

Non-Invasive Ventilation (NIV)

Ventilatory support without using an invasive artificial airway

Types

CPAP = continuous positive airway pressure

- Tight fitting mask which delivers fixed positive air pressure to keep the airways open
- Indications: sleep apnoea; type 1 respiratory failure (e.g. acute pulmonary oedema)

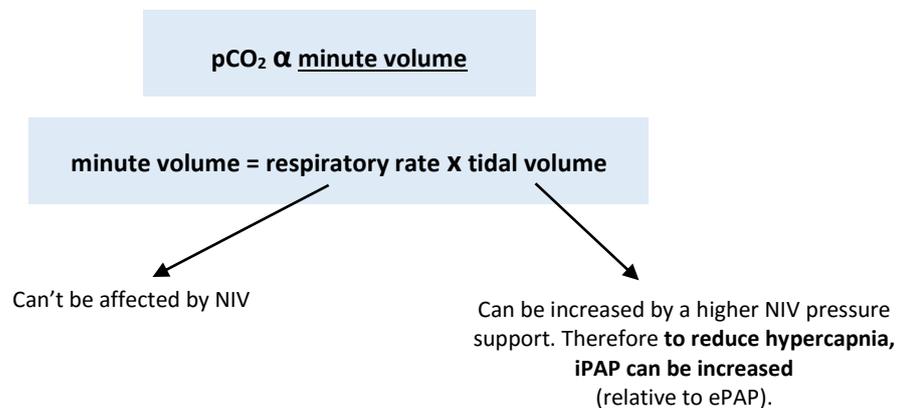
BiPAP = bi-level positive airway pressure

- Similar to CPAP, but the air pressure increases during the patient's inspirations
 - **ePAP** = pressure during expiration
 - **iPAP** = pressure during inspiration
 - **Pressure support** = difference in pressure between ePAP and iPAP (i.e. the amount of 'help' given on inspiration)
- Indication: type 2 respiratory failure (e.g. COPD exacerbation) with acidosis (pH<7.35) or exhaustion despite optimal medical therapy

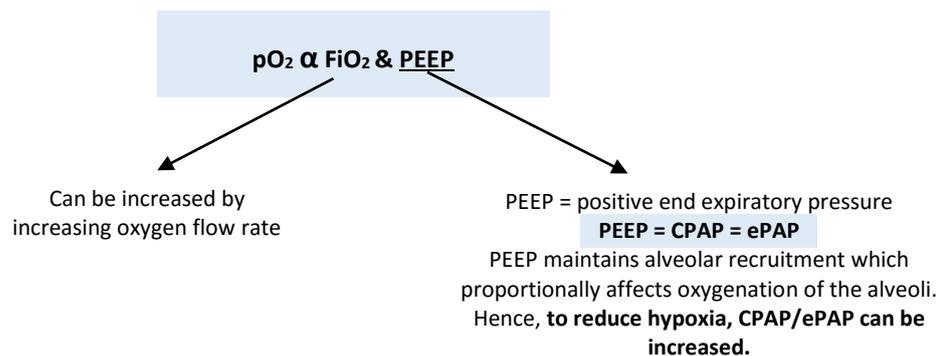
NB. The oxygen concentration in the air can be adjusted because tubing from an oxygen supply can plug directly into the machine

Background physiology

Hypercapnia



Hypoxia



Settings

CPAP

- **Start at 4cmH₂O** and gradually increase to reduce hypoxia
- **Maximum of 12cmH₂O**

BiPAP

- **Start at 12/4cmH₂O** (i.e. iPAP of 12cmH₂O, ePAP of 4cmH₂O) and gradually increase iPAP to 20cmH₂O or maximum tolerated
- **Maximum of 20/12cmH₂O**
 - Increase iPAP to reduce hypercapnia
 - Increase ePAP to reduce hypoxia (but remember iPAP should also be increased proportionately to maintain the same pressure support which is what affects CO₂)

Oxygen

- **Titrate up to maximum of 15L** to aim for sats of 94-98% in non-COPD patients and 88-92% in COPD patients
 - For COPD patients on BiPAP, start at 2L oxygen and titrate up
 - For heart failure patients of CPAP, start using high flow oxygen and titrate down

Complications

- **Too high CPAP or ePAP:** reduced venous return which can cause hypotension
- **Too high iPAP:** mask leak; stomach inflation leading which can cause aspiration (oesophageal opening pressure is 25cmH₂O)
- **Both:** patient discomfort; claustrophobia; pressure sores; dryness; pneumothorax

Contraindications

- Undrained pneumothorax
- Severe epistaxis
- Vomiting
- Apnoea
- Severe agitation
- Unable to tolerate or fit mask
- Low GCS
- NIV should not be used for asthma (just delays inevitable intubation) or pneumonia (unless patient is not for intubation)

Monitoring required

- Oxygen saturation monitoring (aim 88-92% in COPD patients, 94-98% in non-COPD patients)
- Regular arterial blood gasses (~30mins after each change to monitor pCO₂ and subsequent pH)
 - In COPD, aim PaO₂~8mmHg and improving pH
- Blood pressure (check not becoming hypotensive)
- Respiratory rate

Weaning off NIV

- Once the medications have had time to work, NIV can be gradually weaned
- Options:
 - Give patient time off NIV and gradually extend time off (but not overnight as respiratory drive naturally decreases)
 - Gradually reduce pressures