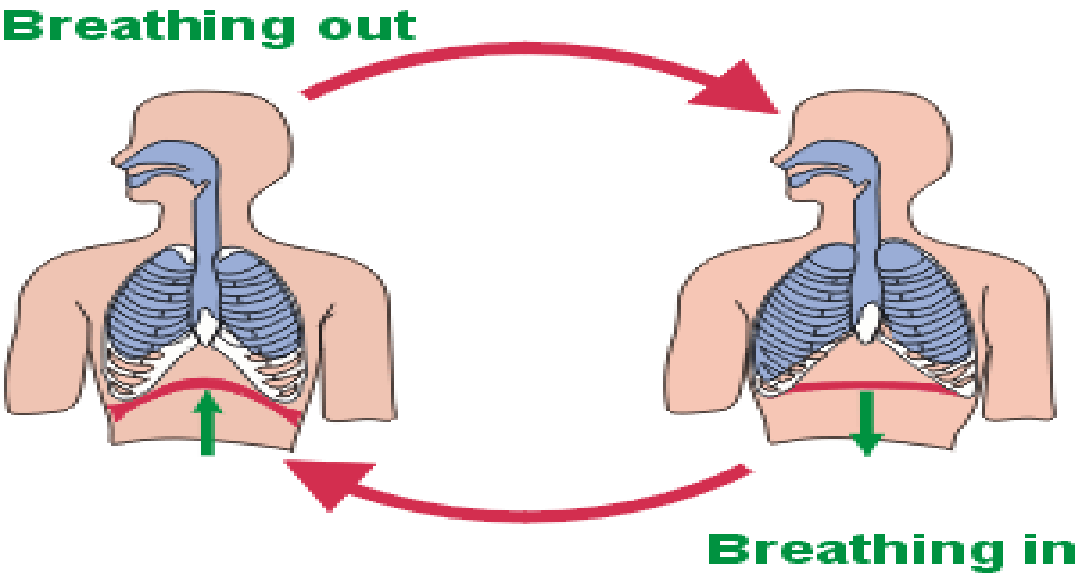
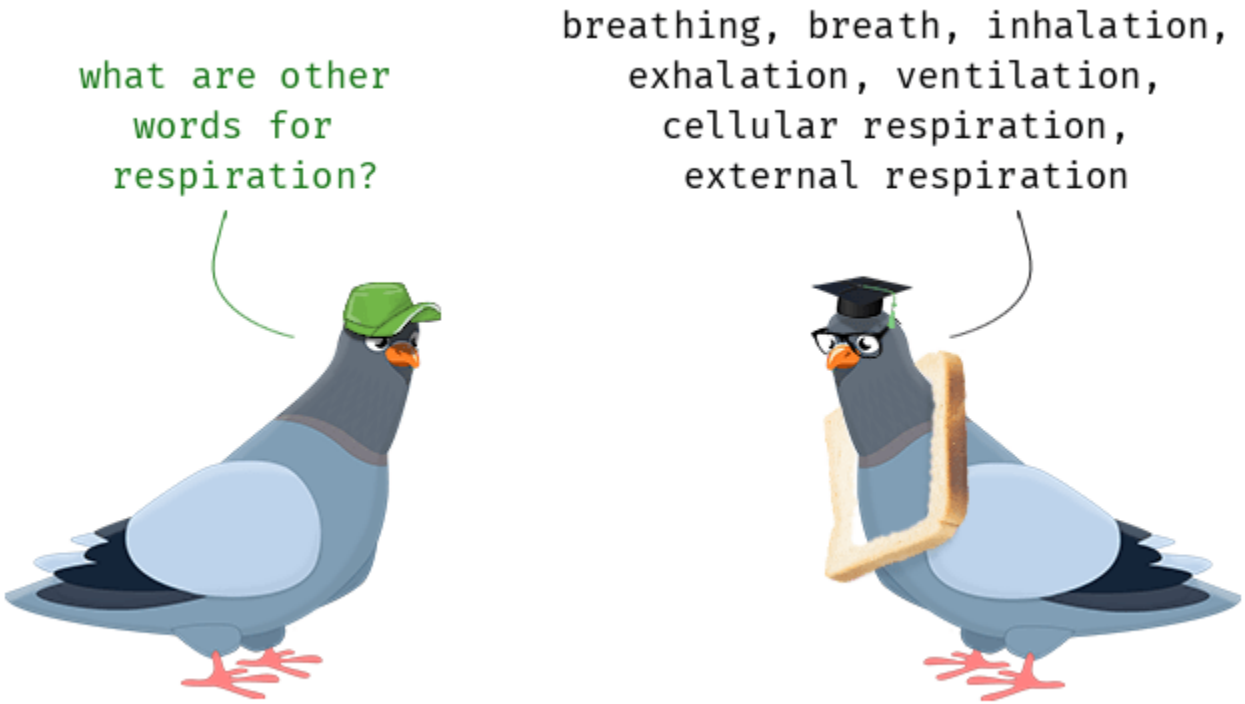
SESSION 2:

RESPIRATION



RESPIRATION



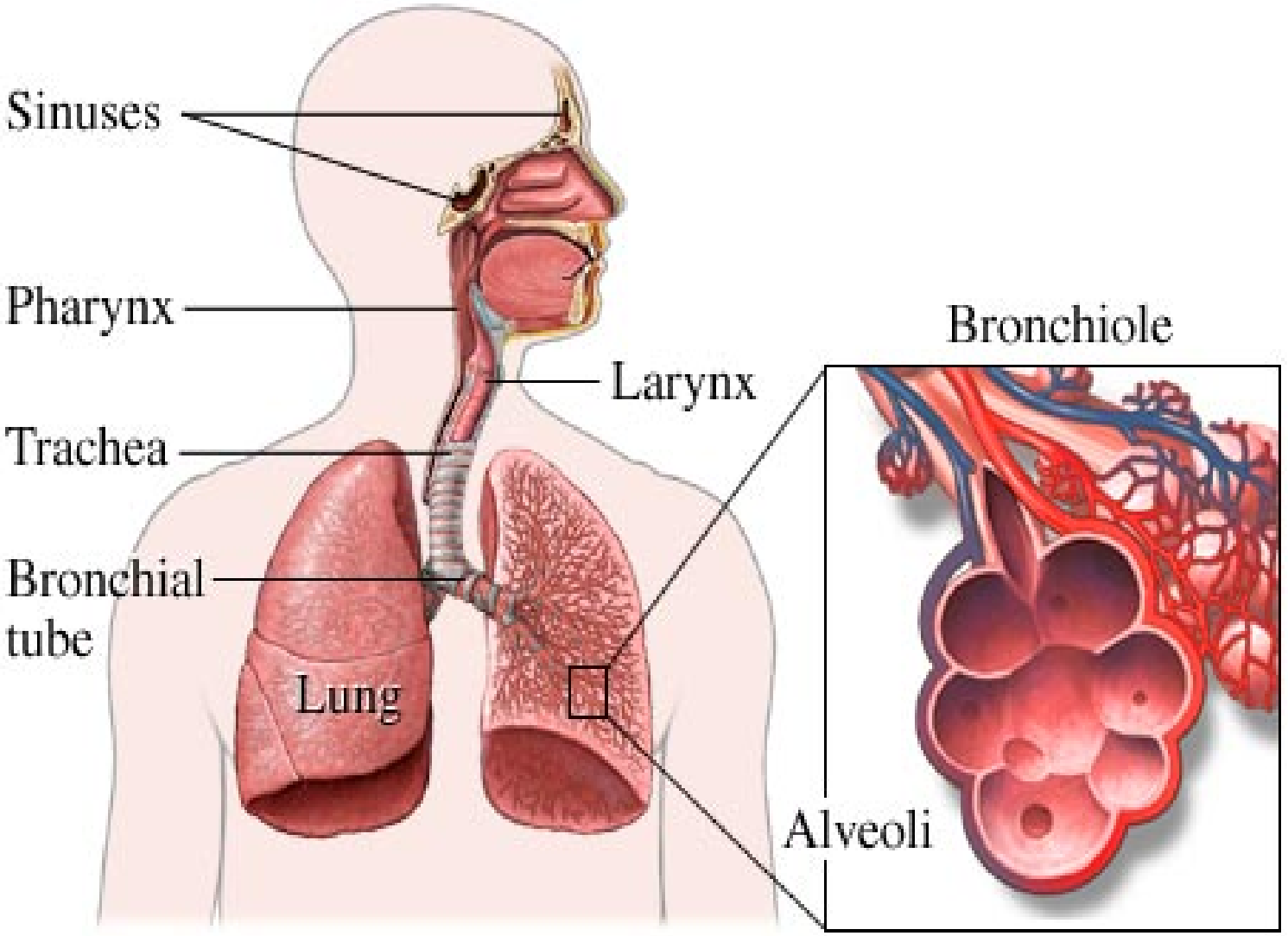
INTRODUCTION

- Respiratory system
- Breathlessness
- Wheeze
- Cough
- Colour/cyanosis
- Sputum
- Tracheostomy
- Suction
- Airways obstruction
- Basic life support

