Cardiopulmonary Resuscitation & Defibrillation using an Automated External Defibrillator (AED)

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1. Cardiopulmonary Resuscitation (CPR) in Adults

Think: DR SHABAC

Danger

- Is there any danger to you, the casualty or bystanders?
- Think of danger as 3 Ss – Sight (anything you can see), Sound (anything you can hear) and Smell (any fumes, gases)

Response

- Is your casualty responsive?
- Check this by Shout and Shake. Speak loudly to your casualty on approach and, if no response, kneel on one knee and gently rock the shoulders to induce a painful response. I suggest you do not Shake before Shout!
- For the purpose of this module your casualty is unresponsive

Shout out loudly ‘Help’

- If help arrives, keep your helpers with you and move on to airway
- If no help arrives, move on to airway

Airway

- Open the airway using a head-tilt and chin-lift (keeping the fingers off the soft tissue of the throat)
- Combine this with a quick check inside the mouth for any visible obstruction – remove any visible obstruction but, otherwise, no fingers in the mouth
Breathing

- Look, Listen and Feel for normal, quiet (just audible) breathing. Do this by placing your ear down at the casualty’s nose and looking at the chest and abdomen. Take no more than ten seconds to do this.

- Ignore occasional gasping and sighing sounds which are present in 40% of cardiac arrest victims.

- For the purpose of this module your casualty is either not breathing or is making occasional gasping or sighing sounds – this signifies CARDIAC ARREST!

Ambulance

- If you are still alone, leave your casualty and call 999/112, saying that you have an unconscious casualty who is not breathing / not breathing normally

- If you are still alone and have a mobile phone, then call 999/112, put your phone on speaker-mode and place it by your casualty’s head – you can talk to the ambulance service without having to interrupt your patient care

- If help arrived, ask your helper to make the emergency call and ask your helper to return – some ‘helpers’ do not make the emergency calls that they say they will make!

Circulation

- Start CPR

- Place the heel of one hand on the breastbone in the centre of the chest

- Place your other hand on top
• Interlock your fingers (only a suggestion)

• Position your shoulders directly above your wrists – elbows locked

• Push down 5 - 6cm at a rate of 100 - 120 compressions per minute (but no more than 120)

• Allow the chest to rise completely between compressions, but maintain contact with the chest

• Allow an equal amount of time for the compression and the release (the upstroke and downstroke)

• After 30 good-quality chest compressions, give two rescue breaths unless you are unable or unwilling to give the breaths – in which case perform chest compression-only CPR (CCOCP); but remember that a casualty needs air during a prolonged cardiac arrest!

• Only make two attempts to achieve two rescue breaths – if either or both breaths do not result in lung inflation, then return immediately to chest compression

• Change over every one to two minutes to avoid fatigue with the consequent reduction in good-quality CPR – teamwork is essential

• Do not interrupt chest compressions except to perform ventilations, during the analysis stage of an AED, or to push the shock button of your AED

• Keep going until medical help arrives, the casualty comes back to life, or you need a break because of fatigue

To summarise DR SHABAC:

• Danger - *Sight, Sound and Smell*
• Response - *Shout and Shake*
• Shout ‘Help’
• Airway
• Breathing - *Look, Listen and Feel*
• Ambulance
• Circulation
Some useful adjuncts during resuscitation are:
- Suction equipment
- Oropharyngeal airway
- Pocket mask
- Bag-Valve-Mask

**Children and Babies**

Children are treated the same as adults except:
- You may only need the heel of one hand to compress the chest
- You compress the chest at least one-third of the way down

Babies are treated the same as adults except:
- You use two fingers to compress the chest
- You compress the chest at least one-third of the way down
- You seal your mouth over the baby’s mouth & nose

With children and babies:
- Be careful not to hyperextend the neck
- Start resuscitation with five rescue breaths
- If you have to leave a child or baby to make the 999/112 call, then perform CPR for one-minute first
- If you are confident in your resuscitation skills, then use a ratio of 15 compressions to 2 inflations
Questions (answers at the end)

