Anaphylaxis Management in Dental Practice
(Medical Emergencies)

Aims: This article provides the dental care professional with information on the causes, signs, symptoms, and treatment of anaphylaxis.

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

- Identify potential causes of anaphylaxis
- Identify signs and symptoms of anaphylaxis
- Identify medical conditions that may present in a similar way to anaphylaxis
- Have knowledge of the intramuscular adrenaline doses for the treatment of anaphylaxis
- Complete a questionnaire, scoring more than 70%

Introduction

The World Allergy Organisation Anaphylaxis Committee defines anaphylaxis as: “A serious systemic hypersensitivity reaction that is usually rapid in onset and may cause death. Severe anaphylaxis is characterised by potentially life-threatening compromise in airway, breathing and/or circulation, and may occur without typical skin features or circulatory shock being present.”[1]

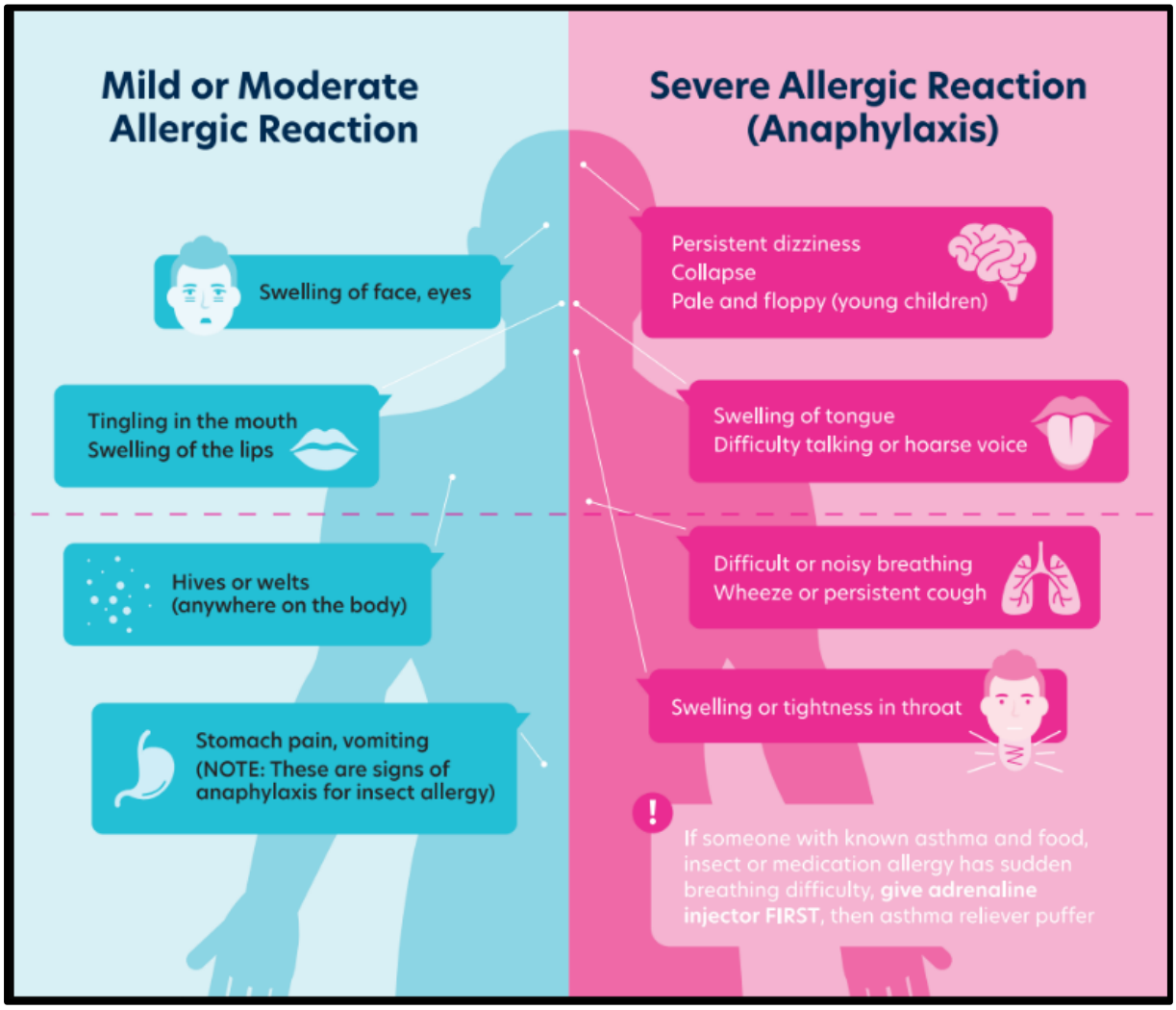
The World Allergy Organisation and the Resuscitation Council UK are using the term ‘serious’ instead of ‘severe to describe anaphylaxis. Switching to the term serious is to ensure that it is understood that if any of the Airway/Breathing/Circulation symptoms are present then the adrenaline auto injector should be used. The term ‘severe anaphylaxis is used to describe those people that do not recover with 2 doses of the adrenaline auto injector.

