FIRST AID TO THE INJURED

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INTRODUCTION

Definition of first aid

First aid is the provision of immediate care to a victim with an injury of illness, usually effected by a lay person, and performed within a limited skill range. First aid is normally performed until the injury or illness is satisfactorily dealt with (such as in the case of small cuts, minor bruises, and blisters) or until the next level of care, such as an ambulance or doctor, arrives.

Guiding principles

The key guiding principles and purpose of first aid, is often given in the mnemonic "3 Ps". These three points govern all the actions undertaken by a first aider.

- **P**revent further injury
- **P**reserve life
- **P**romote recovery

Limitations

The nature of first aid means that most people will only have a limited knowledge, and in emergency situations, first aiders are advised to FIRST seek professional help. This is done by calling, or assigning an able bystander to call, an emergency number, which is 1-1-2 in Croatia and all other member states of the European Union.

In emergency situations, it is important that the responder seek help immediately, seeking professional help by other means, if telephone contact is unavailable. The risks of inadvertently doing further injury to a victim, and/or the responder sustaining injury themselves while applying aid, can often outweigh the benefits of applying immediate treatment.

Improvisation

Many first aid situations take place without a first aid kit readily to hand and it may be the case that a first aider has to improvise materials and equipment. As a general rule, some help is better than no help, especially in critical situations, so a key first aid skill is the ability to adapt to the situation, and use available materials until more help arrives.

Some common improvisations include:
• Gloves → plastic bags, dish gloves,...
• Gauze → clean clothing (but not paper products)
• Splints → straight sections of wood, plastic, cardboard or metal
• Slings → the victim's shirt's bottom hem pinned to the center of their chest will immobilize a forearm nicely

FIRST AID IN THE INJURED

What is trauma ?

The word “trauma” is used to describe an injury to living tissue caused by an extrinsic agent. An injury is defined as damage or harm caused to the structure or function of the body by an outside agent or force, which may be physical, chemical, or even psychological.

Incidence of injuries

In developed countries, every year a serious trauma experiences about 3% of the total population. Trauma affects significantly more males (more than 60%). Of the total number of injured 4% of them being permanently disabled and 1.5% die. It is important to note that death and disability due to trauma affecting mostly young adult segment of the population, people ages 1-45.
The injuries are a major source of health care costs. An annual price of providing for injured gets to an amount which is almost a double price of providing for cardiovascular and malignant diseases together.

What cause injuries and how they are divided by cause?

Anything that can damage the body can cause an injury: blunt or sharp objects, impact at high speed, falls, animal or insect bites, fire or extreme heat, and exposure to chemicals and toxins.
According to the cause the injury can be divided into:

- ***mechanical injury*** - injury to any portion of the body from a blow, crush, cut, or penetrating force (bullet)
- ***thermal injury*** - injury caused by exposure to excess heat and excess cold sufficient to cause damage to the skin, and possibly deeper tissue
- ***electrical injury*** - injuries caused by exposure to natural lightning or electricity in the home or workplace, and
- ***injury produced by ionizing radiation***

What are the symptoms and signs of injuries?

Injury symptoms and signs vary depending on the parts of the body involved and the type and severity of the injury itself.

Table 1: The parts of the body, symptoms and signs of injury

Head	Neck	Shoulders and chest	Abdomen and pelvis	Arms and legs	Back and Spine
Bleeding Fractures Bruising Swelling Tenderness or pain Cerebral spinal fluid (CSF) from ears.	Bleeding Fractures Bruising Swelling Deformity Tenderness or pain Numbness or tingling	Bruising Swelling Gently Tenderness or pain when gently 'spring' the ribs Unequal rise of the chest with each breath	Rigidity Tenderness or pain Swelling	Bleeding Fractures Soft tissue injuries Tenderness or pain Loss of strength	Bleeding Deformity Tenderness or pain Paralysis or inability to move a body part

In some cases, injury can be life threatening. Life-threatening symptoms related to injuries are:

- Bleeding or abdominal trauma while pregnant
- Bluish coloration of the lips or fingernails
- Change in level of consciousness or alertness
- Chest pain, chest tightness, chest pressure, palpitations
- Paralysis or inability to move a body part
- Respiratory or breathing problems, such as shortness of breath, difficulty breathing, labored breathing, wheezing, not breathing, choking
- Severe pain
- Trauma, such as burns, significant injuries to the head, neck or back
- Uncontrolled or heavy bleeding, hemorrhage
- Vomiting blood, major rectal bleeding, or bloody stool
- Weak or absent pulse

How is injury treated?

Treatment of injury depends upon its type and severity. Some injuries can be treated with basic first aid techniques such as wound cleansing, wound dressings, rest, application of ice, compression, and elevation. More severe injuries may require cardiopulmonary resuscitation (CPR) and other resuscitation procedures or surgery.

First aid in the injured

First aid in the injured is generally consists of a series of simple and in some cases, potentially life-saving procedures that an individual can be trained to perform with minimal equipment.
It is usually performed by non-experts (or sometimes by an expert in case of an emergency), but trained personnel to a injured person until definitive medical treatment can be accessed.
In fact, certain self-limiting illnesses or minor injuries may not require further medical care past the first aid intervention, but in other cases, first aid is only the first step in the treatment of injured persons.
The key aims of first aid in the injured can be summarized in three key points:

1. ***Preserve life***: the overriding aim of all medical care, including first aid, is to save lives and minimise the threat of death.
2. ***Prevent further harm***: also sometimes called prevent the condition from worsening, or danger of further injury. This covers both external factors, such as moving a patient away from any cause of harm, and applying first aid techniques to prevent worsening of the condition, such as applying pressure to stop a bleeding which becomes serious.
3. ***Promote recovery***: first aid also involves trying to start the recovery process from the injury, and in some cases might involve completing a treatment, such as in the case of applying a plaster to a small wound.

Key skills of first aid

Certain skills are considered essential to the provison of first aid to injured persons and apply before all others if indicated. Particularly the **"ABC“**s of first aid, which focus on critical life-saving intervention, must be rendered before treatment of less serious injuries. ABC stands for *Airway*, *Breathing*, and *Circulation*.
Obstruction (choking) is a life-threatening emergency. For this reasons, when we get to the injured, care must first be brought to the his or her **airway (A)** to ensure it is clear.
Following evaluation of the airway, a first aid attendant would determine adequacy of **breathing (B)** and provide rescue breathing if necessary.

