

Compliance and Adherence to Oxygen Therapy Prescription in a Critical Care Department of a Rural Tertiary Teaching Hospital: A Prospective Audit

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Abstract:

Context: Oxygen therapy is essential for managing various medical conditions. Being a drug, it has to be prescribed rationally with appropriate dose and device. Targets to be achieved depends upon clinical status. Non-compliance with prescribed guidelines can compromise patient outcome.

Aims: This prospective audit was aimed to assess compliance to prescribed oxygen therapy and documentation of appropriate prescription as per guidelines, followed in a critical care department

Settings and Design: A prospective observational audit was conducted in a critical care unit of a tertiary care teaching hospital, located in a rural region.

Methods and Material: Sixty consecutive patients fulfilling inclusion criteria, admitted to the intensive care unit were included, and their oxygen therapy compliance were evaluated as per (British Thoracic society) BTS guideline. Compliance was analysed for achieving targeted oxygen saturation levels and adhering to prescribed oxygen flow levels. The prescription documented in the electronic record were also analysed for its completeness regarding instruction.

Results: The study revealed a fairly high compliance rate (76.6%) in achieving the desired oxygen saturation levels, indicating effective oxygen delivery tailored to patient needs. However, proper documentation of oxygen therapy prescription was low (26.6%), highlighting potential gaps in oxygen prescription.

Conclusions: This audit indicate reasonably good compliance in achieving desired oxygen saturation level in a rural setting. However, documentation of oxygen prescription was poor. Education, training, and enhanced monitoring will be crucial to ensuring guideline compliance, optimizing patient outcomes, and minimizing risks associated with suboptimal therapy.

Keywords: Oxygen Therapy, Compliance, Oxygen Prescription, Oxygen Audit.

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Introduction

Oxygen is a common drug used in intensive care unit. It is used to relieve hypoxia but doesn't treat its cause. Acute indications for oxygen therapy include hypoxemia, carbon monoxide toxicity, chronic pulmonary disease and cluster headaches. [1] While administering it, Haemoglobin saturation or PaO₂ should be monitored and titrated as per need. Physiologically, it is indicated in people with an arterial oxygen partial pressure of PaO₂ < 55 mmHg (7.3 kPa) or an arterial oxygen saturation of SaO₂ < 88%. [2] Oxygen can be delivered via a low flow or high flow interface. It can also be given by bypassing the airway, such as in ECMO therapy. In most conditions, an oxygen saturation of 94–96% is adequate. Hyperoxia while oxygen administration is common and can cause oxygen toxicity. [3,13] For

those at risk of carbon dioxide retention (risk of type 2 respiratory failure), target saturations of 88–92% are preferred. [4,12] Careful titration of oxygen therapy should be considered in patients with chronic conditions predisposing them to carbon dioxide retention (e.g., COPD, emphysema). In these instances, oxygen therapy may decrease respiratory drive, leading to hypercapnia, acidemia, and increased mortality. Improved outcomes have been observed with titrated oxygen treatment. Many national and international audits suggest that oxygen administration practices are often not compliant with prescribed standards. [5,6] This can lead to waste, cost overruns, place patients at risk, and cause serious adverse events. Many interventions strategy have been published to improve compliance of

oxygen therapy. However, very few audits are published from India. Data from rural settings are lacking. Therefore, this audit was designed in a rural setting to investigate compliance of oxygen therapy.

Methods and Methods

This was a prospective audit of oxygen therapy being given to patients in an intensive care unit. This audit was conducted in adult intensive care unit of a tertiary care teaching hospital, located in a rural setting. 60 patients were selected for audit by non-statistical sampling technique. All eligible patients admitted during the study period of three months were included in the audit. This audit was approved by Ethical committee (IEC/BU/2022/Ex.32/) and need of informed consent to collect data was waived off. Inclusion criteria was adult patients in intensive care receiving oxygen therapy and who was hemodynamically stable. Patients with rapidly changing oxygen need, patients on Non-Invasive Ventilation and on mechanical ventilation were excluded from the audit. The standards used in audit for the prescriptions of oxygen therapy were as per Table 1.

Data collection: Data was collected by one of the auditing team. On the second day of starting oxygen

therapy, patient was enrolled in study, if was eligible as per inclusion and exclusion criteria. It was ensured that Oxygen therapy was not altered in previous six hours. Compliance of the oxygen therapy's target (required as per BTS guideline) was documented as per relevant clinical condition. Compliance of an oxygen prescription also comprises the oxygen flow rate and delivery device. Overshooting of oxygen target was also documented.

Prescription of oxygen therapy was also analysed from the electronic hospital record. Parameters observed were medical condition, oxygen device, flow rate and SPO2 target to be achieved.

Patient information's collected were patient's hospital ID, age, gender, co-morbidities and diagnosis.

