

Tracheostomy and Ventilator Education Program

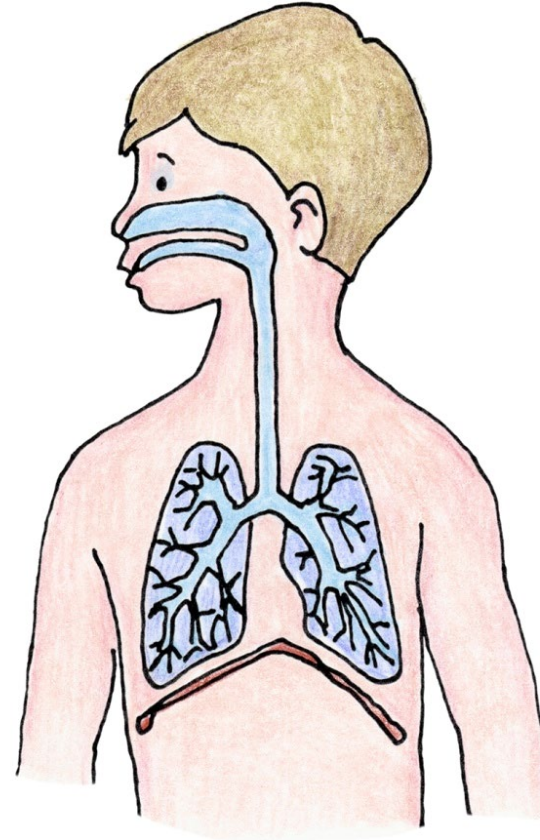
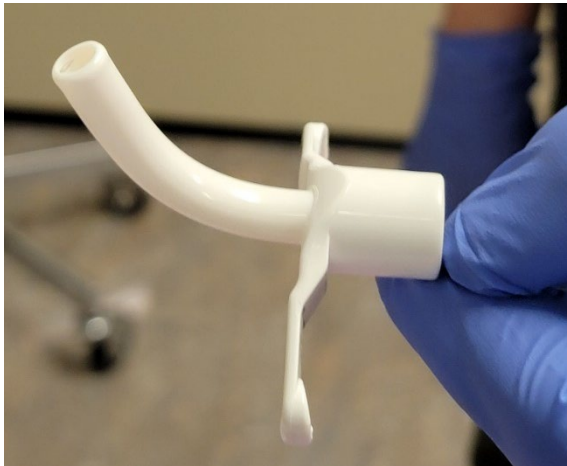
Module 2: Respiratory Anatomy

Disclaimer

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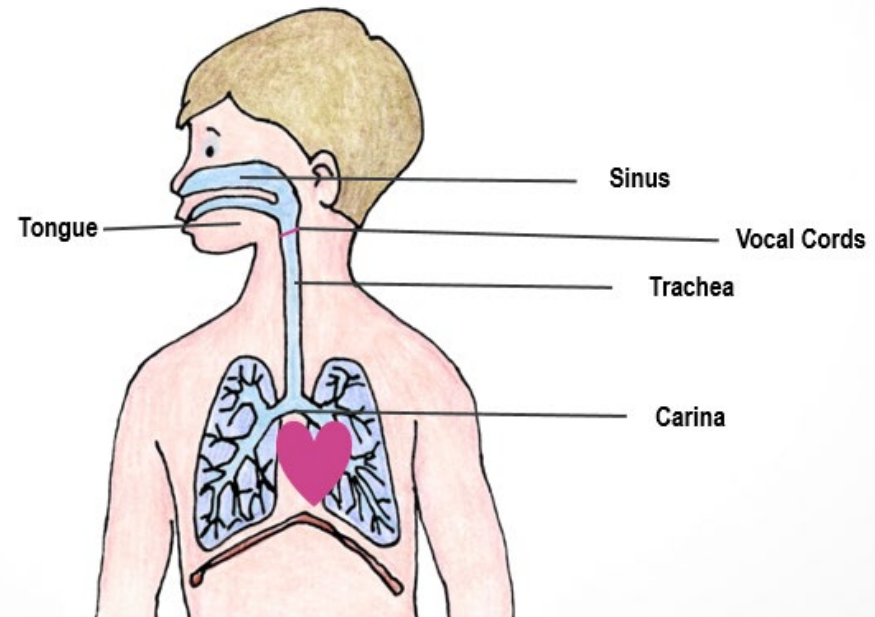
Objectives:

