NHS
National Patient Safety Agency

MAKING OXYGEN USE SAFER IN HOSPITALS

A rapid response report by the National Patient Safety Agency outlines how the risks of oxygen use can be minimised to prevent serious harm to patients

Why do we need to change practice?
Nurses administer supplemental oxygen to patients daily. However, as with any other medicine, oxygen has potential risks if is not administered safely and appropriately. Underuse of oxygen is dangerous as it exposes critically ill patients to the risk of hypoxic organ damage. However, overuse of oxygen can also be harmful, especially for vulnerable patients such as premature infants and those with chronic obstructive pulmonary disease.

The National Patient Safety Agency (NPSA) received 281 serious incidents relating to the use of oxygen in hospitals between December 2004 and June 2009. It was found that poor oxygen management has caused nine patient deaths and contributed to a further 35 patient deaths.

The data prompted the release of a Rapid Response Report (RRR) by the NPSA, which aims to change practice at both a system and an individual level.

Serious reported incidents included:

- *Patients on oxygen were not monitored*
An unwell patient required 80% high flow oxygen and regular monitoring. However, despite his Modified Early Warning Score (MEWS) being 5, no observations were performed overnight. The patient required intubation and admission to the intensive care unit.
- *Abnormal saturation levels were not acted upon*
A patient had a saturation oxygen level documented at 77%. There was no documented evidence of treatment or escalation to senior nursing or medical staff and no evidence of oxygen administration. There were no subsequent observations until the patient had a fatal cardiac arrest four hours later.
- *Patients connected to medical compressed air instead of oxygen*
A patient went into respiratory arrest and a crash call went out. The patient was intubated, recovered but subsequently rearrested. The second attempt to resuscitate failed and the patient died. When staff were clearing up they noticed that the tubing from the ambu-bag had been connected to air rather than oxygen.
- *Oxygen cylinders were found to be empty*
A Patient was being transferred from ward X to ward Y; she had 100% high flow oxygen in situ, which was connected to an oxygen cylinder. On arrival at ward Y the porter stated that the oxygen had run out. Action was taken immediately to connect the patient to the mains oxygen but her respiratory condition deteriorated and she had respiratory arrest followed by cardiac arrest. Resuscitation began immediately but this was unsuccessful and the patient died.

Dagmar Luettel, clinical reviewer, NPSA

FIVE THINGS TO MAKE OXYGEN USE SAFER IN YOUR HOSPITAL

1 Check that the oxygen you are giving is prescribed
Oxygen is a medicine and should always be prescribed. In an emergency, oxygen can be given immediately and documented later.

2 Measure and record saturation levels
Oxygen is a treatment for hypoxaemia, not breathlessness. Establish whether the patient is hypoxaemic and, if so, to what extent. Pulse oximetry is an essential tool in assessing the oxygen saturation of the blood and results should be recorded.

3 Adjust the flow rate, if required, to achieve target saturation
Maintain the target saturation range. The recommended initial target saturation range, unless stated otherwise, is 94-98%. If patients have chronic obstructive pulmonary disease (COPD) or other risk factors for hypercapnic respiratory failure, aim at a saturation of 88-92%.

4 Don't confuse oxygen and medical compressed air
Be aware of colour coding of flow meters and make sure they are not obstructed by curtains or other equipment.


Colour coding: white for oxygen, black for air

Alamy

5 Check the content of cylinders and calculate how long they will last
This is especially important for cylinders on resuscitation trolleys and when transferring a patient.

WHAT SHOULD MY TRUST BE DOING?

The NPSA rapid response report identified key actions for organisations and frontline staff to make practice safer.

Find out how your hospital is putting these actions into practice:

- minimise use of oxygen cylinders on wards (it is more expensive and less safe than piped oxygen for clinical areas with regular use);
- ensure reliable and adequate supplies of oxygen cylinders in transfer and emergency situations;
- assess the risks of confusing oxygen and medical compressed air (for instance, covering air outlets when not in use);
- ensure that oxygen is prescribed and pulse oximetry is available in all locations where oxygen is used;
- ensure a multidisciplinary group is responsible for the safe use of oxygen in your hospital; this includes reviewing oxygen related incidents, developing a local oxygen policy and a training programme.

