ACCIDENTS CAN HAPPEN even on the best regulated construction sites. If you are able to give prompt first aid treatment when an accident occurs, you can at least prevent the casualty's condition from becoming worse until medical aid arrives - and you could well save the person's life.

The Occupational Safety and Health Administration (OSHA) clearly require individuals working in the construction field to be trained according to the 29 CFR 1926 standards. Every construction site should have at least one qualified first aide person.

National occupational injury prevention goals often prioritize the reduction of serious injuries. This paper analyzes whether this prioritization is credible in respect to lost-time injuries and short and long term work absence, and the implications this has for injury severity-based versus injury absence-based prevention approaches.

Absence length was significantly dependent on the type of injury. Sprains and strains were most prevalent and accounted for approximately one third of injuries and absence. Fractures accounted for one sixth of injuries and the greatest proportion of long-term absence. The results give credibility to the need for targeting sprains and strains in injury and absence prevention initiatives.

**Electric shock**

*High voltage*--If the victim is touching or near to an overhead electric cable or other high-voltage source don't attempt rescue. Keep at least 60 feet away until you are certain the cable is permanently de-energized. Never climb an electric pylon or pole to render first aid. If a crane fouls an overhead cable, keep well back until it is confirmed as safe.

*Domestic voltage*--Break the contact – switch off the current or pull out the plug. Never try to cut the cable. If you can't break the current, stand on dry insulating material (e.g. wood, thick newspapers) and remove the victim from contact with the current by grasping his clothing if it is dry, or by pulling with a dry rope. Don't come into contact with anything damp or metallic.

**Gas or fumes**

Do not enter a gas- or fume-filled chamber unless you are equipped with a respirator and know how to use it. Wear a lifeline and have a helper at the other end.

*If no respirator is available and if the victim can be reached quickly* take a deep breath, hold it, enter chamber and drag the victim free. If possible, turn off gas or fumes at source and open doors and windows.

**Lifting**

If a victim is pinned beneath heavy machinery, vehicle, boulder, etc. don't try to lift it without help. Make sure it won't fall back on the person.
Machinery

Stop the machine trapping the victim. Avoid getting caught in it yourself while rescuing the victim.

Smoke suffocation

Follow the same rules as for gas or fumes. If you must enter a smoke filled room or building to remove a victim, keep yourself and the victim as low as possible.

Excavation

If a victim is buried in a trench cave-in, beware of further falls of material. Immediately remove earth or sand from the victim's face and chest.

Structural collapse

Beware of any obvious cause of further collapse, and gas or electricity hazards. Wear a hard hat. Remove debris likely to suffocate the victim first.

High places

Scaffolds, buildings, cranes, etc. Wear a safety belt and line before attempting rescue - if necessary, a safety line can be improvised. Warn people below of possible danger.

Attract help

Do all you can to attract help. Give clear instructions on what to do, e.g. call ambulance. Warn bystanders of any possible hazards. *Never move an accident victim unless there is immediate danger to life from the surroundings* - you could make the injuries worse.

Reassure the Victim

Do all you can to reassure the victim. This will help to lessen shock - which can have serious effects - and will make your job of treating the injuries much easier.

Airway - Breathing - Circulation

IF THE VICTIM stops breathing, his brain will not receive oxygen through the blood. He will die in 4 minutes - unless you act quickly. You must get air into the victim's lungs at once - seconds count. You do this by *mouth to mouth resuscitation* - that is by blowing air from your own lungs into the victim's lungs.

The need for oxygen is so vital that you should start mouth to mouth resuscitation even before you check for a heart beat. Once the victim's lungs are inflated there is a chance the heart will start itself. If not, you must apply external heart compression - See Red Cross or American Heart Association.

Remember, start mouth to mouth resuscitation immediately - don't try to move the victim first, e.g. if he is trapped by a fall of earth. If the victim has injuries to the mouth or face, you may have to use an alternative method of Resuscitation. See Red Cross or American Heart Association.
Mouth to mouth resuscitation

The A, B, C's are:

- **Airway** - you make sure air can get into the victim's lungs by removing any obstructions.
- **Breathing** - you breathe for the victim until his own breathing starts.
- **Circulation** - if the heart doesn't start, you stimulate it to help it get going.

**Airway**

Lay the victim on his back, on a firm surface. Ensure a clear airway by pressing the top of the victim's head backwards while supporting the nape of the neck to extend the head. Improve his airway by pressing forward the angles of the jaw from behind, or by pressing the chin forward. These maneuvers extend the head on the neck and lift the tongue clear of the airway. This is particularly necessary when the unconscious casualty is on his back because the tongue falls back and blocks the airway. If the victim is capable of breathing, he will gasp and start breathing on his/her own. If he/she doesn't, his/her condition is serious. Start mouth to mouth resuscitation at once.

