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 beta$_2$-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 them 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 (15 litres per minute) should be given. Assuming the patient's nebuliser is unavailable, up to 10 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: http://www.brit-thoracic.org.uk/guidelines/asthma-guidelines.aspx

Anaphylaxis

Anaphylaxis is a severe, life-threatening, generalised or systemic hypersensitivity reaction. It is characterised by rapidly developing life-threatening airway and/or breathing and/or circulation problems usually associated with skin and mucosal changes.

Anaphylactic reactions in general dental practice 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 may include:

- Urticaria, erythema, 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, wheezing and/or a hoarse voice.
- Vasodilation causes relative hypovolaemia leading to low blood pressure and collapse. This can cause cardiac arrest.
- Respiratory arrest leading to cardiac arrest.

Treatment

Use an ABCDE approach to recognise and treat any suspected anaphylactic reaction. First-line treatment includes managing the airway and breathing and restoration of blood pressure (laying the patient flat, raising the feet) and the administration of oxygen (15 litres per minute).

For severe reactions where there are life-threatening airway and/or breathing and/or circulation problems, i.e., hoarseness, stridor, severe wheeze, cyanosis,

pale, clammy, drowsy, confusion or coma (see Appendix (vi) *Anaphylactic reaction – Initial treatment*), adrenaline should be given intramuscularly (anterolateral aspect of the middle third of the 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 (vi) *Anaphylactic reaction – Initial treatment*.

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.

For further information about the management of the patient with an emergency anaphylactic reaction see http://www.resus.org.uk/pages/reaction.pdf.

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 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.

High flow oxygen may be administered (15 litres per minute) if the patient is cyanosed (blue lips) or conscious level deteriorates.

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 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 <3.0mmol 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.