IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 9, Issue 3 Ser. IV (May - June 2020), PP 49-55
www.iosrjournals.org

Effect of Implementing Oxygen Administration Guidelines on Nurses'Performance Caring for Patients with Chest Disorders

[1]Heba Ahmed ELgneid, [2] Wafaa Ismail Sherief, [3]Madiha Hassan Nabih Mohamed.

[1]*B.Sc.Nursing, Faculty of Nursing, Mansoura University, Egypt.*
[2]*Professor of Medical-Surgical Nursing, Faculty of Nursing, Mansoura University, Egypt*
[3]*Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Mansoura University, Egypt*

Abstract:
Oxygen therapy is widely available and commonly used in treatment of hospitalized patients with chest disorders. So, the nursing staff should have oxygen therapy related knowledge and practice based on educational guidelines. ***Methodology****: Quasiexperimental research design was utilized in this study andconducted at the chest department of Mansoura University Hospital (MUH).* ***Tools: I****Socio-demographic Data & Nurses knowledge about oxygen administration questionnaire sheet.* ***Tools: II****Performance checklist related to oxygen therapy administration.* ***Sample****: all available nurses (70) who provide direct care for patients with chest disorders in chest department with various age, qualifications, years of experience, different level of education, and agree to participatein the study.* ***Result****: There was a statistically significant increase in total mean score of knowledge and practice after application of oxygen therapy related educational guidelines****(p=<0.0005).*** ***Conclusion****: This study represents highly statistically significance increaseinnurses knowledge and practices scores after application of oxygen therapy relatededucational guidelines.* ***Recommendation****: This study recommended continuous educational programs on regular basis to nurses regarding oxygen therapy based on updated guidelines to improving their knowledge and practice and achieve high quality of care.*

Key Wards: *Chest Disorders, Guidelines, Nurses performance, Oxygen Administration****.***

Date of Submission: 13-05-2020 Date of Acceptance: 26-05-2020

I. Introduction

Oxygen therapy is a treatment that provides oxygen for patient with more concentration than in environment[(1)]**.** Oxygen therapy aims to reach an ideal arterial oxygen tension using the lowest possible amount of oxygen, without any toxic effects[(2)]**.**Oxygen should be deliberated as a drug that is approved and ordered for specific conditions, with a standard target saturation and regular monitoring of the patient's reaction[(3)].

Oxygen delivery devices available in different forms [(4)]**.**The choice of delivery device is complex based on clinical assessment, which depend onneeded oxygen saturation level, underlying respiratory disorder, patients' age, the need for humidity, and patients' tolerance. Patients can be harmed by receiving too little or too much oxygen[(5)].

While there are numerous benefits to oxygen therapy, there are similarlydangers and side effects that complicate the disease course or even worsen clinical outcomes[(6)].Therefore, it requires constant monitoring of the dose, concentration, and side effects to ensure its safe and effective use**[(7)]**.This might suggest that health-care professionals especially nurses would be knowledgeable and familiar with its uses and limitations**.**So, it should be administered cautiously and according to the safety guidelines**[(8)]**.

Guideline offers a standardized framework that can be adopted in all areas where oxygen is provided in the acute setting. Which promote best practice, provide clarity in clinically complex situations, standardize service delivery and care of patients requiring oxygen therapy, reduce inappropriate prescribing, act as a basis for audit and evaluation of current service provision, and encourage improved interaction between healthcare professionals to ensure continuity of care for this patients group**[(9)]**.

Significance of the study

Chest disorders show increase in prevalence worldwide generally and in Egypt specifically about 5 million people suffer from asthma, 4 million suffer from COPD and 1.5 million people suffer from TB. This high incidence of chest disorders divert our attention to the importance of nursing care that including oxygen administration in right way based on international guidelines **(World Health Organization (WHO). 2016)[(10)]**.

Study Aim

This study aimed to assess effect of implementing oxygen administration guidelines on nurses' performance for patients with chest disorders.

