

# Nurses Knowledge and Practice Regarding Supplemental Oxygen Therapy at Kirkuk City Teaching Hospitals/Iraq

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## Abstract

**Background:** Oxygen therapy means the clinical use of supplemental oxygen. It is considered in the treatment of many life-threatening diseases such as respiratory failure, chronic obstructive pulmonary disease, and others. Particularly now, with the spread of the Coronavirus outbreak, it has become the main use to save the patients' lives and care for them. It is indicated in patients with acute hypoxemia (PaO<sub>2</sub> less than 60 mm Hg or SaO<sub>2</sub> less than 90%) or those with symptoms of chronic hypoxemia. As a result, the nurse should be a professional at performing this procedure. **Methods:** A structured questionnaire was used in a cross-sectional study, during the period from (14 January 2021 to 20 April 2021). A non-probability (purposive) sample was selected from nurses currently working at an emergency medical unit (EMUs), intensive care units (ICU) cardiac care unit (CCU) at Kirkuk city teaching and general hospitals. The size of the sample was (120) nurses, this study aims to assess the knowledge and practice of nurses in emergency medical units (EMUs), intensive care units (ICU) cardiac care unit (CCU) in Kirkuk city teaching hospitals. The scoring method was adopted from a previous study, a few manipulations in questions relating to nurses' knowledge and practice were added to the original items. Good knowledge and good practice were recorded for nurses who scored above the mean result for the knowledge and practice questions. Poor knowledge and poor practice scores were given to nurses who scored below the mean result for the knowledge and practice questions. The data were analyzed by applying descriptive and inferential data ( $P \leq 0.05$ ). **Results:** Only one-third of nurses had a good practice on supplemental oxygen administration. Nurses who had good knowledge of supplemental oxygen administration were 10-times [AOR]=10.87, 95% CI=3.25–30.51) more likely to have a good practice of supplemental oxygen administration than those who had poor knowledge of supplemental oxygen administration. **Conclusion:** Knowledge and practice among nurses working in Kirkuk city teaching hospitals and General Hospital had a clear gap. The knowledge and practice level of nurses in this study is low compared with others. The possible factors were identified, such as lack of supplemental oxygen therapy training, absence of supplemental oxygen administration standard guidelines, workload, and inadequate supply of oxygen and delivery devices.

**Keywords:** knowledge, practice, supplemental oxygen therapy, nurse

## 1. Introduction

Oxygen is important to the human body, oxygen accounts for 65 percent of total body mass and plays a very important role in the body (1). Oxygen therapy is a very effective medical treatment that can be administered to patients in various severe conditions. If oxygen therapy is not performed properly, patients are at risk of many critical health problems, such as hypoxemia, respiratory failure and death, it is indicated in patients with acute hypoxemia (PaO<sub>2</sub> less than 60 mm Hg or SaO<sub>2</sub> less than 90%) or those with symptoms of chronic hypoxemia. Oxygen therapy is an important part of resuscitation (2).

Oxygen therapy is classified as a key item in the World Health Organization (WHO) model of essential medicines, which is a list of the most common and safe medications used in the healthcare field (3). It is also necessary for the treatment of patients to ensure that oxygen therapy is performed in a proper and safe manner and at the right time. This research is therefore carried out to determine whether oxygen

therapy is performed in a safe manner based on the experiences and procedures of nurses and to evaluate the existence of any barriers that may influence the process of oxygen therapy administration (4). The level of knowledge and professional skills of nurses must be taken into account in ensuring the positive outcome of the condition for critically ill patients in terms of healthcare quality. It is also important to consider the challenges that can lead to bad practice related to oxygen administration. The optimal amount and method of oxygen delivery varies depending on a patient's underlying medical condition and whether the condition is acute or chronic. The selection of the best oxygen delivery device and flow rate of oxygen depends on many factors some of which are the patient's age, the therapeutic goals and patient tolerance. Even though OT is one of the most widely used resuscitation methods, it may harm or cause a patient's status to deteriorate if used inappropriately. Pulmonary oxygen toxicity and oxygen-induced hypercapnia are considered as two of the major side effects of OT (5) A favorable effect

that improves survival rates has been reported at OT saturations between 94% and 98% for acutely ill patients; however, lower saturation, 88%–92% should be considered for patients with suspected risk of hypercapnia respiratory failure (6). To the best of our knowledge, no study has been conducted in Iraq/kirkuk city to identify the depth of knowledge, and practice (KP) among nurses, emergency medical technicians (EMTs) on OT at an ED department.