Assessment of **circulation (C)** is now not usually carried out for patients who are not breathing. First aiders must conclude indirectly that unconscious patients, without breathing have no circulation and go straight to chest compressions. Pulse checks may be done on less serious patients.

Once the ABCs are secured, first aiders can begin additional treatments, as required.

First aid for wounds

A wound is any type of injury to the skin. In general, wounds can be classified as closed (where the skin stays intact) or open.

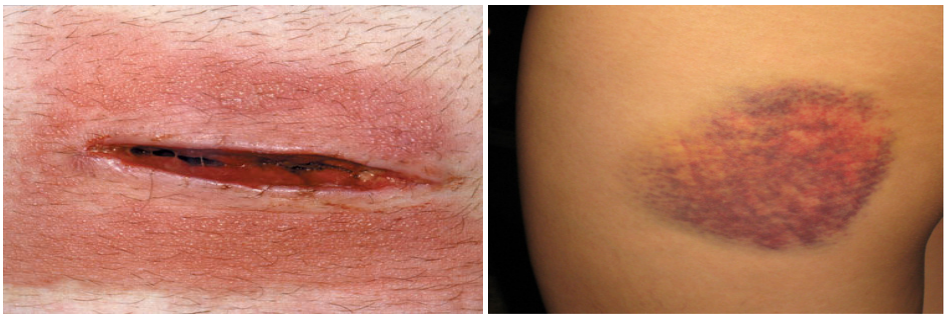

Figure 1. Open and closed wound

In open wounds, the skin is cracked open, leaving the underlying tissue exposed to the outside environment, which makes it more vulnerable to bleeding and infections.

In closed wounds, the skin is intact and the underlying tissue is not directly exposed to the outside world. Even with the skin intact, the damage can reach down to the underlying muscle, internal organs and bones. That is why these kind of wounds can be complicated by severe bleeding, large bruises, nerve damage, bone fractures and internal organ damage.

Open wounds can be classified according to the object that caused the wound. The types of open wounds are:

- ***Incisions or incised wounds***, caused by a clean, sharp-edged object such as a knife, razor, or glass splinter
- ***Lacerations***, irregular tear-like wounds caused by some blunt trauma
- ***Abrasions***, superficial wounds in which the topmost layer of the skin (the epidermis) is scraped off. Abrasions are often caused by a sliding fall onto a rough surface
- ***Avulsions***, injuries in which a body structure is forcibly detached from its normal point of insertion.

- ***Puncture wounds***, caused by an object puncturing the skin, such as a splinter, nail or needle.
- ***Penetrating wounds***, caused by an object such as a knife entering and coming out from the skin.
- ***Gunshot wounds***, caused by a bullet or similar projectile driving into or through the body. There may be two wounds, one at the site of entry and one at the site of exit, generally referred to as a "through-and-through."

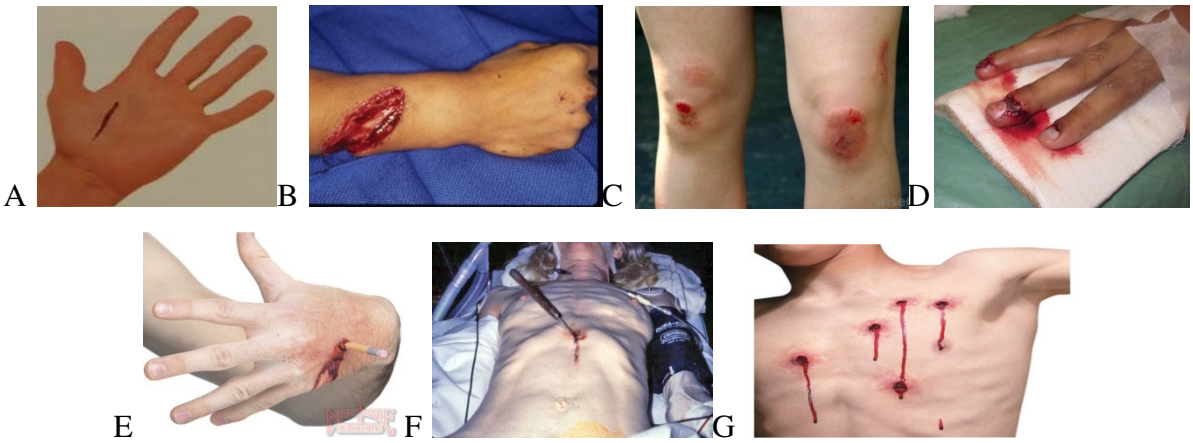

Figure 2. The types of open wounds : A. incision, B. laceration, C. abrasion, D. avulsion, E. puncture wound, F. penetrating wound, G. gunshot wound

The types of **closed wounds** are:

- ***Contusions***, more commonly known as bruises, caused by a blunt force trauma that damages tissue under the skin.
- ***Hematomas***, also called a blood tumor, caused by damage to a blood vessel that in turn causes blood to collect under the skin.
- ***Crush injury*** is an injury that occurs because of pressure from a heavy object onto a body part or from squeezing of a body part between two objects. Depending upon their severity, crush injuries can be complicated by bleeding, bruising, broken bones, open wounds or so-called compartment syndrome. Compartment syndrome usually results from extreme swelling after an injury. The dangerously high pressure in the field of injury impedes the flow of blood to the affected tissues. Severe tissue damage can result, with loss of body function or even death.

Figure 3. The types of closed wounds: A. contusion, B. Hematoma, C. crush injury

The following measures need to be taken in giving first aid to a victim of a open wound :

1. ***Stop the bleeding***
   - Minor cuts and scrapes usually stop bleeding on their own.
   - If they don't, apply gentle pressure with a clean cloth or bandage. Hold the pressure continuously for 20 to 30 minutes and if possible elevate the wound (Figure 4.)

Figure 4.

2. ***Clean the wound*** (Figure 5)
   - Rinse out the wound with clear water. Soap can irritate the wound, so try to keep it out of the actual wound.
   - If dirt or debris remains in the wound after washing, use tweezers cleaned with alcohol to remove the particles.
   - To clean the area around the wound, use soap and a washcloth.
   - There's no need to use hydrogen peroxide, iodine or an iodine-containing cleanser.

