



EVALUATING THE DEGREE OF EXPERTISE IN OXYGEN THERAPY HELD BY NURSES AND TECHNICIANS IN THE INTENSIVE CARE UNIT (ICU) AND EMERGENCY

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Abstract:

Objective: This research aims to assess staff members' understanding of oxygen therapy (OT) in the ICUs and emergency departments at the Mayo Hospital in Lahore, Pakistan.

Methods: An analytical cross-sectional investigation was carried out between October 2022 and March 2023. Five components of a questionnaire were used to evaluate the understanding of oxygen therapy. Through the use of the universal sample approach, 96 individuals (17 technicians and 79 nurses) who worked in the emergency room and critical care units of the Mayo Hospital in Lahore were included. SPSS 26 was used to analyze the data.

Results: Each section of the knowledge tool evaluated a person's understanding of oxygen therapy. The study's findings revealed that, overall, 11.5 percent of the participants had a high understanding of oxygen therapy, 61.4% had a moderate understanding, and 27.1% had low knowledge.

Conclusions: The research found that technicians' and nurses' familiarity with using oxygen therapy fell short of the required level.

Keywords: oxygentherapy, ICU, nurse

DOI Number: 10.48047/nq.2023.21.6.NQ23072

NeuroQuantology2023;21(6): 686-694

Introduction:

Oxygen therapy, commonly referred to as oxygen supplementation, is a life-saving method used to treat hypoxia (low oxygen levels in the blood) and additionally, those who are experiencing carbon monoxide intoxication [1]. The majority of the healthcare system uses

oxygen treatment (OT), which is ranked as the safest and most effective medication on the World Health Organization's approved listing for essential medicines. It is a crucial tool for either patient evaluation and transfer or patient resuscitation during pre-hospital trauma.[2] The WHO lists oxygen treatment as one of the



essential medications that should be administered to patients who are in critical condition; however, the dosage requirements might change depending on the patient's state.[3,4] It has been shown via several research that improper oxygen supply may result in hypoxemia, respiratory issues, hyperoxemia, and unintentional death.[5,6] According to studies, long-term oxygen therapy (OT) involves giving patients with COPD oxygen supplementation for at least 15 hours a day. However, the benefits of this therapy are debatable. [7,8] 51.5% of participants, according to research, adhered to the advised oxygen strategy. It was shown in the same

research that only 27.9% of individuals accurately described the rationale for oxygen consumption. Most doctors (86%) and nurses (82.3%) provide accurate information on the measurements and monitoring required for oxygen treatment.[9] In contrast, in different research, nurses had an average accurate response rate of 58.28% when asked about their understanding of oxygen treatment. The research found that the hospital ICU lacked the recommended methodology for administering nasal oxygen. Studies on the understanding of oxygen treatment among nurses employed by hospitals are few [10,11,12].



Figure 1: Oxygen Therapy

The goal of this research was to ascertain the level of expertise in oxygen treatment among the nurses and emergency personnel employed by Mayo Hospital in Lahore, Pakistan.

Methods:

This study was carried out at the Mayo Hospital in Lahore, Pakistan, between October 2022 and March 2023. Acute oxygen therapy expertise among nurses and technicians employed in emergency and intensive care units was the focus of the investigation. 96 people that were selected via the universal sampling approach made up the sample size. To take part in the research, the subjects gave written permission.

A standardized questionnaire was utilized to gather data and assess the participants' understanding of acute oxygen treatment. The questionnaire included five sections: one on understanding oxygen, one on identifying hypoxemia, one on determining the need for acute oxygen treatment, one on understanding oxygen administration, and one on documenting oxygen delivery. The dependability of the instrument was determined to be 0.88, which indicates a good level of internal consistency.

The scoring approach for the questionnaire depended on Bloom's original threshold points,

which classified scores between 80 and 100 as indicating "good knowledge," 60 to 79 as "moderate knowledge," and less than 60 as "poor knowledge."

Data for the study were gathered and analyzed using accepted research techniques. The design of the research made it possible to gather information at a particular moment in time, giving an overview of the respondent's comprehension of acute oxygen treatment.

