



MEDICAL EMERGENCIES AND RESUSCITATION

STANDARDS FOR CLINICAL PRACTICE
AND TRAINING
FOR DENTAL PRACTITIONERS
AND DENTAL CARE PROFESSIONALS
IN GENERAL DENTAL PRACTICE

A Statement from
The Resuscitation Council (UK)

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Foreword by the General Dental Council

The General Dental Council's core ethical guidance booklet 'Standards for dental professionals' and associated, supplementary guidance, emphasise that all dental professionals are responsible for putting patients' interests first, and acting to protect them.

Central to this responsibility is the need for dental professionals to ensure that they are able to deal with medical emergencies that may arise in their practice. Such emergencies are, fortunately, a rare occurrence, but it is important to recognise that a medical emergency could happen at any time and that all members of the dental team need to know their role in the event of a medical emergency.

Our guidance 'Principles of dental team working' states:

Medical emergencies can happen at any time in dental practice. If you employ, manage or lead a team, you should make sure that:

- There are arrangements for at least two people available to deal with medical emergencies when treatment is planned to take place.
- All members of staff, not just the registered team members, know their role if a patient collapses or there is another kind of medical emergency.
- All members of staff who might be involved in dealing with a medical emergency are trained and prepared to deal with such an emergency at any time, and practise together regularly in a simulated emergency so they know exactly what to do.

Maintaining the knowledge and competence to deal with medical emergencies is an important part of all dental professionals' continuing professional development. The Council welcomes these guidelines and congratulates the authors on the considerable work that has led to this publication.



Hew Mathewson
President
General Dental Council
March 2006

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1 Executive summary

- Medical emergencies are rare in general dental practice.
- There is a public expectation that Dental Practitioners and Dental Care Professionals should be competent in managing common medical emergencies.
- All dental practices should have a process for medical risk assessment of their patients.
- All Dental Practitioners and Dental Care Professionals should adopt the 'ABCDE' approach to assessing the acutely sick patient.
- Specific emergency drugs and items of emergency medical equipment should be immediately available in all dental surgery premises. These should be standardised throughout the UK.
- All clinical areas should have immediate access to an automated external defibrillator (AED).
- Dental Practitioners and Dental Care Professionals should all undergo training in cardiopulmonary resuscitation (CPR), basic airway management and the use of an AED.
- There should be regular practice and scenario based exercises using simulated emergencies.
- Dental practices should have a plan in place for summoning medical assistance in an emergency. For most practices this will mean calling 999.
- Staff should be updated annually.
- Audit of all medical emergencies should take place.

2 Introduction

All Dental Practitioners and Dental Care Professionals may have to deal with medical emergencies. Fortunately, these are rare. The commonest problems, namely, vasovagal syncope (faints), hypoglycaemia, angina, seizures, choking, asthma and anaphylaxis have been reported to occur at rates between 0.7 cases per dentist per year (Girdler, 1999) or on average once every 3 to 4 years (Atherton, 1999). Myocardial infarction and cardiopulmonary arrest are even more uncommon. Despite such events happening so infrequently, published guidance from the General Dental Council (GDC) in 2005 has clearly stated that:

- Medical emergencies can occur at any time.
- All members of staff need to know their role in the event of a medical emergency.
- Members of staff need to be trained in dealing with such an emergency.
- Dental teams should practise together regularly in simulated emergency situations.

The 2002 GDC document 'The First Five Years. A Framework for Undergraduate Dental Education' states that Dental Practitioners must be competent in resuscitation techniques, have the knowledge to diagnose common medical emergencies and be confident in managing such situations. Despite such recommendations, many Dental Practitioners do not feel capable of identifying many of the causes of collapse and even fewer feel comfortable dealing with emergencies like myocardial infarction, anaphylaxis and cardiopulmonary arrest.

Safety within general dental practice has maintained a high profile since publication of the Poswillo Report in 1990. The use of general anaesthesia in general dental practice has been abandoned and 'conscious sedation' techniques (inhalational, oral or intravenous) are now preferred. Clear standards have been published defining the use of such 'conscious sedation' techniques, the most recent being that from the Standing Dental Advisory Committee (SDAC) in 2003. Such guidance from the SDAC, which is to be further updated in 2006, clearly stipulates the clinical practice requirements and training needs of those using such techniques. Detailed published guidance for the medical emergency and resuscitation training needs for Dental Practitioners and Dental Care Professionals in general dental practice is lacking however. Exact standards do not currently exist for training, equipment and drugs for medical emergencies and resuscitation in this setting.

For many years the Resuscitation Council (UK) has published advice on resuscitation training and standards for clinical practice. After receiving numerous enquiries from those involved in the dental healthcare profession, the Resuscitation Council (UK) decided to convene a Working Party whose aim was to develop a document that should provide guidance to Dental Practitioners and Dental Care Professionals in general dental practice on the following:

- Exactly what training should be undertaken in order to be competent in dealing effectively with medical emergencies and resuscitation.
- The equipment and drugs that should be available.
- How this process should be managed.

Much of the advice in this document is based on previously published reports but it has been amplified and brought up to date. In 2006, new resuscitation guidelines will be in use throughout the UK and Europe. It is hoped that this document will provide complimentary guidance to be used in conjunction with the new resuscitation guidelines, to help those individuals in general dental practice who may have to deal with the rare event of a sick or collapsed patient.

3 Medical risk assessment in general dental practice

Statements and recommendations

1. Any patient can have a medical emergency during dental treatment.
2. A medical and drug history will enable the Dental Practitioner to identify patients at particular risk and take measures to reduce the chance of a problem arising.
3. History taking should not be delegated to another member of the dental team and patient completed health questionnaires are only acceptable if augmented by a verbal history taken by the Dental Practitioner.
4. Modifying the planned treatment or referral to hospital may be appropriate for some dental procedures in selected patients.
5. Dental Practitioners should routinely assess patients using a risk stratification scoring system, e.g., the American Society of Anaesthesiologists (ASA) classification. This may help identify patients with a higher risk of medical emergencies occurring during treatment. Scoring systems should trigger a referral to hospital for treatment when a certain level of risk is attained. Such systems can be incorporated into a specifically designed medical history questionnaire (see Appendix (viii)) so that the risk scoring becomes part of the routine medical history.
6. As patients' medical problems and medication can change frequently, Dental Practitioners must demonstrate that medical and drug histories are formally updated at least annually and interim changes noted at treatment visits. Liaison with the patient's General Practitioner may be necessary.
7. Examples of how patients with special risks may be identified are given below (for further details see 'Common Medical Emergencies', Appendix (ii)).

Angina

Patients with a history of frequent exertional angina or those in whom angina is easily provoked may have an attack in the dental surgery. If these episodes are precipitated by anxiety or stress, an oral anxiolytic treatment may reduce the risk. Patients with 'unstable' angina, nocturnal angina and those with a recent history of hospital admission for angina have the highest risk and may require some or all of their treatment in a more medically supported environment.

Asthma

The quantity of medication used in an asthmatic patient's treatment is often a good guide to the severity of their illness. Those at highest risk of having an emergency in the dental surgery include those taking oral medications in addition to inhaled medication and those who regularly use a nebuliser at home. Those who have

required oral steroids for their asthma within the last year and those admitted to hospital with asthma within the last year represent high risk patients. The British Thoracic Society (www.brit-thoracic.org.uk/asthma-guideline-download.html) provides further guidance on the definition of high risk patients.

Epilepsy

Patients will usually be able to give the Dental Practitioner a good guide to the control of their illness. Factors that should alert the Dental Practitioner to a higher risk are poor seizure control and a recent change in medication. Enquiring about the timing of and precipitating factors for the last three seizures is a sensible risk precaution.

