

# Fourth Handbook on Healthcare

## First Aid



Trust for Voluntary Organizations

**Fourth Handbook  
on  
Healthcare**

**First Aid**

By: Iqbal Jafar

# **Trust for Voluntary Organizations**

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# **Trust for Voluntary Organizations (TVO)**

The Trust for Voluntary Organizations was established in 1990 in pursuance of an agreement between the governments of the US and Pakistan. The purpose was to create an independent indigenous grant-making agency for the assistance and support of NGOs engaged in participatory development. The Trust also provides assistance for the capacity building of NGOs and has, recently, undertaken dissemination of information as part of capacity building programme for its partner NGOs and the communities that they serve.

So far the Trust has disbursed more than Rs. 700 million out of its own funds and the funding provided by the European Commission under a five-year agreement that would conclude in 2003. The grants have been provided in the field of Primary Education, Primary Health (including reproductive health), Poverty Alleviation and Rehabilitation of the Disabled.

The Trust operates through its 20 regional offices and a network of CBOs (more than 300) that extends to each sub-district (tehsil) of Pakistan. However, NGOs/CBOs that are not part of this network are also eligible for support by the Trust.

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The People's Medical Society; and The First Aid Guide by Dr. P.S. Phadke.

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# Introduction

Every single individual in the world is constantly exposed to numerous health and life hazards through many sources and in many different ways: viruses, germs, poisons (pollution, bites and stings); weather (heat, cold, flood, drought, storm); accidents, big disasters, little mishaps, and inherited or genetic deviations from the norm, ticking away within us like time fuses. With so many threats, many of them potentially lethal, to fend off, it is a miracle that vast majority of men and women in the world do live long enough to see their grandchildren grow up. This should make us realize how precious is the gift of life, and how precarious its survival.

For reasons that are well-known, there is huge variation worldwide in the average life expectancy at birth. In the spectrum of life expectancy in different countries that begins at about 35 years in Sierra Leone to 80 years in Japan, Pakistan stands at about 63 years. This variation among nations is due to many reasons (climate, food, lifestyle), the most important being the degree of access to competent, well-equipped, and responsive medical service. For the vast majority of the population in the developing countries that kind of medical service remains beyond its reach, physically and financially.

Efforts are being made, all over the developing world to remedy this situation by making at least basic medical services and information available to the population living in the less developed areas, especially the rural areas, where the social services infrastructure is non-existent or exists only in a rudimentary form. As part of the effort in Pakistan, the TVO has undertaken a programme of health education through Community Resource Persons (CRPs) who would not only be trained but also provided with handbooks on four major areas of

healthcare, that is:

1. Hygiene and Nutrition
2. Prevention of Common Diseases
3. Mother and Child
4. First Aid

This handbook, the fourth in the series, will be translated into Urdu and some regional languages, as the previous three handbooks were, for making the information accessible to the communities in all the regions of the country. Non-profit organizations would, on request, be freely allowed to reproduce or adapt any of these handbooks or any part of them.

**IQBAL JAFAR**  
Chief Executive Officer  
Trust for Voluntary Organizations



# Chapter 1

**Safety First**

# Safety First

Accidents cannot be foreseen, but some can be avoided by exercising care and caution at home, place of work, on the road, at play, or wherever you may happen to be. Here are some simple precautions that do not appear to be of any consequence if exercised, but can be of much consequence if not exercised.

## At Home

- Clean up spills on the floor at once to prevent slips.
- Use unbreakable plates and cups for children.
- Keep knives, nails and other sharp objects out of the reach of children.
- Take the ammunition out of the gun, and keep it out of the reach of children.
- Cut the food for children into small pieces to prevent choking. Children under the age 6 should not be given nuts, candies or any hard food.
- Keep medicines away from the reach of children.
- Do not let children play with matches.
- Do not let children play with plastic bags.
- While using a knife cut in the direction away from you to avoid injury if it slips.
- Do not use polyester clothes while cooking. They catch fire quickly, melt and stick to the body.
- Do not smoke in the bed, especially when feeling sleepy.
- Do not wear shirts with loose or broad sleeves while cooking or using any machinery.
- Cover electric outlets with caps when not in use.
- Do not plug or unplug electrical appliances with wet hands.

## In the outdoors

- Wear shoes. This is the single most important precaution that would save you from cuts, bites, stings and viruses.

- Keep your body cool in summer and warm in winter by appropriate clothing.
- Do not drive a vehicle if you are tired or sleepy.
- Carry a light after dark.
- Keep the children away from ponds, wells and canals.
- Keep your cycle's reflectors clean and the headlamp in working condition when riding after dark.
- Keep away from an animal foaming at the mouth for it could be a case of rabies.
- Do not ride a motorcycle without wearing a helmet as head injuries are the most common injuries caused by accidents, and can be fatal.

## **At home and away**

- Do not laugh with food in your mouth. It can cause choking which is no laughing matter.

# Chapter 2

## The Human Body

# The Human Body

There are numerous situations where first aid may be required, but there would, in each of those situations, be only one object of attention—a human body. The first section of this handbook is, therefore, a brief introduction to human anatomy. The intention is to provide basic information about human body to a non-professional provider of first aid.

The human body can be broadly divided into 10 different systems:

- The integumentary system that consists of the skin, hair, nails etc.
- The skeletal system that consists of bones and cartilages.
- The muscular system that consists of muscles that move various parts of the body.
- The nervous system that consists of the central nervous system i.e. the brain and spinal cord, and the peripheral nervous system i.e. the cranial and spinal nerves.
- The circulatory system that consists of the cardiovascular and lymphatic systems that function in parallel.
- The digestive system that consists of the organs for chewing, swallowing, digestion, absorption of food, and elimination of waste.
- The respiratory system that consists of the air passages and lungs that supply oxygen to the body and remove carbon dioxide.
- The urinary system that consists of the kidneys, ureters, urinary bladder and urethra, which filter blood and eliminate waste through urine.
- The reproductive system that consists of organs that are involved in reproduction.
- The endocrine system that consists of glands which produce hormones and distribute them in the body through the bloodstream. The hormones regulate the body chemistry and help respond to infection, disease, hunger, stress, and prepare the body for physical activity.

Through a vast and intricate network of linkages, these separate systems work together as a single unified system that operates with amazing efficiency and precision even without any conscious planning or control. From the point of view of first aid, only seven of these 10 systems are relevant. These are: the in

tegumentary system, the skeletal system, the muscular system, the nervous system, the circulatory system, the respiratory system, and the digestive system. These seven systems are described separately in the following sections.

## The Integumentary System

The integumentary system (integumentum means 'a covering' in Latin) consists of the skin and its appendages, such as hair, nails, sweat glands (See Figure 1) and is divided into four layers:

- epidermis, a thin uppermost layer that contains the nerve endings which are sensitive to touch, temperature and irritation;
- dermis, a deeper layer that contains hair follicles and the muscles that erect the hair, and sebaceous glands that release oily secretion to the surface of the skin.
- subcutaneous tissue, the third layer, is the thermal regulator and contains the sweat glands, blood vessels, lymphatic and the cutaneous nerves whose endings are located in the epidermis.
- deep fascia, a thick connective tissue layer provides a base for the rest of the layers.

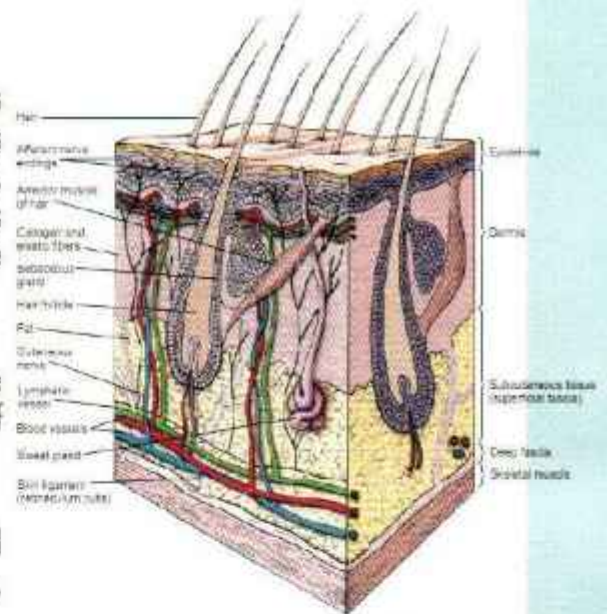


Figure 1

The skin is the largest organ of the body and with its intricate network of tissues, nerves, muscles and vessels, provides:

- Protection to the environmental intrusions in the form of harmful substances and microorganisms, and fluid loss;
- Regulates heat through sweat glands and blood vessels, and maintains a steady temperature of 98.6° F;
- Sensations (heat, cold, burns, stings etc) through the network of nerve endings embedded throughout the skin;
- A covering for the tissues, organs, and fluids of the body.

## The Skeletal System

The human body is supported by a framework of bones, called skeleton (See Figure 2), that consists of 206 bones. There are 86 bones that are in pairs (one identical bone on each side of the body), and 34 single bones that form the central axis of the skeleton. All these bones together provide:

- Protection for vital organs, such as brain, heart and lungs;
- Firm support for the body;
- Together with muscles, a system of movement;
- Storage for calcium and other salts; and
- Continuous supply of blood cells.

The 206 bones of the skeleton can be grouped into five clusters: the skull, spine, chest cage, upper limbs and lower limbs. An important feature of the skeletal system is a series of joints where two or more bones are connected.

**Skull,** It consists of 17 different bones fused together to provide protection to the brain, and the organs of four of the five senses i.e. sight, hearing, smell and taste. Base of the skull has many openings through which pass important nerves and blood vessels, and one large central opening for the spinal cord.

**Spine,** It consists of 33 small bones, irregular in shape but alike, placed in the shape of a column, hence also called vertebral column. Between each pair of vertebrae is a strong fibrous tissue called the intervertebral disc. This disc provides a cushion to the movement of the spine. The spine is not a straight column, but is curved in the neck, chest and lower back. These curvatures provide elasticity for movement. The central portion of each vertebrae is hollow to allow passage of the spinal cord. In addition vertebrae have small holes through which pass the nerves that connect the spinal cord, and through it the brain, to different parts of the body. (For more details see the section on the nervous system).

**Chest Cage,** It consists of 24 long bones (12 on each side) known as ribs. These 24 ribs are connected with 12 vertebrae at the back, and 14 of them are connected with the breast bone in the front. Out of 10 ribs that are not connected with the breast bone, eight are connected together as an arch. The last two ribs are smaller and connected only with the vertebrae.