RESPIRATORY SYSTEM

- Upper respiratory tract:
  - Nose
  - Nasal cavity
  - Pharynx (throat)
- Lower respiratory tract
  - Larynx
  - Trachea
  - Bronchi
  - Lungs

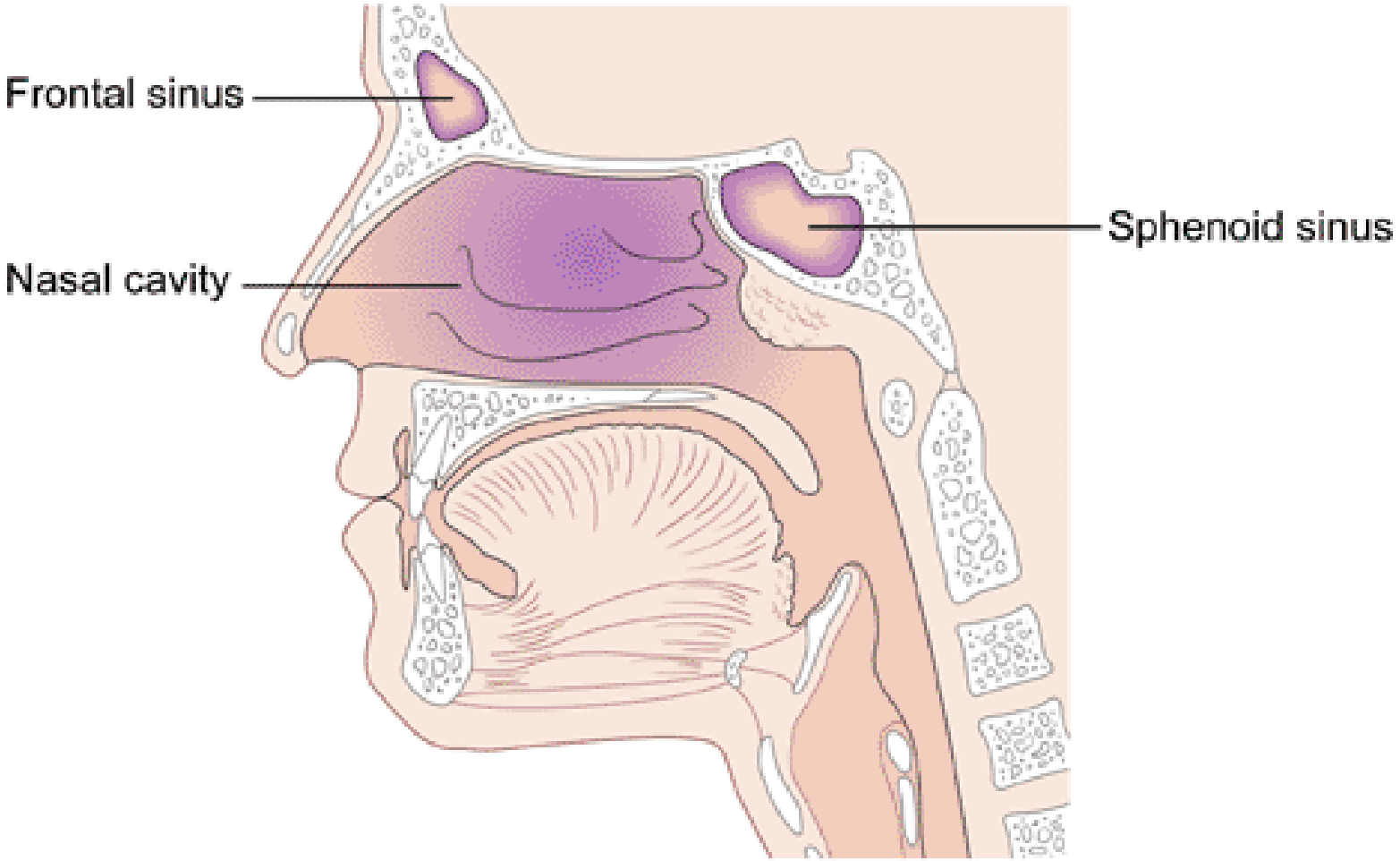
RESPIRATORY SYSTEM



NASAL CAVITY

- Located behind nose in middle of face
- Warms, filters and moistens air breathed in through nose.
- Air warmed by tiny capillaries close to surface - one of reasons nose bleeds are common
- Dust particles trapped by hairs in nose and mucous membranes to prevent them entering lungs
- Mucous membranes moisten air entering nose and mouth
- Moisture in nose and mouth dissolves tiny particles in air, allowing them to contact nerves of olfactory sensors allowing us to smell

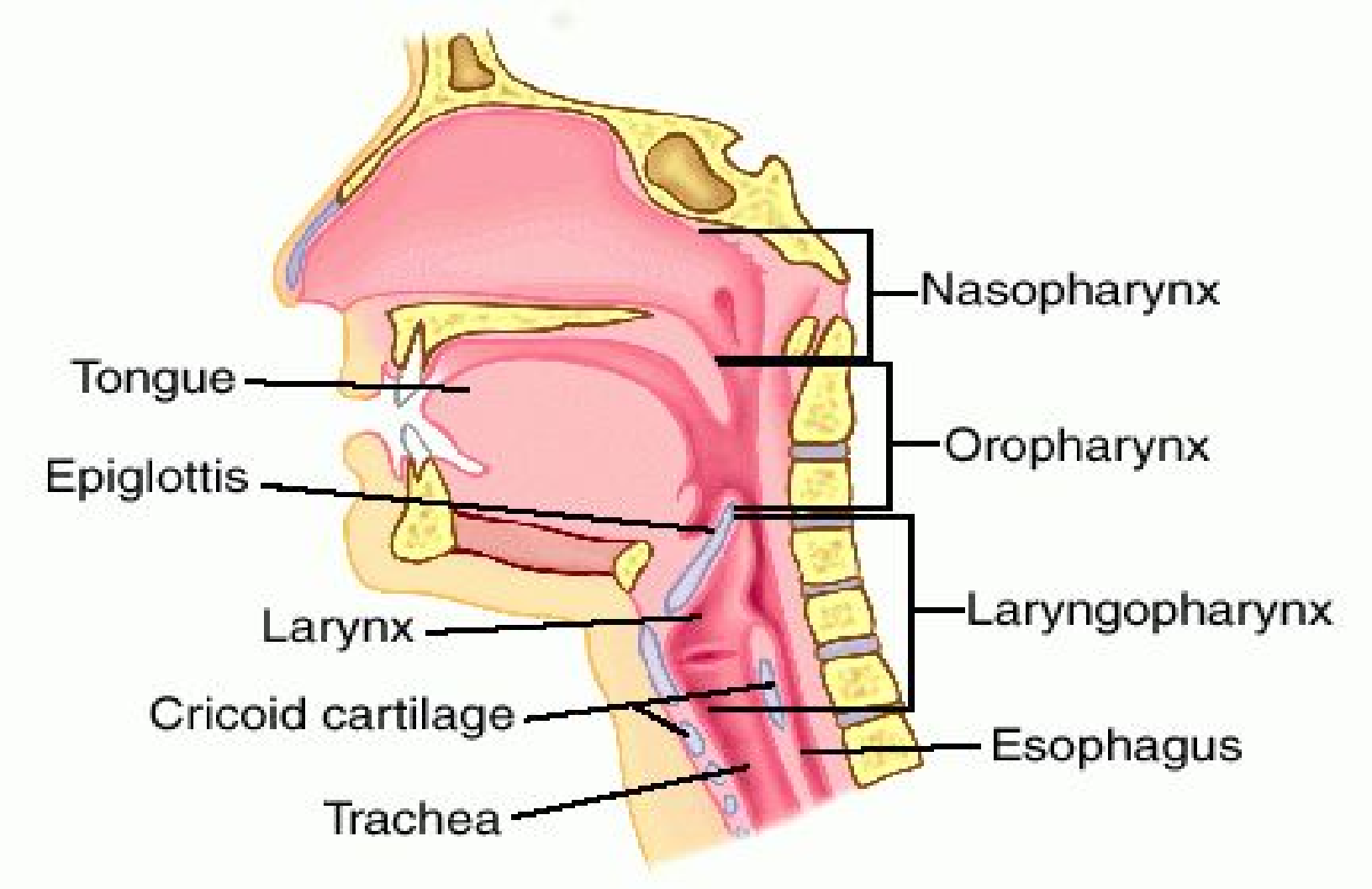
NASAL CAVITY



PHARYNX

- Common passageway of respiratory and digestive systems
- Receives air from nasal cavity and air, fluid and food through mouth
- Leads to lower respiratory system through opening into larynx
- Leads to digestive system through oesophagus

