A broken bone or bone fracture occurs when a force exerted against a bone is stronger than the bone can bear. This disturbs the structure and strength of the bone, and leads to pain, loss of function and sometimes bleeding and injury around the site.

Our skeleton is made up of bones. Bones are a type of connective tissue, reinforced with calcium and bone cells. Bones have a softer centre, called marrow, where blood cells are made. The main functions of our skeleton are supporting our body, enabling movement and protecting our internal organs.

There are different types of bone fractures. Some are more severe than others, depending on the strength and direction of the force, the particular bone involved, and the person’s age and general health. Common bone fractures include the wrist, ankle and hip. Hip fractures occur most often in older people.

Broken bones take around four to eight weeks to heal, depending on the age and health of the person and the type of break.

**Causes of bone fractures**

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 of bone fractures**

Fractures are different from other injuries to the skeleton such as dislocations, although in some cases it can be hard to tell them apart. Sometimes, a person may have more than one type of injury. If in doubt, treat the injury as if it is a fracture.

The symptoms of a fracture depend on the particular bone and the severity of the injury, but may include:

- Pain
- Swelling
- Bruising
- Deformity
- Inability to use the limb.

**Types of bone fracture**

Different types of fracture include:
• Closed (simple) fracture – the broken bone has not pierced the skin
• Open (compound) fracture – the broken bone juts out through the skin, or a wound leads to the fracture site. Infection and external bleeding are more likely
• Greenstick fracture – a small, slender crack in the bone. This can occur in children, because their bones are more flexible than an adult’s bones
• Hairline fracture – the most common form is a stress fracture, often occurring in the foot or lower leg as a result of repeated stress from activities such as jogging or running
• Complicated fracture – structures surrounding the fracture are injured. There may be damage to the veins, arteries, or nerves, and there may also be injury to the lining of the bone (the periosteum)
• Comminuted fracture – the bone is shattered into small pieces. This type of complicated fracture tends to heal more slowly
• Avulsion fracture – muscles are anchored to bone with tendons, a type of connective tissue. Powerful muscle contractions can wrench the tendon free and pull out pieces of bone. This type of fracture is more common in the knee and shoulder joints
• Compression fracture – occurs when two bones are forced against each other. The bones of the spine, called vertebrae, can have this type of fracture. Older people, particularly those with osteoporosis, are at higher risk.

Not all fractures 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. Always seek emergency assistance if you suspect this type of fracture.

**Complications of bone fractures**

Other problems caused by bone fracture can include:

- Blood loss – bones have a rich blood supply. A bad break can make you lose a large amount of blood
- Injuries to organs, tissues or surrounding structures – for example the brain can be damaged by a skull fracture. Chest organs can be injured if a rib breaks
- Stunted growth of the bone – if a child’s long bone breaks close to the joint where the growth plates are found.

**First aid for bone fractures**

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 on.

First aid for fractures is all about immobilising (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.

If you suspect a bone fracture, you should:

- Keep the person still – do not move them unless there is an immediate danger, especially if you suspect fracture of the skull, spine, ribs, pelvis or upper leg
- Attend to any bleeding wounds first. Stop the bleeding by pressing firmly on the site with a clean dressing. If a bone is protruding, apply pressure around the edges of the wound
- If bleeding is controlled, keep the wound covered with a clean dressing
- Never try to straighten broken bones
- For a limb fracture, provide support and comfort such as a pillow under the lower leg or forearm. However, do not cause further pain or unnecessary movement of the broken bone
- Apply a splint to support the limb. Splints do not have to be professionally manufactured. Items like wooden boards and folded magazines can work for some fractures. You should immobilise the limb above and below the fracture
• Use a sling to support an arm or collarbone fracture
• Raise the fractured area if possible and apply a cold pack to reduce swelling and pain
• Stop the person from eating or drinking anything until they are seen by a doctor, in case they will need surgery
• In an emergency, call triple zero (000) for an ambulance.

Diagnosis and treatment of bone fractures
Doctors can diagnose bone fractures with x-rays. They may also use CT scans (computed tomography) and MRI scans (magnetic resonance imaging).

Broken bones heal by themselves – 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 immobilise the bone
• Traction – a less common option
• Surgically inserted metal rods or plates – to hold the bone pieces together
• Pain relief.