Diabetes

Insulin treated diabetics are those most likely to become hypoglycaemic whilst at the dental surgery. Diet or tablet controlled diabetics are a much lower risk. Diabetics with poor control or poor awareness of their hypoglycaemic episodes have a greater chance of developing problems.

Allergies

Always ask patients about known allergies including previous reactions to local anaesthetics, antibiotics and latex. Avoid any possible allergens if suitable alternatives are available, e.g., latex-free gloves. When this is not the case referral for specialist assessment is usually recommended. The dental team must also be aware that no previous history of allergen exposure is necessary for a serious reaction to occur. Any patient with a significant latex allergy should be treated in a hospital environment or latex free dental environment where appropriate resuscitation facilities are available.

4 Emergency drugs in general dental practice

Statements and recommendations

Specific emergency drugs should be immediately available in all dental surgery premises. These should be standardised throughout the UK.

1. To manage the more common medical emergencies encountered in general dental practice the following drugs should be available:
 - Glyceryl trinitrate (GTN) spray (400micrograms / dose)
 - Salbutamol aerosol inhaler (100micrograms / actuation)
 - Adrenaline injection (1:1000, 1mg/ml)
 - Aspirin dispersable (300mg)
 - Glucagon injection 1mg
 - Oral glucose solution / tablets / gel / powder
 - Midazolam 5mg/ml or 10mg/ml (buccal or intranasal)
 - Oxygen
2. Where possible drugs in solution should be in a pre-filled syringe.
3. The use of intravenous drugs for medical emergencies in general dental practice is to be discouraged. Intramuscular, inhalational, sublingual, buccal and intranasal routes are all much quicker to administer drugs in an emergency.
4. All drugs should be stored together in a purposely-designed 'Emergency Drug' storage container.
5. Oxygen cylinders should be of sufficient size to be easily portable but also allow for adequate flow rates, e.g., 10 litres per minute, until the arrival of an ambulance or the patient fully recovers. A full 'D' size cylinder contains 340 litres of oxygen and should allow a flow rate of 10 litres per minute for up to 30 minutes. Two such cylinders may be necessary to ensure the supply of oxygen does not fail when it is used in a medical emergency.

5 Medical emergency and resuscitation equipment

Statements and recommendations

The equipment used for any medical emergency or cardiopulmonary arrest should be standardised throughout general dental practices in the UK.

1. All clinical areas should have immediate access to resuscitation drugs, equipment for airway management and an automated external defibrillator (AED). Staff must be familiar with the location of all resuscitation equipment within their working area. The following is the **minimum** equipment recommended:
 - Portable oxygen cylinder (D size) with pressure reduction valve and flowmeter.
 - Oxygen face mask with tubing.
 - Basic set of oropharyngeal airways (sizes 1,2,3 and 4).
 - Pocket mask with oxygen port.
 - Self-inflating bag and mask apparatus with oxygen reservoir and tubing (1 litre size bag) where staff have been appropriately trained.
 - Variety of well fitting adult and child face masks for attaching to self-inflating bag.
 - Portable suction with appropriate suction catheters and tubing e.g., the Yankauer sucker.
 - Single use sterile syringes and needles.
 - 'Spacer' device for inhaled bronchodilators.
 - Automated blood glucose measurement device.
 - Automated External Defibrillator.
2. Automated External Defibrillators (AEDs) will reduce mortality from cardiac arrest caused by ventricular fibrillation and pulseless ventricular tachycardia. The widespread deployment of such devices throughout the UK and the Department of Health's 'Public Access Defibrillation' programme has ensured that such machines are now readily available and in common use.
3. The provision of an AED enables all dental staff to attempt defibrillation safely after relatively little training and their use is therefore recommended. These defibrillators should have recording facilities and standardised consumables, e.g., self-adhesive electrode pads, connecting cables. Adult AEDs can safely be used on children over 8 years old. Some machines have paediatric pads or a mode that permits them to be 'attenuated' to make them more suitable for use in children between 1 and 8 years of age. These modifications should be considered for practices that regularly treat children. In cardiac arrest situations when paediatric pads or attenuation is not available, a standard adult AED may be used in a child over 1 year old. Staff should be familiar with the device in use on their premises and its mode of operation.

4. It is an expectation of the public that AEDs should be available in every healthcare environment and the dental surgery is not seen as an exception.
5. Where possible all emergency medical equipment should be single use and latex free.
6. Responsibility for checking resuscitation equipment rests with the individual dental practice where the equipment is held. This process should be designated to named individuals. The frequency of checking will depend upon local circumstances but should ideally be weekly. Checking should be the subject of local audit.
7. A planned replacement programme should be in place for equipment and drugs that are used or reach their expiry date.

6 Training of staff

Statements and recommendations

Early identification of the 'sick' patient is to be encouraged. Pre-empting any medical emergency by recognising an abnormal breathing pattern, an abnormal patient colour or abnormal pulse rate, allows appropriate help to be summoned e.g., ambulance, prior to any patient collapse occurring. A systematic approach to recognising the acutely ill patient based on the 'ABCDE' principles is recommended (see Appendix (i)).

Accurate documentation of the patient's medical history should further allow those 'at risk' of certain medical emergencies to be identified in advance of any proposed treatment.

1. Staff should undergo regular training in the management of medical emergencies to a level appropriate to their expected clinical responsibilities.
2. Dental Practitioners and Dental Care Professionals must be trained in cardiopulmonary resuscitation (CPR) so that in the event of cardiac arrest they should be able to:
 - Recognise cardiac arrest.
 - Summon help (dial 999).
 - Start 'CPR', i.e., ventilate the patient's lungs with a pocket mask or self-inflating bag and mask device and provide chest compressions (at a rate of 100 per minute) according to current resuscitation guidelines. Evidence suggests that chest compressions can be effectively performed in a dental chair.
 - Give high flow rate oxygen (10 litres per minute) as soon as practicable.
 - Attach an AED as soon as possible after collapse. Follow the prompts from the machine and attempt defibrillation when indicated.
 - Provide other advanced life support skills if appropriate and trained to do so.
3. Staff working in practices that treat children should learn the modifications to adult CPR for use in children (see Appendix (iii)) and practise on paediatric manikins.
4. Staff should update their skills at least annually.
5. A system must be in place for identifying which equipment requires special training, such as defibrillators (AEDs) and self-inflating bag and mask devices.
6. All new members of staff should have resuscitation training as part of their induction programme.
7. Training can be undertaken locally within the dental practice or within local and regional training centres. Designated 'trainers' from within the dental practice staff should be encouraged to undertake 'cascade' training, e.g., BLS. More

complex training e.g., AED, may require a specific trainer (Resuscitation Officer) or attendance at a designated course.

8. Training in resuscitation must be a fundamental requirement for Dental Practitioner and other Dental Care Professional qualifications. Undergraduate and postgraduate examinations for all Dental Practitioners and Dental Care Professionals should include an evaluation of competency in resuscitation techniques appropriate to their role.
9. All general dental practices should recognise the need for and make provision for staff to have sufficient time to train in resuscitation skills as part of their employment.
10. All training should be recorded in a database.
11. Training and retraining should be a mandatory requirement for Continuing Professional Development and maintenance on professional healthcare registers.

