Oxygen Therapy

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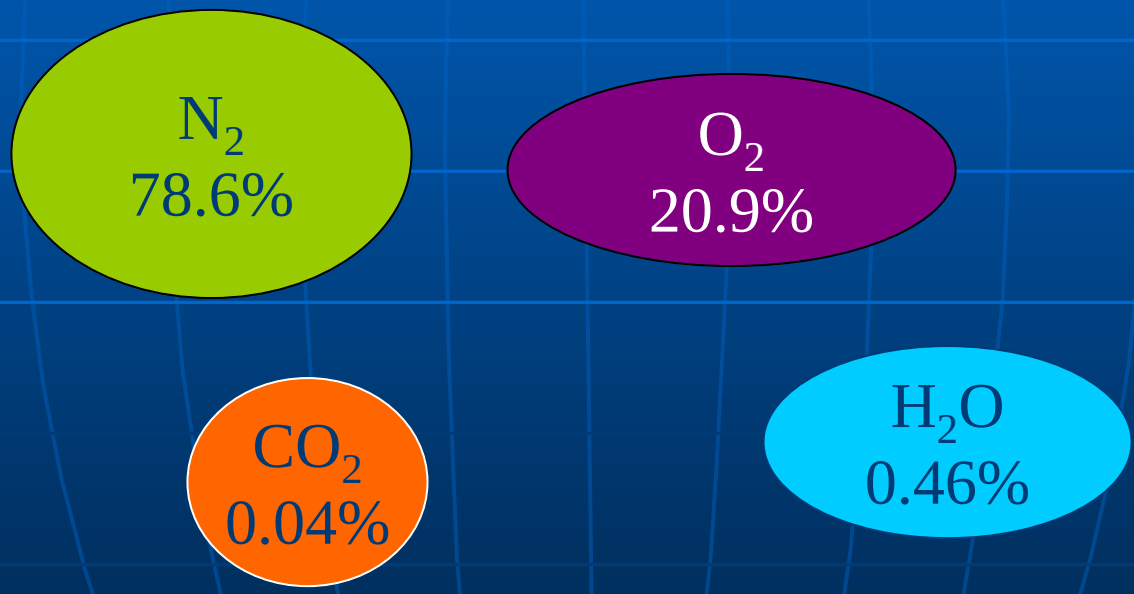
Modified by Louise Fowler

Objectives

- To be able to identify appropriate oxygen therapy to your patients
- Be able to identify a CO2 retainer from a blood gas

Atmospheric gas



Definitions

- Hypoxaemia – Diminished amount of O_2 in arterial blood
- Hypoxia – Insufficient O_2 at tissue level
- Anoxia – No O_2 at tissue level
- Hypercarbia – High CO_2 in blood

Hypoxaemia is caused by

- Hypoventilation (eg post surgery, obesity, sleep apnoea)
- Reduced capillary transit time (increased blood flow eg sepsis)
- V/Q mismatching – ventilation should = perfusion

Signs of hypoxaemia

- Agitation
- Restlessness
- Confusion
- Tachypnoea
- Tachycardia
- Cyanosis
- ABG may be required

Blood gas's

Normal ABG range

pH acidosis < 7.35 – 7.45 > Alkalosis

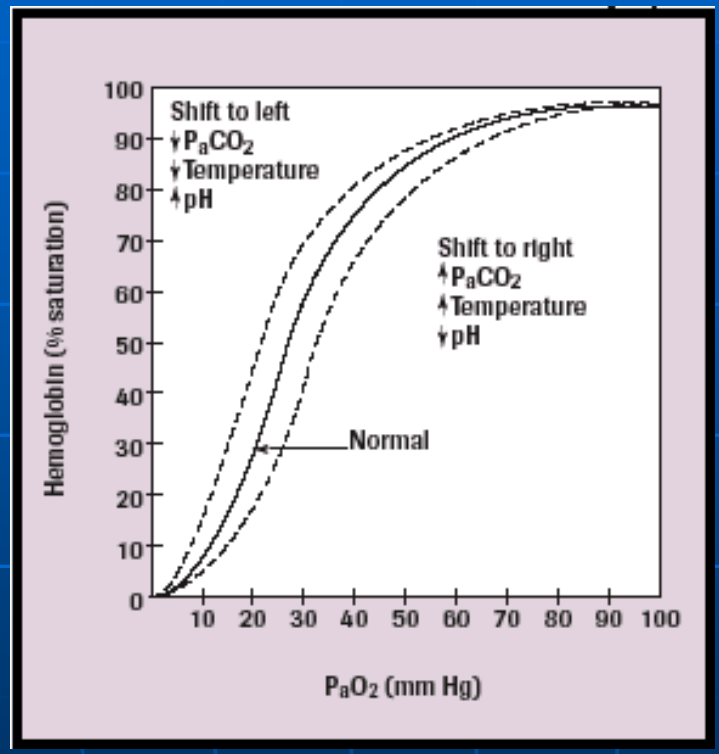
PaCO2: alkalosis<4.5 – 6.0 > acidosis

HCO3: acidosis < 21 – 27 > alkalosis

PaO2: = 11-13kPa

SaO2: 95 – 100%

Oxyhaemaglobin dissociation curve



Oxygen

- Relieves hypoxaemia
- Allows full O_2 carrying capacity
- Increases coronary PaO_2 thereby reducing myocardial O_2 consumption
- Increases FiO_2 therefore PAO_2