**Breathing**

Open your mouth wide and take a deep breath. Pinch the victim's nostrils with your fingers, and then seal your lips around his mouth. Blow into his lungs until the chest rises, then remove your mouth and watch his chest deflate. You should hear the air escaping from his lungs. If the chest doesn't rise, remove any foreign body in the mouth or back of the throat by sweeping the area with your finger, then repeat, giving the first four inhalations as rapidly as possible to saturate the blood with oxygen. You can also carry out lung inflation through the victim's nose. Seal the victim's mouth with the thumb of your hand holding the lower jaw. Do this if you cannot seal the victims' mouth with your own. If you have one always use a plastic airway with a one way valve for protection.

Continue to ventilate the lungs until the victim starts breathing for himself. Try to inflate his lungs every 4 seconds (15 breaths per minute). Check the victim's pulse or get a helper to do it. The easiest way to do this is to feel for a pulse in the neck. This can be felt on either side, in the hollow between the windpipe and the column of neck muscles. Or, you can listen for the heart by pressing your ear against the victim's breastbone.

While the victim is recovering, saliva and gastric secretions often flow from his mouth, and he may retch and vomit. When this happens, place him in the coma or recovery position until he is fully conscious to prevent him swallowing the secretions.

**Circulation**

If the heart has not started, you will not be able to feel a pulse in the neck or hear it in the chest. The victim's pupils will be wide open and his color will be blue-grey. You must now try to restart the heart.

Give the victim a smart thump on the breastbone with your fist – this may be enough to restart the heart.
Get a helper, if you have one, to raise the victim's legs and keep them raised – this lets the blood in the victim's legs flow to his brain and also stimulates the heart. If this doesn't work, start external compression of the heart while continuing to ventilate the lungs.

**External compression of the heart**

Kneel alongside the victim. Find the lower half of the breastbone. Place the heel of your hand on it, with your palm and fingers raised from the chest, and put the heel of your other hand over the first, keeping your arms straight, rock forwards and press down on the lower part of the breastbone. Your fingers should not be in contact with the victim's chest. The forward rocking movement should be quicker and snappier than the recovery movement. Keep the pressure firm and controlled—too rough a movement could break the victim's ribs. The breastbone can be pressed downwards from 25 mm to 40 mm (2 inches). Repeat this pressure once per second. The revised guidelines issued by the [American Heart Association](https://www.americanheart.org) on cardiopulmonary resuscitation advise giving 30 chest compressions — instead of 15 — for every two rescue breaths. Continue this cycle. If you have a helper, one person can continue the external heart compression and the other can do the mouth to mouth resuscitation. This combined heart-lung resuscitation may have to be repeated until the victim reaches the hospital.

**Alternative method of resuscitation**

Use this method when the victim has injuries to the face or mouth, or in any other case where mouth to mouth resuscitation is not possible. Lay the victim on his back on a firm surface. Raise his shoulders by putting something under them, e.g. a pair of overalls. Kneel astride his head. If necessary, turn his head to one side to clear out the mouth. Next, grasp his wrists and cross them over the lower part of his chest. Now, rock your body forward and press down on the victim's chest. Release the pressure, and with a sweeping movement draw the victim's arms backwards and outwards as far as possible. Repeat this rhythmically, 12 times per minute. Keep the victim's mouth clear.

**Control bleeding**

**Minor bleeding** is not serious and can be easily stopped. Severe bleeding is dangerous — if the victim loses a lot of blood, his brain and other vital organs are deprived of oxygen and shock develops. Unless the bleeding is quickly stopped, the victim will die.

Deal with severe bleeding first, especially if the blood is bright red and spurting. The aim is to plug the wound with whatever material is handy—clothing (e.g., a shirt), towels, tissues, etc. Never try to apply a tourniquet – this can cause other medical problems. You can treat less severe bleeding in the same way, or by using items from the first aid kit – which must be kept on the construction site.

**Severe bleeding**

Press your fingers or hand firmly over the wound. If the wound is large and open, press the sides firmly but gently together. This constricts blood vessels in the wound area and will usually control even serious bleeding. Avoid disturbing any clots of blood. Get the victim to lie down and raise his legs if possible. Raise the injured part and support it, suspect there is a fracture.

Remove loose dirt from the wound only if it can be brushed off. Apply a sterile dressing, press it firmly down, cover with a pad of soft material then apply a bandage to hold the dressing and pad firmly in place. If blood keeps seeping through the pad, apply a second larger pad over the top
and bandage more firmly. Don’t take the first pad off. If possible, immobilize an injured leg by tying it to the uninjured one. Support a broken arm with a sling.