Study Hypothesis

There will be improvement in nurses'performance after implementation of oxygen administration guidelines.

Subjects and Method

Study design

Quasi-experimental study design was utilized in this study.

Study settings

This study was conducted in chest department at Mansoura University Hospital

Study Subjects

All available nurses (70 nurses) working in chest department with various ages, years of experience and level of education were recruited to the current study.

Tools of data collection

Two tools were used to collect the necessary data.

Tool I: interview questionnaire sheet:

It was developed by the researcher after reviewing the recent related literature and consisted of two parts

part 1:represents socio-demographic characteristics of nurses such as age, sex, level of education, occupation, and years of experience**.**

Part2:representsnurses' knowledge about oxygen administrationwhichincluding oxygen therapy definition, types, methods, procedure, indication, contraindication, complication… etc and nursingrole before, during and after oxygen therapy.

Tool II: Observational checklist:

This tool adopted from (British Thoracic Society (BTS) Guideline 2017) **(O'Driscoll et al, 2017)**[(11)]Which developed by BTS Emergency Oxygen Guideline Development Group. To evaluate the nurses' practice of oxygen administration for patients with chest disorders.

This guideline consisted of 5 sections which included (55) steps:-

1- Oxygen Administration and Weaning protocol….. 11steps.

2- Administering acute oxygen therapy…….. 15steps.

3- Equipment used in the delivery of oxygen…… 20 steps.

4- Monitoring of patient……. 4 steps.

5- Health and safety ……5 steps.

Operational Design

The operational design includes the preparatory phase, ethical consideration, validity and reliability, pilot study, and field work.

1. Preparatory phase

After review of the recent scientific literature the researcher used these literatures as a guide for developing tools for data collection, and preparing teaching materials which are used in this study.

2. Ethical consideration

Ethical agreement was gotten to complete the study from ethics committee prior to initiation of the study, the researchers presented themselves to all participants, and the aim of the study was explained in order to gain their cooperation. Confidentiality of data was assured. The researcher assured that participation in the study was voluntary and they have the right to withdraw at any time.

3. Validity of the tools

Validity of the tools were assessed by a panel of five experts in the field of the study from medical- surgical nursing as a jury to test the study tools for content validity, completeness, feasibility and clarity of the items. Accordingly, all the necessary modifications were done. Also, educational booklet was reviewed by jury to ensure correct Arabic translation. Suggestions were followed and booklet was modified as indicated.

4. Reliability

Reliability was measured to evaluate whether all items on the study instruments measure the same variable, and how well the used items fit together conceptually. Reliability was tested by using Cronbach,s Coefficient Alpha test and value were as follow; knowledge questionnaire (0.70) and observational checklist (0.83).

5. Pilot study

A Pilot study was carried out on 10% (7 nurses) of study sample to test feasibility, objectivity, clarity and the applicability of the study tools, as well, and identify difficulties that may be encountered during the application of the study. Pilot sample was included in the main study sample because of limited number of nurses in chest department and to strength the results of the study.

6. Field work

The framework of the study was carried out according to 4 phases as the following:

Phase I: preparatory phase (assessment):

The researcher introduced herself to the nurses, gave them brief explanation about the aim of the study to obtain cooperation as well as their verbal consent. Each nurse was interviewed in order to collect the baseline data using tool I part1. The researcher assessed nurse's knowledge about oxygen therapy through tool I part (2) and then investigated their practice about oxygen therapy for patients with chest disorders through tool II. This pretests were done to evaluate the level of knowledge and practices of the studied group who caring for patients with chest disorders before starting education.

Phase II: planning phase:

Based on the previous step the researcher assessed the educational needs of the subject group related to oxygen therapy based on BTS guidelines 2017. The main aim of educational guidelines was to improve knowledge and practices of nurses related to oxygen therapy for patients with chest disorders through educational simple colored Arabic booklet. It included definition of oxygen therapy, target oxygen saturation, indications, contraindications, signs and symptoms of CO_2 retention, methods of oxygen therapy, procedures of oxygen therapy, monitoring of patients, Health and Safety and humidification.