123 critical care nurses committed their time to take part in a study that examined their understanding of oxygen treatment as part of this study. There were 82 daring female nurses and 41 courageous male nurses among them, and all of them had a fierce enthusiasm for their line of work. They were between the ages of 19 and 37, with a mean age of 26.01 ±4.106. These extraordinary people were split into two groups: 61 worked in private hospitals and the remaining 62 in public ones. (Table1)

Results:

Table 1: Demographic information of the individuals included in the study

Characteristics		Mean	N (%)
Age		31.3	
Gender	Female		26(27.08)
	Male		70(72.92)
Department	Emergency		35(36.5)
	ICU		61(63.5)
Profession	Technician		17(17.7)
	Nurse		79(82.3)
Practicing period (Years)		6.9	
	More than 5 (years)		42(43.8)
	Up to 5 (years)		54(56.2)
Designation			
	Technician:		
	Senior		2(2.1)
	Technician		15(15.6)
	Nurse:		
	Cardiac		9(9.4)
	Head		12(12.5)
	Senior		10(10.4)
Registered		48(50)	
Has your institution a sufficient supply of oxygen?			
	No		10(10.4)
	Yes		86(89.6)
Length of time patients get oxygen treatment			
	More than one month		28(29.1)



	One week to one month		14(14.6)
	Less than a week		54(56.3)

Table 2: Participants' Oxygen Awareness

S.No	Oxygen Knowledge	FALSE		TRUE	
		n	%	n	%
1	Does oxygen encourage combustion?	22	22.9	74	77.1
2	If oxygen is utilized improperly, may it be harmful?	22	22.9	74	77.1
3	Only after a physician's advice would oxygen be administered.	41	42.7	55	57.3
4	Is oxygen a supportive treatment rather than a medication?	16	16.7	80	83.3
5	Is oxygen treated the same as any other medication?	57	59.4	39	40.6
	Recognizing Hypoxemia				
6	Adults with a SpO2 of 90% are hypoxemic.	12	12.5	84	87.5
7	Breathlessness isn't always a sign of hypoxemia?	30	31.2	66	68.8
8	Not all cases of breathlessness indicate hypoxemia, right?	21	21.7	75	78.1
9	Blood Gas Analysis is useful for confirming hypoxemia.	13	13.5	83	86.5
10	Can clinical indications of hypoxemia be used to diagnose it?	5	5.2	91	94.8
	Acute oxygen therapy indications include				
11	Breathing difficulty (>24/min in adults or 60 in newborns)	12	12.5	84	87.5
12	Children's agitation and convulsions	21	21.9	75	78.1
13	Eclampsia	31	32.3	65	67.7
14	Asymptomatic Anemia	45	46.9	51	53.1
15	Central Cyanosis	8	8.3	88	91.7

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The goal of the research was to gauge nurses' familiarity with oxygen treatment and its many facets. The findings were interesting. Only 11 of the 96 participants, including both nurses and

technicians, had a solid understanding of oxygen treatment. In contrast, the majority of participants—59 in total—had a moderate understanding of oxygen treatment, while the



remaining 26 had little or no understanding of it. With an average knowledge level of 83.1%, the research indicated that participants could identify hypoxemia with ease. Furthermore,

with an average knowledge percentage of 74.4%, the participants had a fair amount of information about the indications for acute oxygen treatment, covering several criteria.

Table 3: Understanding of the paperwork required for oxygen delivery

Documentation For Delivery of Oxygen	Answer	
	n	%
Which of the following information on a patient getting oxygen has to be recorded in the treatment/monitoring chart?		
Volume of oxygen	26	27.1
Concentration of nitrogen and oxygen	64	66.7
How Often You Administer	24	25
Oxygen Smell	8	8.3
Which of the following information on a patient getting oxygen has to be recorded in the treatment/monitoring chart?		
oxygen content	2	2
Source and Means of Delivering Oxygen	71	74
Solubility of Oxygen	23	24
Which of the following information on a patient getting oxygen has to be recorded in the treatment/monitoring chart?		
Rate of Oxygen Diffusion	0	0
Flow Rate of Oxygen or FI	70	72.9
Average		71.2

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Table 4: Information on Oxygen Delivery

Delivery of Oxygen	Answer with	
	n	%
Which of the above oxygen supply systems best fits the relevant statement?		
A 70% maximum oxygen concentration is provided by an oxygen concentrator.	8	8.3
Instead of a set dosage, oxygen prescriptions should be based on a desired saturation range.	41	42.7
Nasal catheter oxygen flow rates more than 5 L/min result in CO2 rebreathing.	38	39.6



Which of these devices is appropriate for oxygen delivery to achieve a goal saturation of 88–92% in a 72-year-old man with COPD who has CO₂ holding (type II respiratory failure)?		
oxygen mask with reservoir, 6- to 9 liters per minute	15	15.6
16 L/min nasal catheter	8	8.3
In the dearth of Venturi respirators, breathing catheter at 1-2 L/min	73	76
A 2-year-old kid who was experiencing type 1 respiratory distress was given the appropriate initial oxygen dose in order to reach a goal saturation of 94–98%.		
FiO ₂ of 150%	6	6.3
FiO ₂ of 20%	25	26
FiO ₂ of 60%	65	67.7
For patients getting oxygen by one of the following, humidification is crucial:		
tracheostomy or an endotracheal tube	37	38.5
an oxygen mask	27	28.2
nostril prong	32	33.3
Which of the following statements about weaning and stopping oxygen is true?		
If the patient is clinically stable while receiving high-dose oxygen, weaning from oxygen treatment should begin.	13	13.5
After a fresh chest radiograph shows no abnormalities, weaning and stopping oxygen treatment should begin.	21	21.9
If the patient is clinically stable while receiving low-dose oxygen, weaning and stopping oxygen treatment should be initiated.	62	64.6
Average knowledge		57.9

