BASIC CARDIAC LIFE SUPPORT (BCLS) PROGRAMME

Institute for Medical Simulation & Education

IMSE

SGH General Hospital
SingHealth
SAFETY IN CPR TRAINING

**DO's**

- Wash your hands or use handrub before and after manikin contact.
- Disinfect manikin’s mouth and nose with 70% methylated spirit after each participant’s contact.
- Use a disposable face shield when performing mouth-to-mouth ventilation.
- Inform the staff of the training centre if you have:
  - Wet skin rashes on your hands, in your mouth or around your lips.
  - Hepatitis B.
  - An upper respiratory infection.
  - Medical problems e.g. heart, asthma or orthopaedic problems.
- Disinfect manikins after each practical session following guidelines provided by the training centre.

**DONT’s**

- Do not eat or drink during practical training to avoid contamination of manikins with food particles.
- Do not use pen to mark any area of the manikin.
- Do not attempt to force the manikin’s mouth open beyond 2.5cm.
- Do not use lipstick if practising on the manikin.
- Do not perform or practise chest compression on a victim with a pulse, practise only on a manikin.
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In Singapore, heart disease is the second commonest cause of death, being responsible for about 24% of total mortality. About 2,400 persons develop an acute heart attack in Singapore. In addition, nearly 1000 people suffer from sudden cardiac arrest in the out-of-hospital environment and another few hundred sustain sudden cardiac arrest after reaching hospital. The total survival rate for the group of pre-hospital collapses is about 2.6%.

Public education and training in Cardio-Pulmonary Resuscitation (CPR) are crucial in reducing “sudden death” because the majority of these deaths occur out of hospital. One of the most startling ideas of modern medicine is that “sudden death” can be reversed. The actions taken during the first few minutes of an “Emergency” are critical to victim survival. It can be performed by any of us, anywhere. All that is needed is our two hands.

REMEMBER:
CPR can save lives.
Do it well. Do it right.
And the victim gets a chance at life.
The concept of “Chain of Survival” is the best approach to the treatment of victims in cardiac arrest. The four links in this chain are: Early Recognition and Access to Emergency Care, Early CPR, Early Defibrillation and Early Advanced Cardiac Care.

**First Link: Early Recognition and Access**

Early recognition and access refers to shortening the time interval from onset of heart attack or cardiac arrest to arrival of a trained emergency care team. It includes:

- recognition of early warning signs of heart attack e.g. chest pain, sweatiness, shortness of breath, nausea or vomiting
- recognition of cardiac arrest e.g. unconscious, no breathing and no pulse or ‘signs of circulation’
- rapid call for the first response team
- allowing ambulances priority on the roads so that they can reach the patient quickly
- allowing paramedics rapid access and priority in use of elevators in high-rise buildings.

**Second Link: Early CPR**

The brain starts dying within minutes when the heart stops pumping. CPR needs to be initiated as soon as possible to provide oxygen and blood flow to the brain and heart and remove excess carbon dioxide from the lungs. CPR cannot always re-start the heart. It can however buy the valuable time needed to keep the vital organs alive until definitive help arrives.
**Third Link: Early Defibrillation**

This procedure can frequently re-start the heart if carried out early. Studies have shown that early defibrillation is most likely to improve survival rates for out-of-hospital cardiac arrest patients. Every emergency vehicle transporting cardiac arrest patients should be equipped with a defibrillator. Defibrillation works best in the first few minutes after onset of cardiac arrest. If initiated too late, the heart will not respond to electrical therapy. For every minute of delay in delivering defibrillation following collapse, the survival rate decreases by 7–10%.

**Fourth Link: Early Advanced Care**

Advanced Cardiac Life Support stabilises the resuscitated victim’s condition in the most critical phase. It consists of advanced airway management and administration of medication and is frequently carried out in the in-hospital environment.

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**Module 3  THE HEART**

### 3.1 ANATOMY & FUNCTION

The heart is a hollow, conical, muscular organ situated in the centre of the chest between the lungs and behind the sternum (breastbone). It is about the size of a clenched fist.

It receives blood depleted of oxygen from all parts of the body and pumps it to the lungs. There oxygen is taken up and the oxygen-enriched blood returns to the heart to be distributed to all parts of the body. The coronary arteries are blood vessels that send oxygen-rich blood to the muscles of the heart.
3.2 HEART ATTACK
Heart attack usually occurs when a blood clot suddenly and completely blocks an already diseased coronary artery. Coronary artery disease is the end-result of a gradual build-up of fatty deposits (cholesterol plaques) and blood cells in the inner lining of the coronary arterial wall, a process also known as “atherosclerosis”. Over a period of years, this leads to gradual narrowing of the lumen of the vessel, thereby reducing blood flow to heart muscle. Occasionally, the surface of a plaque may split or crack, and attract blood clots, which then cause complete obstruction of the lumen, resulting in “heart attacks”.

Symptoms of Heart Attack
How to recognize a Heart Attack
• Chest discomfort or pain is the most common symptom. It usually has the following characteristics:
  – uncomfortable pressure, squeezing, fullness, tightness, or pain.
  – usually located at the centre of the chest behind the breastbone.
  – may spread to either the shoulder, neck, lower jaw, or either arm and occasionally to the upper abdomen.
  – usually lasts longer than 20 minutes.
• Other symptoms may include any or all of the following:
  – sweating
  – nausea (a feeling of wanting to vomit)
  – shortness of breath
  – weakness
• Symptoms may occur suddenly and not be typical, so that some victims may not realise that they are having a heart attack. They may also think that the problem is due to indigestion.

If you meet anyone with these symptoms, arrange for immediate transportation to the nearest emergency medical facility by dialling 995 for an emergency ambulance.

Common Causes Of Sudden Death
• Heart Attack
• Foreign Body Airway Obstruction
• Drowning
• Stroke
• Drug Overdose
• Suffocation
• Smoke Inhalation
• Electrocution
• Severe Allergic Reactions
• Severe Trauma, e.g. Automobile Accident

Many of these deaths can be prevented if the victims get prompt help – if someone trained in CPR provides proper life-saving first-aid until other medical expertise take over.