Figure 5.

3. ***Cover the wound*** **(Figure 6.)**
   - If the bleeding slows, cover the wound with a clean dressing and bandage.
   - Dressings and bandages can help keep the wound clean and keep harmful bacteria out.

     A dressing is a sterile pad or compress (usually made of gauze or cotton wrapped in gauze) used to cover wounds, to control bleeding and/or prevent further contamination. A dressing should be large enough to totally cover the wound, with a safety margin of about 2.5 cm on all sides beyond the wound.

     A bandage is used to secure a dressing in place and to apply pressure to bleeding wounds.

Figure 6.

The following measures need to be taken in giving first aid to a victim of a closed wound :

1. ***Application of direct pressure***, preferably with ice wrapped in a cloth, for several minutes, in order to arrest the bleeding as well as to reduce the swelling.
2. ***Elevation of the affected region*** will also support in reducing the pressure as well as the re-absorption process and it should be practiced as and when appropriate.

Figure 7. Place ice pack on wound to slow down bleeding and reduce the swelling

When to seek help from health professional :

- If the wound is in the head, chest or abdomen (unless it is minor).
- If there is blue, white or cold skin, numbness, tingling, loss of feeling, or the person is unable to move a limb below the wound.
- If your tetanus shots are not up to date, especially if the object that caused the puncture was dirty, such as a rusty nail or farm implement.
- If a deep wound to the foot occurred through a shoe.
- If an animal bite is severe and may need stitches, or if it is on the hand or face.
- If you are unable to remove an object from the wound.
- If signs of infection develop – increased pain, swelling, redness, tenderness – heat or red streaks extending from the wound – discharge of pus – fever of 38 °C with no other cause.

First aid for bleeding

Bleeding is the loss of blood escaping from the circulatory system. It arises due to either traumatic injury, underlying medical condition, or a combination and can occur *internally*, where blood leaks from blood vessels inside the body, or *externally*, either through a natural opening such as the mouth, nose, ear, urethra, vagina or anus, or through a break in the skin.

External bleeding is generally described in terms of the origin of the blood flow by vessel type. The basic categories of external bleeding are:

– ***Arterial bleeding****:* As the name suggests, blood flow originating in an artery. With this type of bleeding, the blood is typically bright red to yellowish in colour, due to the high degree of oxygenation. Blood typically exits the wound in spurts, rather than in a steady flow. The amount of blood loss can be copious, and can occur very rapidly.

– ***Venous bleeding****:* This blood is flowing from a damaged vein. As a result, it will be blackish in colour (due to the lack of oxygen being transported) and will flow in a steady manner. Caution is still indicated; while the blood loss may not be arterial, it can still be quite substantial, and can occur with surprising speed without intervention.

– ***Capillary bleeding****:* Capillary bleeding usually occurs in superficial wounds, such as abrasions. The colour of the blood may vary somewhat (distal portion of circulation with oxygenated and unoxygenated blood mixing), and will generally ooze in small amounts, as opposed to flowing or spurting.

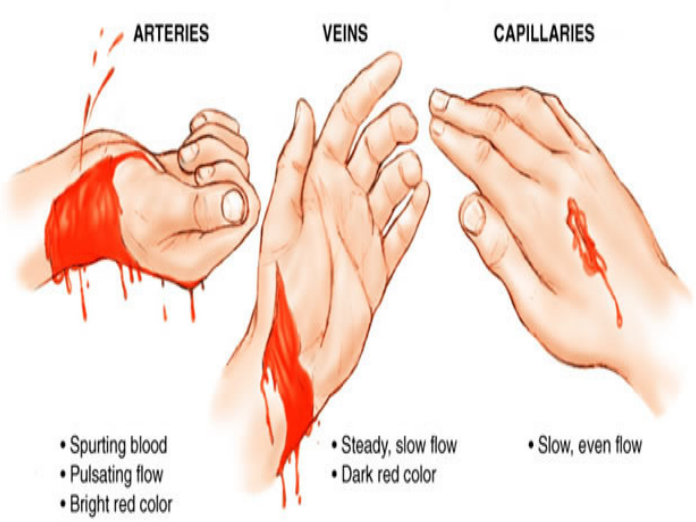

Figure 8. Division of external bleeding in terms of the origin of the blood flow by vessel type.

Internal Bleeding is one of the most serious consequences of trauma. It may occur after any significant physical injury. There are two main types of trauma, and either may cause internal bleeding:

– ***Blunt trauma*** - This kind of trauma happens when a body part collides with something else, usually at high speed. Blood vessels inside the body are torn or crushed either by shear forces or a blunt object. Examples are car accidents, physical assaults, and most falls.

– **Penetrating trauma** - This happens when a foreign object penetrates the body, tearing a hole in one or more blood vessels. Examples are gunshot wounds, stabbings, or falling onto a sharp object.

Almost any organ or blood vessel can be damaged by trauma and cause internal bleeding. The most serious sources of internal bleeding due to trauma are:

- Head trauma with internal bleeding (intracranial hemorrhage)
- Bleeding around the lungs (hemothorax)
- Bleeding around the heart (hemopericardium and cardiac tamponade)
- Tears in the large blood vessels near the center of the body (aorta, superior and inferior vena cava, and their major branches)
- Damage caused by trauma to the abdomen such as liver or spleen lacerations or perforation of other soft organs

Symptoms of bleeding are:

- Blood coming from an open wound
- Bruising
- Shock, which may cause any of the following symptoms:
  - Confusion or decreasing alertness
  - Clammy skin
  - Dizziness or light-headedness after an injury
  - Low blood pressure
  - Paleness (pallor)
  - Rapid pulse, increased heart rate
  - Shortness of breath
  - Weakness

If the injured has internal bleeding, the aforementioned symptoms are joined by the following symptoms :

- Abdominal pain and swelling
- Chest pain
- External bleeding through a natural opening
  - Blood in the stool (appears black, maroon, or bright red)
  - Blood in the urine (appears red, pink, or tea-colored)
  - Blood in the vomit (looks bright red, or brown like coffee-grounds)
  - Vaginal bleeding (heavier than usual or after menopause)

Any of these signs of internal bleeding after a trauma should be treated as a medical emergency. The injured person needs to be evaluated in a hospital emergency room.