Please select one answer for each question

1) DR SHABAC reminds you to:
   a. Call 999/112 after the breathing check
   b. Call 999/112 as soon as you establish unresponsiveness
   c. Perform rescue breathing before starting chest compressions in an adult
   d. Check for a pulse to confirm the absence of circulation

2) Head-tilt and chin-lift:
   a. Is not necessary in cardiac arrest
   b. Should lift the tongue off the back of the throat
   c. Must be performed before rescue breathing
   d. Guarantees a patent airway
   e. Answers b and c

3) How many attempts do you have to achieve two effective rescue breaths?
   a. 4
   b. 2
   c. As many as required
   d. 3

4) The correct rate of chest compression per minute is:
   a. 120 – 140
   b. 100 – 140
   c. 100 – 120
   d. 100

5) The correct compression depth in adults is:
   a. 4 – 5 cm
   b. 2 – 3 cm
   c. 5 – 6 cm
   d. None of the above

6) When resuscitating a baby or child:
   a. You can use a ratio of 15 : 2 (compressions : ventilations)
   b. The neck must not be hyper-extended
   c. You start with five rescue breaths
   d. The chest must be compressed at least one-third of the AP diameter
   e. All of the above
7) Cardiac arrest is confirmed by:
   a. Checking for a pulse
   b. Absence of normal breathing
   c. Noting the casualty’s skin colour to be pale
   d. Dilated pupils

8) Agonal ‘breathing’ is present in what percentage of victims of cardiac arrest?
   a. 40%
   b. 4%
   c. 30%
   d. 2%

9) The breathing check must take no more than:
   a. 5 seconds
   b. 15 seconds
   c. 2 seconds
   d. 10 seconds

10) During CPR:
    a. Chest compression-only CPR can be performed if you are unwilling or unable to provide rescue breaths
    b. Rescue breaths must be combined with chest compressions
    c. Rescue breaths can take ten seconds to be given
    d. Rescue breaths are necessary during a prolonged cardiac-arrest
    e. Answers a and d

Answers

1 a
2 e
3 b
4 c
5 c
6 e
7 b
8 a
9 d
10 e
2. Defibrillation using an Automated External Defibrillator (AED)

What is an Automated External Defibrillator (AED)?

An AED is a simple to use device that recognises the life-threatening arrhythmias of ventricular fibrillation and ventricular tachycardia and is able to treat them through defibrillation - the application of electrical therapy which stops the arrhythmia, allowing the heart to re-establish an effective rhythm.

AEDs are very simple to use – some are semi-automatic (the user pushes a button to deliver the shock) while others are fully-automatic (the shock is delivered without user intervention).

Unlike any other piece of medical equipment or first aid kit, there is nothing that can substitute defibrillation. If a collapsed victim of cardiac arrest is in ventricular fibrillation, the only piece of medical equipment that can stop it is a defibrillator.

How does the heart work?

The heart is a highly efficient muscular pump that pushes blood around the body at an average rate of 100,000 times each day. An electrical system initiates the power that enables the heart to do its work. If the electrical system and muscular pump work together in a co-ordinated manner, the end result is a normal heart beat.

What is Ventricular Fibrillation (VF)?

VF is uncoordinated electrical activity occurring in the ventricles (the lower two chambers of the heart) and is a cause of cardiac arrest and sudden cardiac death. The ventricular muscle twitches randomly, rather than contracting in a coordinated fashion, so the ventricles fail to pump blood around the body. In other words, the normal electrical pathways throughout the heart muscle have been interrupted and the electrical cells in the ventricular muscle begin firing off independently and dominating the electrical system. The result is completely uncoordinated electrical activity that prevents the heart from beating – the victim will be unconscious within seconds and will almost certainly die without defibrillation.

A person’s collapsed!

Follow your protocol and as soon as it has been established that the casualty is unresponsive and not breathing (or not breathing normally), start chest compressions. Ensure somebody calls 999/112 and somebody goes for the AED.
Immediately the AED arrives, switch it on and follow the voice prompts.