Approximately half of anaphylaxis episodes reported in the literature are not treated with intramuscular adrenaline, even when reactions occur in a healthcare setting. Furthermore, prominent skin features (including facial swelling and generalised urticaria) may be misdiagnosed as anaphylaxis and be treated with adrenaline.”

Recent National Institute for Health and Care Excellence guidance reports that "there is no overall figure for the frequency of anaphylaxis from all causes in the UK because anaphylaxis presents mainly in accident and emergency departments and outpatient settings.

Anaphylaxis may not be recorded, or may be misdiagnosed as something else, for example, asthma. It may also be recorded by cause, such as food allergy, rather than as an anaphylactic reaction." However, it is estimated that approximately 1 in 1333 of the UK population has experienced anaphylaxis during their life.[1] The UK incidence of anaphylaxis is reported to be increasing. [2]

Mild or Moderate Allergic Reaction VS Anaphylaxis



Causes of Anaphylaxis

Allergy

Anaphylaxis is caused by the sudden release of chemical substances, including histamine, from cells in the blood and tissues where they are stored. This release is triggered by the reaction between the allergic antibody (IgE) and the substance (allergen) causing the anaphylactic reaction. Histamine is a chemical that plays a major role in many allergic reactions, dilating blood vessels and making the vessel walls abnormally permeable.

Common causes of anaphylaxis include foods. There are 14 Major Allergens identified in the UK and food businesses must provide information about any of 14 major allergens when they are used as ingredients in the food and drink, they provide. The way the information is communicated to the customer depends on what kind of business they are (e.g., retail or catering), and how the food is presented.

The 14 Major Allergens are:

- Celery (including celery stalks, leaves, seeds and the root called celeriac)
- Cereals containing gluten (e.g., wheat, rye, barley, oats, pasta)
- Crustaceans (e.g., prawns, scampi, crabs, lobster, shrimp paste)
- Eggs (found in cakes, mayonnaise, mousses, quiche, sauces etc)
- Fish (in fish sauces, relishes, salad dressing, stock cubes, Worcestershire sauce)
- Soya (often found in bean curd, and soya is a staple ingredient in oriental food)
- Molluscs (e.g., mussels, land snails, squid and whelks)
- Milk (Used in butter, cheese, cream, milk powders and yoghurt)
- Mustard (Mustard liquid, seeds and powder)

- Sesame seeds (Often found in bread, breadsticks, humous, sesame oil and tahini)
- Lupin (Lupin can be a flour and seed and used in different types of bread, pastries, and pasta)
- Sulphur dioxide or Sulphites (Often used in dried fruits, meat products, soft drinks, beer, and wine)
- Nuts (grown on trees) (Cashew nuts, almonds, and hazelnuts … found in breads, biscuits, desserts, nut oils)
- Peanuts (grown underground) (Found in biscuits, cakes, curries, sauces such as satay sauce, groundnut oil)

Idiopathic Anaphylaxis

The common causes of anaphylaxis include food, insect stings, latex and medicines, but sometimes there may be no obvious trigger for the reaction. If after medical testing and investigation the cause of the reaction is not found, the reaction is then labelled as 'idiopathic anaphylaxis' (which means 'cause unknown').

This does not necessarily mean the reaction took place without something triggering it; it simply means that no trigger can be identified. Sometimes it could mean there is an unusual external trigger, such as a rare food allergen for which there is no skin or blood test, or which tests fail to pick up.

Sometimes it means there is no external trigger; instead, the cause is a temporary increase in the reactivity of the immune system. This increased reactivity usually clears up within a few weeks or months, although in some cases the condition may take a year or two to settle. A key message in all cases is to visit your GP and ask for a referral to an allergy clinic.

