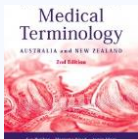


# TRAUMATOLOGY

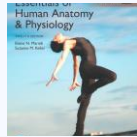
Khaleel Alyahya, PhD, MEd

[www.khaleelalyahya.net](http://www.khaleelalyahya.net)

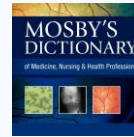
# RESOURCES



**Mastering Medical  
Technology**  
*by Sue Walker, Maryann  
Wood and Jenny Nicol*



**Essential of Human  
Anatomy & Physiology**  
*by Elaine Marieb and  
Suzanne Keller*



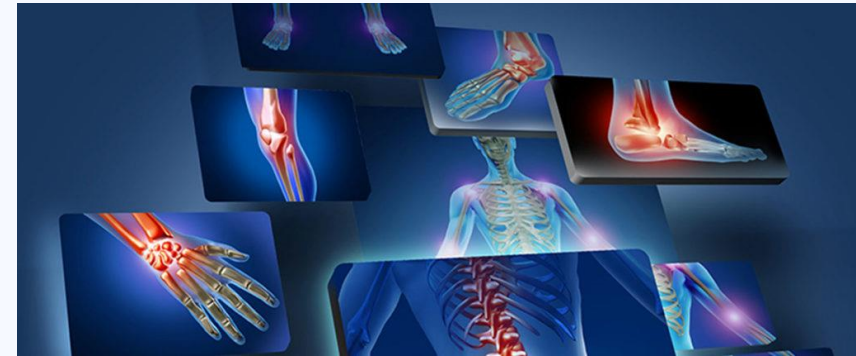
**Mosby's Dictionary**  
*BY Mosby*



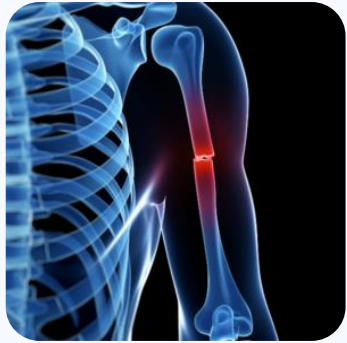
**KENHUB**  
[www.kenhub.com](http://www.kenhub.com)

# INTRODUCTION

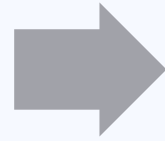
- Traumatology (from Greek “**Trauma**” meaning injury or wound) is the study of wounds and injuries caused by accidents or violence to a person, and the surgical therapy and repair of the damage.
- It is considered a branch of medicine.
- It is often a subset of surgery and in countries without the specialty of trauma surgery it is most often a sub-specialty to **orthopedic surgery**.
- Traumatology may also be known as **accident surgery**.



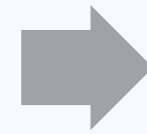
# HEADLINES



**Fractures**

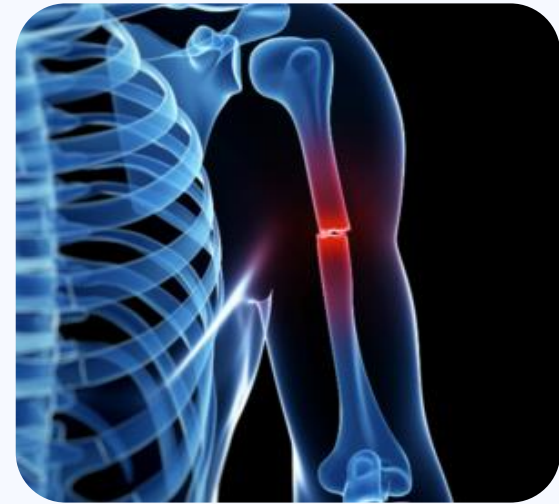


**Injuries**



**Burns**

# FRACTURES



# INTRODUCTION

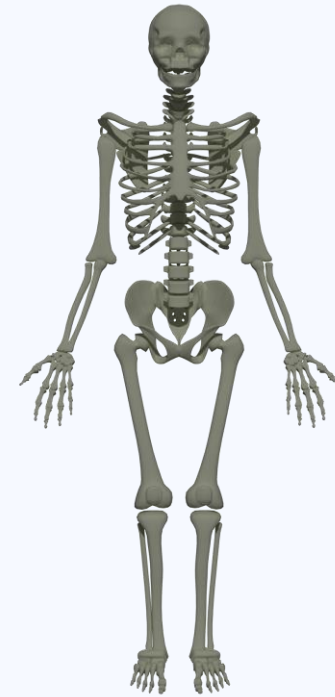
- Approximately 30–40% of the body's total weight is made up of the **bones**.
- There are **206** bones in human body, while newborn babies has **270** bones but many of these fuse as the child grows.
- As the body grows, ossification takes place as the cartilage and replaced by hard deposits of **calcium, phosphorus** and **collagen**, which make up the bones.
- Ossicles in middle ear is the smallest bones, while femurs in the thigh is the largest bones.
- There are certain differences in the bones of males and females, due to the requirement and needs of the female to accommodate special event such as pregnancy and childbirth.



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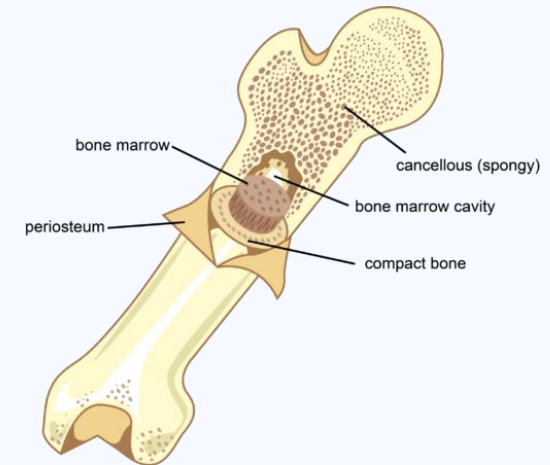
# FUNCTIONS

- To provide a **framework**.
- To enable **movement**.
- To provide **protection**.
- To create **blood cells** (haematopoiesis).
- To store **minerals** (calcium and iron).
- To regulate certain **hormones** (blood sugar levels & fat deposition).



# TYPES OF OSSEOUS TISSUE

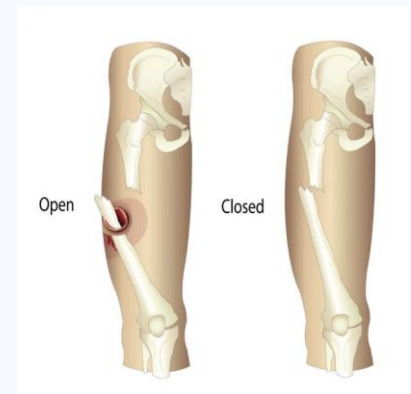
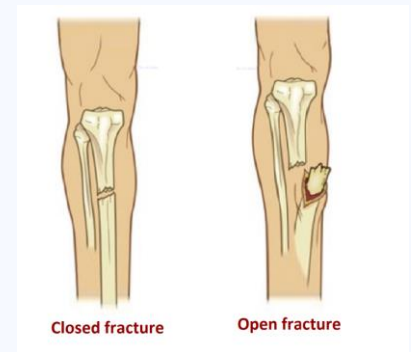
- There are two types of osseous tissue making up bones:
  - **Compact tissue**
  - **Spongy tissue.**
- The difference lies in the denseness of the cells.
- **Compact tissue** is usually located on the outside of bones and gives bones their characteristic hard, smooth, white appearance.
- **Spongy tissue** has spaces in between the cells, giving it a lattice like appearance.





