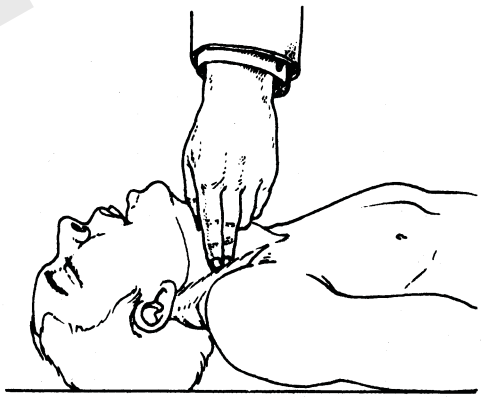
Appendix 2
CPR (CARDIO-PULMONARY RESUSCITATION)

Assessment of breathing

- Tilt the head firmly backwards with one hand while lifting the neck with the other hand to relieve obstructed breathing.
- Pull the tongue forward.
- Suck or swab out excess secretions.
- Clean any vomit from the mouth and back of the throat.
- Remove any loose dentures.
- Listen and feel for any movement of air, because the chest and abdomen may move in the presence of an obstructed airway, without moving air. The rescuer's face should be placed close to the casualty's nose and mouth so that any exhaled air may be felt against the cheek. Also the rise and fall of the chest can be observed and the exhaled breath heard.
- Look, listen and feel for five seconds before deciding that breathing is absent.

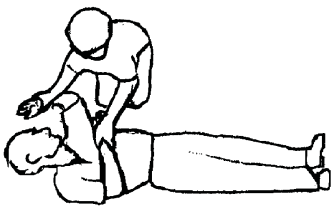
Assessment of heart function

- Check for a pulse. The best pulse to feel in an emergency is the carotid. Feel for five seconds before deciding it is absent. If it cannot be felt or is feeble, there is insufficient circulation.

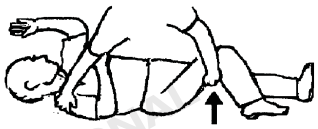


Breathing, heart is beating, unconscious

- Insert a Guedel airway (see **appendix 3**) to prevent the tongue slipping back and obstructing the upper air passage; it should be left in place until the casualty becomes conscious again.
- Place casualty in the recovery position; no pillows should be used under the head:
  - Place the arm nearest to you out at right angles to his body, elbow bent with the hand palm uppermost.
  - Bring the far arm across the chest and place the hand, palm down, on the shoulder nearest to you.

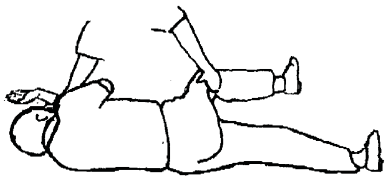


  - Grasp the far leg just above the knee and pull it up, keeping the foot on the ground.

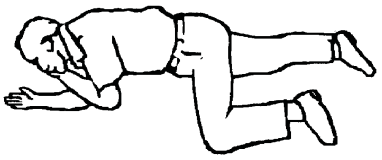


  - With your other hand on the far shoulder, pull on the leg to roll the casualty towards you onto his side.

  - Adjust the upper leg so that both the hip and knee are bent at right angles.



  - Tilt the head back to make sure the airway remains open.



Guidelines for resuscitation,
European Resuscitation Council, 1996

- If the casualty has breathing difficulties and his lips turn blue, give oxygen at a flow rate of 6 to 8 L per minute until symptoms resolve (see **appendix 3**).
- Keep the casualty warm.
- **RADIO FOR MEDICAL ADVICE.**

Further advice on **subsequent treatment for an unconscious person: see appendix 4.**

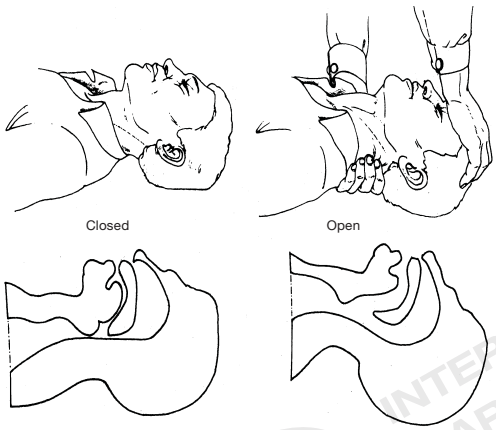
Not breathing but heart is beating

Airway

Establishing an OPEN AIRWAY IS THE MOST IMPORTANT STEP IN ARTIFICIAL RESPIRATION. Spontaneous breathing may occur as a result of this simple measure.

- Place the casualty in a face-up position on a hard surface.
- Put one hand beneath the casualty's neck and the other hand on the forehead. Lift the neck with the one hand, and apply pressure to the forehead with the other to tilt the head backward.

  This extends the neck and moves the base of the tongue away from the back of the throat. The head should be maintained in this position during the entire artificial respiration and heart compression procedure.



