



In Ministry of Health Malaysia

BASIC LIFE SUPPORT TRAINING MANUAL



This guideline was developed by:
The BLS Subcommittee,
National Committee on Resuscitation Training
Ministry of Health Malaysia

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BASIC LIFE SUPPORT TRAINING MANUAL

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ABBREVIATIONS

AED	AUTOMATED EXTERNAL DEFIBRILLATOR
AHA	AMERICAN HEART ASSOCIATION
ALS	ADVANCED LIFE SUPPORT
BLS	BASIC LIFE SUPPORT
BMV	BAG MASK VENTILATION
CPR	CARDIO PULMONARY RESUSCITATION
EMS	EMERGENCY MEDICAL SYSTEM
ERS	EMERGENCY RESPONSE SYSTEM
FBAO	FOREIGN BODY AIRWAY OBSTRUCTION
HCW	HEALTH CARE WORKER
IHCA	IN-HOSPITAL CARDIAC ARREST
ILCOR	INTERNATIONAL LIAISON COMMITTEE ON RESUSCITATION
LMA	LARYNGEAL MASK AIRWAY
MECC	MEDICAL EMERGENCY COORDINATING CENTRE
MERS	MALAYSIA EMERGENCY RESPONSE SYSTEM
MOH	MINISTRY OF HEALTH
NCORT	NATIONAL COMMITTEE ON RESUSCITATION TRAINING
OHCA	OUT-OF-HOSPITAL CARDIAC ARREST
PPE	PERSONAL PROTECTIVE EQUIPMENT
ROSC	RETURN OF SPONTANEOUS CIRCULATION
RRT	RAPID RESPONSE TEAM
VF	VENTRICULAR FIBRILLATION
VT	VENTRICULAR TACHYCARDIA

FOREWORD

The image features a minimalist design with the word 'FOREWORD' centered in a black, serif font. The background is white, accented by abstract, flowing lines. A prominent teal-colored wave starts from the left edge and curves upwards towards the right. Below it, a series of lighter, greyish-white lines create a similar but more complex, layered wave pattern that also flows from left to right. The overall aesthetic is clean and modern.

FOREWORD



Datuk Dr. Noor Hisham Bin Abdullah
Director General
Ministry of Health Malaysia

National Committee on Resuscitation Training (NCORT) was formed in 2006 and given the task to oversee and streamline the resuscitation training in Ministry of Health (MOH) facilities.

The NCORT and its BLS subcommittees have been given the task to study the updates in International Liaison Committee of Resuscitation (ILCOR) 2015 and to produce a Basic Life Support (BLS) training manual that is tailored to the practice of our health care workers.

Resuscitation training in MOH is one of the important areas that need to be given emphasis in order to ensure all healthcare workers in MOH are equipped with basic life support training.

As healthcare workers, we are expected to know how to perform cardiopulmonary resuscitation (CPR). With this manual, we hope that there will be a standardized guidance on the techniques used during the initial resuscitation of a cardiac arrest victim among MOH health care workers.

In this manual, guidance on Basic Life Support be taught.

Lastly, I would like to congratulate the NCORT and its BLS subcommittees for producing this basic life support manual for healthcare worker and hopefully all of us will benefit from this manual.



Dato' Dr Hj. Azman bin Hj. Abu Bakar
Director of the Medical Development Division
Ministry of Health Malaysia

First and foremost, I would like to express my heartfelt appreciation to the Basic Life Support (BLS) subcommittee, which is under the umbrella of National Committee on Resuscitation Training (NCORT) for producing this BLS training manual.

MOH formed the National Committee on Resuscitation Training (NCORT) in 2006. This year, the NCORT's BLS subcommittee has study the updates in International Liaison Committee of Resuscitation (ILCOR) 2015 and come out with this BLS training manual for healthcare worker which contains the latest updates in basic life support. These guidelines are aimed primarily at healthcare worker who are first to respond to an in-hospital cardiac arrest as well as those who are working in other clinical settings.

Basic Life Support is the foundation for saving lives after cardiac arrest. This guideline has incorporated latest evidence-based updates of resuscitation which has shown to improve patient's outcomes following cardiac arrest. This BLS training manual will provide a standardized guidance on the techniques used during the initial resuscitation of a cardiac arrest victim in Ministry of Health (MOH) hospitals and healthcare facilities.

Our duty as healthcare provider is to save lives. I sincerely hope that this BLS training manual set a path to a more standardised, systematic and well organised resuscitation among MOH's facilities which will improved patient's survival outcome.



Dr. Sabariah Faizah Jamaluddin
Head of National Emergency Medicine and
Trauma Services,
Chairman, National Committee On Resuscitation
Training (NCORT)
Ministry of Health Malaysia

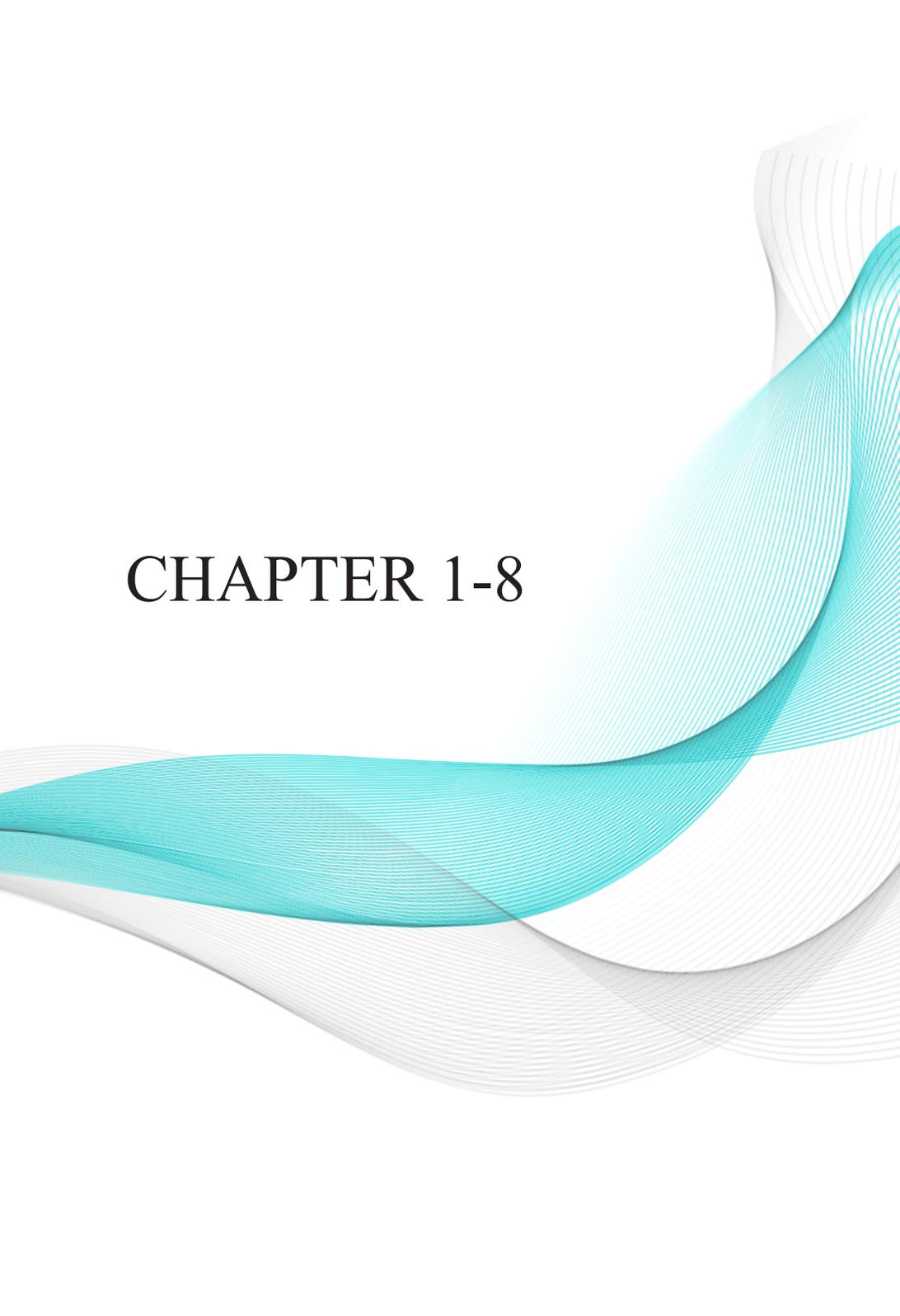
Basic Life Support (BLS) refers to the care healthcare workers and public safety professionals provide to patients who are experiencing respiratory arrest, cardiac arrest or airway obstruction. As emergencies might happens anywhere, even in hospitals, it is therefore important for the first responder to have the knowledge and skill to perform BLS.

International Liaison Committee on Resuscitation (ILCOR) has released the latest consensus on 15th of October 2015. The BLS subcommittee, which is under the National Committee on Resuscitation Training (NCORT) was given the task to study these updates and produced a manual for of our health care facilities.

With this BLS training manual, we hope to provide a standardized guidance on the techniques used during the initial resuscitation of a cardiac arrest victim in Ministry of Health (MOH) hospitals and healthcare facilities which incorporate the latest evidence-based updates of resuscitation. The BLS subcommittee will also held regular training to provide guidance and training on BLS for MOH's healthcare workers.

Lastly, I would like to applaud the BLS subcommittee for their effort in developing this manual. I sincerely hope that with this manual and the training provided, healthcare workers in Ministry of Health will perform a high quality resuscitation if needed.

CHAPTER 1-8

The background features a series of overlapping, wavy lines that create a sense of motion and depth. A prominent teal-colored wave flows from the bottom left towards the top right. Behind it, several layers of lighter grey waves are visible, creating a layered, ethereal effect. The lines are closely spaced and follow a similar sinusoidal path, giving the impression of a liquid or fabric-like texture.