Phase III: Implementation phase:

The implementation ofOxygen TherapyEducational Guidelines considered for this study has been carried out in nursing room of chest departmentwithin the nursesworking hours. It took three months from middle of December 2017to the end of March 2018.

Subjects were divided into (7 groups), each group consist of 10 nurses according to the total number of nurses (70).Each group obtained the three sessions through two weeks, and each session took 20-30 minutes.

1- **First session** was included introduction about oxygen, definition, indications, contraindications, signs and symptoms of CO_2 retention, methods of oxygen therapy (define each method, oxygen concentration, flow rate, indications, contraindications, advantages and disadvantages.

2-**Second session** included the explanation of oxygen administration procedure, equipment used in oxygen administration, summary of administration and weaning protocol, patients monitoring, health and safety and humidification.

3- **Third session** the researcher reviewed what have been taught to the nursing staff during the previous sessions and assessed their ability to apply what have been learned on the patient.

Phase IV: Evaluation phase:

The evaluation phase focused on determining the effect of the educational guidelinesusing (Tool I) part 2 knowledge sheet and (Tool II) observational checklist after implementing educational guidelines (posttest). The results were compared to determine the impact of the educational guidelines on nurses' knowledge and practice.

Statistical analysis

Data will be collected, then entered, processed, and analyzed using IBM-SPSS software (version 21.0). Qualitative data were expressed as count and percent. Quantitative data were initially tested for normality using Kolmogorov-Smirnov and Shapiro-Wilk's test with data being normally distributed if $p>0.050$. Quantitative data were expressed as mean ± standard deviation (SD) if normally distributed or median and interquartile range (IQR) if not.

II. Results

Table (1): presents distribution of the studied sample according to their socio-demographic characteristics. It was observed that, more than two thirds of studied nurses (71.4%) aged 20- 30 years with mean age was 26.6 ± 4.4 years. Only on third (30%) were highly educated (bachelor degree), and half of them (50%) graduated from technical institute of nursing. mean years of experience were 5.7 ± 4.6 years, with more than half (52.9%) had less than five years' experience. The same table denotes that, more than one third (42.9%) attending oxygen therapy related workshops, of them one quarter (25.7%) attending only one workshop.

Table (2) demonstrates mean knowledge and practices scores of the studied nurses before and after educational guideline. It can be noticed that, an improvement in nurses' total mean score of knowledge and practice (17.7 ± 4 and 58.5 ± 2.3 respectively) after applying educational guidelines compared to their baseline total mean score (5.3 ± 3.2 and 28.4 ± 4.4), represents highly statistically significance difference ($P=<0.0005$).

Figure (1): Illustrates that, the majority (97. 1 %) of the studied nurses had unsatisfactory knowledge before educational intervention. However, after intervention the most (91.4%) of them had satisfactory knowledge.

Figure (2): Illustrates that, only one third (31.4%) of the studied nurses had competent practices before educational guidelines. However, after intervention changed to be (94.2%).

Table (3)reflects that, there were negative, highly statistically significant correlations between nurses' total knowledge, total practices scores and between their age, educational level, years of experience, and workshop attendance before and after educational guidelines.

Table (1): Distribution of nurses according to their socio-demographic Characteristics (N = 70).

Socio demographic data	Studied group (n = 70)	
	%	No
Sex		
Female	63	90
Male	7	10
Age		
20<30	50	71.4
30<4	20	28.6
Mean ± SD	26.6 ± 4.4	
Min – Max	21-36	
Median	26	
Education level		
Secondary nursing school	12	17.1
Nursing institute	35	50
Bachelor of nursing	21	30
Post graduate	2	2.9
Years of Experience		
<5	37	52.9
5<10	16	22.9
10<15	15	21.4
15 & more	2	2.8
Mean ± SD	5.7 ± 4.6	
Min – Max	1-16	
Median	4	
Training courses		
one	18	25.7
two	6	8.6
three	4	5.7
four& more	2	2.9

Table (2): Mean knowledge and practices scores of the studied nurses before and after educational guideline (n= 70).