3.3 RISK FACTORS OF HEART ATTACK
There are a number of well-recognised risk factors for a heart attack. All risk factors can be modified to decrease the chance of heart attack. The more risk factors are present, the greater the risk of having a heart attack.

• Major risk factors that cannot be changed:
  – heredity
  – male gender
  – increasing age
• Major risk factors that can be changed:
  – cigarette smoking
  – high blood pressure
  – high blood cholesterol levels
  – diabetes mellitus

• Other risk factors that can be modified:
  – obesity
  – physical inactivity
  – stress

3.4 PRUDENT HEART LIVING
Prudent Heart Living includes adopting a lifestyle to help minimise the risk of a future heart attack. Reducing risk factors lowers the chance of having a heart attack or stroke.

• Control high blood pressure – treatment generally includes dietary change and medication. Take medication regularly as prescribed by your doctor.

• Quit smoking completely.

• Eat wisely – reduce saturated fat and cholesterol in the diet. Eat a Balanced diet.

• Reduce weight if you are overweight – count calories in your food intake.

• Exercise regularly – exercise tones the muscles, stimulates blood circulation, helps avoid excess weight gain and promotes a general feeling of well being.
CARDIO-PULMONARY RESUSCITATION (CPR)
4.1 DEFINITION

Cardio-Pulmonary Resuscitation (CPR) includes a series of assessments and interventions that support cardiac and pulmonary functions. When cardiac arrest occurs, the heart stops beating and circulation ceases. Unless the circulation is re-started quickly, organ death will begin to occur. The most sensitive organ is the brain and if its circulation to the brain is not re-started within 4 to 6 minutes, permanent and irreversible damage can occur. It is therefore important to start CPR as quickly as possible.

Air contains approximately 21% oxygen at sea level. During its passage through the body, only about 5% of the oxygen is utilised and hence exhaled air contains approximately 16% oxygen. When mouth to mouth ventilation is done during CPR, there is just sufficient oxygen in the exhaled air to keep the victim alive. Chest compression squeezes the heart between the breastbone and the spine and thereby helps to circulate the blood and deliver this oxygen to the vital organs, especially the brain, heart and kidneys.

If CPR is performed promptly and correctly,
1) heart function may be restored, and
2) circulation may be maintained until institution of other life support measures.

The next section takes you step-by-step through the procedures needed to perform CPR or cardio-pulmonary resuscitation – the basic skill needed to save life in the event of cardiac arrest.

4.2 STEPS FOR ADULT ONE-MAN CPR

STEP 1 CHECK FOR DANGER

- Look out for unsafe environment eg, electrical current, fire, possible explosion, construction works or poisonous gas.
- Ensure that the scene is safe for you to help.
STEP 2 ASSESS UNRESPONSIVENESS

Quickly assess and determine whether the victim is responsive. The rescuer should tap or gently shake the victim on his / her shoulders and ask loudly: “Hello! Hello! Are you OK?”

Avoid violent shaking of the victim as this might result in injury. Also, avoid unnecessary movements of the neck in the event of injury to the head and neck.

If the victim does not respond, he / she is likely to be unconscious. Unconsciousness may be due to:

- An airway that is obstructed (blocked) by food, secretions or a tongue that has fallen backwards.
- Breathing that has stopped.
- A heart that has stopped beating, usually because of a heart attack.
**STEP 3 SHOUT FOR HELP & ACTIVATE EMERGENCY MEDICAL SERVICES (EMS)**

If the victim does not respond, call loudly for help and immediately dial 995 for an emergency ambulance.

The rescuer should activate the Emergency Medical Services (EMS) as soon as he has determined that an adult victim is unconscious and requires emergency care.

If there is another person around, ask him / her to do the calling. When calling the EMS, state:

- Location of victim.
- The telephone number you are calling from.
- What happened (e.g. that someone is having a heart attack / is unconscious).
- Number of victims.
- Hang up only after instructed to do so by the dispatcher.

In addition, there is an increasing number of AEDs (automated external defibrillators) that are currently being deployed in public areas. These can also be life saving. Thus call for an AED. Say loudly “Help! Call Ambulance 995, Get AED”.
STEP 4 POSITION THE VICTIM

For CPR to be effective, the victim must lie on a firm, flat surface. If the victim is lying face down, or on his / her side, you will need to roll the victim over onto his /her back.

Do take care that the head, neck and body are supported and turned simultaneously during re-positioning.

STEP 5 OPEN THE AIRWAY

Perform a Head tilt-chin lift Manoeuvre to open the airway. In the unresponsive victim, muscle tone is impaired resulting in the tongue falling back and obstructing the airway. As the tongue is attached to the lower jaw, moving the lower jaw forward will lift the tongue away from the back of the throat and open the airway.
• Place one hand on the victim’s forehead and apply firm backward pressure with your palm to tilt the head back.
• Place the fingers of your other hand under the bony part of the lower jaw to lift the jaw forward.

**Caution**

- *Do not press deeply into the soft tissues under the chin because this might obstruct the airway.*
- *Perform a gentle chin lift if head or neck injury is suspected.*

**STEP 6 CHECK FOR NORMAL BREATHING**

Place your ear and cheek over the victim’s mouth and nose and assess for breathing (up to 10 seconds):

- **Look** for the rise and fall of the chest.
- **Listen** for air escaping during exhalation.
- **Feel** for the flow of air from the victim’s mouth and nose moving past your cheeks.

* Gasping is NOT considered as normal breathing.
**STEP 7**  **ASSESS FOR PULSE (FOR HEALTHCARE PROVIDERS ONLY)**

- Maintain head tilt, locate the Adam’s apple or centre of the throat of the victim with the index and middle fingers.
- Slide your fingers down into the groove at the side of the neck near you (This is the location of the carotid pulse).
- Apply gentle pressure and feel for the carotid pulse up to 10 seconds.
- If the victim has no pulse or if unsure of the presence of normal breathing or pulse within 10 seconds, start chest compressions.