# FRACTURES

- A fracture is a break or crack in a bone.
- Fractures are caused by trauma such as a fall or motor vehicle accident, through overuse or repetitive movements as may occur in athletes, or as a result of a disease process such as osteoporosis that weakens the bones.
- A fracture occurs when force exerted against a bone is stronger than the bone can structurally withstand.
- The most common sites for bone fractures are the wrist, ankle and hip.
- Fractures are classified by types and whether they are open or closed.
- **Closed fracture** is when the bone cracks but does not tear through the muscles and skin hence being invisible to the naked eye.
- **Open fracture** is when the bone snaps into two or more parts and tears through the skin making a visible cut on the skin. It might rebound into the skin, but the skin tear still remains.
- **Displaced fracture** is when a bone moves from its original alignment with the adjacent bones
- **Non-displaced** fracture is when the bone cracks but does not move from its original aligned position.



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# TYPES OF FRACTURES

## ▪ Avulsion

- A closed fracture that occurs when a strong muscle contraction pulls a tendon free, resulting in a fragment of bone being broken off.
- Avulsion commonly occurs in athletes.

## ▪ Complete

- Bone fragments at the fracture site are completely separated.

## ▪ Complicated

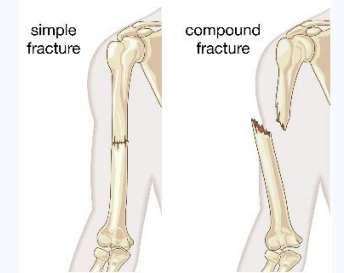
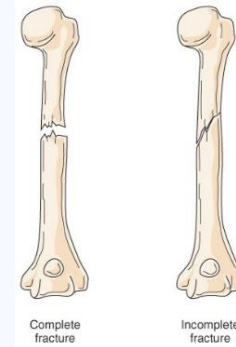
- Involves injury to bones and other organs such as blood vessels, brain, lungs, etc.

## ▪ Compound

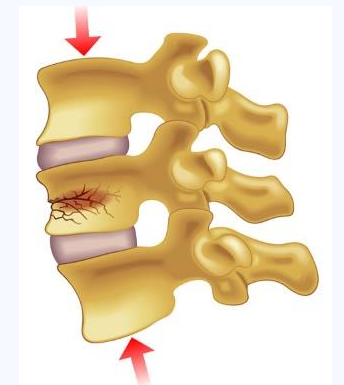
- Another name for an open fracture.

## ▪ Compression

- A closed fracture that occurs when bones are forced into each other crushing them.
- It commonly occurs to the bones of the spine and may be caused by a heavy landing onto the feet or falling into a sitting position, or as a result of advanced osteoporosis.



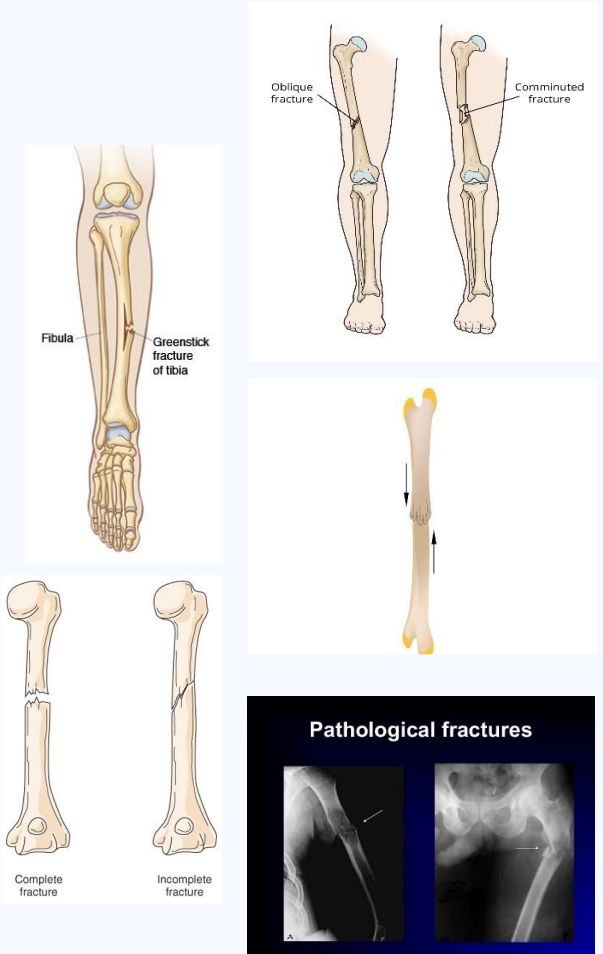
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# TYPES OF FRACTURES

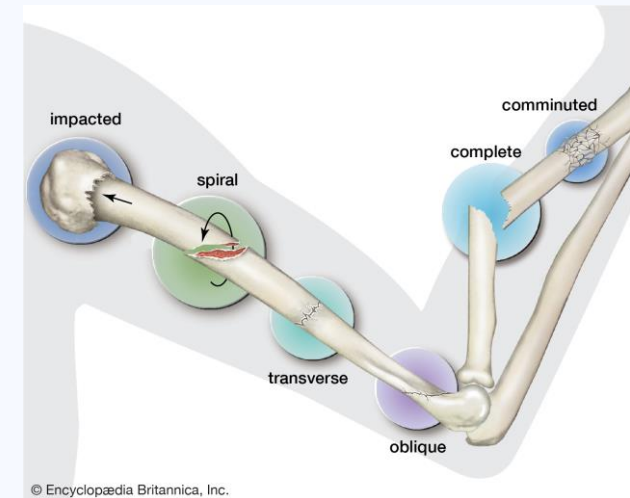
- **Comminuted**
  - Bone is broken into multiple fragments.
- **Greenstick**
  - An incomplete break, a bending of the bone.
  - Most often occurs in children.
- **Impacted**
  - A closed fracture which occurs when force is applied to both ends of a bone, driving them into each other.
- **Incomplete**
  - Bone fragments at the fracture site are partially joined.
- **Pathological**
  - A fracture that is caused because bones have been weakened by a disease process such as **osteoporosis**, metastatic neoplasm, Paget's disease.
  - Usually, no significant trauma or injury occurs to cause the fracture.
  - A gentle bump or rolling over in bed may be enough force to cause the diseased bone to fracture.