Biphasic Anaphylaxis

Anaphylaxis is a potentially life-threatening allergic reaction. The first symptoms usually occur very rapidly, and most cases are relieved by prompt treatment but occasionally the symptoms return. This usually happens within hours of the initial reaction but on rare occasions they can be more delayed. This is known as *biphasic anaphylaxis* and occurs in around 5% of patients.

Therefore, anyone who suffers a severe allergic reaction (anaphylaxis) needs to be observed in hospital after they recover in case a biphasic reaction occurs. The length of the observation period is for the treating doctor to decide.

There have been cases where people who have suffered anaphylaxis have decided not to dial 999 but have waited for the symptoms to resolve on their own, which can happen. These people were unaware that a biphasic reaction could occur. Anyone suffering anaphylaxis needs emergency medical treatment as soon as possible after the first symptoms occur.

Research shows that it is difficult to predict whether biphasic anaphylaxis will occur after the initial reaction. It seems more likely to happen if a drop in blood pressure (hypotension) is a symptom of the initial reaction. This will show as feeling light-headed, faint, extremely tired, or becoming unconscious.

Can Anaphylaxis be Fatal?

When anaphylaxis is fatal, death usually occurs very soon after contact with the trigger. The chart below shows how quickly a fatal collapse can happen (figure 1). In a series of test cases, death never occurred more than six hours after contact with the trigger. Intravenous medication caused the quickest reaction, followed by insect stings and then food reactions.[2]

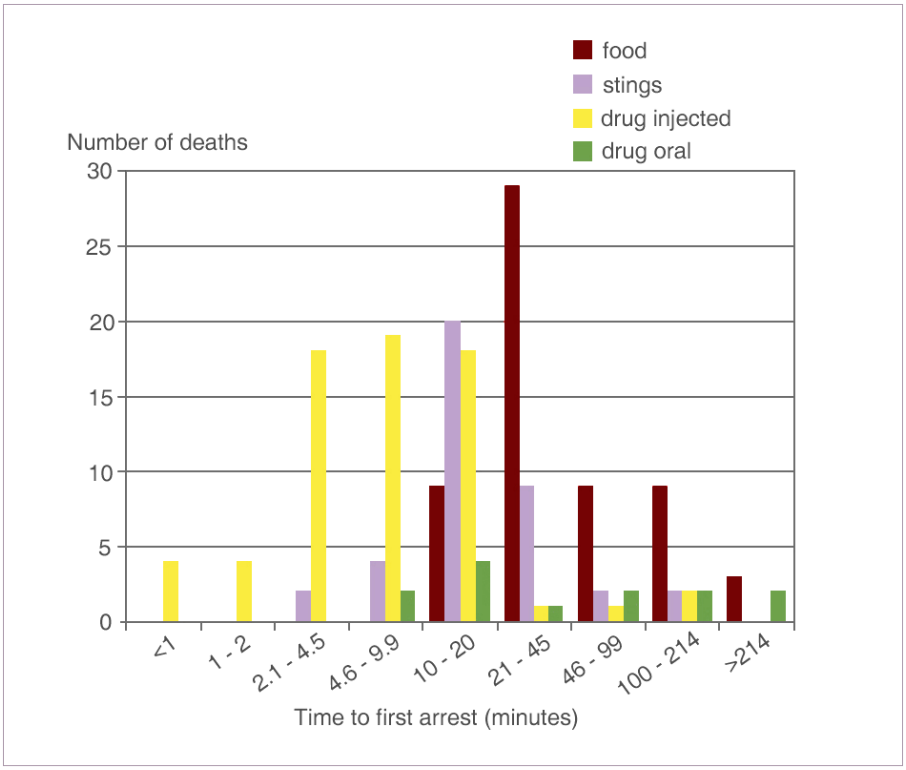


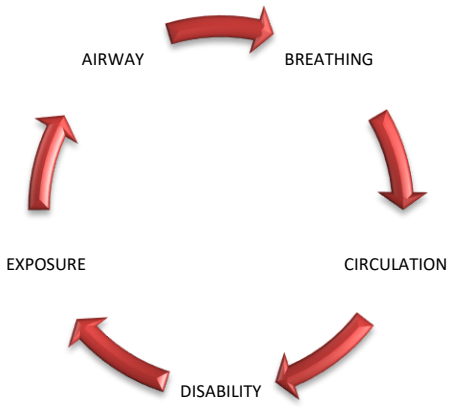
Figure 1. Time to cardiac arrest following exposure to triggering agent [2]