- Basic introduction to respiratory anatomy
- Basic introduction to a tracheostomy



A basic introduction to respiratory anatomy

- The respiratory system is how we move air into our bodies by inhaling (breathing in) oxygen (O_2) that we need for body function and exhaling (breathing out) carbon dioxide (CO_2) as a waste gas
- We breathe in through our mouth and nose, and the air moves through our airways into the lungs and out again



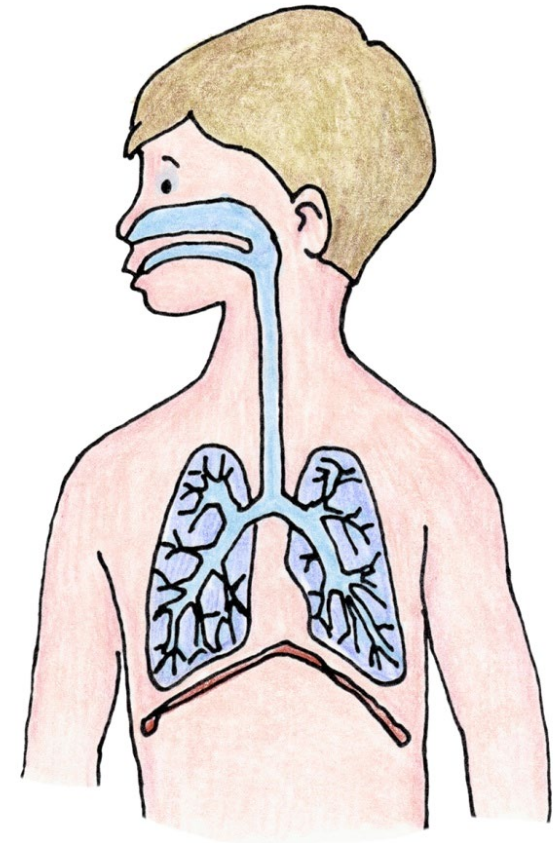


Breathing

- We normally breathe without thinking about it because our breathing is controlled by the respiratory centre in the brain
- This respiratory centre monitors the O_2 and CO_2 levels in our blood that controls our respiratory rate and effort
- This process is active (needs **energy**) when breathing in to move our respiratory muscles, but is passive (no **energy** needed) when breathing out because these muscles relax on their own