If there are objects embedded in the wound (e.g., stones, a rivet, pieces of wood or steel) leave them where they are. Cover the wound with a sterile dressing and mould a pad to fit around it so that the bandage doesn’t press the object further in.
Use this method also if there is a bone protruding from the wound.

**Slight bleeding**

Blood usually oozes from all parts of the wound. It is easily controlled and usually stops of its own accord.
If possible, first wash your hands thoroughly. If the wound is dirty, wash it with running water and dry the skin around it with cotton wool. Cover the wound with a sterile dressing, and press it firmly on the bleeding part. Apply a pad if necessary, then bandage.

**Sucking wound in chest**

The victim could have been impaled as he fell, crushed, or hit in the chest by a bolt from a powder-powered tool. The wound may not bleed much but you will hear the air blowing in and out as the victim’s chest moves. This means the lungs are not working and the victim will suffocate unless you seal the hole. Plug the wound with a pad of cloth and strap or tie it firmly in place. You can even use a plastic bag and sticky tape. Make sure the wound is airtight then arrange to get the victim to the hospital urgently.

**Internal bleeding**

Internal bleeding may result if the victim is struck a heavy blow, crushed, or stabbed. It may or may not be visible. Internal bleeding is very dangerous and you must call an ambulance immediately. Lay the victim down and tell him not to move. Raise his legs. If he is vomiting blood, place him in the coma position. Loosen all tight clothing about his neck, chest and waist.

Don’t give the victim anything to drink. Watch his breathing and take his pulse rate every 10-15 minutes - write it down and note the time when you do so. Avoid any unnecessary movement as the patient is being moved to hospital.

**Bleeding from special areas**

**Bleeding from ear** - This may mean the victim's skull is fractured. Place a dressing or pad over the ear and bandage lightly. Raise the victim’s head and turn it to the side of the injury. If unconscious, place him in the recovery position with the injured ear downwards. Watch his breathing and pulse rate.

**Bleeding from scalp** - Scalp wounds may bleed severely. Don’t press into the wound or probe it – the victim’s skull may be fractured. Apply a dressing larger than the wound and bandage firmly. Use a ring pad if there is any object embedded in the wound.

**Bleeding from nose** - This may not be serious but could be caused by a fractured skull. Get the victim to sit with his head tilted forward and pinch the soft part of his nose for 10 minutes or so, while breathing through his mouth. If the bleeding doesn’t stop, get medical attention.
**Blast injuries**—(Caused by an explosion.) The victim may be dazed, cough blood and breathe with difficulty. Loosen tight clothing. Lay him down with his head and shoulders raised and supported. He should be removed to the hospital urgently.

**Abdominal wounds**—Abdominal wounds usually show little sign of bleeding but there could be worse injury than you can see. If any internal organs protrude from the wound, don’t try to put them back. Cover the wound lightly with a soft clean towel or large gauze dressing. Don’t give the victim anything to drink.

**Unconsciousness**

UNCONSCIOUSNESS CAN RESULT from injury to the brain (e.g. a blow to the head) or from some condition that interferes with the brain functions (e.g. asphyxia, shock, or heart attack).

The unconscious victim is in danger of suffocation by inhaling his own blood or vomit. He must be placed in the coma position to allow the blood, vomit or mucus to drain away.

**What to do**—Remove false teeth, if any, and clean out mucus, etc. from the victim’s mouth. Loosen any tight clothing. Gently place him in the coma position—lying on his front, head tilted to one side, and with his leg drawn up on that side. If the victim is on a sloping surface, position him so his head is downhill—as explained before, this improves the supply of blood to the brain.

<table>
<thead>
<tr>
<th>Sequence of actions</th>
<th>Comments</th>
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<tbody>
<tr>
<td><strong>Coma position, right side</strong></td>
<td>If there are injuries on the right side of the body, the injured person has to be put in coma position on the left side!</td>
</tr>
<tr>
<td>1. The injured person is in dorsal position.</td>
<td></td>
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<tr>
<td>2. Kneel down by the right side of the injured person.</td>
<td>Kneel down on the left side!</td>
</tr>
<tr>
<td>3. Carefully pull the injured person by his left arm and leg on his right side.</td>
<td>Use the right arm and right leg!</td>
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<tr>
<td>4. Pull the right arm of the injured person backwards underneath his body.</td>
<td>Left arm!</td>
</tr>
<tr>
<td>5. Bend his left arm and put his left hand under his head the back of the hand being placed under the face.</td>
<td>Right arm and right hand!</td>
</tr>
<tr>
<td>6. Bend his left leg by the knee and put the foot on the calf of the right leg which remains elongated.</td>
<td>Put the right leg on the calf of</td>
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If possible, wrap the casualty in a blanket but do not apply heat. Keep a watch on his breathing. Check for a “Medic-Alert” bracelet. The victim may be wearing one if he has a medical condition. If so, tell the Paramedic authorities—they may be able to advise you of any special treatment you should give before they arrive.

