THE UNIVERSITY OF WESTERN AUSTRALIA

DENT 3005:Introduction to Pharmacology

Medical emergencies: dental setting

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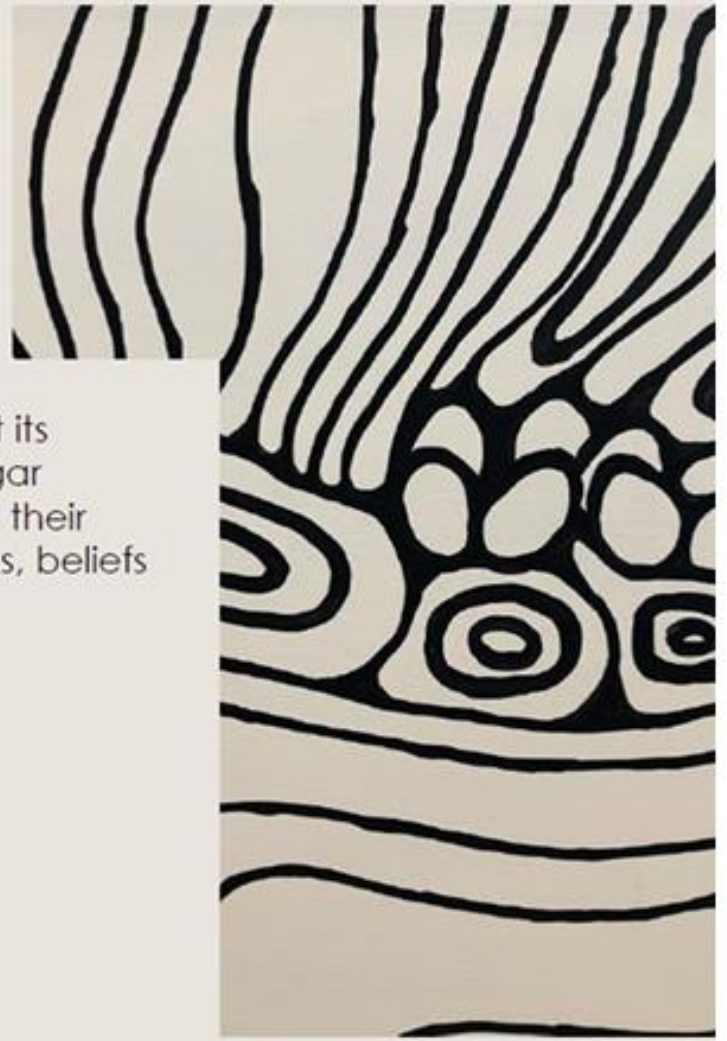
Acknowledgement of country

The University of Western Australia acknowledges that its campus is situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.



Artist: Dr Richard Barry Walley OAM

Learning Outcomes

Learning objectives

1) Recognise basic drugs and equipment(s) for emergency situations
2) Understand the use of these drugs and equipment(s) for various situations
3) Recognise common medical emergencies in the dental setting
4) Accurately assess and implement emergency protocols according to therapeutic guidelines

Medical emergencies in the dental setting

- Diagnose & treat medical emergencies
  - Relating to dental tx, patient's medication(s)/medication condition(s), LA systemic adverse effects etc
- Dental staff must be prepared to provide BSL
- Common emergent problems
  - E.g. Syncope, hyperventilation syndrome, acute angina, allergies
- Basic emergency kit in the clinic?
  - Medications and equipment(s)

In an emergency call Triple Zero (000) for an ambulance

1 Danger?

Is there a danger to yourself, others or the patient?

- If **no**, check for a response 2.
- If **yes**, and if safe to do so, remove the danger or remove the patient from danger. Check for a response 2.

2 Response?

Check the patient for a response:

- ask name
- squeeze shoulders.

If **no** response, send for help 3.

If **yes**, there is a response:

- reassure the patient and make comfortable
- monitor breathing and response
- manage injuries.

3 Send for help!

Call Triple Zero (000) for an ambulance or ask a bystander to make the call.