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The participants had an average knowledge level of 71.2%, according to the research, which also focused on the paperwork for oxygen supply. (Table3) But with a mean score of 57.9%, which was well below the threshold for adequate knowledge, their understanding of oxygen delivery was very poor in all respects. The evaluation of humidification, which was determined to have the poorest knowledge, was done at a rate of 38.5%, followed by the selection of adequate oxygen delivery equipment, which had a knowledge rate of just 42.7%.

Despite these results, the volunteers' commitment to their line of work and their patients never faltered. To ensure that they provide individuals in need with the greatest care possible, they consistently work to advance their knowledge and abilities. The survey acted as a wake-up call, pointing up the participants' knowledge gaps and the need for more education and training. Throughout the course of the research, the nurses' dedication to their line of work was clear, and their enthusiasm for giving excellent care would spur more developments in the critical care sector.

Discussions:

In hospital emergencies and intensive care units, oxygen therapy is the most crucial treatment given to patients. For nurses and technicians trying to save the lives of the patients, understanding its usage and other circumstances of a patient is crucial. A study found that 35.7% of nurses have experience providing oxygen to patients over a period of two to twelve months.[13] In our research, 56.3% of the nurses had just a month or less of experience giving oxygen to patients. In the current research, 89.6% of participants had the information necessary to give oxygen safely in their hospital, which was almost identical to another study's results (86.7%). [14] In the hospital ICU, a study found that the recommended procedure for administering nasal oxygen was missing.[15] Similarly to this, only 57.3% of participants in our survey were aware of the WHO/British recommendations for oxygen treatment, and the majority of them had read and used them in their daily work. The most crucial steps in preventing mortality are airway care, hence nurses and technicians must be adequately knowledgeable in this area. According to these results, the knowledge and abilities of emergency and intensive care unit employees were not ideal. Another research found that the participants (37.1%) understanding of oxygen delivery was quite poor. According to different research, 38.5% (1217/3611) of children who underwent oxygen treatment were not hypoxemic.[16] A study carried out in China found that, on average, nurses knew 58.28% of the facts about oxygen treatment. [17] These results support a study that found that, of 65 nurses, 73.8% had knowledge levels that might be classified as low, 21.1% as intermediate, and 3.1% as excellent. Only 26.2% of respondents properly identified oxygen indicators, 50.8% correctly identified the usual range of oxygen saturation, and 27.7% correctly answered questions regarding the physiology of the respiratory system.[18] In other investigations, the knowledge of nurses was also shown to be less

than a tenth within the tested sample at a sufficient level.[19] Our results on a score-basis show that 59 out of 96 participants (61.4%) had intermediate knowledge of oxygen treatment (average right answer for 60-79), compared to 11 out of 96 participants (11.5%) who had high knowledge of oxygen therapy (average accurate answer 80-100%). The other 26 individuals, or 27.1%, had an inadequate understanding of oxygen treatment (below 60% knowledge of oxygen therapy), despite working in emergency rooms and intensive care units.

Neonatal nurses were found to have an appropriate understanding of certain parts of oxygen treatment but insufficient awareness of other crucial areas of oxygen therapy, according to a different study on neonatal nurses.[20] In other research, it was discovered that nurses had poor levels of expertise. For example, 58% of nurses just followed a doctor's orders when it came to administering oxygen to a patient, while 50% of nurses in one study did not know whether a patient had hypoxemia, which would have required oxygen treatment.[21,22] There are also reports of a significant discrepancy in the oxygen treatment knowledge and skill performance of certified and student nurses.[23] The recommendations for clinical respiratory treatment should be incorporated into the curriculum of nurses to guarantee the right knowledge and abilities of oxygen therapy.[24,25]

To validate the general state of the information surrounding oxygen treatment, a broader investigation in several hospitals may be carried out.

Conclusions:

According to the results of our research, nurses' and technicians' understanding of how to employ oxygen therapy fell short of acceptable levels. Only 11.5% of the participants had strong knowledge, with the remaining participants having either moderate or low understanding. Similarly to this, the majority of them hadn't even read the WHO/British guideline's fundamental recommendations for using

oxygen treatment. The expertise of nurses and technicians in oxygen therapy may be improved via ongoing educational opportunities.

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