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ASSESSMENT OF NURSES' KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT OXYGEN THERAPY IN EMERGENCY AND ICU DEPARTMENTS OF OROTTA NATIONAL REFFERAL HOSPITAL

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ABSTRACT

Background: One of the most and frequently used nursing procedure and highly problematic in developing countries is oxygen therapy. However, there are significant gaps regarding oxygen therapy despite their frequent use. It is reported that, Maximum percent of oxygen delivery and flow rates are particularly poor, with potential negative impact on patient care including delivering too little oxygen in emergencies, leading to CO2 retention[1]. It is noted that oxygen deficiency leads to deleterious effects on all organs of the body and it causes cell dysfunction and death[2,3]. The objective of this study was to assess knowledge, attitude and practices of nurses about oxygen therapy at Orotta National Referral Hospital. **Methodology:** A cross-sectional descriptive study design was used. The target population was all nurses working in the emergency and ICU department of the Orotta National Referral Hospital (ONRH) and total enumerative method was used. A self-administered structured questioner was used to assess nurses' knowledge and attitude about oxygen therapy and observational checklist was used to assess their practice in comparison with the widely used oxygen therapy guidelines in nursing standards. Data was entered in to SPSS and descriptive statistics was used to compare results among the study groups using frequency distribution count, percentages, and cross tabulation. **Results:** Among 60 nurses included in the study, 81.7% were females. The mean age was 25 years. The mean percentage score on knowledge, attitude and practice were 40%, 60% and 60% respectively. Knowledge, attitude and practice on oxygen therapy was good in 43.3% for knowledge; 63.3% for attitude; 45% for practice respectively. It was found out that poor knowledge, attitude and practice on oxygen therapy were attributed due to lack of training, availability of oxygen therapy guidelines, and adequate supply of oxygen and delivery devices by 45%, 35%, 70%, and 61.7% of the respondents respectively. **Conclusion:** This study showed that there was a gap in knowledge, attitude and practice among the participants. Some of the possible factors were also identified which includes lack of oxygen therapy training and guideline and work load.

KEYWORDS

Nurses, Oxygen therapy, Knowledge, Attitude and Practice.

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INTRODUCTION

Backgrounds

Oxygen therapy is a medical treatment used for tissue hypoxia. It is prescribed to improve oxygen supply and reduce the work of breathing. It has the potential to improve medical outcomes and save

lives when used appropriately and to cause harm if used inappropriately. It is projected that there are close to 800,000 patients receiving long-term oxygen therapy (LTOT) in the United States, at a cost of approximately $1.8 billion annually[4]. Four million newborns are annually born in the USA, 12.5% of whom are preterm births[5], demonstrated that the length of oxygen delivery was correlated with incidence of retinopathy in infants[6]. Records at the Karle-Bu Teaching Hospital (KBTH), Ghana, indicate that the hospital uses about 600 m3 of cylinder oxygen per month on the average and about 90% of the patients admitted at the Surgical Medical Emergency (SME) ward receive some amount of oxygen[7]. Inadequate assessment or monitoring could result in complications such as decrease in Respiration, a state of narcosis and respiratory stasis or arrest in the case of elevated therapy[8].

Also, patients on oxygen may develop skin breakdown around the mask or the cannula, dry mouth, nose or lips and sore throat among others. Therefore it is necessary that the nurses identify the need for O2 and have adequate skills on procedures of O2 therapy in order to avert harm to the patient[9]. The complications associated with oxygen therapy also calls for effective team work, proper documentation, and handing over of oxygen therapy specific issues[10]. Regardless of the setting in which oxygen is delivered; it should be regarded as a drug. Its potency in treating hypoxemia is often under estimated and, if given in appropriately, it can be lethal[11]. Patients must receive this therapy in an appropriate, safe and comfortable way. This depends on a sound understanding of why oxygen is being delivered, the methods of oxygen delivery and the nursing needs to the patient receiving it.

