

Safe and Correct Use of Oxygen in Paediatrics, a Quality Improvement Opportunity

Mohammed Rohouma*

Higher Specialty Doctor, University Hospitals of Leicester, UK

***Corresponding Author:** Mohammed Rohouma, Higher Specialty Doctor, University Hospitals of Leicester, UK.

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You can't smoke near an oxygen cylinder, that's the first logical safety advice jumps to my mind when writing about oxygen safety. But this is not what I mean here.

As a paediatrician, I feel oxygen is the second most used drug after paracetamol. I use it in ED, Paediatric ward, neonatal unit and paediatric ITU, so that I have to make myself familiar with the indications, devices and monitoring of such a drug. Thanks to the 'British Thoracic Society Guideline for oxygen use in adults in healthcare and emergency settings' [1] which is adopted in many Paediatric institutes.

Most paediatricians are aware of the risk of bronchopulmonary dysplasia and retinopathy of prematurity in neonates who are exposed to high prolonged levels of oxygen. This is why the National Institute for Health and Care Excellence NICE has defined the target saturation levels to 91 - 95% in preterm babies [2]. Similarly, in PICU, lower levels of Oxygenation may be acceptable in certain patients to avoid excessive use of ventilator pressures. Some ongoing studies like Oxy-PICU is comparing the outcome of targeting low saturations 88 - 92% with higher levels i.e. > 94% [3].

Moving from the PICU to a paediatric department in a district hospital, I faced different challenges. In the Paediatric ward, many patients receive oxygen during treatment of chest conditions like infections or asthma attacks. When they improve, the oxygen should be weaned based on the target saturation set for each patient. The practice was variable in this hospital which was facing shortage of staff and rapid turnover of doctors. Some patients had their oxygen therapy weaned down to 1 or 2 litres per minute on simple facemask, however it is known that any flow less than 4 LPM in simple facemask may lead to CO₂ retention. No wonder, those patients got sleepy with longer length of stay and consequently higher cost. Some devices like Venturi masks were never used, despite availability. Another potential risk of not setting an acceptable saturation, is the inappropriate escalation of treatments in patients with normally low saturation like cyanotic congenital heart diseases and chronic lung disease.

It was clear that the national guidance of prescribing oxygen, using the appropriate device and monitoring the saturation levels were not fully met. We performed an audit to address this and quantify the defect. This revealed that only 5% of the patients had had the oxygen therapy prescribed with target saturation set beforehand. Similarly, 50% of the patients had incorrect flow used for specific oxygen delivery devices.

Digging deeper to find the reasons behind that, we found that staff training was incomplete partly due to the rapid turnover. The local guidelines were clear, but not pointed to during the shadowing or training period. Surprisingly, the trust prepared a video to raise awareness of oxygen therapy prescription among the newly employed staff. However, this was not highlighted enough to achieve the desired effect.

Finally, here we go, we need to teach people or remind them of the appropriate usage of this drug, oxygen. Presentations, bedside teaching, emails and posters in doctors and nurses' facilities were the measures we used in our quality improvement project. Less than a year later, we were awarded the best project in the paediatric service within the trust after the re-audit showed significant changes in the practice. Sixty-five percent of the patients had the oxygen prescribed with target saturation, and in 85% of occasions the right flow and device were used, compared to 5% and 50% in the first audit.

Personally, I feel such measures can improve the care we provide to our patients and help them avoid any iatrogenic risk. However, these improvements can be temporary if it depends on the personnel rather than the system. The question will always be: can these improvements vanish after this patch of staff leave the hospital?

I think the lesson I learnt from this quick project is to make changes to both the system and staff rather than put all efforts to build people alone. Measures like a mandatory question on admission to prescribe oxygen, set the target saturation and limiting the options of the flow and devices to the correct ones, can be more effective. At the end, the safety of the patients we treat is the paramount goal through our practice. We can't ensure that unless we perform such quality improvement projects.

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