* For laypersons, it is not necessary to check for pulse. If victim has no breathing, start chest compressions.
STEP 8  LOCATE HAND POSITION FOR CHEST COMPRESSION

Chest compression technique consists of serial, rhythmic applications of pressure over the lower half of the sternum (breastbone). To locate the correct hand position for chest compression:

- Maintain head tilt, run your middle finger from the lower margin of the victim’s rib cage till you reach the Xiphi Sternum.

- Place your index finger next to the middle finger.

- Place the heel of one hand next to the index finger.
• Remove the index and middle fingers.
• Place the heel of the other hand on top of the hand on the sternum.

• Interlace the fingers of both hands and lift the fingers off the chest wall.
• Straighten both elbows and lock them in position.
• Position your shoulder directly over the victim’s chest.

• Use your body weight to compress the victim’s chest by at least 5cm.
• Count your compressions:
  1 and 2 and 3 and 4 and 5 and
  1 and 2 and 3 and 4 and 10 and
  1 and 2 and 3 and 4 and 15
  1 and 2 and 3 and 4 and 20
  1 and 2 and 3 and 4 and 25
  1 and 2 and 3 and 4 and 30.

• Perform chest compressions at a rate of at least 100 per minute. Allow complete recoil of the chest wall after each compression.
• The ratio of compression and ventilation is 30 compressions: 2 breaths.
• **Healthcare Providers** – Check pulse after 5 cycles of 30 compressions : 2 ventilations. If no pulse or unsure presence of pulse, resume CPR.
• **Laypersons** – Continue performing CPR until help arrives or victim starts moving.
DO's

- Maintain your hands on the sternum (breastbone) during each upstroke.
- Release the pressure on the chest after each compression to allow blood to flow into the chest and heart.
- Use your body weight to perform the chest compression.
- Keep the fingers off the chest wall.
- Compress at rate of at least 100 per minute.

DONT's

- Do not lift the hands from the sternum (breastbone), otherwise correct hand position may be lost.
- Do not bounce or jerk during compressions as these movements may cause injuries.

GUIDELINES FOR PROPER COMPRESSION

STEP 9B  MOUTH-TO-MOUTH BREATHING

To perform mouth-to-mouth-breathing:
- Maintain head tilt-chin lift.
- Pinch the nose with your thumb and index finger to prevent air from escaping through the victim’s nose.
- Seal your mouth over the victim’s mouth and give 2 short breaths in quick succession one after the other.
- Release the nostrils to allow exhalation after each breath.
- Each rescue breath should make the chest rise.
- The duration for each breath is 1 second.
- Ventilation volume is between 400 to 600 ml.

Note:
Too great a volume of air is likely to cause air to enter the stomach and result in gastric distension.
STEP 10 RE-ASSESSMENT (FOR HEALTHCARE PROVIDERS ONLY)

- Assess the victim for pulse and breathing after every 5 cycles of CPR 30:2.
- If pulse is absent (if unsure of pulse and victim has no breathing, assume cardiac arrest), continue CPR 30:2.
- If both the pulse and breathing are present, position the victim in the recovery position.
- Continue to monitor the victim’s pulse and breathing every few minutes as these can stop suddenly.

**Adult 1-man CPR**

Flowchart courtesy of NRC

- **CHECK DANGER**
  - UNRESPONSIVE?
    - Tap shoulder firmly
    - Ask loudly
  - SHOUT “HELP! CALL AMBULANCE 995, GET AED” Activate EMS
  - OPEN AIRWAY
    - Head tilt, chin lift
  - NOT BREATHING NORMALLY?
    - Look, Listen, Feel
    - Up to 10 sec

- **30 CHEST COMPRESSIONS**
  - Centre of chest / lower half of sternum
  - Depth at least 5 cm
  - Rate at least 100 per min
  - Allow complete chest recoil

- **OPEN AIRWAY**
  - Head tilt, chin lift

- **2 BREATHS**
  - 1 sec per breath, tidal volume
  - 400-600 ml till chest just rises

- CONTINUE UNTIL PATIENT WAKES UP
  - AED ARRIVES AND ANALYSING HEART RHYTHM EMERGENCY TEAM TAKES OVER CPR

- **CHECK CAROTID PULSE**
  - For healthcare providers only
  - Define pulse and normal breathing within 10 sec

- **HEALTHCARE PROVIDERS** –
  - Check pulse after 5 cycles of 30 compressions:
  - 2 ventilations. If No pulse or unsure of presence of pulse, resume CPR

**IF UNABLE / UNWILLING TO DO MOUTH-TO-MOUTH FOR ANY REASON**
**DO CONTINUOUS CHEST COMPRESSIONS AT LEAST 100 / MINUTE**
Module 5  ADULT RECOVERY POSITION

The recovery position is used in the management of victims who are unresponsive but have breathing and pulse. When an unresponsive victim is lying supine, the airway may become obstructed by the tongue or mucus and vomit. These problems may be prevented when the victim is placed in the recovery position, because fluid can drain easily from the mouth.

If there is no evidence of trauma, place the victim in the recovery position. This position keeps the airway open. The following steps are recommended:

**STEP 1  POSITION THE VICTIM**

A) Tuck the hand nearer to you, arm straight and palm upward under the victim’s thigh.
B) Bring the arm further from you across the victim’s chest and place the back of his hand against his cheek.
C) Using your other hand, bend the victim’s far knee to a 90 degrees angle.
**STEP 2** ROLL THE VICTIM TOWARDS THE RESCUER

- Put your palm against the victim’s palm that is on the cheek and maintain position. Using your other hand, hold the victim’s far hip and roll him towards you until he is lying on his side.
- Use your knees to support the victim’s body as you turn him so as to prevent him from rolling too far forward.

