Respiratory Disease and Dentistry

by DLim

7 Jul 2026 (Tuesday) 3-4pm 211 VLC DENT5311 SND2

Recap questions

- What types of respiratory diseases have you seen in your patients?

- What are some ways that the respiratory disease affected your treatment provision (or not affected)?

- What emergencies related to respiratory disease are there? What is your first line of action?

WHAT IS IT ABOUT XXX DISEASE/CONDITION?
- Definition
- Aetiology
- Epidemiology
- General Manifestations/Clinical Features
- General Management/Treatment
- Oral Manifestations
- Oral Management = Risk Assessment and ACCESS acronym

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Learning Objectives

1. Discuss the specific characteristics and dental needs of individuals with common respiratory conditions (e.g. asthma, COPD, obstructive sleep apnoea, tuberculosis)

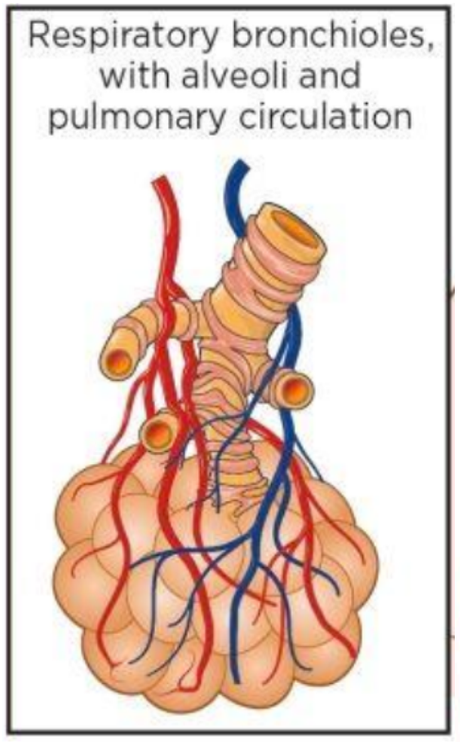
2. Perform a risk assessment and make appropriate treatment adaptations to ensure safe and effective dental care.

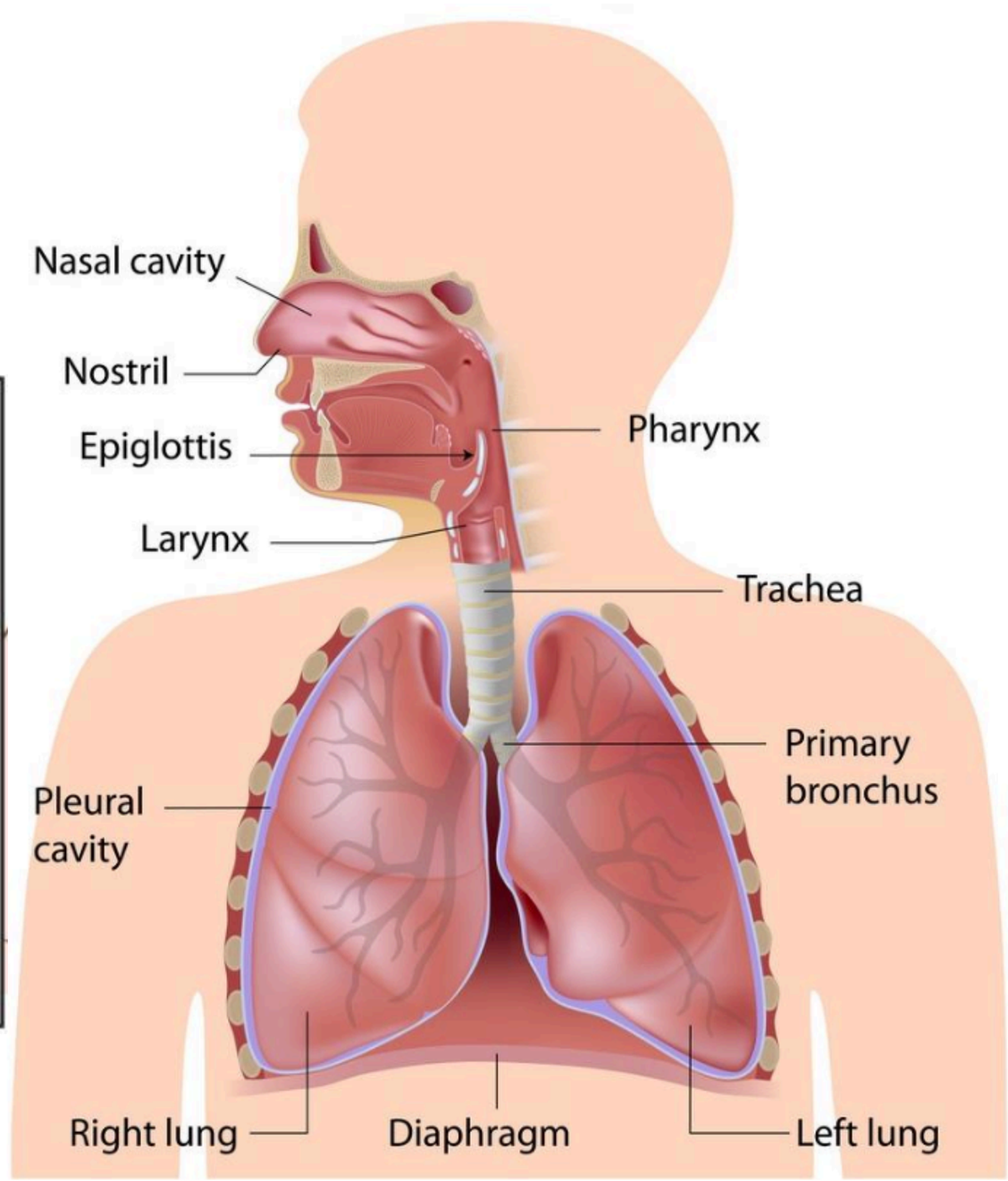
3. Manage hyperventilation and an acute asthma attack in dental practice