**Broken bones**

IF A BONE IS BROKEN, the casualty will usually not be able to move the affected part. There may be pain, swelling, bruising, and some distortion in its shape. In an “compound” fracture there is a
wound leading down to the broken bone or the ends of the bone protrude through the skin. If the skin is unbroken, the fracture is said to be “closed”.

Broken bones are not usually an immediate threat to life. In treating them your task is to reduce pain and bleeding and to prevent further damage. Always handle the victim gently - rough handling could be fatal.

**What to do**- Secure the injured part before moving the casualty. Hold it steady and avoid grating the broken ends of the bone together until it is firmly secured. Do not force any joint that resists being flexed. Immobilize the fracture by strapping - or tying the affected part to a sound part of the body, e.g. an arm against the side, or a leg to a leg. If you have no bandages, use strips of cloth, a belt, etc. They must be applied tightly enough to prevent movement but not so tight as to restrict circulation.

**Using splints**- Pieces of wood (available on all construction sites) can be used to make an effective splint. Choose a rigid piece that is wide and long enough to support the joint above and below the fracture. Pad it well and strap the limb to it.

**Special fractures**

*The skull*- If the victim's ear or nose is bleeding or oozing a yellowish liquid and the eyes look bloodshot, suspect a fractured skull. Place him in the recovery position and avoid all further movement. Keep a check on his breathing.

*The spine*- This is a very serious injury. Suspect a broken neck or back if the victim has a pain in his back, no feeling or tingling sensations in the lower parts of his body, and if he is unable to move his limbs. He may feel as if he is cut in half. *Never move such a person, except in a very extreme emergency.* This could damage the spinal cord and leave the victim permanently paralyzed. Cover him with a blanket and try to keep him calm. Remember - do not place him in the recovery position; do not move the casualty at all.

*Ribs*- The casualty has a sharp pain in the area, which is worse when he breathes or coughs. Take the weight of the arm and shoulder off the injured ribs with an elbow sling from the opposite shoulder.

*Collar bone*- The victim feels pain at the injury site. The arm on that side is partly helpless and the victim supports it at the elbow. Brace the victim's shoulders back by means of bandages under each armpit encircling the shoulder, and pulled together by a third bandage across the shoulder blades. Support the limb on the injured side in an elbow sling to the good shoulder.

*Pelvis*- The victim has pain in the hips or loins. This fracture could be caused by a heavy fall of debris or the victim falling from a height and landing on his feet. There are often internal injuries as well.

Help the victim into the position he feels most comfortable - usually flat on his back with his knees raised. Tell him he should not pass urine. Supportive bandages are not necessary unless he has to be moved some distance.

**Crush injuries**

The victim may have had an arm or leg crushed by falling masonry or under a machine. Outwardly there may be little sign of injury, apart from redness, swelling, bruising or blistering.
But complications can develop a few hours later and these can be fatal. Poisons produced by the injured muscles are absorbed into the bloodstream and can cause kidney failure and death.

On release, keep the victim on his back, with his head low and lower limbs raised if possible. If he is conscious, give him sips of water to wash out his mouth. Inform the paramedics and pin a note on the victim explaining that he has been crushed.

**Minor sprains and bruises**

The best way to ease pain and control swelling is to apply an icepack. If possible, fill a plastic bag with ice cubes and pack it round the affected area. This can also be used as an additional treatment for broken ankles or wrists.

**Shock**

SHOCK IS A CONDITION that results from an insufficient flow of blood to the brain. If the victim has suffered injury, pain, or sudden illness – or even a bad emotional upset – shock is likely to be present. The victim is pale and sweats profusely, he/she feels faint and sick, his/her skin is cold and clammy, and the pulse becomes weak.

**What to do**-Loosen any tight clothing and lay the victim on his/her back, with his head low and turned to one side. Wrap him/her in a blanket for warmth but don’t overheat him. Provided it will not interfere with any injuries, raise his legs –this increases the supply of blood to the brain. If there are no obvious internal injuries, he may be given sips of water, tea, or coffee (never alcohol). To relieve fainting it may be easier to place the casualty in the sitting position with his head between his/her knees. This is usually all you need to do as the victim should quickly recover.