Stay on the line.

If alone with the patient, first roll into the recovery position before leaving to calling for an ambulance.

Check airway 4.

4 **Airway?**
5 **Breathing?**
6 **CPR!**
7 **Defibrillate?**

In an emergency call Triple Zero (000) for an ambulance

4 Airway?

Open the patient's mouth and check for foreign material.

If **no** foreign material –

- leave in position found and open the airway
- check breathing 5.

If **yes**, there is foreign material –

- roll the patient into the recovery position.
- open the airway with a chin lift.
- clear the airway.
- check breathing 5.

5 Breathing?

Tilt the patient's head back and check for normal breathing.

- Look, listen and feel for 10 seconds.

If **not** breathing normally –

- ensure an ambulance has been called
- start CPR 6.

If **yes**, breathing normally –

- roll into the recovery position
- ensure an ambulance has been called
- monitor breathing and response
- manage injuries.

6 CPR!

Start CPR
– 30 chest compressions
: 2 breaths

Continue CPR until:

- help arrives
- the patient starts breathing normally
- or you are physically unable to continue.

Infant

Adult/ child

7 Defibrillate!

Apply an AED if available.

- Follow the voice prompts.
- If the patient starts breathing normally and is responsive, turn into the recovery position.
- Do not remove the AED pads.
- Monitor breathing and response.
- Manage injuries and shock.
- Be prepared to restart CPR.

Drug(s)

- **Adrenaline [anaphylaxis]**
  - Sufficient qty to provide 2 doses
  - Preloaded auto injections: preferred, available in Epipen & Anapen
    - Need to know how each device works
  - Ampoules: calculate dose per weight and draw required amount
- **Glucose [hypoglycaemia]**
  - Readily available product: juice box, honey, jelly-beans etc
  - Pure glucose preps: glucose gel, tablets
- **GTN [angina/ACS]**
  - GTN sprays: longer shelf life, ease of administration
- **Salbutamol inhaler [acute asthma attack]**
  - Ideally with a spacer device
- **Aspirin [suspected MI]**

Equipment(s)

- ✓**Oxygen**: mask (6–8 L/min) or nasal prongs (2 L/min); bag-valve mask if not breathing
- ✓**Airways**: disposable oral airways for ventilation support
- ✓**Adrenaline**: 2 doses for anaphylaxis (prefer autoinjector)
- ✓**Salbutamol inhaler + spacer**: for asthma attacks
- ✓**GTN spray**: for angina/cardiac events
- ✓**Glucose**: juice, gel, or tablets for hypoglycaemia
- ✓**Aspirin**: for suspected MI
- ✓**Monitors**: pulse oximeter, BP monitor, blood glucose monitor
- ✓**AED**: for cardiac arrest

Allergy

- **Common allergens**
  - Latex (gloves, rubber dam) → delayed hypersensitivity
  - Acrylates → contact dermatitis (esp. with frequent exposure)
- **Urticaria (hives)**
  - Itchy, fluid-filled red lesions; last minutes to 24 hrs
  - May progress to **angioedema** (deep tissue swelling: lips, tongue, face)
  - **Anaphylaxis signs**: laryngeal swelling, hypotension, bronchospasm
- **Management**
  - **Mild**: stop treatment, remove allergen, give oral antihistamine (e.g., cetirizine, loratadine)
  - **Extensive**: stop treatment, urgent referral, consider corticosteroids (e.g., prednisone)
  - **Anaphylaxis**: stop treatment, call 000, give IM adrenaline 0.3 mg (or EpiPen)
- **Drug reactions**
  - May be delayed (days after starting)
  - Urticaria may persist after stopping the drug

Allergy

For mild urticaria or angioedema:

- Stop dental treatment.
- Remove or stop administration of the allergen.
- Recommend an oral antihistamine.

For extensive urticaria or angioedema, or swelling involving eyelids, lips or tongue:

- Stop dental treatment.
- Remove or stop administration of the allergen.
- Refer for urgent medical attention; systemic corticosteroids may be indicated.