ADC: 5.1	iADH: 5A, 5B, 5C, 6Ci	5.1	Scientific and Clinical Knowledge	apply the social, cultural, biological, biomedical, physical and behavioural sciences in relation to oral health care provision and disease prevention

Recap on Structures

- Air passages
- Nasal cavities
- Mouth
- Pharynx
- Larynx
- Trachea
- Bronchi
- Bronchioles
- Lungs
- Alveoli
- Alveolar ducts





Physiology

- Gaseous exchange to allow oxygenation of blood
- So as to supply the body with oxygen and dispose carbon dioxide
- 4 distinct processes

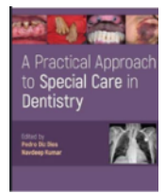
1. Pulmonary ventilation (breathing) i.e. movement of air into and out of the lungs
2. External respiration: O_2 and CO_2 exchange between lungs and blood
3. Transport: O_2 an CO_2 in the blood
4. Internal respiration: O_2 and CO_2 exchange between systemic blood vessels and tissues

Circulatory system

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Asthma

- What is asthma?
  - Asthma is a chronic respiratory condition, characterised by recurrent and reversible attacks with:
    - spasm of bronchial smooth muscle resulting in reversible narrowing,
    - mucosal oedema causing airway congestion, and
    - excessive secretion of mucus within bronchial lining.
  - This is a type of hyper-reactivity conditions.
- How do you assess severity and risk of asthma for dental procedures
  - Most patient with asthma can appear healthy until the attack occurs. History taking is essential to assessing severity and risk.
    - How frequent are the attacks and admission to hospital?
    - How severe are the attacks? If they are relieved with the inhalers, or if they have to be admitted to the hospital.
    - What are the triggers? This can include the season, time of the day, or even anxiety. Highlight any allergens to your dental team.
    - What medications or inhalers are used?
- How common is asthma?
  - Asthma is a common worldwide respiratory condition, prevalent in 1 in 11 children and 1 in 20 adults. While its cause is not exactly known, occurrence in children is associated genetically, while occurrence in adult is related to environmental factors.
  - Asthma kills around 1000 people everyday
- When do we refer asthmatic dental patients to specialists
  - If there is an unknown dental-related allergen, refer to physician for skin prick test.
  - Dentists should be able to manage vast majority of asthmatic patients, as asthmatic management is part of basic emergency training. If there are comorbidities or a refractory asthma, a referral to tertiary institutions may be warranted.



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Asthma details

Aetiopathogenesis

- Asthma can be triggered by known allergens (extrinsic asthma) or unknown stimuli (intrinsic asthma).
- The hypersensitivity reaction initiates a cascade of histamine and leukotriene release (causing smooth muscle contraction) and IgE-mediated mast cell and basophil degranulation (releasing inflammatory cytokines with mucus production)

Clinical Features

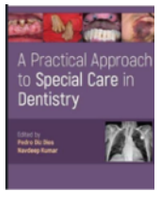
- On triggering, patients present with expiratory wheeze, cough, breathlessness (dyspnoea), and employ accessory muscles to assist breathing. It is asymptomatic prior to trigger.
- Asthma severity is grouped into mild, moderate, or severe (**see Table next slide)**
- The asthmatic attacks can be also categorised into acute asthma, acute severe asthma, and status asthmaticus.

