SINGAPORE

INSTITUTE FOR HUMANITARIAN STUDIES
SINGAPORE RED CROSS ACADEMY

SRFAC

CPR + AED

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SECTION A

Cardiac Arrest and You

A-1: INTRODUCTION

Based on national health statistics from the Ministry of Health in 2015, Singapore, ischemic heart disease (lack of blood circulation to heart muscles) is the third most common cause of death, contributing to 16.7% of total mortality.

A person with heart disease is prone to a heart attack, which could result in cardiac arrest and sudden death. According to a 2015 study* conducted in Singapore, 2374 people collapsed in an out-of-hospital setting from sudden cardiac arrest, of which, 1656 (69.8%) occurred at home. Bystander CPR was performed on 1284 (54.1%) casualties and bystander defibrillation was performed on 97 (4.1%) of them. Only 77 (3.24%) casualties survived to be discharged with good-to-moderate neurological functions.

Survival from sudden death can be maximized with the prompt application of basic life-saving skills of cardio-pulmonary resuscitation (CPR) and use of automated external defibrillators (AEDs). These can be performed by any of us, anywhere and anytime. All that is needed are our two hands.

** Ong, M. E. H., et al. (2015). 2011-2015 Singapore Out-of-Hospital Cardiac Arrest Registry Report*

A-2: THE HEART, LUNGS AND CIRCULATION

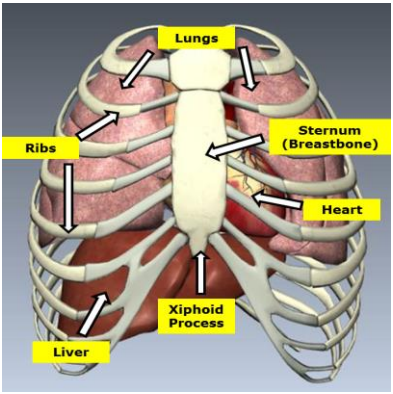

Figure A1 - The heart and lungs

The heart is a muscular pump located in the center of the chest and slightly towards the left (see figure A1).

The heart has two halves. The right side receives low oxygen blood from all parts of the body through veins and pumps it to the lungs via the pulmonary arteries to pick up oxygen (see figure A2).

The left side receives oxygen-rich blood from the lungs through the pulmonary veins and delivers it to all parts of the body, including the vital organs such as the heart, lungs, kidneys and brain.

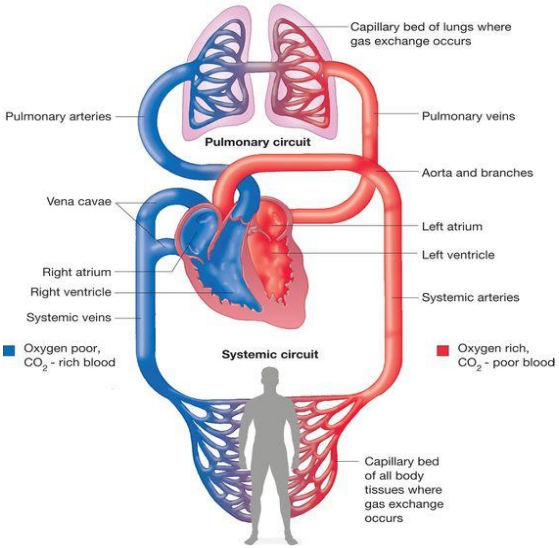

Figure A2 - The circulatory system

The heart muscles receive oxygen rich blood via a set of coronary arteries.

The pumping action of the heart is initiated by electrical signals from a pacemaker (sinoatrial or SA node), these signals travel to other parts of the heart in an orderly manner through a conductive network. The electrical signals from the heart can be picked up by an electrocardiogram (ECG) (see figure A3).

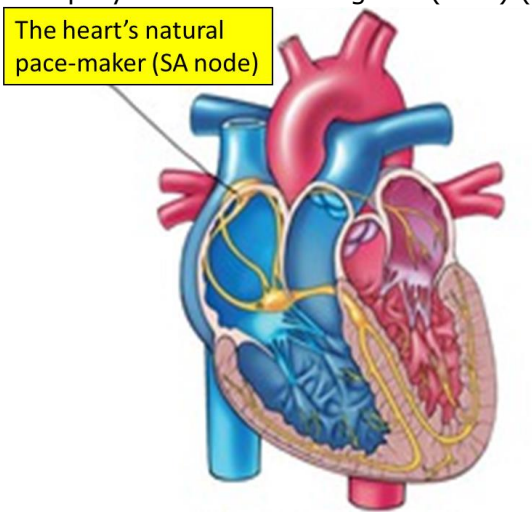

Figure A3 - The heart's electrical conduction

The pumping action gives rise to an organized heart-beat at regular rate of 60-100 beats per minute in a normal person.

On an ECG, normal heart rhythm, also known as the Normal Sinus Rhythm, appears as below (see figure A4):

Figure A4 - Normal Sinus Rhythm

The human body has two lungs which absorb oxygen from the air that we breathe. 21% of air consists of oxygen, of which 5% is extracted by the lungs. The extracted oxygen is passed to the blood within the capillaries of the lungs. The capillaries confluence into the pulmonary vein, which transports the oxygenated blood into the left side of the heart (see figure A5).