**Upper Limb,** This part of the skeleton consists of four segments:

- Pectoral girdle, formed by the scapula and clavicle, on each side of the

## SKELETON

ANTERIOR VIEW

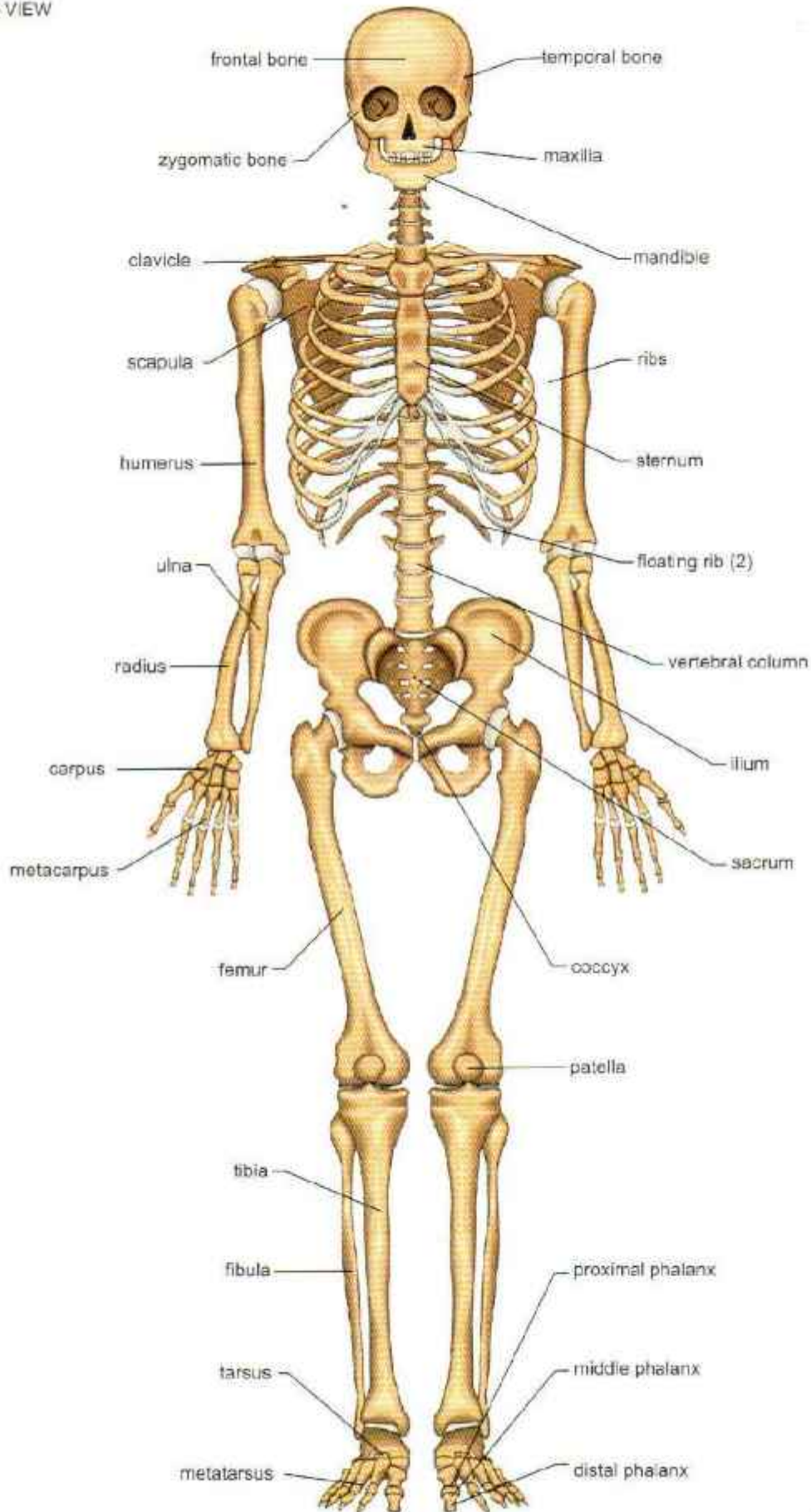


Figure 2



MUSCLES

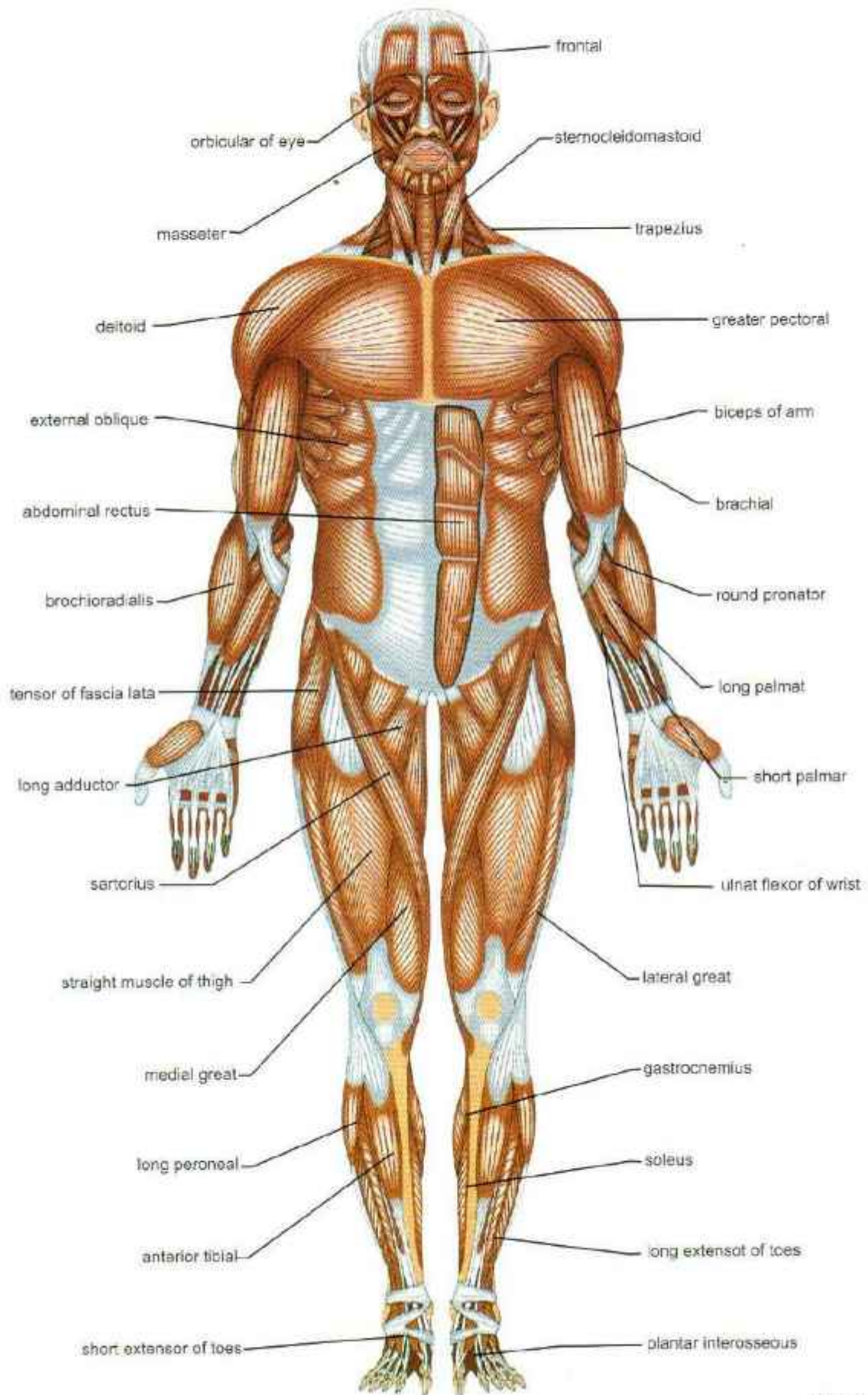


Figure 3

body.

- Arm, the long bone that connects the shoulder with the elbow.
- Forearm, a combination of two bones that connect the elbow with wrist.
- Hand, that includes the wrist, palm and fingers.

**Lower Limb,** This part of the skeleton also consists of four segments:

- Hip, containing the hip bone which connects the lower part of the skeleton to the vertebral column.
- Thigh, containing a long bone that connects the hip to the knee.
- Leg, containing the two bones that connect the knee to the ankle.
- Foot, that includes the bones of the sole and of the toes.

**Joints,** These are the meeting points of two or more bones that are either fixed such as the joints between the bones of the skull, or moveable, such as the shoulder joint. There are three types of joints, depending upon the material by which the bones are united:

- Synovial joints, where the joint cavity contains synovial fluid, and is covered by a cartilage, such as the knee-cap.
- Fibrous joints, where the bones are united by fibrous tissue, such as bones of the skull.
- Cartilagous joints, where the bones are joined by a fibrous cartilage, such as the one that joins two vertebrae.

## The Muscular System

Muscles are a bundle of tissue (See Figure 3) located in such a way as to enable movement. When relaxed they produce contraction, when tense, they cause expansion. They also give form and protection to the body and provide heat. There are three types of muscles:

- Skeletal muscle, which moves bones, and other organs, such as the eyes.
- Cardiac muscle, which forms the walls of the heart and associated parts of the blood vessels, such as the aorta.
- Smooth muscle, which forms part of the walls of blood vessels and of organs, such as the intestine.

Muscles are richly supplied with blood vessels through which energy reaches the muscles and the waste products are removed.

## The Nervous System

The nervous system is composed of millions of cells called neurons which are connected with each other by two kinds of thread-like extensions called dendrites and axons. Dendrites carry the message or the impulse to the cell, and the axons away from the cell. These cells, too small to be visible to the naked eye, form the building blocks of the nervous system (See Figure 4) which can be classified:

- Structurally into the central nervous system and peripheral nervous system
- Functionally into somatic nervous system and autonomic nervous system

The central nervous system consists of the brain and spinal cord, and its function is to integrate and coordinate incoming and outgoing neural impulses, and carry out higher mental functions, such as thinking.

The peripheral nervous system consists of the cranial nerves and spinal nerves as an extension of the central nervous system. At the base of the skull there are openings for the 12 pairs of cranial nerves that are connected with the vital locations such as eyes, ears, nose, heart, stomach etc. In addition, there are 31 pairs of spinal nerves that arise from the spinal cord and leave it from the spaces between two vertebrae. These nerves extend the network of the nervous system to the rest of the body.

The Somatic Nervous System is composed of somatic parts of the central and peripheral nervous system. It transmits sensations of touch, pain, and temperature from sensory receptors, and permits voluntary and reflexive movement by causing contraction of skeletal muscles, such as when a person touches a hot object.

The Autonomic Nervous System controls involuntary bodily functions, such as blood circulation, respiration and digestion etc. These are life sustaining activities in the body that go on whether a person is asleep or awake, and there is no conscious control over them.