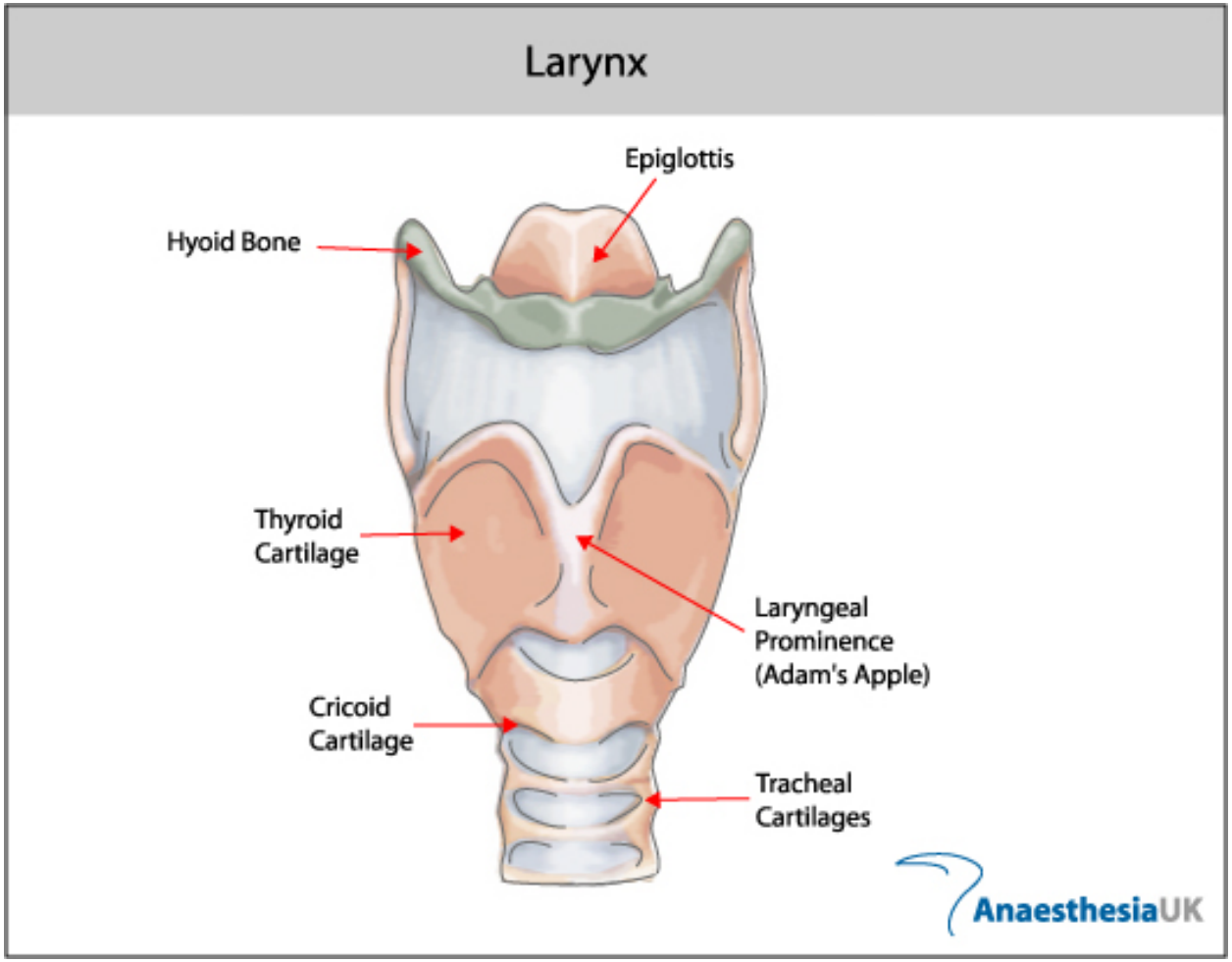
PHARYNX


Nasopharynx
Tongue
Oropharynx
Epiglottis
Laryngopharynx
Larynx
Cricoid cartilage
Esophagus
Trachea

LARYNX

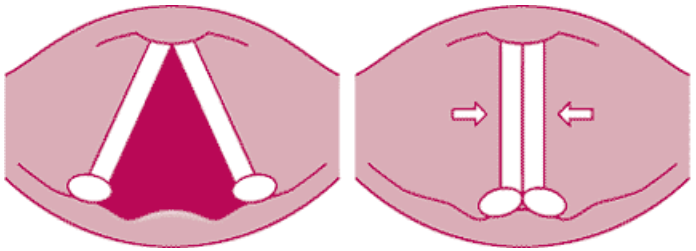
- Tubular structure made of muscle tissue and cartilage, lined with mucous membrane
- Connected to top of trachea (windpipe)
- Voice box
- Protects airway
- If anything other than air enters will produce a cough to clear

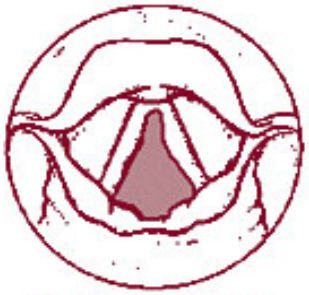
LARYNX


Larynx
Epiglottis
Hyoid Bone
Thyroid Cartilage
Laryngeal Prominence (Adam's Apple)
Cricoid Cartilage
Tracheal Cartilages
AnaesthesiaUK

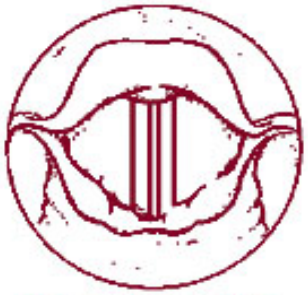
VOCAL CORDS

- Two bands of tissue located inside larynx
- Muscles pull cords together when you speak or sing
- Air passing through makes them vibrate producing sounds
- Shorter they are and faster they vibrate higher sound produced
- Vocal cords grow during puberty causing voice to deepen particularly noticeable in boys