**STEP 3** FINAL RECOVERY POSITION

- Ensure that the victim’s head (cheek) is lying on the back of his palm.
- Check that the victim’s other hand is lying free along side his body with palm facing upwards.
- The former far leg should preferably be bent at the knee at about 90 degrees.
- Continue to monitor the victim’s pulse and breathing every few minutes as these can stop suddenly.
Module 6 ADULT FOREIGN BODY AIRWAY OBSTRUCTION (FBAO)

6.1 INTRODUCTION

Complete airway obstruction is an emergency that will result in death within minutes, if not treated immediately. Complete airway obstruction indicates that the breathing passages are totally blocked. The victim is unable to speak, breathe or cough.

As most choking incidents are associated with eating, and are commonly witnessed, the chance of survival increases if the rescuer is able to intervene immediately when the victim is still conscious. Techniques used to relief FBAO include the Heimlich Manoeuvre (abdominal thrusts) and chest thrusts (for pregnant and obese victims).

The Heimlich Manoeuvre, also known as subdiaphragmatic abdominal thrusts or abdominal thrusts is recommended for relieve of FBAO in responsive adults and children of 1 to 8 years of age.

The Heimlich Manoeuvre (abdominal thrusts) elevates the diaphragm and increase airway pressure, which force air out from the lungs. This creates an artificial cough and expels the foreign body from the airway.

In obese or pregnant victims, the chest thrust is recommended.

COMMON CAUSES OF FBAO

Airway obstruction can result from either intrinsic, or extrinsic causes.

INTRINSIC CAUSES

• The tongue falling backward into the pharynx in the supine unconscious victim.
• Blood from head and facial injuries trickle into the airway.
• Regurgitated stomach contents going into the airway.

EXTRINSIC CAUSES

• Foreign bodies e.g. food, dentures etc.
6.2 RECOGNITION OF FOREIGN BODY AIRWAY OBSTRUCTION (FBAO)

FBAO can cause partial or complete airway obstruction. Coughing is the body’s natural defence against airway obstruction.

A victim with partial airway obstruction will cough in an attempt to expel the foreign body. If the victim is wheezing (breathing noisily with a wheezing sound) or coughing, this means that the airway is partially obstructed. Do not interfere. Allow the victim to cough to expel the object himself.

In complete airway obstruction, the victim is unable to speak, breathe or cough and may become cyanotic. The victim will clutch his neck with the thumb and fingers, which is the universal distress signal for choking. This requires immediate action.

6.3 RELIEF OF FBAO IN THE CONSCIOUS ADULT

Techniques used to relieve FBAO in a conscious adult include the Heimlich Manoeuvre (abdominal thrusts) and chest thrusts.

A) The Heimlich Manoeuvre (Abdominal Thrust) Technique

STEP 1

- To determine whether the victim is choking, ask, “Are you choking?”
- If the victim is able to cough, ask him to cough as hard as he can to get the foreign body out of his upper airway.
- If the victim’s airway is obstructed, he will not be able to speak, breathe or cough. The victim’s face may turn blue. The rescuer should immediately proceed to the next step.

STEP 2

- If the victim is upright, the rescuer stands behind the victim. If the victim is sitting, the rescuer kneels down and positions himself behind the victim.
- Position one foot between the victim’s legs.
**STEP 3**

- Place your arms around the victim’s abdomen and locate the navel.
- With one hand, place 2 fingers just above the navel.
- Make a fist with the other hand.
- Place the thumb-side of the fist against the abdomen above the 2 fingers.
- Release the 2 fingers but maintain your fist against the abdomen.
- Lean the victim forward and grasp your fist with the other hand.
- Give successive *inward and upward* thrusts (set of 5 abdominal thrusts).
- Check if foreign body is expelled after every set of 5 abdominal thrusts.
- Repeat abdominal thrusts until the foreign body is expelled or the victim becomes unconscious.

**B) Chest Thrust Technique**

Chest thrust technique is used as an alternative to Heimlich Manoeuvre. It is performed on a conscious obese or pregnant victim.

**STEP 1**

- To determine whether the victim is choking, ask “Are you choking?”
  - If the victim is choked, the victim will not be able to *speak, breathe or cough*.

**STEP 2**

- If the victim is upright, the rescuer stands behind the victim. If the victim is sitting, the rescuer kneels down and positions behind the victim.
- Position one foot between the victim’s legs.
STEP 3

- Place arms under the victim’s armpits to encircle the chest.
- Make a fist with one hand.
- Place the thumb-side of the fist on the middle of the victim’s breastbone.
- Grasps fist with the other hand and give **successive quick backward thrusts** (set of 5 chest thrusts).
- Check if foreign body is expelled after every set of 5 chest thrusts.
- If the obstruction is still not relieved, continue to deliver the set of 5 chest thrusts firmly and distinctly until the foreign body is expelled or the victim becomes unconscious.

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6.4 RELIEF OF FBAO IN THE **UNCONSCIOUS ADULT**

For an **unconscious adult**, proceed with the following steps:

**STEP 1**

- Position victim on a firm, flat surface and immediately activate Emergency Medical Services by dialling 995 for an emergency ambulance.

**STEP 2**

- Start 30 chest compressions (The hand position for chest compression is the same as for Adult CPR).
STEP 3
- Open victim’s airway by performing head tilt-chin lift.
- Check victim’s mouth for any visible foreign bodies.
- Use a hooked index finger and remove any obvious obstructing foreign bodies.

STEP 4
- Check for normal breathing: Look, Listen & Feel (up to 10 seconds).
- If breathing is absent, attempt to ventilate (1st attempt).
- If airway is blocked, re-position with the Head Tilt-Chin Lift procedure.
- Attempt 2nd ventilation.

STEP 5
- If airway is still blocked, perform 30 chest compressions, then proceed back to head tilt-chin lift and check for foreign body.
- Repeat Step 3 & 4 till help arrives or able to give 2 successful ventilation.