Result:

After approval from ethics committee, consecutive 60 patients meeting inclusion and exclusion criteria were included in the audit. These patients were enrolled over three-month period. The general demographic characteristics are mentioned in Table 2.

Table 1: Standards for Audit

Standards	Target	Exception	Source and Evidence
Acute ill patients without risk of type 2 respiratory failure-oxygen therapy to targeted spo2: 94-98%	100% compliance	None	As per BTS guideline. ^[12]
Acute ill patients with risk of type 2 respiratory failure - oxygen therapy to targeted spo2 : 88-92%	100% compliance	None	As per BTS guideline. ^[12]
Breathless but non hypoxic patient: oxygen therapy not required	100% compliance	Anemic patient	As per BTS guideline. ^[12]

Regarding compliance in implementation of oxygen therapy (as per guidelines) – 46 (76.6%) patients demonstrated compliance. These patients were receiving just enough oxygen to achieve targeted SPO2 level.

As regards to documentation of oxygen therapy in the electronic health record - Out of 60 patients, only 16 (26.6%) patients had complete documentation of oxygen therapy's prescription.

Table 2: General demographics of the study group

Gender	
Male	33
Female	27
Age Group (in years)	
20-40	14
41-60	23
61-80	21
>80	2
Diagnosis – primary disease	
Respiratory	12
Cardiac	12

CNS pathology	11
Post-surgical	3
Hepatic	2
Renal	7
Infection	5
Others	8

Discussion

Oxygen as any drug, has to be prescribed as per goldilocks principle. [7] However, being a common intervention in emergency room and intensive care, it is misused and liberally used. [8] This problem is more acute in rural settings where oversight is often weak. Both hypoxia and hyperoxia is detrimental to smooth recovery. Therefore, it has to be prescribed in dose and targets as per types of respiratory failure. [9] For example AVOID trial highlights the lack of benefit for oxygen therapy and the potential for harm in acute myocardial infarction unless oxygen saturations are <94%. [10] Even in other critical illness like cardiac arrest, stroke, traumatic brain injury and sepsis, hyperoxia may be detrimental. [11] Hence, the focus has increased in adhering to goldilocks principle of oxygen therapy. [10] Since the publication of BTS Guidelines -2008, oxygen therapy prescription and its compliance has gained attention. This guideline was last revised in 2017 with evolving evidence. [12] It states that Oxygen should be prescribed to achieve a target saturation of 94–98% for most acutely ill patients or 88–92% or patient-specific target range for those at risk of hypercapnic respiratory failure. [12] However, the implementation and adherence to the guidelines were poor. [14,15,18] A review article which incorporated studies from 1980 to 2015 had concluded that the practice of prescribing oxygen therapy was poor although it is improving in recent audits. [14] The practice in India is largely unstudied. Very few audits on oxygen therapy from India has been published. Data from rural settings in India is lacking.

Kamran et al had audited oxygen therapy in Australia and had observed that 55% patients had prescription of targeted oxygen therapy. In this audit, compliance of oxygen therapy target was 76.6%. [15] Rudge et al described a quality improvement project in UK which showed that in baseline data, 55% of patients had a valid oxygen prescription. [16] In a recent Indian study done in Delhi, the baseline audit showed 1.4% of the oxygen prescriptions were complete and valid. Although, they were able to demonstrate significant improvement after 4 PDSA cycle. [17]

In this present audit, 26.6% had complete documented oxygen prescription. The Audit done in 40 ICUs of New Zealand and Australian ICUs observed only 7% had complete documentation of

prescription. [18] The compliance to the targeted oxygen level were 76.6%.

The results of this study shed light on the inadequate documentation of prescription of oxygen therapy and fairly well compliance of implementation of the guidelines in a rural setting, of India. This discrepancy between prescribed and actual oxygen therapy highlights potential issues in the healthcare system, such as inadequate monitoring, communication gaps, or lack of awareness among healthcare providers. It also suggests the need for further education and training on appropriate oxygen prescription and delivery practices. [5]

Limitation of this Audit is that, as it is single centre audit, it cannot be generalised to prevailing practice in rest of rural India. The BTS guideline has not been designed for intensive care, although its principle should be applicable in all clinical scenario.

These findings emphasize the importance of healthcare providers closely monitoring and assessing the administration of oxygen therapy to ensure compliance with prescribed guidelines. By optimizing oxygen delivery and enhancing adherence to oxygen prescription, we can enhance patient outcomes and minimize potential risks associated with oxygen therapy. [19] Sustained automated audit can also improve the compliance to acceptable level. [20]

Conclusion

This audit done in an intensive care setting evaluated the prescription of oxygen therapy and its compliance. The findings revealed that while a significant proportion of patients demonstrated good compliance in achieving the targeted oxygen saturation levels, there was a notable lack of proper and complete prescription (26.6%) of Oxygen therapy.

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