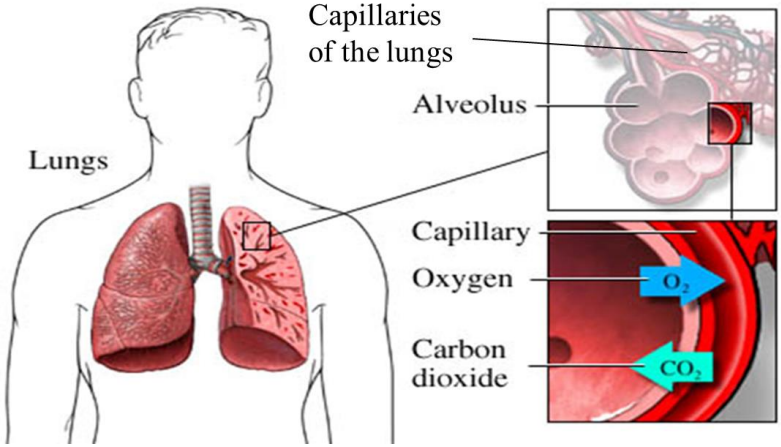

Figure A5 - Exchange of Oxygen and Carbon Dioxide in the lungs

The remaining 16% of unabsorbed oxygen is breathed out. This is extremely important in the context of mouth-to-mouth ventilation; the air that we ventilate into a cardiac arrest casualty can deliver sufficient oxygen to save and sustain life.

A-3: RISK FACTORS FOR HEART ATTACK

Survival rates of Sudden Cardiac Arrest is dismal even in the best cities. Prevention is of paramount importance to prevent heart attack from occurring. Several key risk factors contribute to the development of a heart attack. We can minimize the chance of getting a heart attack by controlling the risk factors. These are:

Smoking – Smoking promotes the development of plaques within the coronary arteries and increases the risk of heart attack by two-fold. This habit should be avoided altogether (see figure A6).

Figure A6 - Avoid smoking

Blood Pressure – If the blood pressure is high, there will be tremendous stress on the heart. Frequent blood pressure checks and reduction of salt in the diet is important. Those with high blood pressure should take their medicines and check their blood pressure regularly as instructed (see figure A7).

Figure A7 - Check your blood pressure regularly

Blood Sugars – Avoid a diet high in carbohydrates or refined sugars and control body weight through diet and exercise (see figure A8 and A9). If you have diabetes, take your medications regularly as instructed.

Figure A8 - Eat healthily

Blood Lipids - Manage blood lipids (fats) by avoiding foods high in fats. Doing regular exercise (see figure A9) could improve your blood lipid profile and take your medications regularly as instructed.

We all owe it to our families and loved ones to remove or minimize our exposure to these risk factors. Adopting healthy lifestyles by not smoking, eating foods in moderate amounts and regular exercise will decrease the risk of heart disease and other illnesses.

Figure A9 - Exercise regularly

A-4: WHAT HAPPENS IN A HEART ATTACK?

A heart attack occurs when cholesterol deposits and / or blood clots block one of the coronary arteries supplying the heart muscle (see figure A10). The heart muscles beyond the blocked vessel dies due to lack of oxygenated blood. This is heart attack.

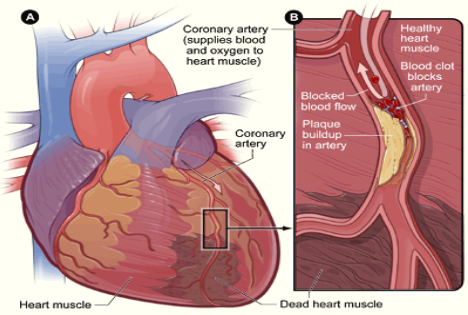

Figure A10 - Blocked coronary artery

Symptoms of a Heart Attack

A person who has a heart attack may experience any of these:

Pain – described as tightness or discomfort either over the chest or upper part of the abdomen (see figure A11). This pain may also spread to the left shoulder, left arm, neck or lower jaw. Some may mistake this for indigestion or fatigue.

Shortness of breath – A sudden difficulty in breathing may be a warning sign of a heart attack.

Other Symptoms - Sweating, nausea, vomiting or dizziness

If a heart attack is not treated promptly, deterioration of heart function will occur and the casualty may develop a sudden cardiac arrest.

Figure A11 - Pain or discomfort over the chest or upper abdomen

Learn to recognize the symptoms of a heart attack. When someone experiences these, it is best to call for an ambulance (telephone: 995) and be taken to the nearest Emergency Department for immediate evaluation.

A-5: WHAT HAPPENS IN A CARDIAC ARREST?

When a portion of the heart muscles dies, it affects the electrical impulses within the heart. The orderly flow of electrical signals within the heart is disrupted. This is a dangerous situation and an irregular, chaotic electrical rhythm called Ventricular Fibrillation (**VF**) develops in many cases (see figure A12).

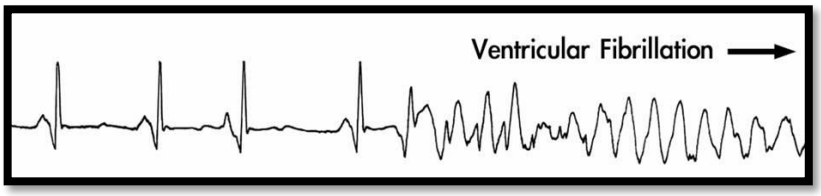

Figure A12 - Normal Sinus Rhythm to Ventricular Fibrillation

When VF occurs, the heart does not pump the blood to the rest of the body. This is a state of **cardiac arrest** and the casualty will be unconscious and stops breathing normally.

At the start of a cardiac arrest, the oxygen level in the blood decreases, causing brain damage. If this situation is reversed immediately, survival chance could be as high as 90%. With a 6 minutes delay, this drops to 40–50% and at 9 minutes, it is a dismal 10% (see figure A13).

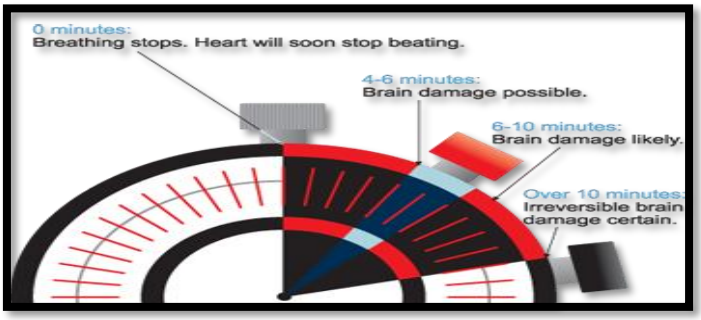

Figure A13 - Irreversible brain damage after 10 minutes

To avoid this, immediate CPR and defibrillation are key components for increased chances of survival.