	Total knowledge score		Total practice score		
	pretest	**Posttest**	**pretest**	**Posttest**	**P**
Mean ± SD	5.3 ± 3.2	17.7 ± 4	28.4 ± 4.4	58.5 ± 2.3	
Median (IQR)	5 (2-8)	18.5 (15.75-21)	26.5 (25-32)	59 (57-60)	
Minimum-Maximum	0-11	8-22	23-39	54-62	**<0.0005**

Figure (1): distribution of the studied nurses (%) according to their total knowledge scores before and after application of educational guideline (n= 70)

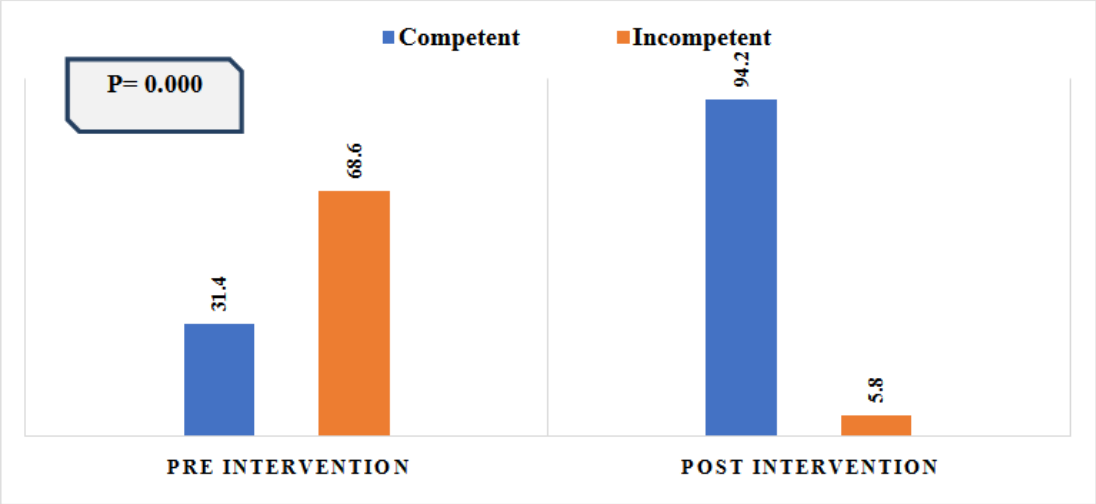

Figure (2): distribution of the studied nurses (%) according to their total practice scores before and after application of educational guideline (n= 70)

Table (3): correlation between studied nurses' knowledge and practice scores pre and post educational guidelines with different variables

variables		age		Experience		Educational level		Workshop attendance	
		r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
Knowledge	Pre-intervention	0.325	**0.006***	0.263	**0.028***	0.310	**0.009***	0.196	0.105
	Post-intervention	0.141	0.243	0.149	0.219	0.124	0.305	0.072	0.553
Practice	Pre-intervention	0.292	**0.014***	0.224	**0.052***	0.272	**0.023***	0.077	0.529
	Post-intervention	0.153	0.206	0.035	0.777	0.338	**0.004***	0.304	**0.011***

III. Discussion:

Nurses have a dynamic role in health care team in ensuring proper oxygen saturation for patients, recognize how oxygen is transported in the body and which oxygen delivery devices and approaches work best to deliver oxygen into the lungs. They must also recognize the dangers and side effectsof oxygen therapy and the risks of hyperoxia and be aware of consequences for oxygen delivery to acutely ill patients **(Siela& Kidd, 2017**)[12].

