KNOWLEDGE REGARDING OXYGEN-THERAPY AMONG NURSES AND TECHNICIANS IN EMERGENCY AND INTENSIVE CARE UNITS OF TERTIARY CARE HOSPITALS, KARACHI

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ABSTRACT

OBJECTIVES

To determine knowledge regarding Oxygen Therapy (OT) among nurses and technicians working in ICUs & Emergency units in two tertiary care hospital, Karachi Pakistan.

METHODOLOGY

Cross sectional analytical study was conducted during September 2019 to February 2020. Questionnaire was used to assess knowledge regarding oxygen therapy which comprised of five sections. 96 participants (79 nurses and 17 technicians) working in emergency department and intensive care units of tertiary care hospitals, Karachi were included through universal sampling technique. The data was analyzed through SPSS 21.0

RESULTS

Knowledge of oxygen therapy was assessed on each part of the knowledge tool. The results of study showed that overall knowledge of oxygen therapy were; 11.5% of respondents had good knowledge, 61.4% moderate knowledge and 27.1% participants had poor knowledge of oxygen therapy.

CONCLUSION: *The study concluded that the knowledge of nurses and technicians regarding use of oxygen therapy was not up to the standards*

KEYWORDS: *Knowledge; Oxygen Therapy; Nurses; Technicians; Emergency Department*

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INTRODUCTION

Oxygen therapy also known as oxygen supplement is used as treatment of hypoxia (low oxygen level in blood) as well as for patients suffering with carbon monoxide toxicity and is lifesaving procedure.[1] According to World Health Organization recommended list for essential medicines; oxygen therapy (OT) is counted as safe and most effective drug used in most of the health care system. It is a key instrument in patients either in resuscitation during pre-hospital trauma, or in patients assessment and transportation.[2] WHO considers oxygen therapy as one of important enlisted medicine to be used in critical condition of patients; however administration requirement may vary from one patients condition to another.[2, 3] It is evident through different studies that incorrect oxygen administration may cause hypoxemia, respiratory problem, hyperoxemia and accidental death.[4,5] Studies show that long-term OT is the provision of oxygen supplement for minimum of 15 hours a day, however its benefit are controversial in patients with chronic obstructive pulmonary disease.[6,7] According to a study conducted in Tehran, Iran, 51.5% of participants followed a prescribed oxygen protocol. In the same

study it was concluded that only 27.9% participants defined the reasons for oxygen use correctly. Majority of the physicians (86%) and nurses (82.3%) give the correct answer of the necessary measurements and monitoring for oxygen therapy.[8] However, in a study conducted in China, the average correct answer regarding knowledge of Oxygen therapy among nurses was 58.28%. In the study, the guide line protocol of nasal oxygen administration was lacking in hospital ICU.[9] There is a dearth of studies on knowledge of oxygen therapy among nurses working in hospitals. The purpose of this study was to determine the knowledge of oxygen therapy among nurses and emergency technicians working in two public sector tertiary care hospital in Karachi, Pakistan.

METHODOLOGY

A cross sectional analytical study was conducted after getting approval from Institutional Review Committee (IRC) of Dow University of Health Sciences (DUHS), the study was conducted at two tertiary care hospitals (CHK and DUHK) Karachi, Pakistan from September 2019 to Feb 2020. The study included 96 nurses and technicians who worked in Emergency and ICUs. Participants were recruited through Universal sampling technique. A written consent was taken from the participants before the study. A structured questionnaire knowledge of acute oxygen therapy was used to collect data.[10] The reliability of the tool was 0.88. The questionnaire was divided into following sections: knowledge of oxygen, recognizing hypoxemia, indication for acute oxygen therapy, documentation for delivery of oxygen, and knowledge of oxygen delivery. The level of knowledge was categorized according to Bloom's original cut-off points used by Victoria , 80-100% indicates good knowledge, 60-79% indicate moderate knowledge and < 60% indicate poor knowledge.[3]The pilot testing of the tool was done on 10%participants in Sindh Government Hospital Liaquatabad, Karachi and the tool was modified accordingly.

