CPD4dentalnurses

YOUR FUTURE IN YOUR HANDS

Basic Life Support (BLS), Cardiopulmonary Resuscitation (CPR), and Automated External Defibrillation (AED) (Medical Emergencies)

Aims: To describe the steps involved in CPR and the use of an Automated External Defibrillator.

Learning Outcomes: On completion of this verifiable CPD article, the participant will be able to demonstrate, through completion of a questionnaire, the ability to:

- Identify statistics relating to cardiac arrest in the UK.
- Demonstrate knowledge of the Resuscitation Council (UK) Guidelines.
- Demonstrate knowledge of the Chain of Survival.
- Be able to identify the steps and methods involved in cardiopulmonary resuscitation for adults and children.
- Know the importance of using an Automated External Defibrillator when necessary.
- Be able to identify which are the shockable heart rhythms.
- Know how to use an Automated External Defibrillator.
- Know how to carry out basic life support.
- Know the training requirements in relation to medical emergencies.

Introduction

Heart and circulatory disease (Cardiovascular disease), causes around a quarter of all deaths in the UK. Of these, most deaths from coronary heart disease are caused by a heart attack which can lead to cardiac arrest.[1] Cardiac arrest is a serious medical emergency, where the heart stops pumping blood around the body. Unless treated immediately, it leads to death within minutes. The latest January 2025 factsheet from the British Heart Foundation estimates that there are around 7.6 million people in the UK that are living with heart and circulatory diseases. It is estimated that in the UK, more than half of us will get a heart or circulatory condition in our lifetime. Heart and circulatory diseases cause around a quarter (26%) of all deaths in the UK.[1]

In the UK, over 30,000 people sustain a cardiac arrest outside of the hospital environment and are treated by the emergency services each year.[2] The General Dental Council state that, “a patient could collapse at any time, whether they have received treatment or not. It is therefore essential that all registrants must be trained in dealing with Medical Emergencies, including resuscitation, and possess up to date evidence of capacity.”[3] Therefore, although cardiac arrest is rare in Primary Dental

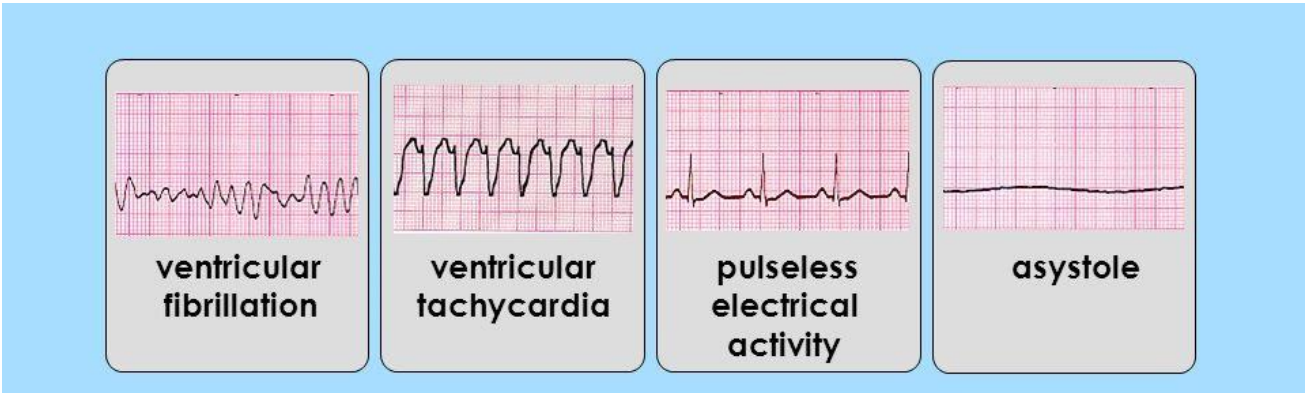
Practice, it is important that dental staff are competent in dealing with such an eventuality.

The current Resuscitation Council UK Adult Basic Life Support Guidelines were published in May 2021. These can be downloaded using the link at the end of this article. This article will describe Cardiopulmonary Resuscitation (CPR) and the use of Automated External Defibrillator.

