

Audit on Oxygen Prescription in Adult Inpatient Wards at the Gozo General Hospital

ABSTRACT

Oxygen is crucial in the delivery of inpatient care. An audit regarding oxygen prescription and administration in adult inpatient wards at the Gozo General Hospital was carried out between December 2022 and January 2023. Data was collected by reviewing emergency department and inpatient ward treatment charts and admission plans. Results acquired were then compared to a similar audit done in Malta. Both audits concluded that oxygen documentation and prescription tend to be overlooked. Hence, we recommend that further education and awareness is given to this domain of patient care to improve outcomes and reduce likelihood of adverse events.

Keywords: Oxygen, Documentation, Prescription, Patient safety

INTRODUCTION

Oxygen is crucial in the treatment of patients with acute illness. However, despite its frequent use in both emergency and inpatient settings, appropriate prescription, documentation on treatment charts, and regular review of oxygen therapy tend to be neglected. The British Thoracic Society Guidelines¹ recommend specifying target oxygen saturations and appropriate delivery methods for each patient in their treatment chart to ensure safety. Inappropriate oxygen delivery or hypoxia in the context of type 2 respiratory failure can be fatal and potentially harmful to the patient; this highlights the importance of accurate prescription and administration of oxygen therapy.

METHODOLOGY AND AIMS

Data was retrospectively gathered from patient hospitalizations at the Gozo General Hospital's (GGH) emergency department (ED) and adult inpatient wards (Male General Ward, Female General Ward, Critical Care Unit and Day Care Unit) over the course of six weeks between December 2022 and January 2023, after acquiring approval from the lead consultant at GGH

and the data protection officer. Data was gathered by reviewing the patient's emergency admission sheet and treatment chart, followed by an analysis of the inpatient treatment chart and the admission plan in the ward.

A self-constructed data collection sheet was created to maintain full patient confidentiality with no possibility of patient identification. Data collected was then analysed, with the intention of determining whether oxygen prescriptions were documented on treatment charts. Any patient in a hospital setting has the possibility of acutely deteriorating leading to development of hypoxemia. In view of this, target saturation ranges, means of oxygen delivery devices and flow rate must be specified in the patient's treatment chart, to avoid detrimental outcomes while simultaneously allowing clinicians to safely titrate oxygen delivery. Patients were not contacted at any stage of the data collection, analysis, and study reporting.

The data collected included the following information:

- Admission date
- Oxygen saturation at ED
- Use of oxygen at ED
- Oxygen prescription on ED treatment chart
- Oxygen on ED plan
- Oxygen on ward plan
- Oxygen prescription on Ward Treatment chart
- Method of oxygen delivery on ward.

This audit's primary objective is to check whether prescription and documentation for oxygen therapy, for patients transferred from ED to the inpatient ward, is done appropriately. Accurate and detailed documentation of prescribed oxygen therapy plays a crucial role in reducing the risk of errors or complications that may harm the patient. It also facilitates effective communication among health care professionals during handovers or shift changes. By reviewing the documented information, incoming staff can swiftly grasp the patient's oxygen requirements and any specific considerations, promoting continuity of care and minimizing the chances of errors or miscommunication.

RESULTS

A total cohort of 229 patients were recruited over the 6-week data collection period. From these individuals, 59 patients required oxygen therapy in either the ED or the ward, for the medical diagnosis specified in Table 1.

Inclusion criteria:

Patients admitted to the general medical wards and coronary care unit with:

- Asthma exacerbation
- COPD exacerbation
- Exacerbation of Congestive Heart Failure
- Pneumonia / Bronchitis (including COVID-19)
- Pulmonary Embolism
- Inhalation of fumes
- Syncope
- Sepsis
- Diabetic ketoacidosis
- Overdose with illicit substances
- Pneumothorax
- Acute Coronary Syndrome
- Uncertain diagnosis (atypical chest pain or Shortness of Breath) requiring oxygen therapy.

Exclusion criteria:

- Patients less than 16 years of age
- Patients requiring immediate transfer to Mater Dei Hospital after presenting to Emergency at GGH
- Patients who voluntarily discharged against medical advice on initial presentation
- Re-admissions over the data collection period.

