An audit of oxygen prescribing practices in a tertiary care hospital.

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Abstract

Introduction: Oxygen is the first drug that is administered to a sick child. However prescribing oxygen is not done like other drugs like antibiotics, anticonvulsants, etc. A background knowledge about the various oxygen delivery devices is required to give a proper prescription of oxygen.

Aims and objectives: To analyse the prescription of oxygen to inpatients by doctors in a tertiary care hospital and studied the prescribing practices.

Materials and methods: The audit was undertaken between October 2009-March 2010. Patients between 1 month to 18 years of age was randomly selected for chart review from the records section.

Results: A total of 300 in patients with principle diagnostic categories of respiratory, cardiovascular and neurological illness were included in the audit. Respiratory distress was the commonest indication for initiating oxygen therapy, 63.7% followed by seizures, 15.2%, shock in 13.7%, severe anemia in 2%, low GCS in 4.8%, sepsis and cyanosis in 0.3% each. Formal prescription of oxygen was found only in 43.5% whereas in 56.5% of children oxygen was administered without any prescription. The mean duration of oxygen administration was 24 h. The shortest duration of administration was 1 h and the longest was 16 days.

Conclusion: Oxygen prescription and/or delivery are associated with significantly greater error than that seen with antibiotics. Education of medical personnel should stress more prudent prescription and use of oxygen in hospitalized patients. Supplemental oxygen is actually detrimental to many of the patients who receive it. Supplemental oxygen is much overused and its use should be limited to the few conditions and situations in which it is truly effective, useful and non-detrimental.

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illness were included in the audit. For each patient, the clinical diagnosis, oxygen prescription (if present), and implementation were analysed in conjunction with the oxygen flow rate and oxygen saturations (as documented in the observation chart).

Results

Analysis of the observed data revealed the following:

Respiratory distress was the commonest indication for initiating oxygen therapy, 63.7% followed by seizures, 15.2%, shock in 13.7%, severe anemia in 2%, low GCS in 4.8%, sepsis and cyanosis in 0.3% each (Figure 1).

A combination of shock and respiratory distress were the indication in 2.8% of children. The mean age was 12 months. The mean oxygen saturation prior to starting oxygen was 85%, however in about 12.5% of children oxygen saturation was not checked prior to starting oxygen therapy.

Formal prescription of oxygen was found only in 43.5% whereas in 56.5% of children oxygen was administered without any prescription. Target oxygen saturation to be achieved was mentioned only in 21% of patients as against 79% of patients where there was no mention about the target range.

The mode of oxygen administration was mentioned only in 35% of children as against 65% where there was no mention about the device. Face mask was used in 14.13% followed by non-re-breathing Mask (NRM) in 5.86%, venturi in 2.06% and hood and nasal prongs in 1.03% each (Figure 2).

The mean duration of oxygen administration was 24 h. The shortest duration of administration was 1 h and the longest was 16 days.

Arterial Blood Gas (ABG) analysis was not done routinely in children who were admitted to the wards and SpO2 reading as shown by the pulse oximeter was used as a guideline for initiating or stopping oxygen.

Among the children with respiratory distress, bronchiolitis was the commonest indication followed by Wheeze Associated Lower Respiratory Infection and community acquired pneumonia. Febrile status epilepticus and break through seizures were the neurological indications. For children with seizures oxygen was continued even after control of seizures in about 20% of the subgroup with seizures.

Discussion

Oxygen therapy can be life-saving as treatment of hypoxemia is essential. Oxygen is a drug and should be prescribed with caution as it can have detrimental effects. Current rates of oxygen prescription in medical wards are unsatisfactory; only 43.5% of patients who were receiving oxygen during the study had oxygen prescribed, with the majority of oxygen prescriptions being inadequate.

Oxygen is most commonly delivered by devices with variable performance such as face masks and nasal cannulae. These can produce unexpectedly high concentrations of inspired oxygen, particularly when ventilation is depressed [2].

In addition masks that incorporate a reservoir bag are often used in emergencies; following the widespread adoption of PALS & ATLS guidelines [3]. These appliances may produce systemic hyperoxia which may be harmful. In the present study face mask was most commonly used followed by nasal prongs and NRM.

Studies have also shown that routine administration of high concentrations of oxygen in adults with myocardial infarction and acute ischemic stroke are more hazardous and the outcome has been better when oxygen was used cautiously [4-6]. This apparent paradox occurs because supraphysiologic oxygen tensions produce little increase in the oxygen carrying capacity of blood, but they promote reflex vasoconstriction via local regulatory mechanisms in arteriolar smooth muscle [7].

The dangers of pulmonary toxicity due to oxygen ranging from atelectasis to pro inflammatory processes and the risks of prescribing oxygen for patients with chronic respiratory illness has been widely appreciated. Injudicious use of oxygen in these patients produces respiratory Acidosis [8]. The treatment guidelines should be based on achieving target arterial oxygen tensions and saturations rather than on giving predetermined concentrations or flow rates of inspired oxygen. In the present study target oxygen percentage was mentioned only in 21% of patients.

Inevitably, oxygen continues to be given on the basis of presumed need rather than of documented low oxygen saturation. This may be acceptable in emergencies but in more controlled situations, efforts should be made to confirm the presence of hypoxia by pulsoximetry before giving oxygen. In this way normoxic patients who do not require oxygen therapy will avoid the risks of hyperoxia. In the present study pulsoximeter was used to document the oxygen saturation prior to initiation of oxygen in 87.5% of patients.

Pulsoximeters should be available in all critical areas where acutely ill patients are managed. Supplemental oxygen can then be given on a rational basis focusing on the attainment of target oxygen saturations which may

Figure 1: Indications for initiation of oxygen
differ between patient groups rather than using fixed flow rates and devices. In addition, arterial blood gas analysis can be used in sick children to confirm the appropriate pH, oxygen and carbon dioxide tensions. The use of oxygen prescription charts similar to those advocated by Dodd and colleagues may help to achieve these aims [1].

**Conclusion**

Oxygen therapy remains a cornerstone of medical practice and doctors should strive to ensure that oxygen is prescribed, administered and monitored with care. Oxygen therapy is neither prescribed nor administered with the same attention that is given to other drugs such as antibiotics. Oxygen prescription and/or delivery are associated with significantly greater error than that seen with antibiotics. Education of medical personnel should stress more prudent prescription and use of oxygen in hospitalized patients.

Supplemental oxygen is actually detrimental to many of the patients who receive it. Supplemental oxygen is much overused and its use should be limited to the few conditions and situations in which it is truly effective, useful, and non-detrimental.

One should also be aware of the prohibiting cost of oxygen and use it judiciously. It may be wise to use a separate oxygen prescription format to avoid such errors in practice.

**References**


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