CHAPTER 1

COURSE OVERVIEW

This Manual contains guidance on the techniques used during the initial resuscitation of a cardiac arrest victim. BLS includes airway, breathing and circulatory support without the use of equipment (except protective devices) and the use of an AED. It also includes the management of choking.

Course Objectives

1. Understand relevant anatomy and physiology of cardiopulmonary system
2. Describe the links in the chain of survival
3. Describe, understand and perform BLS

Course Description

Table 1 : Minimum module

TIME	PROGRAMME
08:00 – 08:15	Registration
08:15 – 08:35	Introduction to Basic Life Support Course
08:35 – 09:15	Video/Lecture
09:15 – 09:30	Tea Break
09:30 – 11:30	skill station <ol style="list-style-type: none">1. Adult BLS2. Paediatric BLS3. Foreign Body Airway Obstruction (FBAO)4. Automated External Defibrillator (AED)
13:00 – 14:00	Lunch
1400- 1700	Assessment

CHAPTER 2

INTRODUCTION

Basic life support (BLS) includes:

1. Airway,
2. Breathing
3. Circulation
4. Automated external defibrillator (AED)
5. Management of choking or foreign body airway obstruction (FBAO)

Highlights in 2015 International Liaison Committee on Resuscitation (ILCOR) changes

- a. The 2015 ILCOR guidelines highlights the critical importance of the interactions between the emergency medical dispatcher, the bystander who perform CPR and the use of AED.
- b. Emphasis on importance of early recognition of cardiac arrest (telephone CPR - dial 999) via MERS (Malaysian Emergency Response System).
- c. Emphasis on high quality CPR.
 - i. Compression rate 100-120 compressions per minute
 - ii. The depth is 5cm to 6cm
 - iii. Minimal interruption in chest compression (< 10 seconds)
 - iv. Allow spontaneous recoil of the chest wall in between compressions.
- d. Awareness that seizures can be a sign of cardiac arrest.
- e. Real time CPR feedback should be used to ensure high quality CPR if available. The use of real time CPR feedback in clinical practice should be considered as part of a comprehensive system for care for cardiac arrest.
- f. Implementation of public-access defibrillator program.

The chain of survival

The Chain of Survival summarizes the vital links needed for successful resuscitation. Most of these links apply to victims of both primary cardiac and asphyxia arrest.



Figure 1: The chain of survival (adapted from ERC 2015)

1. **Early recognition and call for help**

Chest pain should be recognized as a symptom of myocardial ischaemia.

Cardiac arrest occurs in a quarter to a third of patients with myocardial ischaemia within the first hour after onset of chest pain.

Recognizing the cardiac origin of chest pain, and calling the emergency services before a victim collapses, enables rapid activation of Emergency Response System (ERS).

If cardiac arrest has occurred, early recognition is critical to enable rapid activation of the ERS and prompt initiation of bystander CPR. The key observations are **unresponsiveness** and **not breathing normally**. Emergency medical dispatchers can improve recognition by focusing on these keywords.

2. **Early bystander CPR**

The immediate initiation of CPR can increase the survival rate from cardiac arrest. If able, bystanders with CPR training should give chest compressions together with ventilations.

3. *Early defibrillation*

Defibrillation within 3–5 mins of collapse can produce survival rates as high as 50–70%. Each minute of delay to defibrillation reduces the probability of survival to discharge by 10–12%. The links in the chain work better together: when bystander CPR is provided, the decline in survival is more gradual and averages 3–4% per minute delay to defibrillation.

4. *Early advanced life support and post-resuscitation care*

Early initiation of advanced life support and post resuscitation care will improve the survival of the victims.

CHAPTER 3

ANATOMY & PHYSIOLOGY

The main components of the heart are:

1. Heart muscles -contract to pump blood.
2. Heart chambers -collect and channel blood flow.
3. Heart valves -allows only one-way flow of blood.
4. Conduction system -coordinate heart muscle contraction
5. Coronary blood vessels -supply blood to the heart

The cardiovascular system maintains blood flow to deliver oxygen and nutrients to every cell and removes the carbon dioxide and waste products made by those cells.

The heart is a muscular organ which pumps a continuous flow of blood through the blood vessels of the circulatory system.

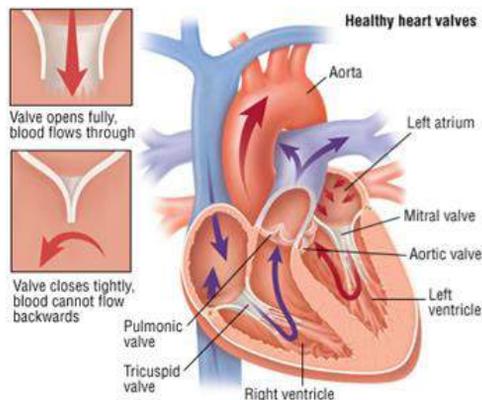


Figure 1 : Heart anatomy

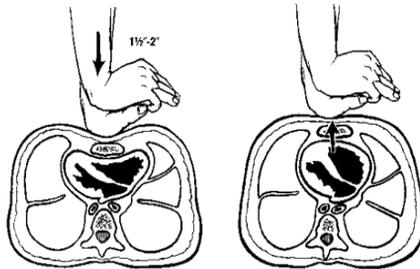


Figure 2 : Chest compression

Importance of adequate chest recoil

Due to this simple way of how the flow of blood occurs, when the heart stops pumping during cardiac arrest, effective external chest compressions push blood out of heart chambers and thus maintain blood flow and oxygen delivery to the heart, brain and other vital organs.

The contraction of the heart is coordinated by its conduction system. The heart will fail to maintain a good blood flow if it pumps at a too slow rate (less than 60/min), too fast (more than 150/min) or unorganized rhythm (ventricular fibrillation). In a child, heart rate of less than 60/min may require chest compressions to maintain adequate perfusion.

The coronary blood vessels supply oxygen to the heart muscles and conduction system. Most of blood flow (perfusion) to the heart muscles occur during the diastole (relaxation) phase. This is the reason why the recommended maximum rate of chest compression is 120/min and full chest recoil is important to allow for adequate perfusion to the heart muscles and blood filling of the heart chambers during the relaxation (diastole) phase.

Anatomy & Physiology of the Respiratory System

The human body needs oxygen to sustain life. After about four minutes without oxygen, brain cells start dying and can lead to irreversible brain damage and ultimately death.

The main components in respiratory system are:

1. Airways - to channel air to the lungs
2. Lungs and blood vessels - for gas exchange
3. Muscles for breathing - to move air in and out of the lungs

Room air contains 21% oxygen. Rescue breathing using exhaled air contains 16% oxygen.

Most child-related cardiac arrests occur as a result of a hypoxic event. Therefore, breathing and oxygenation are important for a successful resuscitation.

The tongue may occlude the upper airway in an unconscious patient. Thus, opening the airway is essential. However, due to anatomical differences between an adult, children and neonate airway, head-tilt- chin lift maneuver may differ slightly. Over extension of the neck in an unconscious infant may occlude the airway.

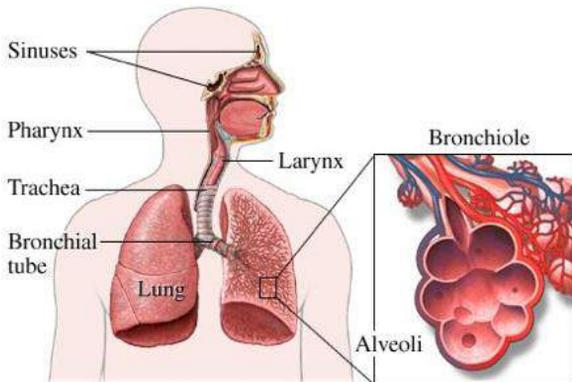


Figure 3 : Lungs anatomy

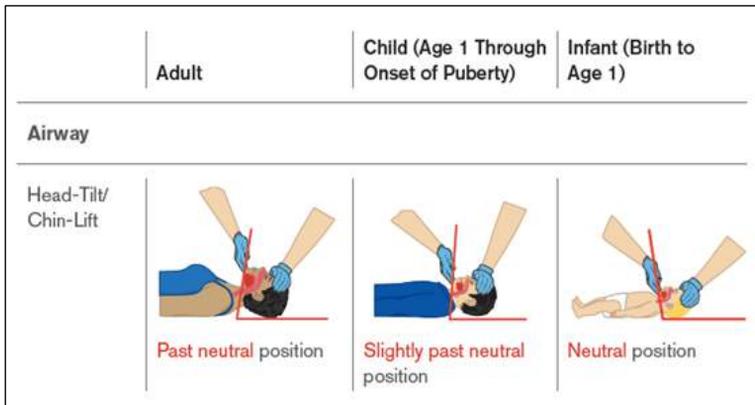


Figure 4 : Open airway

During cardiac arrest, the body's metabolic demand for oxygen is decreased. Therefore, a smaller amount of air is needed. When giving ventilation, a visible chest rise indicates adequate volume of air has been given.

Overventilation and hyperventilation should be avoided because with each ventilation, intrathoracic pressure increases. The detrimental effects are: 1. Decrease in atrial/ventricular filling. 2. Reduction in coronary perfusion pressures (blood flow to heart muscles) 3. Distention of the stomach with air which will reduce diaphragm mobility and increase risk of regurgitation and aspiration.

Sudden Cardiac Arrest

Sudden cardiac arrest (SCA) is a condition in which the heart suddenly and unexpectedly stops beating. If this happens, blood stops flowing to the brain and other vital organs. SCA usually causes death if it's not treated within minutes.

Signs and symptoms of cardiac arrest: If there is abnormal or absent of breathing, no pulse and the patient is unresponsive, the patient is in cardiac arrest.