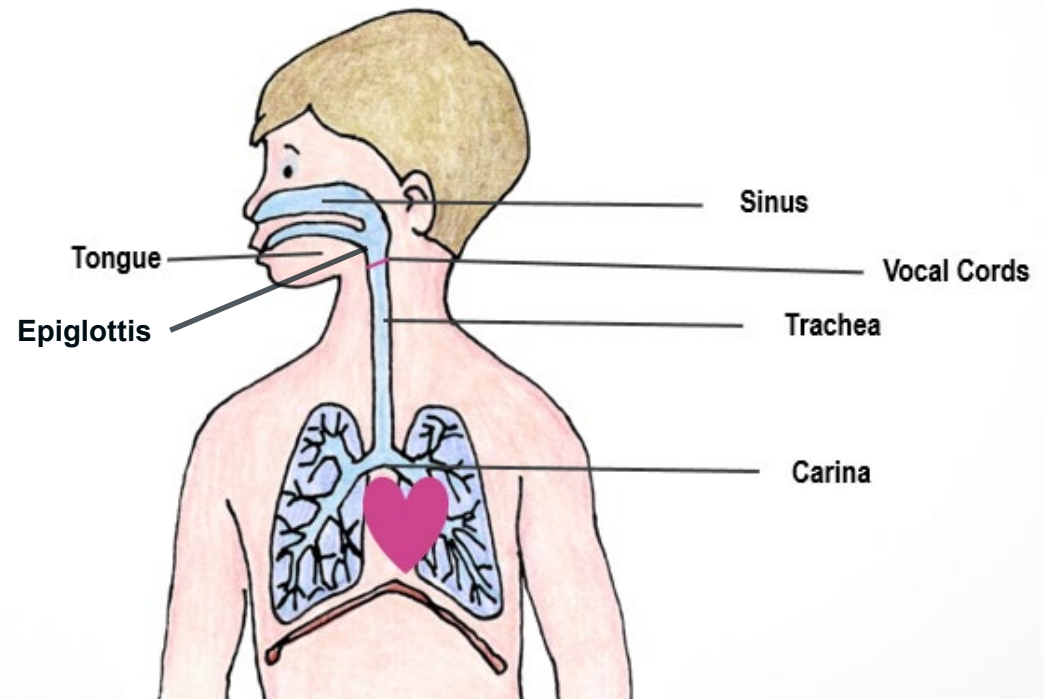
Breathing

- Breathing in through the nose filters, warms, and humidifies the air from the environment as it passes through the different regions of the upper airway
- Mouth breathing does not provide as much humidity as breathing through the nose does
- Note: This natural ability to filter, warm, and humidify air is lost when a trach tube is in place



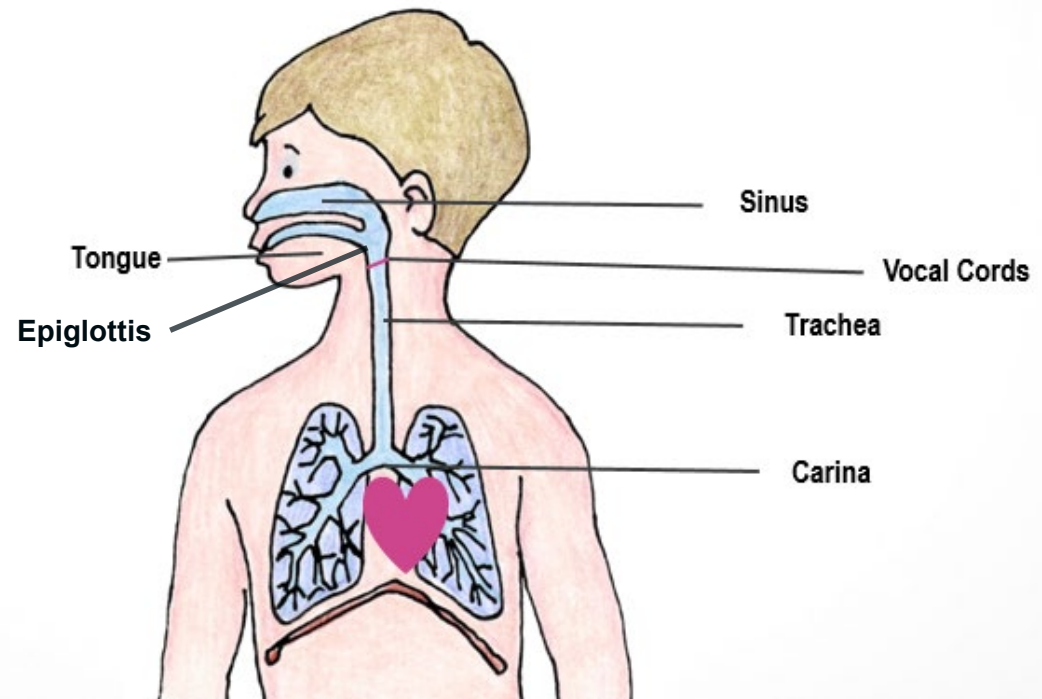
Upper airway

- The upper airway is from the mouth and nose to the trachea
- Includes the larynx where the epiglottis and vocal cords are