The following measures need to be taken in giving first aid to a victim of a external bleeding :

1. ***Wash your hands*** to avoid infection ***and put on gloves***
2. ***Lay on the injured person down and cover the person to prevent loss of body heat.***
   - If possible, position the person's head slightly lower than the trunk or elevate the legs and elevate the site of bleeding (Figure 9.)
3. ***While wearing gloves, remove any obvious dirt or debris from the wound.***
   - Don't remove any large or more deeply embedded objects.
   - Your principal concern is to stop the bleeding.

Figure 9.

4. ***Apply pressure directly on the wound until the bleeding stops*** (Figure 10.)
   - Use a sterile bandage or clean cloth and hold continuous pressure for at least 20 minutes without looking to see if the bleeding has stopped.
   - Maintain pressure by binding the wound tightly with a bandage or clean cloth and adhesive tape.
   - Use your hands if nothing else is available.

Figure 10.

   - If the bleeding continues and seeps through the gauze or other material you are holding on the wound, don't remove it. Instead, add more absorbent material on top of it (Figure 11.)

Figure 11.

5. ***Squeeze a main artery if necessary*** (Figure 12.)
   - If the bleeding doesn't stop with direct pressure, apply pressure to the artery delivering blood to the area.

– Squeeze the main artery in these areas against the bone. Keep your fingers flat.
– With your other hand, continue to exert pressure on the wound itself.

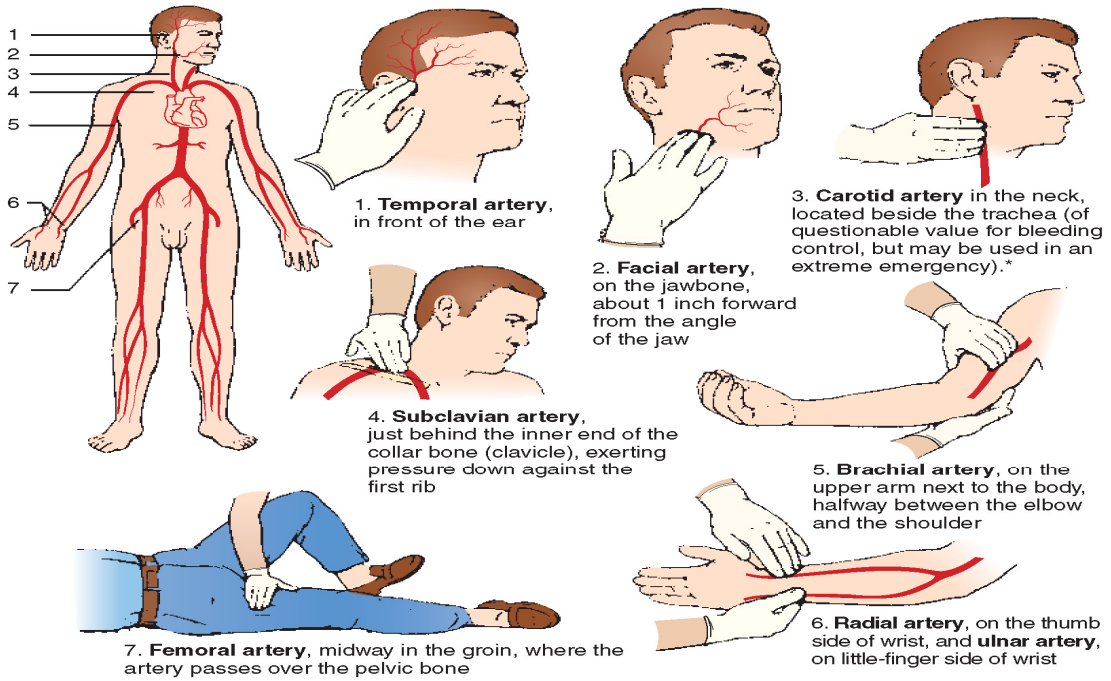

Figure 12.

6. ***Immobilize the injured body part once the bleeding has stopped*** (Figure 13.)
   – Leave the bandages in place and get the injured person to the emergency room as soon as possible.

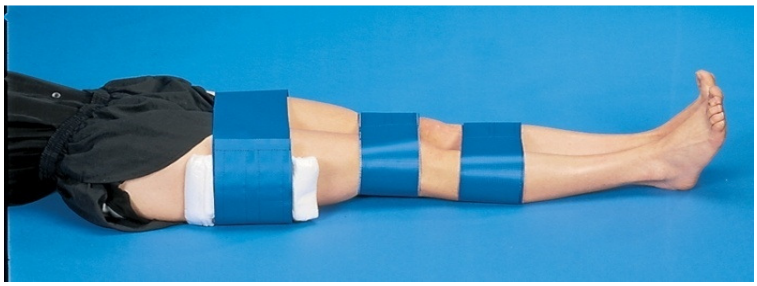

Figure 13.

7. If continuous pressure hasn't stopped the bleeding and bleeding is extremely severe, a ***tourniquet*** may be used until medical help arrives or bleeding is controllable (Figure 14)
   – It should be applied to the limb between the bleeding site and the heart and tightened so bleeding can be controlled by applying direct pressure over the wound.

– To make a tourniquet, use bandages 5 -10 cm (2 to 4 inches) wide and wrap them around the limb several times. Tie a knot, leaving loose ends long enough to tie another knot. A stick should be placed between the two knots. Twist the stick until the bandage is tight enough to stop the bleeding and then secure it in place.
– Check the tourniquet every 10 to 15 minutes. If the bleeding becomes controllable, (manageable by applying direct pressure), release the tourniquet.

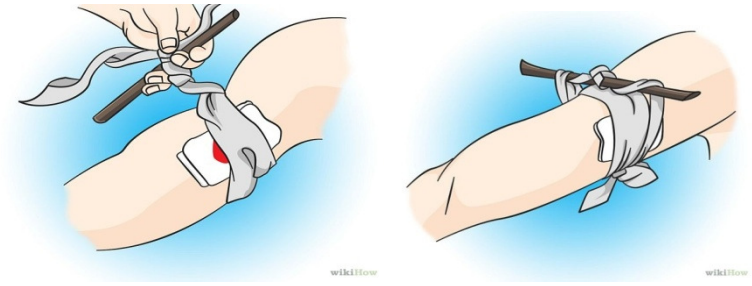

Figure 14.