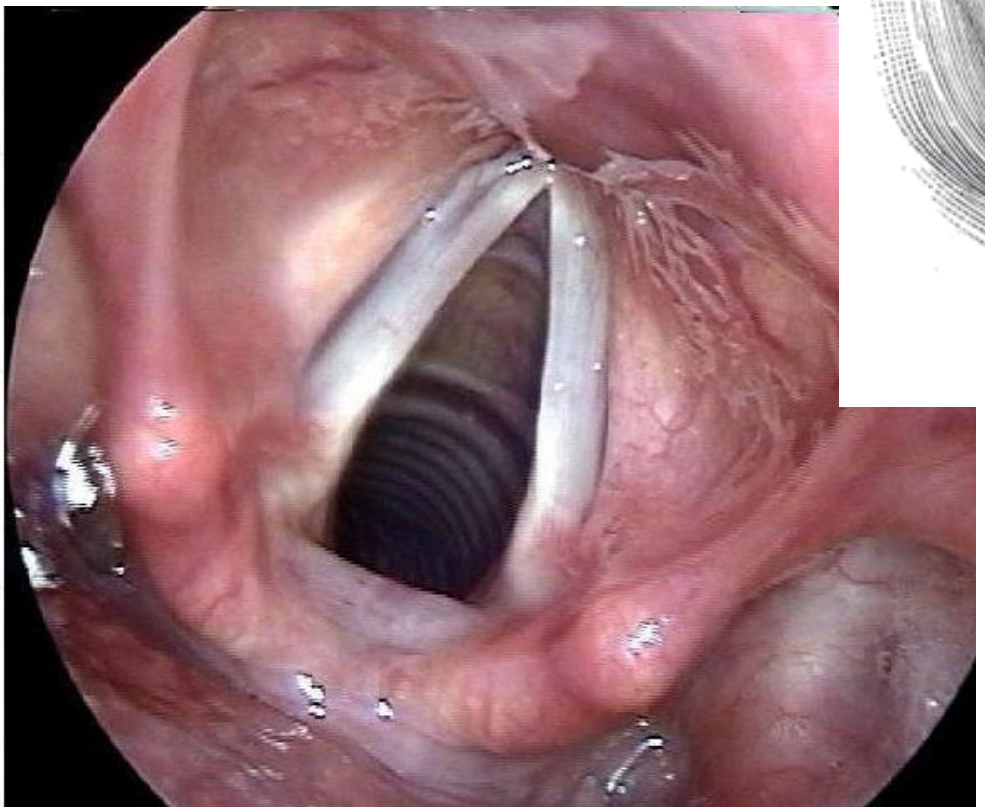


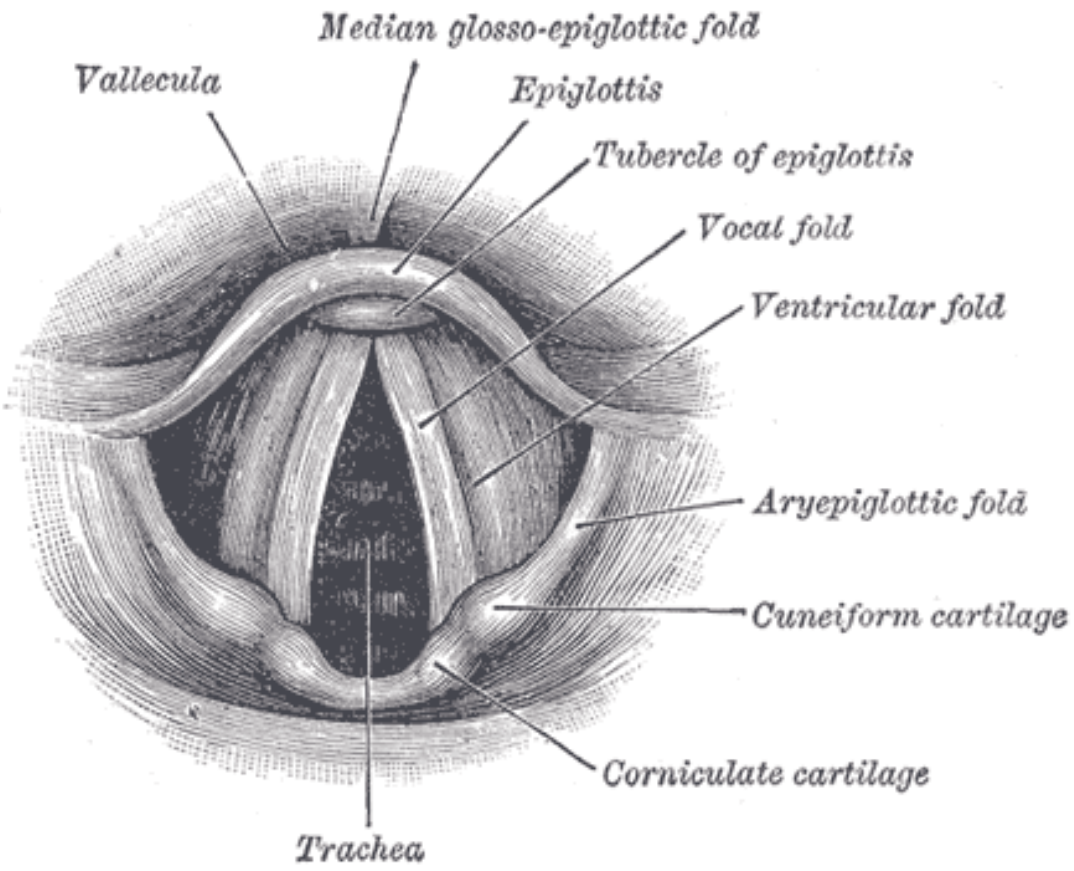


Vocal cords abducted to breathe



Vocal cords adducted to speak

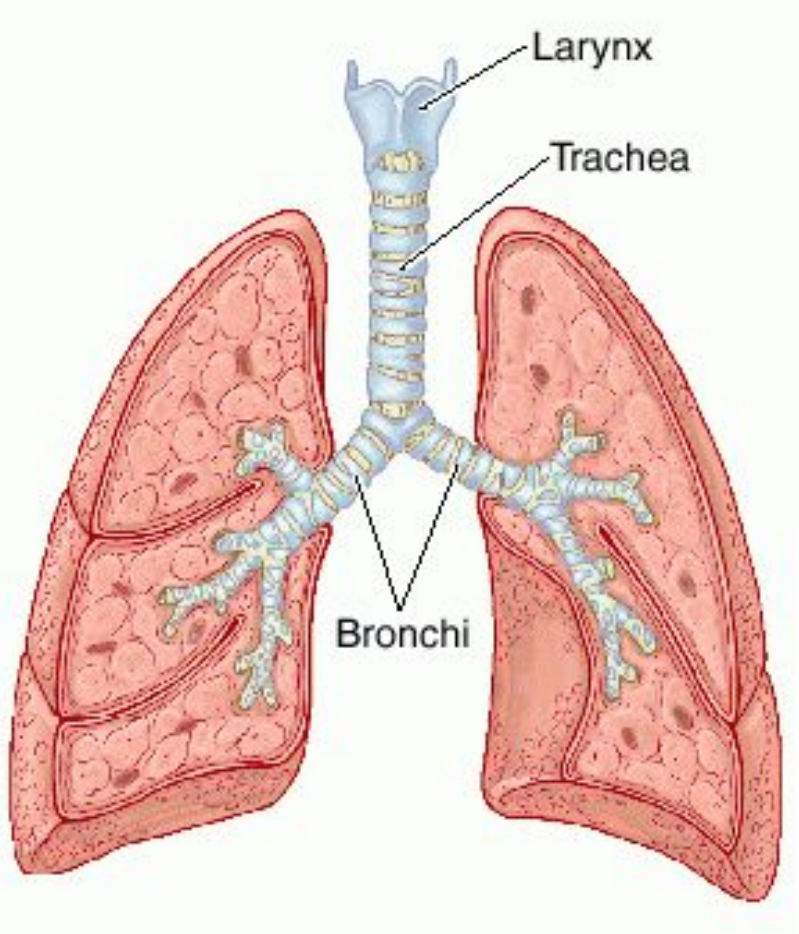




VOCAL CORD ANATOMY

TRACHEA

- Air passage
- Starts at lower end of larynx
- Divides into right and left bronchi



BRONCHI and BRONCHIOLES

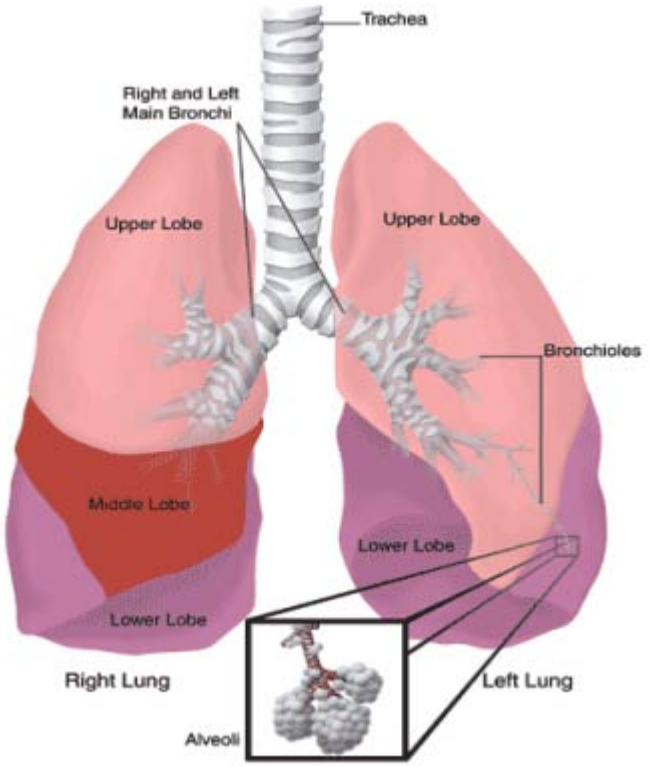
- Each bronchi enters a lung where it divides into bronchioles
- Tracheal and bronchial air passages are lined with hair like projections (cilia) which remove secretions or foreign particles that may have been inhaled by a sweeping motion
- Excessive secretions will initiate a cough

LUNGS

Made up of:

- Conducting airways
- Alveoli
- Blood vessels

- Right – 3 lobes
- Left – 2 lobes
- Protected by pleura:
  - Visceral – inner
  - Parietal - outer



BREATHLESSNESS

- Awareness of increased work in breathing
- Main symptom of both heart and respiratory disease
- Also occurs in anaemia and some other disorders
- Psychological factors e.g. anxiety may cause person to hyperventilate

COUGH

- Protective reflex to clear airway
- Stimulation of receptors in pharynx, larynx, trachea or bronchi may induce cough
- Difficult to clarify – most people cough
- Severity varies
- Is it dry or productive?