STEP 6
- Assess the victim for pulse & breathing once the airway is cleared.
- If pulse (for healthcare providers only) & breathing are absent, assume cardiac arrest, continue 30:2.
- If both pulse & breathing are present, position the victim in the recovery position
- Continue to monitor the victim’s pulse and breathing every few minutes as these can stop suddenly.
CARDIO-PULMONARY RESUSCITATION (CPR)

Infant
INFANT CARDIO-PULMONARY RESUSCITATION (CPR)

7.1 INTRODUCTION

An infant is a child who is up to 1 year old. Infants rarely collapse because of a primary heart problem. Cardiac arrest is usually secondary to other events, such as major trauma or respiratory problems. Therefore, rescuers must detect and promptly treat early signs of respiratory failure to prevent cardiac arrest.

STEP 1 CHECK FOR DANGER

- Look out for unsafe environment eg, electrical current, fire, possible explosion, construction works or poisonous gas.
- Ensure that the scene is safe for you to help.
- One should always ensure the safety of rescuer(s) and infant at the onset.

STEP 2 ASSESS UNRESPONSIVENESS

- Quickly assess and determine whether the infant is responsive by tapping gently on the infant’s shoulders.
- Avoid violent shaking and unnecessary movements of the infant’s head and neck as this might result in injury.
- If the infant does not respond, he/she is likely to be unconscious.
- Possible causes of unconsciousness may be:
  - an airway that is obstructed (blocked) by food, secretions or a tongue that has fallen backwards.
  - breathing that has stopped.
  - a heart that has stopped beating.
**STEP 3** ACTIVATE EMERGENCY MEDICAL SERVICE (EMS)

When the infant does not respond:

- **If you are alone,** immediately commence CPR 30 : 2 for approximately 2 minutes before calling 995 for an ambulance.
- **If a second rescuer is present,** ask him / her to activate the EMS system by dialling the ambulance number 995.

When calling EMS 995, state:

- Location of infant.
- The telephone number you are calling from.
- What happened
- Number of victims.
- Hang up only after instructed to do so by the dispatcher.

**STEP 4** POSITION THE INFANT

- For CPR to be effective, the infant must lie on a firm flat surface, the leg straightened and the arms placed alongside the body.
STEP 5 OPEN THE AIRWAY

Perform a head tilt-chin lift manoeuvre to open the airway. In an unconscious infant, muscle tone is impaired resulting in the tongue falling back and obstructing the airway. As the tongue is attached to the lower jaw, moving the lower jaw forward will lift the tongue away from back of the throat and open the airway.

Perform a head tilt-chin lift manoeuvre:

- Place one hand on the infant’s forehead and apply firm backward pressure with your palm to tilt the head back.
- Place the fingers of your other hand under the bony part of the lower jaw to lift the jaw forward.

Caution

- Do not press deeply into the soft tissues under the chin or over extend the infant’s neck because this may block the airway.
- Perform a gentle chin lift if head or neck injury is suspected.
STEP 6  CHECK FOR NORMAL BREATHING

• Place your ear and cheek over the infant’s mouth and nose and assess for breathing (up to 10 seconds):
  – **Look** for the rise and fall of the chest.
  – **Listen** for air escaping during exhalation.
  – **Feel** for the flow of air from the infant’s mouth and nose moving past your cheeks.

* Gasping is NOT considered as normal breathing.

STEP 7  ASSESS FOR PULSE (FOR HEALTHCARE PROVIDERS ONLY)

• Maintain head tilt and locate the brachial pulse (which is on the inner aspect of the upper arm) with the index and middle fingers.
• Apply gentle pressure and feel for the brachial pulse within 10 seconds.
• If the infant has no pulse (if unsure of pulse) and is not breathing, start chest compressions.
**STEP 8  LOCATE LANDMARK FOR CHEST COMPRESSION**

Chest compressions in an infant consist of serial, rhythmic applications of pressure over the lower half of the sternum (breastbone). To locate the correct landmark for chest compression:

- Maintain head tilt with one hand.
- Draw an imaginary line between the infant’s nipples using your index finger of the other hand.
- Place your middle and ring fingers next to the index finger.
- Place the index finger *on the imaginary line*.

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- Move the 3 fingers to the centre of the sternum (breastbone).
- Position the fingers upright.

- Lift off the index finger but maintain the middle and ring fingers contact on the sternum (breastbone).
STEP 9A PERFORM CHEST COMPRESSION

• Lean forward and place your cheek near the infant’s mouth and nose.
• Use your middle and ring fingers to compress the sternum (breastbone) 4cm.
• Count your compressions:
  1 and 2 and 3 and 4 and 5 and
  1 and 2 and 3 and 4 and 10 and
  1 and 2 and 3 and 4 and 15
  1 and 2 and 3 and 4 and 20
  1 and 2 and 3 and 4 and 25
  1 and 2 and 3 and 4 and 30.
• Perform chest compressions at a rate of at least 100 per minute.
• Healthcare Providers – Check pulse after 5 cycles of 30 compressions:
  2 ventilations. If no pulse or unsure presence of pulse, resume CPR.
• Laypersons – Continue performing CPR until help arrives or infant starts moving.

Note:
To facilitate ventilation without delays to re-position the head, use one hand to maintain the head tilt position while performing chest compressions.
GUIDELINES FOR PROPER COMPRESSION

DO’s

• Maintain your 2 fingers on the sternum (breastbone) during each upstroke.
• Release the pressure on the chest after each compression to allow blood to flow into the chest and heart.
• Compress at rate of at least 100 per minute.

DONT’s

• Do not lift the fingers from the sternum (breastbone), otherwise correct finger position may be lost.
• Do not bounce or jerk during compressions as these movements may cause injuries.

STEP 9B MOUTH TO MOUTH & NOSE BREATHING

Perform *mouth to mouth & nose breathing* as follows:

• Maintain a head tilt-chin lift.
• Seal your mouth over the infant’s mouth and give 2 short breaths in quick succession one after the other.
• Each rescue breath should make the chest rise.
• The duration for each breath is 1 second.
• Ventilation volume is approximately 30 ml per breath.
• Allow exhalation between breaths.