A-6: OTHER COMMON CAUSES OF CARDIAC ARREST

A heart attack is the most common cause of cardiac arrest. There are other causes, which include:

Figure A14 - Other common causes of cardiac arrest

Death in these situations can be prevented if someone trained in CPR and first-aid skills provides prompt help.

A-7: THE CHAIN OF SURVIVAL

The essential steps for helping a cardiac arrest victim are illustrated in a system called the "Chain of Survival". The five rings in this chain are: Early Recognition and Access, Early CPR, Early Defibrillation, Emergency Medical Services and Advanced Cardiac Life Support (see figure A15).

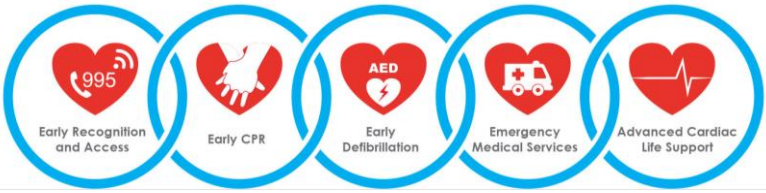

Figure A15 - The chain of survival (picture courtesy of Singapore Heart Foundation)

First Ring: Early Recognition and Access

Call for ambulance (dial 995) and get an AED if visible and near-by. Follow the SCDF dispatcher's instructions.

Second Ring: Early CPR

The brain cells start dying within 4-6 minutes of cardiac arrest. CPR must be initiated as soon as possible to provide oxygen and blood flow to the brain and heart.

Third Ring: Early Defibrillation

Automated external defibrillators (AEDs) are increasingly available in the community, at lift lobbies, void decks, gymnasium, shopping malls, hotels, airports and schools etc. Apply onto the casualty and be ready to defibrillate.

Fourth Ring: Emergency Medical Services

Quick access to the scene and transport to the hospital makes a difference to the casualty's chances of survival.

Fifth Ring: Advanced Cardiac Life Support

Medical teams will provide advanced cardiac Life Support at the hospital. The first 4 rings will buy time for the casualty to reach advanced care.

SECTION B

Cardio-Pulmonary Resuscitation (CPR)

B-1: THE IMPORTANCE OF EARLY CPR

B-2: ADULT ONE-RESCUER HANDS ONLY CPR

B-3: STANDARDS FOR PROPER CHEST COMPRESSIONS

B4: THE RECOVERY POSITION

B1: THE IMPORTANCE OF EARLY CPR

When the heart stops beating, blood stops flowing through the body. Unless the flow is restarted quickly, other organs in the body will stop functioning. For example, if the blood does not flow to the brain for 4 to 6 minutes, it could result in brain death. CPR is a series of actions required to restart the heart and get the blood flowing once again as soon as possible.

CPR includes mouth-to-mouth ventilation and chest compressions. When mouth-to-mouth ventilation is done during CPR, oxygen is introduced into the body. 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:

- Heart function may be restored, and
- Circulation may be maintained until institution of other life support measures.

In many cases, rescuers in public are unwilling and/or unable to provide ventilations. Hands only (chest compressions only) CPR, which only requires continuous chest compressions without mouth-to-mouth ventilation, is easier to learn and is not less effective than standard CPR.

The next section takes you step-by-step through the procedures needed to perform hands-only CPR – the basic skill needed to save lives in the event of cardiac arrest.

B2: ADULT ONE-RESCUER HANDS ONLY CPR

MNEMONIC: **DRSABC**

D Check for **D**anger
R Check **R**esponsiveness
S **S**hout for Help and call Ambulance 995
A Get **A**ED
B Check for Normal **B**reathing
C Provide **C**ontinuous **C**hest **C**ompressions

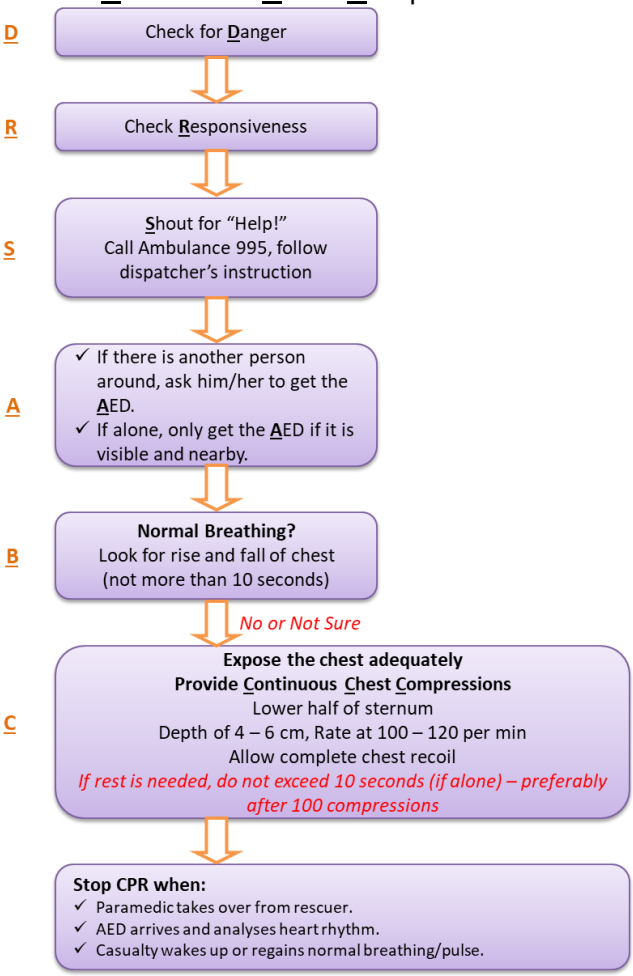

Figure B1 - One rescuer hands only CPR steps

Step 1: Check for danger

- Quickly assess the situation for danger, so that the rescuer can operate in a safe environment.