This study aimed to evaluate the effect of implementing oxygen administration guidelines on nurses' performance caring for patients with chest disorders.

In the present study, the majority of studied sample wasfemalesand aged 20- 30 years. Only on third were highly educated (bachelor degree), and half of them graduated from technical institute of nursing. Mean years of experience were 5.7 ± 4.6 years, with more than half had less than five years' experience. More than one third attending oxygen therapy related workshops, of them one quarter attending only one workshop.

This study results showed that the majority of nurses had unsatisfactory knowledge and incompetent practice about oxygen therapy before implementation of oxygen therapy related educational guidelines. This may be attributed to decreasedyears of experience, absence of written protocol of oxygen administration and lack of training courses about oxygen therapy. In agreement with this results**Cousins, Wark& McDonald, (2016)&Mayhob, (2017)**[13, 14] they notified thatlow educational level, absence of awareness of significance of oxygen therapy, and deficiency of the nursing staff in comparison to the number of the patients are resulting in presence of low level of knowledge among nursesregarding oxygen therapy.

In the same line **Kord et al, (2015) & Lema et al, (2017)**[15, 16] noted that, nearly half of their studied sample had inadequate practice due to lack of training program resulting in decreased nurses' awareness regarding the importance of oxygen therapy and the right way toadminister oxygentherapy. The result is not context with **Hemati et al (2016)**[17] who reported that, most of their studied sample had favorable performance of oxygen administration. This may be correlated to educational level asthe majority of their studied nurses had bachelor degree.

In posttest nurses' knowledge wasimproved after implementation of educational guidelines to high satisfactory level and become more competent in oxygen therapy. Our finding in agreement with**Kavitha&Ninaganagouda, (2015**)[18]who clarified that, the majority of nurses accept more knowledge and enhanced practice after structure educational program and showed that need based training is effective in enhancing knowledge regarding oxygen therapy. Also, **Dogan, & Ovayolu, (2017)**[19]statedthatthe nursing staff

should beknowledgeableabout oxygen therapy to ensure nontoxic and effective administration of oxygen therapy.

In addition, **Goharani, Miri, Kouchek&Sistanizad, (2017)**[20]revealed that, emphasis on training courses of nurses; and constant and effective monitoring on knowledge and performance should be applied. Also**Doyle & McCutcheon, (2015)**[21]clarified that all nurses involved in the administration of oxygen should be aware of all steps that should be done for the patient throughout oxygentherapy administration to ensure safe and effective administration.

Our study result showed that, there were significant correlation between nurses' practice and knowledge with age, experience and education. This finding explicated as the better the education the better the nurses' practice. This result supported by**Kord et al, (2015)**[15]who revealed significant correlation between practice withyears of experience and age. Since an increase in age is directly correlated with increased nurses' experience and performance that expected to improve over time as they gain more and more experience. This result in the same line with **Mayhob, (2017)**[22]who revealed that, there was statistically significant correlation between nurses' level of knowledge and performance with their age as well as education. In addition **Hemati et al (2016)**[17]documented significant correlation between practice and age. Conterary to our results K**avitha&Ninaganagouda, (2015) and Derakhshanfar et al,(2017)**[18, 23]reported that, no significant correlation between nurses' knowledge and socio demographic variables including age, sex and experience.

IV. Conclusion

This study represents highly statistically significance improvement in nurses' knowledge and practices scores after implementation of O_2 related educational guideline.

V. Recommendations

This study recommended that, providing continuous educational programs regarding O_2 therapy on regular basis aimed to improve nurses' knowledge and practice to achieve high quality of care based on updated guidelines.

Limitation of the Study

Workload of the nursing staff in chest department.
Limited number of nurses in chest department.

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Heba Ahmed ELgneid, et. al. "Effect of Implementing Oxygen Administration Guidelines on Nurses'Performance Caring for Patients with Chest Disorders." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 9(3), 2020, pp. 49-55.