Other signs of life - coughing & movement, will also be absent.

Myocardial Infarction

A myocardial infarction (MI) or heart attack refers to the necrosis (death) of heart tissue as a result of a loss of oxygenated blood.

Signs and Symptoms of MI

1. Chest discomfort or pain that is severe, lasts longer than 3 to 5 minutes, goes away and comes back, or persists even during rest.
2. Discomfort, pressure or pain that is persistent and ranges from discomfort to an unbearable crushing sensation in the chest, possibly spreading to the shoulder, arm, neck, jaw, stomach or back, and usually not relieved by resting, changing position or taking medication
3. Pain that comes and goes (such as angina pectoris)
4. Difficulty breathing, such as at a faster rate than normal or noisy breathing
5. Pale or ashen skin, especially around the face.
6. Sweating, especially on the face
7. Dizziness or light-headedness

CHAPTER 4

ADULT BASIC LIFE SUPPORT

The sequence of steps for the initial assessment and treatment of the unresponsive victim are as below. If the patient is unresponsive with abnormal or absent breathing, it is reasonable for the emergency dispatcher to assume that the patient is in cardiac arrest

D anger Make sure it is safe to help	Wear PPE (gloves, apron, mask) if available Look out for blood spills, sharps, electric wires etc
R esponsiveness Check the victim for a response	Tap shoulders. Say 'Hello, hello are you OK?'
S hout for help Ask for help and a defibrillator	Emergency! Emergency! Bring the resus trolley and defibrillator!
A irway Open the airway	Perform head tilt-chin lift
B reathing Assess for normal breathing	Look for normal breathing in not more than 10 seconds Start chest compressions if not breathing or abnormal breathing (gasp) is seen.
C irculation Start chest compression	High quality chest compression : <ul style="list-style-type: none">• Middle of chest, lower half of sternum• Depth : 5 to 6 cm• Rate : 100 to 120/min• Full recoil after each compression• Minimize interruption• 30 compressions: 2 ventilations• Each ventilation in 1 second
D efibrillation Assess for need to shock	<ul style="list-style-type: none">• Attach AED/Manual defibrillator• Do not interrupt chest compression• Follow AED voice prompt• For manual defibrillator, shock if VF or pulseless VT recognized• Immediately continue CPR

Table 1: BLS/AED detailed sequence of steps

Sequence	Technical description
<p>1. DANGER</p>	<p>Make sure you, the victim and any bystanders are safe</p> <ul style="list-style-type: none"> • Wear PPE (gloves, apron, mask) if available. • Look out for blood spills, sharps, electric wires, unsteady beds, trolley.
<p>2. RESPONSIVENESS</p> 	<p>Check the victim for a response</p> <ul style="list-style-type: none"> • Gently tap his shoulders and ask loudly: "Are you alright?". • If he responds-- leave him in the position in which you find him, provided there is no further danger. • Try to find out what is wrong with him. • Get help if needed. • Reassess regularly.
<p>3. SHOUT FOR HELP</p> 	<p>Shout for help/activate Emergency Response System(ERS)</p> <ul style="list-style-type: none"> • Activate ERS. • Shout "Emergency! Emergency! Bring the resuscitation trolley and defibrillator!". • Health care provider (HCW) can look for no breathing (or only gasping) almost simultaneously before activating the ERS.

4. AIRWAY



a. Head tilt Chin lift



b. Jaw thrust

Open The Airway

a. Head tilt-chin lift

b. Jaw thrust if suspected cervical injury

- Turn the victim onto his back.
 - a. **Head tilt chin lift**
 - Place your hand on the forehead. Gently tilt the head back and with your fingertips under the point of the victim's chin, lift the chin to open the airway.
 - b. **Jaw thrust**
 - Use index and middle fingers to physically push the posterior aspects of the mandible upwards while your thumbs push down on the chin to open the mouth.

5. BREATHING



Look for normal breathing in not more than 10 seconds

- Determine absent or abnormal breathing almost simultaneously while opening the airway by looking at the chest, neck and face
 - In the first few minutes after cardiac arrest, a victim may be barely breathing, or taking infrequent, slow and noisy gasps (abnormal breathing).
 - **Do not confuse this with normal breathing.**
 - Treat absence of breath or presence of abnormal breathing as a sign of cardiac arrest.
- Chest compression should be started with the absence of breath—or presence of abnormal breathing.
- If you have any doubt whether or not breathing is normal, act as if they are **not breathing** normally and **prepare to start CPR**.

<p>6. SEND FOR AED</p> 	<p>Send someone to get an AED if available If you are alone, do not leave the victim and start CPR</p>
<p>7. CHEST COMPRESSION (CIRCULATION)</p>  <p>Place the heel of one hand in the centre of the victim's chest</p>  <p>Place the heel of your other hand on top of the first hand. Interlock the fingers of your hands and ensure that pressure is not applied over the victim's ribs</p>	<p>Start chest compressions</p> <p>Location:</p> <p>Lower half of the sternum/centre of the chest</p> <ul style="list-style-type: none"> • Kneel by the side of the victim. • Place the heel of one hand in the centre of the victim's chest (centre of the chest). • Place the heel of your other hand on top of the first hand. • Interlock the fingers of your hands and ensure that pressure is not applied over the victim's ribs. • Keep your arms straight. • Do not apply any pressure over the upper abdomen or the bottom end of the bony sternum (breastbone). • Position your shoulders vertically above the victim's chest and press down. <p>High quality CPR</p> <ul style="list-style-type: none"> • Rate: 100 to 120 compressions per minute • Depth: at least 5 cm and not greater than 6 cm (injuries are more common when compression depth is greater than 6 cm).



Keep your arms straight

- **Complete Recoil** of the chest
 - After each compression, release all the pressure on the chest.
 - Do not lean on the chest.
- **Minimize interruption on chest compression**
 - Delivery of rescue breaths, shocks, ventilations and rhythm analysis lead to pauses in chest compression
 - Pre- and post-shock pauses of **less than 10s**

8. RESCUE BREATH

(compression to ventilation ratio 30:2)



Bag-valve-mask (BVM) ventilation

- Position yourself directly above the victim's head.
- Place the mask on the victim's face, using the bridge of the nose as a guide for correct position.
- Use the E-C clamp technique to hold the mask in place while you lift the jaw to hold the airway open:
 - perform head tilt.
 - use the thumb and index finger of one hand to make a "C" on the side of the mask, pressing the edges of the mask to the face.
 - use remaining fingers to tilt angles of the jaw (3 fingers form an "E").
- Squeeze the bag to give breaths (1 second each) while watching for chest rise.



Mouth to mask ventilation

- Position yourself at the victim's side.
- Place the mask on the victim's face and seal the mask against the face.
- Place index finger and thumb along the edge of the mask, remaining fingers along the bony margin of the jaw and perform head tilt-chin lift to open the airway.
- While you lift the jaw, press firmly and completely around the outside edge of the mask to seal the mask against face.
- Deliver air over 1 second, look for victim's chest rise.

Mouth to mouth rescue breath

- Pinch the soft part of the nose, using the index finger and thumb.
- Allow the mouth to open, but maintain chin lift.
- Take a normal breath and place your lips around the mouth, making sure that you have a good seal.
- Blow steadily into the mouth while watching for the chest to rise, taking about **1 second** as in normal breathing; this is an effective rescue breath.
- Maintaining head tilt and chin lift, take your mouth away from the victim and watch for the chest to fall as air comes out.
- Take another normal breath and blow into the victim's mouth once more to achieve a total of



If **trained** and able combine chest **compressions with rescue breath**



If **untrained** or unable to do rescue breaths
Chest compression only CPR

two effective rescue breaths. **Do not interrupt compressions by more than 10 seconds.**

Then return your hands without delay to the correct position on the chest/sternum and give a further 30 chest compressions.

During delivery of rescue breath:

- **Avoid hyperventilation.**
- The ventilation is over 1 second till there is a visible chest rise.
- This improves venous return.

If you are untrained or unable to do rescue breaths, give chest compression only CPR (continuous compressions at a rate of at least 100–120 per min).

9. DEFIBRILLATION

When AED arrives



If **shock is advised, deliver shock**

Early defibrillation is an essential step in the chain of survival for victims of cardiac arrest.

Defibrillation should be done as soon as it is available in shockable rhythm.

Resume chest compression **immediately** after defibrillation.

When AED arrives :

- a. Switch on the AED
- Attach the electrode pads on the victim's bare chest.
 - If more than one HCW is present, CPR should be continued while electrode pads attached to the chest.
 - Follow the spoken/visual directions.

<p>Continue CPR</p>  <p>Resume CPR 30:2 immediately after defibrillation</p>	<p>If a shock is advised, deliver shock within 5 seconds</p> <ul style="list-style-type: none"> • Ensure that nobody is touching the victim with clear CHANT “I am clear, you are clear, everyone is clear...” • Push shock button as directed (fully automatic AEDs will deliver the shock automatically) • Immediately restart CPR at the compressions:ventilation ratio of 30:2. • Continue as directed by the voice/visual prompts. <p>If no shock is advised, continue CPR as directed by the voice/visual prompts.</p>
	<p>Reassessment</p> <p>After every 5 cycles or 2 minutes of CPR, HCP shall check for normal breathing</p> <p>Do not stop resuscitation until:</p> <ul style="list-style-type: none"> • Victim recovers with normal breathing. • HCP is exhausted. • Assistance arrives to take over CPR. <p>To avoid fatigue, the person applying chest compression should be switched every 5 cycles or 2 minutes.</p>
<p>10. RECOVERY POSITION</p>	<p>If you are certain the victim is breathing normally but is still unresponsive, place the victim in the recovery position.</p> <ul style="list-style-type: none"> • Remove the victim’s glasses, if worn. • Kneel beside the victim and make sure that both his legs are straight.