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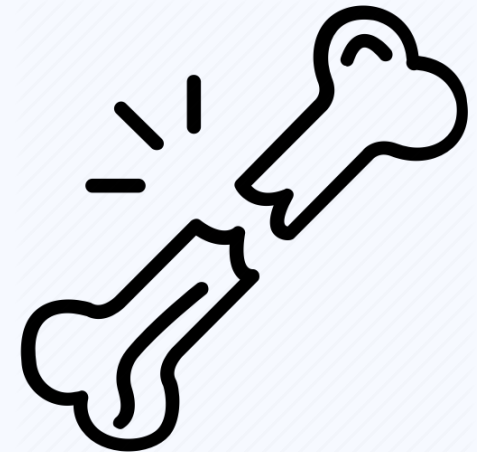
# TYPES OF FRACTURES

- **Simple**
  - A closed nondisplaced fracture that does not require manipulation.
- **Spiral**
  - Part of the bone has been twisted.
  - The fracture runs around the long axis of the affected bone.
- **Stress**
  - A closed fracture, often just a hairline crack that occurs as a result of repetitive movements that cause strain on a body part.
  - It is common in athletes such as runners and ballet dancers.
- **Transverse**
  - The fracture is in a straight line across the affected bone.



# COMPLICATIONS

- All fracture types are of a person's **arm** or **leg**.
- Trauma to the head, chest, spine or pelvis can fracture bones such as the **skull** and **ribs**.
- These fractures are further complicated by the underlying body structure that the bone normally protects.
- Some of these fractures can be very difficult to manage using first-aid principles only as they may represent life-threatening injuries.
- **Blood loss** – bones have a rich blood supply. A bad break can make you lose a large amount of blood
- Always seek emergency assistance if you suspect this type of fracture.



# CAUSES

- Causes of bone fractures can include:
  - **Traumatic incidents** such as sporting injuries, vehicle accidents and falls
  - **Conditions** such as osteoporosis and some types of cancer that cause bones to fracture more easily, meaning even minor trauma and falls can become serious.



# SYMPTOMS

- The symptoms of a fracture depend on the bone and the severity of the injury, but may include:
  - **Pain**
  - **Swelling**
  - **Bruising**
  - **Deformity**
  - **Inability to use the limb.**



# FIRST AID

- Good first-aid care of fractures is always important.
- Moving the broken bones can increase pain and bleeding and can damage tissues around the injury.
- This can lead to complications in the repair and healing of the injury later.
- First aid for fractures is all about **immobilizing** (limiting movement of) the injured area.
- **Splints** can be used for this.
- Control any external **bleeding**.
- Complicated breaks where a limb is very deformed may need to be **realigned** before splinting – only paramedics or medical staff should do this.
- Fractures of the head or body such as skull, ribs and pelvis are all serious and should be managed by **paramedics**.



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# DIAGNOSES

- Fractures can be diagnosed with **x-rays**.
- They may also use **CT scans** (computed tomography) and **MRI scans** (magnetic resonance imaging).



# TREATMENTS

- The aim of medical treatment is to make sure the pieces of bone are lined up correctly.
- The bone needs to recover fully in strength, movement and sensitivity.
- Some complicated fractures may need surgery or surgical traction (or both).
- Depending on where the fracture is and how severe, treatment may include:
  - **Splints** – to stop movement of the broken limb
  - **Braces** – to support the bone
  - **Plaster cast** – to provide support and immobilize the bone
  - **Traction** – a less common option
  - **Surgically** inserted metal rods or plates – to hold the bone pieces together
  - **Pain relief** medications.



# INJURIES



# INTRODUCTION

- Traumatic injury is a term which refers to physical injuries of sudden onset and severity which require immediate medical attention.
- The insult may cause systemic shock called “**shock trauma**” and may require immediate resuscitation and interventions to save life and limb.
- Traumatic injuries are the result of a wide variety of blunt, penetrating and burn mechanisms.
- They include motor vehicle collisions, sports injuries, falls, natural disasters and a multitude of other physical injuries which can occur at home, on the street, or while at work and require immediate care.



# TYPES OF INJURIES

- Brain Injury
- Broken/Fractured Bones
- Burn Injury
- Catastrophic Injury
- Drowning
- Electrocution
- Wounds
- Spinal Cord/Back Injury
- Loss of Limb
- Scarring/Disfigurement
- Paralysis
- Poisoning



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# SEVERITY OF INJURIES

- An injury can be relatively **minor**, such as cutting a finger while opening a metal can or breaking a bone during a sporting event.
- Whilst these can be painful or uncomfortable, the person will usually be able to remain at home once the injury is treated by general practices, health clinic or emergency department.
- However, traumatic injury can be more **serious**, requiring admission to hospital for assessment, treatment and rehabilitation.
- The full extent of injuries is not always apparent when a patient first arrives at hospital, and they may require in-depth **examination** and multiple tests (such as scans and x-rays) or **operations** in the first few days.
- The severity of injury is calculated using a scoring system – the **injury severity score** (known as ISS).
- This score is calculated retrospectively once all injuries have been diagnosed.
- Some patients with severe injuries may require intensive care or specialist treatments which may require a transfer to another hospital.



# TREATMENT

- Many accidents resulting in traumatic injury can be treated appropriately in hospital emergency departments.
- More severe and multiple traumatic injuries may be triaged by responding ambulance or helicopter flight teams as a Trauma Alert.
- A Level One Trauma Alert is a **determination** based on a rapid physical assessment of the victim's immediate medical needs.
- Based on trauma alert criteria, first responders deliver the patient to the most appropriate hospital.



# TRAUMA CENTERS

- Some hospitals are designated as **Major Trauma Centers** (MTCs) where there is a full complement of medical specialties available on site, responsible for treating the most severely injured patients or those patients with multiple injuries.
- There are also **Trauma Units** (TUs), which are acute hospitals where patients with less severe injuries are treated.
- Patients may be transferred to a TU closer to home once their specialist treatment at an MTC is complete.
- Some patients can be discharged home directly from an MTC.





# SPORT INJURIES



# INTRODUCTION

- Sports injuries occur during exercise or while participating in a sport.
- Children are particularly at risk for these types of injuries, but adults can get them, too.
- You're at risk for sports injuries if you:
  - haven't been regularly active
  - don't warm up properly before exercise
  - play contact sports



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# TYPES OF SPORT INJURIES

## ▪ Sprains

- Overstretching or tearing the **ligaments** results in a sprain.
- Ligaments are pieces of tissue that connect two bones to one another in a joint.

## ▪ Strains

- Overstretching or tearing **muscles** or **tendons** results in a sprain.
- Tendons are thick, fibrous cords of tissue that connect bone to muscle.
- Strains are commonly mistaken for sprains.

## ▪ Knee injuries

- Any injury that interferes with how the knee joint moves could be a sports injury.
- It could range from an overstretch to a tear in the **muscles** or **tissues** in the knee.

## ▪ Swollen muscles

- Swelling is a natural reaction to an injury.
- Swollen muscles may also be painful and weak.



# TYPES OF SPORT INJURIES

## ▪ Achilles' tendon rupture

- The Achilles tendon is a thin, powerful tendon at the back of your ankle.
- During sports, this tendon can break or rupture.
- When it does, you may experience sudden, severe pain and difficulty walking.

## ▪ Fractures

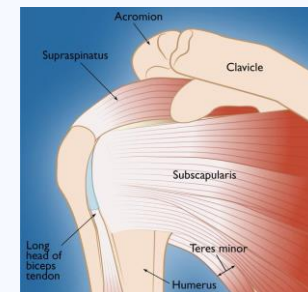
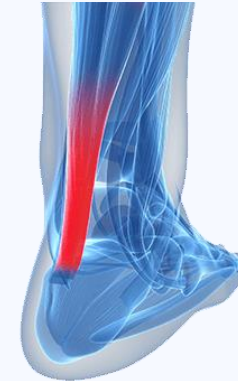
- Bone fractures are also known as broken bones.