Signs and Symptoms of anaphylaxis

USE THE ABCDE APPROACH

- **Airway**
  - A feeling that the throat is closing up

- Swelling of the throat or tongue
- Hoarse voice
- Stridor
- Difficulty swallowing (dysphagia)



- **Breathing**

  - Shortness of breath (dyspnoea)
  - Increased respiratory rate
  - Wheezing
  - Respiratory arrest

- **Circulation**

  - Signs of shock
  - Increased heart rate (tachycardia)
  - Feeling faint
  - Collapse
  - Myocardial ischaemia / angina (bradycardia is usually a late sign, often preceding cardiac arrest)
  - Low blood pressure (the person may be fine when supine, but may go into **cardiac arrest** if sat up or stood up - blood pools in the legs)
  - Cardiac arrest

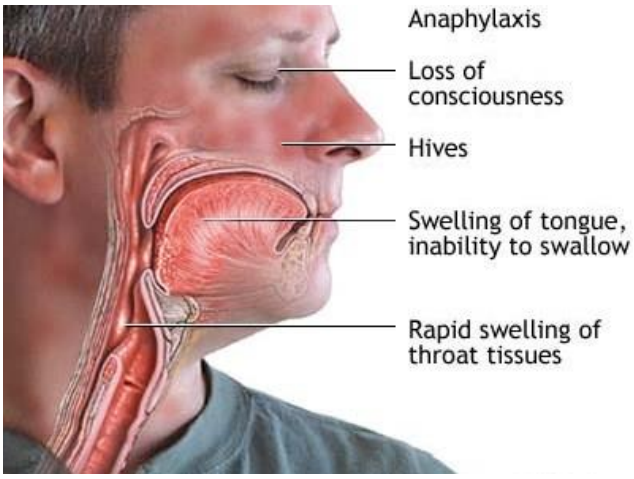
- **Disability (neurological problems – decreased brain perfusion)**

  - A sense of impending doom
  - Tiredness, Weakness
  - Reduced level of consciousness
  - Confusion

- **Exposure (skin and/or mucosal changes)**

Skin changes are often the first feature, and are present in over 80% of anaphylactic reactions:

  - Skin changes can be subtle or dramatic
  - There may be erythema (a patchy or generalised red rash)
  - Urticaria (also known as hives, nettle rash, weals or welts)
  - Angioedema (similar to urticaria but involves swelling of the deeper tissues such as the eyelids, lips, mouth, or throat)
  - Cyanosis – a late sign



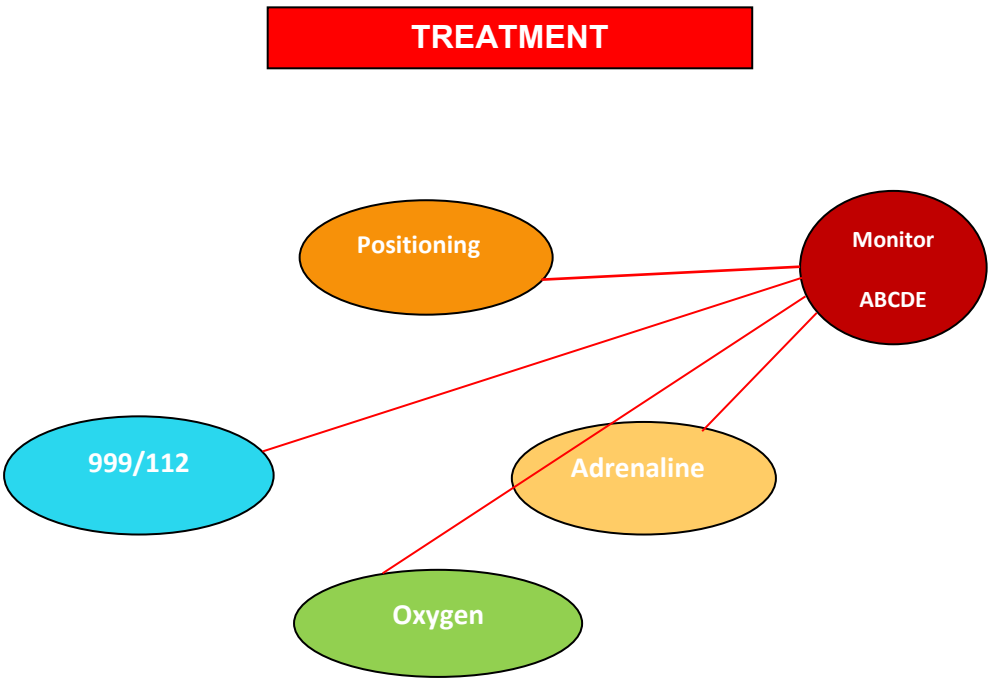
Some potential signs and symptoms of anaphylaxis[4]