### NERVOUS SYSTEM

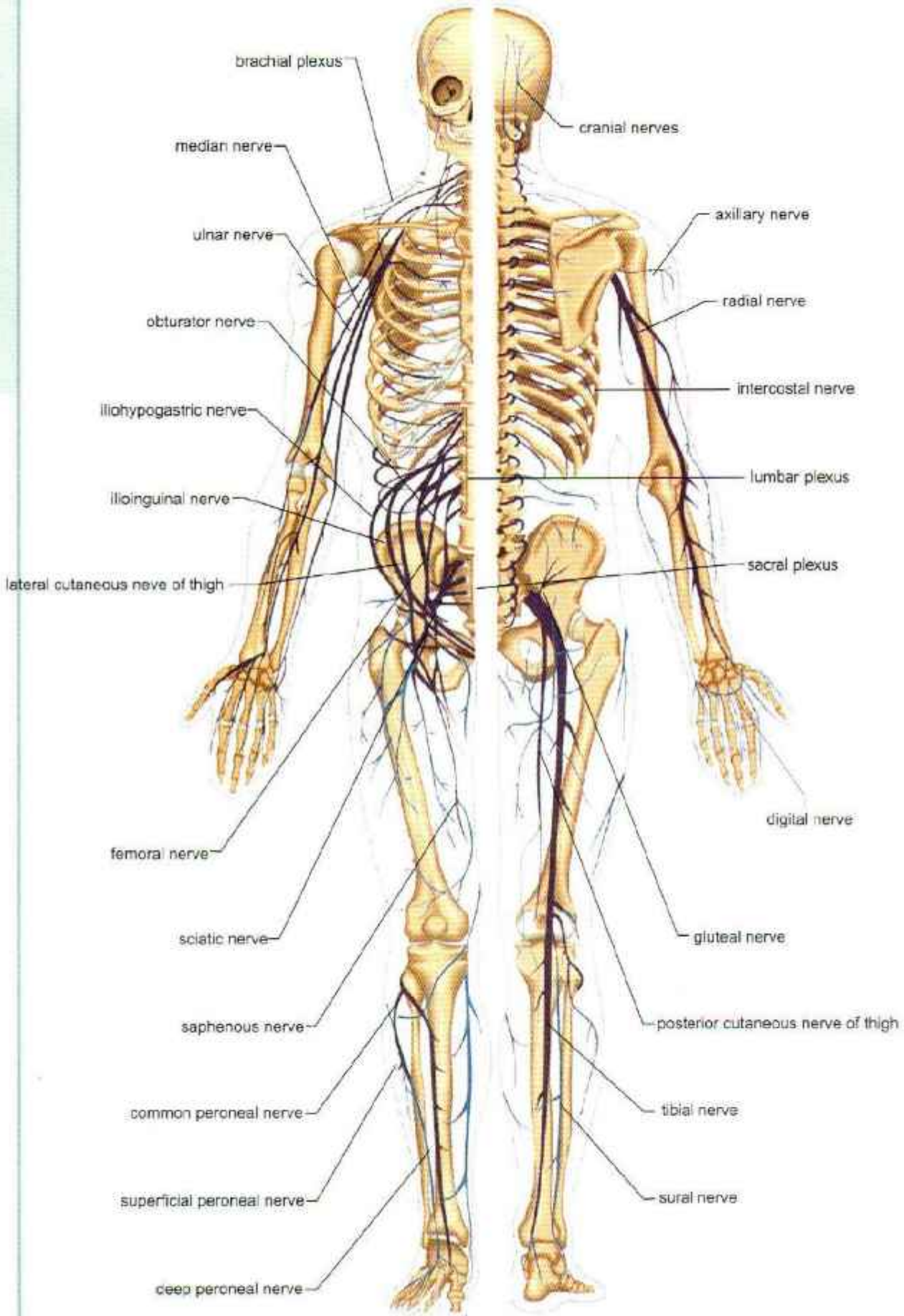


Figure 4

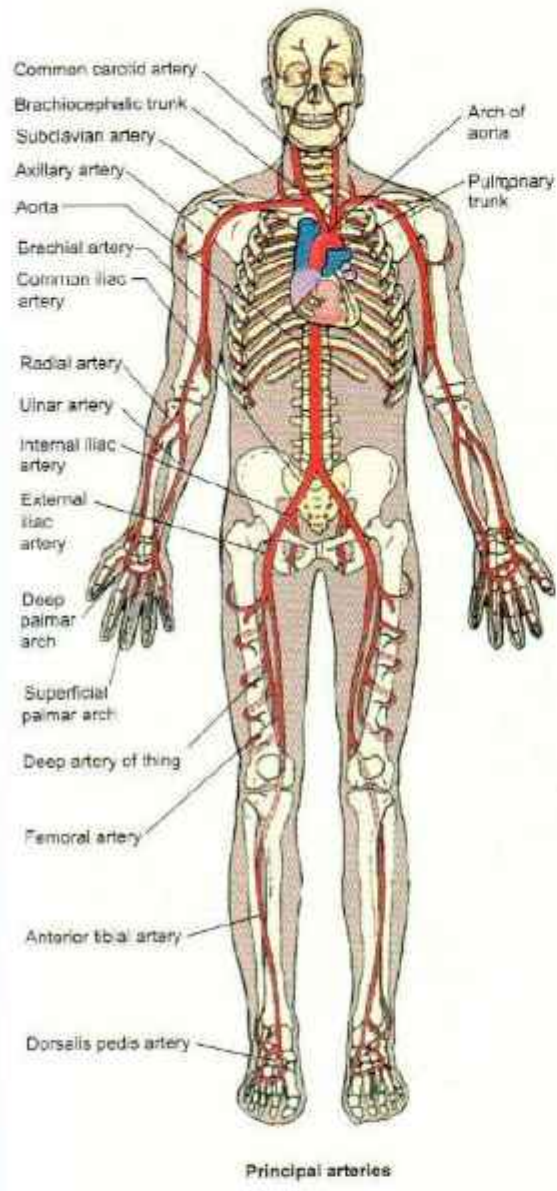


Figure 5

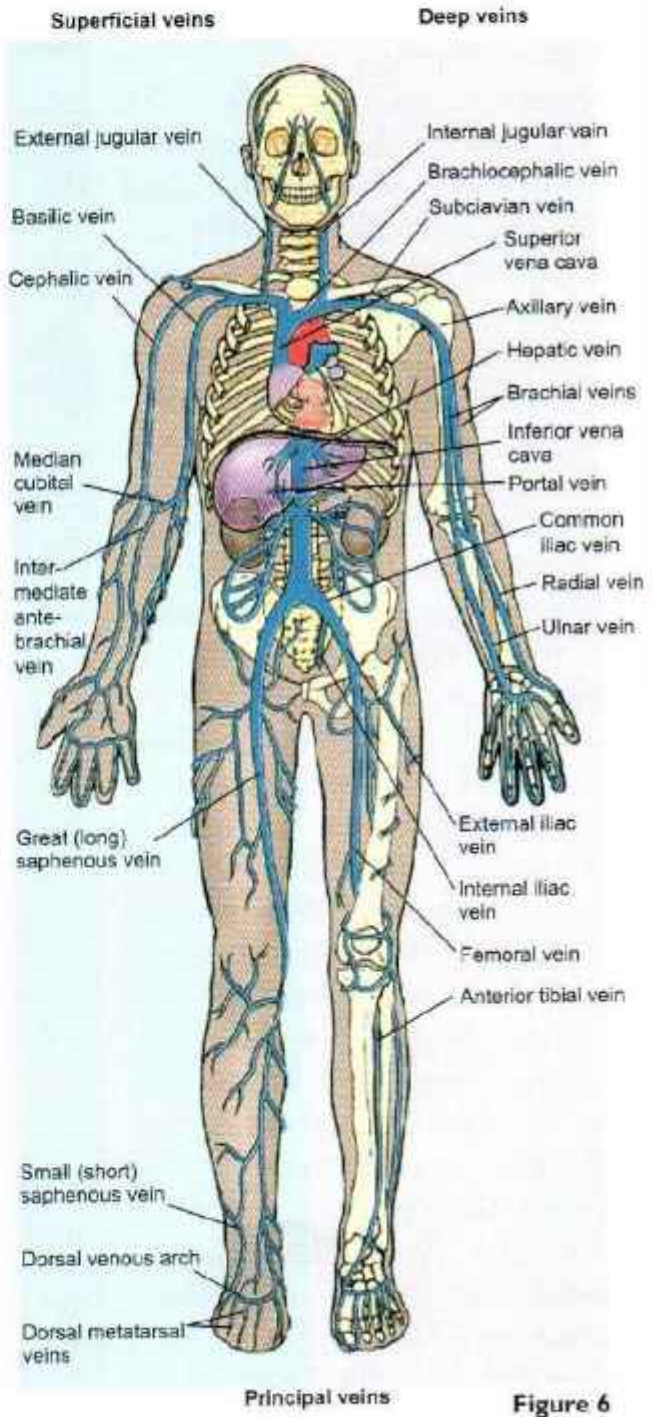


Figure 6

# The Circulatory System

The circulatory system, as mentioned earlier, consists of the cardiovascular system that transports blood throughout the body, and of the lymphatic system that collects surplus tissue fluid, called lymph. The cardiovascular system (See Figure 5 and 6) consists of the heart and blood vessels, and functions in unison with the respiratory and urinary system i.e. the lungs and the kidneys. The heart is divided into two upper chambers (atria), and two lower chambers (ventricles). The left upper chamber receives oxygenated blood from lungs that is passed on to the left lower chamber which pumps it into a large blood vessel called aorta for distribution to the whole body through a network of smaller blood vessels called arteries. The arteries are further subdivided into even smaller blood vessels called capillaries. Once oxygen and nutrients have been passed on, another network of capillaries collects the impure blood, containing waste produced in the process of metabolism and carries it back to the heart through another network of blood vessels called veins. While being transported back to the heart, the blood also passes through the liver and kidneys where it is filtered and some impurities, except carbon dioxide, are removed. The poorly oxygenated blood enters the right upper chamber and passed on to the right lower chamber from where it is pumped into the lungs where

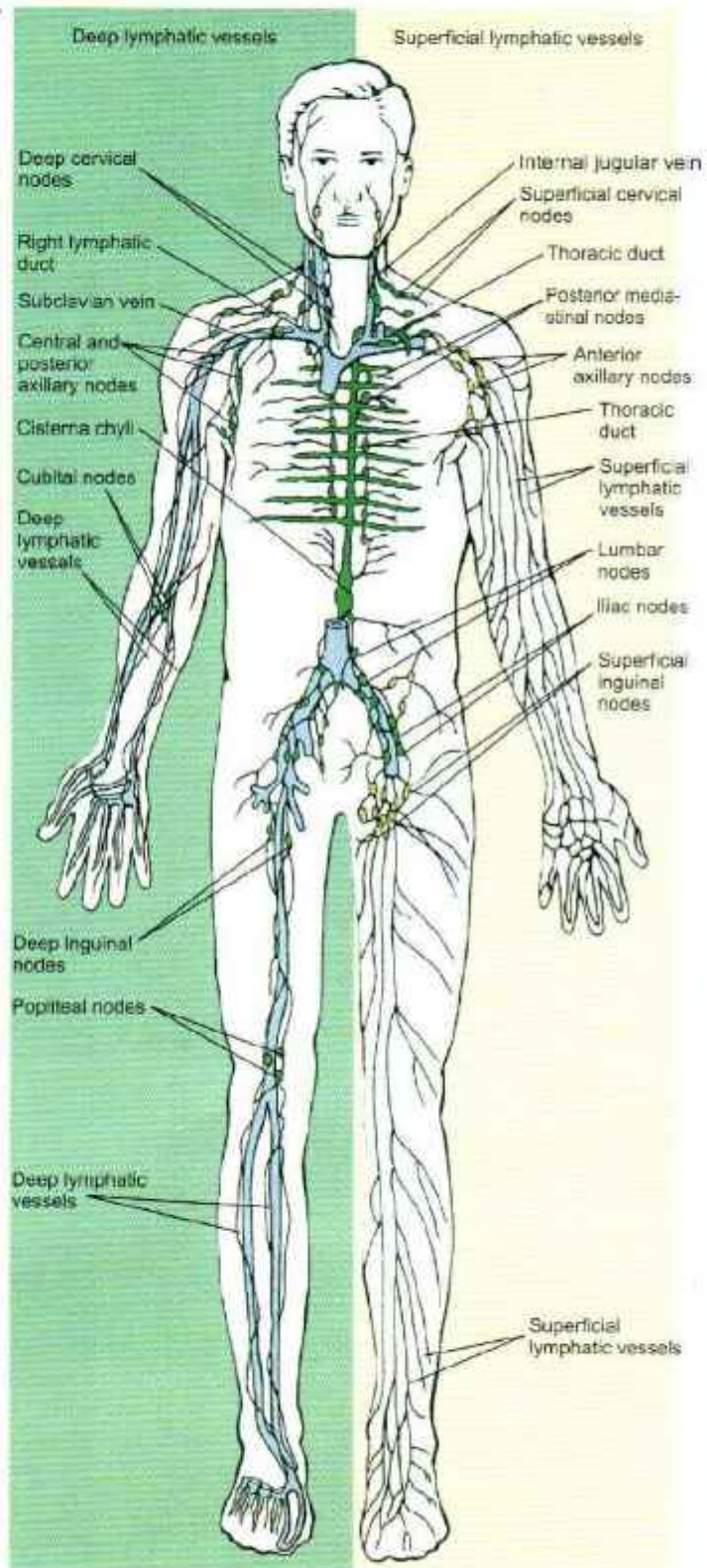


Figure 7

carbon dioxide is removed and oxygen is added. This completes one cycle of blood circulation. To perform this function, the heart beats about 100,000 times every 24 hours, and is linked to a system of blood vessels i.e. arteries, veins and capillaries.

Blood consists of red cells (erythrocytes) which convey oxygen throughout the body; white cells (leucocytes) which fight infections; platelets (thrombocytes) which assist in clotting blood to seal ruptures, cuts and wounds; and plasma is the pale yellow fluid part of the blood that carries nutrients.

The lymphatic system (See Figure 7) is a vast network designed to collect waste tissue fluid called lymph. This is a kind of 'flushing' system that collects most of the toxins and infections from the tissues and drains them, through the lymphatic fluid, into the veins. The system consists of:

- Lymphatic plexuses which are very small lymphatic capillaries that originate in the spaces between the cells of the tissues;
- Lymphatics which are larger vessels that carry the lymph from the capillaries to the lymph nodes;
- Lymph nodes which are lymphatic tissues that collect the lymph from lymphatics and drain it into the veins;
- Lymph glands and the spleen that produce lymphocytes, a kind of white blood cells, and antibodies that defend the body against infection.

The functions of the lymphatic system include:

- Collection and transport of lymph to the veins;
- Absorption and transport of fat to the veins;
- Formation of defuse mechanism against infection.

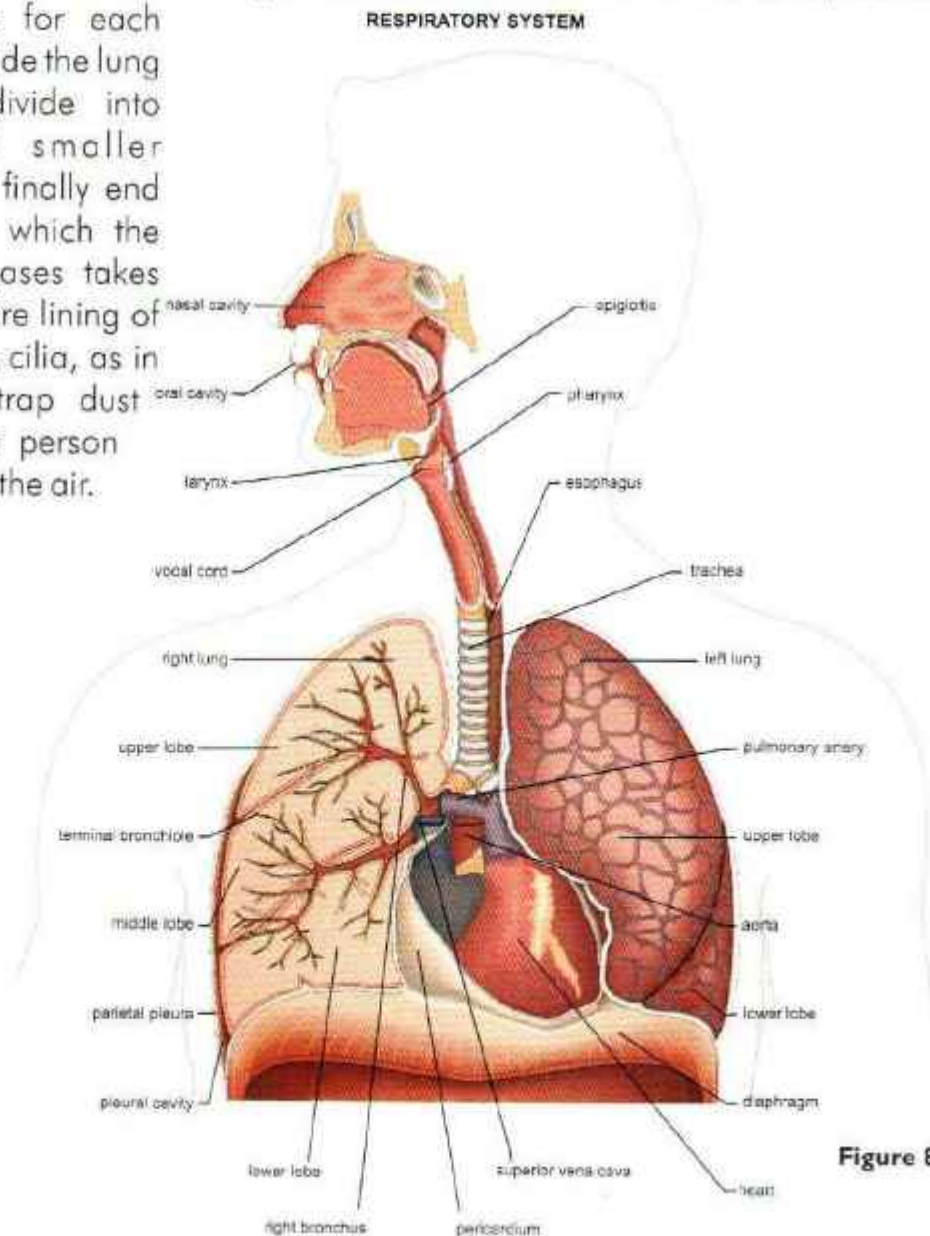
# The Human Body

## Respiratory System

Respiratory System (See Figure 8) is the breathing apparatus through which oxygen is supplied to the body and carbon dioxide removed. It consists of the nasal passage, mouth cavity, voice box (larynx), air pipes (trachea, bronchi) and the lungs.