As soon as the pads are placed the AED will determine whether or not the victim is in a shockable rhythm. If so, the AED will charge and prompt the user to stand clear. A semi-automatic AED requires the user to push the shock button, whereas an automatic AED will deliver the shock without user intervention.

Do not interrupt CPR unless the victim begins to show signs of life. If you think that is the case; stop CPR, perform a quick ‘shout’ and ‘shake’ and reassess the victim’s breathing. If there is any doubt as to whether the victim is breathing normally, continue CPR. An unconscious person who does not appear to breathing normally needs good quality, uninterrupted CPR.

Unlike performing CPR, the use of an AED requires the victim to have a bare chest. Essential adjuncts that should be with every AED are:

- Shears (to cut clothing if the clothing cannot be ripped)
- Surgical Prep Razor (to shave the upper right chest if the chest is so hairy that skin is not visible beneath it)
- Cloth (the area where the pads are placed, and in between, needs to be dry so that the pads are able to function properly)

Other useful items to consider keeping with an AED are:

- Pocket Mask
- Metronome
- Spare Defibrillation Pads

**Think about the six Ps**

- Perspiration – ensure the chest is dry
- Pacemaker – do not place a pad over a pacemaker. Instead, position it to the side of, or below, the pacemaker
- Pendants – do not have any metal resting between the pads during defibrillation
- Piercings – there is nothing you can do about these
- Patches/Plasters – avoid placing the pad over these
- Playtex – when removing clothes, cut through a bra also

An AED should be prominently placed for all to see. This will save a person from having to hunt for it in an emergency, and will enable easy observation of the date on the pads and the flashing indicator light.

Good quality CPR and early defibrillation give the person the best chance of survival!
Questions (answers at the end)

1. An AED:
   a. Is completely safe to use
   b. Recognises a normal heart rhythm
   c. Does not recognise Ventricular Fibrillation
   d. Uses three electrode pads

2. Defibrillation Pads:
   a. Can be placed anywhere on the chest
   b. Can be placed front-to-back on a child
   c. Do not have an expiry date
   d. Can be re-used

3. Defibrillation Pads:
   a. Can be applied to the chest of a person who is feeling unwell
   b. Can be applied to the chest of a conscious heart-attack victim
   c. Are applied as soon as you diagnose cardiac arrest
   d. Are applied only after starting chest compressions

4. Ventricular Fibrillation:
   a. Is the only arrhythmia that an AED can recognise
   b. Enables blood flow through the heart
   c. Is recognised by the AED, along with Ventricular Tachycardia
   d. Results in a palpable pulse

5. During delivery of the ‘shock’ it is important:
   a. To continue chest compressions
   b. Not to touch the patient
   c. To switch off the oxygen or move the mask at least 1m away from the pads
   d. To continue rescue breathing
   e. Answers b and c

6. The minimum suggested equipment that should accompany an AED is:
   a. Shears
   b. Cloth
   c. Surgical prep razor
   d. All the above
7. An AED:
   a. Can be used by anybody
   b. Can only be used by trained personnel
   c. Is simple to use – you cannot do anything wrong
   d. Should only be used when there are two or more rescuers
   e. Answers a and c

8. The correct pad placement is:
   a. One pad on the front of the chest to the right of the breastbone
   b. One pad on the left side of the chest, wrapped slightly towards the back
   c. One pad placed over the left collar bone (clavicle)
   d. Both pads placed on the left side of the chest
   e. Answers a and b

9. You think a victim of cardiac arrest has come back to life, therefore you should:
   a. Stop CPR
   b. Check the victim’s responsiveness
   c. Assess the victim’s breathing
   d. Continue CPR is there is any doubt whether the victim is breathing normally
   e. All the above

10. A victim of sudden cardiac arrest has the best chance of survival when:
    a. The emergency services are alerted early
    b. CPR is started immediately
    c. AED pads are applied early
    d. The emergency services arrive quickly
    e. All the above

Answers

1    a
2    b
3    c
4    c
5    e
6    d
7    e
8    e
9    a
10   e