NOTE :
- DO NOT apply a tourniquet to control bleeding, except as a last resort. Doing so may cause more harm than good.
- A tourniquet should be used only in a life-threatening situation and should be applied by an experienced person

The following measures need to be taken in giving first aid to a victim of a internal bleeding :

1. Call 112
2. If the victim has ABC complications, treat those first – CPR always has priority.
3. Administer CPR if necessary
4. Treat for shock
5. Assist the victim into the most comfortable position
6. Check the victim's vital signs regularly (until the ambulance arrives)

First aid for bone and joint injuries

Injuries of bones and joints can be bone fractures or dislocations and sprains of joints.

A ***fracture*** is the medical term for a broken bone. There are many types of fractures, but the main categories are open, and closed.

- A ***closed fracture*** is when the bone breaks but there is no puncture or open wound in the skin.
- An ***open fracture*** is one in which the bone breaks through the skin. This is an important difference from a closed fracture because with an open fracture there is a risk of a deep bone infection.

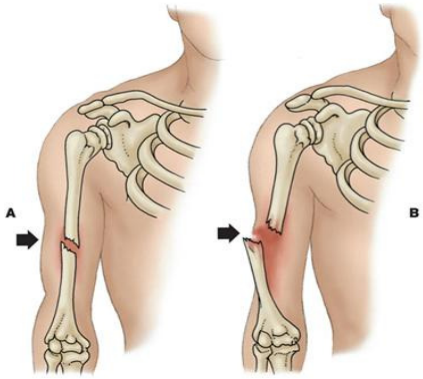

Figure 15. Closed and open fracture

The severity of a fracture depends upon its location and the damage done to the bone and tissue near it. Serious fractures can lead to serious complications if not treated promptly. Possible complications include damage to blood vessels or nerves and infection of the bone (osteomyelitis) or surrounding tissue.

Fractures can be identified by symptoms that can be represented by the acronym DOTS: **D** for deformity, **O** for open wounds, **T** for tenderness and **S** for swelling

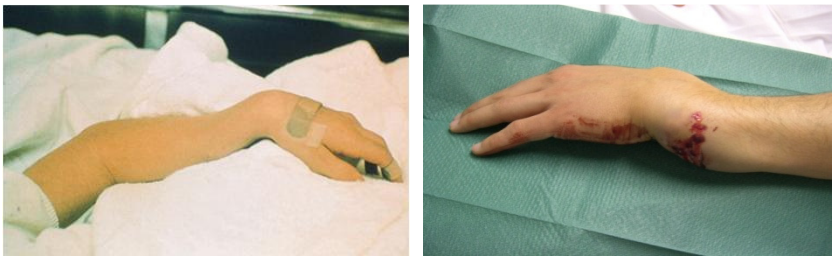

Figure 16. Symptoms of a broken arm

The following measures need to be taken in giving first aid to a victim with bone injury:

1. ***Don't move the person except if necessary*** to avoid further injury. Take these actions immediately while waiting for medical help:
2. ***Stop any bleeding***

– Apply pressure to the wound with a sterile bandage, a clean cloth or a clean piece of clothing.

3. ***Immobilize the injured area***

– Don't try to realign the bone or push a bone that's sticking out back in.

– If you've been trained in how to splint and professional help isn't readily available, apply a splint to the area above and below the fracture sites.

Splinting reduces pain, prevents further damage to muscles, nerves and blood vessels, prevents closed fracture from becoming open fracture and reduces bleeding and swelling.

In an emergency, almost any firm object or material can serve as a splint such as sticks, boards, or even rolled up newspapers. If none can be found, use a rolled blanket or clothing. An injured body part can also be taped to an uninjured body part in order to prevent it from moving. For example, you can tape an injured finger to the finger next to it, or fractured leg to uninjured leg to keep it immobile (self-splint or anatomic splint).

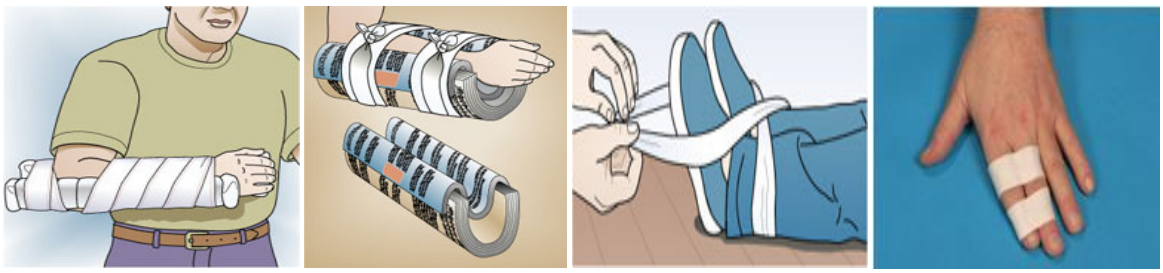

Figure 17. Improvise materials and techniques for splinting

Splint must be well padded on the sides touching the body; if they are not properly padded, they will not fit well and will not adequately immobilize the injured part. Before applaying splint open wounds must be covered. We have to immobilize in position found.

A basic rule of splinting is that the joint above and below the broken bone should be immobilized to protect the fracture site. For example, if the lower leg is broken, the splint should immobilize both the ankle and the knee.

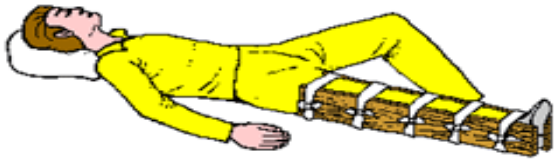

Figure 18. Splinting of the lover leg

Fasten splints in place with bandages, strips of adhesive tape, clothing, or other suitable materials (Figure 19.)

- Use opposite arm to measure lenght of splint !
- If possible, one person should hold the splints in position while another person fastens them.

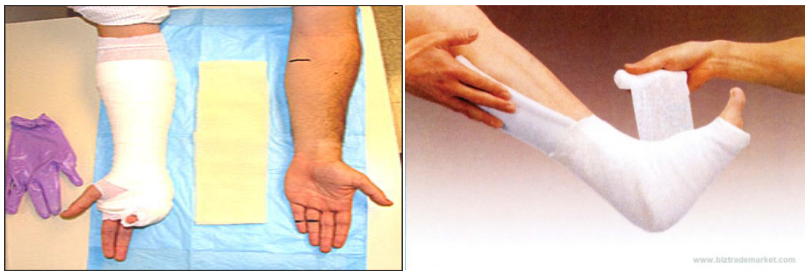

Figure 19.