HOW TO USE THE RAPID RESPONSE REPORT TO CHANGE PRACTICE

Norma Linaker, respiratory nurse specialist at Salford Royal Foundation Trust, explains how the rapid response report (RRR) on oxygen safety has helped to improve patient safety.

"Oxygen therapy is commonly used within healthcare settings, and is often administered routinely. However, while oxygen can be lifesaving it can also be harmful if given inappropriately.

"The target saturation prescribing system has helped change this mindset, so that the use of oxygen is outcome led rather than habitual. It gives nurses more autonomy to manage oxygen safely by emphasising monitoring and observation, ensuring patients are kept within a safe target range for that individual. Nurses now have an objective tool which they can refer to so they know when to act or contact a doctor.

"We had an adverse incident a few years ago, so the trust had already developed a target saturation oxygen prescribing system before publication of the RRR in 2009.

"The medical high dependency unit had utilised target oxygen saturations for some time, but we felt this could be widened across the trust. Initially we used a sticker system, then had our drug charts reprinted – now most wards use electronic prescribing.

"The RRR was circulated throughout the trust in September 2009 and has raised the profile of the prescription and administration of oxygen therapy. It has made staff aware that it is not just a trust issue but a nationwide issue.

"The report has helped to highlight areas where we can still improve, such as creating physical barriers to prevent incorrect attachment to air instead of oxygen. We have advised removal of all air gauges that are not in use,

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as the report makes the point colour coding of oxygen and air gauges is not always enough to prevent adverse incidents. We are now also looking at introducing shields that cover the air gauge to further reduce this risk.

"The trust policy for the prescription and administration of oxygen therapy now advises that all patients requiring transfer between areas should be accompanied by a trained nurse wherever possible. If this does not occur, clear instructions must be provided for the personnel involved in the patient transfer, which must include delivery device and flow rate. The policy also provides guidance for oxygen use in emergency situations in line with the British Thoracic Society guidelines.

"We have already developed competencies in oxygen therapy, which both the practice educators and ourselves can use in staff training. The RRR has helped push these forward and take it to the next level.

"The report also highlighted that although we provide training on the 'clinical' aspects of oxygen therapy, we don't always encompass the 'technical' aspects. We are now looking at this with the trust's Medical Gases Committee who have led work around cylinder handling.

"The RRR gives renewed focus to a very basic and important aspect of training of all health professionals – in the past it wasn't given that significance."

EVERY REPORTED INCIDENT COUNTS
Each serious incident you report is reviewed at the NPSA. We see if there is potential for national action (an RRR) by looking for further evidence of harm in our database of more than four million incidents reported by nurses, doctors and others. Each RRR starts with a single incident – in this case, a patient attached to air instead of oxygen. Please carry on reporting to ensure safer care.
http://tinyurl.com/npsaguidance

Find the Rapid Response Report and additional information (including a briefing sheet for nurses and FAQs) on the NPSA website at www.nrls.npsa.nhs.uk/oxygen

DID YOU KNOW?

- **The colour coding in the UK is white for oxygen and black for air.**
- **You can easily calculate how long a full cylinder will last. The formula for calculating is: volume of cylinder in litres/flow rate = minutes it lasts. For example: how long would a D size cylinder (340 litres) last when on nasal "specs" at 4 litres a minute? 340 litres/4 = 85 minutes (1.4 hours)**
- **All hospitals were asked to complete key actions by March 2010. Has yours?**
- **A network of "oxygen champions" has been established in hospitals across the UK. The oxygen champions facilitate staff training and disseminate the educational materials and new standardised documentation for the prescription and monitoring of oxygen use. To find out more information about your local champion please contact emergencyoxygen@brit-thoracic.org.uk**