Artificial Airways & Insertion Techniques

Nasopharyngeal airway

- Flexible rubber tube which goes through the nose ends at base of tongue (an *adjunct* to help keep airway open)
- An oxygen mask or bag mask ventilation can be applied over the top if needed
- **Use:** prevents tongue covering epiglottis in patients with reduced GCS. It is tolerated better than oropharyngeal airways in more alert patients.
- **Size:** should be similar to distance between nostril and tragus; 6-7mm diameter for most adults
- **Insertion technique:**
  - Lubricate the nasopharyngeal airway with water-soluble jelly
  - Insert into the nostril (preferably right) vertically along the floor of the nose with a slight twisting action (aim towards the back of the opposite eyeball)
  - Confirm airway patency

Oropharyngeal airway (e.g. Guedel)

- Rigid plastic tube which sits along top of mouth and ends at base of tongue (an *adjunct* to help keep airway open)
- An oxygen mask or bag mask ventilation can be applied over the top if needed
- **Use:** prevents tongue covering epiglottis in patients with reduced GCS
- **Size:** should be similar to distance between corner of mouth and angle of jaw
- **Insertion technique:**
  - Ensure no foreign bodies in the mouth
  - Lubricate the oropharyngeal airway
  - Insert into the mouth upside down (reduces risk of pushing tongue back) – do not continue if patient gags
  - Once tip is around hard-soft palate junction, rotate 180˚ and advance the rest of the way
  - Confirm airway patency

Supraglottic airway (e.g. laryngeal mask airway, LMA; i-Gel)

- Flexible plastic tube with inflatable circular opening on end which sits over top of larynx (some aspiration protection but doesn’t fully secure airway and can only withstand a small amount of positive pressure ventilation)
- Attached to ventilation machine which allows spontaneous ventilation ± low-level positive pressure ventilation supplementation during surgery, or attached to ventilation bag in respiratory arrest
- **Use:** *airway protection* during anaesthetic for surgery (if no risk of aspiration and a muscle relaxant is not required); cardiac arrest; if there is an indication for endotracheal intubation but the provider is not trained or attempts failed
- **Size:** usually size 5 for men, size 4 for women
- **Gather equipment**
  - Supraglottic airway
  - Syringe for cuff inflation
  - Water-soluble lubricating jelly
  - Monitoring: end-tidal CO₂ monitor, pulse oximeter, cardiac monitor, blood pressure
  - Tape
  - Suction
  - Ventilation bag
  - Face mask
  - Oxygen supply
  - Medications in awake patient – hypnotic, analgesia
- **Insertion technique:**
  - Give medications if required
  - Deflate cuff using 20ml syringe (LMA)
  - Lubricate outer cuff
  - Position patient – neck flexed to 15˚, head extended on neck (i.e. chin anteriorly), no lateral deviation
  - From behind the patient, hold the tube like a pen and insert into the mouth, sliding the outer cuff along the palate
  - Push back over tongue until it reaches the posterior pharynx wall
  - Apply pressure to force it backwards and downwards until it reaches the back of the hypopharynx
  - Inflate the cuff (LMA; 40ml for size 5, 30ml for size 4)
  - If required, attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
  - Consider applying CO₂ detector or end-tidal CO₂ monitor to confirm placement
  - Secure with bandage or tape
**Endotracheal tube**

- Flexible plastic tube with cuff on end which sits inside the trachea (fully secures airway = gold standard)
- Attached to ventilation bag/machine
- **Use:** ventilation during anaesthetic for surgery (if muscle relaxant is required, long case, abdominal surgery, or head positing may be required); patient can’t protect their airway (GCS <8, aspiration risk, muscle relaxation); potential airway obstruction (airway burns, epiglottitis, neck haematoma); inadequate ventilation/oxygenation (e.g. COPD, head injury, ARDS)
- **Rapid sequence induction (RSI) intubation** = procedural variation using rapid anaesthetisation with cricoid pressure to prevent aspiration while airway is quickly secured – used for patients at risk of aspiration e.g. non-fasted patients
- **Size:** 8mm diameter for men, 7mm diameter for women

**Gather equipment**

- Laryngoscope (check size – the blade should reach between the lips and larynx – size 3 for most patients), turn on light
- Cuffed endotracheal tube
- Syringe for cuff inflation
- Monitoring: end-tidal CO₂ monitor, pulse oximeter, cardiac monitor, blood pressure
- Tape
- Suction
- Ventilation bag
- Face mask
- Oxygen supply
- Medications in awake patient – hypnotic, analgesia, short-acting muscle relaxant (to aid intubation)

**Laryngoscope technique:**

- Give medications if required
- Pre-oxygenate patient with high concentration oxygen for 3-5mins
- Position patient – neck flexed to 15˚, head extended on neck (i.e. chin anteriorly), no lateral deviation
- Stand behind the head of the patient
- Open mouth and inspect: remove any dentures/debris, suction any secretions
- Holding laryngoscope in left hand, insert it looking down its length
- Passing the tongue
  - Slide down right side of mouth until the tonsils are seen
  - Now move it to the left to push the tongue centrally until the uvula is seen
- Advance over the base of the tongue until the epiglottis is seen

**Insertion technique:**

- Apply traction to the long axis of the laryngoscope handle (this lifts the epiglottis so that the V-shaped glottis can be seen)
- Insert the tube in the groove of the laryngoscope so that the cuff passes the vocal cords
- Remove laryngoscope and inflate the cuff of the tube with~ 15ml air from a 20ml syringe
- Attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
- Consider applying CO₂ detector or end-tidal CO₂ monitor to confirm placement
- Secure the endotracheal tube with tape

**NB. if it takes more than 30 seconds, remove all equipment and ventilate patient with a bag and mask until ready to retry intubation**

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**Tracheostomy**

- Surgical hole made in trachea, through which a tracheostomy tube is passed
- Attached to ventilation bag/machine
- **Use:** a tracheostomy is performed for long-term ventilation in intensive care
- **Note:** a needle or surgical cricothyroidotomy is different and is used in the emergency setting when an acute upper airway obstruction is preventing endotracheal intubation

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**Sedation, paralysis, ventilation**

- If a patient has had a muscle relaxant they need to be ventilated
- Otherwise the need for ventilation/supplementation of breathing depends on the degree of sedation (a low amount of sedation can allow spontaneous ventilation)
- Patients need to be sedated to a certain degree to be intubated and a short-acting muscle relaxant helps endotracheal intubation