

- 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 seizure.

Treatment

During a seizure 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 (15 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 seizure 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 individual's 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 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. (See Appendix (viii) *Emergency use of buccal midazolam*)

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 / seizures.
- 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 (15 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

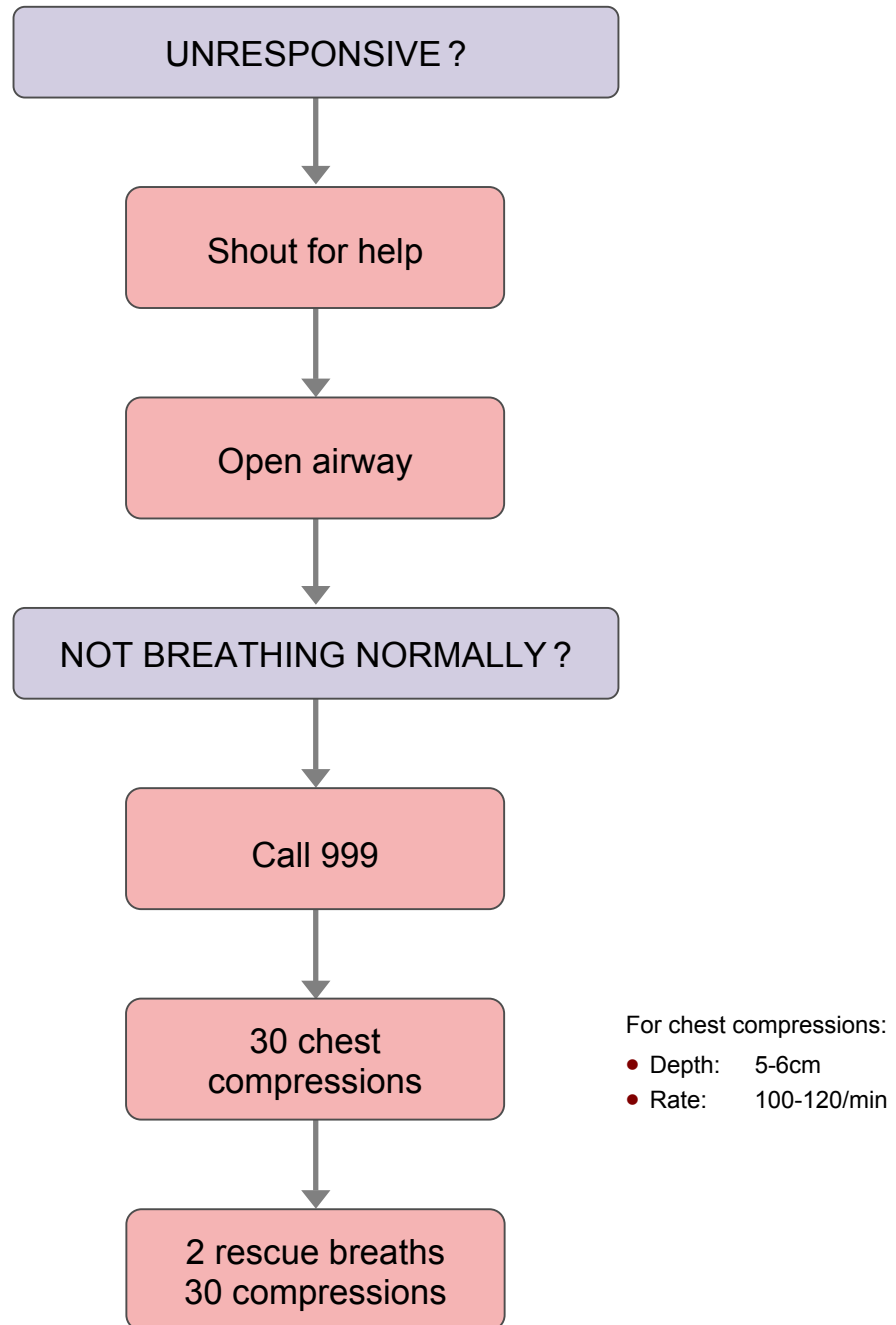
Adrenal insufficiency may follow long term administration of oral corticosteroids and can persist for years after stopping therapy. A patient with adrenal insufficiency may become hypotensive when under physiological stress. The nature of dental treatment makes this a rare possibility however and if 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 (<http://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.