Step 2: Check for responsiveness

- Quickly assess and determine whether the casualty is responsive. The rescuer should tap or shake the casualty on the shoulders firmly and ask loudly: "Hello! Hello! Are you OK?" (see figure B2)

Figure B2 - Tap shoulder for response

- Avoid violent shaking of the casualty as this may result in injury.
- Avoid unnecessary movements of the neck in the event of injuries to the head and neck.

Step 3: Get help and call for ambulance 995 and a near-by AED

- If the adult is unresponsive, shout loudly for help and immediately call "995" for an emergency ambulance and get AED if visible and nearby. However, if there is another person around, ask him/her to call for an ambulance "995" and get an AED (see figure B3).

Figure B3 - Call Ambulance 995

- When calling for ambulance, the emergency dispatcher will ask the following questions:
  - Location of casualty
  - The telephone number you are calling from
  - What happened (e.g. that someone is having a heart attack or is unconscious)
  - Number of casualties
  - Hang up only after instructed to do so by the dispatcher

Step 4: Position the casualty

Figure B4 - Casualty in prone position

- For CPR to be effective, the casualty must be lying on his/her back on a firm, flat surface. If the casualty is lying face down (prone position – see figure B4), or on his/her side, you will need to roll the casualty over onto his/her back. Do take care that the head, neck and body are supported and turned simultaneously during repositioning, to avoid aggravating any potential cervical spine injury.

Step 5: Check for normal breathing

Figure B5 - Look for normal breathing

- **Look** for the rise and fall of the chest (see figure B5).
- Do not take more than 10 seconds.
- It is important to recognize that gasping is NOT normal breathing but a sign of cardiac arrest (gasping can also happen in severe asthmatic attack). Start chest compressions immediately if unsure whether the casualty has no normal breathing or gasping.

Step 6: Locate hand position for chest compressions

- Chest compressions consist of a series of rhythmic applications of pressure over the lower half of the sternum (breastbone). These compressions create blood flow to the vital organs (heart, lungs and brain).

- Locate the correct hand position for chest compressions:

    - Expose the chest adequately and start chest compression over the lower half of the sternum (breastbone).
    - Place the heel of your hand on the lower half of the casualty's sternum (breastbone) (see figure B6).

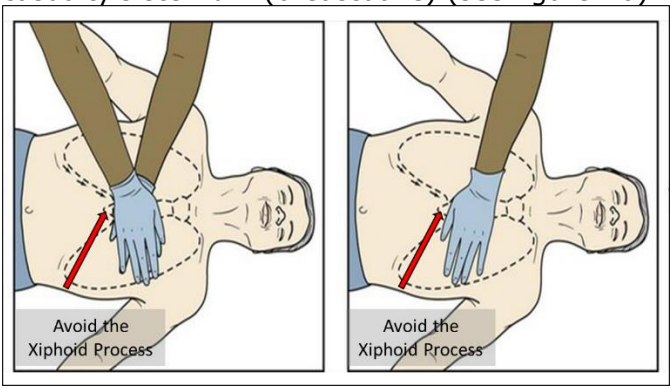

Figure B6 - Chest compression location and avoid the Xiphoid Process

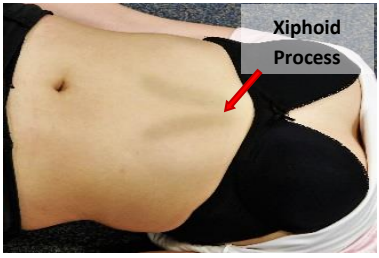

Figure B7 - Xiphoid Process (Female casualty) – to be avoided

Figure B8 - Xiphoid Process (Male casualty) – to be avoided

    * Do not compress on the **Xiphoid Process** (see figures B7 and B8)

Step 7: Perform chest compressions

- Place the heel of the other hand on top of the first hand on the sternum.
- Interlace the fingers of both hands and lift the fingers off the chest wall (see figure B9).

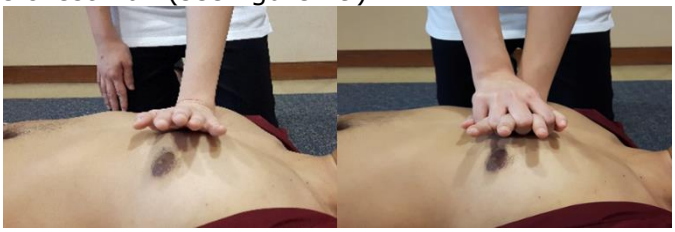

Figure B9 - Lift fingers off the chest wall and interlock hands

- Straighten both elbows and lock them in position.
- Position your shoulders directly over the casualty's chest.
- Use your body weight to compress the casualty's chest vertically to a depth of 4-6 cm, counting as you compress:

  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 **100**

- Perform 100 chest compressions at a rate of 100-120 per minute.

B3: STANDARDS FOR PROPER CHEST COMPRESSIONS

- For effective chest compressions, rescuer should "push hard, push fast".
- Compress the casualty's chest vertically to a depth of 4 – 6 cm, counting as you compress (see figure B10).
- Make sure you allow complete chest recoil before starting the next chest compression (see figure B11).
- Do not lift the heels of your hands off the chest between compressions.
- Continue chest compressions at the rate of 100-120 per minute. If you are a single rescuer and feeling tired, you may take a rest of not more than 10 seconds (preferably after 100 compressions).
- Do not stop chest compressions until paramedics take over or casualty is conscious, opens his/her eyes, starts talking and has normal breathing as the return of spontaneous breathing in an out-of-hospital context is extremely rare.
- Provision of continuous chest compressions is highly recommended as any interruption may negatively affect the survival outcome.
- If casualty regains consciousness, starts talking or has normal breathing, stay with the casualty and continue to monitor the casualty until arrival of paramedics.