- If only one rescuer is available, the head should be fixed in the shown position by means of a rolled blanket or similar object pushed under the casualty's shoulders.
- If the airway is still obstructed, any foreign material in the mouth or throat should be removed immediately with the fingers.

Artificial respiration

If the casualty does not resume adequate, spontaneous breathing promptly after his head has been tilted backward, artificial respiration should be given by the mouth-to-mouth or mouth-to-nose method or other techniques. Regardless of the method used, preservation of an open airway is essential.

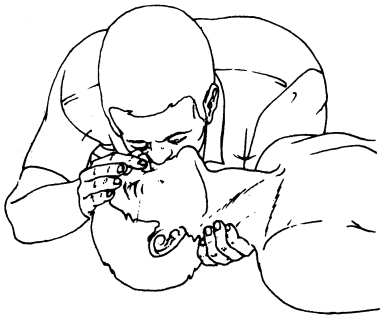
Before starting artificial respiration, the casualty's clothes should be removed as far as feasible. Otherwise, the rescuer might become poisoned by inhaling vapour or gases emanating from contaminated clothes.

In some circumstances, mouth-to-mouth respiration should be used cautiously. The rescuer should be aware of getting in touch with toxic and caustic materials around the casualty's mouth.

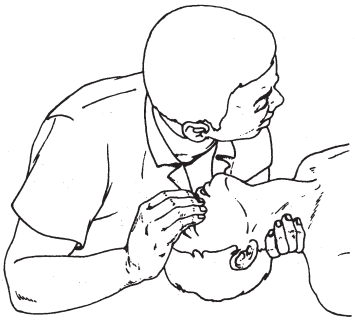
As the artificial respiration must be continued as long as there are signs of life, a resuscitator should be made available as soon as possible.

Mouth-to-mouth respiration

- Keep the casualty's head at a maximum backward tilt **with one hand** under the neck.
- Place the heel **of the other hand** on the forehead, with the thumb and index finger towards the nose. Pinch together the casualty's nostrils with the thumb and index finger to prevent air from escaping. Continue to exert pressure on the forehead with the palm of the hand to maintain the backward tilt of the head.



- Take a deep breath, then form a tight seal with your mouth over and around the casualty's mouth.
- Blow in until the casualty's chest rises.
- Watch the casualty's chest while inflating the lungs. If adequate respiration is taking place, the chest should rise and fall.
- Remove your mouth and allow the casualty to exhale passively. If in the right position, the casualty's exhalation will be felt on your cheek.



- Take another deep breath, form a tight seal around the casualty's mouth and blow into the mouth again. Repeat this procedure 10 to 12 times a minute, once every 5 seconds.
- If there is no air exchange, and an airway obstruction exists, reach into the casualty's mouth and throat to remove any foreign matter with your fingers; and resume artificial respiration. A foreign body should be suspected if you are unable to inflate the lungs, despite proper positioning and a tight air-seal around the mouth or nose.

Mouth-to-nose respiration

The mouth-to-nose technique should be used when it is impossible to open the casualty's mouth, when the mouth is severely injured, or a tight seal around the lips cannot be obtained.

- Keep the casualty's head tilted back with one hand. Use the other hand to lift up the casualty's lower jaw to seal the lips.
- Take a deep breath, seal your lips around the casualty's nose, and blow in until the casualty's chest rises.

- Remove your mouth and allow the casualty to exhale passively.
- Repeat the cycle 10 to 12 times per minute.

Artificial respiration should be continued for 2 hours if necessary; longer if there are signs of life.

Breathing and heart have stopped

Heart compression (external cardiac compression) should be applied together with artificial respiration throughout any attempt to resuscitate a casualty whose breathing and heart have stopped. Unless circulation is restored, the brain will be without oxygen and the person will suffer cerebral damage within 4 to 6 minutes, and may die.

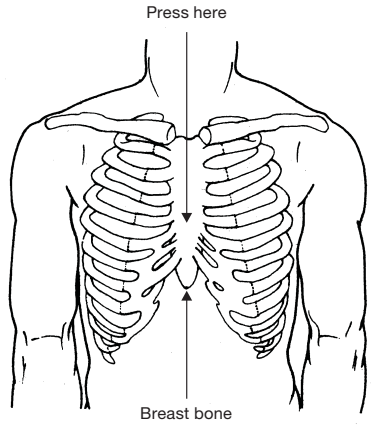
Artificial respiration will bring oxygen-containing air to the lungs of the casualty. From there, oxygen is transported with circulating blood to the brain and to other organs, and the effective heart compression will – for some time – artificially restore the blood circulation, until the heart starts beating.

Technique for heart compression

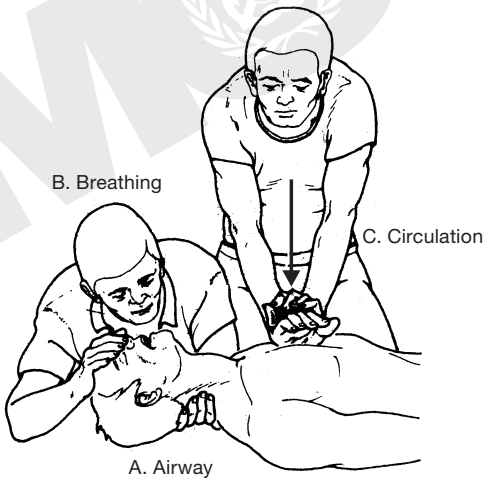
Compression of the breast bone produces some artificial ventilation, but not enough for adequate oxygenation of the blood. For this reason, artificial respiration is always required whenever heart compression is used.