RESULTS

A total of 123 critical care nurses participated in the study. Among them 41 (33.3%) were males and 82 (66.7%) were females. The mean age of the participants was 26.01±4.106 (Min = 19, Max = 37). Of the participants 61 (49.6%) were working in private hospitals and the remaining 62 (50.4%) were working in public sector hospitals (Table 1).

Table 1: Demographic Characteristics of the Participants

S. No	Characteristics	Mean ± SD	n=96	%age
1.	Age	31.3±7.1 years (range=35, 20-55 years)		
2.	Gender Male Female		 70 26	 72.92% 27.08%
3.	Department 1. ICU 2. Emergency		 61 35	 63.5% 36.5%
4.	Profession 1. Nurse: 2. Technician		 79 17	 82.3% 17.7%
5.	Practicing period Up to 5 years More than 5 years	6.9 ± 6.6 years	 54 42	 56.2% 43.8%
6.	Designation 1. Nurse: (out of 79) i. Registered nurse ii. Senior nurse iii. Head nurse iv. Cardiac nurse 2. Technician: (out of 17) i. Technician ii. Senior technician		 48 10 12 09 15 02	 50.0% 10.4% 12.5% 09.4% 15.6% 02.1%
7.	Period of administer oxygen therapy to patients 1. < 1 week 2. 1 weekto 1 month 3. >1 month		 54 14 28	 56.3% 14.6% 29.1%
8.	Does your institute have adequate supply of oxygen 1. Yes 2. No		 86 10	 89.6% 10.4%

Table.1: 96 participants (79 nurses and 17 technicians) working in emergency department and intensive care units of tertiary care hospitals, Karachi. Out of them 70 were males and 26 were females with mean age 31.3 ± 7.1 years.

Table 2: Knowledge of Oxygen in Participants

S.No	Knowledge of oxygen	True	False
1.	Oxygen is like any other medication?	39 (40.6%)	57 (59.4%)
2.	Oxygen is not medication but a supportive therapy?	80 (83.3%)	16 (16.7%)
3.	Oxygen should only be given after doctors" prescription?	55 (57.3%)	41 (42.7%)
4.	Oxygen may cause harm when used inappropriately?	74 (77.1%)	22 (22.9%)
5.	Oxygen promotes combustion?	74 (77.1%)	22 (22.9%)
	Average % of knowledge=50.8%		
	Recognizing Hypoxemia		
6.	Hypoxemia can be recognized by clinical signs?	91 (94.8%)	05 (5.2%)
7.	Blood Gas Investigation is helpful for validating hypoxemia	83 (86.5%)	13 (13.5%)
8.	Breathlessness is not always a sign of hypoxemia?	75 (78.1%)	21 (21.7%)
9.	Pulse Oximetry is a helpful in detecting and checking hypoxemia?	66 (68.8%)	30 (31.2%)
10.	SpO2 level < 90 % in adults define hypoxemia?	84 (87.5%)	12 (12.5%)
	Average percentage of knowledge=83.1%		
	Indication for Acute Oxygen Therapy include		
11.	Central Cyanosis	88 (91.7%)	08 (8.3%)
12.	Asymptomatic Anemia	51 (53.1%)	45 (46.9%)
13.	Eclampsia	65 (67.7%)	31 (32.3%)
14.	Restlessness and Convulsion in children	75 (78.1%)	21 (21.9%)
15.	Respiratory discomfort (>24/min in adult or 60 in neonate)	84 (87.5%)	12 (12.5%)

The study result shows the knowledge of oxygen therapy on each part of the knowledge tool as 11 out of 96 participants had good knowledge of oxygen therapy whereas 59 had moderate knowledge of oxygen therapy. The remaining 26 participants had poor knowledge of oxygen therapy. However, knowledge regarding recognizing hypoxemia was found good in participants as average knowledge of it was 83.1%, Knowledge regarding indication for acute oxygen therapy includes different parameters was also found moderate as average percentage of knowledge regarding it was found 74.4%.