Diagnosis

- Eliciting history, physical examination and chest radiographs are used in screening
- Spirometry demonstrates lowered peak expiratory flow rate (PEFR) in an asthmatic
- Arterial blood gas analysis
- Skin prick test (or scratch test) and exercise-tolerance test
- Blood examination show raised total IgE and specific IgE antibody concentrations

Treatment

- Long-term follow up, functional monitoring, and education
- Lifestyle adjustments such as avoiding allergens, environment control, smoking cessation, and limiting physical exertion
- Drug therapy (**see Table next slide**)
- Respiratory rehabilitation through physiotherapy maneuvers
- Others forms of therapy:
    - Allergen immunotherapy can benefit allergy-induced asthma, where small doses of allergen are regularly infused over 3-5 years
    - Bronchial thermoplasty is an intervention where controlled thermal energy is applied to the airway via a series of bronchoscopy procedures
    - Alternative medicine like acupuncture, herbal medicine



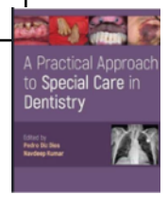
Asthma Severity and Drug

Table 2.27.1 Asthma Severity and Typical Management

	Mild	Moderate	Severe
Features	• Last under 1 hour, and less than 2 attacks per week • Triggered predictably by allergens or following exercise	• Attack can last days, and have over 2 attacks per week • Restricted activities	• Attacks can persist up to weeks • Audible wheezing, persistently breathless. • Daily activities like sleep is severely affected
Typical management	• Beta-2-agonist (when needed)	• Beta-2-agonist • Steroids (inhaled or oral)	• Beta-2-agonist • Steroids • Theophylline

Table 2.27.3 Drug Therapy for Asthma

Category of drugs	Individual examples	Remarks
Beta 2 agonist inhalers (short acting)	Salbutamol (albuterol), levalbuterol, fenoterol, terbutaline	Safe and effective bronchodilators with minimal cardiac effects Effect lasts 3-6 hours
Anticholinergic relievers	Ipratropium bromide, tiotropium, oxitropium	Effects lasts up to 8 hours
Beta 2 agonist inhalers (long acting)	Salmeterol, formoterol, bambuterol	Effect lasts at least 12 hours
Corticosteroid preventers	Beclomethasone, ciclesonide, budesonide, fluticasone	Associated adrenal suppression can occur
Leukotriene receptor antagonists and 5-lipoxygenase inhibitors	Montelukast, zafirlukast, pranlukast, Zileuton	May impair liver function
Combination	Fluticasone+salmeterol, Budesonide+formoterol,	Increased efficacy but also drug
Methylxanthines	Theophylline	For nocturnal asthma, high doses may cause cardiac arrhythmias or convulsions. Metabolised by cytochrome p450
Mast cell stabilisers	Cromoglicic acid, nedocromil sodium	Prevents release of inflammatory mediators from like histamine
Recombinant monoclonal antibodies	Omalizumab (anti-IgE) Mepolizumab (anti-IL 5)	For allergic or eosinophilic asthma



Asthma and dentistry

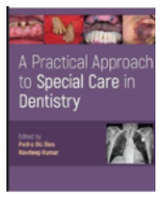
Oral Findings

- Dental erosion for those with gastro-oesophageal reflux or obligate mouth-breathers
- Intra-oral effects of corticosteroids can result in aggravated periodontal disease, oropharyngeal candidiasis, and even angina bullosa haemorrhagica (localised purpura).
- Beta agonists and ipratropium have sympathetic effects and can result in xerostomia - post inhaler rinsing can help.
- Increased dental caries risk due to dry mouth and pH changes (see **Figure**

Some Medical Considerations

- Asthmatic attack
- Steroid cover





video of asthma attack



https://www.youtube.com/watch?v=TysknAuI990

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Acute Asthma Management

Mild
talks in sentence, pulse <100/min

- give 4 puffs of salbutamol via spacer - 4 breadth per puff
- if spacer is not available, ask patient to hold for 4s+ for each direct puffs
- Wait 4 mins
- give 4 puffs of salbutamol via spacer again
- Assess status and rebook

Moderate-Severe
talks in phrases, pulse >100/min

- call 000
- give O2 6L/min (mask)
- give 4 puffs of salbutamol via spacer - 4 breadth per puff
- if spacer is not available, ask patient to hold for 4s+ for each direct puffs
- Wait 4 mins
- Continue puff/monitor until help arrives

what happens if excess bronchodilator (B-adrenergic) is given?