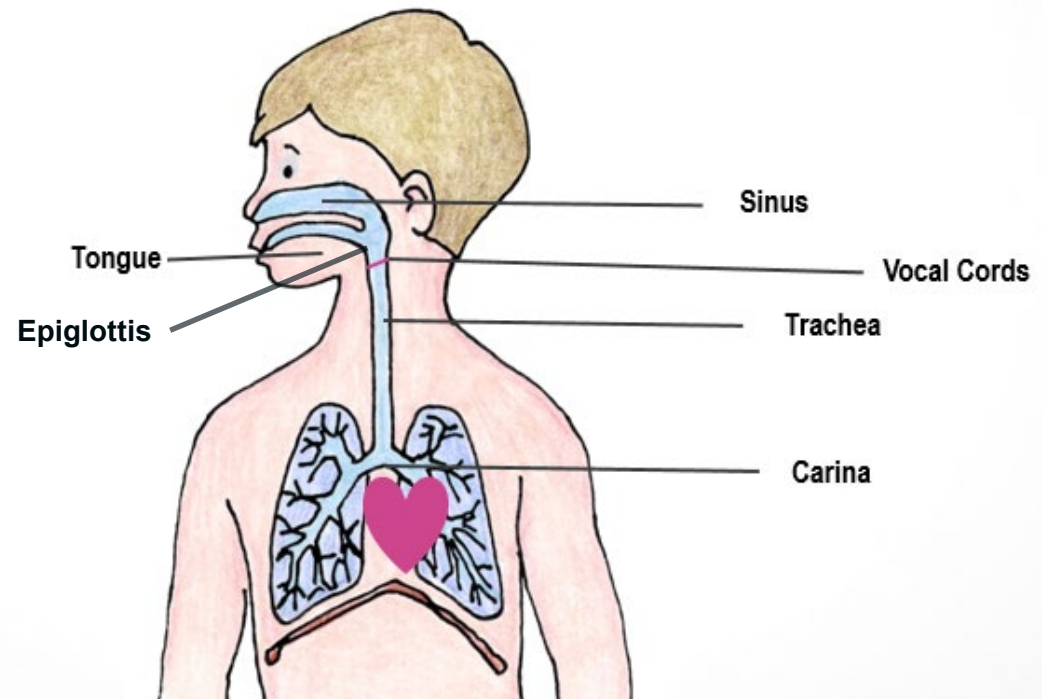
Upper airway

- The vocal cords open and allow air to pass to the lungs when breathing in
- They close to create speech, allow us to cough, and to protect the airway while eating



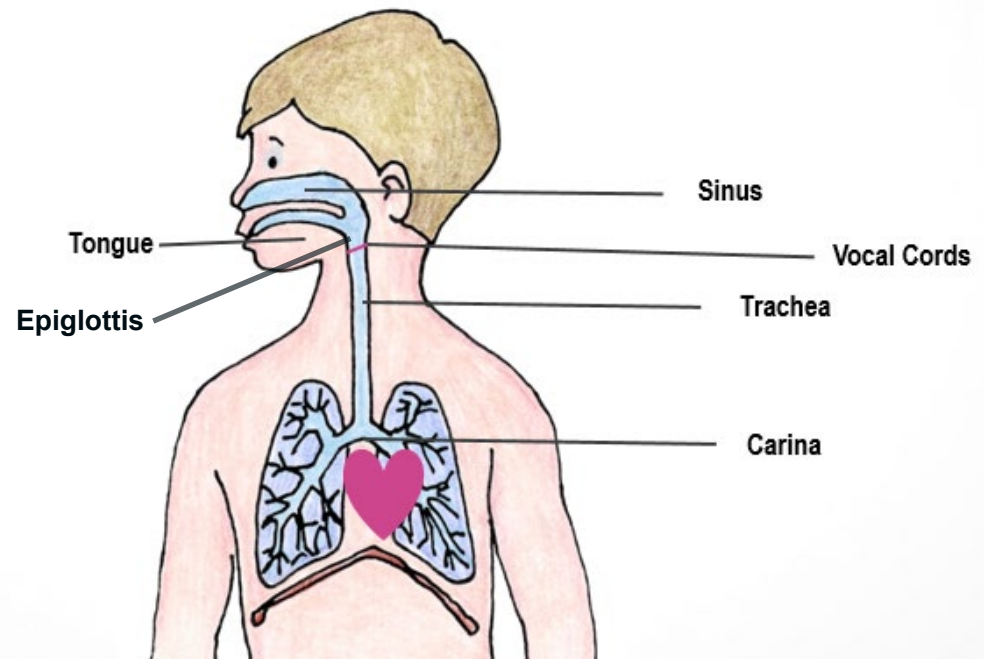
Lower airway

- The trachea allows air from the upper airway to travel to the lungs
- The trachea is held open by “C” shaped cartilage while breathing in so it doesn’t collapse
- The long trachea ends in the carina



