

STUDY OF DELIVERY PRACTICES OF OXYGEN BY HEALTHCARE PROFESSIONALS IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

Objective: To document the practices of our healthcare professionals (HCPs) about oxygen (O₂) therapy in patients admitted with acute exacerbation of chronic obstructive pulmonary disease.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Medicine, Sialkot Medical College, Sialkot, from Jul 2017 to Jan 2018.

Methodology: 150 Health Care Professionals, working in emergency and intensive care units for more than 2 years, who administered supplemental oxygen to patients admitted with Acute Exacerbation of Chronic Obstructive Pulmonary Disease, were included in the study.

Results: Of the 150 Health Care Professionals, 88 were staff nurses and 62 were doctors. 82.7% of Health Care Professionals knew the importance of controlled 2 delivery in patients of An acute exacerbation of chronic obstructive pulmonary disease. But only 66.9% actually practiced according to their knowledge/consultants prescription.

Conclusion: Despite adequate knowledge of Health Care Professionals regarding oxygen supplementation in Acute Exacerbation of Chronic Obstructive Pulmonary Disease, their practices need to be improved. The culture of giving high concentration oxygen to patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease should be discouraged. Appropriate local protocols should be devised, prominently displayed and rigorously followed.

Keywords: Acute exacerbation of chronic obstructive pulmonary disease, Health care professionals, Oxygen practices.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common illness in a community¹. It is characterized by airflow limitation with complaints of cough, dyspnea and sputum production. It is a progressive disease with considerable mortality and morbidity and significantly impairs quality of life of patients². Developing slowly, over time, it makes hard to perform routine tasks. Patients suffering from COPD have more emergency visits or overnight hospital stays posing a burden to healthcare system. They also suffer from other chronic diseases such as diabetes, coronary heart disease, stroke, arthritis or congestive heart failure. Tobacco smoking is associated with a greater risk of developing COPD. It's the

third leading cause of death in United States².

Oxygen is widely used as emergency drug in clinical setting and has proven role in saving lives. Though oxygen is used to correct hypoxemia, its potential harmfulness at high concentrations in patients with COPD has been known for years. As acute exacerbation of chronic obstructive pulmonary disease (AECOPD) will cause multiple emergency admissions in hospitals, the patients are potentially exposed to the threat. Excessive oxygen also results in increased mortality of patients with stroke, myocardial infarction and cardiac arrest survivors. Oxygen is regarded as a useful drug for all serious medical conditions by the healthcare professionals and even patients. A culture of "more is better" has evolved over the time. In patients with AECOPD, uncontrolled oxygen delivery, particularly at high concentration, can result in worsening of hypercapnia. An increase in PaCO₂ as a result of inhibition of

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pulmonary constriction results in ventilation/perfusion mismatch and a right hand shift of CO₂ dissociation curve⁴.

For many years, use of titrated oxygen therapy has been advocated in AECOPD. Guidelines recommend target oxygen saturation for AECOPD between 88-92%. The aim should be to raise PaO₂ without worsening of the acidosis. Therefore, oxygen should be given at 4L/min via venturi mask or not more than 2L/min via nasal prongs⁶⁻⁸. However the beliefs of doctors and nurses present challenges to best practice implementation. Patients are usually given high concentration oxygen despite reinforcement at various levels by consultants⁹. The objective of the study was to document the practices of our healthcare professionals about oxygen therapy in patients admitted with AECOPD.

METHODOLOGY

This cross sectional study was conducted at emergency departments and intensive care units of hospitals associated with Sialkot Medical College, Sialkot from July 2017 till January 2018. Employing purposive sampling technique, sample size of 150 was calculated using WHO formula with confidence interval of 95% and margin of error as 5%.

Healthcare Professionals (MBBS doctor or a Staff Nurse having diploma in general nursing & midwifery) administering supplemental oxygen to patients with AECOPD (an acute worsening of respiratory symptoms in a patient of COPD that resulted in additional therapy), on advise/ prescription of Consultant Physician (MBBS doctor with post graduation in Medicine/ Pulmonology), who had spent a minimum of 2 years in emergency or intensive care units and consented for inclusion in study, were included. Non qualified ancillary staff, house officers, student nurses and healthcare professionals who had spent less than 2 years in emergency department or intensive care units, or who did not given consent for study, were excluded.

Data was collected through a predesigned questionnaire given by hand to all the healthcare

professionals and collected immediately upon completion. The questionnaire had its predetermined responses of “Yes”, “No” or present doses and duration of oxygen, which the respondents had to choose from. Data was analyzed through SPSS 20. Qualitative variables were presented as frequency and percentage while quantitative variables were presented as mean and standard deviation.

RESULTS

There were 88 (58.7%) staff nurses and 62 (41.3%) doctors. Their mean age was 31.03 ± 5.24 years, ranging from 24 to 48 years (table-I). The HCPs had worked in their units from 2 years to

Table-I: Demographic features of study participants.

Characteristics	Study Participants (n=150)
Age (Years)	31.03 ± 5.24
Age Groups	
<25 Years	12 (8%)
25-30 Years	71 (47.3%)
30-34 Years	38 (25.3%)
35-39 Years	15 (10%)
40-44 Years	11 (7.3%)
>45 Years	3 (2%)
Male	41 (27.3%)
Female	109 (72.7%)
Doctors	62 (41.3%)
Staff Nurses	88 (58.7%)

Table II: Knowledge & practice of participants for O₂ delivery in acute exacerbation of chronic obstructive pulmonary disease.