7 Patient transfer and post-resuscitation / emergency care

Statements and recommendations

1. In the event of any significant medical emergency an ambulance should be summoned at the earliest opportunity. All dental practices should have a defined protocol for how to summon the emergency services, including calling 999. This protocol should include clear directions on how to find the practice and whether or not there may be a difficult access point. Dental practices should clearly identify all access points and removal routes.
2. Ambulance personnel will provide equipment, expertise, practical help and a range of treatments supplementary to those available in the dental surgery. Should the emergency not turn out to be as serious as first thought, no harm will be done.
3. Immediately after any medical emergency many patients may be clinically unstable and may require admission to hospital. This will depend on factors such as previous health, nature and severity of illness and underlying diagnosis. If the Dental Practitioner does not feel competent to make this judgement it is their duty to ensure that an appropriate individual (for example a doctor or paramedic) is contacted to assess the patient's immediate treatment needs.
4. If a patient recovers completely and hospital admission is not deemed necessary, safe medical practice dictates that they should not leave the dental premises unaccompanied nor drive a motor vehicle.
5. When a patient remains unwell (or if there is any doubt concerning their health) they should be assessed by a doctor. This will usually mean attending hospital by ambulance. Occasionally contacting the patient's General Practitioner may be appropriate.
6. The patient's condition should be stabilised as far as possible before transfer but this should not delay further assessment or treatment.
7. Written documentation containing details of the dental procedure (if any), medical emergency, any treatment given and the name of the Dental Practitioner should accompany the patient to hospital.
8. Relatives should be informed about the transfer of a patient, but should not expect to travel with the patient in the ambulance. Contact details for the relatives should be obtained.

8 Audit

Statements and recommendations

1. To ensure a high quality service, general dental practices should audit:
 - Weekly checks of the emergency medical equipment and drugs.
 - All medical emergencies that occur on site including near miss events.
 - Other health and safety issues, e.g., manual handling.
2. Ideally, audit should include periods of 'debriefing' after any medical emergency. This allows staff to reflect on the treatment given and permits discussion of whether anything might have been done differently. Regular staff meetings will often provide the ideal forum for such discussions.
3. Where audit has identified deficiencies, steps must be taken to improve performance.

9 Further reading

Cardiopulmonary Resuscitation – Guidelines for Clinical Practice and Training. Resuscitation Council (UK), Royal College of Anaesthetists, Royal College of Physicians, Intensive Care Society, 2004.

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10 Glossary

AED	automated external defibrillator
ALS	advanced life support (life support which may include CPR, defibrillation and administration of drugs)
BLS	basic life support (refers to CPR with no equipment except protective devices)
CPR	cardiopulmonary resuscitation (refers to chest compressions and ventilations)
GDC	General Dental Council
RO	resuscitation officer
SDAC	Standing Dental Advisory Committee

Appendix (i)

The 'ABCDE' approach to the sick patient

This appendix and the one following provide guidance on the initial approach and management of common medical emergencies which may arise in general dental practice. Dental Practitioners, Dental Care Professionals and their staff should be familiar with standard resuscitation procedures as recommended by the Resuscitation Council (UK). In all circumstances it is advisable to call for medical assistance as soon as possible by dialling 999 and summoning an ambulance.

Early recognition of the 'sick' patient is to be encouraged. Pre-empting any medical emergency by recognising an abnormal breathing pattern, an abnormal patient colour or abnormal pulse rate, allows appropriate help to be summoned e.g., ambulance, prior to any patient collapse occurring. A systematic approach to recognising the acutely ill patient based on the 'ABCDE' principles is recommended. Accurate documentation of the patient's medical history should further allow those 'at risk' of certain medical emergencies to be identified in advance of any proposed treatment. The elective nature of most dental practice allows time for discussion of medical problems with the patient's general medical practitioner where necessary. In certain circumstances this may lead to a postponement of the treatment indicated or a recommendation that such treatment be undertaken in hospital.

General principles

1. Follow the **A**irway, **B**reathing, **C**irculation, **D**isability, and **E**xposure approach (ABCDE) to assess and treat the patient.
2. Treat life-threatening problems as they are identified before moving to the next part of the assessment.
3. Continually re-assess starting with Airway if there is further deterioration.
4. Assess the effects of any treatment given.
5. Recognise when you need extra help and call for help early. This may mean dialling 999 for an ambulance.
6. Use all members of your dental team. This will allow you to do several things at once, e.g., collect emergency drugs and equipment, dial 999.
7. Organise your team and communicate effectively.
8. The aims of initial treatment are to keep the patient alive, achieve some clinical improvement and buy time for further treatment whilst waiting for help.
9. Remember - it can take a few minutes for treatment to work.
10. The ABCDE approach can be used irrespective of your training and experience in clinical assessment or treatment. Individual experience and

training will determine which treatments you can give. Often only simple measures such as laying the patient down or giving oxygen are needed.

First steps

- In an emergency, stay calm. Ensure that you and your staff are safe.
- Look at the patient generally to see if they 'look unwell'.
- In an awake patient ask, "How are you?" If the patient is unresponsive, shake him and ask, "Are you all right?" If they respond normally, they have a clear airway, are breathing and have brain perfusion. If they speak only in short sentences, they may have breathing problems. Failure of the patient to respond suggests that they are unwell. If they are not breathing and have no pulse or signs of life, start CPR according to current resuscitation guidelines.

Airway (A)

Airway obstruction is an emergency.

1. Look for the signs of airway obstruction:

- Airway obstruction causes 'paradoxical' chest and abdominal movements ('see-saw' respirations) and the use of the accessory muscles of respiration e.g., neck muscles. Central cyanosis (blue lips and tongue) is a late sign of airway obstruction. In complete airway obstruction, there are no breath sounds at the mouth or nose.
- In partial airway obstruction, air entry is diminished and usually noisy
 - Inspiratory 'stridor' is caused by obstruction at the laryngeal level or above.
 - Expiratory 'wheeze' suggests obstruction of the lower airways, which tend to collapse and obstruct during expiration. This is most commonly seen in patients with asthma or chronic obstructive pulmonary disease.
 - Gurgling suggests there is liquid or semi-solid foreign material in the upper airway.
 - Snoring arises when the pharynx is partially occluded by the tongue or palate.

2. Airway obstruction is an emergency:

- In most cases, only simple methods of airway clearance are needed
 - Airway opening manoeuvres – head tilt/ chin lift or jaw thrust.
 - Remove visible foreign bodies, debris or blood from the airway (use suction or forceps as necessary).
 - Consider simple airway adjuncts e.g., oropharyngeal airway.

3. Give oxygen at a high inspired concentration:

- Use a mask with an oxygen reservoir. Ensure that the oxygen flow is sufficient (10 litres per minute) to prevent collapse of the reservoir during inspiration.

- If you have a pulse oximeter, aim for a normal oxygen saturation (97-100%). In very sick patients this may not be possible and a lower oxygen saturation (more than 93%) is acceptable for a short period of time.

Breathing (B)

During the immediate assessment of breathing, it is vital to diagnose and treat immediately life-threatening breathing problems, e.g., acute severe asthma.

1. Look, listen and feel for the general signs of respiratory distress: sweating, central cyanosis (blue lips and tongue), use of the accessory muscles of respiration (muscles of the neck) and abdominal breathing.
2. Count the respiratory rate. The normal adult rate is 12 to 20 breaths per minute and a child's rate is between 20 and 30 breaths per minute. A high, or increasing, respiratory rate is a marker of illness and a warning that the patient may deteriorate and further medical help is needed.
3. Assess the depth of each breath, the pattern (rhythm) of respiration and whether chest expansion is equal and normal on both sides.
4. Listen to the patient's breath sounds a short distance from their face. Gurgling airway noises indicate airway secretions, usually because the patient cannot cough or take a deep breath. Stridor or wheeze suggests partial, but important, airway obstruction.
5. If any patient's depth or rate of breathing is inadequate, or you cannot detect any breathing, use bag and mask (if trained) or pocket mask ventilation with supplemental oxygen while calling urgently for an ambulance.
6. Hyperventilation and panic attacks are relatively common in dental practice. In most patients these will resolve with simple reassurance.

Circulation (C)

Simple faints or vasovagal episodes are the most likely cause of circulation problems in general dental practice. These will usually respond to lying the patient flat and if necessary raising the legs (see Appendix (ii) *Syncope*). The systematic ABCDE approach to all patients will ensure that other causes are not missed.