Refer to page 172, 173 in Therapeutic guidelines

Columbia Doctors

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COPD

- Chronic obstructive pulmonary disease (COPD) is the name for a collection of lung diseases characterised by airflow limitation that is not fully reversible, usually progressive. This is due to a combination of airway and parenchymal damage resulting from chronic inflammation.

- These diseases have different aetiologies but may have overlapping signs and symptoms. Some key ones:

    - Chronic bronchitis -long-term cough productive of sputum ‘blue bloaters’ - inadequate ventilation and becoming hypercapnia and hypoxic. can develop central cyanosis, cor pulmonale and oedema.

    - Emphysema - ‘pink puffers’ - hyperventilation to maintain normal blood gases. Breathless but not cyanosed.

- Caused predominantly by smoking, and sometimes occupational exposures, rarely genes (alpha-1-antitripsin deficiency)

- Treatment is tailored to severity and includes

    - smoking cessation

    - inhaled bronchodilators, corticosteroids or theophylline

    - Long Term Oxygen Therapy (LTOT) nebulised oxygen >15 h/day

    - Pulmonary surgery, Bullectomy

What’s some difference between Asthma and COPD?



- Indoor air pollution is the biggest risk factor for COPD in low-income countries, where almost 3 billion people worldwide use biomass and coal for household cooking and heating.



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COPD in Dentistry

Oral Findings

- Dry mouth - long-term use of inhaled oxygen can be dehydrating, while ipratropium and salbutamol may also predispose one to dry mouth.
- Mouth breathing - seeks to improve aperture for air entry, but prolonged mouth breathing can desiccate the oral environment. Mouth breathing during dentition development may contribute to malocclusion with narrowing of dental archs
- Associated inhaled steroids or beta-agonist (see **Chapter 27: ASTHMA**)
- Highly-associated with excessive tobacco use - tobacco stains, periodontal disease, poor surgical healing, poor oral hygiene, oral cancer risk.
- Theophylline may rarely produce erythema multiforme

- Supplementary oxygen may theoretically reduce their ‘hypoxic drive’, although short-term dental usage is considered insignificant (Scully, 2014) - check with your service on their take.

General Dental Management

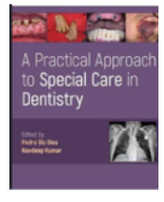
- determined by the severity and risk levels
- concurrent inhaled steroid / bronchodilator usage
- tobacco usage considerations
- risk of co-morbidities

Table 1.26.3, Risk level for dental patients with COPD	
Low risk	Dyspnoea with exertion. Normal blood gas values. Almost all dental procedures can be performed normally
Moderate risk	Dyspnoea on effort. Treated with bronchodilators or recently with corticosteroids PaO2 lowered Medical consultation is advised before dental procedures
High risk	Symptomatic COPD with poorly diagnosed or poorly treated Medical consultation is essential before dental procedures

COPD references
(not in MCQ exam but useful in real life)

Table 2.26.1, Types of Respiratory Failures			
Respiratory failure*	Description	Gas values	Examples
Type I Hypoxaemia; "Blue bloaters"	Lung damage prevent adequate oxygenation. However, less lung tissue is required for adequate CO2 exchange compared to oxygenation	Reduced PaO2 Normal PaCO2	Pulmonary oedema, pneumonia, acute respiratory distress syndrome, chronic pulmonary fibrosing alveolitis
Type II Hypercarpnic; Ventilatory failure; "Pink panters"	Insufficiency to exchange gases. Usually the whole lung is affected	Reduced PaO2 Raised PaCO2	COPD, chest wall deformities, respiratory muscle defects (Guillian-Barre Syndrome), central depression of respiration (e.g. oversedation, heroin overdose)
*Respiratory failure occurs when PaO2 is 27kPa (55mmHg) or lower			

Table 2.26.2 GOLD staging for COPD severity			
GOLD stage	COPD severity	FEV1*/ FVC** ratio	FEV1 Range^
I	Mild	<0.70	≥80% of normal
II	Moderate	<0.70	50-79% of normal
III	Severe	<0.70	30-49% of normal
IV	Very severe	<0.70	<30% of normal or <50% of normal with chronic respiratory failure present
*FEV1: forced expiratory volume within 1 sec **FVC: forced vital capacity ^Does not specify pre- or post-bronchodilator GOLD: abbreviation of Global Initiative for COPD			



Obstructive Sleep Apnea

- OSA is partial or complete airway obstruction when sleeping. ‘Apnea’ means breathing pauses, where each episode can arouse you from sleep, as a biological response to restart your breathing. This worsens sleep quality and may increase your risk of health issues.