## ▪ Dislocations

- Sports injuries may dislocate a bone in your body.
- When that happens, a bone is forced out of its socket.
- This can be painful and lead to swelling and weakness.

## ▪ Rotator cuff injury

- Four pieces of muscle work together to form the rotator cuff.
- The rotator cuff keeps your shoulder moving in all directions.
- A tear in any of these muscles can weaken the rotator cuff.



# DIAGNOSES OF SPORT INJURIES

- Many sports injuries cause immediate pain or discomfort.
- Others, like overuse injuries, might be noticed only after long-term damage.
- These injuries are often diagnosed during routine physical examinations or checkups.
- If you think you have a sports injury, your doctor will likely use the following steps to get a diagnosis. These include:
  - **Physical examination.** Your doctor may attempt to move the injured joint or body part. This helps them see how the area is moving, or how it's not moving if that's the case.
  - **Medical history.** This involves asking you questions about how you were injured, what you were doing, what you've done since the injury, and more. If this is your first time visiting this doctor, they may also ask for a more thorough medical history.
  - **Imaging tests.** X-rays, MRI, CT scans, and ultrasounds can all help your doctor and healthcare providers see inside your body. This helps them confirm a sports injury diagnosis.
- If your doctor suspects you have a sprain or strain, they may recommend you follow the RICE method.
- Follow these recommendations and keep an eye on your symptoms. If they get worse, that can mean you have a more serious sports injury.



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# TREATMENTS OF SPORT INJURIES

- The RICE method is a common treatment technique for sports injuries.
- It stands for: **Rest, Ice, Compression** and **Elevation**
- This treatment method is helpful for mild sports injuries.
- For best results, follow the RICE method within the first 24 to 36 hours after the injury.
- It can help reduce swelling and prevent additional pain and bruising in the early days after a sports injury.
- Both over-the-counter and prescription medications are available to treat sports injuries. Most of them provide relief from pain and swelling.
- If your sports injury looks or feels severe, make an appointment to see your doctor. Seek emergency care if the injured joint shows signs of:
  - severe swelling and pain
  - visible lumps, bumps, or other deformities
  - popping or crunching sounds when you use the joint
  - weakness or inability to put weight on the joint
  - instability
- Serious sports injuries can require surgery and physical therapy.
- If the injury doesn't heal within two weeks, contact your doctor for an appointment.



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# PREVENTION OF SPORT INJURIES

- The best way to prevent a sports injury is to warm up properly and stretch.
- Cold muscles are prone to overstretching and tears.
- Warm muscles are more flexible.
- They can absorb quick movements, bends, and jerks, making injury less likely.
- Also take these steps to avoid sports injuries:
  - Use the proper technique and exercises.
  - Have the proper equipment.
  - Don't overdo it.
  - Cool down.
  - Resume activity slowly.



# WOUNDS





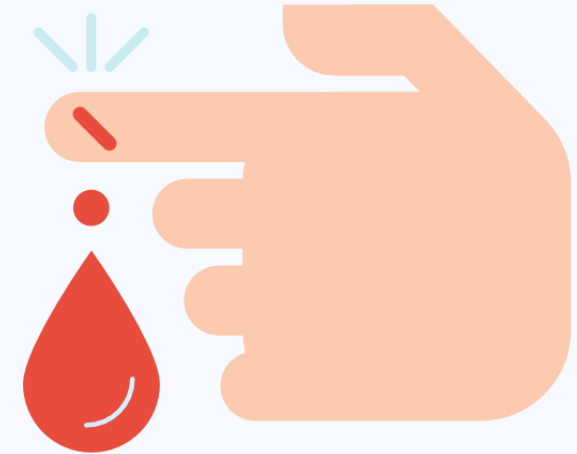
# INTRODUCTION

- Wounds are type of injuries that break the skin or other body tissues.
- They include cuts, scrapes, scratches, and punctured skin.
- They often happen because of an accident, but surgery, sutures, and stitches also cause wounds.
- Minor wounds usually are not serious, but it is important to clean them.
- Serious and infected wounds may require first aid followed by a visit to your doctor.
- You should also seek attention if the wound is deep, you cannot close it yourself, you cannot stop the bleeding or get the dirt out, or it does not heal.



# OPEN WOUNDS

- The open wound is an injury involving an external or internal break in body tissue, usually involving the skin.
- Nearly everyone will experience an open wound at some point in their life.
- Most open wounds are minor and can be treated at home.
- Falls, accidents with sharp objects, and car accidents are the most common causes of open wounds.
- In the case of a serious accident, you should seek immediate medical care.
- This is especially true if there's a lot of bleeding or if bleeding lasts for more than 20 minutes.



# TYPES OF OPEN WOUNDS

## ▪ Abrasion

- An abrasion occurs when your skin rubs or scrapes against a rough or hard surface.
- Road rash is an example of an abrasion. There's usually not a lot of bleeding, but the wound needs to be scrubbed and cleaned to avoid infection.

## ▪ Laceration

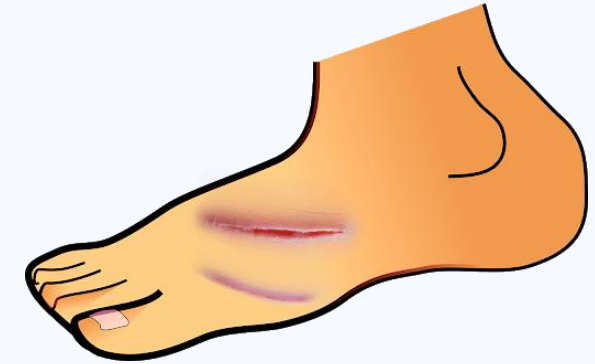
- A laceration is a deep cut or tearing of your skin. Accidents with knives, tools, and machinery are frequent causes of lacerations. In the case of deep lacerations, bleeding can be rapid and extensive.

## ▪ Puncture

- A puncture is a small hole caused by a long, pointy object, such as a nail or needle. Sometimes, a bullet can cause a puncture wound.
- Punctures may not bleed much, but these wounds can be deep enough to damage internal organs. If you have even a small puncture wound, visit your doctor to get a tetanus shot and prevent infection.

## ▪ Avulsion

- An avulsion is a partial or complete tearing away of skin and the tissue beneath.
- Avulsions usually occur during violent accidents, such as body-crushing accidents, explosions, and gunshots. They bleed heavily and rapidly.



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# TREATMENT OF OPEN WOUNDS

- Some wounds may be treated at home and others may require a visit to the doctor for a medical approach.
- **Minor wounds.** First, wash and disinfect the wound to remove all dirt and debris. Use direct pressure and elevation to control bleeding and swelling.
- When wrapping the wound, always use a sterile dressing or bandage. Very minor wounds may heal without a bandage.
- You may need to keep the wound clean and dry for five days with plenty of rest.
- You may take acetaminophen (**Tylenol**) as directed on the package to reduce pain.
- Avoid products with aspirin since they can cause or prolong bleeding.
- Apply ice if you have bruising or swelling, and avoid picking at scabs.