1. Look at the colour of the hands and fingers: are they blue, pink, pale or mottled?
2. Assess the limb temperature by feeling the patient's hands: are they cool or warm?
3. Measure the capillary refill time. Apply cutaneous pressure for five seconds on a fingertip held at heart level (or just above) with enough pressure to cause

blanching. Time how long it takes for the skin to return to the colour of the surrounding skin after releasing the pressure. The normal refill time is less than two seconds. A prolonged time suggests poor peripheral perfusion. Other factors (e.g., cold surroundings, old age) can also prolong the capillary refill time.

4. Count the patient's pulse rate. It may be easier to feel a central pulse (i.e., carotid pulse) than the radial pulse.
5. Weak pulses in a patient with a decreased conscious level and slow capillary refill time suggest a low blood pressure. Laying the patient down and raising the legs may be helpful. In patients who do not respond to simple measures urgent help is needed and an ambulance should be summoned.
6. Cardiac chest pain typically presents as a heaviness, tightness or indigestion-like discomfort in the chest. The pain or discomfort often radiates into the neck or throat, into one or both arms (more commonly the left) and into the back or stomach area. Some patients experience the discomfort in one of these areas more than in the chest. Sometimes pain may be accompanied by belching, which can be misinterpreted as evidence of indigestion as the cause. The patient may have known stable angina and carry their own glyceryl trinitrate (GTN) spray or tablets. If they take these, the episode may resolve. If the patient has sustained chest pain, give high flow oxygen (10 litres per minute) and GTN spray if the patient has not already taken some. The patient may feel better and should be encouraged to sit upright if possible. Give a single dose of aspirin. (See Appendix (ii) *Cardiac Emergencies*)

Disability (D)

Common causes of unconsciousness include profound hypoxia, hypercapnia (raised carbon dioxide levels), cerebral hypoperfusion (low blood pressure), or the recent administration of sedatives or analgesic drugs.

1. Review and treat the ABCs: exclude hypoxia and low blood pressure.
2. Check the patient's drug record for reversible drug-induced causes of depressed consciousness.
3. Examine the pupils (size, equality and reaction to light).
4. Make a rapid initial assessment of the patient's conscious level using the AVPU method: **A**lert, responds to **V**ocal stimuli, responds to **P**ainful stimuli or **U**nresponsive to all stimuli.
5. Measure the blood glucose to exclude hypoglycaemia, using a glucose meter. If below 3.0mmol per litre give the patient a glucose containing drink to raise the blood sugar or glucose by other means (see Appendix (ii) *Hypoglycaemia*).

6. Nurse unconscious patients in the recovery position if their airway is not protected.

Exposure (E)

To assess and treat the patient properly loosening or removal of some of the patient's clothes may be necessary. Respect the patient's dignity and minimise heat loss. This will allow you to see any rashes (e.g., anaphylaxis) or perform procedures (e.g., defibrillation).

Appendix (ii)

Common medical emergencies in general dental practice

Asthma

Patients with asthma (both adults and children) may have an attack while at the dental surgery. Most attacks will respond to a few 'activations' of the patient's own short-acting beta₂-adrenoceptor stimulant inhaler such as salbutamol (100 micrograms/actuation). Repeat doses may be necessary.

If the patient does not respond rapidly, or any features of severe asthma are present, an ambulance should be summoned. Patients requiring additional doses of bronchodilator should be referred for medical assessment after emergency treatment. If the patient is unable to use the inhaler effectively, additional doses should be given through a large-volume spacer device. If the response remains unsatisfactory or if the patient develops tachycardia, becomes distressed or cyanosed (blueness around the lips or extremities), arrangements must be made to transfer the patient urgently to hospital.

Symptoms and Signs

Clinical features of **acute severe asthma** in adults include:

- Inability to complete sentences in one breath.
- Respiratory rate > 25 per minute.
- Tachycardia (heart rate > 110 per minute).

Clinical features of **life threatening asthma** in adults include:

- Cyanosis or respiratory rate < 8 per minute.
- Bradycardia (heart rate < 50 per minute).
- Exhaustion, confusion, decreased conscious level.

Treatment

Whilst awaiting ambulance transfer, oxygen (10 litres per minute) should be given. Assuming the patient's nebuliser is unavailable, 4–6 activations from the salbutamol inhaler should be given using a large-volume spacer device and repeated every 10 minutes if necessary until an ambulance arrives. All emergency ambulances in the UK carry nebulisers, oxygen and appropriate drugs.

If asthma is part of a more generalised anaphylactic reaction or if signs of life threatening asthma are present, an intramuscular injection of adrenaline (see *Anaphylaxis*) should be given.

The perceived risk of giving patients with chronic obstructive pulmonary disease too much oxygen is often quoted but this should not distract from the reality that ALL sick, cyanosed patients with respiratory difficulty should be given high flow oxygen until the arrival of the ambulance. This short term measure is far more

likely to be of benefit to the patient than any risks of causing respiratory depression.

If any patient becomes unresponsive always check for 'signs of life' (breathing and circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

For further information about the management of the the patient with asthma see: www.brit-thoracic.org.uk/asthma-guideline-download.html

Anaphylaxis

Anaphylactic reactions in dentistry may follow the administration of a drug or contact with substances such as latex in surgical gloves. In general, the more rapid the onset of the reaction, the more serious it will be. Symptoms can develop within minutes and early, effective treatment may be life saving.

Anaphylactic reactions may also be associated with *additives* and *excipients* in medicines. It is wise therefore to check the full formulation of preparations which may contain allergenic fats or oils (including those for topical application, particularly if they are intended for use in the mouth).

Symptoms and signs

The lack of any consistent clinical manifestation and a wide range of possible presentations can cause diagnostic difficulty. Clinical assessment helps make the diagnosis.

Signs and symptoms include:

- Urticaria, rhinitis, conjunctivitis.
- Abdominal pain, vomiting, diarrhoea and a sense of impending doom.
- Flushing is common, but pallor may also occur.
- Marked upper airway (laryngeal) oedema and bronchospasm may develop, causing stridor and wheezing.
- Respiratory arrest leading to cardiac arrest.
- Vasodilation causes relative hypovolaemia leading to low blood pressure and collapse. This can also cause cardiac arrest.

Treatment

First-line treatment includes managing the airway, restoration of blood pressure (laying the patient flat, raising the feet) and the administration of oxygen (10 litres per minute).

For severe reactions, i.e., the collapsed, semi-conscious patient, or those with severe bronchospasm and widespread rash, adrenaline should be given intramuscularly (upper outer arm or outer thigh) in a dose of 500 micrograms (0.5 mL adrenaline injection of 1:1000); an autoinjector preparation delivering a dose of 300 micrograms (0.3 mL adrenaline injection 1:1000) is available for

immediate *self-administration* by those patients known to have severe reactions. This is an acceptable alternative if immediately available. The dose is repeated if necessary at 5 minute intervals according to blood pressure, pulse and respiratory function.

The paediatric dose for adrenaline is based on the child's approximate age or weight. Guidance on the correct adrenaline dose for children is given in Appendix (vii) (RC(UK) Anaphylaxis Children's Algorithm for Community Responders).

In any unconscious patient always check for 'signs of life' (breathing and circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

In less severe cases any wheeze or difficulty breathing can be treated with a salbutamol inhaler as detailed above in the section on *Asthma*.

All patients treated for an anaphylactic reaction should be sent to hospital by ambulance for further assessment, irrespective of any initial recovery. Antihistamine drugs and steroids, whilst useful in the treatment of anaphylaxis are not first line drugs and they will be administered by the ambulance personnel if necessary.

Cardiac emergencies

The signs and symptoms of cardiac emergencies include chest pain, shortness of breath, fast and slow heart rates, increased respiratory rate, low blood pressure, poor peripheral perfusion (indicated by prolonged capillary refill time) and altered mental state.

