Indications for Respiratory Assistance

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Respiratory Assistance

- Non-invasive
  - Nasal specs
  - Facemask/ Resevoir
  - Continuous Positive Airway Pressure (CPAP)
  - Bilevel Positive Airway Pressure (BiPAP)
- Invasive
  - Laryngeal mask
  - Endotracheal intubation

Emergency Airway Management

- Clearing the upper airway

    - Heimlich Maneuver

- Maintaining an open air passage with a mechanical device
- Sometimes assisting respirations

Clinical Indications For Intervention

- Concerning findings include;
  - respiratory rate > 30/min,
  - inability to maintain arterial O2 saturation > 90% with fractional inspired O2 (Fio2) > 0.60,
  - PaCO2> 50 mm Hg with pH < 7.25.
  - Polycythaemia/pulmonary hypertension.
- Airway Compromise – airway patency is in doubt or patient may be at risk of losing patency. Examples of upper-airway disorders are acute epiglottitis and tumors involving the trachea; lower-airway disorders include COPD, asthma, and cystic fibrosis.

Indications for Intervention

- Respiratory Failure – Type I & II
- Cardiopulmonary arrest
- Trauma (especially head, neck, and chest)
- Cardiovascular impairment (strokes, tumors, infection, emboli, trauma)
- Neurological impairment (drugs, poisons, myasthenia gravis)
- Pulmonary impairment (infections, tumors, pneumothorax, COPD, trauma, pneumonia, poisons, drowning)

Evaluation

- History- Rapid onset with hypoxia rule out PE/pneumothorax. Hx of chronic disease or previous respiratory intervention should be ascertained.
- Examination- checking for; Obstruction of airways, signs of CHF
- ABG's & SaO_2
- Fluid intake over whole hospital stay.
- Pharmacological review.
- Bronchoscopy- FB, mucous plug

COPD

- Long-term O2 therapy prolongs life in patients with COPD whose Pao2 is chronically < 55 mm Hg.
- Continual 24-h use is more effective than a 12-h nocturnal regimen.
- O2 therapy brings Hct toward normal levels;
- Nocturnal O2 may be prescribed if a sleep study shows episodic desaturation to ≤ 88%. Such treatment prevents progression of pulmonary hypertension,

COPD

- O2 is administered by nasal cannula at a flow rate sufficient to achieve a Pao2> 60 mm Hg (Sao2> 90%), usually ≤ 3 L/min at rest.
- O2 is supplied by electrically driven O2 concentrators, liquid O2 systems, or cylinders of compressed gas.
- The aim of (controlled) oxygen therapy is to raise the PaO2 without worsening the acidosis. Therefore give oxygen at no more than 28% (via venturi mask, 4l/min) or no more than 2 L/minute (nasal) in patients with a history of COPD until ABGs have been checked
- Various O2-conserving devices can reduce the amount of O2 used by the patient, either by using a reservoir system or by permitting O2 flow only during inspiration.

Cystic Fibrosis

- In patients with chronic hypoxaemia, LTOT should usually be prescribed after appropriate assessment, when the PaO2 is consistently at or below 7.3 kPa (55 mmHg) when breathing air during a period of clinical stability.
- 1-2%of children with CF in the UK receive supplementary oxygen at night.
- pO2 of <93% overnight
- pO2 of <95% daytime

Cystic Fibrosis

- Signs of overnight hypoxemia.
- Hospital admissions
- Any acute condition, infections etc.
- stress/exercise and sleep patients will before hypoxemic.

Obstructive Sleep Apnea

- CPAP first line, should be used 6-7 hours at least.
- Nasal system seems to work most effectively
- Small portable and not as many side effects as O2
- BPAP used if not successful which changes amount of pressure as required, not the same each time.
- Supplemental O2 improves blood oxygenation, but a beneficial clinical effect cannot be predicted. Also, O2 may provoke respiratory acidosis and morning headache in some patients.

Other conditions

- Asthma- Supplemental O2 is indicated for hypoxemia and should be given by nasal cannula or face mask at a flow rate or concentration sufficient to maintain O2sat> 90%.
- Very severe scoliosis, the angle is over 100deg. And causes such strain on the lungs that supplemental oxygen can be required.
- Palliative Use of home oxygen therapy can be prescribed for palliation of dyspnoea in pulmonary malignancy and other causes of disabling dyspnoea due to terminal disease.

Other Conditions

- Pneumonia or PE can be treated with up to 60% oxygen. Indications for starting treatment are the same.