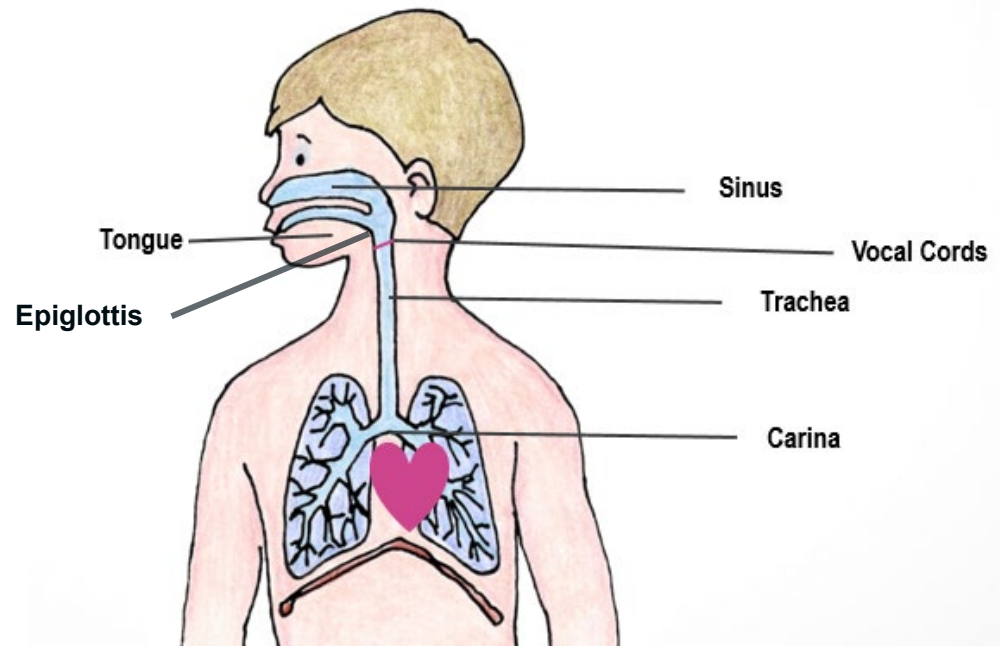
Lower airway

- The carina is where the trachea divides into the right and left main stem bronchi
- This area is very sensitive with lots of blood vessels
- It is very important to avoid touching the carina when suctioning



Lower airway

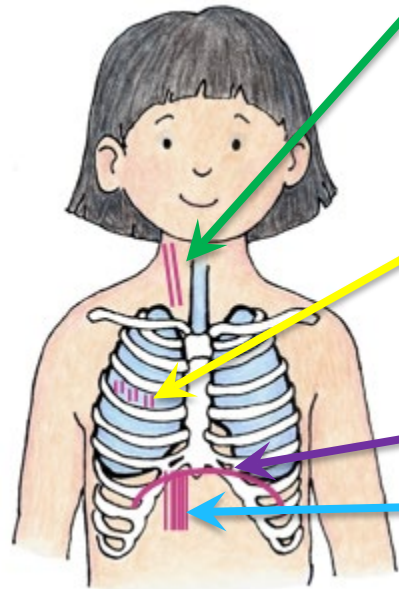
- The left and right main bronchi lead to the bronchioles and smaller airways
- The smaller airways lead to the mucus glands and alveoli and capillaries



Lower airway

- Alveoli and capillaries:
 - Where gas exchange happens
 - O_2 from the alveoli goes into the capillaries → into our blood stream and CO_2 moves from the capillaries into the alveoli → then we breathe it out
- Mucous glands:
 - Glands throughout our airways and lungs that produce mucus (secretions) to provide moisture and humidity and to help keep our lungs protected from debris