- **Symptoms**: witnessed apnoeas, loud snoring, insomnia, daytime tiredness, difficulty focusing

- **Risk factors**: overweight, thick neck, narrow airway (e.g. small maxilla/mandible), enlarged adenoids, tonsils or tongue, smoking, alcohol, family history, middle aged

- **Treatment**:

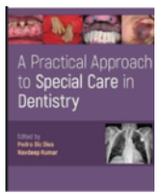
    - Lifestyle - Weight loss, smoking cessation, avoid alcohol, nasal spray, sleep hygiene

    - Continuous positive airway pressure (CPAP)

    - Oral appliance (mandibular advancement)

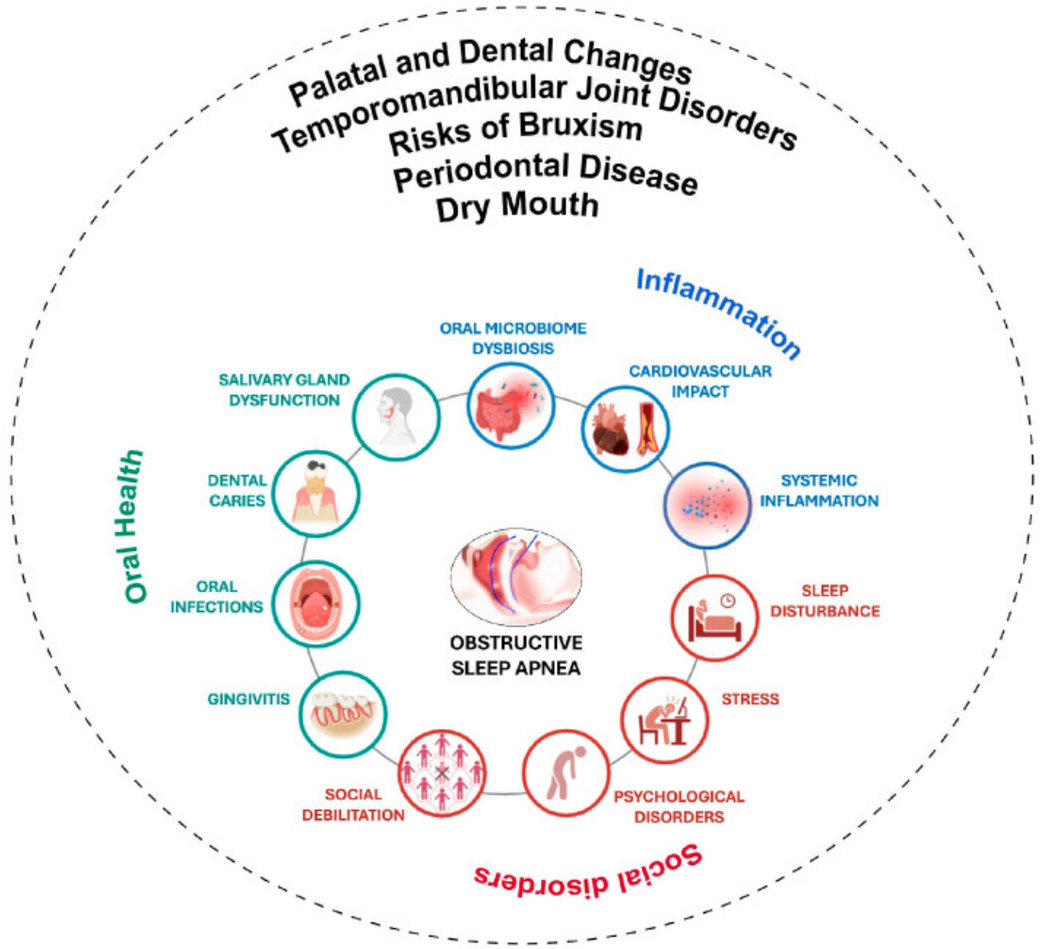
    - Surgery (adenoidectomy, tonsillectomy)

https://www.healthdirect.gov.au/obstructive-sleep-apnoea



OSA and Dentistry

- Oral findings:
    - dry mouth (mouth breathe),
    - bruxism,
    - TMD issues
    - caries and possibly periodontal disease



Maniaci A, Lavalle S, Anzalone R, et al. Oral Health Implications of Obstructive Sleep Apnea: A Literature Review. *Biomedicines*. 2024;12(7):1382. Published 2024 Jun 21. doi:10.3390/biomedicines12071382

Tuberculosis

- Tuberculosis is a contagious disease caused by inhalation of airborne particles containing the bacterium Mycobacterium tuberculosis.