Table 3: Knowledge Regarding Documentation For Delivery of Oxygen

Documentation For Delivery Of Oxygen	Answer with %age
1. Which of the following should be documented in the Treatment/Monitoring Chart of a patient receiving oxygen? **a)** Oxygen Volume **b)** Oxygen Flow Rate or FI **c)** Oxygen Diffusion Rate	26(27.1%) 70(72.9%) 00(0.0%)
2. Which of the following should be documented in the Treatment/Monitoring Chart of a patient receiving oxygen? **a)** Oxygen Solubility **b)** b) Oxygen Source and Delivery Device **c)** c) Oxygen Density	23(24.0%) 71(74.0%) 02(2.0%)
3. Which of the following should be documented in the Treatment/Monitoring Chart of a patient receiving oxygen? **a)** Oxygen Odour **b)** Frequency of Administration **c)** Oxygen and Nitrogen Concentration	24(25.0%) 64(66.7%) 8(8.3%)
Average knowledge was =71.2%	

Regarding documentation for delivery of oxygen, the average knowledge was found 71.2% (table 3).

Table 4: Knowledge Regarding Oxygen Delivery

Oxygen Delievry	Answer with %age
1. Which one of the following oxygen delivery device matches the appropriate statement? **a)** Nasal catheter oxygen flow rate >5L/min lead to rebreathing of CO2. **b)** Oxygen pre scription should be to a target saturation range rather than a fixed dose **c)** Oxygen concentrator delivers maximum oxygen concentration of 70%	38 (39.6%) 41 (427%) 08 (08.3%)
2. A 72-year-old planter with COPD has CO2 holding (type II respiratory failure), which of this instrument is suitable for oxygen supply accomplish a target saturation of 88-92%? **a)** Nasal catheter at 1-2 L/min/ in the absence of Venturi masks **b)** Nasal catheter at 16 L/min **c)** Oxygen mask with reservoir 6-9L/min	73 (76.0%) 08 (08.3%) 15 (15.6%)
3. 2-year-old boy had type 1 respiratory distress, choose one right initial dosage of oxygen to attain a target saturation of 94-98%. **a)** FiO2 of 60% **b)** FiO2 of 20% **c)** FiO2 of 150%	65 (67.7%) 25 (26.0%) 06 (06.3%)

4.	Humidification is essential for patients receiving oxygen through one the following: **a)** Endotracheal tube or a tracheostomy **b)** Nasal Prong **c)** Oxygen mask	37 (38.5%) 32 (33.3%) 27 (28.2%)
5.	Regarding weaning and discontinuation of oxygen which of the following statement is correct? **a)** Weaning and discontinuation of oxygen therapy should be started if clinically stable on low-dose oxygen **b)** Weaning and discontinuation of oxygen therapy should be started after a new Chest Radiograph is normal **c)** Weaning of oxygen therapy should be started if clinically stable on high-dose oxygen	62 (64.6%) 21 (21.9%) 13 (13.5%)
Average knowledge was 57.9%		

Knowledge of oxygen delivery was very low in all aspect with mean score of 57.9% which is much below the level of satisfactory knowledge. The worst knowledge was regarding humidification assessment which was found as 38.5% followed by knowledge regarding selection of appropriate oxygen delivery device which was also just 42.7%.