# TREATMENT OF OPEN WOUNDS

- The doctor may use different techniques to treat open wound.
- After cleaning and possibly numbing the area, doctor may close the wound using skin glue, sutures, or stitches.
- **Tetanus** shot may be given if you have a puncture wound.
- Depending on the location of your wound and the potential for infection, doctor may not close the wound and let it heal naturally.
- This is known as **healing by secondary intention**, meaning from the base of the wound to the superficial epidermis.
- Another treatment for an open wound includes pain medication.
- The doctor may also prescribe penicillin or another antibiotic if there's an infection or high risk for developing an infection.
- In some cases, you may need surgery.



# COMPLICATIONS

- The main complication of an open wound is the risk for **infection**.
- Call the doctor immediately if you've had a puncture, deep laceration, or serious accident and you're showing signs of significant bleeding or infection.
- Signs of hemorrhage include continuous bleeding that doesn't respond to direct pressure.
- You may have an infection if the wound shows:
  - an increase in drainage
  - thick green, yellow, or brown pus
  - pus with a foul odor



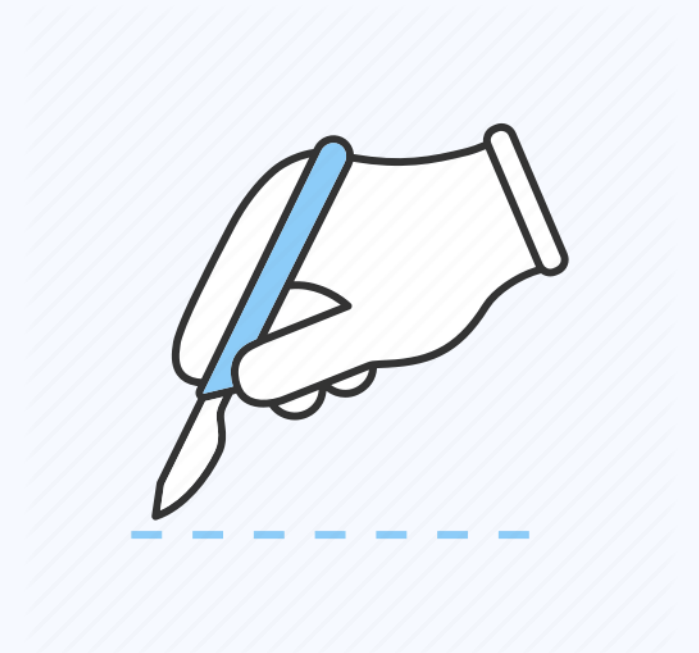
# SURGICAL WOUNDS

- It is a cut or incision in the skin that is usually made by a scalpel during surgery.
- A surgical wound can also be the result of a drain placed during surgery.
- Surgical wounds vary greatly in size. They are usually closed with sutures, but are sometimes left open to heal.



# TYPES OF SURGICAL WOUNDS

- Surgical wounds can be classified into one of four categories.
- These categories depend on (1) how contaminated or clean the wound is, (2) the risk of infection, and (3) where the wound is located on the body.
  - **Class I:** These are considered clean wounds. They show no signs of infection or inflammation. They often involve the eye, skin, or vascular system.
  - **Class II:** These wounds are considered clean-contaminated. Although the wound may not show signs of infection, it is at an increased risk of becoming infected because of its location. For example, surgical wounds in the gastrointestinal tract may be at a high risk of becoming infected.
  - **Class III:** A surgical wound in which an outside object has come into contact with the skin has a high risk of infection and is considered a contaminated wound. For example, a gunshot wound may contaminate the skin around where the surgical repair occurs.
  - **Class IV:** This class of wound is considered dirty-contaminated. These include wounds that have been exposed to faecal material.





# CAUSES OF SURGICAL WOUNDS

- Surgical wounds are created when a surgeon makes an incision or cut with a surgical instrument called a scalpel.
- A wide variety of medical circumstances require surgery.
- The size of a wound depends on the type of procedure and location on the body.



# SYMPTOMS OF SURGICAL WOUNDS

- Surgical wounds are frequently monitored to make sure they are healing properly.
- Infections may affect only the skin, tissue under the skin, or implants, according to the Centers for Disease Control and Prevention Trusted Source.
- Signs of a surgical wound infection include:
  - increased pain and redness around the wound
  - delayed healing
  - the presence of pus
  - a foul smell, or drainage from the wound
- In some cases, an infected surgical wound can appear dried out or deeper. Fever may also be a common symptom.



# DIAGNOSE OF SURGICAL WOUNDS

- A physician can diagnose a surgical wound infection by examining the wound, assessing symptoms, or taking a culture of fluid drained from the wound.



# TREATMENTS OF SURGICAL WOUNDS

- Treatment for a surgical wound sometimes depends on where it's located on the body.
- Surgical dressings are normally placed over the wound and may need to be changed regularly.
- The skin around the surgical wound will likely need to be cleaned, often with salt water and soap.
- The wound may also need to be irrigated with salt water.
- This involves filling a syringe with salt water and spraying the skin around the wound.



# COMPLICATIONS OF SURGICAL WOUNDS

- When surgical wounds cause infection, it typically occurs within 30 days of surgery.
- Infections may be red, painful, hot to the touch, or drain pus.
- To treat infections, your physician may prescribe an antibiotic, or they may have to open the wound to clean it.



# RISK FACTORS OF SURGICAL WOUNDS

- Any surgical procedure will create a surgical wound.
- The likelihood of a wound infection after surgery is between 1% and 3%.
- Risk factors for developing a surgical wound infection include having other medical issues, such as diabetes or a weakened immune system.
- Smokers, older adults, and people who are overweight also have an increased risk of infection.
- Emergency surgeries, abdominal surgeries, and surgeries that last longer than two hours bring a higher risk of infection, too.



# POISONING



# INTRODUCTION

- Poisoning is the harmful effect that occurs when a **toxic substance** is swallowed, inhaled, or comes in contact with the skin, eyes, or mucous membranes, such as those of the mouth or nose.
- More than **2** million people suffer some type of poisoning each year in the United States.
- Drugs, over the counter, and illicit are a common source of serious poisonings and poisoning-related deaths.
- Other common poisons include gases (carbon monoxide), household products, agricultural products, plants, heavy metals (iron and lead), vitamins, animal venom, and foods (mushroom and fish).
- However, almost any substance ingested in sufficiently large quantities can be toxic.





# POISONOUS SUBSTANCES

- They include prescription and over the counter drugs, illicit drugs, gases, chemicals, vitamins, food, mushrooms, plants, and animal venom.
- Some poisons cause no damage, whereas others can cause severe damage or death.
- The diagnosis is based on symptoms, on information gleaned from the poisoned person and bystanders, and sometimes on blood and urine tests.
- Drugs should always be kept in original child-proof containers and kept out of the reach of children.
- Treatment consists of supporting the person, preventing additional absorption of the poison, and sometimes increasing elimination of the poison.