- **Symptoms** (during active disease) include persistent cough > 2-3 weeks, blood in sputum, fevers, high sweats, unexplained weight loss, severe fatigue.

- **Tests** - Tuberculin Skin Test (Mantoux or TST). The tuberculin protein is injected under the skin, and you return to measure any swelling at the site. TB Blood test (IGRA) - blood is drawn to check immune response to TB bacteria. Chest X-rays (CXR), sputum microscopy

- **Epidemiology**, one third of the global population is infected with this mycobacterium or its variants leading infectious cause of morbidity and mortality at a global level, accounting for approximately 10.0 million new cases and 1.4 million deaths in 2019.[1]

- **Spread** - When *M. tuberculosis* reach the alveoli, within 2-12 weeks, the body contains it, and becomes a ‘latent infection’. around 10% of people with ‘latent infection’ can develop an active disease in their lifetime, usually when their immunity is weakened.

    - Co-infection with human immunodeficiency virus (HIV) is one of the strongest risk factors for tuberculosis infection. Also, leukaemia and lymphomas, diabetes, and prolonged steroid use, along with other conditions.

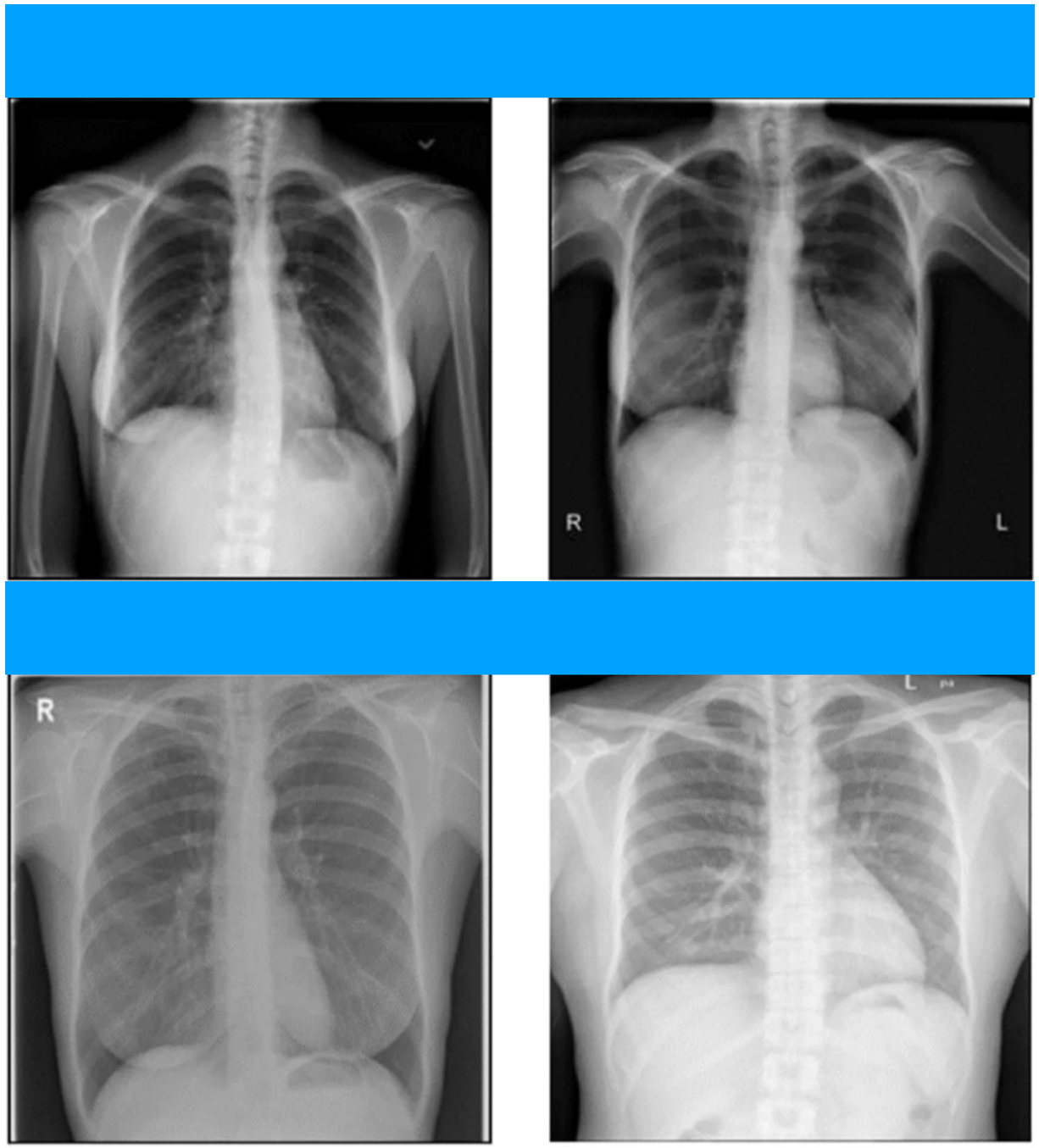
- **Treatment** - Active disease is treated with a combination of antibiotics (usually Isoniazid, Rifampicin, Pyrazinamide and Ethambutol) taken for at least 6 months. Lung scarring and fibrosis cannot be reversed, and persons with live with lower lung function for the rest of their lives. Latent TB is treated preventatively with a single medication for 6-9 month

