

# Oxygen Therapy in an Acute Exacerbation of COPD



**KIRSTEN LASSEY  
CNM RESPIRATORY  
HVDHB**

# Acute Exacerbations of COPD and CO<sub>2</sub> Retention



- There are several mechanisms thought to be responsible for increased O<sub>2</sub> leading to hypercapnia in susceptible individuals:
  - Decreased hypoxic drive
  - Decreased minute ventilation
  - Increased ventilation perfusion mismatch

# Hypercapnia



- **Hypercapnia leads to:**
  - Worsened acidosis
  - Increased systemic vascular resistance
  - Increased blood pressure
  - Decreased cardiac output
  - Reduced coronary, cerebral and renal blood flow

# Hyperoxaemia



- **Hyperoxaemia can lead to:**
  - Hypercapnia
  - Absorption atelectasis
  - Pulmonary toxicity
  - Increased systemic vascular resistance and blood pressure
  - Reduced coronary artery blood flow
  - Reduced cardiac output
  - Reduced cerebral blood flow
  - Increased reperfusion injury

# TSANZ Acute Oxygen Guidelines 2015



*“Swimming Between the Flags”*

# Concepts



- Oxygen should be considered a drug, and should be prescribed
- Oxygen is for hypoxaemia, not breathlessness
- Hypoxaemia is both a marker of risk of poor outcome due to underlying cause, and an independent risk factor of poor outcome
- Major limitation is variable accuracy of pulse oximetry
- The use of unnecessarily high flow O<sub>2</sub> to maintain 'normal' SpO<sub>2</sub> has the potential to delay recognition and treatment for deteriorations

# Recommendations



- Pulse oximetry should be available in all clinical situations where O<sub>2</sub> is used
- Pulse oximetry (including delivery system and flow rate of oxygen) should be documented with other 'vital signs'

# Recommendations



- **ABGs should be considered for:**
  - Critically ill patients with cardiorespiratory or metabolic dysfunction
  - Patients with SpO<sub>2</sub> <92%
  - Deteriorating SpO<sub>2</sub>
  - Patients at risk of hypercapnia
  - Breathless patients where a reliable pulse oximetry can't be obtained

# Recommendations



- In conditions associated with chronic respiratory failure aim for SpO<sub>2</sub> 88-92%
  - No need for O<sub>2</sub> if sats  $\geq 88\%$
- In other acute medical conditions, aim for SpO<sub>2</sub> 92-96%
  - No need for O<sub>2</sub> if sats  $\geq 92\%$

# Recommendations



- In conditions associated with chronic respiratory failure, the preferred method of administration of bronchodilator is an air-driven nebulizer, or MDI + spacer
- For most patients, nasal cannulae are the preferred method of O<sub>2</sub> delivery

# A Retrospective Audit



- Wijesinghe et al (2011) carried out a retrospective audit on 250 patients in ED with exacerbation of COPD, who were brought in by ambulance
- Looking at combined risk of death/assisted ventilation/respiratory failure with O<sub>2</sub> administration
- Oxygen flow rate was recorded in 73% of cases
- Documentation of room air SpO<sub>2</sub> was only recorded in 36.9% of cases

# A Retrospective Audit



- 92% received oxygen  $\geq 3\text{L}/\text{min}$
- 49% received oxygen  $\geq 8\text{L}/\text{min}$ 
  - Or
- 72% received high flow oxygen
- 21% received low flow oxygen
  
- On arrival to ED
  - 75% patients had  $\text{SpO}_2 > 92\%$
  - 29% patients had  $\text{SpO}_2 \geq 98\%$
  - Median  $\text{PaCO}_2$  on ABG was 54mmHg
  - Median pH on ABG was 7.36

# A Retrospective Audit



- Ten patients (4%) died
- In total 31% patients met the outcome criteria
- It was found the risk of adverse outcome rose progressively as the flow rate of oxygen increases
  - This risk was also seen to increase with increasing PaO<sub>2</sub>
- The results were adjusted for severity of illness, and the association was not due to more unwell patients receiving higher concentrations of oxygen therapy