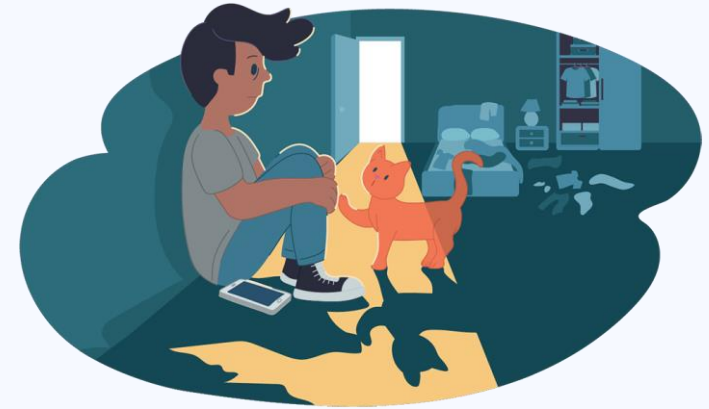
# ACCIDENTAL POISONING

- Poisoning is the most common cause of nonfatal accidents in the home.
- Young children, because of curiosity and a tendency to explore, are particularly vulnerable to accidental poisoning in the home, as are older people, often due to confusion about their drugs.
- Because children often share found pills and substances, siblings and playmates may also have been poisoned.
- Also vulnerable to accidental poisoning are hospitalized people (by drug errors) and industrial workers (by exposure to toxic chemicals).



# DELIBERATE POISONING

- Poisoning may also be a deliberate attempt to commit murder or suicide.
- Most adults who attempt suicide by poisoning take more than one drug and consume alcohol.
- Poisoning may be used to disable a person (for example, to rape or rob them).
- Rarely, parents with a psychiatric disorder poison their children to cause illness and thus gain medical attention (a disorder called factitious disorder imposed on another).



# SYMPTOMS

- The symptoms caused by poisoning depend on the **poison**, the **amount** taken, the **age** and underlying **health** of the person who takes it.
- Some poisons are not very potent and cause problems only with prolonged exposure or repeated ingestion of large amounts.
- Other poisons are so potent that just a drop on the skin can cause severe symptoms.
- Some poisons cause symptoms within seconds, whereas others cause symptoms only after hours, days, or even years.
- Some poisons cause few obvious symptoms until they have damaged vital organs—such as the kidneys or liver—sometimes permanently.



# SYMPTOMS

- **Ingested and absorbed toxins** generally cause bodywide symptoms, often because they deprive the body's cells of oxygen or activate or block enzymes and receptors. Symptoms may include changes in consciousness, body temperature, heart rate, and breathing and many others, depending on the organs affected.
- **Caustic or irritating substances** injure the mucous membranes of the mouth, throat, gastrointestinal tract, and lungs, causing pain, coughing, vomiting, and shortness of breath.
- **Skin contact with toxins** can cause various symptoms, for example, rashes, pain, and blistering. Prolonged exposures may cause dermatitis.
- **Eye contact with toxins** may injure the eye, causing eye pain, redness, and loss of vision.



# DIAGNOSIS

- **Identification of the poison** is helpful to treatment. Labels on bottles and other information from the person, family members, or coworkers best enable the doctor or the poison center to identify poisons.
- If labels are not available, drugs can often be identified by the markings and colors on the pill or capsule.
- **Urine and blood tests** may help in identification. Blood tests can sometimes reveal the severity of poisoning, but only with a very small number of poisons.
- However, Laboratory testing is much less likely to identify the poison, and many drugs and poisons cannot be readily identified or measured by the hospital.
- **Abdominal x-rays** may show the presence and location of the ingested substances. Poisons that may be visible on x-rays include iron, lead, arsenic, other metals, and large packets of cocaine or other illicit drugs swallowed by so-called body packers or drug mules



# FIRST AID

- The priority in helping a poisoned person is for bystanders not to become poisoned themselves.
- **People exposed to a toxic gas** should be removed from the source quickly, preferably out into fresh air, but rescue attempts should be done by professionals. Special training and precautions must be considered to avoid being overcome by the toxic gases or chemicals during rescue attempts.
- **In chemical spills**, all contaminated clothing, including socks and shoes, and jewellery should be removed immediately. The skin should be thoroughly washed with soap and water. If the eyes have been exposed, they should be thoroughly flushed with water or saline.
- **If the person appears very sick**, emergency medical assistance should be called. Bystanders should do cardiopulmonary resuscitation (CPR) if needed. If the person does not appear very sick, bystanders can contact the nearest poison control center for advice.



# TREATMENTS

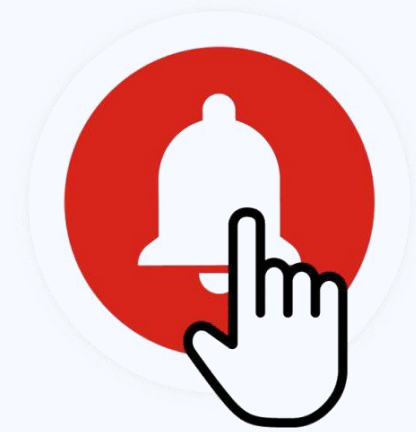
- Some people who have been poisoned must be hospitalized.
- With prompt medical care, most recover fully.
- The principles for the treatment of all poisoning are the same:
  - Support vital functions such as breathing, blood pressure, body temperature, and heart rate.
  - Prevent additional absorption.
  - Increase elimination of the poison.
  - Give specific antidotes (substances that eliminate, inactivate, or counteract the effects of the poison), if available.
  - Prevent re-exposure.
- The usual goal of hospital treatment is to keep people alive until the poison disappears or is inactivated by the body. Eventually, most poisons are inactivated by the liver or are passed into the urine.





# PREVENTION

- To prevent accidental poisoning, drugs and other potentially dangerous substances should be kept in their original containers.
- Toxic substances, such as insecticides and cleaning agents, should not be put in drink bottles or cups, even briefly.
- Other preventive measures include:
  - Clearly labelling household products.
  - Storing drugs (particularly opioids) and toxic substances in cabinets that are locked and out of the reach of children.
  - Using carbon monoxide detectors.
- Expired drugs should be disposed of by mixing them with cat litter or some other substance that is not tempting and putting them in a trash container that is inaccessible to children.
- People can also call a local pharmacy for advice on how to properly dispose of drugs. All labels should be read before taking or giving any drugs or using household products.