The heart, cardiac arrest and ventricular fibrillation

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 result is our normal heartbeat.[4]

The term cardiac arrest means that the heart has stopped pumping blood around the body. The heart may have stopped beating altogether (asystole) or be twitching in an irregular and ineffective way (ventricular fibrillation). In either case, there is no circulation of blood. Within seconds, the casualty will lose consciousness and, if the heart is not restarted, will die within a few minutes. This means that the dental team will need to act quickly and efficiently.[5]

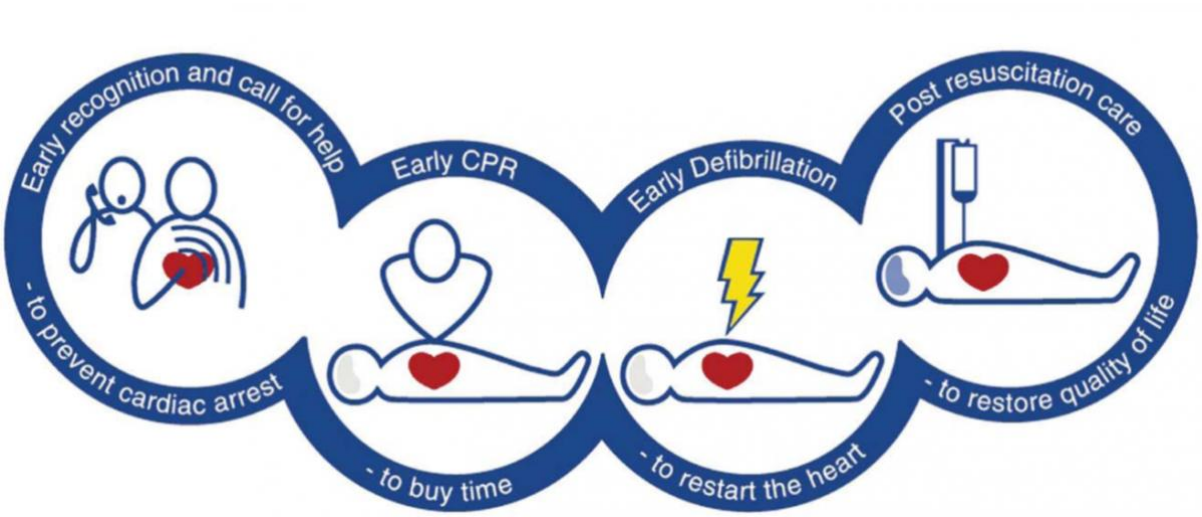


Sometimes, a victim of cardiac arrest may not have any cardiac output, despite there being a cardiac rhythm normally associated with cardiac output. This is known as pulseless electrical activity (PEA). The term PEA does not refer to any specific cardiac rhythm.

The Chain of Survival and Basic Life Support

Ambulance services attempt resuscitation in approximately 30,000 people each year. Bystander CPR is attempted in 7 out of 10 out of hospital cardiac arrests (OHCA). However, Public access defibrillator use is reported as being used in less than 1 in 10 OHCA.[2]

The key stages in the life support sequence can be described as the Chain of Survival. The following steps together, maximise the chance of survival following cardiac arrest:



1) **Early recognition** and call for help - to prevent cardiac arrest
2) **Early CPR** - to buy time
3) **Early Defibrillation** - to restart the heart
4) **Post-resuscitation care** - to restore quality of life

The resuscitation council state that "dental practitioners and other dental care professionals must be trained in cardiopulmonary resuscitation (CPR) so that in the event of cardiorespiratory arrest occurring they can:

- Recognise cardiorespiratory arrest;
- summon help immediately (dial 999);
- start CPR, using chest compressions and providing ventilation with a pocket mask or bag-mask device and supplemental oxygen. (Evidence suggests that chest compressions can be performed effectively in a fully reclined dental chair);
- attempt defibrillation (if appropriate) **within 3 minutes of collapse**, using an AED; and,
- provide other advanced life support skills if appropriate and if trained to do so."[6]

Resuscitation Council (UK) Guidelines 2021

Resuscitation Council UK

The Resuscitation Council (UK) Guidelines 2021 were published in May 2021. Although there were no major changes, there is a heightened emphasis on:

- Cardiac arrest recognition remains a key priority as it is the first step in triggering the emergency response to cardiac arrest.

- Recognise cardiac arrest has occurred in any unresponsive person with absent or abnormal breathing.

- The ambulance call handler will assist with instructions for confirming cardiac arrest, starting compression-only CPR, and locating, retrieving, and using an AED.

- Provide chest compressions as soon as possible after cardiac arrest is confirmed.