Although splints should be applied snugly, they should never be tight enough to interfere with the circulation of the blood.

- When you are applying splints to an arm or a leg, try to leave the fingers or toes exposed (Fifure 20.)
- If the tips of the fingers or toes become blue or cold, you will know that the splints or bandages are too tight.

Figure 20.

You should examine a splinted part approximately every half hour and loosen the fastenings if the circulation appears to be impaired. Remember that any injured part is likely to swell, and splints or bandages that are otherwise applied correctly may later become too tight.

4. ***Apply ice packs to limit swelling and help relieve pain until emergency personnel arrive.***
   - Don't apply ice directly to the skin — wrap the ice in a towel, piece of cloth or some other material (Figure 21.)

Figure 21.

5. ***Treat for shock.***
   - If the person feels faint or is breathing in short, rapid breaths, lay the person down with the head slightly lower than the trunk and, if possible, elevate the legs.

Injuries of joints can be dislocations or sprains of joints.

A **dislocation** is an injury in which the ends of bones are forced from their normal positions. The cause is usually trauma resulting from a fall, an auto accident or a collision during contact or high-speed sports.

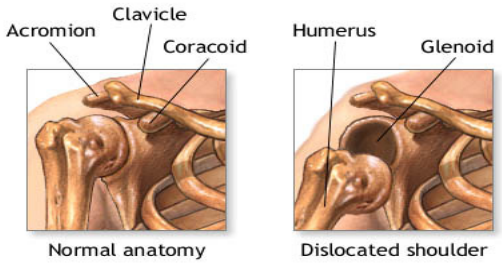

Figure 22. Normal and dislocated shoulder

A dislocation is likely to bruise or tear the muscles, ligaments, blood vessels, tendons, and nerves near a joint.
Rapid swelling and discoloration, loss of ability to use the joint, severe pain and muscle spasms, possible numbness and loss of pulse below the joint, and shock are characteristic symptoms of dislocations. The fact that the injured part is usually stiff and immobile, with marked deformation at the joint, will help you distinguish a dislocation from a fracture. In a fracture, there is deformity between joints rather than at joints, and there is generally a wobbly motion of the broken bone at the point of fracture.

A ***sprain*** is a stretching or tearing of ligaments — the tough bands of fibrous tissue that connect one bone to another in your joints. The most common location for a sprain is in ankle. Signs and symptoms will vary, depending on the severity of the injury but pain and swelling are the main symptoms.

The following measures need to be taken in giving first aid to a victim with joint injury:

1. For dislocations, splint and provide care as you would for fracture.
2. For sprains, use RICE procedure - R=rest, I=Ice, S=compression and E=elevation (Figure 23.)

Figure 23.

3. In both cases seek medical care (Referral).

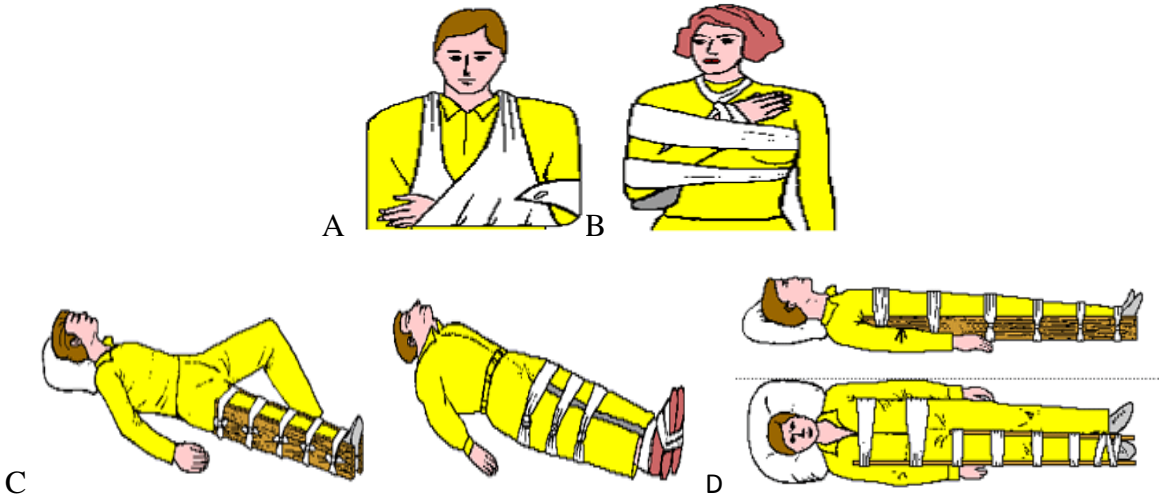

Figure 24. Examples of splinting : A - Forearm fracture, B - Upper arm fracture, C - Lower leg fracture (board and anatomic splint) , D - Upper leg fracture

First aid for back and neck injury (spinal cord injury)

Any severe blow, fall, or other accident may result in injury to the neck, back, or spinal cord. Spinal cord injuries can cause long-term, irreversible damage and death. Symptoms can be loss of sensation, loss of motor functions (paralysis), loss of bowel/bladder functions, loss of involuntary functions like breathing, inability to control rate of heart beat, inability to sweat, ...

The following measures need to be taken in giving first aid to a victim with suspected spinal cord injury:

1. ***Seek medical assistance immediately***. Call for EMS (112)
2. ***Until EMS arrives*:**
   - DO NOT move victim unless absolutely necessary to save victim's life.
   - DO NOT bend or twist victim's neck or body. Careful handling is extremely important.
   - Maintain position in which victim was found and immobilize head, neck, shoulders, and torso - roll up towels, blankets, jackets, or clothing, and place around head, neck, shoulders, and torso (Figure 25.)

Figure 25.

   - If the person is not breathing or showing signs of circulation, begin CPR but do not lift the chin to open an airway. Instead, you should gently pull the jaw forward (Figure 26.)