Side effects of Oxygen

- Retrolental fibroplasia
- Oxygen induced carbon dioxide narcosis
- Atelectasis
- Oxygen toxicity

Signs & Symptoms of Oxygen Toxicity

- Substernal pain
- cough
- sore throat
- dyspnoea
- painful inspiration
- nasal congestion

Stages of oxygen toxicity

- Exudative stage
  - alveolar oedema
  - intra-alveolar haemorrhage
  - fibrin exudate
- Proliferative stage
  - pulmonary fibrosis

% of oxygen depends on

- Type of oxygen giving equipment
- Size of the reservoir
- Rate of flow

Type of oxygen giving systems

- Fixed % needs closed system
- Open systems entrains air diluting O_2

Size of the reservoir

- Oxygen reservoir collected between breaths
- Collected in mask, naso and oropharynx
- Determined by
  - fit of mask
  - size of naso or oropharynx
  - length of expiratory pause

Rate of Flow

- Flow determines
  - how fast reservoir fills
  - whether fixed amount of O_2 will be delivered to patient
- Fixed % requires O_2 flow to be greater than patients inspiratory flow

Types of Oxygen Giving O_2 Equipment

- High flow
- Deliver gas that meets pt's inspiratory flow rate
- Pt doesn't entrain room air
- Able to deliver fixed amount of O_2

- Low flow
- Don't provide all gas to meet pt's inspiratory flow rate
- Inspired O_2 mixed with room air

Nasal Prongs

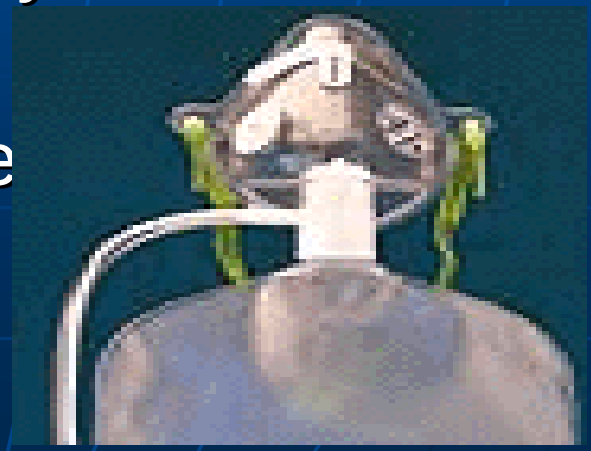
- Low flow
- Flow rate 1- 6 LPM
- Deliver 24 – 40%
- Amount pt receives determined by
  - Flow rate
  - Mouth breathing
  - Size of nasopharyngeal airway
  - Length of expiratory pause

Simple Face Masks

- 6 -10 LPM can deliver 40-60%
- O_2% pt receives dependent on
  - Flow rate
  - Size and fit of mask
  - Size of mouth and oropharynx
  - Length of expiratory pause

Non-rebreather Masks

- Provide higher concentrations of O_2
- Flow rates 8 -10 LPM
- Delivers 60 - 100%
- O_2% patient receives determined by
  - Flow rate
  - Size of mouth and oropharynx
  - Fit of mask
  - Length of expiratory pause



Venturi Masks

- Fixed percentage

- Varies 24 - 60%
- O_2% pt receives determined by
  - Flow rate
  - Orifice size
  - Fit of mask
  - Size of mouth and oropharynx
  - Length of expiratory pause

High Flow Oxygen Giving Systems

- Can deliver up to 100 LPM
- Percentage between what system delivers and what patient receives is minimal

Normal humidification

- Warmed, filtered and humidified by upper airway
- Air
  - 22 & 10mg/l water
- Pharynx
  - 31 & 31mg/l
- Bronchi
  - 37 & 44mg/l

Exhalation

- Nose reabsorbs 25% water
- 75% replaced by systemic reserves
- 0.58 kcals used for every gm of water vaporized
- If not heated body will do so.

Humidification

- Prevents respiratory complications for flows > 4 LPM
- Drying of mucosa
- Loss of ciliary action
- Retained secretions

Humidification

- Dry gas cannot saturate more than 30%
- Warming increases gases capacity to hold water

Nebulizers

- Reduces viscosity
- Improves ciliary action
- Large particles reach URT
- Small particles reach LRT
- Need flow rate of 6 LPM
- More effective with mouth piece

Acknowledgments

- Alison Pirret, Acute Care Nursing, power point presentations
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- Dougherty L., and Lister S., (Eds.), 2004, The Royal Marsden Hospital Manual of Clinical nursing Procedures, 6th ed., Blackwell Publishing Ltd,
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- Steph Parker, Oxygen therapy, power point presentation