If there is a history of angina the patient will probably carry glyceryl trinitrate spray or tablets (or isosorbide dinitrate tablets) and they should be allowed to use them. Where symptoms are mild and resolve rapidly with the patient's own medication, hospital admission is not normally necessary. Dental treatment may or may not be continued at the discretion of the Dental Practitioner. More severe attacks of chest pain always warrant postponement of treatment and an ambulance should be summoned.

Sudden alterations in the patient's heart rate (very fast or very slow) may lead to a sudden reduction in cardiac output with loss of consciousness. Medical assistance should be summoned by dialing 999.

Myocardial infarction

The pain of myocardial infarction is similar to that of angina but generally more severe and prolonged. There may only be a partial response to GTN.

Symptoms and signs of myocardial infarction

- Progressive onset of severe, crushing pain in the centre and across the front of chest. The pain may radiate to the shoulders and down the arms (more commonly the left), into the neck and jaw or through to the back.
- Skin becomes pale and clammy.

- Nausea and vomiting are common.
- Pulse may be weak and blood pressure may fall.
- Shortness of breath.

Initial management of myocardial infarction

Call 999 immediately for an ambulance.

Allow the patient to rest in the position that feels most comfortable; in the presence of breathlessness this is likely to be the sitting position. Patients who faint or feel faint should be laid flat; often an intermediate position (dictated by the patient) will be most appropriate.

Give high flow oxygen (10 litres per minute).

Give sublingual GTN spray if this has not already been given.

Reassure the patient as far as possible to relieve further anxiety.

Give aspirin in a single dose of 300 mg orally, crushed or chewed. Ambulance staff should be made aware that aspirin has already been given as should the hospital. Many ambulance services in the UK will administer thrombolytic therapy before hospital admission. Any dental treatment carried out that might contraindicate this must be brought to the attention of the ambulance crew.

If the patient becomes unresponsive always check for 'signs of life' (breathing and circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

Epileptic seizures

Patients with epilepsy must continue their normal dosage of anticonvulsant drugs before attending for dental treatment. Epileptic patients may not volunteer the information that they are epileptic, but there should be little difficulty in recognising a tonic-clonic (grand mal) seizure.

Symptoms and signs

- There may be a brief warning or 'aura'.
- Sudden loss of consciousness, the patient becomes rigid, falls, may give a cry, and becomes cyanosed (tonic phase).
- After a few seconds, there are jerking movements of the limbs; the tongue may be bitten (clonic phase).
- There may be frothing from the mouth and urinary incontinence.
- The seizure typically lasts a few minutes; the patient may then become floppy but remain unconscious.
- After a variable time the patient regains consciousness but may remain confused.

- Fitting may be a presenting sign of *Hypoglycaemia* and should be considered in all patients, especially known diabetics and children. An early blood glucose measurement is essential in all actively fitting patients (including known epileptics).
- Check for the presence of a very slow heart rate (<40 per minute) which may drop the blood pressure. This is usually caused by a vasovagal episode (see *Syncope* section below). The drop in blood pressure may cause transient cerebral hypoxia and give rise to a brief fit.

Treatment

During a convulsion try to ensure that the patient is not at risk from injury but make no attempt to put anything in the mouth or between the teeth (in the mistaken belief that this will protect the tongue). Do not attempt to insert an oropharyngeal airway or other airway adjunct while the patient is actively fitting.

Give high flow oxygen (10 litres per minute).

Do not attempt to restrain convulsive movements.

After convulsive movements have subsided place the patient in the recovery position and reassess.

If the patient remains unresponsive always check for 'signs of life' (breathing and circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

Check blood glucose level to exclude hypoglycaemia. If blood glucose <3.0 mmol per litre or hypoglycaemia is clinically suspected, give oral/buccal glucose, or glucagon (see *Hypoglycaemia* section below).

After the convulsion the patient may be confused ('post-ictal confusion') and may need reassurance and sympathy. The patient should not be sent home until fully recovered and they should be accompanied. It may not always be necessary to seek medical attention or transfer to hospital unless the convulsion was atypical, prolonged (or repeated), or if injury occurred. The National Institute for Clinical Excellence (NICE) guidelines suggest the indications for sending to hospital are:

- Status epilepticus.
- High risk of recurrence.
- First episode.
- Difficulty monitoring the individuals condition.

Medication should only be given if seizures are prolonged (convulsive movements lasting 5 minutes or longer) or recur in quick succession. In this situation an ambulance should be summoned urgently.

With prolonged or recurrent seizures, ambulance personnel will often administer IV diazepam which is usually rapidly effective in stopping any seizure. An alternative, although less effective treatment, is midazolam given via the buccal or intranasal route in a single dose of 10mg for adults. For children the dose can be simplified as follows: child 1-5 years 5mg, child 5-10 years 7.5mg, above 10 years 10mg.

This might usefully be administered while waiting for ambulance treatment, but the decision to do this will depend on individual circumstances.

Hypoglycaemia

Patients with diabetes should eat normally and take their usual dose of insulin or oral hypoglycaemic agent before any planned dental treatment. If food is omitted after having insulin, the blood glucose will fall to a low level (hypoglycaemia). This is usually defined as a blood glucose <3.0 mmol per litre, but some patients may show symptoms at higher blood sugar levels. Patients may recognise the symptoms themselves and will usually respond quickly to glucose. Children may not have such obvious features but may appear lethargic.

Symptoms and signs

- Shaking and trembling.
- Sweating.
- Headache.
- Difficulty in concentration / vagueness.
- Slurring of speech.
- Aggression and confusion.
- Fitting.
- Unconsciousness.

Treatment

The following staged treatment protocol is a suggested depending on the status of the patient. If any difficulty is experienced or the patient does not respond, the ambulance service should be summoned immediately; ambulance personnel will also follow this protocol.

Confirm the diagnosis by measuring the blood glucose.

Early stages - where the patient is co-operative and conscious with an intact gag reflex, give oral glucose (sugar (sucrose), milk with added sugar, glucose tablets or gel). If necessary this may be repeated in 10 –15 minutes.

In more severe cases - where the patient has impaired consciousness, is unco-operative or is unable to swallow safely buccal glucose gel and / or glucagon should be given.

- Glucagon should be given via the IM route (1mg in adults and children >8 years old or >25 kg, 0.5mg if <8 years old or <25 kg). Remember it may take 5-10 minutes for glucagon to work and it requires the patient to have adequate glucose stores. Thus, it may be ineffective in anorexic patients, alcoholics or some non-diabetic patients.
- Re-check blood glucose after 10 minutes to ensure that it has risen to a level of 5.0 mmol per litre or more, in conjunction with an improvement in the patient's mental status.

- If any patient becomes unconscious, always check for 'signs of life' (breathing and circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

It is important, especially in patients who have been given glucagon, that once they are alert and able to swallow, they are given a drink containing glucose and if possible some food high in carbohydrate. The patient may go home if fully recovered and they are accompanied. Their General Practitioner should be informed and they should not drive.

Syncope

Inadequate cerebral perfusion (and oxygenation) results in loss of consciousness. This most commonly occurs with low blood pressure caused by vagal overactivity (a vasovagal attack, simple faint, or syncope). This in turn may follow emotional stress or pain. Some patients are more prone to this and have a history of repeated faints.

Symptoms and signs

- Patient feels faint / dizzy / light headed.
- Slow pulse rate.
- Low blood pressure.
- Pallor and sweating.
- Nausea and vomiting.
- Loss of consciousness.

Treatment

Lay the patient flat **as soon as possible** and raise the legs to improve venous return.

Loosen any tight clothing, especially around the neck and give oxygen (10 litres per minute).

If any patient becomes unresponsive, always check for 'signs of life' (breathing, circulation) and start CPR in the absence of signs of life or normal breathing (ignore occasional 'gasps').

