audible breathing attempts. Describe the victim's symptoms to the 911 operator, and only proceed if the dispatcher agrees that the procedure is necessary.

In a test of the efficacy of bystander cricothyrotomies, 57 percent of junior doctors and second-year medical students with no prior experience operating on airways were able to successfully perform simulated interventions, using only a scalpel and a ballpoint pen. This study, supported by a small number of documented interventions, suggests that though the rate of success for civilian bystanders would be much lower, the use of these tools does offer some hope in situations where the only other alternatives are irreversible brain damage or death. Severe brain damage and/or complete brain death can occur after a mere three to seven minutes without oxygen, so time is of the essence when dealing with airway obstructions.

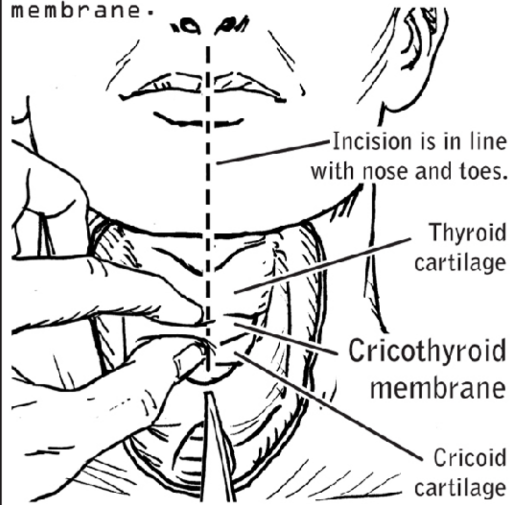
Begin by quickly preparing your tools. You'll need a sharp knife to make the incision, and a durable straw-like tube or pen barrel to create the airway. The thicker the pen, the better the chance that its

barrel will create a viable airway. Studies have identified the oversize durable straws found in sports bottles as a better choice. But most of us are more likely to have a pen in a purse or back pocket—and a situation in which a victim may be near death calls for the use of the best available option. More extensive first-aid kits may contain endotracheostomy or ET tubes, and these are the obvious first choice. If using a pen, remove and discard the ink cartridge and the top and bottom parts of the pen, so that all you are left with is the barrel.

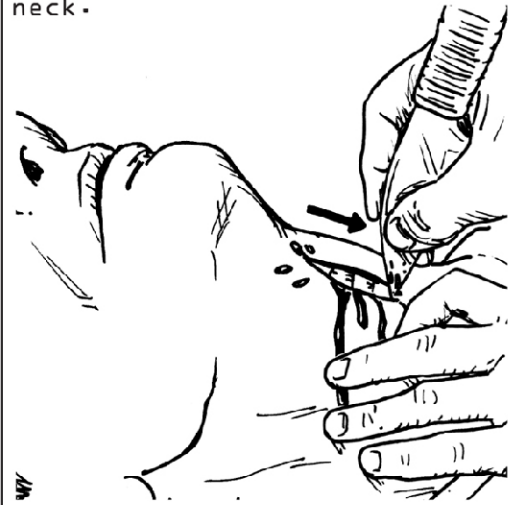
No. 100: Perform a Cricothyrotomy

CONOP: Perform a “cric” to provide an alternate airway.

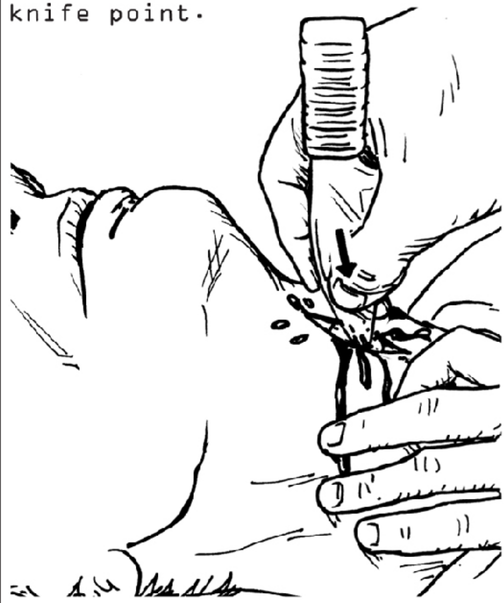
COA 1: Locate and “pinch” skin directly above cricothyroid membrane.



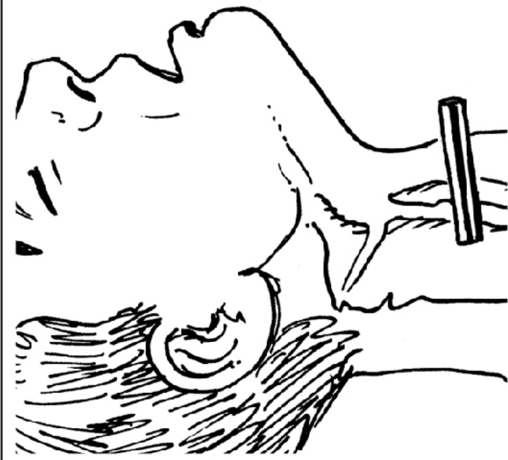
COA 2: With a knife, cut pinched skin in line with neck.



COA 3: Puncture membrane with knife point.



COA 4: Remove ink cartridge and both ends of writing pen and insert into punctured membrane between thyroid cartilage and cricothyroid membrane.



BLUF: Cricothyrotomies should only be performed when all other attempts have failed.

Palpate the neck to locate the Adam's apple, a lump formed by the angle of the thyroid cartilage as it surrounds the larynx. If it isn't visually prominent, slide your fingers down the victim's neck. The first solid protrusion is the Adam's apple, and you want to aim for the space just below it—the cricothyroid membrane that connects the thyroid cartilage to the cricoid cartilage. After an initial cut through the skin, you'll be punching through this membrane in order to clear a new pathway to the trachea.

The skin at the neck is very thin, which means that you need to be extremely careful in performing the initial cut. Slice too deep and you could be lacerating deeper layers of tissue and cartilage. The jugular veins and carotid arteries lie just to the side of the cervical vertebrae, so your cut must be centralized. Cut too low, and you'll be slicing into the thyroid gland. To ensure that your first cut slices only through the skin, pinch the skin just below the Adam's apple and pull it away from the throat. Make a perpendicular, quarter-inch horizontal cut in the loose skin.

Now the underlying membrane will be exposed. Aiming at the indentation between the two rings of cartilage (the thyroid and the cricoid), use the tip of your knife to puncture the membrane. A small, shallow incision is all that is needed; the system will work more efficiently if there's a tight seal around the breathing tube. Though there will be some blood, typically this maneuver should not result in profuse blood flow.

Force the barrel of the pen or ET tube into the incision. To quickly check the airway, look for misting, feel for airflow, or suck on the tube to confirm airflow. Administer two to three breaths through the tube. If the intervention was successful, the victim should thereafter begin to breathe through the airway on his or her own.

If breathing does not resume and a pulse is not discernible, begin to perform CPR.