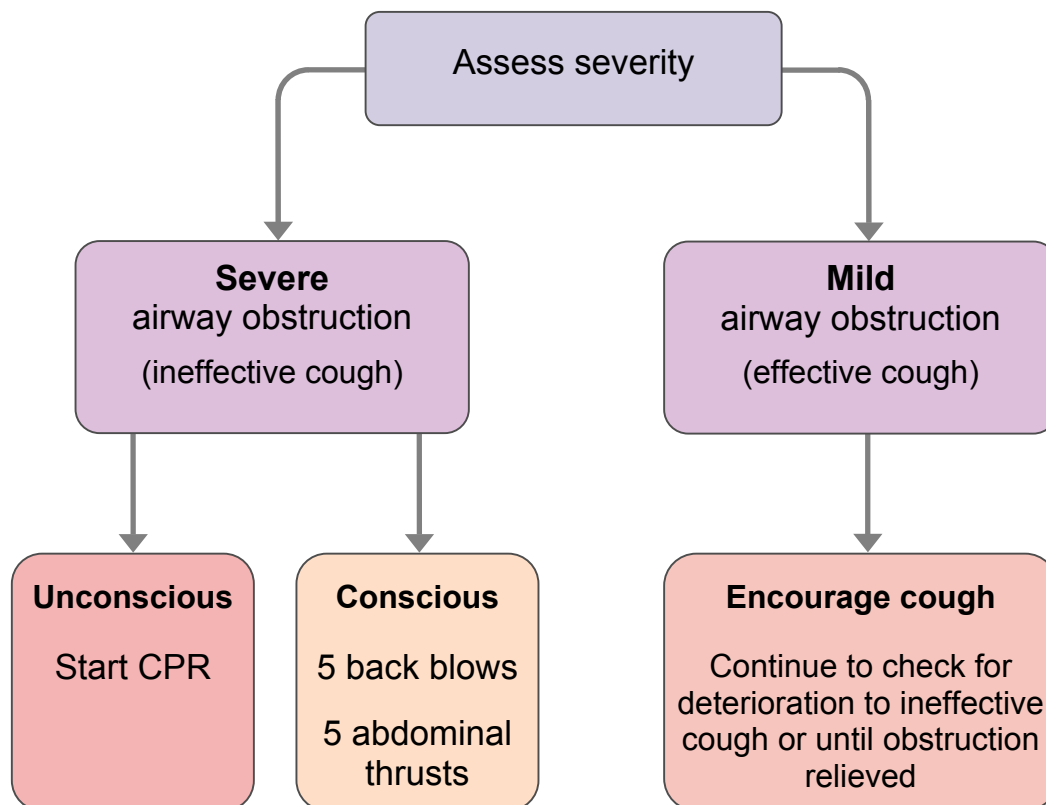
Appendix (iii)
Adult basic life support algorithm *