# BURNS



# INTRODUCTION

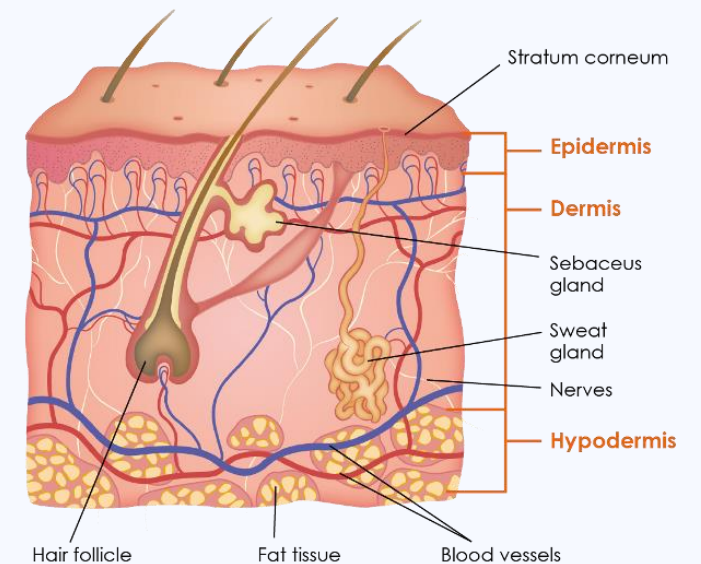
- Burns are one of the most common household injuries, especially among children.
- The term “**burn**” means more than the burning sensation associated with this injury.
- Burns are characterized by severe skin damage that causes the affected skin cells to die.
- Burns are tissue damage that results from heat, overexposure to the sun or other radiation, or chemical or electrical contact.
- Most people can recover from burns without serious health consequences, depending on the cause and degree of injury.
- More serious burns require immediate emergency medical care to prevent complications and death.
- Burns can be minor medical problems or life-threatening emergencies.



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# SKIN

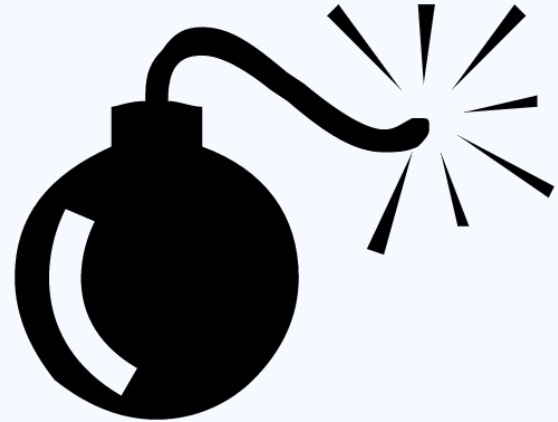
- The skin is the largest and heaviest organ in the human body, covering around 2 m<sup>2</sup> in the average adult and weighing around 3.5 kilograms.
- The skin has three layers.
  - The **outermost** layer is called the **epidermis** and consists of squamous epithelium with four types of cells: keratinocytes, melanocytes, Merkel cells and Langerhans cells. The color of the skin is due to differing numbers of melanocytes, produced in the epidermis as a means of protecting the body from the harmful rays of the sun.
  - **Under** the epidermis and attached to it, is a layer known as the **dermis**, which is composed of collagen and elastin. This layer has many blood vessels which expand or contract to alter the flow of blood in response to external temperatures. The dermis interacts with the brain by providing it with feelings of pain, temperature and touch through the nervous system.
  - The **innermost** layer of the skin is called the **subdermis** or **subcutaneous tissue**. Acting to cushion the body against injury and provide warmth and insulation, this layer also provides fuel or fat for the body that can be used in times of privation.



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# LIFE-THREATENING

- A burn is tissue damage and cell death caused by intense heat, electricity, UV radiation (sunburn), or certain chemicals (such as acids), which denature proteins and cause cell death in the affected areas.
- When the skin is burned and its cells are destroyed, two life-threatening problems result.
  - **First**, without an intact boundary, the body loses its precious supply of fluids containing proteins and electrolytes as these seep from the burned surfaces.
  - **Dehydration** and **electrolyte** imbalance follow and can lead to a shutdown of the kidneys and circulatory shock (inadequate circulation of blood caused by low blood volume).
- To save the patient, lost fluids must be replaced immediately.



# ADVANCES

- The volume of fluid lost can be estimated indirectly by determining how much of the body surface is burned (extent of burns), using the rule of nines.
- This method divides the body into **11 areas**, each accounting for **9%** of the total body surface area, plus an additional area surrounding the genitals (the perineum) representing **1%** of body surface area.
- Later, infection becomes the most important threat and is the leading cause of death in burn victims.
- Burned skin is sterile for about 24 hours.
- But after that, pathogens easily invade areas where the skin has been destroyed and multiply rapidly in the nutrient-rich environment of dead tissues.
- To make matters worse, the patient's immune system becomes depressed within one to two days after severe burn injury.



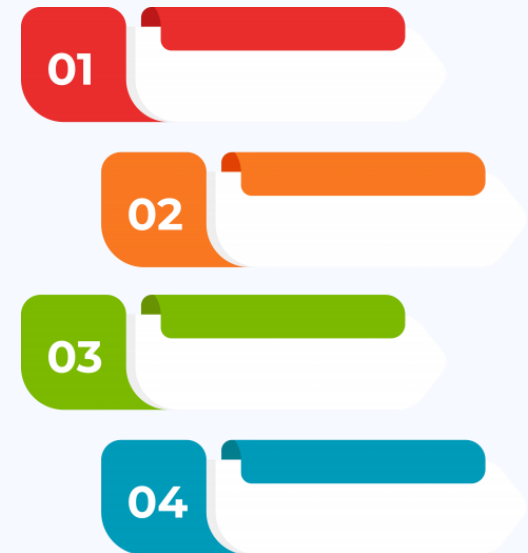
# CAUSES

- Burns have a variety of causes, including:
  - scalding from hot, boiling liquids
  - chemical burns
  - electrical burns
  - fires, including flames from matches, candles, and lighters
  - excessive sun exposure
- The type of burn is not based on the cause of it.
- Scalding, for example, can cause all three burns, depending on how hot the liquid is and how long it stays in contact with the skin.
- Chemical and electrical burns warrant immediate medical attention because they can affect the inside of the body, even if skin damage is minor.



# CLASSIFICATIONS

- Burns are classified according to their severity (depth) as:
- **First-degree**
  - Superficial, Red and Nonblistered skin
- **Second-degree**
  - Superficial, Partial-thickness burns, Blisters and some thickening of the skin
- **Third-degree**
  - Full-thickness burns and Widespread thickness with a white, leathery appearance.
- **Fourth-degree**
  - More-thickness burns
  - This type of burn includes all of the symptoms of a third-degree burn and also extends beyond the skin into tendons and bones.





# FIRST DEGREE BURNS

- Only the superficial **epidermis** is damaged causing minimal skin damage.
- They are also called “**superficial burns**” because they affect the outermost layer of skin.
- Signs of a first-degree burn include:
  - Redness.
  - Minor inflammation or swelling.
  - Pain.
  - Dry peeling skin occurs as the burn heals.
- Since this burn affects the top layer of skin, the signs and symptoms disappear once the skin cells shed.
- Except for temporary discomfort, first-degree burns are not usually serious and generally heal in two to three days.
- You should still see your doctor if the burn affects a large area of skin, more than three inches, and if it's on your face or a major joint, which include:
  - Knee, ankle and foot.
  - Spine.
  - Shoulder, elbow and forearm.



# FIRST DEGREE BURNS

- This type of burns are usually treated with home care.
- Healing time may be quicker the sooner you treat the burn.
- Treatments for a first-degree burn include:
  - soaking the wound in cool water for five minutes or longer
  - taking acetaminophen or ibuprofen for pain relief
  - applying lidocaine (an anesthetic) with gel or cream to calm the skin
  - using an antibiotic ointment and loose gauze to protect the affected area
- Make sure you **don't** use **ice**, as this may make the damage worse.
- Never apply cotton balls to a burn because the small fibers can stick to the injury and increase the risk of infection.
- Also, avoid home treatments like butter and eggs as these are not proven to be effective.