STEP 10 RE-ASSESSMENT (FOR HEALTHCARE PROVIDERS ONLY)

• Assess the infant for pulse and breathing after every 5 cycles of CPR 30:2.
• If pulse is absent (if unsure of pulse and infant has no breathing, assume cardiac arrest), continue CPR 30:2.
• If both the pulse and breathing are present, position the infant in the recovery position.
• Continue to monitor the infant’s pulse and breathing every few minutes as these can stop suddenly.
8.1 INTRODUCTION

The recovery position is used in the management of infants who are unresponsive but are breathing. When an unresponsive infant is lying supine, the airway may become obstructed by the tongue or mucus and vomit. These problems may be prevented when the infant is placed in the recovery position, because fluid can drain easily from the mouth.

The recovery position for an infant differs from the adult position. The infant is put on the lateral (side) position when pulse and breathing have resumed.

This position keeps the airway open. The following steps are recommended:

**STEP 1 POSITION THE INFANT**

- Place the infant’s arms alongside the body.
- Straighten the infant’s legs.
STEP 2  ROLL THE CHILD TOWARDS THE RESCUER

- Support the infant’s head and neck with one hand.
- Place the other hand on the infant’s hip.
- Gently roll or turn the infant on the side toward the rescuer.

STEP 3  FINAL RECOVERY POSITION

- Support the infant’s back with a soft pillow / cushion.
- Ensure that the infant’s head is not over extended or flexed.
- Stay with the infant and continue to monitor the pulse and breathing every few minutes as these can stop suddenly.
Module 9  INFANT FOREIGN BODY AIRWAY OBSTRUCTION (FBAO)

9.1  INTRODUCTION

Airway obstruction (choking) is a common cause of infant death and disability. Complete airway obstruction indicates that the breathing passages are totally blocked. The infant is unable to speak (make noises), breathe or cough. Choking in infants is commonest during eating or playing with small objects.

In a witnessed choking event, the chance of survival increases if the rescuer is able to intervene when the infant is still conscious. The obstructed airway can be cleared using a combination of back blows and chest thrusts.

COMMON CAUSES OF FBAO

Airway obstruction can result from either intrinsic, or extrinsic causes.

INTRINSIC CAUSES

- The tongue falling backward into the pharynx in an unconscious infant.
- Blood from head and facial injuries trickling into the airway.
- Regurgitated stomach contents going into the airway.

EXTRINSIC CAUSES

- Foreign bodies e.g. food, small objects or toys etc.

RECOGNITION OF FBAO

In complete airway obstruction, the infant may exhibit the following signs:

- Sudden onset of respiratory /breathing distress.
- Cyanosis (blue lips, nail or skin).
- Unable to speak (make noises).
- Unable to breathe.
- Unable to cough.
9.2 RELIEF OF FBAO IN THE CONSCIOUS INFANT

STEP 1 ASSESSMENT

• Assess for signs of complete airway obstruction e.g. unable to make noises, breathe or cough.
• If infant is choking, attempt to relieve the airway obstruction immediately.

STEP 2 SUPPORT THE INFANT

• Supporting the infant’s head and body between your hands and forearms using the ‘Sandwich Manoeuvre’.

• Hold the infant’s face down and rest your forearm on your thigh.
• Keep the head lower than the trunk.
STEP 3  BACK BLOWS AND CHEST THRUSTS

• Deliver 5 back blows forcefully between the shoulder blades with the heel of your other hand.

• Support the infant’s head and body between your hands and forearms using the ‘Sandwich Manoeuvre’ after delivering the 5 back blows.

• Turn the infant over on his/her back, resting on your thigh.

• Keep the infant’s head lower than the trunk.
• Deliver **5 chest thrusts** over the lower half of the sternum (breastbone) by counting aloud ‘1,2,3,4,5’ (landmark for chest thrust is the same as for infant CPR).

**Note:**

*Each back blow and chest thrust should be delivered with sufficient force and with the intention of expelling the foreign body.*

**STEP 4  RE-ASSESSMENT**

• Check if foreign body is expelled after every set of 5 back blows and 5 chest thrusts and remove it with your little finger if the foreign body is visible in the mouth.
• If the foreign body is expelled successfully, assess the infant for pulse and breathing.
• If the airway remains obstructed and the infant is still conscious, repeat the sequence of 5 back blows and 5 chest thrusts until the foreign body is expelled or the infant becomes unconscious.
9.3 RELIEF OF FBAO IN THE UNCONSCIOUS INFANT

For an unconscious infant, proceed with the following steps:

**STEP 1**
- Position infant on a firm flat surface and immediately activate Emergency Medical Services by dialling 995 for an emergency ambulance, if a second rescuer is available.

**STEP 2**
- Start 30 chest compressions. (The landmark and technique is the same as for infant CPR).

**STEP 3**
- Open infant’s airway by performing head tilt-chin lift.
- Check the infant’s mouth for visible foreign bodies.
- Use a hooked little finger and remove any obvious obstructing foreign bodies.

**STEP 4**
- Check for normal breathing.
- If breathing is absent, attempt to ventilate.
- If airway is blocked, re-position the infant’s head and re-attempt to ventilate.
- Attempt 2nd ventilation.

**STEP 5**
- If airway is blocked, perform 30 chest compressions.
- Proceed to head tilt-chin tilt and check for foreign body.
- Repeat step 3 and 4 till help arrives or able to give 2 sucessful ventilations.

**STEP 6**
- Assess for pulse and breathing once the airway is cleared.
- If pulse and breathing are absent assume cardiac arrest & continue CPR 30:2.
- If both the pulse and breathing are present, position the infant in the recovery position.
- Continue to monitor the infant’s pulse, and breathing every few minutes as these can stop suddenly.
- Activate EMS if it is not done earlier.
APPLICATION OF POCKET MASK
The pocket mask is a barrier device used to provide rescue breathing. It has a one-way valve that prevents exchange of secretions between the victim and rescuer. It is made of firm plastic with a cushioned rim and is roughly triangular in shape. The rim creates a flexible seal around the victim’s nose and mouth. The mask fits over the victim’s mouth and nose. The narrowest portion of the mask is placed over the bridge of the victim’s nose.
APPLICATION

STEP 1
• Check that filter (if included) is snapped firmly in place.