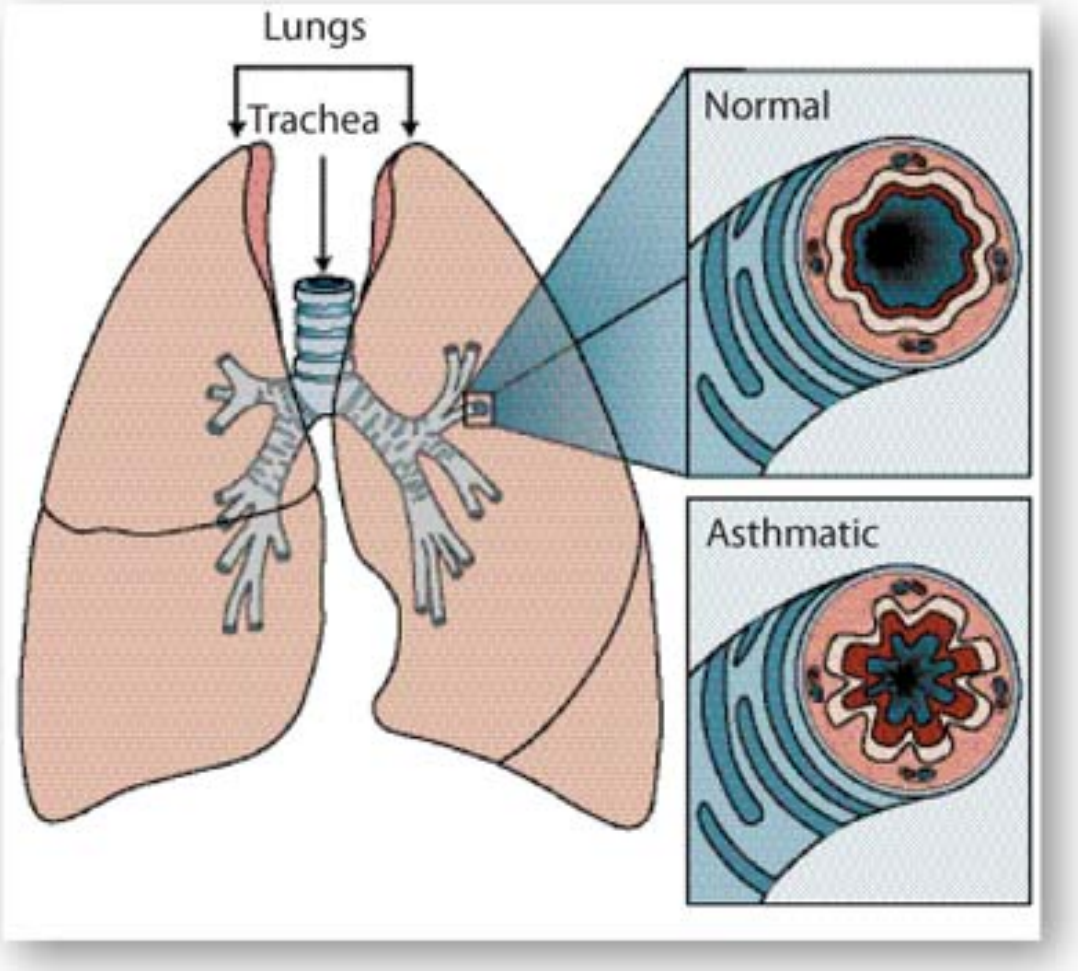
COUGH

- Loud barking cough may indicate disease in larynx or trachea
- Recurrent coughing after meals or drinks may suggest aspiration
- Coughing at night may be a symptom of asthma in young people or cardiac failure in older people
- Some drugs may cause a chronic cough

WHEEZE

- Whistling sound produced by airflow vibrating through narrowed airways
- Large tubes – noisy like plumbing
- Small tubes – more musical
- As airway is compressed when we breath out wheeze first heard then
- Any cause of narrowing can causes wheezing
- May be heard on breathing in if narrowing is severe

UNDERSTANDING WHEEZE



CHEST MOVEMENT

- Should be equal on both sides
- Movement on one side only suggests disease on other side e.g. collapsed lung, fluid, pneumonia

COLOUR

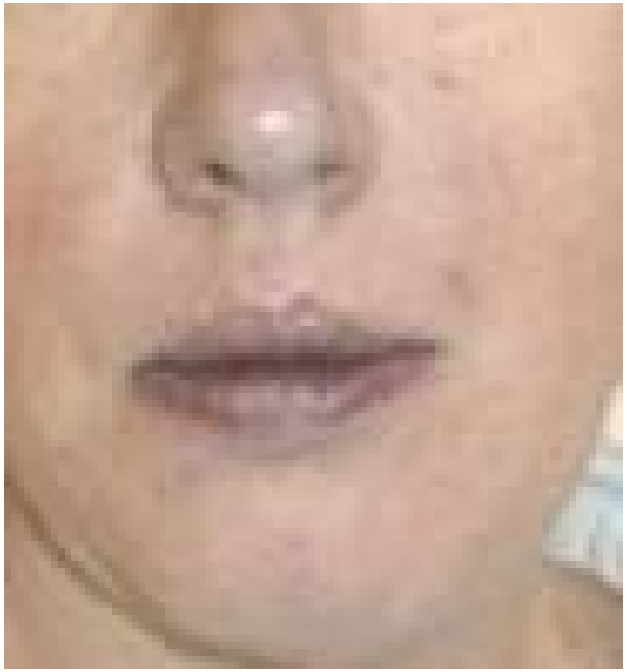
- Check patient's appearance – face and extremities
- Pallor may indicate he is unwell or anaemic
- High colour may indicate too many red blood cells (polycythaemia)
- People with severe life threatening illness e.g. heart attack often appear grey
- Cyanosis – blue discolouration of skin, nail beds, mucous membranes caused by blood with low oxygen

CYANOSIS - PERIPHERAL

- A dusky bluish colour of skin and nail beds
- Tongue and lips remain pink
- Caused by poor circulation

CENTRAL CYANOSIS

- Blue tongue and lips
- Oxygen saturation <85%



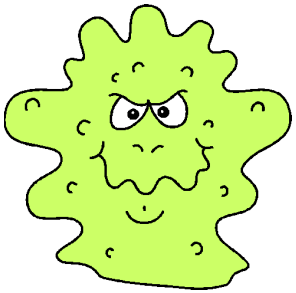
DEMONSTRATION AND PRACTISE _Pulse Oximeter

Pulse oximetry is a test used to measure the oxygen level (oxygen saturation) of the blood. It is an easy, painless measure of how well oxygen is being sent to parts of your body furthest from your heart, such as the arms and legs.

Things to consider when using a pulse oximeter:

- Patients with low Hb levels (anaemic)
- Patients with cold extremities (fingers or toes)
- Presence of nail varnish or false fingernails
- Patient in severe shock
- Inadequate blood perfusion to the body's peripheral sites (fingers, toes, ear)
- Inadequate blood flow due to an inflated Blood Pressure cuff in place on the arm, tight clothings or restraint