...DATA FROM THIS AUDIT SHOWS THAT 66% OF PATIENTS WHO NEEDED OXYGEN TREATMENT DID NOT HAVE ANY RECORD OF THIS WHEN THEY WERE TRANSFERRED FROM EMERGENCY CARE



Table 1. Rationale for the use of oxygen.

Diagnosis	Number of Patients Admitted
Bradycardia	1
Asthma exacerbation	1
COPD Exacerbation	7
CHF Exacerbation	13
Pneumonia (including COVID-19)	21
PE	1
Inhalation of fumes	4
Syncope	1
Sepsis	1
DKA	1
OD	1
Chest Pain	2
Pneumothorax	1
Uncertain diagnosis	4
Total	59

From the 59 patients receiving oxygen at GGH, in either the ED or the ward, 39 individuals did not have a specific prescription for this documented in their treatment charts. This was noted in both the ED and the Inpatient Wards.

Table 2 presents the types of oxygen delivery devices adopted for the various patients.

Table 2. Types of oxygen delivery devices adopted for the patients.

Mode of Delivery	Number of Patients	Percentage
Nasal Cannulae	11	18.6%
Normal Face Mask	28	47.4%
Tracheostomy Mask	2	3.4%
Venturi Mask	8	13.6%
Non-Rebreather Mask	7	11.9%
Non-Invasive Ventilation	2	3.4%
Intubation	1	1.7%
Total	59	100%

In the ED, oxygen was administered to 51 patients. Out of these only 14 patients had the treatment specifically mentioned in the ED treatment chart. This represents only 28% of the total number of patients that were actually administered oxygen in the ED (Figure 1).

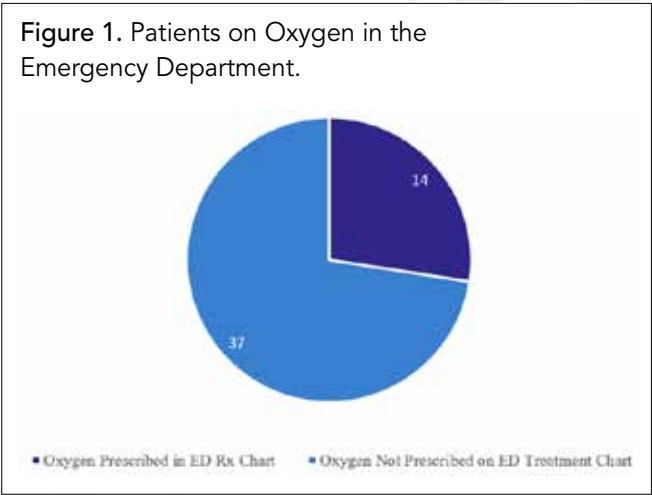
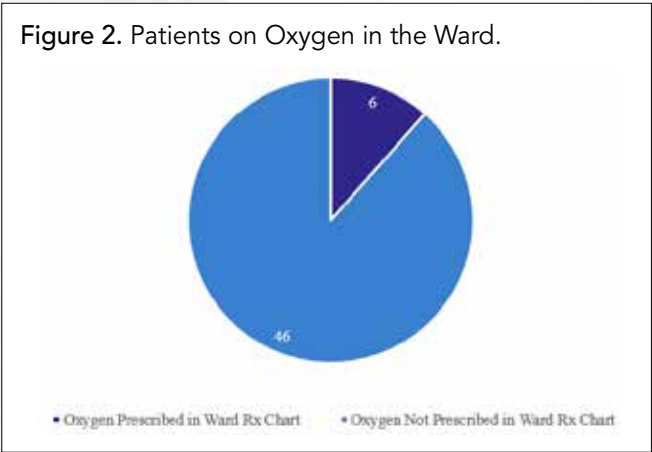
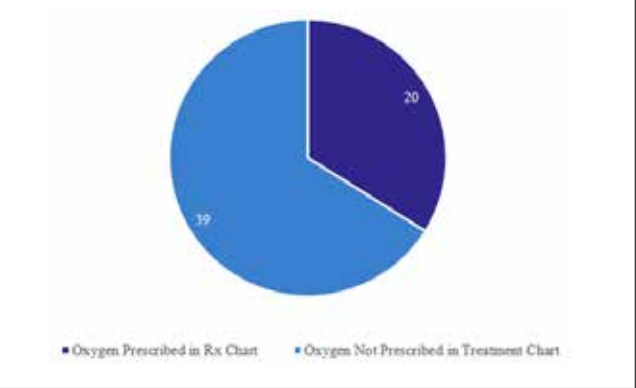