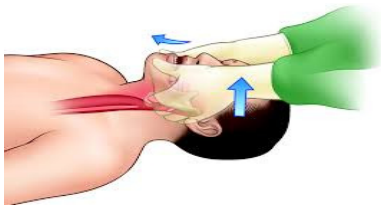

Figure 26.

   - If victim must be moved to perform rescue breathing, to clean mouth of vomit or in danger of further injury, enlist help at least one other person to keep victim's head, torso, and legs in straight line as you turn victim.

Figure 27.

First aid for burns

Burns are thermal injury caused by exposure to excess heat. According to the depth of injury to the skin, we distinguish tree (or four) types of burns:

1. Burns that affect only the superficial skin are known as **superficial or first-degree burns**.
2. When damage penetrates into some of the underlying layers, it is a **partial-thickness or second-degree burn**.
3. In a **full-thickness or third-degree burn**, the injury extends to all layers of the skin.
4. Sometimes we talk about a **fourth-degree burns** when the injury affects deeper tissues, such as muscle or bone.

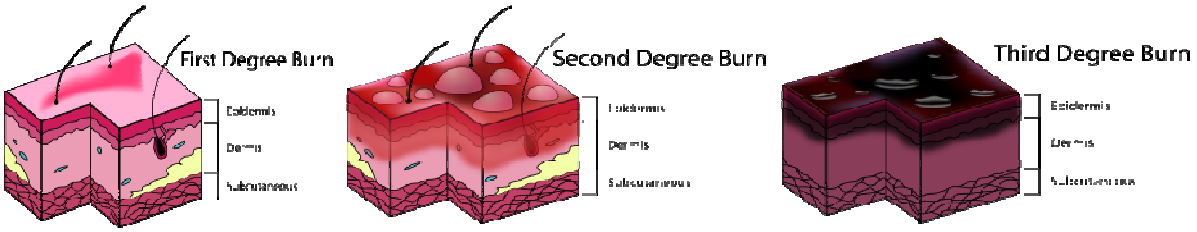

Figure 28. Three types of burns

Table 2. Simptoms and sign of various types of burns

Type	Layers involved	Appearance	Texture	Sensation	Healing Time	Prognosis	Example
Superficial (First degree)	Epidermis	Red without blisters	Dry	Painful	5–10 days	Heals well, Repeated sunburns increase the risk of skin cancer later in life!	
Superficial partial thickness (Second degree)	Extends into superficial (papillary) dermis	Redness with clear blister. Blanches with pressure.	Moist	Very painful	less than 2–3 weeks	Local infection/cellulitis but no scarring typically	
Deep partial thickness (Second degree)	Extends into deep (reticular) dermis	Yellow or white. Less blanching. May be blistering.	Fairly dry	Pressure and discomfort	3–8 weeks	Scarring, contractures (may require excision and skin grafting)	
Full thickness (Third degree)	Extends through entire dermis	Stiff and white/brown No blanching	Leathery	Painless	Prolonged (months) and incomplete	Scarring, contractures, amputation (early excision recommended)	
Fourth degree	Extends through entire skin, and into underlying fat, muscle and bone	Black; charred with eschar	Dry	Painless	Requires excision	Amputation, significant functional impairment and, in some cases, death.	

To distinguish a minor burn from a serious burn, the first step is to determine the extent of damage to body tissues. In order to determine the need for referral to a specialized burn unit, the American Burn Association devised a classification system. Under this system, burns can be classified as major, moderate and minor. This is assessed based on a number of factors, including total body surface area affected, the involvement of specific anatomical zones, the age of the person, and associated injuries. Minor burns can typically be managed at home, moderate burns are often managed in hospital, and major burns are managed by a burn center!

Table 3. American Burn Association severity classification

American Burn Association severity classification		
Minor	**Moderate**	**Major**
Adult <10% TBSA	Adult 10-20% TBSA	Adult >20% TBSA
Young or old < 5% TBSA	Young or old 5-10% TBSA	Young or old >10% TBSA
<2% full thickness burn	2-5% full thickness burn	>5% full thickness burn
	High voltage injury	High voltage burn
	Possible inhalation injury	Known inhalation injury
	Circumferential burn	Significant burn to face, joints, hands or feet
	Other health problems	Associated injuries

For minor burns, including first-degree burns and second-degree burns limited to an area no larger than 8 centimeters in diameter, take the following action:

1. **Cool the burn.**
   - Hold the burned area under cool (not cold) running water for 10 or 15 minutes or until the pain subsides.
   - If this is impractical, immerse the burn in cool water or cool it with cold compresses.
   - Don't put ice on the burn.

2. **Cover the burn with a sterile gauze bandage.**
   - Wrap the gauze loosely to avoid putting pressure on burned skin.
   - Bandaging keeps air off the burn, reduces pain and protects blistered skin.
3. **Take an over-the-counter pain reliever.**
   - These include aspirin, ibuprofen , naproxen or acetaminophen
   - Use caution when giving aspirin to children or teenagers.
   - Talk to your doctor if you have concerns.

For major burns, call 112 or emergency medical help. Until an emergency unit arrives, follow these steps:

1. **Don't remove burned clothing.**
   - However, do make sure the victim is no longer in contact with smoldering materials or exposed to smoke or heat.
2. **Don't immerse large severe burns in cold water.**
   - Doing so could cause a drop in body temperature (hypothermia) and deterioration of blood pressure and circulation (shock).
3. **Check for signs of circulation (breathing, coughing or movement).**
   - If there is no breathing or other sign of circulation, begin CPR.
4. **Elevate the burned body part or parts.**
   - Raise above heart level, when possible.
5. **Cover the area of the burn.**
   - Use a cool, moist, sterile bandage, clean, moist cloth or moist cloth towels.

First aid for cold related injuries

Cold-related injuries, such as hypothermia and frostbite, occurs when low temperatures damage the body.

Frostbite is a common injury caused by exposure to extreme cold or by contact with extremely cold objects (especially those made of metal). It occurs when tissue temperature falls below the freezing point (0°C/32°F), or when blood flow is obstructed.

In mild cases, the symptoms include inflammation of the skin in patches accompanied by slight pain. In severe cases, there could be tissue damage without pain, or there could be burning or prickling sensations resulting in blisters.

Toes, fingers, ears and nose are at greatest risk because these areas do not have major muscles to produce heat.