- Send someone to fetch an AED and bring it to the scene of the cardiac arrest. The British Heart Foundation database, "The Circuit" serves as a national resource for the location of AEDs.

- Use the recovery position, only if a person's conscious level is reduced and they do not meet the criteria for starting CPR.[7]

Adult Basic Life Support Recap

Danger: Check for danger: sight, sound, and smell. Is there anything that may be dangerous to you, the person, or bystanders?

Response: Speak loudly to the person and gently shake/tap the shoulders if there is no response to your voice. Shout for help, but do not leave the person yet.

Airway: Open the airway using a head tilt and chin lift. Place two fingers under the point of the chin gently and lift, whilst placing the other hand on the person's forehead and gently tilting the head back.

Breathing: Look (for chest movement and any other purposeful movement or signs of life), listen (for breath sounds from the person's mouth) and feel for air on your cheek. Take no more than *ten seconds* to do this. If you do not think the person is breathing normally, or you do not think the person is breathing at all, treat this as a cardiac arrest.

Circulation: Begin chest compressions whilst asking someone else to **call the ambulance service**. If you are alone, you will need to leave now and make the call yourself before starting chest compressions. If an AED is available, send somebody to get it- do not delay starting chest compressions in order to get an AED.

Perform high quality, uninterrupted cardiopulmonary resuscitation (CPR). Deliver chest compressions on the lower half of the sternum (the centre of the chest). The compression rate is 100-120 per minute, with a compression depth of 5-6cm. Allow an equal amount of time for compression and release, ensuring the chest rises fully after each compression.

Give 30 compressions then two gentle rescue breaths sufficient to make chest rise as in a normal breath. The breaths must not be forceful or rapid and should take one second each to deliver. If either or both rescue breaths do not result in chest movement, return immediately to chest compressions. Continue chest compressions and rescue breaths at a ratio of 30:2. If you are unable or unwilling to provide ventilations, give continuous chest compressions. **80% of the CPR cycle should comprise of chest compressions.**

Defribrilliation: Once the AED arrives, switch it on and follow the voice prompts (further details below).

Resuscitation of children and infants (babies)

The adult BLS sequence for a child is far better than not doing anything at all. However, there are modifications that will make it more suitable for children and infants:

- Start by giving 5 rescue breaths.
- Look for signs of life such as movement, coughing, or normal breathing. Take no more than *ten seconds* to do this. If there are no signs of life, start CPR.
- If you are on your own, perform CPR for one minute before leaving to get help.
- Compress the chest *at least one-third* of its depth. This will be approximately 5 cm for an older child and approximately 4 cm for the infant. Use one or two hands for a child over 1 year and two fingers for the infant under 1. Never press deeper than the adult 6 cm limit (approximately the length of an adult's thumb).
- To avoid compressing the abdomen, press down on the sternum one finger's breadth above the xiphisternum.
- Use a compression: ventilation ratio of **15:2** if you are confident and competent in your resuscitation skills. This ratio will usually only be provided by healthcare professionals with a duty to respond to paediatric emergencies. The paediatric BLS healthcare algorithm from the Resuscitation council can be accessed by clicking on the link.

  In dental practice, it may be that staff are not used to dealing with cardiac arrest in children and infants and therefore may be more comfortable with the compression: ventilation ratio of 30:2. Time off the chest should be minimised as much as possible, therefore a 15:2 ratio should only be provided if the rescuer is confident in delivering rescue breaths. The out-of- hospital paediatric BLS healthcare algorithm can be accessed by clicking on the link.

Within dental and orthodontic practices, one person alone may be able to provide compressions and ventilations. If two or more staff are available as rescuers, then one could deliver compressions while the other delivers rescue breaths. In such a case, a two-thumb encircling technique can be used. The team approach is key.

- A lone rescuer with a mobile phone should call for help after the five rescue breaths, then move on to the next step while waiting for the emergency services to answer (activate the speaker function on the phone).

When performing rescue breaths:

- Ensure head tilt and chin lift in a child over 1 .
- Keep the head of an infant in a neutral position and lift the chin (when an infant is supine, the head is usually flexed and may require a degree of extension).
- If the infant's mouth and nose cannot be covered by the rescuer's mouth, then the rescuer can try to seal only the mouth or nose of the infant whilst closing the other.

Age definitions:

- An infant is under the age of one year.
- A child is between one year and 18 years of age.

The early use of a defibrillator significantly increases the patient's likelihood of survival and does not increase the risk of infection.

