Oxygen friend or foe?

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Respiratory CNS
What’s the problem with oxygen?

• Frequently administered to acutely unwell patients without clear and credible body of evidence
• Considered harmless by many health professionals
• Although essential treatment for hypoxaemia, concerns raised about effects
Who uses oxygen?³

• 34% of patients in ambulance
• 25% of patients in emergency department
• 15% of patients admitted to hospital
• Up to 84% of patients exposed to oxygen
O₂ the fix, aim 92-96
If high CO₂, aim 88-92

#O2TheFix
History

- Thomas Beddoes worked with inventor James Watt to generate oxygen and other gases
- First described in 1885 for treatment in acute care
- Haldane’s expedition to Pikes Peak in 1911
• Rubber tubing and nasal catheter developed by Arbuthnot Lane and Haldane developed masks

• Oxygen tent was developed in 1920’s by Leonard Hill

• Barach perfected other oxygen delivery systems
Benefits of oxygen in chronic lung disease

• Barach first suggested LTOT in 1936
• Slow to be applied prior to 1966
• Several small studies carried out in patients with COPD, pulmonary hypertension and secondary polycythemia
NOTT (nocturnal oxygen therapy trial) study

(Cited in 6)
Media attention


- NZ Herald: [https://www.nzherald.co.nz/index.cfm?objectid=12064815&ref=twitter](https://www.nzherald.co.nz/index.cfm?objectid=12064815&ref=twitter)


Evidence

• Oxygen titrated to a specific target saturation saves lives\textsuperscript{1}
• TSANZ Guideline “Swimming between the flags”\textsuperscript{2}
• BTS Guidelines for Ventilatory Management of Acute Hypercapnic Respiratory Failure 2016\textsuperscript{5}
Lancet 2018

• Mortality and Morbidity in acutely ill adults treated with liberal versus conservative oxygen therapy.
• Systematic review and meta-analysis of more than 16000 acutely ill patients, in 25 RCT’s
• High quality evidence that liberal supplemental oxygen is harmful
• Supplemental oxygen beyond a range of 94-96% increased mortality in hospital
Oxygen effects

• Cardiac effects – vasoconstriction
• Systemic circulation
• COPD
• Stroke
• CPR
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Who to give oxygen to?

PATIENT WITH SUSPECTED HYPOXIA IN WHOM THE INITIATION OF OXYGEN THERAPY MAY BE INDICATED: OBTAIN OXIMETRY†

IS THE PATIENT AT RISK OF HYPERCAPNIC RESPIRATORY FAILURE?*

YES

NO

Thoracic Society of Australia and New Zealand (2015)
CO2 Retention – Who is at risk?

- Chronic hypoxic lung disease
  - COPD
  - Severe Chronic Asthma
  - Bronchiectasis / CF

- Chest wall disease
  - Kyphoscoliosis
  - Thoracoplasty

- Neuromuscular diseases
  - Motor neurone disease
  - Muscular dystrophy

- Obesity hypoventilation
Ensure you or your family show this card to the Ambulance and Emergency Department Staff.

Oxygen Alert Card

Name: 

NHI: 

I am at risk of type II respiratory failure with raise CO₂ levels. Please use my venturi mask to achieve an oxygen saturation of ___% to ___% 

During exacerbations

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#O2TheFix
Home oxygen

• Given to prevent end organ damage, not to correct breathlessness
• Consider in patients with resting saturations <92%
• Referral can be made to the oxygen service by a GP
• Consider adverse effects of oxygen therapy also (restricts activity, socially isolates, makes the disease visible)
Smoking rules

- Smoke free for 6 weeks
- NRT
- CO testing
- Cotinine urine test
- Oxygen is a fire accelerator
- Patients in oxygen enriched atmosphere
Oxygen devices at home
Equipment provision

• LTOT – issued based on ABG (<7.3 kpa )
  - must use 16 hours a day
  - concentrator and in certain situations a back up cylinder

• STOT - issued on discharge from hospital based on ABG
  - concentrator only
  - reassessed in 6-8 weeks
Portable Oxygen

• Patients who de-saturate on exercise documented on 6 minute walk test on air and oxygen – must increase walking distance
• Go out regularly (more than occasional visits to relatives)
• Must complete pulmonary rehabilitation programme
• It’s expensive
• It’s heavy – some people are unable to carry the cylinders
Palliative oxygen

- Treat the cause of breathlessness first
- Oxygen has been shown to relieve dyspnoea in hypoxic cancer patients
- Pharmacological and non-pharmacological options should be optimised
- Based on resting oxygen saturations of <90% and less than 3 months life expectancy
Summary

Whatever the cause

- **Friend**: Oxygen is essential to treat hypoxemia
- **Foe**: Potentially harmful when not titrated to a specific target saturations range
References