Recovery Position



Be prepared to restart CPR immediately if the victim deteriorates or stops breathing normally

- Remove the victim's glasses, if worn.
- Kneel beside the victim and make sure that both his legs are straight.
- Place the arm nearest to you at right angles to his body, elbow bent with the hand palm-up.
- Bring the far arm across the chest, and hold the back of the hand against the victim's cheek nearest to you.
- With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground.
- Keeping his hand pressed against his cheek, pull on the far leg to roll the victim towards you on to his side.
- Adjust the upper leg so that both the hip and knees are bent at right angles.
- Tilt the head back to make sure that the airway remains open.
- If necessary, adjust the hand under the cheek to keep the head tilted and facing downwards to allow liquid material to drain from the mouth.
- Check breathing regularly.

Signs that the victim has recovered:

- Waking up
- Moving
- Open eye
- Normal breathing

Table 2 : Rescuer Adult BLS

Health care workers (HCW) may provide additional measures that will improve the effectiveness of patient resuscitation. This can be summarized in the table below:

Location	Duties
<p>HCP1 At the victim's side</p> 	<p>Perform High Quality Chest Compression High quality CPR</p> <ul style="list-style-type: none"> • Rate: 100 to 120 compressions per minute • Depth: at least 5 cm not greater than 6 cm - injuries are more common when compression depth is greater than 6 cm • Complete Recoil of the chest - After each compression, release all the pressure on the chest - Do not lean on the chest • Minimize interruption on chest compression - Delivery of rescue breaths, shocks, ventilations and rhythm analysis lead to pauses in chest compression - Pre- and post-shock pauses of less than 10 s • Avoid hyperventilation <ul style="list-style-type: none"> - The ventilation is over 1 second till there is a visible chest rise - This is to improve venous return <p>Switch duties with the HCP2 every 5 cycles or about 2 minutes, taking < 5 seconds to switch.</p>
<p>HCP2 At the victim's head</p>	<p>Maintain an open airway using either</p> <ul style="list-style-type: none"> • Head tilt chin lift or • Jaw thrust <p>Give breaths, watching for chest rise and avoid hyperventilation.</p> <p>Continue with chest compressions and rescue breaths in a ratio of 30:2.</p> <p>Switch duties with the HCP1 every 5 cycles or about 2 minutes, taking < 5 seconds to switch.</p>

	<p>Notes: Once advance airway like Laryngeal Mask Airway (LMA) is inserted or patient is intubated, no more synchronization between two HCW are required.</p> <p>The first HCW does 100 to 120 compressions per minute and the second HCW ventilates the victim every 5 to 6 seconds.</p>
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CHAPTER 5

PAEDIATRIC BASIC LIFE SUPPORT

1. Introduction

The majority of paediatric cardiorespiratory arrests are mostly caused by respiratory insufficiency but not due to primary cardiac problem. Ventilation is a very important component of CPR in children.

Health care workers (HCW) who are unable or unwilling to provide breaths should be encouraged to perform at least compression-only CPR. A child is far more likely to be harmed if the bystander does nothing.

All HCPs should initiate CPR in children even if they haven't been taught specific paediatric techniques. CPR should be started with the compression: ventilation ratio of 15:2.

INFANT AND CHILD 1 YEAR OF AGE TO PUBERTY BLS SEQUENCE

Sequence for Paediatric and infant BLS

<p>Danger</p>	<p>Wear PPE (gloves, apron, mask) if available Look out for blood spills, sharps, electric wires etc</p>
<p>Make sure it is safe to help</p>	
<p>Responsiveness</p>	<p>Gently stimulate the child and ask, Are you alright?</p>
<p>Check the child for a response</p>	
<p>Shout for help</p>	<p>Emergency! Emergency! Bring the resus trolley and defibrillator!</p>
<p>Ask for help and a defibrillator</p>	
<p>Airway</p>	<p>Perform head tilt-chin lift</p>
<p>Open the airway</p>	
<p>Breathing</p>	<p>Look for normal breathing in not more than 10 seconds if not breathing or abnormal breathing (gasp) is seen, give 5 rescue breaths</p>
<p>Assess for normal breathing</p>	
<p>Circulation</p>	<p>In less than 10 seconds:</p> <ul style="list-style-type: none"> • Look for signs of life • Check for pulse • Start chest compressions if pulse • High quality chest compressions • 15 compressions: 2 ventilations • Each ventilation in 1 second <p><60/min with poor perfusion</p>
<p>Start chest compression</p>	
<p>Defibrillation</p>	<ul style="list-style-type: none"> • Attach AED/Manual defibrillator • Do not interrupt chest compression • Follow AED voice prompt • For manual defibrillator, shock if VF or pulseless VT recognized • Immediately continue CPR
<p>Assess for need to shock</p>	

Table 1: Paediatric BLS sequence

Sequence	Technical Description
<p>1. Danger</p>	<p>Ensure the safety of rescuer and child.</p>
<p>2. Responsiveness</p> 	<p>Check the child's responsiveness:</p> <ul style="list-style-type: none"> • Gently stimulate the child and ask loudly, 'Are you all right?' • If the child responds by answering or moving: • Leave the child in the position in which you find him (provided he is not in further danger). • Check his condition and get help if needed. • Reassess. <p>*The decision to start CPR should take less than 10 seconds from starting the initial assessment of the child's circulatory status and if there is still doubt after that time, start CPR.</p>
<p>3. Shout for Help</p> 	<p>If the child does not respond:</p> <ul style="list-style-type: none"> • HCW to get help as quickly as possible when a child collapses. • When more than one HCW is available, one (or more) starts resuscitation while another goes for assistance. • If only one HCW is present, undertake resuscitation for about 1 min before going for assistance.

4. Airway



Sniffing position in child



Jaw thrust

Turn the child onto his back and open the airway using **head tilt and chin lift** :

- Place your hand on his forehead and gently tilt his head back.
- With your fingertip(s) under the point of the child's chin, lift the chin.
- Do not push on the soft tissues under the chin as this may block the airway.
- If you still have difficulty in opening the airway, try the jaw thrust method: place the first two fingers of each hand behind each side of the child's mandible (jaw bone) and push the jaw forward.

5. Breathing



look listen feel technique

Keeping the airway open, **look, listen, and feel** for normal breathing by putting your face close to the child's face and looking over the chest:

- Look for chest movements.
- Listen at the child's nose and mouth for breath sounds.
- Feel for air movement on your cheek.
- Look, listen, and feel for not more than 10 seconds before deciding – if you have any doubts whether breathing is normal, act as if it is not normal.
 - **In the first few minutes after cardiac arrest a child may be taking infrequent noisy gasps.**
 - **Do not confuse this with normal breathing.**

If the child is breathing normally:

- Turn the child onto his side into the recovery position.
- Send or go for help – call the relevant emergency number. Only leave the child if no other way of obtaining help is possible.
- Check for continued normal breathing.



Airway opening using 'C' clamp

If the breathing is NOT normal or absent:

- Carefully remove any obvious airway obstruction.
- Give **5 initial rescue breaths**.
- Although rescue breaths are described here, it is common in HCP to have access to bag-mask devices.
- While performing the rescue breaths note any gag or cough response to your action. These responses, or their absence, will form part of your assessment of 'signs of life', described below.

Rescue breaths:

- Ensure head tilt and chin lift.
- Pinch the soft part of the nose with the index finger and thumb of your hand on his forehead.
- Open his mouth a little, but maintain the chin lift.
- Take a breath and place your lips around his mouth, making sure that you have a good seal.
- Blow steadily into his mouth over 1 second sufficient to make the chest rise visible.
- Maintaining head tilt and chin lift, take your mouth away and watch for his chest to fall as air comes out.
- Take another breath and repeat this sequence four more times. Identify effectiveness by seeing that the child's chest has risen and fallen in a similar fashion to the movement produced by a normal breath.
- If you have difficulty achieving an effective breath, the airway may be obstructed:
 - Open the child's mouth and remove any visible obstruction. Do not perform a blind finger sweep.
 - Ensure that there is adequate head tilt and chin lift but also that the neck is not over extended.

	<ul style="list-style-type: none"> - If head tilt and chin lift has not opened the airway, try the jaw thrust method. - Make up to 5 attempts to achieve effective breaths (indicated by good chest rise). If still unsuccessful, move on to chest compression.
<p>6. Circulation</p>  <p>Pulse check in child</p> 	<p>Assess the circulation (signs of life): Take not more than 10 seconds to:</p> <ul style="list-style-type: none"> • Look for signs of life. These include any movement, coughing, or normal breathing (not abnormal gasps or infrequent, irregular breaths). • If you check the pulse take not more than 10 seconds : <ul style="list-style-type: none"> - Feel for the carotid pulse in the neck. <p style="text-align: center;">Or</p> <ul style="list-style-type: none"> - Femoral pulse in the groin (mid-way between the anterior superior iliac spine and the symphysis pubis) • If confident that you can detect signs of a circulation within 10 seconds: <ul style="list-style-type: none"> - Continue rescue breathing, if necessary, until the child starts breathing effectively on his own. - move to STEP 8 - Re-assess the child frequently. • If there are no signs of life or the pulse rate is less than 60 beats/min : <ul style="list-style-type: none"> - Start chest compressions. - Combine rescue breathing and chest compressions. <p>For all children, compress at the lower sternum area.</p>

Chest Compression

- Locate the xiphisternum by finding the angle where the lowest ribs join in the middle.
- Compress the sternum one finger's breadth above the xiphisternum.
- Place the heel of one hand over the lower half of the sternum.
- Lift the fingers to ensure that pressure is not applied over the child's ribs.
- Avoid compressing the upper abdomen area.
- Position yourself vertically above the victim's chest and, with your arm straight, compress the sternum.
- Compression should be sufficient to depress the sternum by at least **1/3 (one-third) of the depth of the chest**, which is approximately **5 cm** for a child.
- Release the pressure completely, and repeat at a rate of 100 - 1200 per min.
- Allow the chest to return to its resting position before starting the next compression.
- After 15 compressions, tilt the head, lift the chin, and give two effective breaths.
- Continue compressions and breaths in a **ratio of 15:2**.
- In larger children, use adult chest compression method.

