

Oxygen Therapy in an Acute Exacerbation of COPD



**KIRSTEN LASSEY
CNM RESPIRATORY
HVDHB**

Acute Exacerbations of COPD and CO₂ Retention



- There are several mechanisms thought to be responsible for increased O₂ 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 O₂ to maintain 'normal' SpO₂ has the potential to delay recognition and treatment for deteriorations

Recommendations



- Pulse oximetry should be available in all clinical situations where O₂ 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 SpO₂ <92%
 - Deteriorating SpO₂
 - 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 SpO₂ 88-92%
 - No need for O₂ if sats $\geq 88\%$
- In other acute medical conditions, aim for SpO₂ 92-96%
 - No need for O₂ 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 O₂ 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 O₂ administration
- Oxygen flow rate was recorded in 73% of cases
- Documentation of room air SpO₂ 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 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 PaO₂
- The results were adjusted for severity of illness, and the association was not due to more unwell patients receiving higher concentrations of oxygen therapy