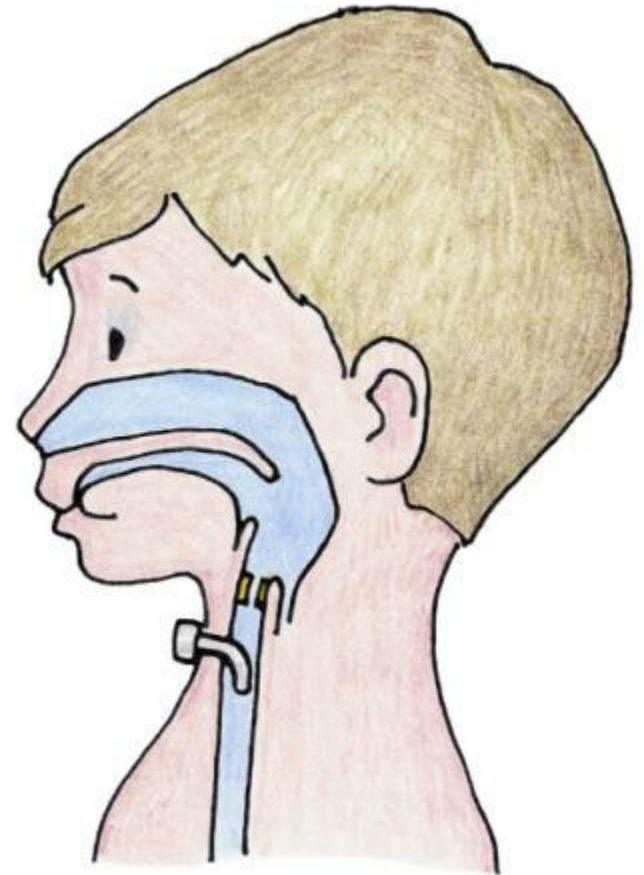
Respiratory muscles



- **Sternocleidomastoids/scalenes:** *Helper or accessory muscles* above the clavicles around the neck that can help with rib cage movement
- **Intercostals:** *Helper or accessory muscles* between the ribs that can help with rib movement
- **Diaphragm:** The *main muscle* of breathing
- **Abdominals/obliques:** Belly muscles that can help the diaphragm pull the rib cage up and down

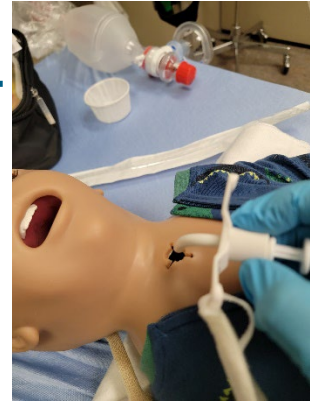
Tracheostomy

- A *trache* “o” *tomy* is a surgical procedure where the *trache* “os” *tomy* (the opening or stoma where the tube goes in) is placed
- The opening is placed in the trachea between the second and fourth tracheal ring – just below the vocal cords



Why a tracheostomy is placed:

- To help with structural issues of the upper airway
 - Upper airway damage, tracheomalacia
- To help with breathing support
 - Ventilator dependence
- To help with airway protection and secretion clearance
 - Floppy upper airway, increased mucus production



Why does your child have a trach?



- Every child is very different as to why they have a tracheostomy tube – you need to know why your child has a trach and what their airway needs are
 - Some children have trachs and can breathe on their own
 - Some children have trachs and can't breathe on their own
 - Some children have trachs but can also move air through their mouths and noses
 - Some children can only breathe through their trach

Structural complications of tracheostomy

- Irritation, inflammation or infection of the interior trachea (Tracheitis)
- Irritation, inflammation or infection of the stoma site
- Abnormal development of scar tissue in or around the stoma site (Granulomas)
- Softening of the tracheal wall leading to collapse on inspiration (Tracheomalacia)
- Permanent narrowing of the interior tracheal wall (Tracheal Stenosis)

Other complications of tracheostomy

- Infection in the lungs
- Bleeding around the stoma site or due to trauma from suctioning
- Breathing in food or fluid which goes into the lungs – aspiration

Emergency complications of tracheostomy

Complications with a trach that require immediate interventions are:

- **Airway obstruction:** This can occur because of secretions or a mucus plug, an improperly placed tube, an object, or aspiration of food or fluid
- **Dislodgement:** This can occur because of loose or damaged ties, coughing, movement, 'busy' hands
 - Ensuring trach ties are securely tied can reduce the risk of dislodgement

Emergency complications of tracheostomy

- Good techniques for care and assessment will help decrease the risk of these events occurring
- Decisive quick action when one of these events occurs is key to prevent serious outcomes
- You will be prepared to deal with these events if they do occur



Summary:

- This module has provided a basic introduction of respiratory anatomy and to a tracheostomy
- If you have concerns or questions, please talk to your healthcare team