The Resuscitation Council Guidelines state the following:

“Anaphylaxis is likely when all of the following 3 criteria are met:

- Sudden onset and rapid progression of symptoms
- Life-threatening Airway and/or breathing and/or Circulation problems
- Skin and/or mucosal changes (flushing, urticaria, angioedema)” (remember though that skin and/or mucosal changes may be absent in up to 20% of cases).[2]

Treatment



- Intramuscular adrenaline (table1 provides information on intramuscular adrenaline dosage) **The Resuscitation Council advise that training should be given to all healthcare workers on how to draw up adrenaline and give an intramuscular injection of adrenaline**

- Repeat Intramuscular adrenaline after 5 minutes if the **A**irway/**B**reathing/**C**irculation problems persist

- Oxygen (highest flow rate with a non-rebreather mask and reservoir)

- 999/112 and say "anaphylaxis" (The patient must go to hospital, even if apparently recovered)

INTRAMUSCULAR ADRENALINE (IM doses of 1 :1000 Adrenaline)	
Adult	500 micrograms IM (0.5ml)
Child over 12 years	500 micrograms IM (0.5ml)
Child 6-12 years	300 micrograms IM (0.3ml)
Child under 6 year	150 micrograms IM (0.15ml)
Child under 6 months	100-150 micrograms IM (0.1 to 0.15ml
The dose should be repeated if there is no improvement in the patient's condition. Further doses can be given at about 5-minute intervals according to the patient's response.[2]	

Table 1: Intramuscular adrenaline dosage

The Resuscitation Council Guidelines Algorithm

The Resuscitation Council currently have the following algorithm.

Resuscitation Council UK

Resuscitation Council UK

GUIDELINES 2021

Anaphylaxis

Anaphylaxis?

A = Airway **B** = Breathing **C** = Circulation **D** = Disability **E** = Exposure

Diagnosis – look for:

- Sudden onset of Airway and/or Breathing and/or Circulation problems[1]
- And usually skin changes (e.g. itchy rash)

Call for HELP
Call resuscitation team or ambulance

- Remove trigger if possible (e.g. stop any infusion)
- Lie patient flat (with or without legs elevated)
  - A sitting position may make breathing easier
  - If pregnant, lie on left side

Give intramuscular (IM) adrenaline[2]

Inject at **anterolateral aspect** – middle third of the thigh

- Establish airway
- Give high flow oxygen
- Apply monitoring: pulse oximetry, ECG, blood pressure

If no response:

- Repeat IM adrenaline after 5 minutes
- IV fluid bolus[3]

If no improvement in Breathing or Circulation problems[1] despite TWO doses of IM adrenaline:

- Confirm resuscitation team or ambulance has been called
- Follow REFRACTORY ANAPHYLAXIS ALGORITHM

1. Life-threatening problems

Airway
Hoarse voice, stridor

Breathing
↑ work of breathing, wheeze, fatigue, cyanosis, SpO_2 <94%

Circulation
Low blood pressure, signs of shock, confusion, reduced consciousness

2. Intramuscular (IM) adrenaline
Use adrenaline at 1 mg/mL (1:1000) concentration

Adult and child >12 years:	500 micrograms IM (0.5 mL)
Child 6–12 years:	300 micrograms IM (0.3 mL)
Child 6 months to 6 years:	150 micrograms IM (0.15 mL)
Child <6 months:	100–150 micrograms IM (0.1–0.15 mL)

The above doses are for IM injection **only**.
Intravenous adrenaline for anaphylaxis to be given **only by experienced specialists** in an appropriate setting.

3. IV fluid challenge
Use crystalloid

Adults:	500–1000 mL
Children:	10 mL/kg

Patient Positioning

Patients should be placed in a comfortable position. However, fatality can occur if a patient stands, walks, or sits up suddenly or too soon.

Lay the patient flat with or without legs elevated. If breathing is difficult, the patient's head and shoulders can be raised just enough to make breathing easier. A semi-recumbent position – 45 degrees from the horizontal – might be enough. The patient should lay flat again as soon as breathing is easier. Keep the patient in that position until the ambulance service arrives and takes over.