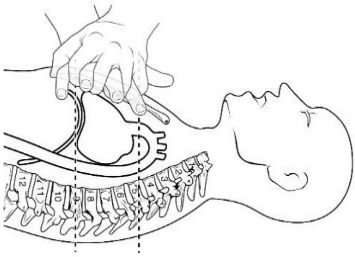

Figure B10 - Compression of the heart

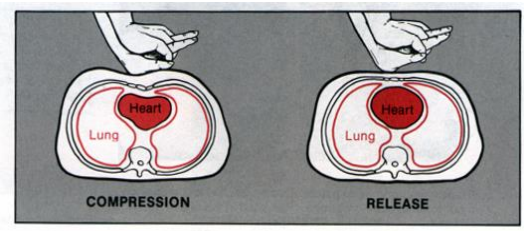

Figure B11 - Compression and release during CPR

B-4: THE RECOVERY POSITION

The recovery position is used in the management of casualties who are unresponsive but breathing and pulse are present. When an unresponsive casualty is lying supine (on the back with the face upwards), the airway may be obstructed by the tongue, mucus or vomitus. These problems may be prevented by placing the casualty on his/her side so that fluid can drain easily from the mouth.

If there is no evidence of trauma, place the casualty on his/her side in the recovery position. The recovery position keeps the airway open. The following steps are recommended:

Step 1: Position the casualty

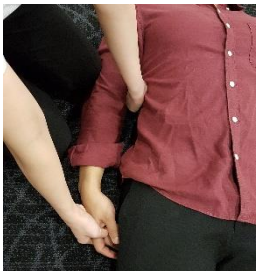

Figure B12 – Tuck the hand under the casualty's hip

Figure B13 – Place the back of hand against the casualty's cheek

Figure B14 – Bend the casualty's far knee to a 90-degree angle

- Tuck the hand nearer to you, arm straight and palm upward under the casualty's hip (see figure B12).

- Bring the other arm (further from you) across the casualty's chest and place the back of his/her hand against his/her cheek (see figure B13).
- Put your palm against the casualty's palm that is on the cheek and maintain this position.
- Using your other hand, bend the casualty's far knee to a 90-degree angle, hold the casualty's far hip and roll him/her towards you (see figure B14).

Step 2: Roll the casualty towards the rescuer

- Use your knees/thighs to support the casualty's body as you turn him/her towards you to prevent him/her from rolling too far forward (see figure B15).

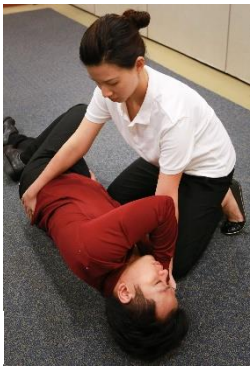

Figure B15 – Turn casualty towards you

Step 3: Final recovery position

- Ensure that the casualty's cheek is resting on the back of his/her palm.
- Check that the casualty's other hand is positioned alongside his/her body with palm facing upwards.
- The former far leg should preferably be bent at the knee to a 90-degree angle (see figure B16).
- Stay with the casualty and monitor his/her breathing continuously.

Figure B16 – The recovery position

SECTION C

AUTOMATED EXTERNAL DEFIBRILLATION (AED)

C-1: The Importance of Early Defibrillation

At the time of a sudden cardiac arrest, the most common underlying cardiac rhythm is an irregular and chaotic electrical rhythm called **Ventricular Fibrillation** or **VF (shockable rhythm)** (see figure C1). However, not all cardiac arrests presents itself as VF and may appear as other electrical rhythms (eg. asystole which is non-shockable).

Figure C1 - Ventricular Fibrillation

During VF, the heart muscles do not contract effectively and delivery of blood to the rest of the body ceases. The treatment for VF is a shock administered using an AED. This shock, together with chest compressions, will reinstate normal heart rhythm and contractility if administered as soon as possible (within 4 minutes). The survival rate decreases by 7-10% for every minute of delay in treating VF. If delayed or untreated, VF eventually degenerates into a fatal rhythm known as **asystole** where the heart has no electrical activity as reflected by a flat line tracing (see figure C2). At this juncture, the only treatment possible is to administer CPR.

In the past, only trained doctors, nurses and paramedics, could perform manual defibrillation as it requires the operator to recognize the cardiac rhythm of the casualty, whether it is **shockable** or **non-shockable**. Since the invention of the AEDs, which are able to analyse the casualty's cardiac rhythm through the electrode pads and advise if a shock is needed, a lay rescuer can now perform the defibrillation, improving survival rates.

Figure C2 - Asystole

The AED should be brought to every person in cardiac arrest. Therefore, when calling for the emergency ambulance (995), also call for an AED by instructing others nearby **"Get AED"**. The rescuer may personally get the AED if it is visible and nearby.

Research has shown that cardiac arrest casualties with VF who are treated promptly have the best chances of survival. Similar experiences from around the world has also demonstrated that more lives are saved if early CPR is combined with early defibrillation (see figure C3).

