

Effect of Educational Program on Doctors' Knowledge and Practice of Oxygen Therapy

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ABSTRACT

Objective: To investigate the effect of an educational program about oxygen therapy on the doctors' knowledge and doctors' practice.

Study Design: Cross-sectional, quasi-experimental research study

Place and Duration of Study: This study was conducted at the Pediatric Emergency Department of Nishtar Hospital, Multan from September 2022 to October 2022.

Materials and Methods: Overall, 266 doctors were included in our study, both sexes. The program was delivered in the emergency department of the pediatric unit. The pre-test and post-test approach was used to evaluate the effectiveness of the structured educational program. The independent variable was the educational program, while the dependent variable was the doctor's knowledge and practice about oxygen toxicity. Data analysis was performed using SPSS version 23. Data was tabulated as mean \pm SD for numerical values and frequency percentages for categorical values. T-test and chi-square test were applied to see the association among variables.

Results: The average test scores before and after the implementation of educational program was 10.99 ± 2.77 and 18.15 ± 1.41 , respectively. The average test score of post-test versus pre-test was greater and the difference was statistically significant, ($p < 0.001$). The mean post test score of male and female doctors was 18.02 ± 1.51 and 18.37 ± 1.15 , respectively. The difference was statistically insignificant, ($p < 0.050$).

Conclusion: Regular practical and educational training sessions are necessary for doctors to stay updated on the latest guidelines for oxygen therapy. This will enable them to provide the best possible care to patients who require oxygen therapy.

Key Words: Education program, Doctors, Knowledge, Oxygen therapy

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INTRODUCTION

Oxygen is essential for life, it can also be harmful in certain circumstances. High concentrations of oxygen can be toxic, causing damage to the lungs and other organs. In addition, the presence of oxygen can contribute to the formation of free radicals and after damaging the cell can cause cancer. Oxygen is also a crucial element that plays a vital role in sustaining life. It is present in the air we breathe and is essential for the production of energy in our body tissues¹.

With a concentration of 21.0% in the ambient air, oxygen is the most abundant element on earth. It makes our body mass 65.0% and is necessary for the proper

functioning of all bodily organs². Oxygen therapy also recognized by World Health Organization (WHO) as an essential drug and recommends its use for treating or preventing hypoxia, a condition in which the body is deprived of oxygen. It is particularly useful in managing critically ill patients and is an emergency drug for adequate resuscitation³⁻⁴. It is essential that oxygen orders are included in a patient's treatment chart prior to administration, and that monitoring of the patient's oxygen levels is carried out regularly to ensure appropriate use and avoid toxicity⁵⁻⁶.

Oxygen therapy is a common medical intervention used to treat various medical conditions that affect the respiratory system⁷. Health care providers, particularly doctors, play a critical role in the administration of oxygen therapy. Oxygen therapy is a widely used treatment for patients with respiratory distress. However, the effectiveness of the therapy is dependent on the knowledge and practice of doctors in administering the therapy⁷. Studies have shown that there is a lack of knowledge and inconsistency in the practice of oxygen therapy among doctors. Therefore, it is essential to educate health care providers on the proper use of oxygen therapy⁸.

The lack of local studies on oxygen therapy knowledge and practice among doctors and role of educational

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program in Pakistan is a concerning issue. With the ongoing COVID-19 pandemic, the importance of oxygen therapy cannot be overstated⁹. It is crucial for doctors to have a deep understanding of the correct use of oxygen therapy to ensure that patients receive the best possible care¹⁰. Without proper training, education and knowledge, doctors may misuse oxygen therapy, leading to severe consequences. Therefore, it is essential to conduct further research on this topic in Pakistan to improve the quality of healthcare and ensure patient safety¹¹.

MATERIALS AND METHODS

This study was conducted at the pediatric emergency department of Nishtar Hospital, Multan during the period of September 2022 to October 2022. The development of this tool was a result of the researcher's review of related literature to assess doctors' knowledge regarding oxygen toxicity. This two-part tool was created to provide doctors with a standardized assessment process to ensure accuracy and consistency.

The first part of the tool consists of a questionnaire that encompasses the various aspects of oxygen toxicity, including the signs, symptoms, risk factors, and treatments. This questionnaire was designed to provide doctors with the necessary information to properly assess a patient's oxygen toxicity levels. This part is also concerned about age, sex, workplace, qualification, and experience.

The second part of the tool is a scoring system that uses the responses to the questionnaire to assign a numeric value to the patient's risk level. This numeric value is then used to determine the proper course of action, such as adjusting oxygen levels or administering treatments. In this tool, the correct answer was scored 1 and the incorrect scored "0". The total score was 20 and categorized as unsatisfactory score and satisfactory score based on 60% of the total.