SPUTUM



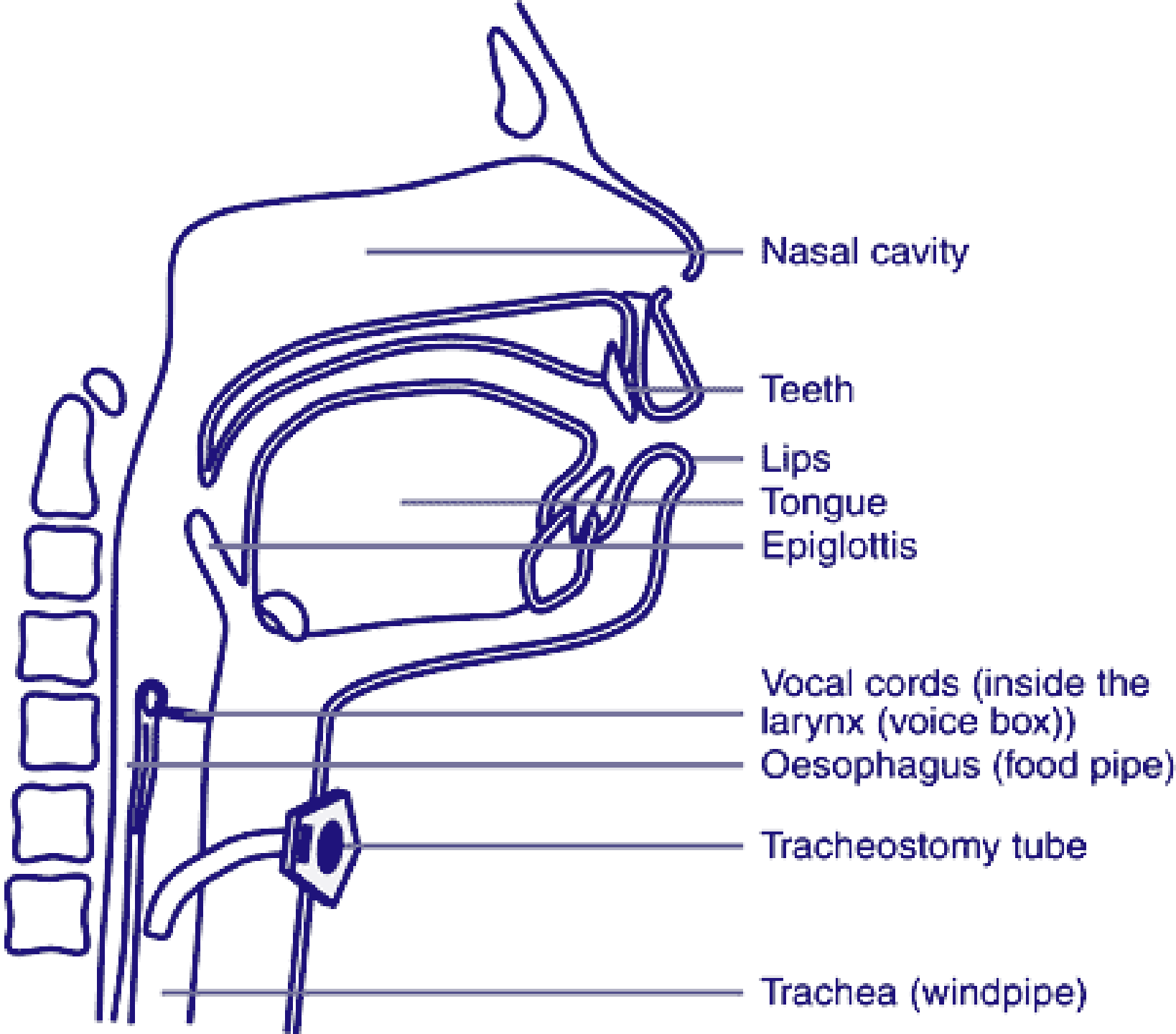
- Normal adults produce up to 100mls secretions daily and clear it without thinking
- Sputum is the excess cleared by coughing
- May contain mucous, cell debris, micro organisms, blood and foreign particles
- Look at colour, consistency and quantity

SPUTUM ANALYSIS

	Description	Possible causes
Saliva	**Clear, watery**	
Mucoid	**White**	**COPD without infection, asthma**
Mucopurulent	**Discoloured but not frank pus**	**Pneumonia, cystic fibrosis, bronchiectasis**
Purulent	**Thick, viscous:** • **Yellow** • **Green/brown** • **Rusty** • **Redcurrant jelly**	**Infected**
Frothy	**Pink or white**	**Pulmonary oedema**
Haemoptysis	**Blood specks, frank blood or dark brown (old blood)**	**Infection, carcinoma, trauma, coagulation disorders or cardiac disease**
Black	**Black specks in mucoid secretions**	**Smoke inhalation, coal dust**

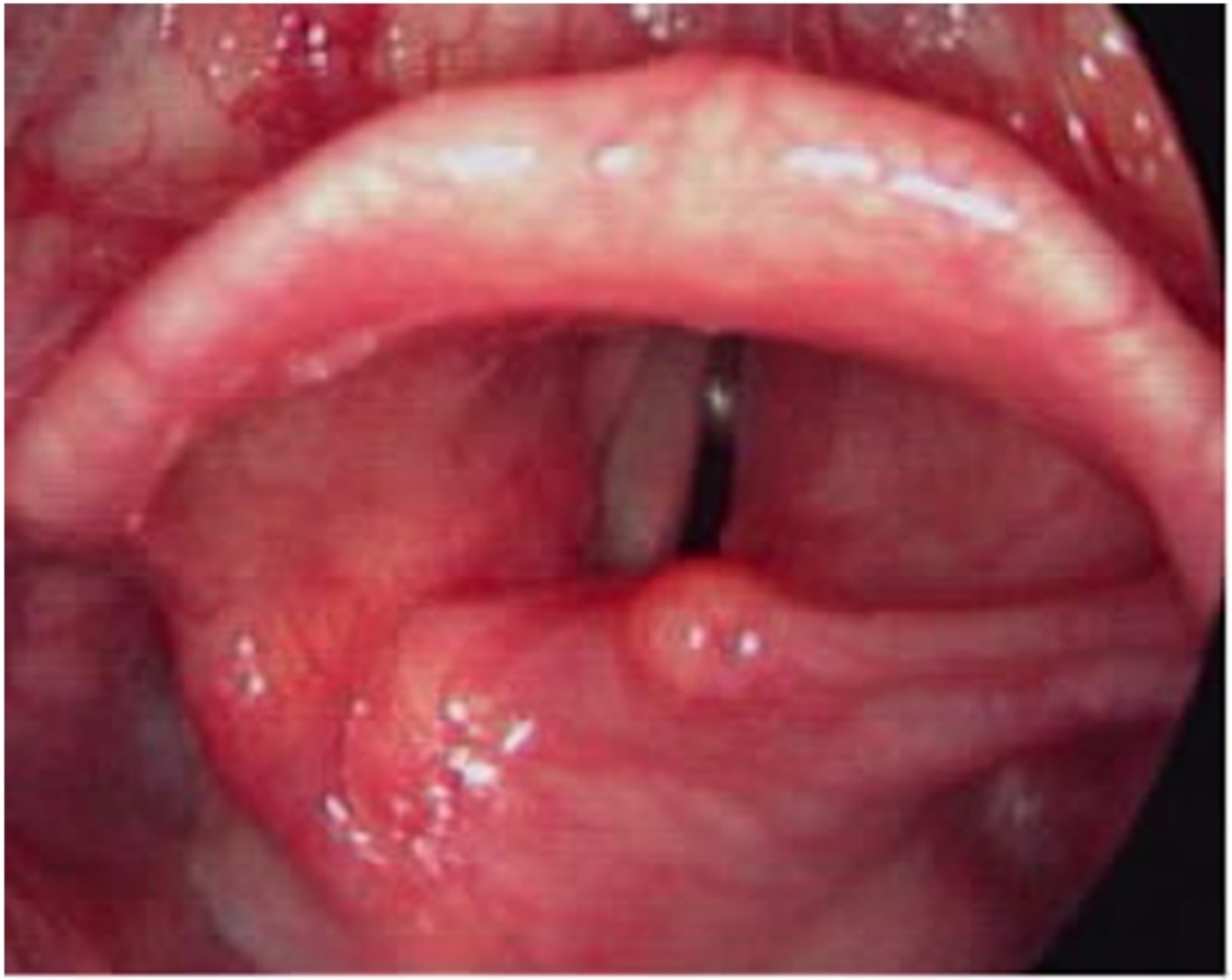
TRACHEOSTOMY - What is it?

- Surgical opening in front of trachea (windpipe), through skin of neck
- A tube (tracheostomy tube)is inserted through opening and into trachea
- Allows person to breath freely if airway is blocked or unusable
- Also used to remove unwanted fluids produced by lower respiratory tract
- May be temporary or permanent


Nasal cavity
Teeth
Lips
Tongue
Epiglottis
Vocal cords (inside the larynx (voice box))
Oesophagus (food pipe)
Tracheostomy tube
Trachea (windpipe)

WHY IS IT DONE?