Figure 29. Frostbite

First aid for frostbite includes:

1. If possible, move the victim to a warm area.
2. Gently loosen or remove constricting clothing or jewellery that may restrict circulation.
3. Loosely cover the affected area with a sterile dressing. Place some gauze between fingers and toes to absorb moisture and prevent them from sticking together.
4. Quickly transport the victim to an emergency care facility.

DO NOT attempt to rewarm the affected area on site (but do try to stop the area from becoming any colder) - without the proper facilities tissue that has been warmed may refreeze and cause more damage.
DO NOT rub area or apply dry heat.
DO NOT allow the victim to drink alcohol or smoke.

Hypothermia is condition in which body temperature falls below 33°C.
People at greatest risk are those who are lying immobile in a cold environment, such as people who have had a stroke or a seizure or who are unconscious due to intoxication, those with a low blood sugar level, or those with an injury. Because they are not moving, these people generate less heat and also are unable to leave the cold environment.
The very young and the very old are at particular risk.

Table 4. Symptoms and signs of hypothermia depend on body temperature

Stage	Core Temperature	Signs and Symptoms
Mild Hypothermia	37.2-36.1ºC (99 - 97ºF)	Normal, shivering may begin.
	36.1-35ºC (97 - 95ºF)	Cold sensation, goose bumps, unable to perform complex tasks with hands, shivering can be mild to severe, hands numb.
Moderate Hypothermia	35-33.9ºC (95 - 93ºF)	Shivering, intense, muscles incoordination becomes apparent, movements slow and laboured, stumbling pace, mild confusion, may appear alert. Use sobriety test, if unable to walk a 9 meter (30 foot) straight line, the person is hypothermic.
	33.9-32.2ºC (93 - 90ºF)	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, withdrawn.
Severe Hypothermia	32.2-30ºC (90 - 86ºF)	Shivering stops, exposed skin blue of puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behaviour, but may be able to maintain posture and appearance of awareness
	30-27.8ºC (86 - 82ºF)	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.
	27.8-25.6ºC (82 - 78ºF)	Unconscious, a heart beat and respiration erratic, a pulse may not be obvious.
	25.6-23.9ºC (78 - 75ºF)	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.

First aid for hypothermia includes the following steps:

1. Seek medical help immediately. Hypothermia is a medical emergency.
2. Ensure that wet clothing is removed.
3. Place the victim between blankets (or towels, newspaper, etc.) so the body temperature can rise gradually. Body-to-body contact can help warm the victim's temperature slowly. Be sure to cover the person's head.

4. Give warm, sweet (caffeine-free, nonalcoholic) drinks unless the victim is rapidly losing consciousness, unconscious, or convulsing.
5. Quickly transport the victim to an emergency medical facility.
6. Do not attempt to rewarm the victim on a site (e.g., do not use hot water bottles or electric blankets).
7. Perform CPR (cardiopulmonary resuscitation) if the victim stops breathing. Continue to provide CPR until medical aid is available.

   The body slows when it is very cold and in some cases, hypothermia victims that have appeared "dead" have been successfully resuscitated !

First aid for shocked

Shock may result from trauma, blood loss, an allergic reaction, severe infection, poisoning, severe burns or other causes.

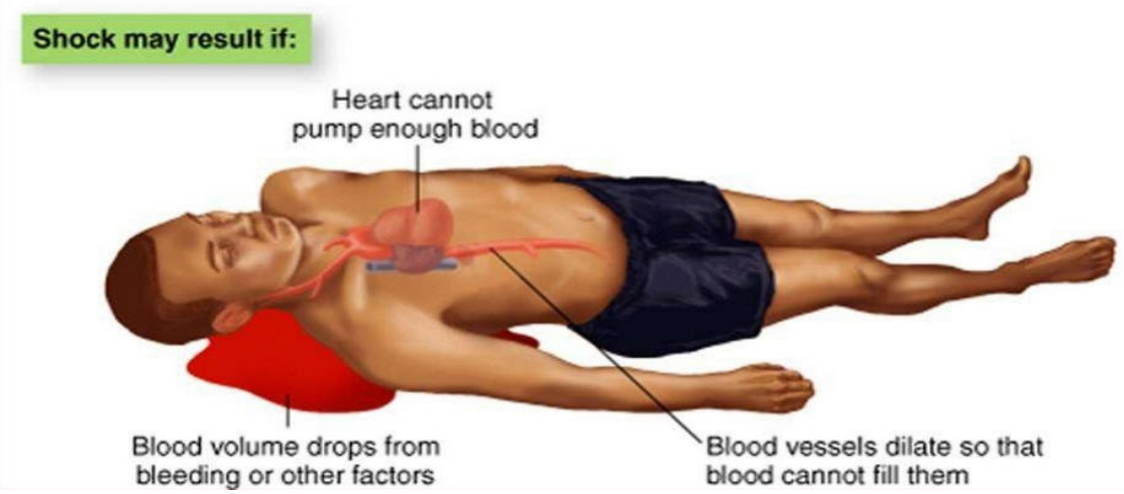

Figure 30. Three basic mechanism of shock

When a person is in shock, his or her organs aren't getting enough blood or oxygen. If untreated, this can lead to permanent organ damage or death. Shock can be a life-threatening problem. The best way to protect people from the serious damages that shock can have on the system is to recognize the symptoms before the person gets into serious trouble.

In most cases, only a few of the symptoms will be present, and many do not appear for some time. Common symptoms are:

– Pale, cold, clammy and moist skin
– Vacant or dull eyes, dilated pupils

- Anxiety, restlessness, and fainting
- Weak, rapid, or absent pulse
- Nausea and vomiting
- Shallow, rapid, and irregular breathing
- Excessive thirst
- Person may seem confused
- Look tired and fatigue

If you suspect shock, even if the person seems normal after an injury:

1. Call 112 or your local emergency number.
2. Have the person lie down on his or her back with feet higher than the head. If raising the legs will cause pain or further injury, keep him or her flat.
3. Check for signs of circulation (breathing, coughing or movement) and if absent, begin CPR.
4. Keep the person warm and comfortable by loosening any belts or tight clothing and covering the person with a blanket. Even if the person complains of thirst, give nothing by mouth.
5. Turn the person on his or her side to prevent choking if the person vomits or bleeds from the mouth.
6. Seek treatment for injuries, such as bleeding or broken bones.