Although oxygen therapy is the most common therapy used for infants, inappropriate control of administered oxygen could lead to irrevocable damage to many of the newborns, particularly preterm infants[5]. Despite, over 75 years of routine oxygen administration to newborn infants, the optimal level of oxygenation one that avoids the detrimental effects of hypoxia on hand, and those caused by hyperoxia on the other- has not yet been clearly defined, leading to wide variations in practice[12]. Other complicating factors in achieving the goals of neonatal oxygen therapy include patient size, tolerance of delivery device, and variability in the use of delivery devices, which suggest that clinicians lack adequate knowledge in the use of oxygen delivery equipment, and the lack of training in the practical aspects of neonatal oxygenation and equipment used to monitor the effects of oxygen therapy[13]. So it is very crucial to study the knowledge, attitude and practice of nurses related to oxygen therapy to identify possible gaps, prevent harm that may arise from inappropriate practice and improve the quality of nursing care by correcting the identified defects. In this study a cross-sectional study design was used to assess KAP of nurses on oxygen therapy in the ED and ICU department of Orotta National Referral Hospital

METHODS

A cross sectional descriptive study was conducted to assess the nurses' knowledge, attitude and practice about oxygen therapy. It was carried out in Orotta National Referral Hospital at Emergency and ICU wards of Pediatric and Medical surgical department from September to December, 2018.

Sampling

All nurses who were working in the Emergency and ICU departments during the study period. (A total of 60 nurses) were selected. And a total enumerative method of all nurses working in the above mentioned department during the study period was used.

Data collection procedure

Data collection was done by two research team members who were trained to observe proper OT. The training was done by the doctors worked in ICU AND ED departments and included both theoretical and practical sessions. The theoretical part included a detailed description of OT and numerous illustrations of OT instruments and how, when and to whom we should apply. The examiners also took 4 weeks of practical lessons in ICU and Emergency units of Orotta national referral hospital, where they examined patients and apply proper OT under the direct supervision of the doctors. At the end of the training session S10patients were examined and took proper OT by the data collectors independently for

different cases under the supervision of the doctors. Inter observer agreement was then calculated using the Cohen's Kappa statistic (0.82) which indicated "almost perfect agreement". Data collection was subsequently carried out using a self-administered structured questionnaire to assess the knowledge, attitude of nurses and training about OT, availability of oxygen therapy guideline, availability of adequate oxygen and oxygen delivery devices and the workload they had. The questionnaire was designed in English language and aimed to meet the specific objectives of the study. It was adopted from a study done by Girma Lema in Ethiopia in 2015 and modified under supervision of experts from various fields (2 adult health experts and 1 statistician). It was composed of categorized closed ended questions. An observational checklist was used to assess the practice of oxygen administration. The check list consists of twenty items. Written consent was obtained from the medical director of the hospital to conduct the study. Respondents were asked for verbal consent before we gave the questionnaire. Data entry and analysis was done using the Statistical Package for Social Sciences (SPSS ver. 20). Data analysis was performed by applying descriptive statistics and chi square tests to assess the relationship between KAP of nurses and related variables. The level of statistical significance was set at $p < 0.05$.

Scoring Method (adopted from Girma Lema study (2015))

Good knowledge, Positive attitude and Good practice - nurses who scored the correct answer to knowledge, attitude and practice questions above the mean result.

Poor knowledge, Negative attitude and Poor practice- nurses who scored the correct answer to knowledge, attitude and practice questions below the mean result.

RESULTS

Table No.1 shows the distribution of nurses by their socio-demographic characteristics. Out of the 60 nurses 49 were females (81.7%). Based on their age the nurses were divided in to 2 categories. These were nurses whose age was 25 years and above (51.7%) and those their age was < 25 years (48.3%). The mean age was found 25. About three forth of the nurses (75%) were single and the rest 25% were married. According to their years of experience the nurses were divided in to two categories, these were those who had experience 5 years and above (38.3%) and those who had < 5 years of experience (61.7%). The mean year of experience was 5 years. The nurses were distributed in to two categories based on their level of education as registered nurses (56.7%) and associate nurses (43.3%). Unfortunately, there were no B.Sc nurses or MSN working in these departments.

Table No.2 shows that the associate nurses had good knowledge than registered nurses with the percentage of 46.2% and 41.2% respectively. Experienced nurses (5 years and above) and the less experienced (<5 years) nurses had similar knowledge *(P=0.986)*. 51.5 % of the nurses who had training about oxygen therapy had good knowledge than those who did not take training about oxygen therapy, which was 33.3% *(P=0.157)*. *At* 47.6% of the nurses who had guideline about oxygen therapy had good knowledge than those who did not, which was 41% (*P-value 0.623)*. 47.6 % of the nurses who had adequate supply of oxygen and delivery systems had good knowledge than those who did not have, which was 33.3%. But the variation was not statistically significant *(P-value 0.306)*.