https://www.ada.org/resources/ada-library/oral-health-topics/tuberculosis-overview-and-dental-treatment-conside https://www.fdiworlddental.org/sites/default/files/2020-11/fdi_world_dental_federation_-_tuberculosis_and_the_practice_of_dentistry_-_2018-07-04.pdf

Chest X-rays



Chest X-ray of a man, 47 years of age, with typical pulmonary tuberculosis



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TB and Dentistry

Active	Symptoms suggestive of Active TB - the patient should be 1. removed from area, 2. masked up, 3. referred to medical treatment, and 4. deferred from dental treatment till physician's notice [what if an active TB patient has a severe dental issue?]
Latent	Standard cross-infectivity protocol - current and generally accepted epidemiological information supports the conclusion that there is no significant risk of contracting tuberculosis through the provision of dental treatment when appropriate infection control procedures are followed.
Others	Healthcare workers can receive BCG immunisation (Bacille Calmette-Guérin) - not compulsory in all countries

https://www.ada.org/resources/ada-library/oral-health-topics/tuberculosis-overview-and-dental-treatment-conside

https://www.fdiworlddental.org/sites/default/files/2020-11/fdi_world_dental_federation_-_tuberculosis_and_the_practice_of_dentistry_-_2018-07-04.pdf

IMPT!

Hyperventilation syndrome

- Sighs/Symptoms
- Short of Breath
- rapid pulse
- Dizzy



Mx of hyperventilation

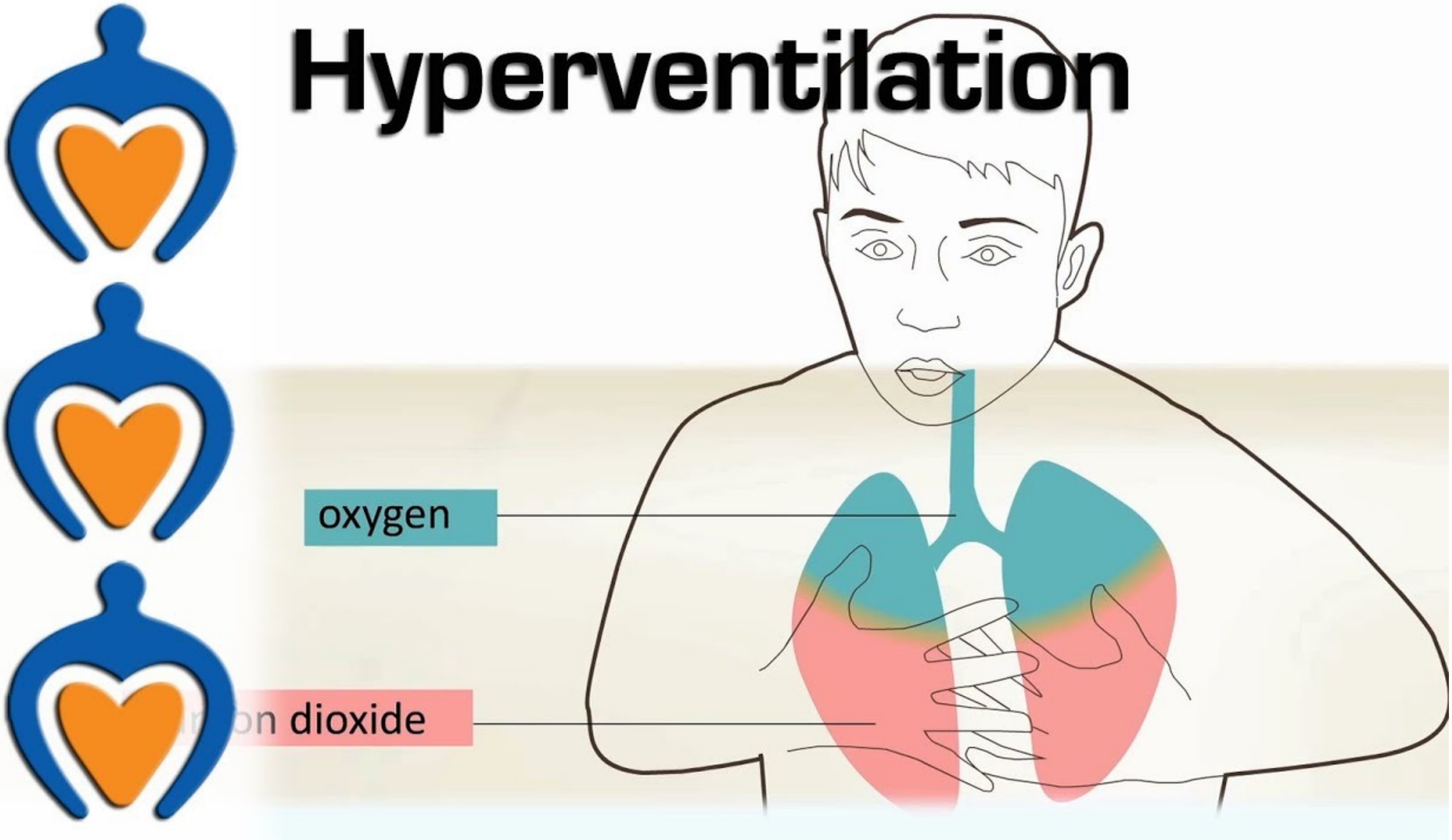
- Cease dental treatment
- Encourage slow breathing
- Rebreathe expired air
- Do not give oxygen