STEP 2
• Push out the dome.

STEP 3
• Attach one-way valve to mask port.
• Direct exhalation port away from ‘nose’ end of mask.
STEP 4
• Apply the rim of the mask first between the victim’s lower lip and chin. This will retract the lower lip and keep the mouth open under the mask.
• Position end marked ‘nose’ over the victim’s nose.

STEP 5
• Seal as illustrated.
• Open the airway by performing a gentle head tilt-chin lift.
• Blow slowly until chest rises.

STEP 6
• Remove your mouth and allow victim to exhale.

Note:
If victim vomits, remove mask and clear victim’s airway. Clear mask assembly by shaking or sweeping out foreign material. Blow through valve to verify operation. Re-apply mask to victim and continue ventilation.
SUMMARY CHECKLIST
# Module 11 SUMMARY CHECKLIST

## ADULT ONE-MAN CPR

<table>
<thead>
<tr>
<th>STEPS</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| **D** : Danger | Look out for unsafe environment, e.g. Electrical current, Fire, Possible Explosion, Construction works, or Poisonous gas  
- Ensure that the scene is safe for you to help |
| **R** : Response | Establish unresponsiveness  
- Call, tap or gently shake the victim  
- Call out loudly: “Hello! Hello! Are you OK?” |
| **S** : Shout for Help | If no response, Call for ambulance 995 & AED |
| **A** : Airway | Open airway : Head Tilt-Chin Lift |
| **B** : Breathing | Check for normal breathing : Look, Listen, & Feel (up to 10 seconds)  
**Look** for the rise and fall of the chest  
**Listen** for air escaping during exhalation  
**Feel** for the flow of air from the victim’s mouth and nose moving past your cheeks |
| **C** : Circulation | Check for pulse up to 10 seconds *(only for Healthcare providers)*  
If no pulse and breathing, start CPR  
For laypersons, there is no need to check for pulse. If victim has no breathing, start CPR  
- Locate the landmark for chest compression  
- Proper body and hand position  
- Compress vertically at least 5 cm downwards with complete relaxation of pressure after each compression at rate of at least 100 per minute  
- Say mnemonic  
“1&2&3&4&5 & 1&2&3&4&10 & 1&2&3&4&15 &1&2&3&4&20  
1&2&3&4&25 &1&2&3&4&30” |
| CPR Cycle |  
- Perform 30 chest compressions followed by 2 breaths  
- The duration for each breath is 1 second.  
- Ventilation volume is between 400 - 600 ml/breath  
- Allow lung deflation between each breath |
| Reassessment |  
- Assess the victim for pulse and breathing after every 5 cycles of 30:2  
*(for healthcare providers only)*  
- If pulse is absent (if unsure of pulse and victim has No breathing,  
assume cardiac arrest), continue 30:2  
- For laypersons, continue performing CPR until help arrives or victim  
starts moving |
| Recovery Position | Place the victim in the recovery position if :  
- Pulse and breathing are present  
- Victim is unconscious and has no evidence of trauma  
- Continue to monitor victim’s pulse and breathing every few minutes as  
this can stop suddenly |
<table>
<thead>
<tr>
<th>STEPS</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Conscious victim</strong></td>
<td><strong>Assessment</strong></td>
</tr>
</tbody>
</table>
|                              | Ask: “Are you choking?”  
Victim acknowledges by nodding. Rescuer replies: “I can help.”  |
| **Heimlich Manoeuvre**       | **Technique** (Normal Size)                                                                                                  |  |
|                              | Stand behind the victim. Position one foot between the victim’s legs   
Locate the landmark:  
• Place your arms around the victim’s abdomen and locate the navel  
• With one hand place 2 fingers just above the navel  
• Make a fist with the other hand  
• Place thumb-side of the fist against the abdomen above the 2 fingers  
• Release the 2 fingers but maintain the fist on the abdomen  
• Lean the victim forward and grasp the fist with the other hand  
• Give successive inward-upward thrusts  
• Check if foreign body is expelled after every set of 5 abdominal thrusts  
• Repeat thrusts until the foreign body is dislodged or the victim becomes unconscious  |
| **Chest Thrust**             | **Technique** (Pregnant & Obese)                                                                                               |  |
|                              | Stand behind the victim. Position one foot between the victim’s legs   
Locate the landmark:  
• Place arms under the victim's armpits to encircle the chest  
• Make a fist with one hand  
• Place thumb-side of fist on the middle of the victim's breastbone  
• Grasp the fist with the other hand and give successive quick backward thrusts  
• Check if foreign body is expelled after every set of 5 chest thrusts  
• Repeat thrusts until the foreign body is dislodged or the victim becomes unconscious  |
| **Unconscious victim**       | When victim becomes unconscious. Proceed with the following steps:  
• Position the victim on a firm, flat surface  
• Call for ambulance 995  |
|                              | • Start 30 chest compressions (The landmark & technique is the same as for adult CPR)  
• Open airway: Head Tilt-Chin Lift  
• Check airway and remove any obvious foreign bodies  |
|                              | • Check for normal breathing: Look, Listen, & Feel (up to 10 seconds)  
• If breathing is absent, attempt to ventilate (1st attempt)  
• If airway is still blocked, re-position the victim’s head and reattempt to ventilate  
• Attempt 2nd ventilation  
• If airway is still blocked, perform 30 chest compressions  
• Proceed to head tilt-chin tilt and check for foreign body  
• Repeat Step till help arrives or able to give 2 successful ventilations  |
|                              | • Check pulse (for healthcare providers only) and breathing once airway is cleared.  
If pulse is absent (if unsure of pulse and victim has no breathing, assume cardiac arrest),  
continue CPR 30:2  |
| **Recovery Position**        | Place victim in the recovery position if:  
• Pulse and breathing are present  
• Continue to monitor victim’s pulse and breathing every few minutes as this can stop suddenly  |
## INFANT CPR