Table No.3 shows that 69.2% of associated nurse and 58.8% of the registered nurses had positive attitude *(p=0.407)*. Majority of the experienced nurses (78.3%) and 54.1% of the less experienced had positive attitude. The variation was statistically significant (p=0049). 70.3 % of the nurses who had training about oxygen therapy had positive attitude than those who did not take training, which was 60.6%. *(p=0.09)*. 71.4 % of the nurses who had guideline about oxygen therapy had positive attitude than those who did not have guideline, which was 59% (p=0.340).

Table No.4 shows that 51.9% of the nurses who had training about oxygen therapy had good practice than those who did take training, which was 39.4% (p-value 0.335). 46.2% of the nurses who did not have guideline about oxygen therapy in the department

had good practice than those who had a guideline, which was 42.9% (p=0807). 47.6% of the nurses who had adequate supply of oxygen and delivery systems had good practice than those who responded "no", which was 38.9% (p=0.533). 51.4% of the nurses who believed that work load/ burden can affects their practice on oxygen therapy had good practice than those who did not believe, which was 34.8%. The variation was found to be statistically significant *(P=0.041)*.

DISCUSSION

The assumption of the study was that nurses have poor KAP on oxygen therapy and the result of the study has revealed that the overall KAP of the nurses on OT was poor with 56.7%, 36.7% and 55% respectively.

Knowledge

Even though the variation in most of the variables was not statistically significant, knowledge was associated with demographic characteristics of the nurses. Male and single nurses and majority of the older nurses with age 25 years and above were found to have good knowledge on oxygen therapy. Considering the level of education, associate nurses had good knowledge than diploma nurses, this might be associate nurses were older in age than diploma holders. Knowledge had positive association with in-service training of the nurses about oxygen therapy. So, continuously updating with training and important sources of information may contribute to good knowledge. Furthermore, availability of guideline and adequate supply of oxygen delivery devices in the departments may increase the knowledge of the nurses.

Overall about 43.3% of the nurses working in the ED and ICU had good knowledge about OT. This result was slightly higher when compared with the study done by Girma Lema in Ethiopia, in which 36.2% of the nurses had good knowledge[14]. This might be due to there was relatively good in-service training of nurses, availability of guidelines and supply of oxygen delivery devices in the current study compared to Girma Lema study. On the other hand, it was very low when compared with the study conducted by Ritu Naihir in India, which showed 95% of the nurses had good knowledge[15]. This might be majority of the respondents in Ritu's study were B.Sc holders.

In our study, 95% of the nurses replied that hypoxemia is an indication for oxygen therapy and 58.3% of the respondents knew that oxygen saturation is a criterion for assessment of patient response. This result was found to be higher than the study done by Mohammed *et al*, in Sudan, which was 50% and 36%, respectively[16]. This might be lack of in-service training about OT, unavailability of guidelines and increased workload was suggested as contributing factors for the poor knowledge of OT in Mohammed *et al*, study.

Attitude

Even though the variation between most of the variables was not statistically significant, most of the demographic characteristics of the nurses had influence on the attitude. The longer the experience of the nurses in the nursing practice, the more they had a positive attitude. Majority of the older nurses with ages 25 years and above, a total work experience in nursing with 5 years and above and those who were married had a positive attitude on oxygen therapy. More associate nurses had positive attitude when compared to registered nurses, which may be because associate nurses were older in age and experienced. Regarding the factors that may affect the attitude of the nurses, the factor with highest effect was the availability of guidelines of oxygen therapy in the departments. So, hospital policy may contribute to the positive attitude of the nurses on oxygen therapy. Furthermore, training of the nurses about oxygen therapy and reducing the work load/ burden that affect their practice may increase the positive attitude of the nurses.

Overall, this study showed that 63.3% of the nurses had positive attitude. This result was slightly higher than the study done by Girma Lema which found that 53.3% of the nurses had positive attitude[14]. This might be due to majority of the respondents in this study were aged which contributes to positive attitude.

Practice

The guidelines from Nottingham University Hospitals, City Hospital/Queens Medical Centre –

Nursing practice guidelines for the administration of oxygen, Royal United Hospitals, and standard guidelines for oxygen administration and monitoring explained that nurses should have to be skilled on the best practices on pulse oximetry, humidification attachment and use of different oxygen devices to save the life of many emergency patients[17]. This study found out that most of the nurses had good level of performance regarding the above mentioned factors, in which 71.67% of nurses attached humidification device during oxygen administration, 83.3% of them monitored patient oxygen saturation level and 75% used correct oxygen delivery devices. This might be due to the availability of adequate supply of oxygen and delivery devices in the wards (i.e. 70% of nurses responded that they had adequate supply of oxygen and delivery devices).