- Patients who are unconscious but breathing normally should be placed on their side (recovery position)
- Pregnant patients should lie on their left side to prevent caval compression."[2]

This video is ~~a~~ really useful, particularly the section on positioning:

https://www.youtube.com/watch?v=4vNR5N1-iBw&t=16s

Auto-injectors

Auto-injectors are for self-use by patients and carers and patients or carers should have been trained in the use of the device (their use is not intuitive). Anyone who has an auto injector should also have a training device for practise. It has been reported that only 30% of patients know how and when to use their injector, have one that is in date and carry it all the time.

Some auto-injectors have an expiry alert service by email or text messaging.

A comparison of auto-injectors

	Jext	EpiPen	Emerade
Shelf Life	19 months - 150 µg 24 months - 300 µg	18 months	18 months
Dosages	150µg 300µg	150µg 300µg	300µg 500µg
Exposed Needle Length	15.02mm	15.36mm	16mm(150µg) 23mm(300µg) 23mm(500µg)
Time against thigh	10 seconds	3 seconds	5 seconds
Prescription	50µg – 15 to 30 kg 300µg – over 30 kg	150µg – 7.5 to 25 kg 300µg – over 25 kg "or at the discretion of the physician"	300µg – 30 to 60 kg 500µg – "recommended dose is 300 to 500 micrograms for individuals over 60 kg depending on clinical judgement"

Differential Diagnosis

Other medical conditions may give a similar presentation to anaphylaxis:

- Severe asthma – can present with similar signs and symptoms to anaphylaxis, particularly in children. Asthma and anaphylaxis compound each other.
  If in doubt - treat as anaphylaxis

- Septic shock – hypotension with a petechial or purpuric rash (tiny red or purple spots caused by an extravasation of blood into the skin).

- Petechial rash (sometimes referred to as a purpuric rash).

- Fainting – a Vaso-vagal episode.

- Panic attack – victims of previous anaphylaxis may be particularly prone to panic attacks if they think they have been re-exposed to the allergen.

  If in doubt - treat as anaphylaxis

- Breath holding in children.

- Idiopathic (i.e., without a known cause) (non-allergic) urticaria or angioedema.

Follow-up

It is important that the dental team make detailed notes following treatment for suspected anaphylaxis. It is recommended that the circumstances immediately before the onset of the reaction are recorded in order to help identify the potential trigger.

The NICE guidelines state that after hospital treatment for suspected anaphylaxis,

- All patients should be referred to a specialist clinic for allergy assessment.
- Patients should be offered (or, if appropriate, their parent and/or carer) an appropriate adrenaline injector as an interim measure before the specialist allergy assessment (unless the reaction was drug induced).
- Patients prescribed adrenaline auto-injectors (and/or their parents/carers) must receive training in their use and have an emergency management or action plan.

Biography

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

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 have the opportunity to answer some reflective learning questions, if you complete these now you will fulfil the requirements of the GDC. These will be:

1) What did you learn (or confirm) from the activity that was helpful or relevant to your daily work and patients?
2) Comment on any changes/updates needed in your daily work
3) How has completion of this CPD article benefitted your work as a DCP?

Examples will be provided. Please remember that you need to fill this in on completion of the exam, but you can also update this at any time from your CPD log. If you take a few moments to write your reflection on completion, you will have fulfilled the Enhanced CPD requirements.

Further Reading

https://www.resus.org.uk/sites/default/files/2021-05/Emergency%20Treatment%20of%20Anaphylaxis%20May%202021_0.pdf

https://www.anaphylaxis.org.uk/wp-content/uploads/2019/07/Anaphylaxis-The-Facts-Feb-2019.pdf

References

1. National Institute for Health and Care Excellence (2011) Anaphylaxis: assessment to confirm an anaphylactic episode and the decision to refer after emergency treatment for a suspected anaphylactic https://www.nice.org.uk/guidance/cg134/evidence/anaphylaxis-full-guideline-pdf-184946941 (accessed 10/05/2025)
2.Rescusitation Council UK (2008) Emergency treatment of anaphylactic reactions Guidelines for healthcare providers available at: https://www.resus.org.uk/anaphylaxis/emergency-treatment-of-anaphylactic-reactions/ (accessed 10/05/2025)
3. Anaphylaxis Campaign (2013) What is Anaphylaxis? Available at: https://www.anaphylaxis.org.uk/what-is-anaphylaxis/ (accessed 10/05/2025)
4. Health Central. Signs and Symptoms of Anaphylaxis Image. Available at: http://www.healthcentral.com/allergy/h/what-are-the-characteristics-of-anaphylaxis.html (accessed 10/05/2025)