When a person breathes through the nose the air is humidified, warmed and cleared of the dust particles by the nasal hairs called cilia. For this reason it is better to breath through the nose rather than the mouth. From the nose, the air passes into the trachea which is guarded by epiglottis that can close the trachea to prevent any food from passing into the air pipe instead of the food pipe. The upper part of the trachea is also called larynx and contains the vocal cords.

The trachea is a tube like structure with ring shaped tissue around it to keep it firm and straight. At the end it gets divided into two smaller branches, called bronchus, one for each lung. Once inside the lung the bronchi divide into smaller and smaller branches, and finally end in air sacs in which the exchange of gases takes place. The entire lining of the trachea has cilia, as in the nose, to trap dust particles that a person may inhale with the air.



**Figure 8**



## Digestive System

The digestive system (See Figure 9) begins at the mouth where teeth and tongue help in the chewing and tasting the food that passes on to the food pipe i.e. the oesophagus. From the oesophagus the food is pushed on into the stomach, duodenum, small intestine, large intestine, colon, and the residue is passed into the rectum and goes out through the anus.

The stomach is the first digestive organ where the food is broken up by the digestive enzymes that are produced by the inner wall of the stomach. The digestive process continues in the duodenum and the small intestine, where the process of absorption begins with the help of digestive juices from the liver, gall bladder and the pancreas. Food slowly moves on through the digestive tract where it is either absorbed or passed out as waste.

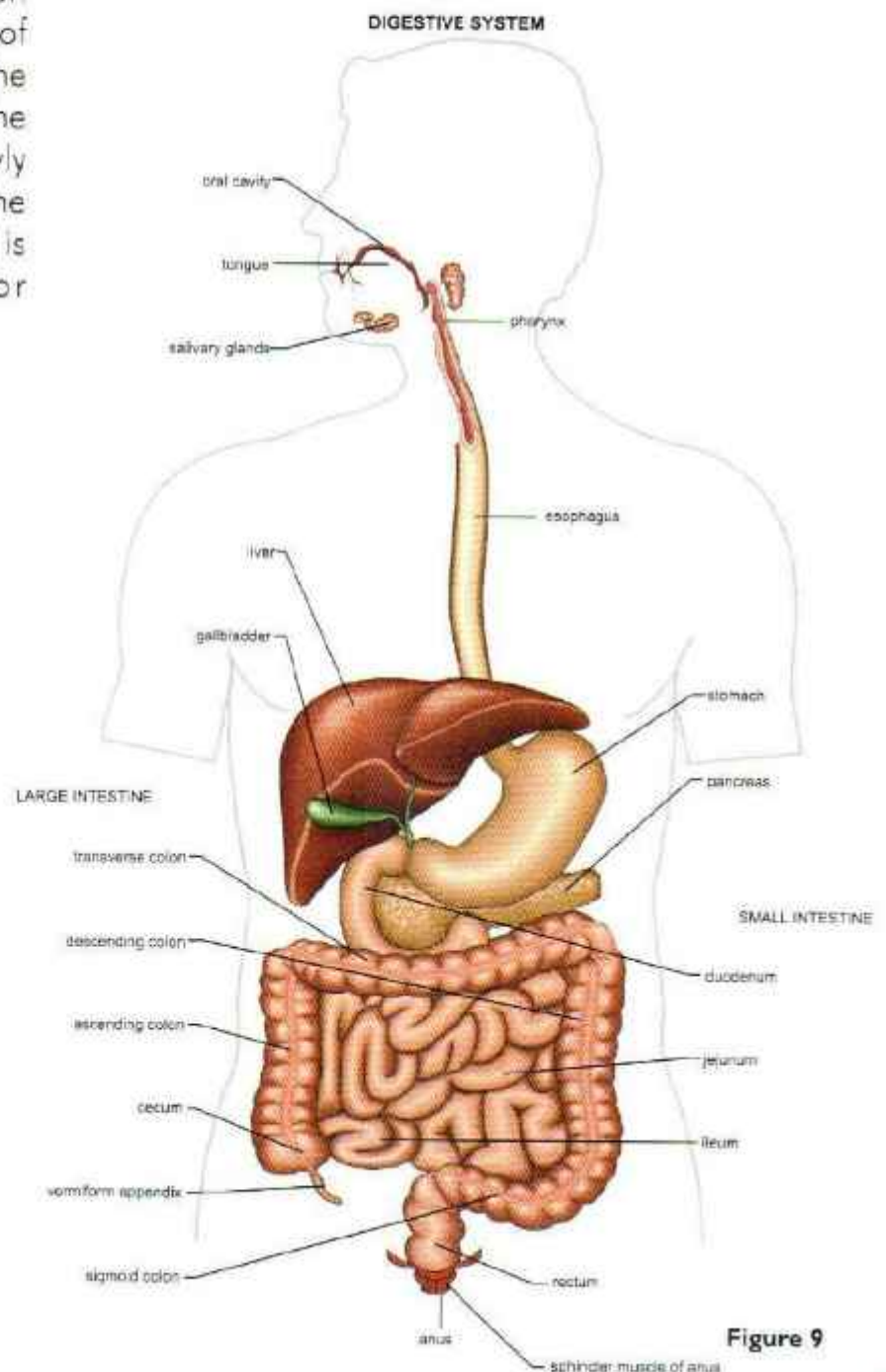


Figure 9

# Chapter 3

## Wounds and Injuries

# Wounds and Injuries

Wounds and injuries are the most common cases requiring immediate administration of first aid. Broadly speaking wounds are of two kinds: closed wounds, where the skin remains intact; open wounds, where the skin is cut or broken. There is no visible bleeding in the case of closed wounds, but in severe cases there can be internal bleeding, and damage to the internal organs.

A closed wound that is caused by a blow or an impact against a hard object, is called contusion. Its indications, in the order of the severity of the wound, are as follows:

- a bruise, that is, collection of blood under the skin shown by bluish tinge of the skin over the affected part;
- swelling of the affected area;
- pain or feeling of tenderness of part of the body that has suffered a blow or impact;
- bleeding from the nose, ear or mouth;
- blood in the vomit, cough or urine.

The open wounds are usually classified in five different categories, depending upon the nature of the damage caused. These are as follows:

- The superficial layer of the skin, epidermis and dermis, may be damaged due to rubbing against a hard or rough surface. There is little bleeding and some pain. This is called abrasion.
- If the wound is deep and cause is the same, it is called laceration.
- A pointed object (such as nail, a sharpened or a splinter) may pierce the skin and create a hole in the skin. It can be deep, and may even damage internal organs. This is called puncture.
- The body surface may be cut by a sharp instrument or a sharp object, such as a knife or a piece of broken glass. It can cause heavy bleeding. This is called incision.
- A part of the body may be torn away due to an animal bite or an accident. In such cases there is heavy bleeding, and all kinds of damages to the skin, the internal organs, the muscular and the skeletal system are possible. This is called avulsion.

## Wounds and Injuries

Measures to be taken in case of bleeding and fracture have been dealt with in some detail in separate sections due to their importance. The other first aid measures to be taken in different situations are as follows:

- **Contusion:** Since in such cases skin is not broken and there is no external bleeding, no bandage is required. Pain and swelling can be reduced by applying an ice pack to the injured area. If the pain persists application of a pain relieving ointment would help.
- **Abrasion or Laceration:** These injuries damage the skin and cause pain and some bleeding. In such case first aid is to be administered by removing the splinter or object embedded in the skin, washing the wound with soap and applying a pressure bandage. Please see section on 'Dressing and Bandage' for details regarding application of bandage.
- **Puncture:** These wounds can be deep, but the surface area may be very small. Sometimes the object causing injury e.g. a splinter or a bullet can get embedded. In such case do not try to dislodge the embedded object because that can cause further damage. Immediate action to be taken is to apply a ring shaped pressure bandage (see the illustration in the section on bandage) around the wound to stop bleeding and get medical aid quickly. Do not try to plug the hole, and do not put antiseptic ointment into the wound. If the wound is sealed off, it will increase the risk of an infection, e.g. Tetanus.
- **Incision:** These wounds are caused by a cut with the sharp edge of an object, that may even cut an artery and, thus, cause severe bleeding. These wounds should be washed with clean water, bandaged, and taken to the nearest hospital or doctor immediately.
- **Avulsion:** In such injuries a whole section of the skin along with its attachments gets torn and has to be put in place. The first aid should begin by washing the wound with clean water and putting back the hanging skin back into its place, and aligned properly. This should be kept in place by a tight bandage after application of an ointment. For ointment please see the section on First Aid Kit.

These were the different kinds of wounds and injuries that may cause damage to any part of the body. Some more advice is necessary from point of view of the location of the wound or injury, as the same kind of injury can cause or bring about different consequences, depending upon the location of the injury. Some of the location related injuries and their treatment is described below:

- **Head Injuries:** These injuries can be internal or external, and can damage any part of the head i.e. the scalp, the skull, the brain, the blood vessels, or the fluid around the brain. In the case of head injury, damage to the spinal cord is also likely, and whenever there is any indication of that, the injured person should not be moved, except by doctors or paramedics. Also, pay attention to the following specific situations:

- An injury to the scalp can cause heavy bleeding as there are numerous blood vessels in the scalp. Take steps recommended for dealing with bleeding, but do not move the injured person or apply bandage too tightly if skull fracture is suspected.
- An injury to the skull causing fracture is indicated by: visible damage to the skull; oozing of blood from the ears or nose; and discolouration around the eyes or behind the ears. In such cases immobilize the head with cushions or blanket placed around the head and shoulders in a manner that does not interfere with the breathing. If there is bleeding do not apply direct pressure to the wound but only around the edges of the wound by using a ring bandage (see the section on bandage). Do not try to stop the blood or any fluid coming from the ears or nose as it will increase the pressure inside. Do not try to clean the fracture as it may cause infection or push the bone splinters deeper in the skull.
- An injury to the brain, is indicated by: loss of consciousness; seizures; paralysis of facial muscles; headache; and vomiting. Damage to the spine is also very likely. The injured person should not, therefore, be moved, and all precautions suggested in the case of head injury should be taken. In addition, if the person is vomiting, roll him to one side to help drain the vomit from the mouth to keep the airways clear.

- **Eye Injuries:** These injuries can be caused by a blow to the eye, a cut to the eye or eyelids, piercing of a sharp object into the eye or the eyelids, or by exposure to intense light. What can be done, as a measure of first aid, in these situations is as follows:

- A blow to the eye usually results in a bruise, called black eye. The area around the eye has a network of small veins that get ruptured by the blow, and since the venous blood is darker than the arterial blood, the clotted blood appears almost black. There is not much that can be done by way of first aid, except placing an ice pack on the injured area to minimize swelling. The injured

person must be examined by a doctor as soon as possible for proper treatment and examination.

- If the eyelid is cut, apply dressing as described in the section on bandage. In case the eye itself is cut, bandage both eyes loosely to keep them from moving together. Do not try to wash, do not apply pressure. If any object is stuck in the eyes do not remove it yourself. This is a case that requires immediate professional attention.
- If the eye is pierced by an object, only a professional should handle the case. Do not try remove the object yourself. Instead, place a paper cup around the object and bandage it into place. This will prevent the object from moving sideways or deeper into the eye ball. While bandaging the injured eye also bandage the good eye to stop the injured eye from moving with the good eye because the two eyes always move together.
- Eye-burns, though rare, can occur if a person looks too long at intense light e.g. sun, glare on snow, or welding without protecting the eyes. The best and the easiest thing to do in such cases is cover both eyes with cold and wet towels.

■ **Ear Injuries:** Ears may appear to be a minor part of the body, but human body is so finely balanced that hardly any part of the body can be treated as minor. We all know that our hearing depends upon the ears, but not many of us know that physical balance of the body is also controlled by a mechanism inside our ears. Hence, damage to the ears can affect not only the hearing, but movement also.

Common injuries to the ear include injury to the outer ear, foreign objects in the ear, ruptured eardrum, or bleeding from within the ear. These are to be handled as follows:

- The outer ear consists of cartilage and skin. Any injury to it is to be treated with a dressing. Ice pack should be applied to the wound if there is need to relieve pain and swelling.
- The eardrum is a delicate circle of tissues that vibrates when touched by sound waves. It can rupture due to very loud noise, blow to the head, infection, or an object that penetrates the ear. In such cases seek medical attention immediately. Do not obstruct the flow of blood or fluid from the ear to avoid blockage.

■ **Nose Injuries:** There are two common nose injuries, that is, nosebleed or a broken nose. These injuries can be dealt with in the following manner:

- Nosebleeds can be caused by a blow to the nose or by some medical conditions, such as hemophilia, high blood pressure, high altitude and cold. The only way to deal with nosebleeds, before proper medical care becomes available, is make the person sit down and lean forward with head down, and apply gentle pressure on the soft, middle part of nose. Do not let the person lift his head backwards, as it will not stop the bleeding, but only let the blood flow back into the throat. An ice pack wrapped in a towel can be applied to the nose to stop the bleeding.
- In the case of a broken nose icepack should be applied to the nose, and the person should sit down with the head down. Get medical help immediately.