Figure 2 shows that out of 52 patients receiving oxygen in the ward, only six had oxygen prescribed in their treatment charts. This represents only 13% of the patients that were actually receiving oxygen treatment in the ward.



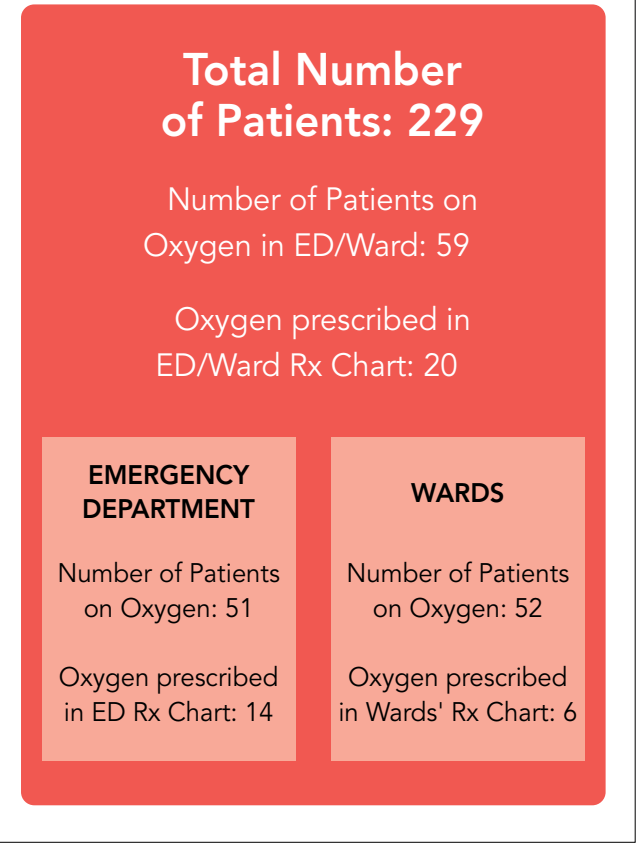
When the ED and ward treatment charts were compared, it was noted that out of the total number of patients receiving oxygen treatment in either the ED or the ward (59 patients), only 20 patients had oxygen prescribed in either their ED or ward treatment chart. This represents 34% of the total number of patients receiving oxygen treatment.

Figure 3. Total Patients on Oxygen in the Emergency Department and Wards.



In conclusion, Figure 4 presents the data summary of the prescribed oxygen therapy in the treatment charts versus that actually administered oxygen therapy in both the ED and the wards, separately. Furthermore, the overall combined data of ED and wards is also presented, reflecting the GGH scenario, following a comparative analysis of all treatment charts.

Figure 4. ED and Wards data summary reflecting prescribed oxygen therapy in treatment charts and actually administered oxygen therapy; Including combined data of audited departments.