Operation procedure for bone fractures
A cast made from plaster of Paris is one of the most common ways of immobilising a limb. This cast is made from a preparation of gypsum that sets hard when water is added. Depending on the location and severity of the fracture, the operation procedures can include:
• Closed or simple fractures – the two ends of the broken bone are lined up and held in place. The limb is thoroughly bandaged, then the wet plaster is applied. Sometimes, once the plaster is dry, the cast is split into two and the two halves are re-bandaged on the outside. This allows for any swelling that may occur
• Open or compound fractures – these are thoroughly cleaned in the operating room to remove debris before being set, because a broken bone exposed to the open air may become infected
• Long bones – long bones such as the bone of the thigh (femur) are difficult to keep aligned. In adults these are often treated by internal nailing. A child may need traction for a couple of days before setting the bone in a cast. Once the two ends of bone start to show signs of healing, the leg and hip joint are immobilised in plaster of Paris. In other cases, pins are inserted above and below the fracture and secured to an external frame or ‘fixator’. This is done under a general anaesthetic.

Immediately after an operation on a bone fracture
After surgery, your doctor will check that you have full feeling in the area. For example, if you have a broken arm in plaster, they may ask you to wiggle your fingers. They will also check your limb for tingling, pallor (pale colour) or coolness. These tests check whether the splint is affecting your limb’s nerve and blood supply. The injured part is kept as still as possible in the first few days.

Nurses will offer you pain-relieving medication. They will determine the difference between the pain of your fracture and any pain that could be caused by the splint, traction, plaster cast, poor alignment of the limb or swelling of the limb.

The healing process for bone fractures
Blood clots that form on the broken ends of bone are the start of the healing process. Over about five weeks, the body joins the two bone portions together with a combination of fibrous cells and cartilage.

This temporary bone (callus) is not as strong as real bone. It can break easily until it is slowly replaced with real bone. For this reason the doctor may remove your cast or splint after a few weeks, but you still need to treat the bone with care for at least one more month.

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Other treatments for bone fractures
Some bones, such as the collarbone or bones of the toes, are immobilised with a sling or splint (instead of plastered) and rested for about two months.

Complications of bone fractures
Possible complications of a bone fracture may include:

- Poor alignment of the limb
- Infection
- Wrongly fitted plaster cast (for example, too tight or too loose).

Self-care after a bone fracture
Follow your doctor’s advice, but general suggestions include:

- Until the cast has set properly, avoid direct heat such as hot water bottles.
- Rest the limb as much as possible.
- Use the techniques shown to you by nurses to walk or manage day-to-day activities. For example, you risk further injury if you use crutches incorrectly.
- Avoid any lifting or driving until the fracture has healed.
- If the skin under the cast is itchy, don’t poke anything between the cast and your limb (such as a coat hanger or pencil). Instead, use a hairdryer to blow cool air into the cast.
- Don’t get your cast wet, as wet plaster becomes soft and does not provide the necessary support. Wet plaster can also irritate your skin. When showering, wrap the cast in a plastic bag and tape it directly to your skin, to keep the area watertight.
- See your doctor immediately if you have swelling, blueness or loss of movement of the fingers or toes, pins and needles, numbness or increased pain.

Long-term outlook after a bone fracture
In most cases, your cast will be removed after a few weeks but you must treat the limb with care for at least the next month or so. Leg fractures will take several months to heal. The weaker, temporary bone (callus) is still being replaced by real bone and can be easily injured.

Your doctor may take more x-rays to check on the bone’s healing progress.

Unlike skin, broken bones heal without forming scar tissue. But immobilised muscles tend to weaken and wither. You may need rehabilitation, including strengthening exercises, for a short time.

Where to get help
- Your doctor
- Hospital emergency department
- In an emergency, always call triple zero (000)

Things to remember
- A fracture is a break or a crack in a bone.
- 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.
- Treatment includes immobilising the bone with a plaster cast, or surgically inserting metal rods or plates to hold the bone pieces together.
- Some complicated fractures may need surgery and surgical traction.
- In most cases, your cast will be removed after a few weeks, but you must treat your limb with care for at least the next month or so.