Chain of survival factors in cardiac arrest and their impact on outcomes

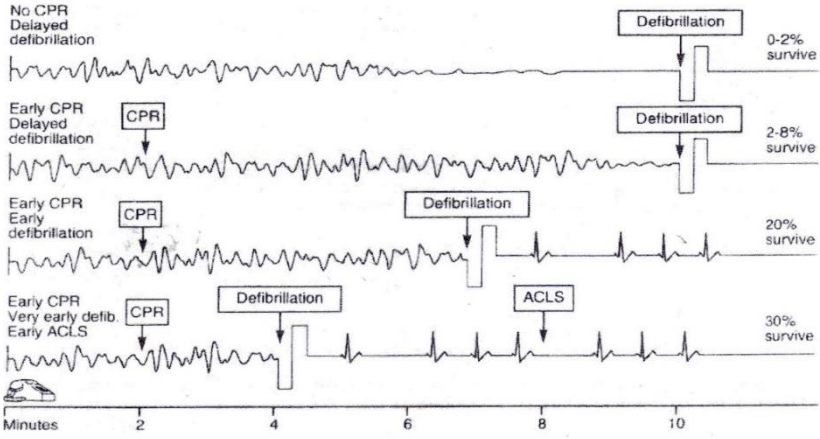

Figure C3 - Importance of the chain of survival

C-2: AUTOMATED EXTERNAL DEFIBRILLATORS (AEDs)

Automated External Defibrillators (AED) are devices that deliver electrical shocks to treat VFs, allowing the heart to restore its function. AEDs are defibrillators designed to be small in size, lightweight and portable (see figure C4). They generally work on similar basic principles and do the following:

- Analyze the electrical rhythm of the heart.
- Determine whether the heart needs to be shocked.
- If a shock is required, it automatically charges to a pre-set energy level. If no shock is required, the device will not charge-up.
- Deliver electric shocks via attached AED pads.
- Advise the rescuer through voice prompts on key actions to deliver the shock, check the casualty or continue CPR.
- Some AEDs provide counting tempo to assist rescuers in chest compressions.

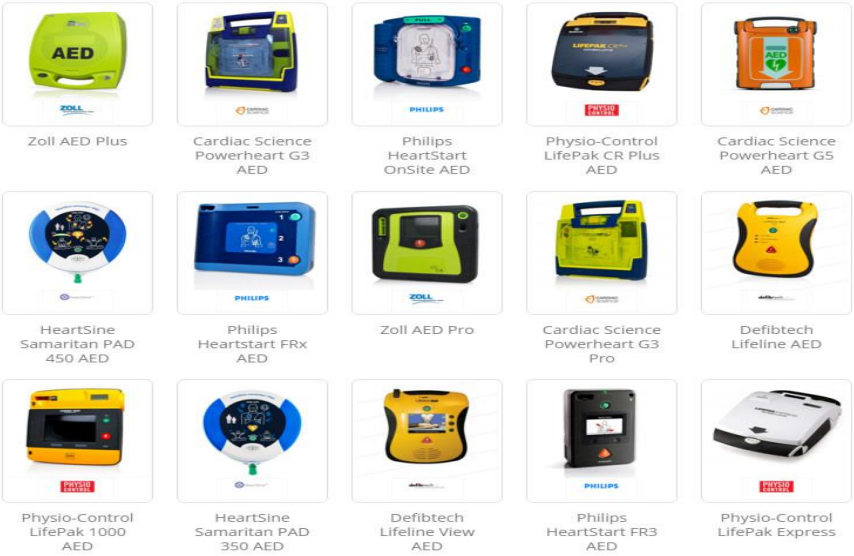

Figure C4 - Various models of AEDs

C-3: PREPARATIONS FOR AED USE

The rescuer must first ascertain that the scene is safe for use of an AED. Avoid the following:

- **Metal surface -** remove casualty from contact with metal surfaces. These can conduct electric currents to the rescuer.
- **Water** - Sweat and moisture are good conductors of electricity and pose danger to the rescuer. It also reduces the adhesion of pads to the chest wall. If the chest is wet, wipe dry quickly with a towel.
- **Gas** - Flammable gases and oxygen sources are fire hazards. Move the casualty away from these before applying AED.

Steps in chest preparation and applying the AED electrode pads (see figure C5):

- Expose the chest of the casualty to facilitate application of AED electrode pads. If needed, cut away the clothing.
- If chest hair prevents proper pad placement, shave the hair from these sites promptly. AEDs come with a shaver blade to expedite this.
- Metallic objects such as necklace and chains should be moved away from the pads. These may result in sparks and potential burns to the chest wall.
- For casualties with a pacemaker or implanted cardiac defibrillator on the right, apply the pads at least four fingers breadth away from these devices.
- Medication patches or monitoring electrodes on the chest wall should be removed as they may interfere with pads placement.
- Wipe dry a wet or sweaty chest to ensure proper adhesion of the electrode pads to the chest.

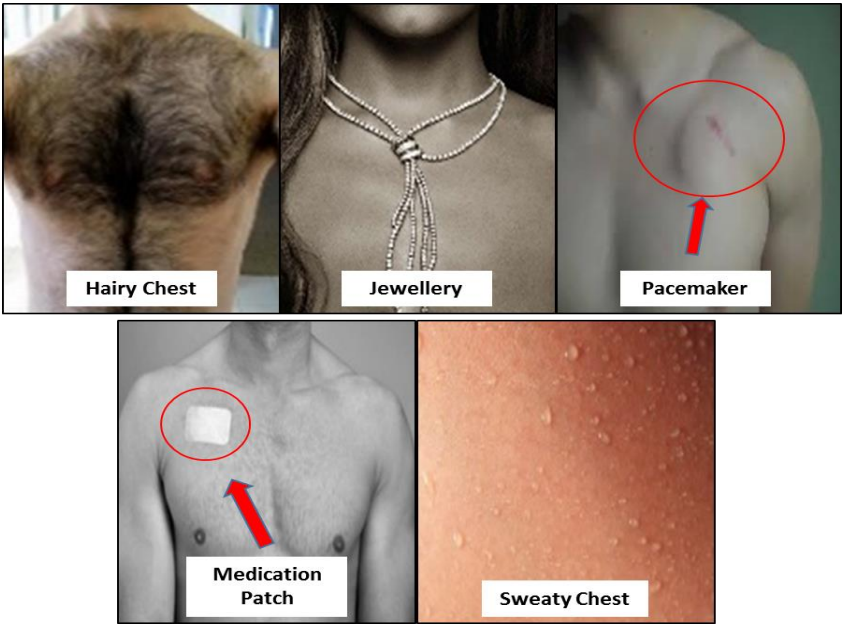

Figure C5 - Things to take note of during chest preparation

Application of AED electrode pads to the chest wall must be done quickly with minimal interruptions to chest compressions.