Resuscitation Council UK Statement on COVID-19 in relation to CPR and resuscitation in first aid and community settings

The Resuscitation Council UK Statement was updated in August 2022 and is as follows[8]:

"New evidence has emerged suggesting a low likelihood that airway management manoeuvres are aerosol generating, leading to the removal of airway management manoeuvres from the list of aerosol generating procedures.

We await further evidence on whether chest compressions generate aerosol. Until such evidence emerges we remain concerned that the provision of chest compressions and the proximity of the rescuer to the patient may constitute a risk of aerosol transmission.

In light of this new information we recommend:

- The curriculum for training members of the public and healthcare professionals reverts to the guidance set out in our **quality standards**.
- Members of the public and healthcare professionals follow **our 2021 guidelines for resuscitation**.
- For those working in healthcare settings, the use of FFP3 masks or respirators as well as eye protection is still recommended when performing chest

compressions for patients with suspected or confirmed COVID-19. AGP PPE, in particular FFP3 mask/respirator and eye protection, should be donned as swiftly as possible to avoid any delays in treatment."

The above-mentioned quality standards and 2021 guidelines can be accessed in the further reading section of this article.

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.[4]

Defibrillation within three minutes of collapse can produce survival rates as high as 50-70%. The initial rhythm is shockable in approximately 1 in 4 OHCA (22-25%). However, public access defibrillator use is reported as being used in less than 1 in 10 OHCA.[2]

Guidelines for use of an AED

The Resuscitation Council state that: "All clinical dental areas should have immediate access (within the first minutes of a cardiorespiratory arrest) to oxygen, resuscitation equipment for airway management including suction, and an automated external defibrillator (AED). The standard AED sign should be used in order to reduce delay in a defibrillator in an emergency."[9]

The standard AED signage[10] reinforces the following key messages:

- Anyone can use an AED- you do not need prior medical or first aid training.
- It is easy to use- you just follow the instructions.
- It is for use on an unconscious person who is not breathing at all, or not breathing normally.

Immediately the AED arrives, switch it on and follow the voice prompts, which include how to place the two electrode pads onto the patient's bare chest. One pad should be placed on the front of the chest to the right of the breastbone, below the clavicle (collar bone) and the other pad should be placed on the left side of the chest, wrapped slightly towards the back. It is important that this pad is placed sufficiently laterally and that it is clear of any breast tissue. The pads can be placed front-to-back on a child. Dental practices should check the age range for their specific AED.

If possible, do not interrupt chest compressions during placement of the pad. See images below for pad placement (the full Resuscitation Council UK/BHF AED guide can be downloaded by clicking here.)

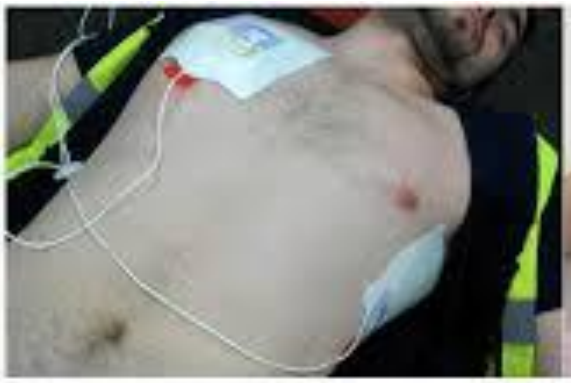


Figure 3.2 (a) AED adhesive pads (electrodes) placed on the chest of an adult – using full-size pads

Figure 3.2 (b) AED adhesive pads (electrodes) placed on the chest of a child – using paediatric pads

As soon as the pads are placed, the AED will determine whether or not the victim is in a shockable rhythm. If a shockable rhythm is identified, the AED will charge and prompt the user to stand clear. The patient must not be touched whilst the shock is delivered. A semi-automatic AED requires the user to push a button to deliver the

shock, whereas an automatic AED will count down and deliver the shock without user intervention. If an AED does not detect a shockable rhythm, the machine will not charge.

Two minutes of CPR is then required, after which time the machine will determine again whether or not the victim is in a shockable rhythm.

Do not interrupt the process 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 be 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).
- Spare Defibrillation Pads.

