

Audit of oxygen therapy target saturation documentation and adherence to guidelines in hospitalized patients in a medical ward

Mohamed Mirghani Ibrahim Eltayeb ¹, Mohamed emadeldin mohamedali ahmed ¹, Ali Mohammed El Haj Izzeldin Ishag ², Mohammedalmojtaba Abdelrahman ³ and Osman Elshafee Osman Elkhalfifa ^{4,*}

¹ Sudan medical specialization board, University of science and technology, khartoum, Sudan.

² Sudan medical specialization board, University of Bahri, Bahri, Sudan.

³ Sudan medical specialization board, Red sea university, Portsudan, Sudan.

⁴ Sudan medical specialization board, Omdurman Islamic university, Omdurman, Sudan.

GSC Advanced Research and Reviews, 2026, 27(01), 133-136

Publication history: Received on 10 March 2026; revised on 19 April 2026; accepted on 22 April 2026

Article DOI: <https://doi.org/10.30574/gscarr.2026.27.1.0094>

Abstract

Background: Oxygen therapy is one of the most commonly prescribed treatments in hospitalized patients. However, inappropriate oxygen administration can lead to serious complications, particularly in patients at risk of hypercapnic respiratory failure such as those with chronic obstructive pulmonary disease (COPD). International guidelines recommend prescribing oxygen with clearly defined target saturation ranges to optimize safety and effectiveness.

Aim: To evaluate compliance with documentation of oxygen therapy target saturation and adherence to recommended oxygen delivery ranges in a medical ward.

Methods: A retrospective clinical audit was conducted involving 50 inpatients receiving oxygen therapy. Data were collected on documentation of target saturation, patient diagnosis (COPD vs non-COPD), and appropriateness of oxygen therapy based on guideline-recommended target ranges.

Results: Target oxygen saturation was documented in 100% of patients. Among COPD patients (n=20), 60% received oxygen within the target range (88–92%), while 40% were over-oxygenated. Among non-COPD patients (n=30), 85% received appropriate oxygen therapy (94–98%), while 15% were under-oxygenated.

Conclusion: Although documentation compliance was excellent, adherence to target saturation ranges remains suboptimal, particularly in COPD patients, highlighting a gap between prescription and clinical practice.

Keywords: Oxygen therapy; COPD; Target saturation; Clinical audit; Patient safety; Hypercapnia

1. Introduction

Oxygen therapy is a fundamental component in the management of acutely ill patients and is frequently administered across all hospital settings. Despite its life-saving role, oxygen is often inappropriately prescribed or delivered, leading to potential harm.

Excessive oxygen administration in patients with COPD may result in oxygen-induced hypercapnia, caused by mechanisms including ventilation-perfusion mismatch and reduced hypoxic respiratory drive. This may lead to respiratory acidosis, need for ventilatory support, and increased mortality.

* Corresponding author: Osman Elshafee Osman Elkhalfifa

Recognizing these risks, international guidelines such as those from the British Thoracic Society (BTS) recommend:

- 94–98% target saturation for most acutely ill patients
- 88–92% for patients at risk of hypercapnic respiratory failure

Oxygen should therefore be treated as a drug, requiring prescription with a specified dose (target saturation), route (delivery device), and monitoring plan.

Despite clear guidelines, studies consistently demonstrate poor adherence to oxygen prescribing and delivery standards. This audit was conducted to evaluate local practice, identify deficiencies, and guide quality improvement interventions.

2. Methodology

2.1. Audit Design

This was a retrospective clinical audit assessing oxygen therapy practices against established guideline standards.

2.2. Setting

The audit was conducted in a general medical ward in a secondary/tertiary care hospital.

2.3. Sample Size

A total of 50 consecutive patients receiving oxygen therapy were included over a defined audit period.