Continue resuscitation until :

- The child shows signs of life (normal breathing, cough, movement or definite pulse of greater than 60 beats/min).
- Further qualified help arrives.
- You become exhausted.

<p>7. Defibrillation</p> 	<ul style="list-style-type: none"> • Assess need to shock • Attach AED/Manual defibrillator. • Do not interrupt chest compression. • Follow AED voice prompt. • For manual defibrillator, shock if VF or pulseless VT recognized. • Immediately continue CPR. <p>*For Manual Defibrillator:</p> <ul style="list-style-type: none"> - Select largest possible available paddles. Recommended sizes are : - 4.5cm diameter for infants and children less than 10kg, - 8-12 cm diameter for children more than 10kg (older than 1 year)
<p>8. Recovery position</p>  <p>recovery position</p>	<p>An unconscious child whose airway is clear and who is breathing normally should be turned onto the side into the recovery position.</p> <p>The important principles to be followed are:</p> <ul style="list-style-type: none"> • Place the child in as near a true lateral position as possible to enable the drainage of fluid from the mouth. • Ensure the position is stable. • There should be no pressure on the chest that impairs breathing. • It should be possible to turn the child onto his side and to return him back easily and safely, taking into consideration the possibility of cervical spine injury. • Ensure the airway is accessible and easily observed. • The adult recovery position is suitable for use in children.

Table 2 : Infant BLS Sequence for HCP

<p>1. Danger</p>	<p>Ensure the safety of HCP and infant</p>
<p>2. Responsiveness</p> 	<p>Check the responsiveness:</p> <ul style="list-style-type: none"> • Gently stimulate him and ask loudly, ‘Are you all right?’. • If there is response either by answering or moving: <ul style="list-style-type: none"> - Leave the infant in the position in which you find him (provided he is not in further danger). - Check his condition and get help if needed. - Reassess. <p>*The decision to start CPR should take less than 10 seconds from starting the initial assessment.</p>
<p>3. Shout for help</p> 	<p>If the infant does not respond</p> <ul style="list-style-type: none"> • HCW to get help as quickly as possible. • When more than one HCP is available, one (or more) starts resuscitation while another goes for assistance. • If only one HCW is present, undertake resuscitation for about 1 min before going for assistance.

4. Airway



infant- neutral position



Turn the infant onto his back and open the airway using head tilt and chin lift:

- Place your hand on his forehead and gently tilt his head back.
- With your fingertip(s) under the point of the infant's chin, lift the chin.
- Do not push on the soft tissues under the chin as this may block the airway.
- If you still have difficulty in opening the airway, try the jaw thrust method: place the first two fingers of each hand behind each side of the infant's mandible (jaw bone) and push the jaw forward.

5. Breathing



Keeping the airway open, look, listen, and feel for formal breathing by putting your face close to the infant's face and looking over the chest:

- Look for chest movements.
- Listen at the nose and mouth for breath sounds
- Feel for air movement on your cheek.
- In the first few minutes after cardiac arrest an infant may be taking infrequent noisy gasps.
- Do not confuse this with normal breathing. Look, listen, and feel for not more than 10 seconds before deciding – if you have any doubts whether breathing is normal, act as if it is not normal.

If the infant is breathing normally:

- Turn infant into the recovery position.
- Send or go for help – call the relevant emergency number. Only leave if no other way of obtaining help is possible.
- Check for continued normal breathing.



If the breathing is NOT normal or absent:

- Carefully remove any obvious airway obstruction.
- Give **5 initial rescue breaths**.
- Although rescue breaths are described here, it is common in HCW to have access to bag-mask devices.
- While performing the rescue breaths note any gag or cough response to your action. These responses, or their absence, will form part of your assessment of 'signs of life', described below.

Rescue breaths for an infant:

- Ensure a **neutral position of the head** (as an infant's head is usually flexed when supine, this may require some extension) and apply chin lift.
- Take a breath and **cover the mouth and nasal apertures** of the infant with your mouth, making sure you have a good seal.
- If the nose and mouth cannot both be covered in the older infant, the rescuer may attempt to seal only the infant's nose or mouth with his mouth (if the nose is used, close the lips to prevent air escape).
- Blow steadily into the infant's mouth and nose over 1 second sufficient to make the chest rise visible.
- Maintain head position and chin lift, take your mouth away, and watch for his chest to fall as air comes out.
- Take another breath and repeat this sequence four more times.
- If you have difficulty achieving an effective breath, the airway may be obstructed:
 - Open the mouth and remove any visible obstruction. Do not perform a blind finger sweep.

	<ul style="list-style-type: none"> • Ensure that there is adequate head tilt and chin lift but also that the neck is not over extended. • If head tilt and chin lift has not opened the airway, try the jaw thrust method. • Make up to 5 attempts to achieve effective breaths. If still unsuccessful, move on to chest compression.
<p>6. Circulation</p>  <p>Pulse check in infant</p>	<p>Assess the circulation (signs of life): Take not more than 10 seconds to:</p> <ul style="list-style-type: none"> • Look for signs of life. These include any movement, coughing, or normal breathing (not abnormal gasps or infrequent, irregular breaths). • If you check the pulse take not more than 10 seconds: • Feel for the brachial pulse on the inner aspect of the upper arm. • Femoral pulse in the groin also can be used. • If confident that you can detect signs of a circulation within 10 seconds: <ul style="list-style-type: none"> - Continue rescue breathing, if necessary, until the infant starts breathing effectively on his own. - Turn onto his side (into the recovery position) if he starts breathing effectively but remains unconscious. - Re-assess frequently.



Two fingers technique



Encircling technique

If there are no signs of life, unless you are **CERTAIN** that you can feel a definite pulse of greater than 60 beats/ min within 10 seconds:

- Start chest compressions.
- Combine rescue breathing and chest compressions.
- Compress the sternum one finger's breadth above this.
- Compression should be sufficient to depress the sternum by at least **1/3 (one-third)** of the depth of the chest, which is approximately **4 cm**
- Release the pressure completely, then repeat at a rate of **100–120** per min.
- Allow the chest to return to its resting position before starting the next compression.
- After 15 compressions, tilt the head, lift the chin, and give two effective breaths.
- Continue compressions and breaths in a ratio of **15:2**.

Chest compression in infants:

- Lone HCW should compress the sternum with the **tips of two fingers**.
- If there are two or more HCPs, use the **encircling technique**:
- Place both thumbs flat, side-by-side, on the lower half of the sternum with the tips pointing towards the infant's head.
- Spread the rest of both hands, with the fingers together, to encircle the lower part of the infant's rib cage with the tips of the fingers supporting the infant's back.
- Press down on the lower sternum with your two thumbs to depress it at least one-third of the depth of the infant's chest, or approximately 4 cm

	<p>Continue resuscitation until:</p> <ul style="list-style-type: none"> • The infant shows signs of life (normal breathing, cough, movement or definite pulse of greater than 60 beats/ min). • Further qualified help arrives. • You become exhausted.
<p>7. Recovery position</p>  <p>recovery position</p> 	<p>An unconscious infant whose airway is clear and who is breathing normally should be turned onto the side into the recovery position.</p> <p>The important principles to be followed are:</p> <ul style="list-style-type: none"> • Place the infant in as near a true lateral position as possible to enable the drainage of fluid from the mouth. • Ensure the position is stable: <ul style="list-style-type: none"> - A small pillow or a rolled-up blanket may be placed behind infant back to maintain the position. - There should be no pressure on the chest that impairs breathing. - It should be possible to turn the infant onto his side and to return him back easily and safely, taking into consideration the possibility of cervical spine injury. - Ensure the airway is accessible and easily observed.

CHAPTER 6

AUTOMATED EXTERNAL DEFIBRILLATOR (AED)

Defibrillation/AED (Automated External Defibrillator)

Chain of survival



Figure 1 : Chain of survival

Early defibrillation is one of the key link in the chain of survival. 80-90% of sudden cardiac death is due to ventricular fibrillation/ pulseless ventricular tachycardia (VT). The survival rate reduces by 7-10% each minute #without early CPR and early defibrillation in a shockable rhythm (VF/ pulseless VT). The survival rate is about 3-5% only if CPR is provided. However, the survival rate will increase drastically to 30-70% by giving early CPR and early defibrillation.

AED (Automated External Defibrillator) is a portable, battery operated device that can automatically analyze the cardiac rhythm. It required electric shock if it is a shockable rhythm. It is very simple to operate, allowing laypersons and healthcare providers to attempt defibrillation safely.

During VF, the heart muscle fibers quiver and do not contract to pump blood. Defibrillation delivers a preset electric current across the heart muscle fibers to stop the quivering and restore the normal cardiac rhythm of the heart.

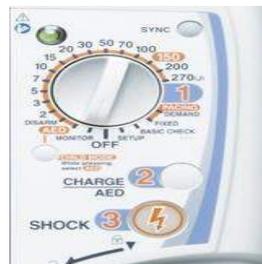
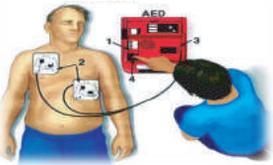


Figure 2 : Defibrillator machine with AED function

Table 1 : AED usage and technique.