All doctors were administered a validated pre-test questionnaire before starting the educational program. This took approximately 15-20 minutes for each doctor. The questionnaire asked each doctor the same questions. This allowed the data collected to be analyzed in a more accurate and meaningful way. After pre-test completion educational program was delivered which consist of the following steps:

Verification of order protocol and provider, provision of equipment like oxygen delivery devices, tubing and monitoring, all protocol have following steps involved: proper hand sanitization or hygiene maintenance, precautions of transmission should be kept in mind, own introduction and after that your role, visit purpose and estimated time period, confirmation of patient ID using patient name birth date, detailed description to patients clear his queries, work in systematic and organized manner, questioning and listening skills must

be proper, listening and clearance of patient cues, patients dignity and privacy care, assessment of ABCs. Respiratory assessment like airway, breathing rate (respiratory rate), heart rate and breathing sounds, personal safety measures regarding oxygen administration, secure flow meter connection to source of oxygen, Tubing adapter secure connection of flow meter and nasal cannula, flow of oxygen as prescribed.

Properly administering oxygen therapy is crucial in emergency situations. When using a nasal cannula, ensure that the prongs are correctly placed in the patient's nostrils and that the tubing is fitted around their ears to ensure a secure fit. On the other hand, when using a mask, place it over the patient's mouth and nose, securing a firm seal and tightening the straps around the head. In the case of a non-rebreather mask, partially inflate the reservoir bag before applying the mask. Additionally, it is essential to position the patient upright, as appropriate for their clinical condition, to ensure optimal oxygen delivery. Always monitor the patient's response to oxygen therapy and adjust the flow rate according to their needs.

Patient's response to administration of oxygen therapy like airway, breathing rate, proper pulse oximetry and dyspnea, interventions improvement as per institute additional need of patients, when administering oxygen therapy, it is crucial to consider variations across the lifespan. Infants and young children may require a lower flow rate and smaller prongs or masks to fit their small nostrils or head size. After administering oxygen therapy, it is essential to assist the patient to a comfortable position.

Safety measures should be ensured while leaving room: CALL LIGHT: Within reach, BED: Low and locked (in lowest position and brakes on), SIDE RAILS: Secured, Table: Within reach, ROOM: Risk-free for falls (scan room and clear any obstacles)

Perform hand hygiene again, Note down the finding of patient assessment and report special concern to agency policy.

Hospital ethical committee approved ethical consideration after evaluation of privacy of risk of participants. After explaining purpose and nature of study written informed consent was taken from all participating doctors. It was also explained to doctors that data of research will saved and used only for research purpose. Additionally, confidentiality and anonymity were assured for the doctors, who can quit participation at any time without any rationale. By adhering to these ethical principles, the researcher was able to ensure the safety and well-being of the study participants, as well as the validity of the research results.

Knowledge assessment was done at two times, 1st at the beginning of the study also named as pre-test assessment, and 2nd after the implementation of the educational program named post-test scoring. The

program was delivered in the emergency department of the pediatric unit. The primary objective of the program was to improve the knowledge of doctors regarding oxygen therapy. Secondary objectives were:

Understanding and describing respiratory anatomy, describe physiology of respiratory tract/system, define oxygenation, enlist indications of oxygenation therapy, modes of delivery, oxygen humidification, oxygen complication, oxygen toxicity, oxygen monitoring and interpretation of pulse oximetry, oxygen therapy at home, patients health education, doctors' role in oxygen delivery and toxicity.

Data analysis was performed using SPSS version 23. Data was tabulated as mean ± SD for numerical values and frequency percentages for categorical values. The T-test and chi-square test was applied to see the association among variables.

RESULTS

Overall, 266 doctors were included in our study, both sexes. There were 169 (63.5%) males and 97 (36.5%) females. (Figure. I). The mean test score and their significance of each question before and after educational program were shown in table. I.

Table No. I: The average test score of each question before and after implementation of educational program

Question	Pre-test score	Post-test score	p-value	Decision
1	0.73±0.44	0.61±0.48	0.004	S
2	0.76±0.42	0.67±0.47	0.017	S
3	0.69±0.46	0.70±0.45	0.830	NS
4	0.80±0.41	0.73±0.44	0.080	NS
5	0.65±0.47	0.67±0.47	0.924	NS
6	0.41±0.49	0.55±0.49	0.012	S
7	0.27±0.44	0.42±0.45	<0.001	S
8	0.43±0.49	0.56±0.48	0.004	S
9	0.71±0.45	0.72±0.44	0.677	NS
10	0.64±0.48	0.63±0.48	0.858	NS
11	0.41±0.49	0.43±0.49	0.443	NS
12	0.42±0.49	0.54±0.50	0.010	S
13	0.46±0.47	0.59±0.48	0.012	S
14	0.65±0.49	0.71±0.45	0.297	NS
15	0.56±0.48	0.68±0.46	0.004	S
16	0.47±0.50	0.41±0.49	0.171	NS
17	0.36±0.48	0.34±0.48	0.687	NS
18	0.64±0.48	0.64±0.48	1.000	NS
19	0.68±0.46	0.71±0.45	0.498	NS
20	0.70±0.46	0.52±0.50	<0.001	S

S=significant, NS=non-significant

The average test score before and after the implementation of educational program was 10.99±2.77 and 18.15±1.41, respectively. The average test score of post-test versus pre-test was greater and the difference

was statistically significant, (p<0.001). (Table. 2). The mean post test score of male and female doctors was 18.02±1.51 and 18.37±1.15, respectively. The difference was statistically insignificant, (p<0.050). (Figure. I).