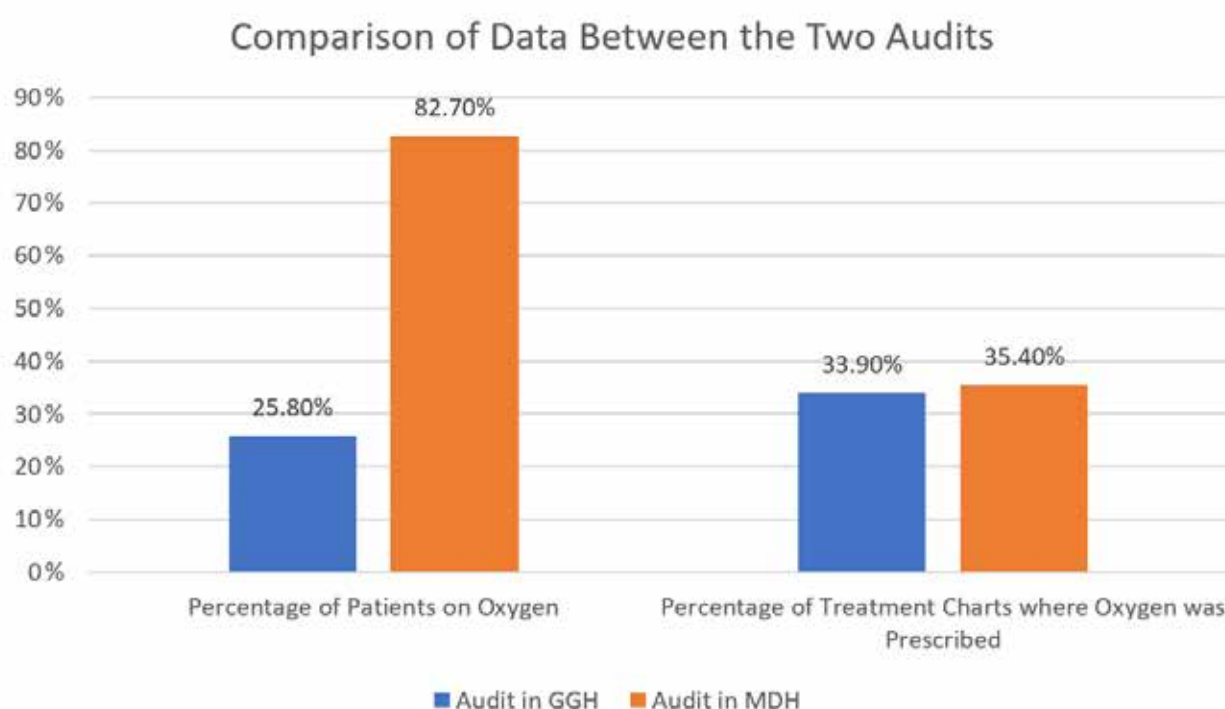
The results of this audit were compared to a similar, albeit more extensive, audit performed by Borg Azzopardi et al.² in 2022 at Mater Dei Hospital, the only other public general hospital in the Maltese islands. This audit consisted of 300 patients, of whom 248 (83%) were on oxygen. When compared to the percentage of patients on oxygen in the current audit, which was 26%, there is an evident discrepancy (Figure 5). However, it is important to note that this can be explained by the smaller pool of patients in GGH and the fact that in the audit done in MDH, only patients who presented with shortness of breath were considered (i.e. there was a higher chance of them being on oxygen). Despite this difference in numbers, the proportion of patients to whom oxygen was prescribed on the treatment chart when indicated, is comparable. In fact, the audit done in MDH, showed that 35% of the patients on oxygen had it prescribed in their treatment charts, while, similarly, in the current audit the percentage was of 34%. Therefore, in both MDH and GGH, the oxygen prescribed in management plans was written in the patient's treatment chart in little more than 1/3 of patients. This means that approximately 2/3 of patients required oxygen and this was not prescribed in their treatment chart. This could lead to serious consequences as discussed below. The following bar chart shows how the two audits compare to each other.

DISCUSSION

A significant proportion of patients admitted during the previously stipulated timeframe were accounted for by cases of both bacterial and COVID-19 pneumonias, CHF exacerbations and COPD exacerbations. In fact, these presentations accounted for 69% of the total cohort group which required some form of supplemental oxygen therapy at emergency or an inpatient level. According to the BTS guidelines, supplemental oxygen is warranted in instances where oxygen saturations fall below 94% or else are less than 88% in chronic obstructive airway disease patients. Moreover, the guidelines also highlight the importance of specifying the targeted oxygen range, suitable oxygen delivery device and flow rates for all patients transferred to an inpatient setting, as a safety netting in the case of acute deterioration in clinical state.³