C-4: PLACEMENT OF AED ELECTRODE PADS

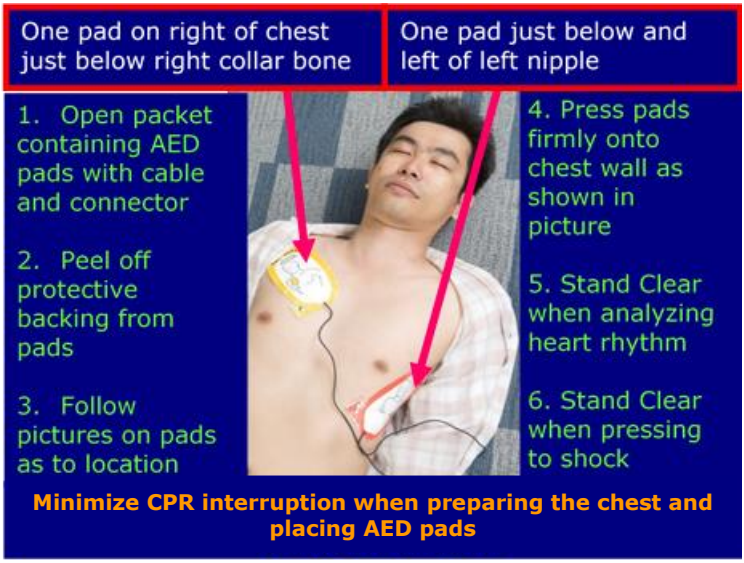

Figure C6 - AED electrode pads placement and operation

1. Switch on the AED. Some AEDs would automatically turn ON when the AED cover is lifted.
2. Open the package that contains the AED pads with attached cable and connector.
3. Peel off protective backing from the pads.
4. Apply the AED pads on the chest according to the instructions on the AED (see figure C6).

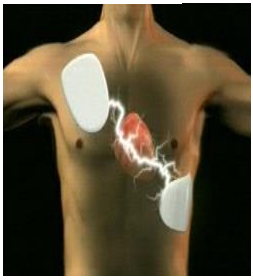

Figure C7 - How AED shocks the heart

5. The right pad is placed on the casualty's right chest just below the collar bone. The left pad is placed on the left chest just below and to the left of the left nipple (see figure C7).
6. Plug the connector end of the cable into the AED. Some AEDs already have pre-connected electrode pads cable and may start analysis once the pads are in place.

C-5: DEFIBRILLATION PROCEDURES

1. The AED will initially analyze the heart's electrical rhythm. It will give a voice prompt, such as

   "ANALYZING HEART RHYTHM. DO NOT TOUCH THE CASUALTY."

   If you hear this, stop chest compressions. Do not touch the casualty and do not allow others to touch the casualty while the AED is analyzing.

2. Spread your arms apart and say clearly "Stay Clear" (see figure C8).

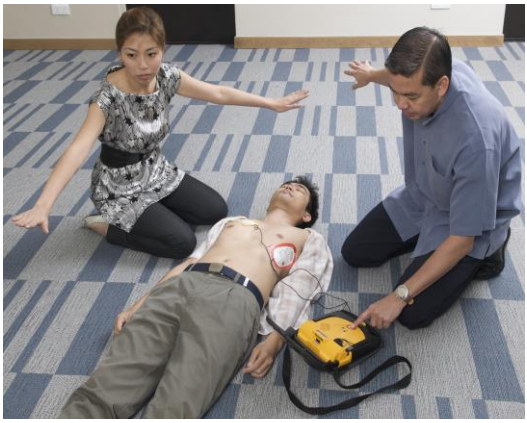

Figure C8 - "Stay clear!"

3. If the casualty has a shockable rhythm (i.e. VF), it will charge automatically. Charging takes a few seconds and may be indicated by a warning tone from AED. No one should touch the casualty during this brief charging phase.

4. Once the AED is fully charged, it will prompt "PRESS THE SHOCK BUTTON NOW". The rescuer then states clearly "Stand Clear", ensures quickly that no one is touching the casualty, and then presses the shock button on the AED firmly before releasing it.

5. Once the shock is delivered, restart chest compressions. Continue the chest compressions until the AED repeats the voice prompt: "ANALYZING HEART RHYTHM. DO NOT TOUCH THE CASUALTY."

6. If the AED prompts: "NO SHOCK ADVISED", restart chest compressions immediately.

7. Only stop CPR when the casualty starts breathing normally or moving and regains consciousness. Place him/her in a recovery position to prevent the tongue from obstructing the airway and facilitate drainage of mouth secretion. Continue to monitor the casualty until help arrives.

8. Throughout this period, the AED should remain connected to the casualty.

SUMMARY OF AED APPLICATION SEQUENCE

Apply AED pads while chest compressions are in progress

Continue Chest Compressions
Open AED box
Turn on AED
Prepare chest
Apply pads – right and left chest
Plug in connector
Analyze rhythm