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

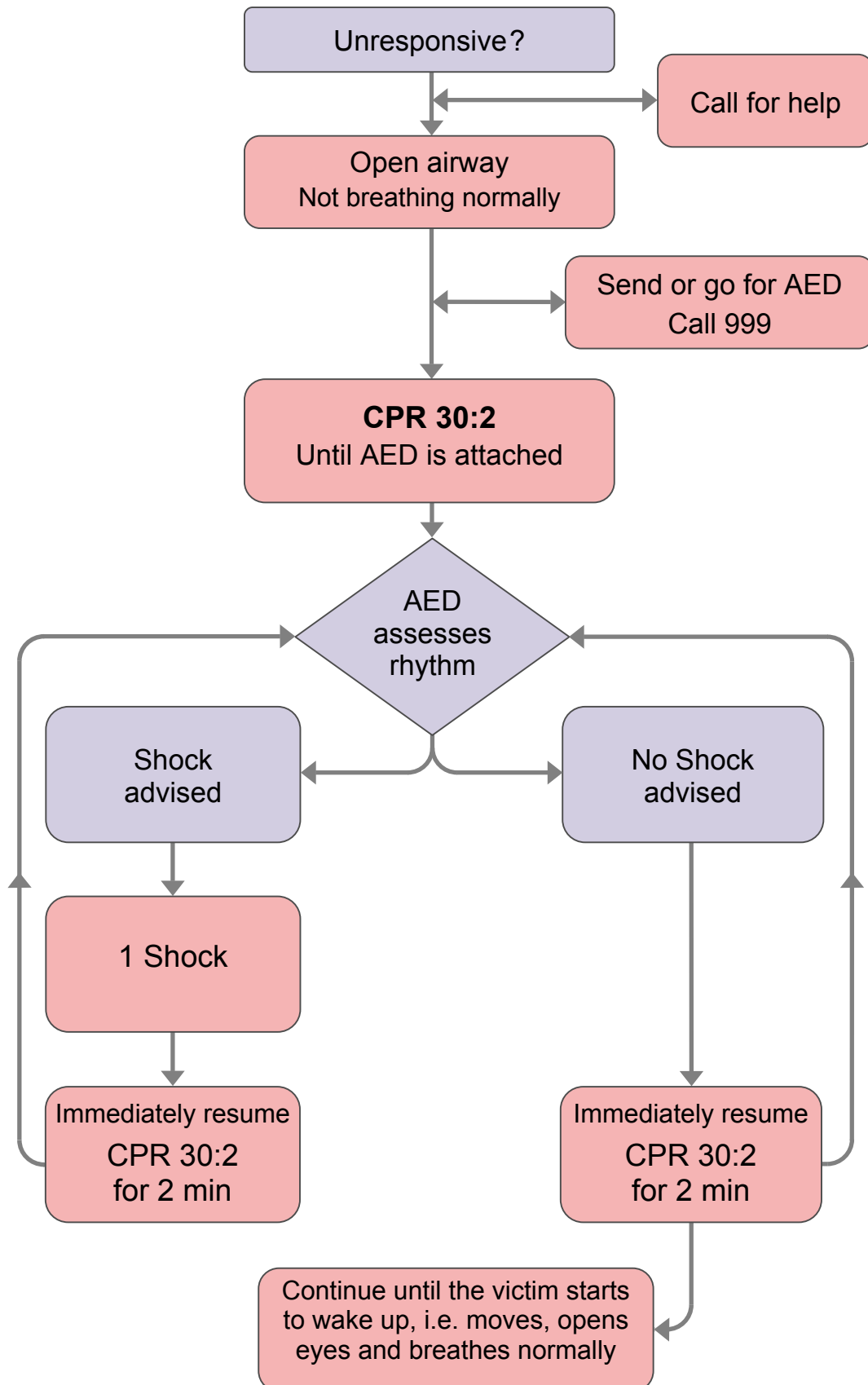
- Give five initial rescue breaths before starting chest compressions.
- If you are on your own perform CPR for 1 min before going for help.
- Compress the chest by one-third of its depth. Use one or two hands for a child over 1 year as needed to achieve an adequate depth of compression.