If a patient's oxygen needs are not met, oxygen therapy, like all other forms of treatment, can have serious side effects. The development of oxygen imbalances like hypoxemia can lead to adverse effects such as lactic acidosis, myocardial ischaemia secondary to coronary vasodilation and pulmonary hypertension. In contrast, hyperoxia may give rise to cerebrovascular accidents, decreased renal blood flow with ensuing acute tubular necrosis, atelectasis, and decreased ventilation in patients with hypercapnic respiratory failure. This makes it the more important to stress the importance of carefully contemplating oxygen therapy given the circumstances at hand, as well as the implications of its documentation

Figure 5. Data Comparison between MDH 2022 Audit² and GGH Audit.



and prescription.⁴ Despite this, data from this audit shows that 66% of patients who needed oxygen treatment did not have any record of this when they were transferred from emergency care. They also did not have information about the desired saturation ranges or the preferred manner of delivery.

The data collected suggests that inattention to the prescription of oxygen on treatment charts is a significant issue in both emergency and ward settings. Specifically, the figures indicate that a substantial proportion of patients in these settings did not have any form of oxygen prescription - with 73% of patients at emergency and 89% of those in an inpatient setting not receiving appropriate oxygen prescription. This alarming trend highlights the potential risks and consequences that patients face due to suboptimal oxygen therapy practices. The absence of proper oxygen prescription can lead to inadequate monitoring of oxygen saturation levels, resulting in inefficiencies and substandard handover of patient care. This could be particularly problematic in situations where patients require continuous oxygenation, as it may lead to oxygen desaturation and harm to the patient's overall health. Thus, it is crucial to ensure that healthcare professionals prioritize accurate and adequate oxygen prescription practices to ensure the safety and well-being of patients.

Poor oxygen prescription practices in hospital treatment charts can arise due to several reasons. Medical and nursing staff may not be familiar with the oxygen prescription section on treatment charts, leading to inadequate or inappropriate prescriptions. Inadequate monitoring of patients who require oxygen therapy can hinder the determination of suitable flow rates and concentrations. Poor communication between medical staff during handover can lead to errors in prescribing and monitoring oxygen therapy. Healthcare professionals may find it challenging to alter ingrained habits, leading to suboptimal oxygen prescription practices. Additionally, healthcare professionals may over-rely on pulse oximetry and overlook other factors such as respiratory rate or level of consciousness. Prescriber biases towards higher oxygen flow rates or concentrations without considering the potential harm of hyperoxia may also contribute to poor oxygen prescription practices. Lack of awareness of the adverse events resulting from hypoxia/hyperoxia, time constraints, and limited resources may further exacerbate the problem.⁵

Adequate documentation of oxygen therapy in treatment charts can be promoted by educating healthcare personnel regarding the importance of accurate and complete documentation. This should include emphasis on the correct use of oxygen prescription charts, the importance of documenting all relevant information, and the consequences of incomplete

or inaccurate documentation. The implementation of an electronic documentation systems can also improve the accuracy and completeness of oxygen therapy records by providing reminders for healthcare professionals to document all necessary information. Such a system will also enable for and facilitate easy retrieval of records which will allow for efficient and effective care of patients.⁵

LIMITATIONS

Sample size is a limitation since Gozo General Hospital caters for a small community. Another limitation is that patients who were admitted at the ED on Sundays or public holidays and needed brief oxygen therapy, but were discharged from the ED, have not been included in the study.

FUTURE RESEARCH

The audit did not investigate whether oxygen is prescribed or administered correctly. Further research in this area will indicate whether oxygen therapy is effectively being given to patients, according to established guidelines, in both the ED and in-patient wards.

CONCLUSION

The use of oxygen prescription charts is crucial in ensuring that oxygen therapy is prescribed appropriately and administered correctly. They help ensure that patients receive appropriate and safe treatment, provide a means of communication between healthcare providers, and serve as a legal record of care. Our audit results show that the majority of patients who required oxygen therapy, did not have this documented in their treatment chart.

Therefore, we recommend that staff should be educated and trained on the use of oxygen prescription charts, and regular audits should be conducted to monitor adherence to prescribed oxygen therapy. This will ensure that patients receive the appropriate oxygen therapy, which can improve their outcomes and reduce the risk of harm associated with inappropriate use of oxygen.

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