■ **Chest Injuries:** These injuries are of three kinds: open wound, closed wound, and rib fracture. Since the case of fracture is dealt with in the separate section on fracture, we will deal only with open and closed wounds in this section.

- An open wound is caused by an object that penetrates into the chest or even into the lungs. If that happens, air is sucked in through the wound every time the patient breathes, a process that can go on increasing the pressure as the air sucked in cannot be pushed out. This can lead to the collapse of the lung. The symptoms of lung puncture include: air bubbles in the blood; release of air from the wound.

In such cases the wound has to be sealed immediately to prevent collapse of the lung. The wound should be sealed with a wet dressing (squeeze out water so that the dressing is wet, not dripping with water) placed on the wound and bandaged firmly. As a further precaution, apply a little vaseline or petroleum jelly on the dressing so that it does not stick. Proper medical attention should be provided as soon as possible.

- In case of closed wounds, where there are no indications of rib fracture, first aid should be provided as in the case of other closed wounds.

■ **Abdominal Injuries:** These injuries are also in the nature of open or closed wounds, and have to be treated accordingly:

- An open wound is caused by an object that penetrates into the abdomen where it can damage internal organs. If the wound is large, parts of internal organs, e.g. intestine, may spill out. In such cases the wound should be covered with a dry and firm bandage. If the intestines have spilled out, do not try to push them back, instead, take following precautions: raise the feet of the person by about a foot; do not give anything to eat or drink. If the patient feels intense thirst, give very small sips of water. The patient must be transferred to hospital as quickly as possible.
- In the case of a closed wound, usually caused by an impact in an accident, the patient may vomit, complain of pain in the abdomen, show marked pallor and weak rapid pulse. All these are symptoms of damage to internal organs. In case of vomiting the patient should be made to lie down and turn to one side to expel the vomit. The patient must be transferred to a hospital for diagnosis and treatment.



# Chapter 4

**Fracture**

# Fracture

Fracture occurs when there is a break or rupture in a bone. There are two basic types of fracture: closed fracture, where a bone is broken but there is no open wound; and open fracture, where there is an open wound at the site of the fracture. A more elaborate classification of fractures is as follows:

- Simple fracture, that is, a clean break in a bone.
- Compound fracture, that is, a break in which the broken bone pierces through the skin.
- Comminuted fracture, that is, shattering of a bone into many fragments.
- Greenstick fracture, that is, incomplete break or split commonly experienced by children who have tender and soft bones.
- Pathological fracture, that is, breaking of a bone due to some disease or a weakening pathological factor.

Fracture is caused by an impact or too much of pressure on a bone whereby the bone is broken and the muscles attached to the bone are pressed, torn or twisted. Fractures can also occur when the bone tissue is not fully developed as in infants (greenstick fracture), or due to weakening of bones in the older people (pathological fracture) due to some disease or use of drugs that interfere with bone metabolism. Fractures are not difficult to diagnose, and are indicated by these symptoms:

- A fracture site is tender to touch, even a slight touch causes pain.
- There is pain, discolouration and swelling at the site of the fracture.
- The injured part may become deformed.
- The broken bone may stick out of the skin.
- The patient may feel a grating sensation where the ends of the bone rub against each other.

## Immediate FirstAid

In addition to the specific measures, applicable to the different sites of fracture, the first step that should be taken is to clean and dress the site, in case of an open wound, to avoid infection, and immobilise the limb or part of the body by a sling or splint. Specific fracture sites should be dealt with as follows:

- **Fracture of the skull.** There are two kinds of skull fractures: 1) fracture of the upper part or the sides; and 2) fracture of the base. These fractures can cause damage to the brain and nervous system, and blood may ooze out of the ears, nose or mouth. There are two different treatments for the two different situations:

- If breathing is not noisy, lay the patient on his back, with the head and shoulders slightly raised with some firm support. In case of bleeding from an ear, turn the head to one side, so that the bleeding ear is on the lower side.
- If breathing is noisy and difficult, lay the patient on his side in the three-quarter prone position and make sure that the air passages are free from obstruction. If there is bleeding from an ear, keep the bleeding ear on the lower side.
- Place a bandage lightly over any bleeding site, but do not try to stop the bleeding because that would build up pressure inside the skull, and cause many complications.

- **Fracture of the neck and spine.** A neck fracture is extremely dangerous as the bone fragments may cut into the spinal cord and affect the whole nervous system. It is indicated by pain in the neck, stiff neck, inability to move arms and or legs, and diminished or complete loss of sensation in the limbs. In the case of a fracture of the spine, the loss of sensation will be felt below the level of injury. The following precautionary steps are recommended in these two situations:

- In the case of neck fracture, do not bend the neck or the head forward or backward, do not raise or twist the head, instead, immobilize the head. If the victim has to be transported without the care of professional medical attendants, do it in the following manner:
  - i) There should be three persons to handle the body of victim as head, trunk and legs must be moved together to avoid bending of the neck. (See Figure 10)
  - ii) Place a wide board beside the victim. It should be longer than the body of the victim.

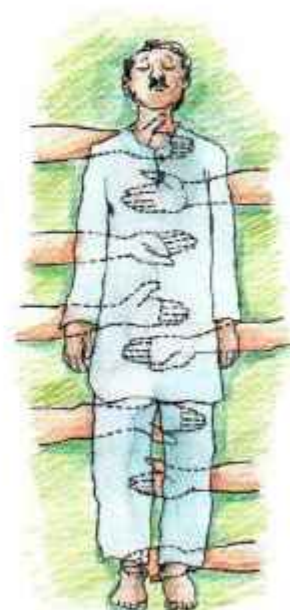


Figure 10

- iii) If the victim is lying face up, one man should hold the head and neck of the victim between his hands, the second man should support the victim at his shoulders and hips, the third man should hold the legs, and gently lay the victim on the board.
- iv) If the victim is lying face down, follow the procedure described above, except that once the victim is transferred onto the board, some padding should be placed under the head, neck and chest in a manner that does not interfere with the breathing. Having done that the head should be immobilized with firm support.

— In the case of fracture of the spine, do not let the spinal column bend for that can cause bone fragments to cut into the spinal cord and result in permanent paralysis. The spinal column should be kept in a slightly swaybacked position so that there is no pressure on the spinal cord. Till the arrival of medical assistance leave the person in the position he is and if he is lying face up, slip some cloth to support the swayback position of the spinal column. If the injured person has to be transported without the assistance of professional medical attendants, do it in the following manner:

- i) If the person is lying face up, tie his wrists together loosely over his waistline, place folded cloth on the board where the arch of his back is to be placed, and transfer him onto the board without bending the spinal column.
- ii) If the person is lying face down, transfer the person onto the board with folded cloth placed where the chest and the neck of the person would be. Throughout the process of laying the person on the board, the spinal column should be kept in swayback position.

■ **Fracture of the upper limb.** The upper limb consists of eight different kinds of bones: collarbone also called clavicle; shoulder blade, also called scapula; upper arm, called humerus; lower arm, consisting of two long bones called ulna and radius; eight small bones of the wrist, called carpals; five bones of the palm, called metacarpals; and three bones of each finger. Fracture of these bones should be dealt with in the following manner:

- Fracture of the collarbone is usually caused when a person falling on his arm puts out his hand to break the fall. There is pain at the site of fracture, and the arm on the affected side hangs limp. The only first aid treatment, before proper medical help, is to put the

arm in a sling to relieve the pressure on the injured part, and bandage the upper arm of the injured side to the side of the chest with little padding in between.

- Fracture of the shoulder blade. It is caused by accidents where the bone suffers a direct impact. It can be associated with the fracture of the ribs too. There can be swelling at the site of the fracture, and the person may be unable to move the arm. The purpose of first aid in such cases is to relieve the pressure on the shoulder blade. This is done by placing the arm of the injured side in a triangular sling, and leave actual treatment to the proper medical care.
- Fracture of the upper arm. In these cases the first aid is to be administered in the same way as for the fracture of the shoulder blade. If the fracture is at the elbow, it would be a serious emergency, as a vital blood vessel and nerve pass through this region. If the injury is not treated in time, a permanent deformity is possible.  
In case the injury is such that the elbow cannot be bent without increasing pain, place the arm by the side, palm touching the thigh, with a padding in between, and then secure the arm to the trunk by three broad bandages: one around the hand and the thighs, one around the elbow and the trunk, and one around the arm and the trunk.
- Fracture of the forearm. In all such cases the arm should be placed in a sling, with the forearm at right angles to the upper arm, and thumb uppermost. Also apply well-padded splints on the front and back of the arm.
- Fracture of the hand. The hand consists of eight little bones of the wrist, five long bones of the palm, and three bones of each of the fingers. An injury to the hand can result in the fracture of any one or many of these bones. In such cases place the hand on a splint, to keep it straight, and place the hand and the forearm in a sling.

■ **Fracture of the lower limb.** The skeletal lower limb consists of the pelvis, which is a girdle that connects the two legs to the main body and the spine; the long bones of the thighs, called femur; the knee; the two long bones of the lower leg; the five bones at the ankle; the five bones of the foot called metatarsals; and finally the five toes having three small bones each. Fracture of these bones should be dealt with in the following manner:

- Fracture of the pelvis. Pelvis consists of three bones that are literally fused together to form a receptacle for vital organs, such as urinary bladder and large intestine, and some major blood vessels and nerves. The bones are well protected by thick and strong muscles. It, thus, needs a very powerful blow to cause fracture of the pelvic bones. It can also cause damage to the pelvic organs, especially the urinary bladder.

The pelvic fracture is usually indicated by the inability to stand, and pain in the region of the hips and loins, internal hemorrhage that would give dark colour to the urine if mixed with it, and desire to pass urine frequently, though with difficulty or even inability to do so. The following first aid measures need to be taken:

- i) Make the injured person lie on his back with some support under his bent knees. Straightening of legs would cause pain.
- ii) Tie his feet together with a figure 8 bandage, and put another bandage on his knees. Put padding between the ankles and knees.
- iii) Pass a broad bandage under the hollow of the waist, slid it gently under the pelvis, and tie it on the uninjured side.
- iv) Give nothing to eat or drink as the patient may need surgery.
- v) Advise the patient not to pass urine, if he can avoid it, as it could worsen a likely injury to the urinary bladder or the urethra.

- Fracture of the thigh bone. Fracture of the thigh bone (femur) may occur at any place along its length, but more common among the elderly people is the fracture of the neck of the femur because of the thinning of the bones due to osteoporosis. As a measure of first aid, place the person on a well-padded splint extending from below the armpit to the feet, tie the feet and ankles together with a figure 8 bandage.

- Fracture of the knee cap. This fracture is indicated by the swelling of the knee, which is extremely tender and painful. In such cases the person should be laid on his back with the injured knee raised a little in a comfortable position. A padded splint should be applied from the pelvis to the heels.

Fracture of the lower leg. First aid measures in such fractures, are the same as in the case of the fracture of the thigh bones,

only the focus of attention is different.

- Fracture of the ankle. The area most susceptible to sprain and fracture is the ankle. In most of the cases it is not possible to distinguish between a sprain and a fracture without the help of x-ray, as both are indicated by pain, swelling, bruises, and inability to walk. However, if the area of maximum pain is just below the end of fibula, the long bone on the outer side of the leg, it is more likely to be a case of sprain.

In all such cases, the feet and ankle should be immobilized with a splint and a figure 8 bandage.

- Fracture of the foot. As described earlier, a foot consists of five bones of the foot and 15 of the toes. A number of them can get fractured at the same time. As in the case of other fractures, this fracture is also indicated by pain and swelling. The first aid in such cases should be provided in a manner similar to the one for the fracture of ankles, that is, the foot and the ankle should be immobilized with a splint and figure 8 bandage. See the section on Bandage.

# Chapter 5

## Bleeding



# Bleeding

Bleeding is caused by rupture of, or any cut to, the capillaries, veins or arteries. Capillary bleeding is slow and the blood oozes from the wound in very small quantities. Venous bleeding is dark- red or maroon, and the blood flows in a steady stream. Arterial bleeding is bright red, and the blood 'spurts' with each heartbeat.

Loss of blood in substantial quantity decreases the volume and pressure of the blood and that, in turn, can lead to the collapse of the circulatory system. A loss of about one litre (average human body contains about six litres of blood) is the maximum that the body can sustain without grave consequences.

Bleeding can be classified into two main categories: external and internal. Within these two main categories there are many different situations that are dealt with separately in this section.

## External Bleeding

External bleeding is associated with injuries to the skin and, in serious wounds, to the blood vessels. In the case of minor bleeding the steps to be taken are the same as recommended for minor injuries caused by abrasion or laceration, that is:

- remove any object embedded in the skin;
- wash the wound with soap, and rinse thoroughly;
- cover the wound with sterile bandage;
- examine the bandage daily to see if it is wet or a scab (dry, hard covering over the wound) has formed; and
- if a scab has formed, remove the bandage; or the bandage is wet, remove it, and apply a new one.

In the case of severe bleeding caused by incision, puncture or avulsion, the control of bleeding is more vital. There are four methods to control bleeding in such cases:

- Direct pressure is the first and most effective method to control bleeding. Apply a sterile dressing or clean cloth on the wound, and put pressure on the wound through a bandage or directly with the palm of your hand. If the bandage gets soaked, apply another bandage, but do not remove the first one.