Knowledge	Adequate	124 (82.7%)
	Inadequate	26 (17.3%)
Practice	Adequate	83 (66.9%)
	Inadequate	41 (33.1%)

24 years. 109 (72.7%) were female and 41 (27.3%) were male. 137 (91.3%) times the consultants properly mentioned the dose and rate of O₂ delivery, while 9 (6%) times consultants only wrote O₂ delivery and 4 (2.7%) times did not mention it at all. Of the included personnel 124 (82.7%) knew the importance of controlled O₂ delivery in patients with AECOPD while 26 (17.3%) were unsure. Prescription of consultant was properly followed by 83 (66.9%) of health

personnel while 41 (33.1%) did not (table-II). O₂ was given by venturi mask to 146 (97.3%) patients while 4 (2.7%) requested for nasal prongs.

DISCUSSION

Oxygen supplementation is a common intervention seen in medical emergencies but there are only a few randomized trials of emergency oxygen use¹⁰. As oxygen administration can rapidly and demonstrably improve hypoxemia in most situations, the evidence for it may be considered unnecessary. However, this is in contrast to AECOPD where overcorrection of hypoxemia may lead to hypercapnia and acidosis¹¹⁻¹⁴. Our study had 72.7% of female and 27.3% of male participants which is in contrast to Davis *et al*, who showed three quarter of the HCPs to be male¹⁵.

The adequacy of oxygen prescription within hospital settings has been studied over many years¹⁶⁻¹⁸. The studies stress upon presence of a prescription and also the adequacy and appropriateness of oxygen prescription. Our study showed that 91.3% of the consultants prescribed oxygen with proper dose and flow rate of oxygen with target oxygen saturation levels to be achieved in AECOPD. Only 8.7% either did not mention at all or mentioned improperly. The proper written orders are particularly important in AECOPD. They not only help in education of junior HCPs but also help to prevent potential dangers of oxygen therapy in patients with AECOPD^{19,20}. Dodd *et al*²¹ demonstrated a large improvement, from 55% to 91%, when oxygen delivery orders are properly prescribed by the consultants. However the prescription was properly followed by 66.9% of our HCPs, insisting the need to reinforce HCPs about following orders/ local guidelines in order to minimize deleterious effects of oxygen.

Most of the practices of oxygen delivery are usually based on custom and opinions rather than evidence based. Emergency and ICU HCPs find it difficult to recognize patients who might be harmed by high concentration oxygen admin-

istration. If one faces a severely dyspnoeic, cyanosed patient, it is hard to resist the temptation to give supplemental oxygen, not only for patient's relief, but also to relieve the anxiety of HCP. Many HCP do not realize that medical oxygen is a drug and has its side effects and complications. Our study showed that 82.7% of HCPs knew proper dose and rate of oxygen delivery in AECOPD while 17.3% were either ignorant or were unsure. These results were comparable to Davis *et al* where 85.0% of HCPs followed guidelines properly. However Yawn *et al* showed only 49.9% of doctors and 46.0% of staff nurses were aware of proper guidelines for management of patients with AECOPD²². Among these 31.7% of doctors and 27.0% of staff nurses practiced their knowledge correctly. This was in contrast to our findings where 66.9% of HCPs properly applied their knowledge in the practice, while 33.1% did not. The significant increase in HCPs knowledge is in line with recent studies being published, showing change in knowledge, attitudes, beliefs and confidence of HCPs in regulated oxygen delivery to patients with AECOPD. The common reason given by those who did not follow any guideline were preference of their own clinical experience (n=41).

Nasal cannulas are commonly used and often preferred for patients with COPD. They allow them to speak, drink, eat and also feel less claustrophobic. However, they might not be suitable in AECOPD as nasal cannulas and face-masks administer uncontrolled oxygen. Our study concluded that 96.7% of patients were given oxygen via venturi mask. Venturi masks allow controlled oxygen therapy irrespective of breathing pattern, without risk of hyperoxia and worsening hypercapnia. Similar findings have been recorded by Brill *et al*²³.

From our study it was evident that only the mere knowledge of proper oxygen delivery in patients with AECOPD does not suffice the optimal oxygen administration to the patients. Every emergency and intensive care unit must have a written oxygen delivery policy to patients, which are commonly admitted. It should be

displayed prominently and rigorously followed. We could not find any oxygen delivery policy in any unit during our study. Apart from that the auditing practices are also lacking in our systems. These audits are extremely important as they have demonstrated slow but steady improvements in rates of oxygen delivery world over. The culture of giving high concentration oxygen to patients with AECOPD needs to be discouraged. There is a clear need to examine the barriers and attitudes toward oxygen and its administration in acute care setting, if we have to improve practice and minimize harm in vulnerable patients group.

CONCLUSION

Despite adequate knowledge of HCPs regarding O₂ supplementation in AECOPD, their practices need to be improved. The culture of giving high concentration O₂ to patients with AECOPD should be discouraged. Appropriate local protocols should be devised, prominently displayed and rigorously followed.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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