DISCUSSION

Oxygen therapy is the most important therapy received by patients in emergencies and ICU's of a hospital. The knowledge regarding its use and other conditions of a patient is essential for nurses and technicians working to save the lives of the patients. According to a study , 35.7% nurses had experience of administration of oxygen to the patients for 2-12 months.[11] In our study, 56.3% nurses have only less than one-month experience of administration of oxygen to the patients. In the present study the knowledge for proper supply of oxygen delivery in their hospital was 89.6% which was almost similar (86.7%) to the study conducted by Aloushan etal .[2] A study reported that the guideline protocol of nasal oxygen administration was lacking in hospital ICU.[9] Similarly, in our study only 57.3% were aware regarding WHO/British guidelines on oxygen therapy and most of these participants had also read and applied it in their practice. It is essential for nurses and technicians to have sufficient knowledge regarding airway management, the most important measures to prevent mortality. These findings suggest that emergency and ICU personnel's knowledge and skills was not desirable.[12] Another study also reported the knowledge of oxygen administration (37.1%) among participants as very low.[13] Similarly another study also noted that 38.5% (1217/3161) of children who received oxygen therapy were not hypoxaemic.[14] According to a study conducted in China, the average correct answer regarding knowledge of Oxygen therapy among nurses was 58.28%.[9] These findings are consistent to a study which reported that among 65 Nurses, 73.8% had a level of knowledge classifiable as poor, 21.1% moderate and 3.1% good. Only 26.2 % of the respondents gave the right answer about oxygen indications, 50.8% gave the correct answer about normal range of oxygen saturation and 27.7% responded correctly questions related to the physiology of respiratory system.[15] Other studies also found nurse's knowledge as less than tenth among the studied sample of satisfactory level.[16] According to our findings on score basis, 11 out of 96 participants (11.5%) had good knowledge of oxygen therapy (average correct answer 80-100%) whereas 59 (61.4%) had moderate knowledge of oxygen therapy (average correct answer for 60-79). The remaining 26 participants i.e. 27.1% had poor knowledge of oxygen therapy (below 60% knowledge of oxygen therapy) even though they were working in emergencies and ICU's.

A study from Turkey on neonatal nurses, determined that Neonatal nurses had adequate knowledge on some aspects of oxygen therapy, but had incomplete knowledge in some vital issues for oxygen therapy.[19] Other studies also noted low level of nurse's knowledge as half of the nurses, in one study did not know if a patient is with hypoxemia it indicated the use of oxygen therapy whereas 58% nurses only followed the instruction of a doctor for given oxygen to a patient.[20] Significant difference is also reported between the knowledge and skill performance of qualified and student nurse regarding oxygen therapy.[21] To ensure the accurate care of patients; the guidelines for clinical respiratory therapy should be included in the curriculum of nurses to get proper knowledge and skills of oxygen therapy.[22,23]

LIMITATIONS

A larger study in different hospitals may be conducted to confirm the overall situation of the knowledge regarding oxygen therapy

CONCLUSION

Our study concluded that the knowledge of nurses and technicians regarding use of oxygen therapy

was not up to the standards. Only 11.5% participant's knowledge was good whereas remaining had either moderate or poor knowledge. Similarly, most of them had not even read the basic WHO/British guideline for implementation of oxygen therapy. Continuous educational sessions can improve the nurses and technicians knowledge regarding Oxygen Therapy.