For urticaria or angioedema with associated hypotension and evidence of anaphylaxis:

- Stop dental treatment.
- Remove or stop administration of the allergen.
- Call 000.
- Give intramuscular injection of adrenaline (epinephrine) (see Figure 13.44).

Antihistamines

- **MOA: p**rolong inhibitory postsynaptic potential
- **Drug interactions**
  - Phenobarbital + metronidazole
  - Other CNS depressants: monitor sedation
  - CYP3A4 substrates: clarithromycin, codeine, erythromycin, azoles, oxycodone, tramadol…
- **ADR**
  - Sedation, cognitive impairment, altered mood and behaviour
  - [Rare]: exfoliative dermatitis

Generic name	Brand Name
Sedating	
Cyclizine	Nausicalm
Cyproheptadine	Periactin
Dexchlorpheniramine	Polaramine
Diphenhydramine	Unisom
Doxylamine	Restavit
Promethazine	Phenergan
Non-sedating	
Bilastine	Allertine
Cetirizine	Zyrtec
Desloratadine	Desonex
Fexofenadine	Telfast
Loratadine	Claratyne

Anaphylaxis

- Severe hypersensitivity reactions with rapid development of life-threatening respiratory and/or circulation problems
- **Triggers:** foods (including additives, eg metabisulfite), drugs, insect stings, blood products, latex (eg surgical gloves)
- **Symptoms:** appear within minutes to several hours
- **Rationale for drug use**
  - Prevention of serious complications and death
  - Cardiorespiratory support
  - Symptom relief

Anaphylaxis: management

- **Stop dental treatment!**
- Remove or stop administration of the allergen
- Lie the patient flat
- Give an intramuscular injection of adrenaline (epinephrine):
  - Adrenaline (epinephrine) intramuscularly [preloaded autoinjector] into the anterolateral thigh
    - *Adult or child more than 20 kg: 300 micrograms*
    - *Child 10 to 20 kg: 150 micrograms*
  - OR
    - *Adrenaline (epinephrine) intramuscularly, into the anterolateral thigh*
    - *Adult and child: 10 micrograms/kg up to 500 micrograms (0.5 mL of 1:1000 solution)*
- **Call 000** – the patient must be taken to an emergency department
- Start supplemental oxygen and airway support if needed
- Be prepared to **start CPR**
- Repeat adrenaline (epinephrine) every **5 minutes** until the patient responds, or assistance arrives

Older children and adults **over 50kg**

EpiPen® 300mcg
Anapen® 500mcg

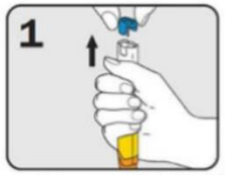
Babies and children **7.5 – 20kg**

EpiPen® Jr 150mcg

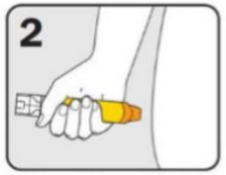
Children and adults **over 20kg**

EpiPen® 300mcg

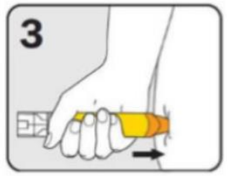
EpiPen® instructions



1. **Form fist around EpiPen® and PULL OFF BLUE SAFETY RELEASE**



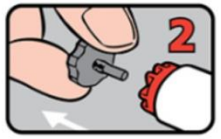
2. **Hold leg still and PLACE ORANGE END against outer mid-thigh (with or without clothing)**



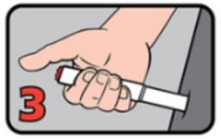
3. **PUSH DOWN HARD until a click is heard or felt and hold for 3 seconds REMOVE EpiPen®**

Anapen® instructions

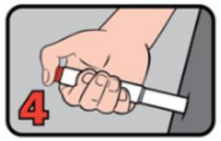
PULL OFF BLACK NEEDLE SHIELD



PULL OFF GREY SAFETY CAP from red button



PLACE NEEDLE END FIRMLY against outer mid-thigh at 90° angle (with or without clothing)