- Elevation of the injured part of the body above the level of heart, where possible, to decrease the pressure, can be used in addition to direct pressure. But elevation is advisable only if fracture is not suspected, for in that case elevation will only worsen the fracture.

Also, use a stable and flat object to maintain elevation. Placing an arm or a leg on an unstable object can cause further injury.

- Indirect pressure may be used where direct pressure and elevation fail to control the bleeding, by applying pressure bandage on the larger blood vessels that supply blood to the injured area. See the section on Dressing and Bandage regarding pressure bandage.

This method should be used with caution as pressure on blood vessels can cause damage due to inadequate supply of blood. Also do not apply pressure on any point on the neck, as it can cause cardiac arrest.

- Tourniquet is a method of last resort to control severe bleeding, and should be used only when an arm or leg has been partially or completely severed, and bleeding is uncontrollable. See detailed instructions in the section on Dressing and Bandage.

## Internal Bleeding

Internal bleeding is of two kinds: noticeable, where the results of the bleeding can be seen, or unnoticeable where bleeding is not directly noticeable. The signs and symptoms of the two kinds of bleedings are as follows.

- **Noticeable** bleeding becomes noticeable from the signs that vary, depending upon the location of bleeding:
  - Bleeding in the lungs is indicated by bright red blood coughed up by the patient;
  - Bleeding in the stomach is indicated by dark brown or red blood in the vomitus; dark blood indicates that bleeding occurred many hours ago.
  - Bleeding in the bowel or intestine is indicated by dark, loose, foul smelling stools;
  - Bleeding in the urinary tract is indicated by dark or red coloured urine.
- **Unnoticeable** bleeding is not easy to diagnose. It can only be assumed, before proper tests are performed. Some of the signs and

symptoms of internal bleeding are as follows:

- Pale, cold and moist skin
- Excessive thirst and nausea
- Rapid but weak pulse
- Visible swelling of the stomach
- Rapid, shallow breathing

In all cases of internal bleeding, noticeable or not, immediate hospitalization is necessary. However, the following pre-hospitalization measures may be taken:

- Keep the patient in lying down position;
- The patient's feet should be elevated to make it easier for the heart to pump blood to the head, but if the head itself is injured, then, the head and neck should be raised by 6-8 inches;
- Keep the patient warm; and
- Give nothing to eat or drink.

# Chapter 6

## Dressing and Bandage

# Dressing and Bandage

Dressing and bandage are two related procedures, but are different in purpose. A *dressing* is a protective covering placed directly on an open wound to control bleeding, protect the wound, and prevent infection. A *bandage* is applied to keep the dressing or a splint in place. It is used to keep pressure on the wound, help reduce swelling, and to provide support to the injured part.

**Dressing,** A variety of ready-to-use sterile dressings are available at the medical stores, but most easily improvised dressing for all kinds of wounds is a sterilised (i.e. germ free) piece of gauze or lint. In case of emergency any piece of cloth can be used after it has been sterilized. The easiest way to sterilise a piece of cloth is to keep it in boiling water for 15 minutes, and then dry it in a way that it won't become contaminated. While applying a dressing care should be taken about things listed below:

- Use a sterilised dressing; wash the hands before handling the dressing; and avoid sneezing or coughing over the wound;
- Use a dressing that should fully cover the wound. It should extend at least one inch from the wounds on all sides;
- Do not use loose, fluffy cotton, such as a cotton ball on an open wound. It can get stuck in the wound and is hard to remove;
- Do not remove the dressing if it gets soaked with blood. Cover it with a new dressing, and remove them when bleeding stops;
- Do not pull off a dressing stuck to a wound because it will reopen the wound. Once bleeding has stopped, soak the dressing in warm water to remove it.

**Bandage,** In shape, bandages are of two kinds: triangular and roller. Triangular bandages are made by cutting a piece of cloth diagonally across. A useful size of the cloth is about one meter long and one meter wide. It will provide two bandages in the shape of a triangle. It can secure dressings and can be made into slings to support fractured or injured limbs. Roller bandages are usually of small width (one inch to six inches) and of any required length. They can be made of cotton or crepe and are used to apply pressure and keep the dressing in place. While applying a bandage the following should be kept in mind:

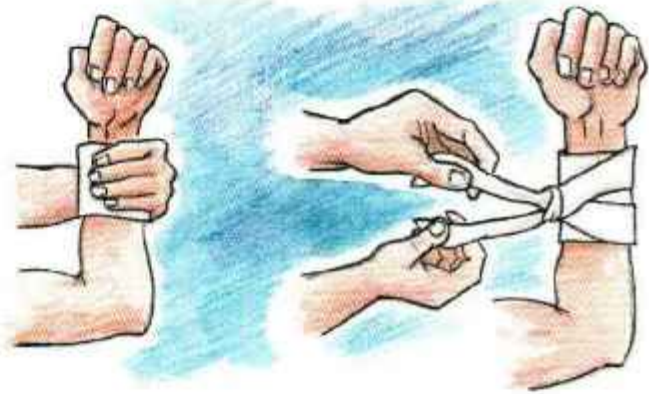
- The bandage should neither be too loose nor too tight. A bandage that is loose won't serve its purpose. A bandage that is too tight can cause harm

by interfering with the circulation of blood. Tingling, numbness or feeling of coldness around the wound is an indication that the bandage is too tight. Checking the pulse can be another guidance. If you can't feel the pulse in the hand or the leg, near the bandage, the bandage is too tight.

- The bandage should not be applied on wet surface, nor should the bandage itself be wet as it will become tighter when it dries up.
- All knots should be tied over the uninjured side.
- Apply the bandage as illustrated in the following pages.

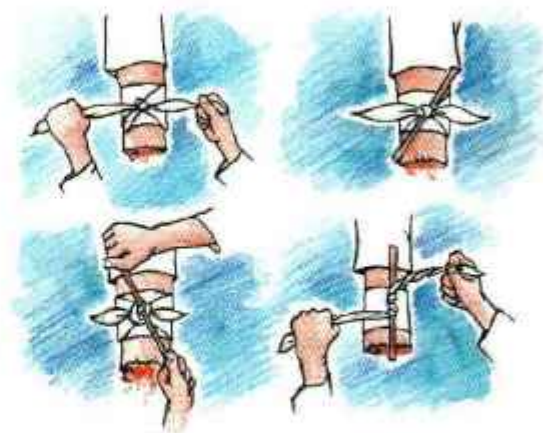
## 1. How to apply a pressure bandage

To apply a pressure bandage, first elevate the wound above the level of the heart. Then place a dressing (sterile, if possible) over the wound and hold it in place with your hand. If the dressing becomes soaked through, cover it with another one. Then place the center of the bandage over the dressing and firmly wrap both ends around the limb and tie them together.



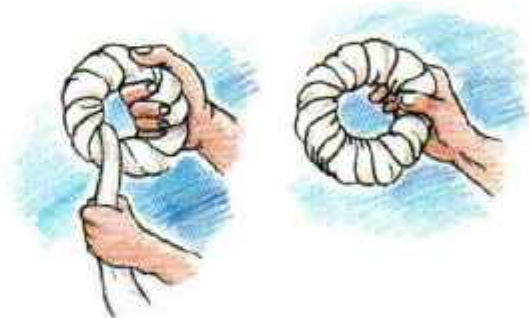
## 2. How to apply a tourniquet

A tourniquet is a bandage that is wrapped very tightly around a limb to stop severe bleeding or hemorrhaging. It's used in the rare instance that pressure bandages and pressure on the appropriate artery are ineffective in stopping the bleeding. Tie a stick to the knot of the bandage, then twist it tight to stop bleeding. Release after every 40 minutes for ten seconds.



## 3. How to make a ring bandage

Use ring bandages when an object such as a pencil or a nail is embedded in a wound and shouldn't be removed. To make a ring bandage, wrap a roller bandage around and around your fingers, as if you were wrapping up some loose string or ribbon. Make the ring wide enough to fit around the embedded object.



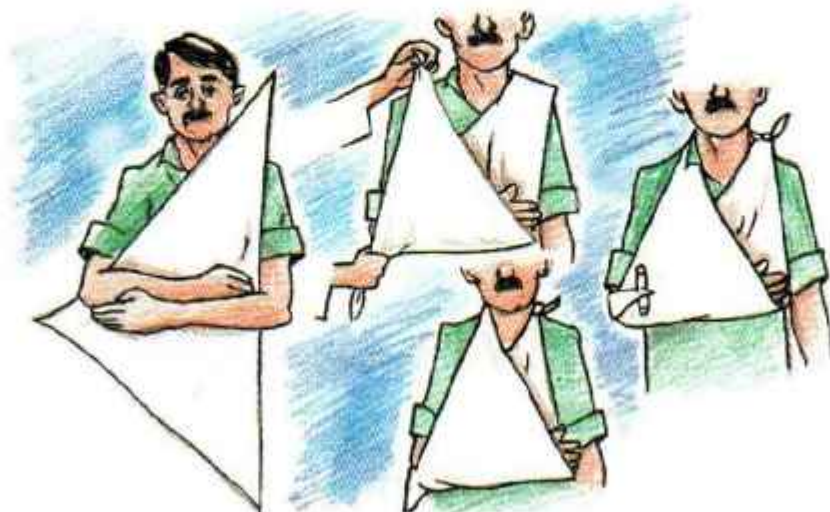
## 4. How to apply a spiral bandage

When a wound or injury is on the side of an arm or a leg, a spiral bandage is used to secure the dressing in place. To apply, wrap the bandage around the limb, beginning at the bottom of the wound and working your way up in a spiral motion. For more support, overlap the edges of the bandage.



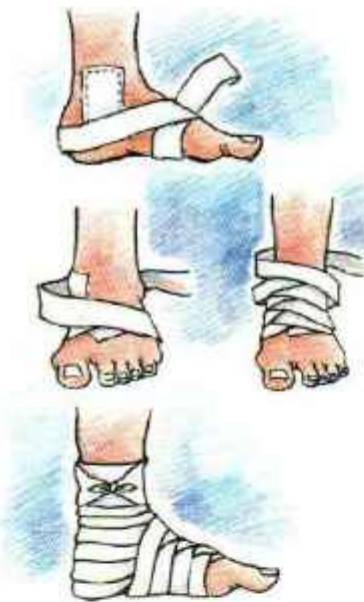
## 5. How to make an arm sling

A sling is the thing when you're dealing with a broken or wounded arm. Start with the triangular bandage from your first-aid kit: two sides should be 3 feet and the third side should be 4.5 feet. Spread the bandage over the torso of the victim, with the longest side along his or her good side and the opposite point under the elbow of the injured arm.



## 6. How to bandage the ears or cheeks

Place the bandage on the wound and wrap it up and over the top of the head. Then do 90-degree twist and wrap it around the head. Tie it in place.

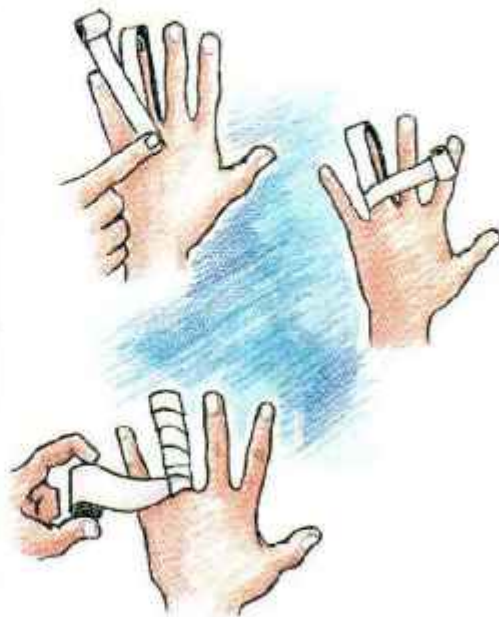


## 7. How to bandage an ankle

Place the bandage at the middle of the foot and wrap it around a few times. Take the bandage diagonally down around the back of the heel and back up to where you started, in a figure-eight motion. Continue this motion, overlapping each pass by about two-thirds the width of the bandage. Tie off when complete.

## 8. How to bandage a finger

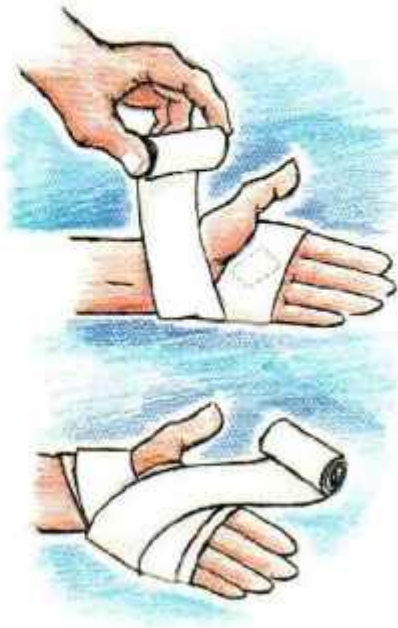
Using a narrow bandage, begin by applying the bandage vertically up over the top of the finger and down the other side, and then doubled back on itself, up and over again. Repeat this several times. Once the finger is wrapped vertically, hold that bandage in place with a spiral bandage wrapped horizontally and tie it off at the bottom.