Other possible causes

- **Postural hypotension** can be a consequence of rising abruptly or of standing upright for too long. Several medical conditions predispose patients to hypotension with the risk of syncope. The most common culprits are drugs used in the treatment of high blood pressure, especially the ACE inhibitors and angiotensin antagonists. When rising, patients should take their time. Treatment is the same as for a vasovagal attack.
- Under stressful circumstances, many anxious patients **hyperventilate**. This may give rise to feelings of light headedness or faintness but does not

usually result in syncope. It may result in spasm of muscles around the face and of the hands. In most cases reassurance is all that is necessary.

Choking and Aspiration

Dental patients are susceptible to choking with the potential risk of aspiration. They may have blood and secretions in their mouths for prolonged periods. Local anaesthesia may diminish the normal protective pharyngeal reflexes and 'impression material' or dental equipment is often within their oral cavity and poses additional risks. Good teamwork and careful attention to detail should prevent aspiration episodes and any risk of choking.

Symptoms and Signs

- The patient may cough and splutter.
- They may complain of difficulty breathing.
- Breathing may become noisy with wheeze (usually aspiration) or stridor (usually upper airway obstruction).
- They may develop 'paradoxical' chest or abdominal movements.
- They may become cyanosed and lose consciousness.

Treatment

In cases of aspiration, allow the patient to cough vigorously.

Symptomatic treatment of wheeze with a salbutamol inhaler may help (as for asthma).

If any large pieces of foreign material have been aspirated, e.g., teeth or dental amalgam, the patient should be referred to hospital for a chest x-ray and possible removal.

Where the patient is symptomatic following aspiration they should be referred to hospital as an emergency.

The treatment of the choking patient involves removing any visible foreign bodies from the mouth and pharynx.

Encourage the patient to cough if conscious. If they are unable to cough but remain conscious then sharp back blows should be delivered. These can be followed by abdominal thrusts if the foreign body has not been dislodged.

If the patient becomes unconscious, CPR should be started. This will not only provide circulatory support but the pressure generated within the chest by performing chest compressions may help to dislodge the foreign body.

See Appendix (iv) for the Resuscitation Council (UK) 'Adult and Child Choking' Algorithm.

Adrenal insufficiency

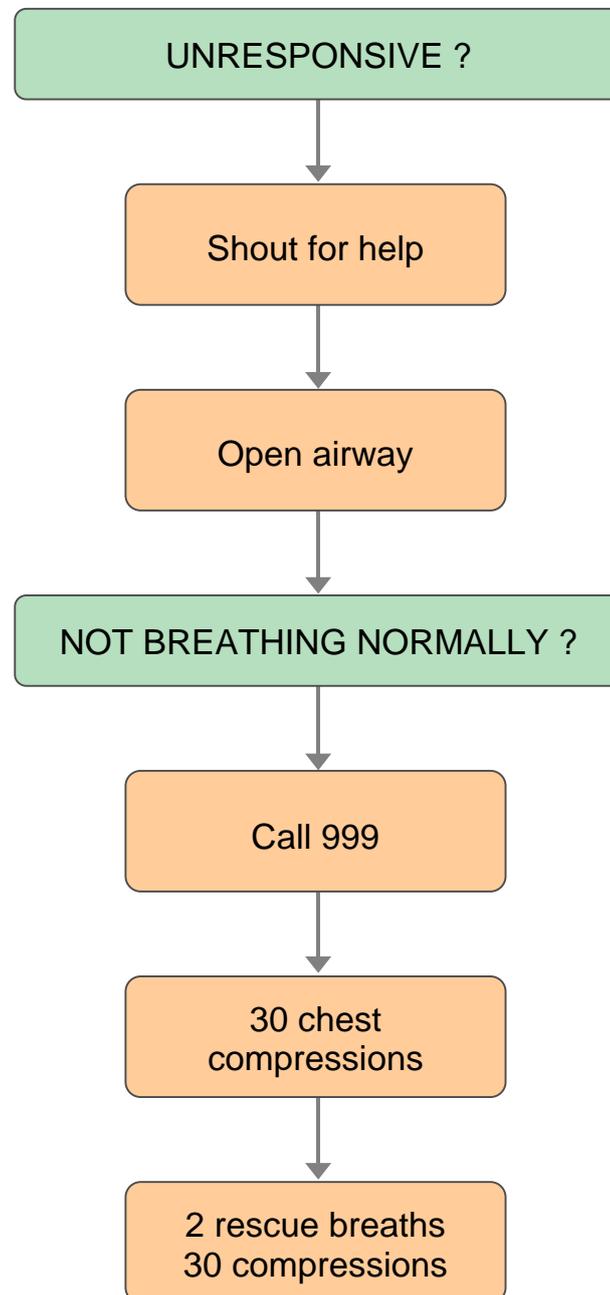
Adrenal insufficiency may follow long term administration of oral corticosteroids and can persist for years after stopping therapy. A patient with adrenal insufficiency may become hypotensive when under physiological stress. The nature of dental treatment makes this a rare possibility however and if a patient collapses during dental treatment other causes should be considered first and managed before diagnosing adrenal insufficiency.

Routine enquiry about the current or recent use of corticosteroids as part of the medical history prior to dental treatment should alert the Dental Practitioner to the patient at risk of this condition. Some patients carry a steroid warning card. Acute adrenal insufficiency can often be prevented by administration of an increased dose of corticosteroid prior to treatment.

Dental treatment that requires an increased steroid dose is that which may cause significant physiological stress. Usually simple dental extractions and restorative procedures, including endodontics, are not a cause for concern, but surgical extractions or implant placement should be considered as a risk. Patients who are systemically unwell from a dentally related infection are also recommended to have a prophylactic increase in steroid dose in addition to any surgical and antimicrobial treatment indicated.

Guidance on the management of those patients with known Addison's disease is available from the Addison's Clinical Advisory Panel (www.addisons.org.uk) who recommend doubling the patient's steroid dose before significant dental treatment under local anaesthesia and continuing this for 24 hours.

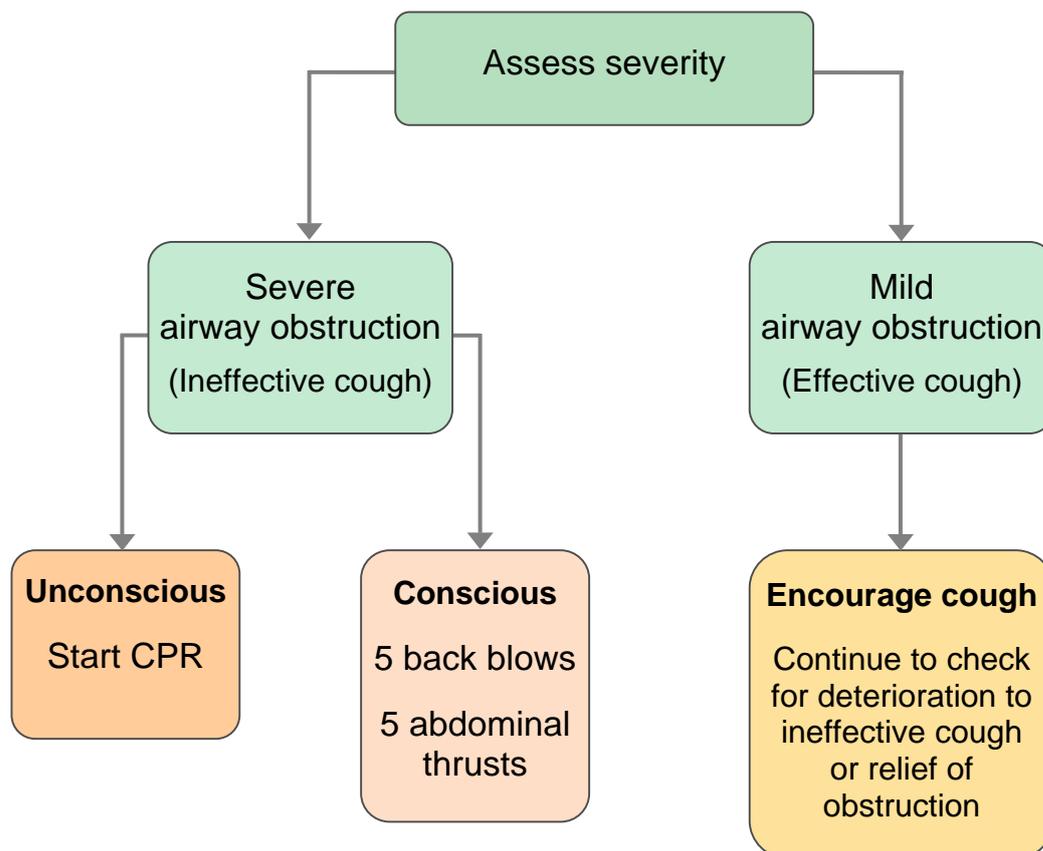
Appendix (iii)
Adult basic life support algorithm *