Table No.2: The average test score of the doctors before and after implementation of educational program

	N	Pre-test score	Post-test score	p-value
Overall	266	10.99±2.77	18.15±1.41	<0.001
Male	169	11.46±2.63	18.02±1.51	<0.001
Female	97	10.17±2.83	18.37±1.15	<0.001

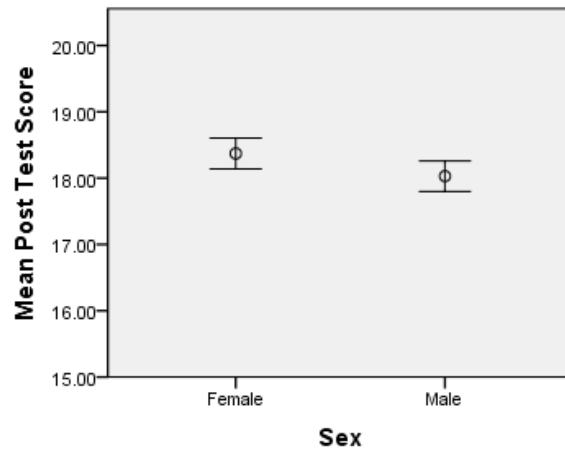


Figure No.1: Mean post test score according to sex distribution

DISCUSSION

Studies have shown that inadequate education and training of medical doctors can lead to the ineffective administration of oxygen therapy, resulting in poor patient outcomes¹². This lack of knowledge can lead to improper oxygen delivery, under or over-administration of oxygen, and failure to recognize and treat oxygen-related complications. Therefore, it is essential for medical professionals to receive proper education and training on oxygen therapy to ensure optimal patient care and outcomes¹³. Aloushan et al¹⁴ there is a significant gap in knowledge, attitude, and practice among healthcare workers when it comes to providing oxygen treatment. This gap may have adverse effects on patient well-being. The study recommended that healthcare professionals undergo comprehensive education and training programs to improve their understanding of oxygen therapy.

In our study a significant difference was observed regarding knowledge of oxygen therapy after training program. The average test score before and after the implementation of educational program was 10.99±2.77 and 18.15±1.41, respectively (p<0.001). A survey conducted by Ginsburg et al¹⁵ among clinicians

working in resource-limited countries revealed that 63% of clinicians in Africa, Asia, and South America do not use oxygen supplementation appropriately due to lack of training. This highlights the need for increased awareness and education regarding the proper use of oxygen therapy, particularly in resource-limited settings. In a study from Australia highlights the importance of appropriate oxygen delivery and doctor's education for patients at risk of Type II respiratory failure. The study found that as prescription rates increased and the number of patients at risk of Type II respiratory failure with saturation levels above 92% decreased from 47% to 18%. This was achieved through a multicomponent intervention, which included the implementation of a local hospital oxygen policy, introduction of a specific oxygen prescription chart, and targeted staff education.

In a study conducted by Stringer et al¹⁸, physicians' prescribing practices of palliative oxygen therapy were surveyed through a telephone survey. The study found that there was variability in prescribing practices among physicians, which was attributed to a lack of evidence and clear guidelines. Another study conducted showed the positive impact of educating healthcare professionals (HCPs) on the use of supplemental oxygen in acute settings. The study found that increased knowledge among HCPs was strongly associated with independent decision-making. This suggests that providing education and training to HCPs can improve their decision-making abilities and ultimately lead to better patient outcomes.

In another study it was reported that Prescribing and monitoring practice is suboptimal among physicians, a physiologic and multidisciplinary education program that focus on hazards and benefits of oxygen therapy is necessary¹⁹. This program should include information on how to properly administer oxygen, monitor its effects, and recognize and respond to complications. The study also recommends conducting randomized trials of such educational interventions to assess their effectiveness.

CONCLUSION

Regular practical and educational training sessions are necessary for doctors and health workers to stay updated on the latest guidelines for oxygen therapy. This will enable them to provide the best possible care to patients who require oxygen therapy. Additionally, doctors in various hospital units should carry out regular clinical audits of oxygen therapy. This audit should aim to review the indications, dose, and eventual outcome of patients who received oxygen therapy. By doing so, doctors can identify areas for improvement and ensure that patients are receiving the most appropriate and effective treatment.

Author's Contribution:

Concept & Design of Study:	Ghulam Mustafa
Drafting:	Ghulam Mustafa
Data Analysis:	Ghulam Mustafa
Revisiting Critically:	Ghulam Mustafa
Final Approval of version:	Ghulam Mustafa

Conflict of Interest: The study has no conflict of interest to declare by any author.

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