PRESS RED BUTTON so it clicks and hold for 3 seconds. REMOVE Anapen®

Syncope

Scenario	Actions
Patient feels faint	• Stop dental treatment • Tilt chair back to horizontal if in chair • If not in chair, have patient lie down • Raise legs • Measure heart rate • Talk to assess consciousness
Patient loses consciousness	• Stop dental treatment • Raise legs, head lower than heart • Tilt chair to horizontal position • Measure BP and heart rate • Allow slow recovery under supervision • Check standing BP and ability to stand unassisted • Consider medical referral if elderly, slow recovery, or repeated syncope
No return of consciousness	• Call 000 • Start basic life support • Place patient on their side • Continue care until patient regains consciousness or help arrives

ACS or Acute Angina

Scenario	Action	Details
Prevention	Ensure patient brings medication	Patients with angina should have glyceryl trinitrate spray/tablets readily accessible during dental visits
If Chest Pain Occurs (Known Angina History)	1. Stop dental treatment	Immediately discontinue the procedure
	2. Monitor vital signs	Measure BP, HR, and SaO_2
	3. Assess consciousness	Talk to the patient
	4. Administer glyceryl trinitrate	- **Spray:** 400 micrograms sublingually, repeat every 5 mins, max 3 doses if tolerated. - **Tablet:** 300–600 micrograms sublingually, repeat every 5 mins, max 3 doses if tolerated
	5. If pain >10 mins after 2 doses	Give a 3rd dose and treat as severe/new chest pain (see below)
	6. If patient recovers	Do not resume treatment. Refer for medical evaluation even if they appear well
If Chest Pain is Severe or New	1. Call 000	Emergency response is required
	2. Glyceryl trinitrate	For known angina patients, administer as above
	3. Aspirin	300 mg orally, chewed or dissolved before swallowing (for all patients)
	4. Monitor vital signs	BP, HR, SaO_2 (oxygen saturation)
	5. Oxygen therapy	Start if $SaO_2 < 90\%$; titrate to 90–96%
	6. Reassurance	Keep patient calm until help arrives
	7. If patient loses consciousness	Start basic life support and use AED if available

Endocrine [Hypoglycemia]

Scenario	Actions
If the patient is conscious and cooperative	
1. Stop dental treatment	
2. Give glucose if available	- Adult: **15 g** - Child ≤5 years or ≤25 kg: **5 g** - Child ≥6 years or >25 kg: **10 g**
3. If glucose is not available	Give a **fast-acting glucose-containing food or drink** (see Note 1)
4. After 15 minutes	If no improvement, **repeat glucose dose**
5. If 3 or more portions are needed	**Seek medical advice**
6. If symptoms improve	Provide a **longer-acting carbohydrate** (e.g. sandwich, dried fruit, yoghurt)
7. After treatment	- Keep patient under observation - **Do not allow patient to drive** - **Strongly advise medical review**
If the patient is drowsy, uncooperative or unconscious	
1. Stop dental treatment	
2. Call **000**	
3. If unconscious	Start **basic life support** (see slide #5)

Endocrine [Hyperglycemia]

- Advised patient to take their usual medications & seek medical review
- DKA or HHS
  - Onset: over hours
  - Symptoms: abdominal pain, nausea, vomiting, fatigue, SOB
  - Patients taking SGLT2: call 000 if DKA
- If unwell
  - Seek medical advice, call 000 or start BSL

Methaemo-globinaemia

- Stop dental treatment.
- Call 000.
- Start supplemental oxygen and airway support if needed.
- Monitor blood pressure, heart rate and pulse oximetry until assistance arrives.
- Start basic life support if required (for ‘Basic life support flow chart’, see Figure 13.42).

Neurological emergencies [stroke]

- Stop dental treatment.
- Call 000.
- Measure blood pressure, heart rate and pulse oximetry.
- Start supplemental oxygen if SaO_2 is less than 90%, and titrate to SaO_2 90 to 96% where possible.
- Maintain airway.
- Monitor vital signs until assistance arrives and start basic life support if required (for 'Basic life support flow chart', see Figure 13.42).