Refer to page 171 in Therapeutic guidelines

IMPT!

hyperventilation



https://www.youtube.com/watch?v=p97He

Clinical Scenario
A 63 year old man came into the clinic with a painful upper right wisdom tooth. It affects his eating and sleeping. He has not seen the dentist for around 10 years due to dental anxiety.

Medical History
- Asthma. Poorly controlled with exacerbations almost every 2 weeks, and admission to hospital 1-3 times annually. Not all attacks are subdued with salbutamol inhaler. No known triggers, although cold air and dust are reported to possibly worsen it. Does not regularly follow up with physician.
- Mild dental anxiety - mainly to sound of ultrasonic and handpieces.
- Rheumatoid arthritis with left knee swollen
- Reduced BMI
- Smokes ~ 5 cigarettes a day now, cut down from ~ 20 sticks a day 20 years ago.
- History of cataract surgery on right eye, with some residual visual impairment



Medications
- Salbutamol 200mcg inhaler
- Fluticasone 500mcg with Salmeterol 50mcg inhaler
- Lignosus rhinocerus (traditional Chinese tonic, 虎乳芝)

Dental History
- Uses an acrylic partial upper denture fabricated over 10 years ago that overlays retained roots
- Brushes once a day only
- Does not clean/brush denture



Social History
- Low socio-economic status
- Works as a security officer with varying shifts in the morning and overnight
- Divorced, lives alone

Oral examination
- Upper left wisdom tooth with caries into pulp
- Poor oral hygiene
- Rampant caries with other retained roots (see **Figure 1.27.1- Picture of caries / retained roots in a patient with severe asthma**)
- Oral candidiasis on upper palate
- Upper denture with dried debris on fitting and smooth surfaces.

What are your treatment considerations briefly? Can you treat the pain today?

- The tooth extraction should be completed today. Despite assessed to be moderate to high risk, attenuating the specific risks and possessing emergency preparedness are key.
- He will require further fillings, extractions and partial dentures in the future. Dental health education is also important.

You may use this table in case presentation to illustrate non-dental risks

Risk Assessment Table

Medical and various (non-dental) concerns	Risk	Implications/Modifications
Respiratory – Severe asthma – inhaler use	Asthmatic attack Poor healing	• Bring inhaler, prophylactic dose • Avoid triggers (cold/dust) • Late morning appointment • Supplementary oxygen? • Drug Px:? steroid use, theophylline may be potentiated by liver enzyme blockers
Social – Financial constraints – Smoking		• Referral for social assistance if appropriate • Smoking cessation
Others - Rheumatoid arthritis – Visual impairment – Anxiety	Fall risk	• Barrier free access • Dental Behavioural Support

What other non-dental risk/concerns can you think of?