Appendix (iv) Adult and child choking algorithm

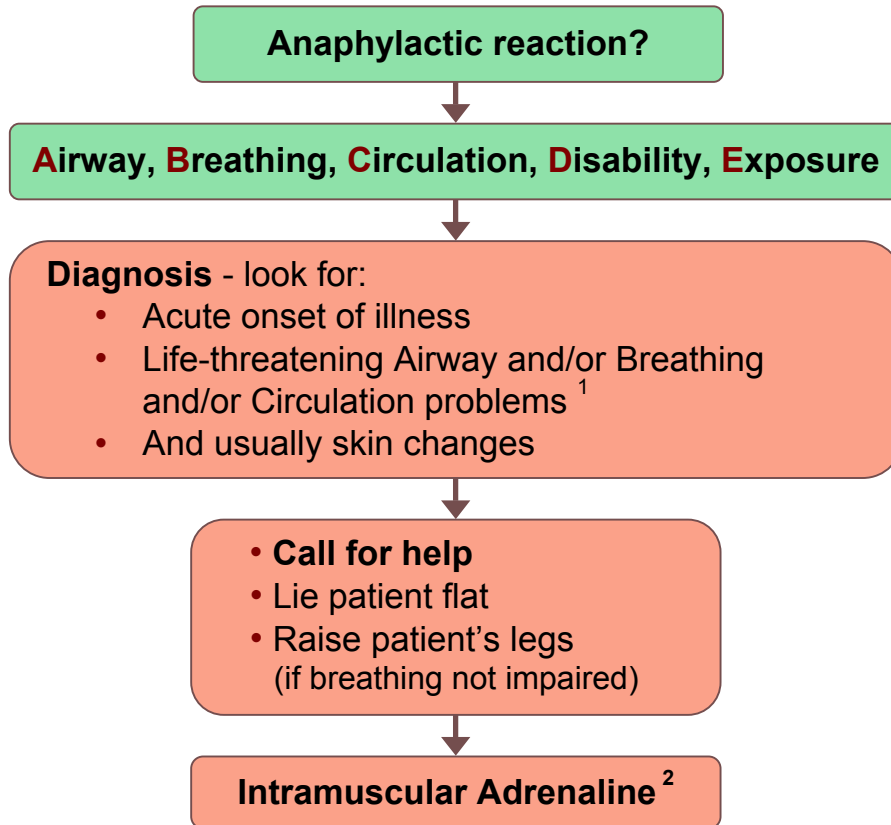


This algorithm is suitable for use in children over the age of 1 year

Appendix (v)
AED algorithm



Appendix (vi) Anaphylactic reaction – Initial treatment



1 Life-threatening problems:

Airway: swelling, hoarseness, stridor

Breathing: rapid breathing, wheeze, fatigue, cyanosis, confusion

Circulation: pale, clammy, faintness, drowsy/coma

2 Intramuscular Adrenaline

IM doses of 1:1000 adrenaline (repeat after 5 min if no better)

- Adult 500 micrograms IM (0.5 mL)
- Child more than 12 years: 500 micrograms IM (0.5 mL)
- Child 6 -12 years: 300 micrograms IM (0.3 mL)
- Child less than 6 years: 150 micrograms IM (0.15 mL)

March 2008

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

Appendix (viii)

Emergency use of buccal midazolam in dental practice

Prolonged seizures are dangerous and may cause severe long lasting cerebral damage to adults and children alike. In the event of a seizure occurring in a dental practice setting the guidance published in this document should be followed. If a patient continues to fit after an ambulance has been called then the administration of buccal midazolam to assist in terminating the seizure is warranted. The dose is 10mg for adults and an appropriately reduced dose for children (see pages 30-31).

The evidence for using midazolam in this manner and for this indication is strong. Despite this being an 'unlicensed' use of the drug, buccal midazolam for prolonged seizure control is recommended in the British National Formulary, by the Advanced Paediatric Life Support course and the Royal College of Paediatrics and Child Health. Paediatricians throughout the country prescribe this drug for parents of children who may have a seizure at home and all the National Epilepsy organisations recommend its use in this setting.

Clinical preparations of midazolam have changed recently in an effort to standardize and reduce overdose concerns. Current formulations include midazolam solution for injection 1mg/ml, 2mg/ml and 5mg/ml. The 2mg/ml and 5mg/ml solutions are now largely limited to general anaesthesia and intensive care settings. An unlicensed 'special order' preparation of midazolam buccal liquid 10mg/ml is available for use in emergency settings for seizure control ('Epistatus'). The Scottish Dental Clinical Effectiveness Programme (SDCEP) 'Drug Prescribing for Dentistry', November 2009 Update, removed 'midazolam buccal liquid' from its list of available drugs. This is only the 10mg/ml 'special order' preparation however. It has not removed the use of midazolam but has replaced the 'special order' preparation with 'midazolam injection solution' (2mg/ml or 5mg/ml). Use of midazolam for uncontrolled seizures is still recommended by the SDCEP.

There have been concerns regarding the reclassification of midazolam as a 'Schedule 3' Controlled Drug. Such reclassification requires certain legal processes. This includes written prescription requirements. However, the law for this Schedule 3 drug does NOT require safe custody i.e. locked cupboard, nor the need to keep a midazolam controlled drug register. Some institutions are encouraging such practices as part of their own Health and Safety protocols but there is no legal obligation to do so.

Similarly, concerns have been raised about acquiring stocks of midazolam for use in the emergency setting of seizure control. Those dental practitioners who perform 'conscious sedation' using midazolam injection solution will have regular stocks of the drug and can use the intravenous preparation via the buccal route (as recommended by the SDCEP above). Those dental practitioners who do not use midazolam regularly are still permitted to requisition the Schedule 3 Drug under the conditions laid out by the Royal Pharmaceutical Society of Great Britain Guidance 'Medicines, Ethics and Practice: a guide for pharmacists and pharmacy technicians: Section 1.2.14'.