Even though the variation in most of the variables was not statistically significant, the socio-demographic variables had some influence in practice. In this study majority of the nurses with 25 years and above, experienced (5 years and above) and those who were single had good practice on oxygen therapy, this may suggested that the longer experience of the nurses in the nursing practice, the more they became skill full and perform better. On the other hand associate nurses were found to have good practice than registered nurses, this might be associate nurses were older in age and experienced than diploma holders. Giving in service training of the nurses about oxygen therapy and reducing the work load/ burden that affect their practice were some of the factors that may lead to good practice. Furthermore, providing guideline and adequate supply of oxygen delivery devices in the departments may increase the practice of the nurses.

Overall, 45% of the nurses had good practice whereas the rest (55%) had poor practice. This might be due to lack of training and guidelines and increased workload. This was similar to the study done by Girma Lema in Ethiopia, in which 43.4% had good practice[14]. However it was inconsistent when compared with another study conducted by Zeineb *et al*. In Iran in which 74.5% of the nurses had good practice and 25.5% of them had poor practice[18]. This might be due to that 92.7% of the nurses were B.Sc holders and most of them were aged.

Another study done by Mohammed *et al*, showed that 88% of the nurses had good practice regarding administration of oxygen by nasal cannula[16], which was slightly higher than the result found in the current study, where 75% of them used correct oxygen delivery devices properly. In the same study done by Mohammed *et al*, 78% of the nurses had kept nosepieces clean in nursing care[16], which was higher when compared with current study which was 20% of the respondents were involved in cleaning. This might be due to increased workload and negligence.

In this study 83.3% of the nurses monitored patients' oxygen saturation level. However, in the study done by Ilham *et al*, in Sudan saturation was not measured at the time of oxygen administration in 85.6% neonates[19]. This might be due to lack of guidelines of oxygen therapy in the NICU and lack of monitoring procedures.

Correlation between knowledge, attitude and practice

Generally, there was significant variation and positive correlation between knowledge, attitude and practice. Respondents with good knowledge had positive attitude. Similarly, respondents with positive attitude were found to have good practice. Moreover, respondents with good knowledge and positive attitude found to have good practice. This might be due to majority of the respondents who were old aged and experienced had good knowledge, attitude and practice.

Table No.1: Socio-demographic Characteristics (N=60)

S.No	Background Characteristics		Number	%
1	Department	AED	13	21.7
		AICU	14	23.3
		NICU	11	18.3
		PED	11	18.3
		PICU	11	18.3
2	sex of the respondent	Female	49	81.7
		Male	11	18.3
3	age of the respondent	<25 years	29	48.3
		25 and above	31	51.7
4	marital status of the respondent	Single	45	75.0
		Married	15	25.0
5	level of education of the respondent	Registered nurse	34	56.7
		associate nurse	26	43.3
6	total year of experience in nursing practice	< 5 years	37	61.7
		5 and above	23	38.3
7	Year of experience in emergency department	No	29	48.3
		Yes	31	51.7
8	Year of experience in ICU department	No	20	33.3
		Yes	40	66.7
9		Total		
			60	100.0

Table No.2: Association of knowledge with educational qualification, year of experience, training about OT, availability of guideline and adequacy of oxygen supply and delivery system

S.No					Knowledge				P - value
					Poor		Good		
1	Educational qualification				Number	%	Number	%	
		Registered nurse			20	58.8	14	41.2	0.700
		Associate nurse			14	53.8	12	46.2	
2	Total				34	56.7	26	43.3	
3	Total year of experience	Less than 5 year			21	56.8	16	43.2	0.986
		5 years and above			13	56.5	10	43.5	
4	total				34	56.7	26	43.3	
5	Training about oxygen therapy	Response	Yes		16	48.5	17	51.5	0.157
			No		18	66.7	9	33.3	
6	Total				34	56.7	26	43.3	
7	Availability of guideline		Response	yes	11	52.4	10	47.6	0.623
				no	23	59.0	16	41.0	
8	Total				34	56.7	26	43.3	
9	Adequacy of oxygen supply and delivery system		Response	Yes	22	52.4	20	47.6	0.306
				no	12	66.7	6	33.3	
10	total				34	56.7	26	43.3	

Table No.3: Association of Attitude with educational qualification, year of experience, training about OT, availability of guideline