## 9. How to bandage the hand or wrist

Start with the bandage over the palm, with the roll on the side away from the thumb. Wrap the bandage around the back of the hand diagonally to the wrist, just below the thumb. Continue wrapping diagonally up over the palm, and then around the back of the hand to just above the thumb. Then cross the palm again to the opposite side of the wrist. Next, go around the back of the wrist to below the thumb and come up again into the palm. Repeat until the bandage is complete, and then tie it off.



# Chapter 7

**Bites, Stings and Poison**

# Bites, Stings and Poison

Bites and Stings (except snake bites, dog bites and scorpion stings) are not matters of major concerns. When a bee, a wasp, or any other insect injects a tiny amount of venom in the skin, it causes redness and swelling at the spot, but symptoms begin to subside within a matter of hours even without a treatment, unless there is allergic reaction which is not very common. Dog bites, snake bites, and scorpion stings are, of course, serious matters, and need more care and attention. This section provides information about the first aid to be administered in the cases of bites and stings that are more common, that is, bites and stings by: snakes, dogs, scorpions, bees, wasps, hornets and ants.

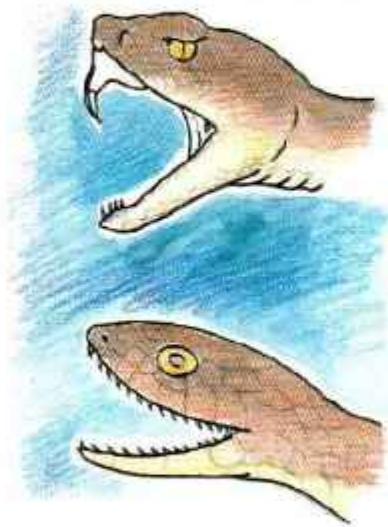
- **Snake bites.** The first thing that should be widely understood about snakes is that most of the snakes are non-poisonous. Quite often a person bitten by a snake dies of fear and shock, not of venom. It is necessary, therefore, to know more about snakes.

The main reason why there is such a deep rooted fear of snakes is their prominence in the popular mythology of many cultures, including the South Asian culture. According to the myths surrounding the snakes, they have supernatural powers, and are an embodiment of evil. All these notions are false as snakes have no supernatural or extraordinary attributes. In fact, in certain ways, snakes are more vulnerable than an animal that can run or a bird that can fly. To say that most of the species of snakes are harmless may sound unbelievable, but the fact is that out of 54 land-based species found in Pakistan, for example, only 7 are poisonous (See Appendix III). It is easy to identify non-poisonous snakes: they do not have pits, fangs, or rattles.

It is important, to be able to distinguish between poisonous and non-poisonous bite, even if the snake cannot be identified, on the basis of symptoms to avoid panic and shock. The main symptoms of a poisonous bite are:

- Puncture wounds caused by fangs (see box) that only the venomous snakes have
- Pain and swelling around the spot of the bite
- Nausea, vomiting, and increasing respiratory problem

Nonpoisonous snakes have round pupils. They also do not have pits, fangs, or rattles.



- Dimness of vision
- Inability of the blood to clot.

If none of these symptoms occur within 20 minutes of the bite, it is not likely to be poisonous. In such cases the wound should be treated like any other case of abrasion or laceration, that is, wash the wound with soap, and apply a pressure bandage.

In case the snake is known to be poisonous or there is reason to believe that the bite was poisonous, the following first aid measures should be taken immediately, before proper medical care becomes available:

- Remain calm, but act swiftly
- Immobilize the affected part in a position below the level of heart, where possible. In most of the cases it is possible as the snake can strike only below the knee if the person is not lying.
- Keep the person as still as possible
- Place a tight band few inches above the bite, and apply another above the swelling if it spreads beyond the first band. The band should be tight enough to halt the flow of blood in the surface vessels but not so tight as to stop the pulse.
- If the person appears to be going into shock, raise his legs about 12 inches above the level of his head.
- Make a single cut over each fang mark. It should not be more than  $\frac{1}{2}$  inch long and  $\frac{1}{4}$  inch deep, and should be made within half an hour of the bite.
- Once cut has been made apply suction to the wound. If suction pump is not available, apply suction by mouth, spitting out the blood and other fluids frequently. Suction by mouth is not harmful if there are no cuts or sores, or any bleeding in the mouth.
- Continue this treatment till proper medical care become available, but not for more than half an hour.

- **Dog bite.** Every dog bite is a potential case of rabies infection. The rabies virus has an affinity for nerve endings and nervous tissues, and moves through the neural pathways to the brain where it causes irreversible damage. The only site where this virus can be neutralized is at the site of the wound, if these recommended steps are taken immediately. These steps are as follows:
  - Keep the bitten part low
  - Wash the wound with a weak solution of potassium permanganate (one teaspoon to a bucket), if available, or with soap
  - Since the rabies travels through the nervous system, not the blood vessels, a constrictive bandage is not necessary. In fact the wound should be left open
  - If services of a doctor cannot be obtained within 20 minutes, and the dog is known to be rabid, apply antiseptic lotion.
  
- **Scorpion Sting.** Scorpions are the creatures of the desert, usually found under stones, bushes and crevices. In scorpion infested areas they even find refuge in houses and may get under the mattresses, into the shoes, or any other place to hide. They have eight legs and a stinger on their long and curved tails. All scorpions are poisonous, some of them are more than others. If there is burning sensation, irritation and pain at the spot stung, apply cold compresses. Symptoms would fade away within two or three hours. In a case of severe reaction get medical treatment. Meanwhile press a small cup, a ring, or any cylindrical object around the sting and press firmly for several minutes to let some poison and blood ooze out. Wash it with soap.
  
- **Bees, Wasps, Hornets and Ants.** Insect stings result in local reaction in the form of redness, a little swelling and some pain and itching. First thing to do is to remove the stinger, wash the area with soap and water, and apply ice to keep the swelling down. In a case of severe reaction due to allergy, proper medical attention will be required.

Children should be watched to control scratching the stung spot, for it can become an open wound and cause infection.
  
- **Poisoning** Poisoning can be unintentional, intentional or homicidal, but for the purpose of first aid there is no difference between the three. Next, poisoning can be through inhalation, by the mouth, by injection, or by absorption:

- Through inhalation. This usually occurs from standing in the path of aerial sprays, or from the fumes from brick kilns.
- By the mouth. This usually occurs from eating infected or decomposed food, poisonous wild fruits, drinking harmful liquors, or taking excessive quantities of medicines for relieving pain or producing sleep.
- By injection. This occurs from deliberate injection of drugs.
- By absorption. This is usually caused during application of pesticides without proper care.

The purpose of first aid in such cases is to neutralise or dilute the poison, and remove the patient to a hospital. Meanwhile some first aid measures that can be taken are as follows:

- Remove the person at once to a place which is not contaminated.
- If the poison has been taken by mouth, make the person vomit if he is conscious by giving an emetic (two tablespoons of salt in a tumbler of water) or by tickling the throat with a spoon or fingers. *Do not induce vomiting if the person is unconscious.*
- If the poison has been absorbed, wash the affected skin with running water, or if the poison is in the form of a powder, brush it off, but do not wash.
- In case of overdose of sleeping tablets, make the person vomit, keep him awake, give strong tea or coffee.

# Chapter 8

## Burns and Scalds

# Burns and Scalds

A burn is an injury caused by: dry heat, that is, fire; hot metal or the sun; electrical heat; or corrosive chemicals, such as sulphuric acid or ammonia. A scald is an injury caused by moist heat, such as boiling water, steam or hot oil. Clinically, burns are divided into three categories:

- **First degree burns** that cause superficial damage to the skin. There is redness and mild pain that heals quickly. Common cause of such burns is sunburn and brief contact with something hot.
- **Second degree burns** that cause more serious damage to the skin resulting in blisters, swelling and much pain. These are caused by severe sunburn and a longer contact with something hot.
- **Third degree burns** that cause great deal of tissue loss where the skin is destroyed. These burns are caused by electricity, contact with fire, burning of the dress, and sustained contact with something hot.

Seriousness of a burn is determined by the degree of the burn and also by the area of the body covered by the burn. If the body surface area covered by the burns is more than 15% in the case of an adult and more than 10% in the case of a child, the patient should be immediately hospitalized. Also, regardless of the area of burn, if the affected area includes the face, eyes, genitals or airways, the patient should be hospitalized. If the body surface area affected by the burn is more than 50% and no proper medical care is available, the chances of survival are very low. There is a rule of thumb to calculate the percentage of the affected area: head and neck account for 9%; front and back of the torso 18% each; arms, 9% each; legs, front, 9% each; legs, back, 9% each; genitals, 1%. In order to provide first aid the following measures are recommended:

## ■ In all cases

- Move the person to safe place
- Avoid touching the affected area of the skin
- Do not remove burned cloth
- Do not puncture blisters
- Apply processed honey over the affected area
- Cover the area with dry sterile dressing
- Apply bandage lightly.



### ■ **In first degree cases**

- Apply clean cloth soaked in cold water to the burn
- Do not apply ice or ice water on the burn
- Follow the other instructions given above

### ■ **In second degree cases**

- Follow the instructions given above for all cases
- Lay the person flat in the 'shock position', that is elevating the legs about a foot, and then covering with a blanket or a sheet
- Get the person to a hospital as quickly as possible

### ■ **In third degree cases**

- Do not rinse a burn with cold water
- Do not apply cold or even cool cloth
- Do not remove burned clothing that does not come off easily
- Take all other measures recommended above

### ■ **Chemical burns**

- Rinse the burn with cold water if the chemical was liquid
- Brush off the chemical if it is dry powder
- Do not use water
- Once the chemical has been removed take other measures, suggested above, according to the severity of the burn

### ■ **Sunburn**

- It can be relieved by applying cool compress, cloth soaked in milk, or bathing with water to which vinegar has been added in a proportion of one cup of vinegar to a bucket of water. Yogurt can also be applied to sunburn for relief.

# Chapter 9

**Choking, Drowning,  
Foreign Bodies**

# Choking, Drowning, Foreign Bodies

## Choking

The process of swallowing begins when the epiglottis, a cartilage, moves downwards to close the entry into the windpipe. When epiglottis fails to move, food, solid or liquid, gets stuck in the airway. This is called choking. It is indicated when a person makes desperate attempts to breathe, sometimes accompanied by rattle or inability to speak.

First aid measures are a bit different in the case of adults and infants (under one year old), and conscious and unconscious persons. Here are some measures that can be taken in an emergency:

### ■ Adults

- Let the person bend forward and give him four or five hard slaps on the back between the shoulder blades
- If that does not work, then give abdominal thrusts. For this purpose stand behind the person, pass your hands around him, and lock your hands together just above the navel in region of diaphragm and pull sharply inwards and upwards. The purpose is to force out the air in the lungs through the windpipe, so that the object is expelled. After trying the thrusts six times without response, cease trying thrusts and begin resuscitation immediately. For performing resuscitation see Appendix I.
- If the person is unconscious, kneel beside the person and perform abdominal thrusts with the base of the palm of one hand placed over the base of the other, just below the rib cage

### ■ Children

- In the case of a child more than one year old, lay the child across your lap with his head down and slap firmly between the shoulders. Repeat four or five times. If that does not work turn the child over on your lap, support his back, and give him a few upward thrusts, with the base of your palm, over the navel.

If this also fails, and the child becomes unconscious, begin resuscitation (See Appendix I) till the obstruction is removed or medical aid arrives.

- In the case of a baby *never* use abdominal thrusts. Give the baby five firm slaps between the shoulders in the manner described above. If the choking continues, turn the baby over, place two finger tips between the navel and the breastbone, and press down and upwards upto four times.  
If this does not work, begin resuscitation (See Appendix I) and continue till choking stops or medical aid arrives.
- Never poke your finger down a person's throat to find the obstruction. It will push it further down the throat

## Drowning

It is one of the most common causes of accidental death, especially in children. The human brain would sustain permanent damage if it has been deprived of oxygen for three or four minutes, but, if the water is cold, that period can be considerably longer. A person who has been pulled out of water should, therefore, be resuscitated even if he had remained submerged for longer than four minutes. Once the person has been pulled out of water, proceed as follows:

- Lay the person face down, on a slope if possible, with the head tilted below the level of the body to allow the water to drain out.
- Check the airways to remove any visible obstruction.
- Do *not* use abdominal thrusts as this may push stomach contents into the air passage.
- If there is no pulse or no breathing, proceed to give resuscitation as explained in Appendix I.

## Foreign Bodies

These are small irritants (fragments of metal, glass, wood, dirt or dust) that may get lodged anywhere in the body. There are some simple ways to deal with them, depending upon where they are lodged, such as:

- **Foreign body in the eye.** These are very common as particles of dust, sand or loose eyelashes got into the eyes quite often. These should be treated in the following manner:

- The eyes should not be rubbed, as it would only increase the irritation.
  - Examine the eye by stretching the upper and lower lid and asking the person to move the eyeball up and down, and from left to right. This should enable you to locate the foreign body.
  - Once located, try to remove the foreign body by washing it out with clean water or with moistened piece of clean cloth.
  - If the foreign body is particle of metal, glass or grit embedded on the eyeball, cover the eye with a sterile dressing lightly placed on the eye, and get medical help.
- **Foreign body in the nose.** This happens when small objects (buttons, seeds, nuts, vegetable pieces) get pushed into the nose. The simplest way to get rid of the foreign body is to blow through the affected nostril, while keeping the unaffected nostril closed. For babies and small children medical attention will be necessary for they cannot blow their nose at will, at least not through the right nostril.
- **Foreign body in the ear.** If it is an insect, warm oil will dislodge it. In case it is something else, do not try to remove it with tweezers or hairpins as it may cause serious injury to the eardrum. *Do not pour water into the ear.* Get medical help.