<table>
<thead>
<tr>
<th>STEPS</th>
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<tbody>
<tr>
<td><strong>D : Danger</strong></td>
<td>Look out for unsafe environment, e.g. Electrical current, Fire, Possible Explosion, Construction works, or Poisonous gas • Ensure that the scene is safe for you to help</td>
</tr>
<tr>
<td><strong>R : Response</strong></td>
<td>Establish unresponsiveness : • Call, tap or gently shake the infant’s shoulder to elicit response • If you are alone, immediately start CPR 30:2 for approx. 2 minutes</td>
</tr>
<tr>
<td><strong>S : Shout for Help</strong></td>
<td>• If a second rescuer is present, ask him or her to call for ambulance 995</td>
</tr>
<tr>
<td><strong>A : Airway</strong></td>
<td>Open airway : Head Tilt-Chin Lift</td>
</tr>
<tr>
<td><strong>B : Breathing</strong></td>
<td>Check for normal breathing : Look, Listen, &amp; Feel (up to 10 seconds) Look for the rise and fall of the chest Listen for air escaping during exhalation Feel for the flow of air from the infant’s mouth and nose moving past your cheeks</td>
</tr>
<tr>
<td><strong>C : Circulation</strong></td>
<td>Check for brachial pulse up to 10 seconds (only for Healthcare providers) If pulse is absent (if unsure of pulse and infant has no breathing, assume cardiac arrest), start 30:2 For laypersons, there is no need to check for pulse. If infant has no breathing, start CPR Locate landmark for chest compression: • Draw an imaginary line between nipples • Place index finger on the imaginary line • Place your middle and ring fingers next to the index finger • Move the 3 fingers to the centre of the sternum (breastbone) • Position the fingers upright • Lift off the index finger but maintain the middle and ring fingers contact on the sternum (breastbone) • Lean forward and place your cheek near the infant’s mouth and nose • Use your middle and ring fingers to compress the sternum (breastbone) by 4 cm Demonstrate correct technique of compression Keep fingers contact on the sternum during each upstroke Say mnemonic “1&amp;2&amp;3&amp;4&amp;5&amp;1&amp;2&amp;3&amp;4&amp;10&amp;1&amp;2&amp;3&amp;4&amp;15 1&amp;2&amp;3&amp;4&amp;20 1&amp;2&amp;3&amp;4&amp;25 1&amp;2&amp;3&amp;4&amp;30” Compression rate is at least 100 per minute</td>
</tr>
<tr>
<td><strong>CPR Cycle</strong></td>
<td>• Perform 5 cycles of 30 chest compressions followed by 2 breaths for approximately 2 minutes (For Healthcare providers only) • The duration for each breath is 1 second. • Ventilation volume is between 30 ml/breath • Allow lung deflation between each breath</td>
</tr>
<tr>
<td><strong>Reassessment</strong></td>
<td>• Assess for pulse and breathing after every 5 cycles of CPR 30:2 (for healthcare providers only) • If pulse is absent (if unsure of pulse and infant is not breathing, assume cardiac arrest), continue CPR 30:2 • For laypersons, continue performing CPR until help arrives or infant starts moving</td>
</tr>
<tr>
<td><strong>Recovery Position</strong></td>
<td>• Recovery Position Place the infant in the recovery position if : • Pulse and breathing are present • Infant is unconscious and has no evidence of trauma • Continue to monitor infant’s pulse &amp; breathing every few minutes as this can stop suddenly</td>
</tr>
</tbody>
</table>
## INFANT FOREIGN-BODY AIRWAY OBSTRUCTION (CONSCIOUS – UNCONSCIOUS)

<table>
<thead>
<tr>
<th>STEPS</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| Conscious infant Assessment| Assess for signs of complete airway obstruction (choking)  
If infant is choking, attempt to Assessment relieve the airway obstruction immediately                                                                                                   |
| Back blows & Chest thrusts | Support the infant’s head and body between your hands and forearms using the "Sandwich Manoeuvre"  
- Hold the infant’s face down and rest your forearm on your thigh  
- Keep the head lower than the trunk  
- Deliver 5 back blows forcefully between the shoulder blades with the heel of your other hand  
- Support the infant’s head and body between your hands and forearms after delivering the 5 back blows  
- Turn the infant over on his/her back, resting on your thigh  
- Keep the head lower than the trunk  
- Deliver 5 chest thrusts over the lower half of the sternum (breastbone) by counting aloud ‘1,2,3,4,5’ (landmark for chest thrust is the same as for infant CPR) |
| Reassessment               | Check if foreign body is expelled after every set of 5 back blows and 5 chest thrusts and remove if it is visible  
- If the foreign body is expelled successfully, assess the infant for pulse & breathing  
- If the airway remains obstructed and the infant is conscious, repeat the sequence of 5 back blows and 5 chest thrusts until the foreign body is expelled or the infant becomes unconscious |
| Unconscious infant          | When infant becomes unconscious. Proceed with the following steps:  
- Position the infant on a firm, flat surface  
- Call for ambulance 995 if a second rescuer is available  
- Start 30 chest compressions (The landmark & technique is the same as for Infant CPR)  
- Open airway: Head Tilt-Chin Lift  
- Check airway and remove any obvious foreign bodies  
- Check for normal breathing: Look, Listen, & Feel (up to 10 seconds)  
- If breathing is absent, attempt to ventilate (1st attempt)  
- If airway is still blocked, re-position the infant’s head and re-attempt to ventilate  
- Attempt 2nd ventilation  
- If airway is still blocked, perform 30 chest compressions  
- Proceed to head tilt-chin tilt and check for foreign body  
- Repeat Step till help arrives or able to give 2 successful ventilations  
- Check pulse (for healthcare providers only) and breathing once airway is cleared.  
- If pulse is absent (if unsure of pulse and infant has no breathing, assume cardiac arrest), continue CPR 30:2 |
| Recovery Position          | Place the infant in the recovery position if:  
- Pulse and breathing are present  
- Continue to monitor infant’s pulse and breathing every few minutes as this can stop suddenly  
- Activate EMS if it is not done earlier |
Notes