Effective heart compression requires sufficient pressure to depress the casualty's lower breast bone about 4 to 5 cm (in an adult). **For heart compression to be effective, the casualty must be on a firm surface. If he is in bed, a board or improvised support should be placed under his back. However, chest compression must not be delayed to look for a firmer support.**

- Kneel close to the side of the casualty and place only the heel of one hand over the lower half of the breast bone. Avoid placing the hand over the tip of the breast bone which extends down over the upper abdomen. Pressure on the tip may tear the liver and lead to severe internal bleeding.



- Feel the tip of the breast bone and place the heel of the hand about 4 cm towards the head of the casualty. Your fingers must never rest on the casualty's ribs during compression. This increases the possibility of rib fractures.
- Place the heel of the other hand on top of the first one.
- Rock forward so that your shoulders are almost directly above the casualty's chest.
- Keep your arms straight and exert adequate pressure almost directly downward to depress an adult's lower sternum 4 to 5 cm.



- Depress the sternum 80 to 100 times per minute for an adult (when two rescuers are used). This is usually rapid enough to maintain blood flow, and slow enough to allow the heart to fill with blood. The compression should be regular, smooth, and uninterrupted, with compression and relaxion being of equal duration. **Under no circumstances should compression be interrupted for more than 5 seconds.**

Two-rescuer heart compressions and artificial respiration:

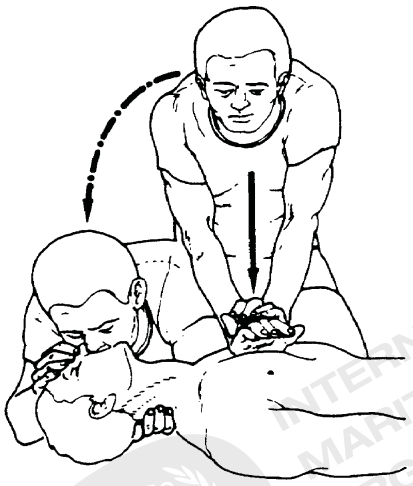
- Five heart compressions:
  - at a rate of 80 to 100 per minute
  - no pause for ventilation.
- One respiration:
  - after each 5 compressions
  - interposed between compressions.

It is preferable to have two rescuers because artificial circulation must be combined with artificial respiration. The most effective artificial respiration and heart compression are achieved by giving one lung inflation quickly after each five heart compressions (5:1 ratio). **The compression rate should be 80 to 100 per minute for two rescuers**.

One rescuer performs heart compression while the other remains at the casualty's head, keeps it tilted back, and continues rescue breathing (artificial respiration). **Supplying the breaths without any pauses in heart compression is important, because every interruption in this compression results in a drop of blood flow and blood pressure to zero.**

Single-rescuer heart compressions and artificial respiration:

A single rescuer must perform both artificial respiration and artificial circulation using a 15:2 ratio. The head should be kept in the shown position by means of a rolled blanket or similar object pushed under the casualty's shoulders. **Two very quick lung inflations should be delivered after each 15 chest compressions, without waiting for full exhalation of the casualty's breath**.



- Fifteen heart compressions at a rate of 80 to 100 per minute.
- Two very quick lung inflations.

Checking effectiveness of heart compression: pupils and pulse

Check the reaction of the pupils: a pupil that narrows when exposed to light indicates that the brain is receiving adequate oxygen and blood. If the pupils remain widely dilated and do not react to light, serious brain damage is likely to occur soon or has occurred already. Dilated but reactive pupils are a less serious sign.

The carotid (neck) pulse should be felt after the first minute of the heart compression and artificial respiration, and every 2 minutes thereafter. The pulse will indicate the effectiveness of the heart compression or the return of a spontaneous effective heartbeat.

Other indicators of this effectiveness are the following:

- Expansion of the chest each time the operator blows air into the lung.
- A pulse which can be felt each time the chest is compressed.
- Return of colour to the skin.
- A spontaneous gasp for breath.
- Return of a spontaneous heartbeat.

Terminating heart compression

Deep unconsciousness, the absence of spontaneous respiration, and fixed, dilated pupils for 15 to 30 minutes indicate cerebral death of the casualty, and further efforts to restore circulation and breathing are usually futile, unless it is a case of hypothermia in which cerebral death can be delayed.

In the absence of a physician, artificial respiration and heart compression should be continued until:

- The heart of the casualty starts beating again and breathing is restored.
- The casualty is transferred to the care of the doctor, or other health personnel responsible for emergency care.
- The rescuer is unable to continue because of fatigue.