Do not give aspirin because it is difficult to identify if the stroke is haemorrhagic or ischaemic.

SaO_2 = oxygen saturation

The F.A.S.T test: most common sign of stroke

Face—check the face. Has the mouth drooped?

Arms—can the patient lift both arms?

Speech—is speech slurred? Does the patient understand you?

Time—time is critical. If you see any of these signs, call 000 immediately.

Neurological emergencies [Seizure]

Action	Details
Stop dental treatment	Cease any dental procedures immediately
Ensure the patient is not in danger in the dental chair	Protect the patient from falling or lift them onto the floor if necessary
Turn the patient on their side (if possible)	Reduces the risk of aspiration
Avoid restraining the patient during the seizure	Restraint should only be used if essential to avoid injury
Wait until the seizure stops	Allow the seizure to end naturally
Assess consciousness	Talk to the patient to assess if they regain consciousness
Maintain airway	Ensure the patient's airway remains clear
Remove vomit from the mouth or pharynx (if present)	Use high-volume suction after the seizure stops. Do not place anything in the mouth during the seizure
Further management for known causes (syncope, hypoglycaemia, stroke)	Follow specific advice for seizures caused by these conditions
For unknown cause or known epilepsy	If the patient recovers completely, observe for at least 30 minutes, and ensure they do not drive home. Provide a summary to the medical practitioner
If seizure or loss of consciousness lasts more than a few minutes or repeated seizures occur (status epilepticus)	Call 000, maintain airway, and monitor the patient until help arrives

Neurological emergencies [Temporary periocular muscles paralysis]

If temporary paralysis of the periocular muscles occurs:

- Stop the local anaesthetic injection and dental treatment.
- Explain what has happened and reassure the patient that the paralysis is temporary.
- Advise the patient not to rub the eyes.
- Close the eye and cover with two eye patches—fold the first patch in half and place over the eye, then tape the second patch over the top of the folded patch.
- Keep the patient under observation until the ability to blink starts to return. This usually happens within the hour, depending on the dose and strength of the local anaesthetic.
- The patient should not drive that day and should be escorted home.
- Check on the patient by phone later that day. If the patient has not fully recovered within 12 hours, medical review is required.

Ocular Emergencies [Chemical injuries]

- Stop dental treatment.
- Immediately irrigate the eye with water.
- Hold the eyelid open.
- Remove contact lens if present.
- Continue irrigation with water, poured from a cup or beaker or from a tap, for at least 15 minutes.
- Do not use an eyecup because a continuous flow of water over the eye is required.
- If weak chemical injury and minor eye irritation have occurred, organise medical review for the same day.
- If caustic chemical injury or a marked inflammatory response has occurred, call 000 and continue irrigation until assistance arrives.
- Inform the medical team which chemical caused the injury.

Ocular Emergencies [Foreign bodies]

- Stop dental treatment.
- Immediately irrigate the eye.
- Hold the eyelid open.
- Do not touch the eye surface.
- Do not attempt to remove the foreign body.
- If the foreign body does not dislodge following a short attempt at irrigation, transfer the patient to an emergency department.
- If the patient has any ongoing symptoms despite apparent removal of the foreign body, organise prompt medical review.

Ocular Emergencies [Penetrating injuries]

- Stop dental treatment.
- Call 000—the patient must be taken to an emergency department urgently.
- Do not attempt to remove the penetrating object from the eye.
- Do not irrigate the eye.
- Prevent the patient from rubbing the eye.
- Cover the eye with an eye shield, or use the base of a polystyrene cup and tape it on so it rests on the bony rim of the eye socket.
- Keep the patient calm until assistance arrives.
- Describe the object that penetrated the eye to the medical team (or show them a similar instrument).