Other useful items to consider keeping with an AED are:

- Pocket Mask
- Metronome

Think about the six Ps

- Perspiration – ensure the chest is dry and free from any creams etc.
- Pacemaker/ICD – place the pads 10cm away from any pacemaker or internal cardioverter-defibrillator (ICD). Use an alternative pad position without compromising effective defibrillation.
- Pendants – do not have any metal resting between the pads during defibrillation.
- Piercings – there is nothing you can do about these.
- Patches/Plasters – remove drug-eluting patches or transdermal patches if they are where the AED pads would be applied, or place the pads in an alternative position.
- Playtex – when removing clothes, cut through a bra also.

Medical Emergencies Training

The General Dental Council state that, "registrants must know their role in the event of a medical emergency, and ensure they are sufficiently trained and competent to carry out that role." The GDC highly recommend that DCPs carry out 10 hours of medical emergency training in each five-year cycle. Although this article covers BLS and the use of an AED, it is important that dental professionals also carry out additional practical life support training.

The Resuscitation Council have the following standards for Primary Dental Care practice in the UK:

- "There is a public expectation that dental practitioners and all other dental care professionals should be competent in treating cardiorespiratory arrest.
- All primary care dental facilities should have a process for medical risk-assessment of their patients.
- Specific resuscitation equipment should be available immediately in all primary care dental premises. This equipment list should be standardised throughout the UK.
- All clinical areas should have immediate access to an automated external defibrillator (AED).
- Primary dental care providers, general dental practitioners and all other dental healthcare professionals should undergo training in cardiopulmonary resuscitation (CPR) including basic airway management and the use of an AED.
- Each primary dental care facility should have a plan for summoning assistance in the event of a cardiorespiratory arrest. For most practices this will mean calling 999 immediately.
- There should be regular practice and teaching using simulation-based cardiorespiratory arrest scenarios.
- Dental staff's knowledge and skills in resuscitation should be updated at least annually.
- A system must be in place for identifying which equipment requires special training, (such as AEDs, bag-mask devices and oropharyngeal airway insertion) and for ensuring that such training takes place.
- All new members of dental staff should have resuscitation training as part of their induction programme.
- Training can be undertaken locally within the dental practice or within local or regional training centres.
- For all staff, various methods to acquire, maintain and assess resuscitation skills and knowledge can be used for updates (e.g. life support courses, simulation training, mock-drills, 'rolling refreshers', e-learning, video-based training/self-instruction).
- Hands-on' simulation training and assessment is recommended for clinical staff
- Dental practitioners and other dental care professionals who work with children should learn the differences in CPR (from CPR in adults) for use in children and practise these on paediatric manikins.
- Training in resuscitation must be a fundamental requirement for dental practitioners and other dental care professional qualifications.
- All primary dental care providers should recognise the need for and make provision for dental staff to have sufficient time to train in resuscitation skills as part of their employment.
- All training should be recorded in a database.
- Training and retraining should be a mandatory requirement for Continuing Professional Development and maintenance on professional healthcare registers. It may be appropriate for some retraining to be undertaken using 'e-learning."[6]

Conclusion

Although cardiac arrest in Primary Dental Practice is rare, dental staff must be confident in dealing with a medical emergency should one arise. The chances of survival increase with good quality, uninterrupted CPR and early defibrillation. It is important that dental staff update their resuscitation skills at least annually, and that they carry out 'hands on' simulation training.

Personal Development Plan and Reflective Learning

This CPD is linked to the following GDC Enhanced CPD Development Outcome:

C. Maintenance and development of knowledge and skill within your field of practice.
D. Maintenance of skills, behaviours and attitudes which maintain patient confidence in you and the dental profession and put patients' interests first.

Reflective learning is now a requirement of the GDC Enhanced Professional Development Scheme. As such, you will now be given the opportunity to answer some reflective learning questions, before your certificate is generated. If you take a few moments to write your reflection on completion, you will have fulfilled the Enhanced CPD requirements.

Further Reading
The British Heart Foundation Heart Statistics 2025

Resuscitation Council (UK) (2021) Adult basic life support Guidelines

Resuscitation Council UK Quality Standards

Jon Andersen of ST4 Training

Jon Andersen is the sole proprietor of ST4 Training and has personally delivered over 2000 courses to a range of organisations. The majority of Jon's training is with GP and dental practices.

Previously, Jon was a Paramedic, Operational Station Officer, Aircrew Paramedic (one of the first six in Sussex), Advanced Exercise Referral Instructor, and Phase IV Cardiac Rehabilitation Exercise Specialist.

Jon can be contacted on 07883 703256

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