2.3.1. Inclusion Criteria

- Adult inpatients receiving oxygen therapy
- Patients admitted under medical specialties

2.3.2. Exclusion Criteria

- Patients not requiring oxygen therapy
- Incomplete medical records

2.4. Data Collection

Data were extracted from patient files, drug charts, and observation charts. The following variables were collected:

- Documentation of target oxygen saturation
- Patient diagnosis (COPD vs non-COPD)
- Recorded oxygen saturation levels
- Type of oxygen delivery device (if available)
- Appropriateness of oxygen therapy relative to target range

2.5. Audit Standards

Based on BTS and WHO recommendations:

- 100% of patients should have documented target saturation
- COPD patients: oxygen maintained at 88–92%
- Non-COPD patients: oxygen maintained at 94–98%

2.6. Definition of Compliance

- Appropriate oxygen therapy: saturation within target range
- Over-oxygenation: saturation above target range
- Under-oxygenation: saturation below target range

3. Results

3.1. Overall Findings

- Total patients: 50
- Documentation of target saturation: 100% compliance

3.2. COPD Patients (n = 20)

- Appropriate oxygen therapy: 60% (n = 12)
- Over-oxygenation: 40% (n = 8)
- Under-oxygenation: 0%

3.3. Non-COPD Patients (n = 30)

- Appropriate oxygen therapy: 85% (n = 26)
- Under-oxygenation: 15% (n = 4)
- Over-oxygenation: 0%

3.4. Key Observations

- High compliance in documentation did not translate into optimal oxygen delivery
- COPD patients were significantly more likely to receive inappropriate oxygen therapy
- Deviation in non-COPD patients was mainly due to under-treatment rather than excess oxygen

4. Discussion

This audit demonstrates a notable success in documentation practices, with all patients having clearly defined oxygen saturation targets. This reflects strong awareness among clinicians regarding guideline recommendations and prescribing standards.

However, the audit also reveals a significant gap between prescription and actual clinical practice, particularly in oxygen delivery and monitoring.

4.1. Clinical Implications

The high rate of over-oxygenation in COPD patients (40%) is concerning and clinically significant. Excess oxygen in this population may:

- Worsen hypercapnia
- Lead to respiratory acidosis
- Increase ICU admissions
- Increase mortality

This suggests that while clinicians prescribe appropriate targets, nursing practice, monitoring frequency, or device titration may not consistently align with these targets.

In contrast, under-oxygenation in non-COPD patients (15%) may reflect overly cautious oxygen administration or inadequate monitoring, potentially leading to tissue hypoxia.

4.2. Comparison with Literature

These findings are consistent with previous studies showing:

- High rates of oxygen misuse despite guideline availability
- Better compliance in documentation than in actual delivery
- Persistent challenges in COPD management

4.3. Possible Contributing Factors

- Lack of continuous monitoring or titration
- Inadequate staff training or awareness
- Absence of standardized oxygen prescription charts
- High workload and staffing pressures

5. Conclusion

This audit highlights excellent compliance with oxygen prescription documentation, but suboptimal adherence to target saturation ranges, particularly in COPD patients.

The findings emphasize the need to bridge the gap between prescribing and real-time clinical practice, ensuring that oxygen therapy is both prescribed and delivered safely.

Recommendations

- Introduce standardized oxygen prescription charts
- Regular staff education and training, focusing on COPD oxygen targets
- Implement bedside reminders or visual aids for target saturation ranges
- Enhance monitoring protocols, including frequent saturation checks
- Multidisciplinary involvement (physicians and nursing staff) in oxygen management
- Re-audit within 3–6 months to assess improvement

Limitations

- Small sample size (n=50)
- Single-center audit (limited generalizability)
- Retrospective design (dependent on documentation accuracy)
- Lack of data on oxygen delivery devices and monitoring frequency

Future Directions

- Expand audit to multiple wards (ICU, ER, surgical wards)
- Assess impact of interventions through a closed-loop audit cycle
- Incorporate electronic prescribing systems with alerts

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.”

References

- [1] World Health Organization. Oxygen therapy for adults in acute care settings. WHO; 2016.
- [2] O'Driscoll BR, Howard LS, Earis J, Mak V. BTS guideline for oxygen use in adults in healthcare and emergency settings. *Thorax*. 2017;72(Suppl 1):ii1–ii90.
- [3] Austin MA, Wills KE, Blizzard L, Walters EH, Wood-Baker R. Effect of high-flow oxygen on mortality in COPD patients. *BMJ*. 2010;341:c5462.
- [4] Chu DK, Kim LH, Young PJ, et al. Liberal vs conservative oxygen therapy. *Lancet*. 2018;391:1693–1705