- Bypass an obstruction e.g. tumour, swelling
- Removal of secretions
- Deliver oxygen more easily:
  - Before surgery to throat or mouth
  - For attachment to long term ventilator
  - When muscles that control swallowing or vocal cords are paralysed – cords remain open leaving airway unprotected
- Protect airway from entry of material other than air entering in absence of laryngeal reflexes



RIGHT VOCAL CORD PARALYSIS

TYPES OF TUBES

- Cuffed
- Uncuffed
- Fenestrated
- Non fenestrated
- Silver
- Subglottic (suctionaid)

CARE OF TRACHEOSTOMY

Essential bedside equipment

- Tracheostomy tube - same size and one size smaller
- Inner tube
- Suction machine
- Suction catheters
- Tracheostomy tube holder
- Tracheal dilator
- 10ml syringe if cuffed tube
- Vinyl gloves

TRACHEOSTOMY STOMA

- Secretions collect above cuff and ooze out of stoma causing wetness around site leading to irritation and skin breakdown

- Aim is to keep area clean and dry, reducing risk of irritation and infection

CHANGING DRESSING

Assess site at least every 24 hours

- Looking for redness or skin breakdown
- Record findings in care plan
- Portex band changed at least daily, if needed
- Two person technique (one must be RN) in case of dislodgement of tracheostomy

REQUIREMENTS

- 2 staff
- Vinyl gloves protective eyewear and disposable
- aprons
- Dressing pack
- Normal saline 0.9%
- Pre-cut keyhole dressing Lyofoam or metalline
- Portex tracheostomy tube holder
- Orange clinical waste bag
- Suction machine, if needed

INNER TUBE

- In place to prevent narrowing or blockage of tube
- Inspect inner tube at least every two hours - more frequently if there are tenacious secretions
- The used tube must be cleaned with warm water and stored in dry clean container

DEMONSTRATION AND PRACTISE

Tracheostomy dressing

Changing inner tube

Securing tube with bands

SUCTIONING

- 2 types:
  - Oral
  - Tracheal

TRACHEAL SUCTION

- Performed to maintain clear airway and optimise respiratory function
- Some patients may be able to clear secretions into tracheostomy tube by means of coughing reducing need for suctioning

TRACHEAL SUCTION

- Patient requires continual assessment to establish required frequency of suctioning
- Switch off enteral feed
- Allow patient adequate time to recover in between suctions to allow oxygen levels to recover

REQUIREMENTS

- Clean inner tube
- Suction machine
- Suction catheters
- Vinyl gloves
- Goggles
- Bowl and fresh tap water

OBSERVATIONS

- Is patient distressed or agitated?
- Note type of secretions:
  - Colour
  - Consistency
  - Amount
  - Presence of blood

RISKS

- Trauma to mucosa
- Increased secretions through overuse of suctioning
- Infection
- Aspiration – caused by vomiting
- Lung collapse – caused by catheter being down for too long

ORAL SUCTION

- May be required by patients who are able to cough but too weak to get rid of secretions

OR

- Secretions are copious

RISKS

- Trauma
- Aspiration
- Laryngeal spasm

DEMONSTRATION AND PRACTISE

SYNCHRONISED SUCTION/CUFF DEFLATION

- Cuffed tubes used to prevent leakage backwards and reduce risk of aspiration
- Secretions may collect above cuff and enter the lower airways when it is deflated
- Technique used to safely remove secretions
- Undertaken by 2 people twice daily

MANUAL VENTILATION (BAGGING)

- Bagging hyper-inflates lungs slowly then lets air out quickly
- Mimics a cough
- Combined with suction, useful procedure to remove secretions or when patient desaturating
- Ventilated patients also ‘bagged’ when not possible to remain attached to ventilator e.g. power/machine failure, during showering
- Also used in resuscitation

AIRWAY OBSTRUCTION

- Medical emergency – get help immediately
- May be complete or partial
- Can occur at any level from mouth to trachea
- Leads to reduced arterial blood oxygen
- May result in hypoxic damage to brain and other vital organs

CAUSES OF AIRWAY OBSTRUCTION - Pharynx

- Commonest site in unconscious person when pharynx becomes occluded by tongue which falls backwards when normal tone in muscles attaching tongue relaxes
- Also:
  - Secretions, vomit or blood
  - Regurgitation of gastric contents
  - Swelling due to allergy, infection or trauma
  - Foreign bodies

CAUSES OF AIRWAY OBSTRUCTION - Larynx

- Oedema – as a result of burns or inflammation
- Anaphylaxis
- Laryngeal spasm may be result of inappropriate response to upper airways stimulation
- Inhalation of secretions, blood or foreign body

CAUSES OF AIRWAY OBSTRUCTION – Below level of larynx

- Less common
- Excessive bronchial secretions
- Mucosal oedema
- Bronchospasm
- Aspiration of gastric contents
- Pulmonary oedema

RECOGNITION OF AIRWAY OBSTRUCTION

- Best achieved by look, listen and feel approach
  - LOOK – for chest and abdominal movements, observe colour
  - LISTEN AND FEEL – for airflow at the mouth
- Central cyanosis is a late sign of airway obstruction

PARTIAL OBSTRUCTION

- Air entry is diminished and usually noisy
- INSPIRATORY STRIDOR (noise on breathing in) is caused by obstruction at laryngeal level or above
- EXPIRATORY WHEEZE suggests obstruction of lower airways which may collapse during expiration e.g.asthma

PARTIAL OBSTRUCTION

- GURGLING – suggests presence of liquid or semi solids in main airways
- SNORING – occurs when pharynx is partially occluded by tongue
- CROWING – sound of laryngeal spasm (causes considerable distress)

COMPLETE OBSTRUCTION

- Breath sounds absent
- Paradoxical chest and abdominal movement as person attempts to breathe in chest wall lifts but abdomen is drawn inwards – often described as ‘see saw’ breathing
- Use of accessory muscles – neck and shoulder as they attempt to assist chest movement

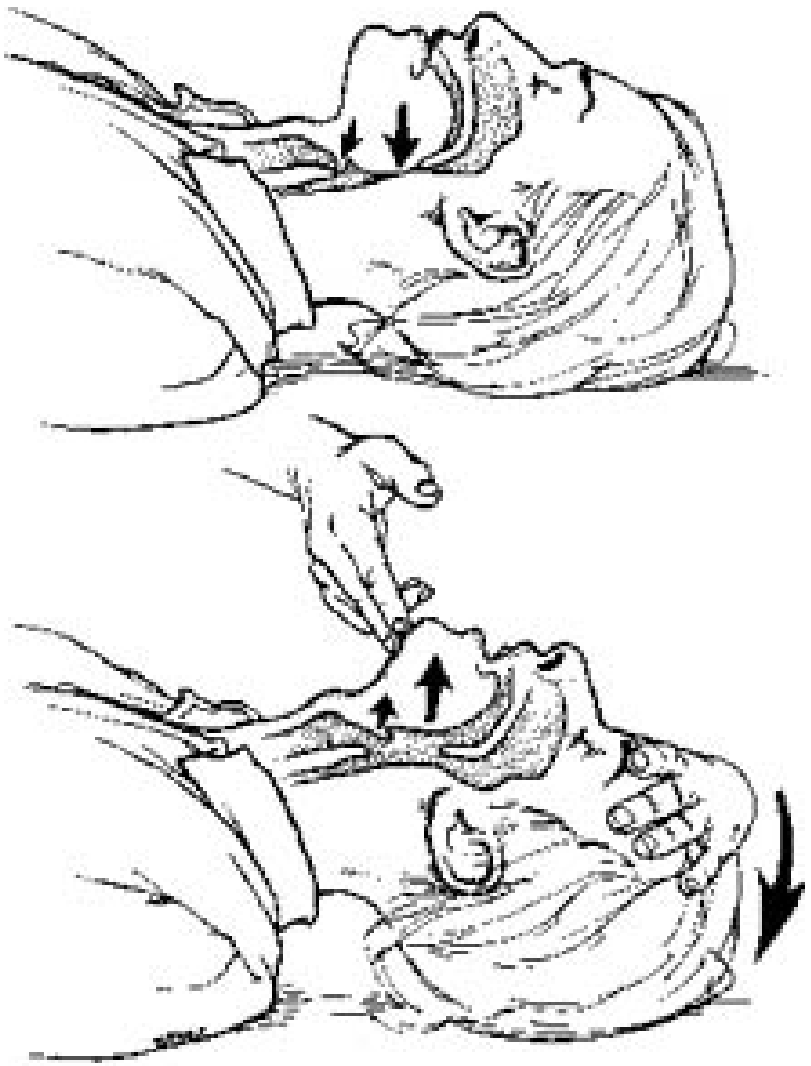
WHAT TO DO?