* The following minor modifications to the above sequence will make it more suitable for use in children:

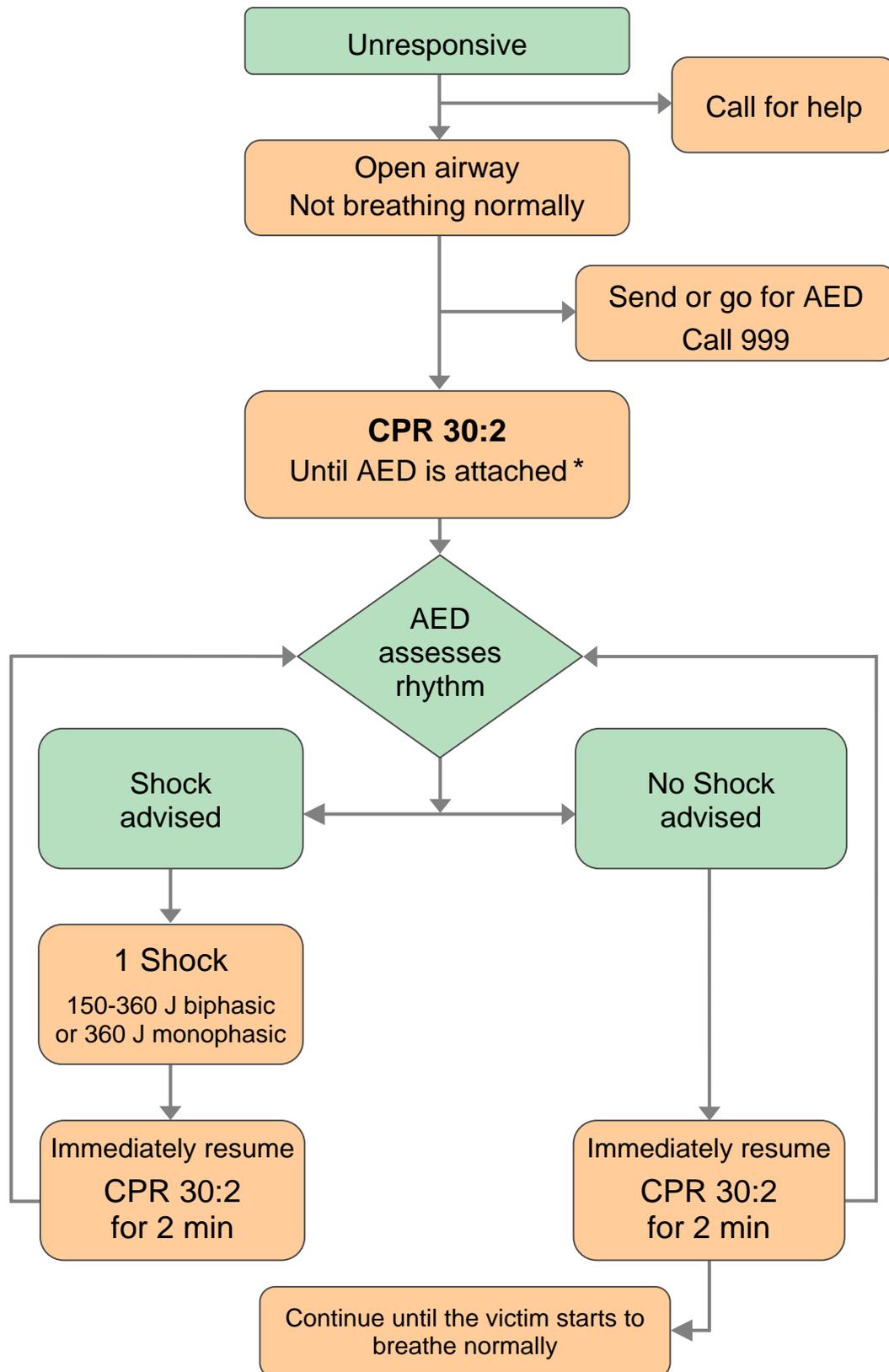
- Give five initial rescue breaths before starting chest compressions.
- If you are on your own perform CPR for approximately 1 min before going for help.
- Compress the chest by approximately one-third of its depth. Use one or two hands for a child over 1 year as needed to achieve an adequate depth of compression.

Appendix (iv) Adult and child choking algorithm



This algorithm is suitable for use in children over the age of 1 year

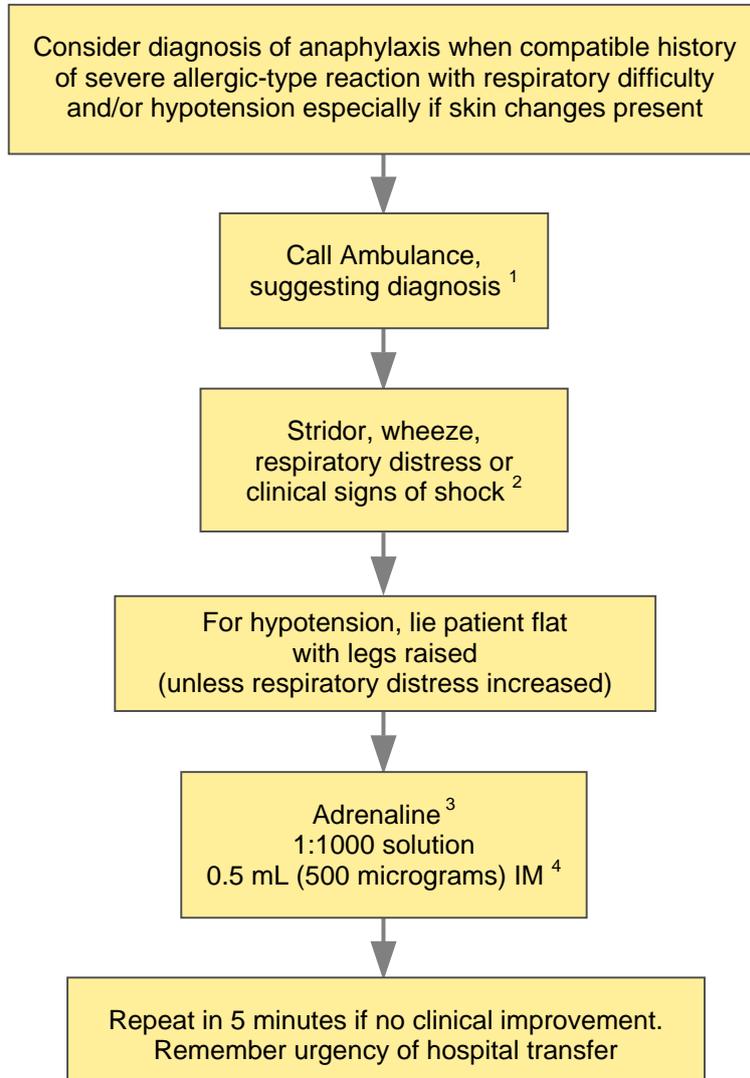
Appendix (v)
AED algorithm



* Use paediatric pads / attenuated mode for children under 8 years if available

Appendix (vi)