S.No				Attitude				P - value
				Negative		Positive		
				Number	%	Number	%	
1	Educational qualification	Registered nurse		14	41.2	20	58.8	0.407
		Associate nurse		8	30.8	18	69.2	
2	Total			22	36.7	38	63.3	
3	Total year of experience	Less than 5 year		17	45.9	20	54.1	0.049
		5 years and above		5	21.5	18	78.3	
4	total			22	36.7	38	63.3	
5	Training about oxygen therapy	Response	Yes	8	29.7	19	70.3	0.09
			No	13	39.4	20	60.6	
6	Total			21	36.7	39	63.3	
7	Availability of guideline	Response	yes	6	28.6	15	71.4	0.340
			no	16	41	23	59	
8	Total			22	36.7	38	63.3	

Table No.4: Association of practice with training about OT, work load effect, availability of guideline and adequacy of oxygen supply and delivery system

S.No					Practice				P - value
					Poor		Good		
					Number	%	Number	%	
1	If work load/ burden affects the practice of the nurses on oxygen therapy		Response	Yes	18	48.6	19	51.4	0.041
				no	15	65.2	8	34.8	
2	total				33	55	27	45	
3	Training about oxygen therapy	Response	Yes		13	48.1	14	51.9	0.335
			No		20	60.6	13	39.4	
4	Total				33	55	27	45	
5	Availability of guideline		Response	yes	12	57.1	9	42.9	0.807
				no	21	53.8	18	46.2	
6	Total				33	55	27	45	
7	Adequacy of oxygen supply and delivery system		Response	Yes	22	52.4	20	47.6	0.533
				no	11	61.1	7	38.9	
8	total				33	55	27	45	

Table No.5: Overall KAP of nurses

S.No	Knowledge		Attitude		Practice	
1	Poor	Good	Negative	Positive	Poor	Good
2	56.7%	43.3%	36.7%	63.3%	55%	45%

Table No.6: Correlation between KAP of nurses

S.No				Practice		Total	P-Value	R- Value
				Poor	Good			
1	Knowledge	Poor	Number	19	15	34	0.875	0.20
			% Of Knowledge	55.9%	44.1%	100%		
		Good	Number	14	12	26		
			% Of Knowledge	53.8%	46.2%	100%		
2	Attitude	Negative	Number	16	6	22	0.36	0.271
			% Of Attitude	72.7%	27.3%	100%		
		Positive	Number	17	21	38		
			% Of Attitude	44.7%	55.3%	100%		
3	Either	Number		22	12	34	0.044	0.223
		%Of Good Knowledge And Positive Attitude		64.7%	35.3%	100%		
4	Good Knowledge and Positive Attitude	Number		11	15	26		
		% Of Good Knowledge And Positive Attitude		42.3%	57.7%	100%		
5	Total			55%	45%			

RECOMMENDATIONS

ED and ICU nurses should be given training on oxygen therapy and be updated. Oxygen therapy guideline must be developed and accessible to all staff nurses. Number of staffs and workload should be proportionate to render quality care related oxygen therapy. The associate nurses had good knowledge, attitude and practice than the registered nurses; since this is a preliminary study it needs further studies. ONRH should have a periodic evaluation regarding the nursing performance in nursing care of oxygen therapy. In general, further study should be done at national level.

LIMITATION OF THE STUDY

The study followed a non-probability sampling method of one month census in each hospital. Systematic random sampling could not be applied because the total population was small. Even though census method was used, still the population that we had was too small. The study could have been much better had it been conducted in a larger number of nurses. Shortage of time: the time period in which this research was done was too short to observe the overall performance of sixty nurses in OT. Also, nurses working in other hospitals were not included due to shortage of time and lack of oxygen. Limited related studies: the literature related to this topic that the researchers found were too few and most of them didn't comprise the three research variables (knowledge, attitude and practice).

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There was no source of funding for the study, for the authors or for the manuscript preparation.

AVAILABILITY OF DATA AND MATERIALS

The complete data set supporting the conclusions of this article is available from the corresponding author and can be accessed upon reasonable request.

AUTHORS' CONTRIBUTIONS

All authors participated in all phases of the study Including topic selection, design, data collection.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval for this study was granted by Asmara College of Health Sciences research ethical approval committee. In addition, after brief explanation of the purpose of the study, written

consent was obtained from the study participants and those who volunteered and participated in the study.

CONSENT FOR PUBLICATION

This manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the final manuscript and agreed for its publication.

CONCLUSION

This study showed that there was knowledge, attitude and practice gap among nurses who were working in ED and ICU. And also it showed that lack of oxygen therapy training and guidelines as well as increased workload contributed much to the challenges on oxygen therapy.

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COMPETING OF INTEREST

The authors declare that they have no competing interests. Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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