Sequence	Technical Description
<p>Danger Response Shout For help</p>	<p>As stated in BLS sequence</p>
<p>1. POWER ON the AED</p> 	<ul style="list-style-type: none"> Place the AED next to the patient and open the carrying case or the top of the AED. Turn the power on (some devices will “power on” automatically when you open the lid or case).
<p>2. ATTACH AED pads</p>  <p>Attach AED pad</p>  <p>Placement of pads</p>	<ul style="list-style-type: none"> Choose adult pads for victims 8 years of age or older. Peel open the AED pads Attach the adhesive pads to the victim’s bare chest. <ul style="list-style-type: none"> place one AED pad on the victim’s right upper chest (directly below clavicle) place another AED pad to the side of the apex of the heart The placement of the AED should not interrupt the chest compression Any open flow of oxygen should be diverted away from the chest to avoid fire hazard



Pads placement in infant
(antero-posterior)

Children aged between 1 and 8 years old:

- Special pediatric pads should be used for children aged 1-8 years old. In situation in which there is no AED with a pediatric dose-attenuator system, the HCP may use an adult AED. For infants, a manual defibrillator is preferred. The pads should be applied as in adults or in antero-posterior (back – front) position.

3. “Clear” the victim and ANALYZE the rhythm



Clear the victim during the analysis of the cardiac rhythm

- AED will prompt you to clear the victims during rhythm analyzing. Be sure no one touches the victim, including the HCW in charge of giving breath.
- Some defibrillator with AED function will prompt the operator to push a button for analyzing the heart rhythm; others will do that automatically.
- The AED then tells you if a shock is needed

<p>4. If the AED advises a shock, it will tell you to clear the victim.</p>	<ul style="list-style-type: none"> • Clear the victim from contact with people before delivering the shock; be sure no one is touching the victim. • Loudly shout out “CLEAR” and perform a rapid visual scan to ensure everyone is cleared from touching the patient. • The rescuer should then press the SHOCK button • The shock will be delivered by producing a sudden contraction of the victim’s muscle.
	<p>Immediately resume CPR after delivering of the shock. However, if the shock is not indicated, there will be no shock advice from AED and the HCW has to continue with chest compression immediately.</p>
	<p>After 5 cycles or 2 minutes of CPR, the device will prompt you to repeat step 3 and 4. If “no shock advised”, the HCW should immediately restart CPR beginning with chest compression.</p>

Notes: In some AEDs, there will be real-time feedback to monitor the quality of CPR, enabling the HCP should improve the quality of CPR according the real-time feedback.

Special situation

1. Hairy chest

A hairy chest will impede the flow of the electricity from the pads through the chest; hinder the adherence of the pads and possibly be a fire hazard. Thus, it is advisable to shave the area in which the pads are to be placed.

2. Immersed in the water or water is covering the victim's chest

Water is a good conductor of the electricity and this will prevent the delivery of the adequate dose of shock to the heart. The victim should be removed from the water prior to attaching the pads. If the chest is covered with water, use a towel to wipe the area before attaching the pads.

3. Implantable defibrillator and pacemaker

The victim may have an ICD (Implantable Cardiac Defibrillator) or pacemaker placed beneath the skin at the upper chest or abdomen. In this case, the HCP should avoid placing the AED pad over the ICD/ pacemaker as it may block the delivery of the shock to the heart. If the ICD is delivering a shock, allow 30-60 seconds for the implantable defibrillator to complete the treatment cycle before delivering a shock from the AED.

4. Transdermal medication patches

Do not place the AED pads direct on top of medication pads (nitroglycerin, nicotine etc) as they may block the transfer of energy to the heart and may cause small burn to the skin. We may remove the patch and wipe the area clean before attaching the AED pads.

CHAPTER 7

FOREIGN BODY AIRWAY OBSTRUCTION (FBAO) OR CHOKING

Adult with foreign body obstruction or Choking

Choking is an uncommon but potentially treatable cause of accidental death. As most choking events are associated with eating, they are commonly witnessed. As victims are initially conscious and responsive, early interventions can be life-saving.

Recognition

Choking usually occurs while the victim is eating or drinking. People at increased risk of choking include those with reduced consciousness, drug and/or alcohol intoxication, neurological impairment with reduced swallowing and cough reflexes (e.g. stroke, Parkinson's disease), respiratory disease, mental impairment, dementia, poor dentition and older age.

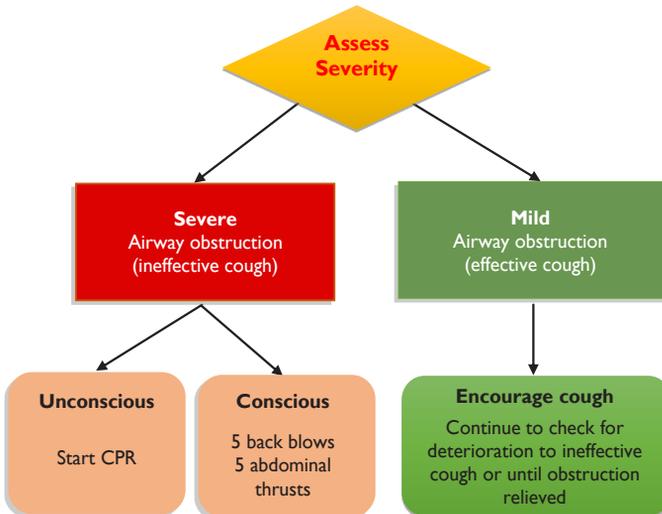


Figure 1: Adult FBAO Algorithm

Table 1: Sequence of steps for managing the adult victim who is choking

SEQUENCE	Technical description
<p data-bbox="155 363 380 386">1. SUSPECT CHOKING</p> 	<p data-bbox="441 363 853 386">Be alert to choking particularly if victim is eating</p> <p data-bbox="441 497 736 520">UNIVERSAL SIGN OF CHOKING</p>
<p data-bbox="155 762 347 807">2. ENCOURAGE TO COUGH</p>	<p data-bbox="441 762 642 785">Instruct victim to cough</p>
<p data-bbox="155 893 375 916">3. GIVE BACK BLOWS</p> 	<p data-bbox="441 893 908 916">If cough becomes ineffective give up to 5 back blows</p> <ul data-bbox="473 938 952 992" style="list-style-type: none">• Give five sharp blows between the shoulder blades with the heel of your hand.

4. GIVE ABDOMINAL THRUSTS



If back blows are ineffective give up to **5 abdominal thrusts**

- Clench your fist and place it between the umbilicus (navel) and the ribcage
- Grasp this hand with your other hand and pull sharply inwards and upwards
- Repeat up to five times
- If the obstruction is still not relieved, continue **alternating five back blows with five abdominal thrusts**

5. START CPR



Start CPR if the victim becomes unresponsive

- Support the victim carefully to the ground
- Immediately activate the Emergency Response Service (ERS)

Begin CPR with chest compressions

As you open the airway to give ventilations, look in the person's mouth for any visible object. If you can see it, use a finger sweep motion to remove it. If you don't see the object, do not perform a blind finger sweep, but continue CPR. Remember to never try more than 2 ventilations during one cycle of CPR, even if the chest does not rise.

Continuing cycles of 30 compressions and 2 ventilations is the most effective way to provide care. Even if ventilations fail to make the chest rise, compressions may help clear the airway by moving the blockage into the upper airway where it can be seen and removed.

Treatment for mild airway obstruction

Encourage patient to cough in order to generate high and sustained airway pressures which may expel foreign body.

Put victims under continuous observation until they improve, as severe airway obstruction may develop subsequently.

Treatment for severe airway obstruction

Approximately 50% of airway obstructions following choking are not relieved by a single technique.

Success rate is increased when combinations of back blows or slaps, and abdominal and chest thrusts are used.

Treatment of choking in an unresponsive victim

Higher airway pressures can be generated using chest thrusts compared with abdominal thrusts.

Bystander initiation of chest compressions for unresponsive or unconscious victims of choking is associated with improved outcomes.

Therefore, start chest compressions promptly if the victim becomes unresponsive or unconscious. After 30 compressions, attempt 2 rescue breaths, and continue CPR until the victim recovers and starts to breathe normally.

Aftercare and referral for medical review

Following successful treatment of choking, foreign material may remain in the upper or lower airways and cause complications later.

Patients presenting with signs and symptoms below should seek medical advice.:

1. persistent cough
2. difficulty swallowing
3. sensation of an object still being stuck in the throat

Abdominal thrusts and chest compressions can potentially cause serious internal injuries and all victims successfully treated with these measures should be examined afterwards for any injury.

Paediatric Foreign Body Airway Obstruction or Choking

Recognition of choking

Choking is characterized by the sudden onset of respiratory distress associated with

1. coughing,
2. gagging, or
3. stridor.

Suspect choking caused by a foreign body if:

1. The onset is very sudden
2. There are no other signs of illness
3. There are clues to alert the rescuer (e.g. a history of eating or playing with small items immediately prior to the onset of symptoms).

Consider the safest action to manage the choking child:

1. If the child is coughing effectively, then no external maneuver is necessary. Encourage the child to cough, and monitor continuously.
2. If the child's coughing is, or is becoming, ineffective, shout for help immediately and determine the child's conscious level.

Conscious child with choking

1. If the child is still conscious but has absent or ineffective coughing, give 5 back blows.
2. If back blows do not relieve choking, give 5 chest thrusts to infants or abdominal thrusts to children. These maneuvers create an 'artificial cough' to increase intrathoracic pressure and dislodge the foreign body.