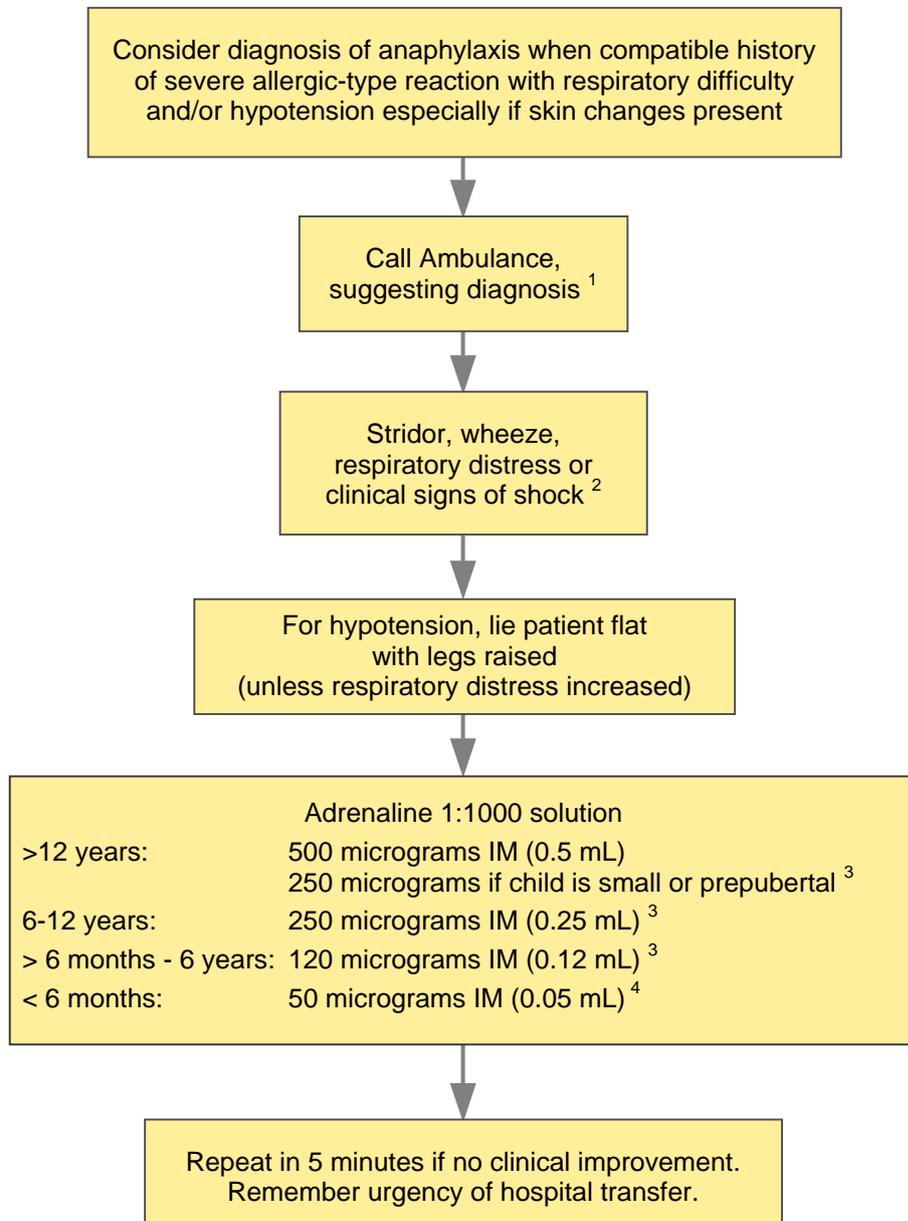
Adult community anaphylaxis algorithm



1. Ambulance will be equipped with oxygen, salbutamol and fluids which may be used as adjunctive therapy.
2. If profound shock judged to be **immediately** life threatening give CPR/ALS if necessary.
3. Half doses of adrenaline may be safer for patients on amitriptyline, imipramine, or beta blocker.
4. If adults are treated with an adrenaline auto-injector, the 300 micrograms will usually be sufficient. A second dose may be required, but this should be considered **ONLY** if the patient's condition continues to deteriorate 5 minutes after the first dose.
NB Remember the urgency of hospital transfer.

January 2002
updated May 2005

Appendix (vii) Paediatric community anaphylaxis algorithm



1. Ambulance will be equipped with oxygen, salbutamol and fluids which may be used as adjunctive therapy.
2. If profound shock judged **immediately** life threatening give CPR/ALS if necessary.
3. For children who have been prescribed an adrenaline auto-injector, 150 micrograms can be given instead of 120 micrograms, and 300 micrograms can be given instead of 250 micrograms or 500 micrograms.
4. Absolute accuracy of this small dose is not essential.

January 2002
updated May 2005

Appendix (viii) Example of a medical risk assessment form

(Courtesy of Lothian Salaried Primary Care Dental Service)

LOTHIAN SALARIED PRIMARY CARE DENTAL SERVICE

CONFIDENTIAL

Date: _____

Adult Medical History Form

SURNAME FIRST NAME(S)

DOB TITLE SEX M / F

HOME ADDRESS PHONE No.

WORK ADDRESS PHONE No.

OCCUPATION.....

FAMILY DOCTOR'S NAME & ADDRESS..... PHONE No.

HOSPITAL DOCTOR'S NAME & ADDRESS..... PHONE No.

	Y	N		Y	N
1. Do you experience chest pain upon exertion (angina pectoris)? If so, Have you had to reduce your activities? Have the complaints increased recently? Do you have chest pain at rest?	II	<input type="checkbox"/>	7. Do you have a tendency to bleed after injury or surgery? If so, Do you suffer from spontaneous bruising?	III	<input type="checkbox"/>
2. Have you ever had a heart attack? If so, Do you still have complaints? Have you had a heart attack in the last 6 months?	II	<input type="checkbox"/>	8. Do you have epilepsy? If so, Do you continue to have seizures?	II	<input type="checkbox"/>
3. Do you have a heart murmur or heart valve dysfunction, or an artificial heart valve? Have you had heart or vascular surgery within the last six months? Have you ever had rheumatic fever? Have you ever had endocarditis?	II	<input type="checkbox"/>	9. Do you suffer from asthma? If so, Do you use inhalers? Is your breathing difficult today? Do you have hayfever or eczema?	II	<input type="checkbox"/>
4. Do you have heart palpitations without exertion? If so, Do you have to rest, sit down, or lie down during palpitations? Are you short of breath, or pale or dizzy at these times?	II	<input type="checkbox"/>	10. Do you have other lung problems? If so, Are you short of breath after climbing stairs? Are you short of breath getting dressed?	II	<input type="checkbox"/>
5. Do you have problems lying flat? If so, Do you need more than 2 pillows at night due to shortness of breath?	II	<input type="checkbox"/>	11. Do you have any allergies to any medicines (eg antibiotics), substances (eg latex/rubber) or foods?	II	<input type="checkbox"/>
6. Have you ever had high blood pressure?	II	<input type="checkbox"/>	12. Do you have diabetes? If so, Are you on insulin? Is your diabetes poorly controlled at present?	II	<input type="checkbox"/>
			13. Do you suffer from thyroid disease? If so, Is your thyroid gland overactive?	II	<input type="checkbox"/>
			14. Do you suffer from liver disease? If so, Have you had a liver transplant?	II	<input type="checkbox"/>