# Chapter 10

**Heat Exhaustion, Heat Stroke and Hypothermia**

# Heat Exhaustion, Heat Stroke and Hypothermia

The human body is designed to function at a temperature between 96.8°F and 99.5°F. The heat regulating mechanism of the brain keeps the core temperature within those limits. A body temperature beyond 102°F can cause heat stroke, while dehydration of the body due to perspiration can cause heat exhaustion.

A body temperature below 95°F causes hypothermia, and if it continues to fall, then, the muscles would become rigid at 86°F, and heart failure would occur at a temperature of less than 80°F. These three different conditions related to body temperatures are dealt with in this section.

**Heat Exhaustion.** This usually occurs gradually when a person has been working hard in a hot environment. It is indicated by:

- Profuse sweating
- Headache
- Dizziness
- Weakness
- Nausea and Vomiting

The first thing to do in such cases is to remove the person to a cool and shaded place, and give him plenty of water mixed with salt. One teaspoon of salt in a litre of water is enough. If it seems that more needs to be done, it will be a good idea to wrap the person in a wet sheet.

**Heat Stroke.** This is much more serious condition than heat exhaustion, and can even cause death if not treated promptly. It occurs due to prolonged exposure to high temperature on a hot day or illness with high fever. It is indicated by:

- A body temperature of more than 102°F
- Dry, hot skin
- Rapid pulse and rapid breathing
- Unconsciousness

Here, again, the first thing to do is remove the person to cool place. Next, wrap the person in sheet and keep it wet till the oral temperature falls to 100°F or lower. When the temperature has lowered to a safe position remove the wet sheet, and place a dry one. If the temperature rises again, cover the body again with a wet sheet. Meanwhile try to get medical help quickly.

**Hypothermia.** This occurs when the body temperature falls below 95°F due to prolonged exposure to low temperature. The first aid measures in such cases are:

- Bring the person indoors and remove any wet clothing
- Immerse the person in hot water in a tub, or, if that is not possible, cover him with blankets
- Give the person something hot to drink
- If the person becomes unconscious, give resuscitation (See Appendix I).



# Appendixes

## Resuscitation

Resuscitation is a method of restoring supply of oxygen to the brain. This is caused by obstruction in breathing or circulation, and is usually needed in cases of heart attack, drowning and heat stroke.

The process begins with the following ABC of resuscitation:

- Open the airway. Remove any visible obstruction from the mouth. Next, place two fingers below the chin of patient and simultaneously tilt his head back with pressure on the forehead. This will clear the airway if blocked by the tongue as a result of loss of muscular control due to unconsciousness.

Tilting the head to ensure open airway



Cross-section of closed and open airway



- Check for breathing. Place your face close to the patient's mouth and feel and listen for breathing. Also, look at the chest and abdomen for signs of movement.
- Check the circulation. Feel for the heartbeat and pulse.

If the patient is not breathing but has a pulse, then breathing air into his lungs may keep him ventilated till medical help arrives. If the patient has no pulse and no breathing, then both artificial respiration and external chest compression have to be performed to prevent brain damage. The two methods are described below.

- **Artificial or mouth to mouth ventilation.** This method (See Figures at the end) has to be applied if the patient is not breathing, but

has a pulse. This is how it should be done:

- Lay the patient flat on his back and tilt his head back to open the airway.
- Remove any visible obstruction from the mouth.
- Close the nostrils of patient with your thumb and index finger, take a deep breath, and place your mouth on the lips of the patient in such a way that the patient's mouth is sealed.
- Blow steadily into the patient's mouth until his chest rises. This should take 2-3 seconds.
- Remove your lips and fingers for 2-3 seconds, and repeat the procedure described above at the rate of about 10 ventilations per minute until the patient starts breathing or medical help arrives.

■ **Chest compression.** If the patient has no pulse, and no breathing is noticeable, then both artificial ventilation and chest compression have to be applied to revive breathing and circulation. The two methods applied together are known as cardio-pulmonary resuscitation (CPR). This is how it is done:

- Lay the patient flat on his back, and feel for the point at which the lower ribs meet (See Figure 11)
- Place the base of your palm at the point where the lower ribs meet, and pressure on the breastbone. Depress the breastbone by about 1 1/2 inches, and release. Do it about 80 times per minute.
- Do *not* give chest compression even if a faint pulse or heartbeat is present.
- The most effective sequence of CPR is 5 chest compression followed by 1 artificial ventilation.
- Continue this process till the medical aid arrives, or the patient shows return breathing or heartbeat.

■ **CPR for children.** For children CPR is usually needed in the case of drowning, though in rare cases even a child can suffer from heart failure. The procedure in respect of children and babies is the same as for adults, except for some little modifications to the procedure such as:

- The rate of artificial ventilation should be faster, that is, about 20 ventilations per minute.
- Amount of air to be exhaled into the lungs of the child should be varied according to the size of the child. A baby, for example, will need only tiny puffs.
- Chest compression in the case of babies and very young children should be applied gently with two fingers just below the centre of an imaginary line between the nipples.
- In case both the pulse and breath are absent, apply artificial ventilation and chest compression together as in the case of adults, gently but at a faster rate. Apply compressions at the rate 100 per minute, alternating five compressions with one ventilation.



Figure 11

## First Aid Kit

In order to be able to apply the information provided in this book or obtained from other sources if necessary to keep some basic first aid items handy in a kit. A dust free first aid box should contain at least the following 19 items:

1.	Thermometer	1
2.	Small unmedicated dressings	3
3.	Medium sized unmedicated dressings	3
4.	Large unmedicated dressings	3
5.	Triangular bandages	2
6.	Roller bandage (1 inch wide)	3
7.	Roller bandage (2 inches wide)	3
8.	Absorbent cotton wool	1
9.	Adhesive plaster	1
10.	Safety pins	4
11.	Antiseptic lotion (pyodine)	50 ml
12.	Blunt nosed scissors	1
13.	Tweezers	1
14.	Needle for removing splinters	1
15.	Forceps	1
16.	Disposable gloves	2 pairs
17.	Ointment for open wounds	1 tube
18.	Ointment for closed wounds	1 tube
19.	Ointment for burns	1 tube

### Suggested ointments:

- i) for open wounds: Burnol, or Calendula which is a Homeopathic ointment.
- ii) for closed wounds: Froben or Brufen cream, or Arnica which is a Homeopathic ointment.
- iii) for burns, Polyfax for face and neck, and Quench cream for rest of the affected area.

## Poisonous Snakes of Pakistan

There are 68 different species of snakes in Pakistan (54 land-based and 14 aquatic) out of which only 7 land-based species are poisonous. All the 14 aquatic species are poisonous. A brief description and the pictures of the land-based poisonous snakes are given here.

### I. Maynard's Awl Headed Snake

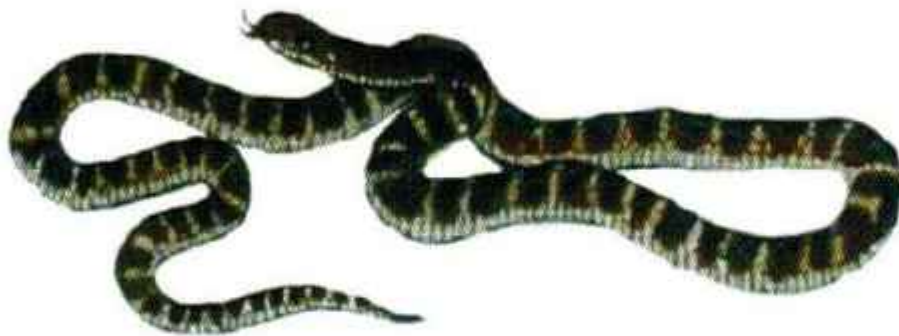


Scientific Name:	Lytorhynchus Maynardi	
Local Name:		
Colour:	Upper body:	Pale orange or pink and large oval spots are present on the body.
	Lower body:	White in colour
Size:	Maximum about 18 inches	

**Habit and Habitat:** They are regarded as desert species and are usually found on sandy tracts. They are nocturnal in habit and cannot survive in captivity for long. At the time of danger, they become very active, glide and dive rapidly over and into the sand. Under favourable circumstances they come out of the sand and coil their bodies into a loop. These snakes constantly vibrate the tip of their tail.

In Pakistan, this species is found in the desert areas of Balochistan such as Nushki, Kharan, Dalbadin and Nok-kundi.

## 2. Indian Krait



Scientific Name:	Bungarus Caeruleus	
Local Name:		Sangchur (Stone Breaker) or Pee-Un (Drinker)
Colour:	Upper body:	Jet black to dark brown in colour with narrow white cross bars.
Size:		Maximum 3 1/2 feet

**Habit and Habitat:** These snakes inhabit grassland, marshy area and agricultural lands. They are nocturnal and shy in nature. At the time of danger or when disturbed by any predator, particularly human beings, they coil their bodies and become round. When they are annoyed they become very aggressive and attack instantly. Movement is jerky and flinching.

In Pakistan this species is distributed widely and found in all four provinces.

### 3. Indian Cobra



Scientific Name:	Naja Naja Naja	
Local Name:	Nagu, Kala Nag, Chamchamar or Spoon Snake (Because it can spread its hood like a big spoon)	
Colour:	Upper body:	Dark brown in colour
	Lower body:	Pale gray to butter yellow in colour.
Size:	Maximum 5 ½ feet	

**Habit and Habitat:** They are usually found in damp grassland and patches of acacia scrub. One specimen has also been collected from Kirthar National Park. Cobras live in clumps of munji grass and dens of small mammals such as porcupines, hares, hedgehogs, scaly anteaters, rats and mice. They are known for their good vision. Whenever they come in contact with a predator, especially human beings, they become aggressive, move their hood to and fro, hiss loudly and strike repeatedly to attack. They are nocturnal in habit, but sometimes may be seen daytime also.

In Pakistan, this species is spread all over the country especially, the North-Eastern part of Punjab and Southern parts of Sindh and Lasbella (Balochistan). Technically there are two species of cobra (Naja Naja Naja and Naja Naja Oxiana) but for all practical purposes all cobras may treated as of one kind. The two species look alike and have the same local names.



## 4. Saw Scaled Viper



Scientific Name:	Echis Carinatus	
Local Name:		Loondee, Khupper, Afee, Jalaibi
Colour:	Upper body:	Light buff to tan, olive brown or chestnut in colour.
Size:		Maximum 3 feet

**Habit and Habitat:** These snakes inhabit the rocky, sandy and alluvial soils with sparse xerophytic vegetation. A variety of xerophytic plants such as euphorbia, tamarix and acacia act as their resting places. They are nocturnal in habit but can be seen in daytime in winter. In the mountainous areas of Pakistan, this specie has been found to survive at the height of nearly 6000-ft.

They are very active and aggressive in nature. Whenever they come in contact with a predator they use different techniques for survival. Either they attack the enemy, escape by retreating fast or coil themselves into a ball and rub their scales against each other, which in turn produces a sizzling sound.

In Pakistan the Saw Scaled Viper is widely distributed and found in all provinces, except the higher mountainous region of Himalayan (above 6000 ft).

## 5. Leaf Nosed Viper



Scientific Name:	Eristicpohis Macmahoni	
Local Name:		
Colour:	Upper body:	Lighter tan to khaki or pale sandy gray in colour.
	Lower body:	White in colour
Size:	Maximum about 3 feet	

**Habit and Habitat:** These deadly poisonous snakes prefer fine and loose sand with xerophytic plants as their habitat. They are burrowers. The whole body resides inside the burrow except the snout, which is exposed to outside for respiration.

They are aggressive snakes. During aggression they make hissing sound, raise their head and attack instantly. They are sidewinders and move very fast on sand.

In Pakistan, they are found in Nushki, Kharan, Dalbandin, Nok-kundi and other deserted areas of Balochistan.

## 6. Persian Horned Viper



Scientific Name:	Pseudocerastes Persicus	
Local Name:		Seengh Wala Sanp or Balla
Colour:	Upper body:	Pale or bluish gray to khaki in colour
Size:		Maximum about 3 feet

**Habit and Habitat:** These poisonous snakes inhabit the sandy as well as rocky terrain. They are nocturnal and shy in habit and get aggressive only when provoked. At the time of danger they produce a loud hissing sound and bite instantly.

In Pakistan they are found in the western part of Lasbela, Mangule, Kalat and Ormara in Balochistan.

## 7. Russell's Viper



Scientific Name:	Vipera Russelii Russelii	
Local Name:		Kauryala, Khuppur
Colour:	Upper body:	Light tan to sandy in colour
Size:		Maximum about 4 feet

**Habit and Habitat:** This species of poisonous snakes inhabit salt bush scrubs, cultivated fields and marshy areas. Thick bushes and clump of trees are their preferred resting places.

They are nocturnal in habit, but in late winter they also come out in the day time in search of food. These snakes are aggressive by nature and if provoked they hiss vigorously and attack.

In Pakistan they are found in Sindh and Punjab.



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