- Get help in all cases
- Encourage to cough

WHAT TO DO?

In most cases simple measures will work:

- Head tilt/chin lift manoeuvre in unconscious person when airway is obstructed by tongue
- Treatment of choking – encourage coughing/back blows/abdominal thrusts
- Suction – to remove secretions
- Insertion of oropharyngeal airway
- Advanced airways management



WHAT TO DO
-severe obstruction

- If conscious give up to 5 back blows:
  - Stand to side and slightly behind victim
  - Support chest and lean victim forward
  - Give up to 5 sharp blows between shoulder blades with heel of hand
  - Check between each one to see of obstruction is clear

WHAT TO DO
-severe obstruction

- If back blows fail, give up to 5 abdominal thrusts:
  - Stand behind victim and put both arms around upper part of abdomen
  - Lean victim forwards
  - Clench your fist and place between umbilicus and sternum
  - Grasp with other hand
  - Pull sharply inwards and upwards
  - Repeat up to 5 times

WHAT TO DO
-Unconscious victim

- Support carefully to the ground
- Call 999
- Begin CPR even if a pulse is present

NOTES

- Following successful treatment foreign materials may remain in upper respiratory tract
- Victims should be seen by a doctor particularly if a persistent cough, difficulty swallowing or feeling of something stuck in throat is present
- Abdominal thrusts can cause serious internal injuries

SUMMARY

- Airways obstruction is a medical emergency it kills faster than breathing or circulation problems
- Get immediate assistance
- Use basic techniques initially
- Advanced techniques may be required

Oxygen Therapy

Oxygen therapy, also known as supplemental oxygen, is the use of oxygen as a medical treatment. This can be given for low blood oxygen levels, carbon monoxide toxicity, cluster headaches, and to maintain enough oxygen while inhaled anaesthetics are given.

Oxygen Safety Awareness

- Oxygen itself does not burn – but most materials will burn very vigorously when in the presence of oxygen. It is important that the oxygen equipment is not used anywhere near where there is an open flame.

- Make sure that the oxygen is always used in a well ventilated area – this will ensure that you will not get any high concentrations of oxygen that will encourage things to burn.

- Oxygen enrichment materials which become enriched with oxygen will burn very vigorously if they are ignited. Oxygen enrichment can occur even when the gas is used at low flow settings. You can help to minimise oxygen enrichment by making sure the oxygen is switched off when not in use.

In particular, make sure that you:

→ Never place your oxygen equipment near curtains or cover them with clothing or other material objects. This will restrict air circulation and increase the oxygen concentration.

→ Never put your cannula or mask on the bed or the chair whilst the oxygen supply is still turned on.

→ Never leave the oxygen supply running when it is not being used.

- Never use oils and grease on your oxygen equipment.

Oils, grease and materials contaminated with these substances are particularly hazardous in the presence of oxygen. They can ignite extremely easily and will burn very violently in an oxygen enriched environment. It is important when handling your oxygen equipment to take care to ensure that it does not come into contact with any form of oil or grease.

- You can use alcohol gels to clean your hands – but if you do, make sure that the alcohol gel is massaged in well, particularly in between the fingers. Allow plenty of time for the alcohol gel to fully evaporate before handling your oxygen equipment. Your hands should be completely dry when handling your equipment.

- Take care that any hose lying on the floor is not trapped under heavy items or allowed to kink. Ensure the tubing is not laid across the floor where it can be a tripping hazard.

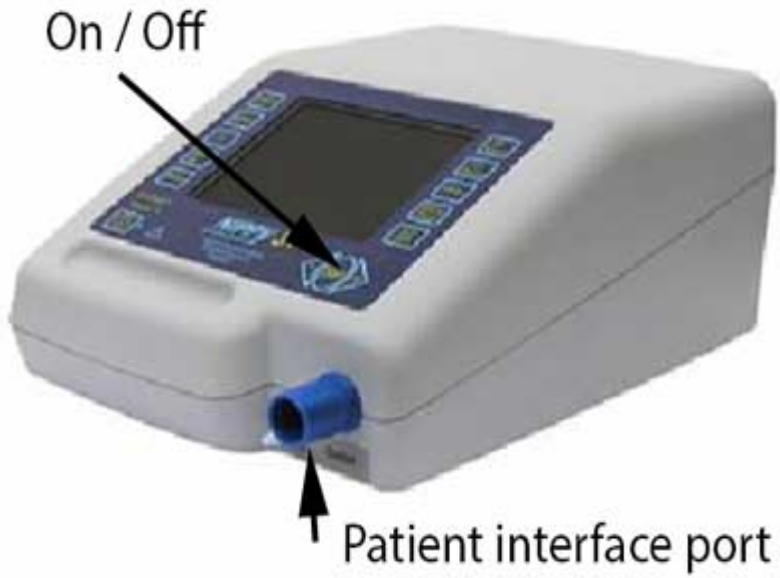
Cleaning

Use only a clean damp cloth to clean your oxygen equipment or any associated equipment.

Allow the oxygen equipment to dry after wiping down before using.

Ventilator

A medical ventilator is a machine designed to move breathable air into and out of the lungs, to provide breathing for a patient who is physically unable to breathe, or breathing insufficiently.



A **ventilator** is connected to a breathing tube which is placed into the patient through their nose, mouth or tracheostomy tube. When a person is unable to breath on their own to the effort needed to get oxygen in and carbon dioxide out a **ventilator** is used to help. This machine is connected to their airway.

Ventilator Awareness

The following to note with the use of a ventilator:

- Ventilator settings and Mode are individually set for each patient. (documentation in patient's Care Plan)
- Ensure ventilator in use is switched on and running off direct current and not from the battery.

- Patient on a ventilator should be suctioned appropriately only as needed and for the shortest duration possible.
- Help to protect the ventilator by keeping it clean and free from contact with water or other liquids.
- Ward ventilator checklist should be done & signed at the beginning of the shift and towards the end of the shift.

Passy Muir Speaking Valve

What is a Passy Muir® Valve?

Invented by a patient named David Muir, the Passy Muir Valve is a simple medical device used by tracheostomy and ventilator patients. When placed on the hub of the tracheostomy tube or in-line with the ventilator circuit, the Passy Muir Valve redirects air flow through the vocal folds, mouth and nose enabling voice and improved communication.

Years of evidence-based research has shown that the Passy Muir® Valve offers patients numerous clinical benefits beyond communication, including improved swallowing, secretion management, and oxygenation.

The **Passy-Muir** speaking **valve** is commonly **used to** help patients speak more normally. This one-way **valve** attaches to the outside opening of the tracheostomy tube and allows air to pass into the tracheostomy, but not out through it. The **valve** opens when the patient breathes in.

How to use the Passy-Muir Speaking Valve:

- Suction the tracheostomy tube as needed before placing the valve. It may not be possible to use the valve if the patient has a lot of secretions or very thick secretions.

If the tracheostomy tube has a cuff, deflate it (remove the air from it) before placing the valve.

- Suction the patient before deflating the cuff so that secretions do not trickle into the trachea (windpipe) and bronchi.
- Attach the valve to the top of the tracheostomy tube with a twisting motion to the right (clockwise) approximately ¼ turn. This will prevent it from popping off with coughing.
- To remove the valve, twist off to the left (counter clockwise).

Special consideration:

- Humidity can be used with the valve in place.
- Oxygen can be given with the valve in place.
- Remove the valve during nebulization treatments. If it is left on, remove it and rinse it to remove any medications that could cause the valve to stick or not work well.

Safety Precautions:

- Patients must not use the valve while sleeping.(see patient's Care Plan regarding it's usage)
- The valve should only be used under direct supervision of caregivers who know how it works and how to correctly use it.

- Remove the valve immediately if the patient has difficulty breathing. Suction and/or change the tracheostomy tube if needed.
- The entire manufacturer’s instruction booklet must be read prior to using the Passy-Muir Valve.
- The valve must not be used on tracheas that have the cuff inflated.


THE END

QUIZ

1. Where are your vocal cords situated?
2. Describe breathlessness
3. Why do we cough?
4. What should our oxygen saturation be?
5. What do we look for in sputum or secretions?

QUIZ

6. Give 2 reasons for doing a tracheostomy
7. How often should we change a tracheostomy dressing?
8. Why do we use an inner tube?
9. What are the 2 types of suction?
10. Why is oxygen therapy given?
11. List some safety awareness with relates to oxygen therapy.

12. What is a medical ventilator?
13. List some safety awareness for a ventilator.
14. What is the purpose for using a Passy Muir speaking valve?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