Oxygen use in a medical emergency

The BTS produced guidance on the use of oxygen in emergency situations in 2008. However, it doesn’t seem to have percolated down to primary care. Because it challenges many assumptions we have summarised it here. Take note if you carry an oxygen cylinder in your emergency bag!

- In many situations O2 should only be given if the patient is hypoxic. (This guidance assumes you have a pulse oximeter to assess hypoxia!)
- Normal oxygen sats should be in the range 94–98%, although in elderly people, even when well, they may be lower than this.

<table>
<thead>
<tr>
<th>Life threatening situations</th>
<th>Most other conditions</th>
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| **In primary care the main scenarios are:**  
Resuscitation/arrest  
Shock  
Sepsis  
**Also applies to:**  
Major trauma  
Near drowning  
Pulmonary haemorrhage  
Major head injury  
Carbon monoxide poisoning  | I’ve listed the commonest seen in primary care:  
Acute asthma  
Pneumonia  
Lung cancer  
Acute heart failure  
MI and ACS  
Stroke (O2 may be harmful if not hypoxic)  
Sickle cell crisis  
Pregnancy/obstetric crises  
Most poisonings (but in carbon monoxide poisoning give high flow O2)  |
| Give high flow oxygen to all  
15l/min via face mask with reservoir  
Aim for target O2 sats of 94–98% | Give O2 only if hypoxic. Moderate flow only  
5–10l/min via simple face mask  
Aim for target sats of 94–98% |

**How to remember this?**

I think this can be simplified to:

- **Everyone else:** moderate flows of oxygen ONLY if hypoxic.

**Why might too much oxygen be a bad thing?**

Too much oxygen is associated with a number of problems:

- Coronary vasoconstriction.
- Reduced cardiac output.
- Release of chemically reactive oxygen molecules that can actually damage tissues.
- Small areas of lung collapse (absorption atelectasis).

None of these things are desirable in an acutely unwell patient!

**Oxygen in COPD**

We have always been cautious about oxygen use in COPD because of concerns that hyperoxia may depress ventilatory drive and/or worsen ventilation perfusion mis-match. This was thought to be mainly with longer term use and high-dose oxygen in acute severe disease was, at one stage, encouraged.
However, evidence is emerging that even in emergency pre-hospital settings (e.g. primary care whilst waiting for an ambulance), high-flow oxygen may be harmful.

The study was done in Australia, using people with presumed acute exacerbations of COPD being transported to hospital by paramedics. Here I’ll discuss the results of the 200 people with confirmed COPD, not those who later turned out not to have COPD. Patients were randomised either to titrated oxygen (to achieve oxygen sats of 88–92%) or high-flow oxygen (the control arm). Arterial blood gases were taken on arrival at hospital (BMJ 2010;341:c5462).

- Mortality was significantly lower in the group who received titrated oxygen.
- Mortality rates were 9% (11 people) in those on high-flow oxygen (control group) and 2% (2 deaths) in the titrated group. That’s a 7% reduction in mortality and is statistically significant.
- Those titrated according to oxygen sats were also significantly less likely to have respiratory acidosis and hypercapnia.
- The BTS recommend aiming for sats of 88–92% unless seriously ill, using oxygen at 28% (4 l/min) via a Venturi mask (the ones with coloured ends controlling flow). If sats persist below 88% on this, change to a simple mask at 5 l/min.
- In reality, I suspect most GPs don’t carry Venturi masks, so use 4 l/min to start and titrate flow to achieve sats of 88–92%.

So what does this mean in practice?

- You need a pulse oximeter (we tie ours to the oxygen cylinder – but make sure you don’t send it back to BOC when the cylinder is empty as they are costly to replace!).
- Make sure you have both simple masks and reservoir masks.
- Stop and think before giving high flow oxygen to all.
- But continue to use high flow oxygen in life threatening situations.
- Use oxygen judiciously in COPD: even in acute severe exacerbations high flow oxygen may be harmful.

### Oxygen in emergencies

- Guidance from the British Thoracic Society changes the way we think about O2.
- Use high flow oxygen in life threatening emergencies.
- Use low flow and titrate according to sats in those with respiratory conditions including COPD.
- In most other situations, including cardiovascular emergencies, give oxygen only if the patient is hypoxic.

**Do you have a pulse oximeter? Do all the clinical staff know how to use it and what target sats you are aiming for in an emergency?**

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