Ocular Emergencies [Unilateral blindness]

If unilateral blindness occurs following injection of dermal fillers:

- Stop treatment.
- Call 000—the patient must be transferred to an emergency department urgently.
- Note the time of onset of blindness.
- As long as this does not delay transfer to an emergency department:
  - assess the visual deficit
  - assess the presence of any symptoms of stroke (eg facial weakness, unilateral weakness, difficulty with speech)
  - assess the presence of any cutaneous symptoms or signs (eg pain, blanching of the skin).
- If hyaluronic acid was used as the dermal filler, inject hyaluronidase if appropriate [NB1].

NB1: Hyaluronidase is essential for the management of serious adverse effects associated with hyaluronic acid; practitioners using hyaluronic acid must be familiar with the use of hyaluronidase.

Hyperventilation syndrome

If hyperventilation syndrome occurs:

- Stop dental treatment.
- Encourage the patient to slow their breathing, and to breathe in through their nose and out through their mouth.
- Reassure the patient, explain the cause of the symptoms, and have them talk to you.
- Re-breathing into a bag is not recommended.

If the patient does not rapidly recover, review the diagnosis.

If acute symptoms persist for more than 5 to 10 minutes:

- Call 000.
- Monitor the patient until assistance arrives.

Symptoms	Signs
Light-headedness Dizziness SOB Feeling of panic & impending death Blurred vision Tingling in fingers, toes & lips Feeling of detachment	Rapid breathing Occasional deep sighing breaths Rapid heart rate Altered consciousness involuntary contraction of hands & fingers

Acute Asthma

Step	Action
Stop dental treatment	Sit the patient upright
If the asthma attack is mild or moderate	
Give 4 puffs of salbutamol inhaler via spacer	1 puff at a time, shake the inhaler before each puff
Instruct the patient	Take 4 breaths in and out of the spacer after each puff
Wait	Wait 4 minutes
If there is little or no improvement	Give another 4 puffs using the same technique
Assess the patient's status	If little or no improvement, manage as for a severe attack (see below)
If the asthma attack is severe or life-threatening	
Call 000	Call for emergency assistance
Start supplemental oxygen and airway support	If needed, initiate supplemental oxygen and airway support
Give salbutamol inhaler via spacer	Shaking the inhaler before each puff: - Adult and child 6 years or older: 12 puffs - Child younger than 6 years: 6 puffs
Instruct the patient	Take 4 breaths in and out of the spacer after each puff
If spacer not available	If a nebuliser is available, give salbutamol 5 mg by nebuliser driven by oxygen
Reassess	Reassess the patient's status within minutes
While waiting for assistance to arrive	
Repeat salbutamol dose as needed	At least every 20 minutes, using the same technique
If life-threatening	Give salbutamol continuously
Monitor the patient	Continue monitoring the patient's status

Inhaled/swallowed objects

Action	Details
Stop dental treatment	Immediately stop dental treatment if an object is suspected to have fallen down the oropharynx
Check for the object	Check the patient's mouth or clothes to see if the object is present. If found, remove it
Upright position	If the object is not found, put the patient in an upright position
Medical assessment	Refer the patient for further medical assessment. If the patient is stable and asymptomatic, complete dental treatment before referral
Signs of airway obstruction **If the patient is conscious with signs of airway obstruction, proceed with the following steps:**	
Call 000	Call emergency services (000)
Reassure the patient	Reassure the patient and encourage deep breathing and coughing to dislodge the object
Back blows	If coughing is ineffective, give up to 5 back blows between the shoulder blades using the heel of the hand (check effectiveness after each blow)
Chest thrusts	If back blows are ineffective, give up to 5 chest thrusts at the same compression point as CPR (check effectiveness after each thrust)
Alternate back blows & chest thrusts	Alternate between back blows and chest thrusts until the obstruction is relieved or help arrives
Unconscious patient **If the patient becomes unconscious, follow these steps:**	
Call 000	Call emergency services (000)
Inspect & remove object	Inspect the back of the throat for the foreign object and remove it if possible
CPR	Start CPR
Cricothyroidotomy	Clinicians with appropriate expertise and equipment should consider performing cricothyroidotomy
Avoid abdominal thrusts	Abdominal thrusts (Heimlich manoeuvre) are not recommended due to the risk of internal organ damage

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