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REFERENCES

1. Olive S. Practical procedures: oxygen therapy. Nursing Times. 2016, 13-19;112(1-2):12-14.
2. Aloushan AF, Almoaiqel FA, Alghamdi RN, Alnahari FI, Aldosari AF, Masud N, et al, Assessment of knowledge, attitude and practice regarding oxygen therapy at emergency departments in Riyadh in 2017: A cross-sectional study, World. 2019; 10(2): 88–93.
3. Didi U, Victoire, Knowledge, attitudes and practice among nurses toward oxygen administration to the critically ill patients [dissertation]. University of Rwanda, 2017. http://hdl.handle.net/123456789/421
4. Renda T, Corrado A, Iskandar G, Pelaia G, Abdalla K, Navalesi P. High-flow nasal oxygen therapy inintensive care and anaesthesia. British journalofanaesthesia. 2018;120(1):18–27.
5. Girardis M, Busani S, Damiani E, Donati A, Rinaldi L, Marudi A, et al. Effect of Conservative vs Conventional Oxygen Therapy on Mortality Among Patients in an Intensive Care Unit: TheOxygen-ICU Randomized Clinical Trial. Jama. 2016; 316(15):1583–9.
6. Hardinge M, Annandale J, Bourne S, Cooper B, Evans A, Freeman D, et al. British Thoracic Society Home Oxygen Guideline Development Group; British Thoracic Society Standards of Care Committee. British Thoracic Society guidelines for home oxygen use in adults. Thorax. 2015;70(1):1–43.
7. Ekström M. Clinical usefulness of long-term oxygen therapy in adults. N Engl J Med. 2016;375(17):1683–4.
8. Goharani R, Miri MM, KouchekM, Sistanizad M, Familiarity of Physicians and Nurses with Different Aspects of Oxygen Therapy; a Brief Report Emergency. 2017; 5 (1): e39
9. Wen Z, Chen J, Bian L, Xie A, Peng M, Li M, et al. The nasal oxygen practice in intensive care units in China: A multi-centered survey. PLoS ONE,2018;13(8): e0203332.
10. Arslan FT , Özkan S , BedriyeAk , Muslu GK, Neonatal Intensive Care Nurses" Opinion on Oxygen Therapy: A Survey Conducted In Turkey , J Contemp Med 2017; 7(2): 184-92.
11. Alikhanizadeh H, Sabouhi F, Haghani F, Yusefi HA. A study of emergency medical technicians' cognitive and practical skills in airway management and its relationship with some related factors in emergency medical centers selected in Isfahan in the year 2015–2016. Ann Trop Med Public Health 2017;10:1691-7
12. Nandasena G, Abeysena C. Knowledge, attitudes and skills of doctors, nurses and emergency medical technicians in pre-hospital care and emergency medicine who accompany patients in ambulances which arrive at the National Hospital of Sri Lanka. Int J ClinAnesth Res. 2018; 2: 38-43
13. Bakarea AA, Grahama H, Ayedea AI, Peeld D, Olatinwoe O, Providing oxygen to children and newborns: a multi-faceted technical and clinical assessment of oxygen access and oxygen use in secondary-level hospitals in southwest Nigeria, Int Health,2019: 2-9, doi:10.109/inthealth/ihz009
14. Victoire UD, Knowledge, attitudes and practice among nurses toward oxygen administration to the critically ill patients at UTHK, 2017, http://hdl.handle.net/123456789/421
15. Mayhob MM, Nurse's Knowledge, Practices and Barriers Affecting a Safe Administration of Oxygen Therapy, JHSN,2018;7(3): 42-51
16. Michael DG, Eric R, Changing the Emergency Department's Practice of Rapid Sequence Intubation to Reduce the Incidence of Hypoxia, Advanced Emergency Nursing Journal, 2017:39(4):

266–79
17. Khosravi N, Khalesi N, Sobouti B, Hasankhani S, Ghavami Y, Ghjaeimi H. Evaluation and Improvement of Knowledge of Medical staff on Pulse Oximetry in Educational Hospital. 2018(10 Feb);4(1):11-17
18. Mahmoud AHO, Alseed HAHF, Awad HMAA, Ahmed AH, Elhussain GEMO, assessment of knowledge and practice of nurses regarding oxygen therapy in elmaknimir university hospital,EJPMR, 2016,3(4), 30-35
19. Alikhanizadeh H, Sabouhi F, Haghani F, Yusefi HA. A study of emergency medical technicians cognitive and practical skills in airway management and its relationship with some related factors in emergency medical centers selected in Isfahan in the year 2015–2016. Ann Trop Med Public Health 2017;10:1691-7
20. Arslan FT , Özkan S , BedriyeAk , Muslu GK, Neonatal Intensive Care Nurse's Opinion on Oxygen Therapy: A Survey Conducted In Turkey , J Contemp Med 2017; 7(2): 184-92.
21. Mahmoud AHO, Alseed HAHF, Awad HMAA, Ahmed AH, Elhussain GEMO, assessment of knowledge and practice of nurses regarding oxygen therapy in elmaknimir university hospital,EJPMR, 2016,3(4), 30-35
22. Bowling AM, Underwood PW, Effect of simulation on knowledge, self-confidence, and skill performance in the USA: A quasi-experimental study, Nursing and Health Science Journal, 2016; 18(3):292-8
23. Johnson AM, Smith SMS, Respiratory clinical guidelines inform ward-based nurse's clinical skills and knowledge required for evidence-based care, Breathe, 2016; 12: 257-66

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