General signs of choking	
Witnessed episode	
Coughing or choking	
Sudden Onset	
- Recent history of playing with or eating small object	
Ineffective coughing	Effective coughing
Unable to vocalize	Crying or verbal response to questions
Quiet or silent cough	Loud cough
Unable to breathe	Able to take a breath before coughing
Cyanosis	Fully responsive
Decreasing level of consciousness	

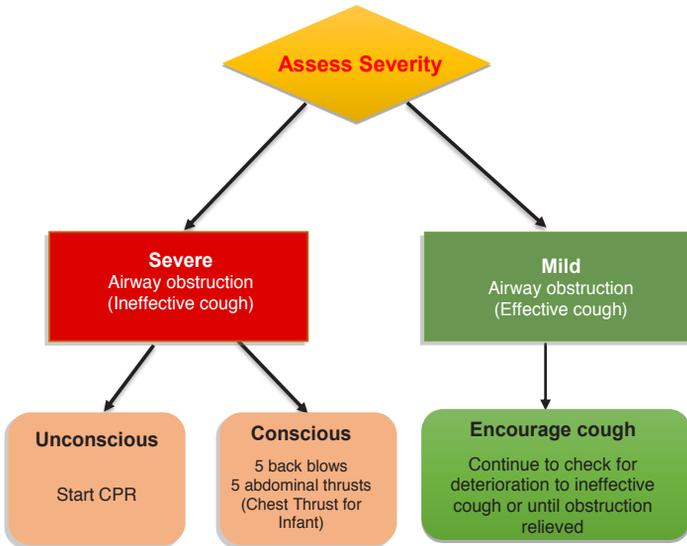


Figure 2: Paediatric FBAO Algorithm

Table 2: Technique for managing a paediatric victim with choking

Technique	Description
<p data-bbox="156 316 369 339">Back blow in an infant</p>  A rescuer wearing white gloves is shown performing a back blow on an infant mannequin. The mannequin is held head-downwards across the rescuer's lap. The rescuer's hand is positioned at the angle of the lower jaw, and the heel of the other hand is used to deliver a sharp back blow to the middle of the back between the shoulder blades.	<ul data-bbox="472 320 980 842" style="list-style-type: none">• Support the infant in a head-downwards, prone position, to enable gravity to assist removal of the foreign body.• A seated or kneeling rescuer should be able to support the infant safely across his lap.• Support the infant's head by placing the thumb of one hand at the angle of the lower jaw, and one or two fingers from the same hand at the same point on the other side of the jaw.• Do not compress the soft tissues under the infant's jaw, as this will exacerbate the airway obstruction.• Deliver up to 5 sharp back blows with the heel of one hand in the middle of the back between the shoulder blades.• The aim is to relieve the obstruction with each blow.
<p data-bbox="156 895 409 946">Back blow in a child over 1 year</p>  A rescuer is shown performing a back blow on a child over 1 year old. The child is positioned head-downwards across the rescuer's lap. The rescuer is supporting the child's head and neck with one hand while using the heel of the other hand to deliver a sharp back blow to the middle of the back between the shoulder blades.	<ul data-bbox="472 898 980 1273" style="list-style-type: none">• Back blows are more effective if the child is positioned head down.• A small-sized child may be placed across the rescuer's lap as with an infant.• If this is not possible, support the child in a forward-leaning position and deliver the back blows from behind.• If back blows fail to dislodge the object, and the child is still conscious, use chest thrusts for infants or abdominal thrusts for children. Do not use abdominal thrusts (Heimlich manoeuvre) for infants.

Chest thrusts for infants



- Turn the infant into a head-downwards supine position. This is achieved safely by placing your free arm along the infant's back and encircling the occiput with your hand.
- Support the infant down your arm, which is placed down (or across) your thigh.
- Identify the landmark for chest compression (lower sternum approximately a finger's breadth above the xiphisternum).
- Deliver up to **5 chest thrusts**. These are similar to chest compressions, but sharper in nature and delivered at a slower rate.
- The aim is to relieve the obstruction with each thrust.

Abdominal thrusts for children over 1 year



- Stand or kneel behind the child. Place your arms under the child's arms and encircle his torso.
- Clench your fist and place it **between the umbilicus and xiphisternum**.
- Grasp this hand with your other hand and pull sharply inwards and upwards.
- Repeat up to 4 more times.
- Ensure that pressure is not applied to the xiphoid process or the lower rib cage as this may cause abdominal trauma.
- The aim is to relieve the obstruction with each thrust.

Following chest or abdominal thrusts reassess the child:

- If the object has not been expelled and the victim is still conscious, continue the sequence of back blows and chest (for infant) or abdominal (for children) thrusts.
- Call out, or send, for help if it is still not available.
- Do not leave the child at this stage.
- If the object is expelled successfully, assess the child's clinical condition. It is possible that part of the object may remain in the respiratory tract and cause complications. If there is any doubt, seek medical assistance.
- If the child regains consciousness and is breathing effectively, place him in a safe side-lying (recovery) position and monitor breathing and conscious level whilst awaiting the arrival of the ambulance.

START CPR



Unconscious child with choking

- If the choking child is, or becomes, unconscious place him on a firm, flat surface.
- Call out, or send, for help if it is still not available.
- Do not leave the child at this stage.

a. Airway opening:

- Open the mouth and look for any obvious object.
- If one is seen, make an attempt to remove it with a single finger sweep.
- Do not attempt blind or repeated finger sweeps – these can push the object more deeply into the pharynx and cause injury.

b. Rescue breaths:

- Open the airway and attempt 5 rescue breaths.
- Assess the effectiveness of each breath: if a breath does not make the chest rise, reposition the head before making the next attempt.

c. Chest compression and CPR:

- Attempt 5 rescue breaths and if there is no response, proceed immediately to chest compression regardless of whether the breaths are successful.
- Follow the sequence for single rescuer CPR for approximately 1 min before summoning an ambulance (if this has not already been done by someone else).

- When the airway is opened for attempted delivery of rescue breaths, look to see if the foreign body can be seen in the mouth.
- If an object is seen, attempt to remove it with a single finger sweep.
- If it appears that the obstruction has been relieved, open and check the airway as above. Deliver rescue breaths if the child is not breathing and then assess for signs of life. If there are none, commence chest compressions and perform CPR.
- If the child regains consciousness and is breathing effectively, place him in a safe side-lying (recovery) position and monitor breathing and conscious level whilst awaiting the arrival of the ambulance.

CHAPTER 8

AIRWAY MANAGEMENT

Mouth-to-Barrier Device Breathing

Health care provider is recommended to use standard precaution such as the pocket mask. This mask has a 1-way valve that diverts exhaled air, blood/body fluid away from rescuer.



Figure 1 : Pocket mask



Figure 2 : Giving mouth to mask breath (Adult)



Figure 3 : Giving mouth to mask breath (Paediatric)

9.2 Bag-Mask Device

Bag-mask device consists of a bag (with 1-way valve) attached to a face mask. It is used to give positive-pressure ventilation during CPR. Adequate ventilation is achieved when rescuer squeeze the bag to give breath (1 sec each) and there is visible chest rise.

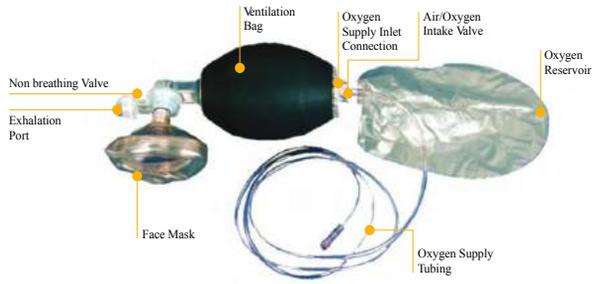


Figure 4 : Bag-Mask Device

E-C clamp technique and 2 hands technique



Figure 5 : One hand technique
(E-C clamp technique)



Figure 6 : Two hands technique
(E-C clamp technique)

Laryngeal Mask Airway (LMA)

LMA is an advanced airway device. It is widely used by healthcare providers, either for the out-of-hospital cardiac arrest or in-hospital cardiac arrest. It can provide adequate ventilation during resuscitation and easy to be used. However, the only problem with LMA is, it can never prevent aspiration during assist ventilation. There are various sizes available. When LMA is in place during 2-rescuer CPR, no more cyclical CPR (30 compression: 2 ventilation) is applied. Rescuers are to give 1 breath every 6 sec (10 breaths per minute) and continue compression 100-120 per minute

Hazards and risk of infection from CPR is extremely low. However, standard precautions including using barrier devices, such as pocket mask is essential

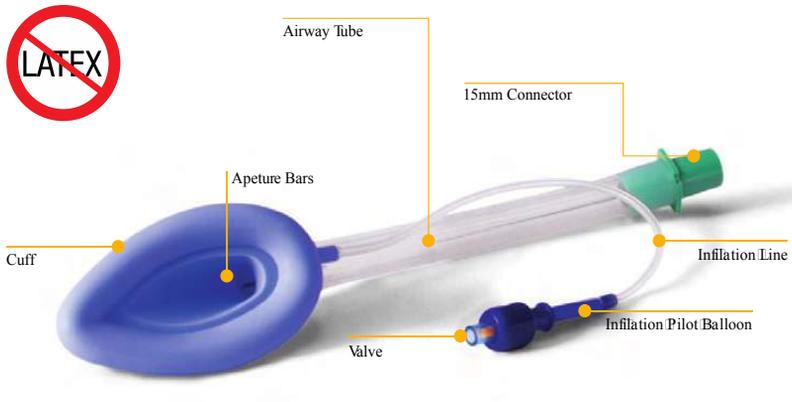


Figure 7 : Laryngeal Mask Airway (LMA)

Table 1: Sizes of LMA

Size of LMA	Weight of patient	Max Air in Cuff Not to Exceed
Size 1	< 5 kg	4 ml
Size 1.5	5 to 10 kg	7 ml
Size 2	10 to 20 kg	10 ml
Size 2.5	20 to 30 kg	14 ml
Size 3	30 to 50 kg or small adult	20 ml
Size 4	50 to 70 kg (adult)	30 ml
Size 5	> 70 kg (large adult)	40 ml

APPENDIX

The image features a minimalist design with the word 'APPENDIX' centered in a black, serif font. The background is white, accented by abstract, flowing lines. A prominent teal-colored wave-like shape curves across the lower half of the page, while a grey, semi-transparent version of a similar shape is positioned below it. On the right side, a vertical stack of thin, grey lines forms a textured, columnar shape that overlaps with the teal wave.