**Serious shock**-If the victim loses consciousness and cannot be revived, his condition is serious and needs urgent hospital treatment. Take action to maintain respiration and control bleeding if necessary.

**Burns and scalds**

BURNS MAY BE CAUSED by fire or hot objects, contact with an electric current, friction from a revolving wheel or fast-moving rope, or from strong acids and alkalis. Scalding is caused by moist heat such as boiling water, steam, hot oil, or tar.

**What to do**-The immediate treatment is cold water. Place the affected part in cool water or gently run water onto it from a hose or tap for at least 10 minutes. Then cover the burn area with a dressing or light clean material. Severe burns can result in fluid loss so give the victim cold drinks at frequent intervals - this will replace the fluids and help lessen shock.

- **Do not** try to remove clothing to expose the injured area as this could rip off damaged skin.
- **Do not** apply lotions or ointments.
- **Do not** prick blisters, breathe or cough over or touch the burned area as this increases the risk of infection.

**Clothing on fire**
If a person’s clothing catches fire, quench the flames with water or any non-flammable liquid at hand. If no such fluid is available, throw a rug around the victim, lay him/her flat and smother the flames.

**Splashes from corrosive chemicals**

If any part of the body is splashed with corrosive chemicals, flood it with running water as described above to dilute and wash the chemical off.

**Chemical in eye**

Hold the victim’s head under a gently running tap, eye wash or hose, gently opening the eyelid with your fingers, or plunge it into a bucket of water and get the victim to blink his eye. If a solid corrosive chemical (e.g. lime) has entered the eye, rinse the upper lid and make sure it is all rinsed out. Apply a light dressing to the eye. In all cases of severe burns, and in any case where chemicals are splashed in the eye, get the victim to the hospital immediately.

**Special treatments —**

**Gases, fumes and poisons**—Gas poisoning on construction sites may occur from manufactured gas (but not natural gas), e.g. through a ruptured main; fumes from fires, stoves, or vehicle exhausts; from carbon tetrachloride (in fire extinguishers); or from certain industrial gases (trichloroethylene, hydrogen sulphide, cyanogen gas, or cyanide fumes). The last three are rapidly fatal.

If the victim is still breathing, place him/her in the recovery position. (The recovery position or semi-prone position is a first aid technique recommended for assisting people who are unconscious, or nearly so, but are still breathing. This position helps a semiconscious or unconscious person breathe and permits fluids to drain from the nose and throat so they are not breathed in. If the person is unconscious or semiconscious after you have done everything, move the person into the recovery position while waiting for help to arrive. **Do not use the recovery position if the person has a major injury, such as a back or neck injury.** If breathing is irregular or has stopped, start artificial resuscitation immediately. If corrosive gases or fumes are involved, sponge the exposed skin with cool water and take off contaminated outer clothing.

**Swallowed poisons**

If the victim is unconscious, start artificial respiration. Do not make him vomit or give fluids.

**Corrosive poisons** (e.g. strong acids, alkalis)—Burns around the victim’s mouth indicate the poison swallowed is corrosive. Give the victim water or milk to dilute the poison. Do not induce vomiting.

**Non-corrosive poisons** (e.g. insecticides, drugs)—Make the victim vomit by putting your fingers down his throat. Do not try to induce vomiting by giving strong salt water. Give the victim water or a sweetened drink. If the victim has swallowed petroleum products (e.g. petrol, oil), do not induce vomiting as these can cause serious damage if they get into the lungs. In all cases of poisoning, get the victim to hospital as quickly as possible. If possible, send with the victim any remaining poison, any box or container that could help to identify it, and any vomited material.
Kinds of first aid kits

Three kinds of first aid kits are recognized, each containing a minimum number and quantity of items for use in first aid.

- **Basic kit** - containing a sufficient quantity of cotton wool, bandages, sterile dressings, adhesive wound dressings, antiseptic, scissors, safety pins, forceps or tweezers, together with such additional items as may be appropriate for the type and conditions of work.

- **Portable kit** - containing a sufficient quantity of bandages, sterile dressings, adhesive wound dressings, and antiseptic detergent.

- **Full kit** - containing the basic kit, together with eyewash, splints, and such additional items as may be appropriate for the type and conditions of work.

Proximity to medical assistance

The proximity to or remoteness from medical assistance or paramedic services is reckoned on the anticipated time between the occurrence of an accident and the receiving of medical assistance.

- “In close proximity” means less than 30 minutes.

- “Some distance removed” means exceeding 30 minutes but less than 2 hours.

- “Remote” means more than 2 hours.