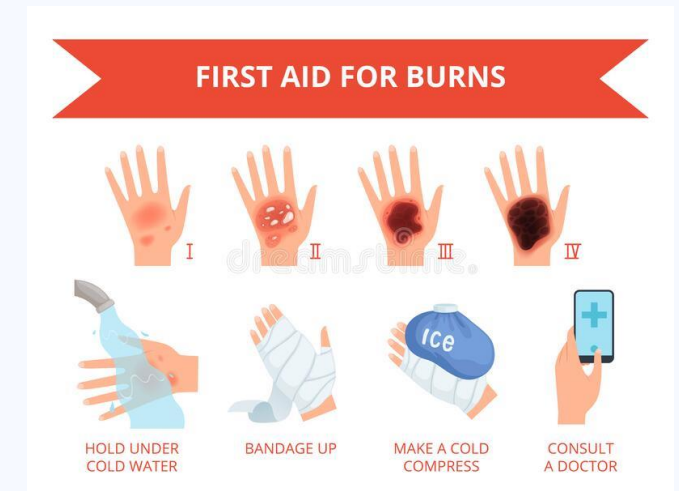
# SECOND DEGREE BURNS

- Second-degree burns are more serious because the damage extends beyond the top layer of skin.
- It involves injury to the epidermis and the superficial part of the dermis.
- This type burn causes the skin to blister and become extremely red and sore.
- Some blisters pop open, giving the burn a wet or weeping appearance.
- Over time, thick, soft, scab-like tissue called fibrinous exudate may develop over the wound.
- Due to the delicate nature of these wounds, keeping the area clean and bandaging it properly is required to prevent infection.
- This also helps the burn heal quicker.
- Some second-degree burns take longer than three weeks to heal, but most heal within two to three weeks without scarring, but often with pigment changes to the skin.
- The worse the blisters are, the longer the burn will take to heal.



# SECOND DEGREE BURNS

- In some severe cases, skin grafting is required to fix the damage.
- Skin grafting takes healthy skin from another area of the body and moves it to the site of the burned skin.
- As with first-degree burns, avoid cotton balls and questionable home remedies.
- Treatments for a mild second-degree burn generally include:
  - Running the skin under cool water for 15 minutes or longer
  - Taking over-the-counter pain medication (acetaminophen or ibuprofen)
  - Applying antibiotic cream to blisters
- Because enough epithelial cells are still present, regrowth (regeneration) of the epithelium can occur.
- Ordinarily, no permanent scars result if care is taken to prevent infection.
- However, seek emergency medical treatment if the burn affects a widespread area, such as any of the following:
  - Face, Hands, Buttocks, Groin or Feet



# THIRD DEGREE BURNS

- Third-degree burns are the most severe type.
- They cause the most damage, extending from epidermis and the dermis to extend into the subcutaneous tissue, reflecting their categorization as full thickness burns. .
- There is a misconception that third-degree burns are the most painful.
- However, with this type of burn the damage is so extensive that there may not be any pain because of nerve damage.
- Depending on the cause, the symptoms third-degree burns can exhibit include:
  - Waxy and white color.
  - Char.
  - Dark brown color.
  - Raised and leathery texture.
  - Blisters that do not develop.



# THIRD DEGREE BURNS

- Because the nerve endings in the area are destroyed, the burned area is not painful.
- In third-degree burns, regeneration is not possible, and skin grafting must be done to cover the underlying exposed tissues.
- Never attempt to self-treat a third-degree burn.
- While you're waiting for medical treatment, raise the injury above your heart. Don't get undressed, but make sure no clothing is stuck to the burn.



# FOURTH DEGREE BURNS

- Fourth-degree burns are also full-thickness burns, but they extend into deeper tissues such as bone, muscle, or tendons.
- These burns appear dry and leathery, and they require surgery and grafting to cover exposed tissue.
- In severe cases, amputation may be required to save the patient's life.



# CONCERNS

- In general, burns are considered critical if any of the following conditions exists:
  - Over 30 percent of the body has second- degree burns.
  - Over 10 percent of the body has third- or fourth-degree burns.
  - There are third- or fourth-degree burns of the face, hands, feet, or genitals.
  - Burns affect the airway.
  - Circumferential (around the body or limb) burns have occurred.
- Facial burns are particularly dangerous because of the possibility of burns in respiratory passageways, which can swell and cause suffocation.
- Joint injuries are troublesome because the scar tissue that eventually forms can severely limit joint mobility.
- Circumferential burns can restrict movement, and depending on location, can interfere with normal breathing.





# COMPLICATIONS

- Compared with first- and second-degree burns, third-degree burns carry the most risk for complications, such as infections, blood loss, and shock, which is often what could lead to death.
- At the same time, all burns carry the risk of infections because bacteria can enter broken skin.
- Tetanus is another possible complication with burns of all levels.
- Like sepsis, tetanus is a bacterial infection.
- It affects the nervous system, eventually leading to problems with muscle contractions.
- As a rule of thumb, every member of your household should receive updated tetanus shots every 10 years to prevent this type of infection.
- Severe burns also carry risk of hypothermia and hypovolemia.
- Dangerously low body temperatures characterize hypothermia.
- While this may seem like an unexpected complication of a burn, the condition is prompted by excessive loss of body heat from an injury.
- Hypovolemia, or low blood volume, occurs when your body loses too much blood from a burn.



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# PREVENTION

- The obvious best way to fight burns is to prevent them from happening.
- Certain jobs put you at a greater risk for burns, but the fact is that most burns happen at home.
- Infants and young children are the most vulnerable to burns.
- It's also important to have a fire escape plan and to practice it with your family once a month.
- In the event of a fire, make sure to crawl underneath smoke. This will minimize the risk of passing out and becoming trapped in a fire.



# PREVENTION

- Preventive measures that can be taken at home include:
  - Keep children out of the kitchen while cooking.
  - Turn pot handles toward the back of the stove.
  - Place a fire extinguisher in or near the kitchen.
  - Test smoke detectors once a month.
  - Replace smoke detectors every 10 years.
  - Keep water heater temperature under 120 degrees Fahrenheit.
  - Measure bath water temperature before use.
  - Lock up matches and lighters.
  - Install electrical outlet covers.
  - Check and discard electrical cords with exposed wires.
  - Keep chemicals out of reach, and wear gloves during chemical use.
  - Wear sunscreen every day and avoid peak sunlight.
  - Ensure all smoking products are stubbed out completely.
  - Clean out dryer lint traps regularly.



# OUTLOOK

- When properly and quickly treated, the outlook for first and second-degree burns is good.
- These burns rarely scar but can result in a change in pigment of the skin that was burned.
- The key is to minimize further damage and infection.
- Extensive damage from severe second-degree and third-degree burns can lead to problems in deep skin tissues, bones, and organs.
- Patients may require:
  - surgery
  - physical therapy
  - rehabilitation
  - lifelong assisted care
- It's important to gain adequate physical treatment for burns, but don't forget to find help for your emotional needs.
- There are support groups available for people who have experienced severe burns, as well as certified counselors.



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QUESTIONS?

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