Appendix

Step of BLS for Adult, children and Infants

Component	Recommendation		
	Adult	Children	Infants
Recognition	Unresponsive		
CPR sequence	DRSABCD	DRSABCD	DRSABCD
Compression rate	100-120 compression per minute	100-120 compression per minute	100-120 compression per minute
Compression Depth	5cm but not more than 6cm	at least 1/3 the depth of the chest or 5 cm	at least 1/3 the depth of the chest or 4 cm
Chest Wall recoil	Allow complete recoil after each compression		
Compression intruption	Minimised interruption in chest compression and limit interruption less than 10 seconds		
Compression- ventilation ratio	30:2	One HCW CPR - 15:2	One HCW CPR - 15:2
		2 Two HCW CPR 15:2	2 Two HCW CPR - 15:2
Ventilation with advanced airway	1 breath every 6-8 seconds		
Defibrillation	Use AED as soon as available		

BLS Checklist

Station: One (1) man CPR

SKILL TEST FOR ONE (1) MAN CPR		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
1	DANGER	
	Wear PPE (gloves, apron, mask), look out for blood spills, sharps, electric wires, Unsteady beds, trolley	
2	RESPONSE	
	A. Shoulder Tap	
	B. Shout & Speak	
3	SHOUT FOR HELP	
	Shout 'Emergency! Emergency! Bring the resuscitation trolley and defibrillator!'	
4	AIRWAY	
	A. Head Tilt Chin Lift	
	B. Jaw Thrust	
5	BREATHING	
	Absent / abnormal breathing	
	Determined simultaneously while opening the airway by looking at the chest, neck and face for not more than 10s.	
	Chest compression shall begin with absence of normal breathing.	
	Normal breathing	
	Recovery position	
6	CIRCULATION	
	A. Location (Middle of chest, lower half of sternum)	
	B. Rate (100-120/min)	
	C. Depth (5-6 cm)	
	D. Full recoil after each compression	
	E. Minimize Interruption	
	F. 30 compressions: 2 ventilations	
	G. Each ventilation in 1 second	

7	PULSE CHECK (After 5 cycles/ 2 minutes)	
	Pulse Present, Abnormal or No Breathing (not more than 10 sec --> ventilation I in 5-6 seconds	
	Pulse & Breathing Present ----> recovery position	
	Recovery Position	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

BLS Checklist

Station: Two (2) man CPR

SKILL TEST FOR TWO (2) MAN CPR		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
1	DANGER	
	Wear PPE (gloves, apron, mask), look out for blood spills, sharps, electric wires, Unsteady beds, trolley	
2	RESPONSE	
	A. Shoulder Tap	
	B. Shout & Speak	
3	SHOUT FOR HELP	
	Shout 'Emergency! Emergency! Bring the resuscitation trolley and defibrillator!'	
4	SECOND RESCUER IDENTIFY SELF	
5	AIRWAY	
	A. Head Tilt Chin Lift	
	B. Jaw Thrust	
5	BREATHING	
	Absent / abnormal breathing	
	Determined simultaneously while opening the airway by looking at the chest, neck and face for not more than 10s.	
	Chest compression shall begin with absence of normal breathing.	
	Normal breathing	
	Recovery position	
6	CIRCULATION	
	A. Location (Middle of chest, lower half of sternum)	
	B. Rate (100-120/min)	
	C. Depth (5-6 cm)	
	D. Full recoil after each compression	
	E. Minimize Interruption	

	F. 30 compressions: 2 ventilations	
7	PULSE CHECK (After 5 cycles/ 2 minutes)	
	Pulse & Breathing Present ----> recovery position	
	Pulse Present, Abnormal or No Breathing (not more than 10 sec) Ventilation 1 in 5-6 seconds	
	Pulse absent -> to switch rescuer	
8	CHANGING PROCESS	
	Switch rescuer after completed 5 cycles or 2 minutes.	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

BLS Checklist

Station: Infant CPR

SKILL TEST FOR INFANT CPR		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
1	DANGER (Wear PPE (gloves, apron, mask), look out for blood spills, sharps, electric wires)	
2	RESPONSE A. Shout & Speak- call baby B. Tap baby soles	
3	SHOUT FOR HELP Shout 'Emergency! Emergency! Bring the resuscitation trolley and defibrillator!'	
4	AIRWAY Head Tilt Chin Lift	
5	BREATHING Look for normal breathing should not take more than 10 seconds.	
<u>Absent or abnormal breathing</u>		
	Give 5 initial rescue breaths (Duration of delivering a breath is about 1 second sufficient to produce a visible chest rise)	
<u>Normal breathing</u>		
	Turn him on his side into the recovery position. Send or go for help. Check for continuous normal breathing.	
6	CIRCULATION Brachial Pulse Felt (not more than 10 sec)	
	Start chest compression	
	Technique: For one rescuer CPR in an infant, the rescuer compresses with the tips of 2 fingers. For two rescuers CPR in an infant, the two thumb chest compression technique is used.	
	Site of Compression Lower half of the sternum	

	Depth of Compression: At least 1/3 the depth of the chest or 4 cm	
	Rate of Compression: Push at the rate of at least 100-120/mm	
	Ratio of Compressions to Breaths: One Rescuer CPR - 15:2 Two Rescuers CPR - 15:2	
	Pulse Present/ pulse \geq 60b/min (No Breathing/inadequate breathing) Give breathing 12-20 breaths/min for 2 min	
<u>Pulse present / pulse \geq 60 b /min and normal breathing</u>		
	Recovery Position	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

BLS Checklist

Station: Adult Choking

SKILL TEST FOR ADULT CHOKING		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
1.	Ask	
	Are you choking? Are you ok?	
2	Perform	
	Apply 5 back blows	
	Apply 5 abdominal thrusts	
	Alternate 5 back blows with 5 abdominal thrusts if obstruction not relieved	
	Perform chest thrust for pregnant and very obese victims	
3	Victim unconscious	
	Put patient in supine position. Call ambulance 999	
4	Check airway for foreign body	
	Look in mouth for foreign body. Remove foreign body if seen	
5	Start 30 chest compressions	
6	Check airway for foreign body	
	Look in mouth for foreign body Remove foreign body if seen	
7	Open airway and try ventilate	
	Attempt to ventilate, if unsuccessful, reposition victim's head and re-attempt ventilation	
8	Repeat steps 5 to 7 until able to give 2 successful ventilations	
9	Proceed to look for breathing. If breathing present, place victim in the recovery position.	
10	If no breathing, proceed to CPR cycles.	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

BLS Checklist

Station: Infant Choking

SKILL TEST FOR INFANT CHOKING		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
<u>Conscious Patient</u>		
1	Assess level of consciousness	
	Tap the shoulder	
	Call the patient	
2	Perform back blow and chest thrust	
	Correct positioning and technique	
	A. Support the infant in a head-downwards, prone position by placing the thumb of one hand at the angle of the lower jaw.	
	B. Deliver up to 5 sharp back blows with the heel of one hand in the middle of the back between the shoulder blades.	
	C. Turn the infant into a head-downwards supine position and place free arm along the infant's back and encircling the occiput with your hand.	
	D. Identify the landmark - lower sternum approximately a finger's breadth above the xiphisternum to deliver up to 5 chest thrusts.	
<u>Unconscious Patient</u>		
1	Assess level of consciousness	
	Tap the shoulder	
	Call the patient	
2	Open airway	
	Open airway using a Head tilt/ chin lift	
	Check for foreign body	
	Finger Sweep If F/B Visible	
3	Perform Rescue Breath	
	Correct technique (good mouth and nose seal)	
	1 second per breath for 5 breath	
	Visible chest rise	
	Repositioning if no chest rise after a breath	

4	Circulation	
	If there is no response (moving, coughing, spontaneous breaths) proceed to chest compressions without further assessment of the circulation.	
	After 15 compressions and 2 ventilations, activate the EMS if no one has done so.	
	Continue with cycles of 15 chest compressions and 2 ventilations until the object is expelled.	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

BLS Checklist

Station: AED (Automated External Defibrillator)

SKILL TEST FOR AED (Automated External Defibrillator)		
	SKILL PERFORMANCE	✓ IF DONE CORRECTLY
1	Prepares and exposed patient's chest	
2	Switch on the AED (follow voice prompt)	
3	Positions pads appropriately	
	Select proper size of AED pads	
	Ensure pad placement in correct position <ul style="list-style-type: none"> - place one AED pad on the victim's right upper chest (directly below clavicle) - place another AED pad to the side of the apex of the heart 	
4	Clears patient to analyze	
	Ensures that no CPR is being done while machine analyzes	
5	Clears patient to shock/presses shock button	
	Instructs all to "stand clear" and "clears" him/her self as indicated by the AED. (Must be visible and verbal check)	
6	Immediately continue CPR	

TEST RESULT	Pass	Instructor Potential	Fail
COMMENTS:			
INSTRUCTOR:			

REFERENCES

1. International Liaison Committee on Resuscitation (ILCOR) 2015 Guidelines
2. European Resuscitation Council (ERC) Guidelines for Resuscitation
3. American Heart Association 2015 Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
4. Guideline For Resuscitation Training In Ministry Of Health Malaysian 2012
5. Advanced Life Support Training Manual Second published in Malaysia in September 2017

The background features a series of overlapping, wavy lines in shades of teal and light grey. The teal lines are more prominent and form a large, flowing shape that curves across the right side of the page. The grey lines are more subtle and create a layered, textured effect behind the teal. The overall aesthetic is clean and modern.

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