C-6: HANDS ONLY CPR+AED PROTOCOL SUMMARY

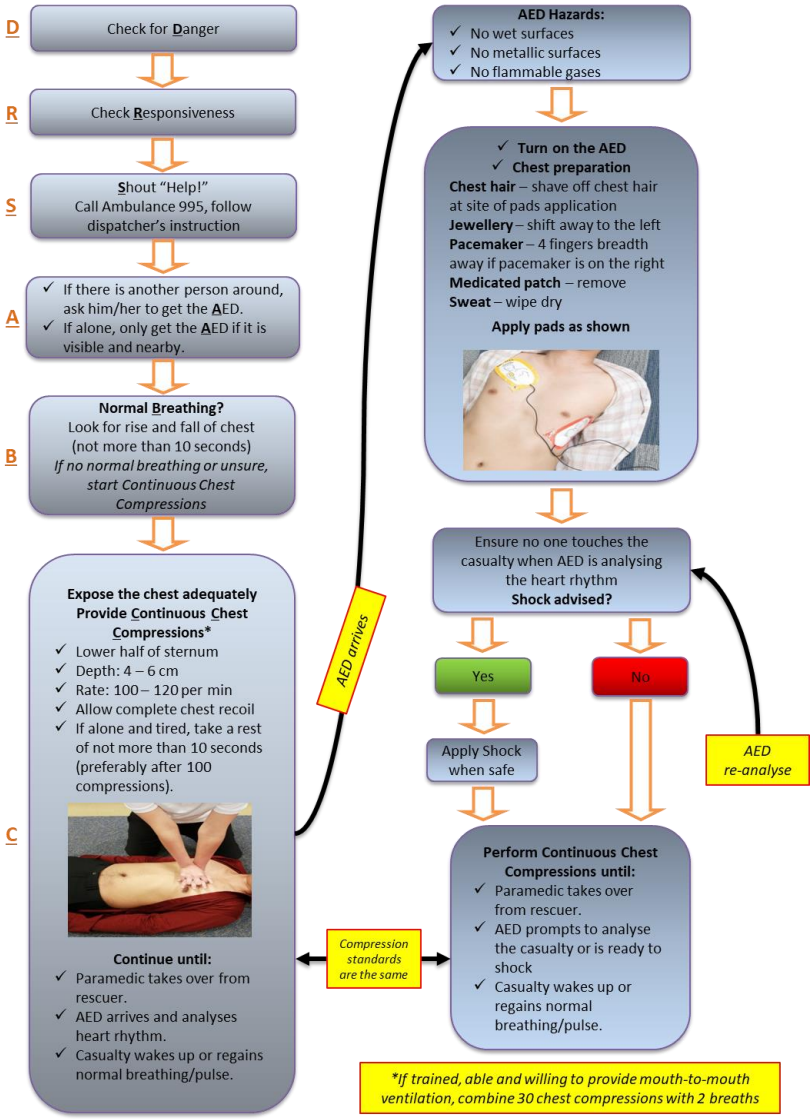

Figure C9 – Summary of Hands Only CPR+AED

C-7: POST-INCIDENT PROCEDURES

Hand-over to emergency services

When paramedics takes over the casualty, they may require a summary of the events that has occurred:

- Time of collapse (best estimate)
- Whether the AED was used
- How many shocks were given?
- Any previous medical history and medications, if known.
- If available, provide a document that lists these events.

Assist the paramedics:

- Until casualty is loaded into the ambulance
- The defibrillation cable with pads should remain on the casualty en-route to hospital.

Housekeeping the AED for future use

Inform the facility or safety manager, in case of commercial establishments or work places, or the local community center or management office for residential areas that the AED has been used.

The person in charge of the AED has the following responsibilities:

- Replace the AED consumables such as the electrode pads, shaver kit, towel and gloves if used.
- The AED battery must be checked. Contact the vendor of the AED device for advice on battery replacement.
- If the AED was removed from a box with a key in a thin glass window, the glass may have been broken to retrieve the key. This glass piece would need to be replaced and the key placed back onto the holder.
- Most AEDs have a chip that records the resuscitation sequence. Get the AED vendor to print the record from this chip. It is useful for audit and quality assurance purposes.

Maintenance of AED

AEDs are almost maintenance-free. Replacement of consumed items in the AED has been described above.

The battery indicator on the AED needs to be checked daily to ensure that it is still functional. Once it gives a low-battery display, steps to replace the battery promptly should be undertaken.

C-8: CHILD/INFANT DEFIBRILLATION

Use of AED for Child/Infant

- AEDs can be used safely for children aged one year or older.
- AEDs are capable of accurately identifying arrhythmias in children; they are very unlikely to advise a shock inappropriately.
- Those aged between 1–8 years should preferably be defibrillated with paediatric pads if available.
- If an AED with paediatric pads is not available, an AED with adult pads may be used.
- For casualties less than one year old, the incidence of shockable rhythms is very low unless if they are suffering from cardiac disease.
- In these cases, the risk/benefit ratio may be favourable, and the use of an AED (preferably with paediatric pads) should be considered.

Placement of Defibrillation Pads for Children/Infant

1. Anterior-anterior defibrillation pads placement is advised. **Ensure that the pads are not touching** and are at least 1-2cm apart (see figure C10).

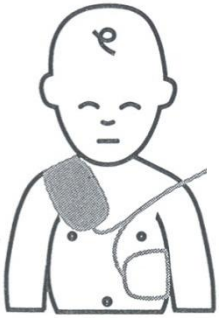

Figure C10 - Anterior-anterior AED electrode pads placement

OR

2. **If the pads are touching**, apply front (right pad on central sternum) and back (left pad on the upper back between the shoulder blades). Attach the child defibrillation pads on front and back (anterior-posterior) as shown (see figure C11):

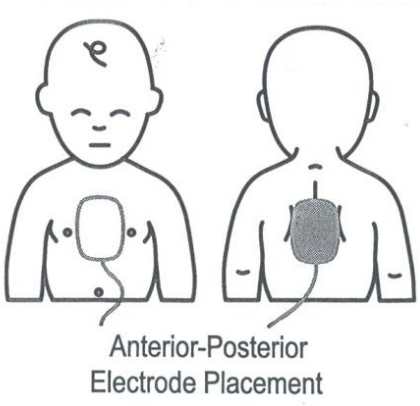

Figure C11 - Anterior-posterior AED electrode pads placement

C-9: SAMPLE PRACTICAL SCENARIOS

The following scenarios may be used by the instructor to depict possible situations which you may encounter due to the varied nature of an emergency. By practicing these scenarios, you can be more confident to assist a casualty in emergencies.

1) Shock – No Shock – No Shock
2) No Shock – Shock – No Shock
3) Shock – Shock – No Shock
4) No Shock – No Shock – Shock
5) No Shock – No Shock – No Shock

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