Air Travel

- Some patients need supplemental O2 during air travel, because flight cabin pressure in commercial airliners is below sea level air pressure (often equivalent to 1830 to 2400 m).
- Eucapnic COPD patients who have a Pao2> 68 mm Hg at sea level generally have an in-flight Pao2> 50 mm Hg and do not require supplemental O2.
- All patients with COPD with a Pao2≤ 68 mm Hg at sea level, hypercapnia, significant anemia (Hct < 30), or a coexisting heart or cerebrovascular disorder should use supplemental O2 during long flights and should notify the airline when making their reservation. .
- Patients are not permitted to transport or use their own liquid O2, but many airlines now permit use of portable battery-operated O2 concentrators, which also provide a suitable O2 source on arrival.

O_2 Therapy

- The amount of O2 given is guided by ABG or pulse oximetry to maintain Pao2 between 60 and 80 mm Hg (ie, 92 to 100% saturation). This level provides satisfactory tissue O2 delivery;
- because the oxyhemoglobin dissociation curve is sigmoidal, increasing Pao2 to > 80 mm Hg increases O2 delivery very little and is not necessary.
- The lowest fractional inspired O2 (Fio2) that provides an acceptable Pao2 should be provided.

O_2 Therapy

- An Fio2 < 40% can be given via nasal cannula or simple face mask. A nasal cannula uses an O2 flow of 1 to 6 L/min. Because 6 L/min is sufficient to fill the nasopharynx, higher flow rates are of no benefit.
- An Fio2 > 40% requires use of an O2 mask with a reservoir that is inflated by O2 from the supply. In the typical nonrebreather mask, the patient inhales 100% O2 from the reservoir, but during exhalation, a rubber flap valve diverts exhaled breath to the environment.

Respiratory Failure

- Hypoxemic respiratory failure (type I) is characterized by an PaO2 lower than 60 mm Hg with a normal or low PaCO2. This is the most common form of respiratory failure, and it can be associated with virtually all acute diseases of the lung, which generally involve fluid filling or collapse of alveolar units
- Hypercapnic respiratory failure (type II) is characterized by a PaCO2 higher than 50 mm Hg. Hypoxemia is common in patients with hypercapnic respiratory failure who are breathing room air. The pH depends on the level of bicarbonate, which, in turn, is dependent on the duration of hypercapnia.

Type 1

- COPD
- Pneumonia
- Pulmonary edema
- Pulmonary fibrosis
- Asthma
- Pneumothorax
- Pulmonary embolism
- Pulmonary arterial hypertension
- Pneumoconiosis
- Granulomatous lung diseases
- Cyanotic congenital heart disease
- Bronchiectasis
- Acute respiratory distress syndrome (ARDS)
- Fat embolism syndrome
- Kyphoscoliosis
- Obesity

Type 2

- COPD
- Severe asthma
- Drug overdose
- Poisonings
- Myasthenia gravis
- Polyneuropathy
- Poliomyelitis
- Primary muscle disorders
- Porphyria
- Cervical cordotomy
- Head and cervical cord injury
- Primary alveolar hypoventilation
- Obesity-hypoventilation syndrome
- Pulmonary edema
- ARDS
- Myxedema
- Tetanus

INVASIVE

ASSISTANCE

Endotracheal Intubation

- Unconscious patients GCS<8
- No/lack of respiratory drive
- Swelling/ mechanical obstruction
- Risk of aspiration
- Relaxation of muscles
- Drug delivery

Contraindications

- Total upper airway obstruction.
- Total loss of facial/oropharyngeal landmarks.
- Inability to open the mouth (eg, scleroderma or surgical wiring).
- Neck immobility (RA)

Tracheostomy

- Obstruction of the upper airway, eg foreign body, trauma, infection, laryngeal tumour, facial fractures.
- Impaired respiratory function, eg head trauma leading to unconsciousness, bulbar poliomyelitis.
- To assist weaning from ventilatory support in patients on intensive care.
- To help clear secretions in the upper airway.

Cricothyroidotomy

- Intubation is not possible via the oral or nasal route.
- Severe maxillofacial trauma.
- Oedema of throat tissues preventing visualisation of the cords (eg angioneurotic oedema, anaphylaxis, burns, smoke inhalation).
- Severe oropharyngeal/tracheobronchial haemorrhage.
- Foreign body in upper airway.
- Lack of equipment for endotracheal intubation/ Technical failure of intubation.
- Severe trismus/clenched teeth.
- Masseter spasm after succinylcholine.

Associated Risk

- Barotrauma —This includes pneumothorax, subcutaneous emphysema, pneumomediastinum, and pneumoperitoneum.
- Ventilator-associated lung injury — (VALI) refers to acute lung injury that occurs during mechanical ventilation.
- Diaphragm — Controlled mechanical ventilation may lead to a rapid type of disuse atrophy involving the diaphragmatic muscle fibers. This cause of atrophy in the diaphragm is also a cause of atrophy in all respiratory related muscles during controlled mechanical ventilation.
- Motility of mucocilia in the airways — Positive pressure ventilation appears to impair mucociliary motility in the airways. Bronchial mucus transport was frequently impaired and associated with retention of secretions and pneumonia.