## 2. Methodology

A structured questionnaire was used in cross-sectional study, during the period from (14 January 2021 to 20 April 2021). Anon-probability (purposive) sample was selected from nurses currently working at an emergency medical unit (EMUs), intensive care units (ICU) cardiac care unit (CCU) at Kirkuk city teaching hospitals. The total size of the sample was (120) nurses, this study aims to assess the knowledge and practice of nurses in emergency medical units (EMUs), intensive care units (ICU) cardiac care unit (CCU) in kirkuk city teaching hospitals.

A questionnaire was adopted from a previous study done by Weldetsadik (7). A few manipulations in questions relating to nurses' knowledge and practice, were added to the original items. Reliability and content validity was done before final data collection through pilot testing. The questionnaire included demographic information such as gender, age, category of profession and total duration of work. There were an additional two sections: OT knowledge, OT practice. The questions were asked using a Likert scale in which "strongly agree" scored

three and "agree" and "strongly disagree" scored one.. The scoring method was adopted from a previous study (8).

good knowledge and good practice were recorded for nurses who scored above the mean result for the knowledge and practice questions. Poor knowledge and poor practice scores were given to nurses who scored below the mean result for the knowledge and practice questions (9).

Statistical analysis: Statistical Package for Social Sciences (SPSS) version 23.0 used for analysis. The data were analyzed by applying descriptive and inferential data analysis, Descriptive statistics data management and analysis were used to assess the baseline demographics; they were carried out by calculating the frequencies and percentages comparing those who had a fall and those who had not. Initially, bivariate logistic regression was carried out to see the association of each independent variable with the outcome variable. Thereafter, to see the relationship of knowledge, practice, and socio-demographic and other variables, multivariable logistic regression was used.

Prevalence was calculated with a 95%CI. All tests were considered significant if the P value was less than 0.05 ( $P \leq 0.05$ ). The mean scores were calculated for the Knowledge and Practice and categorized further into categorical variables: knowledge was reported as having knowledge or no knowledge and practices were categorized as good and bad practices.

## 3. Results

Table (1): Distribution of Nurses by Demographic Characteristics of the Study. (n= 120 Nurse )

Demographic Characteristics	Variables	Frequency	%
Age group (Years)	20 -29	92	76.7
	30 -39	18	15
	40 -49	10	8.3
	Mean & SD	37.30 ± 8.88 years	
Gender	Male	32	26.7
	Female	88	73.3
Area of work (unit)	ICU	48	40
	CCU	24	20
	Emergency	36	30
	RCU	12	10
Your category of profession	Nursing Institute	64	53.3
	Nursing college	56	46.7
years of working in nursing	1 -3	36	30
	4 -6	54	45
	7 -9	10	8.3
	≥ 10	20	16.7
participate in an oxygen therapy training course?	YES	24	20
	NO	96	80
study Course duration	One Month	16	66.7
	Two Months	8	33.3
Course place	Inside of Iraq	24	100
	Outside of Iraq	NO One	

Table 1 revealed that the majority 92 (76.7%) of nurses in the study are within the age group (20-29 years). 88 (73.3%) of nurses are females. In respect to the Area of work (unit) of nurses, 48 (40%) of the

nurses are working in ICU. Concerning to the category of profession, the high percentage 64 (53.3%) of nurses are nursing institute. In relation to the years of working in nursing, 54 (45%) of nurses have (4-6) years. Regarding to participate in an

oxygen therapy training course, the majority 96 (80%) of nurses had (No) training, while 24(20%) had training. Concerning the study course duration 16

(66.7%) of nurses had one month duration. In relation to the course place, all of 24 (100%) had training inside of Iraq.

**Table 2: General nurses' knowledge on oxygen therapy. (n=120)**

Items	True n (%)	False n (%)
Oxygen is like any other medication	89 (74.2)	31 (25.8)
Hypoxemia can be recognized by clinical signs	109 (90.8)	11 (9.2)
Blood Gas Analysis is useful for confirming hypoxemia	105 (87.5)	15 (12.5)
pulse oximetry is useful in detecting and monitoring hypoxemia	103(85.8)	17(14.2)
Central cyanosis is an indication for acute oxygen therapy	108 (90)	12 (10)
Asymptomatic anemia is an indication for acute oxygen therapy	40 (33.1)	80 (66.9)
Restlessness and convulsion in children are indications for acute OT	79 (65.8)	41 (34.2)

Table 2, show that 109(90.8%) of the nurse knew that hypoxemia could be recognized by clinical signs and that blood gas analysis is useful for confirming hypoxemia while pulse oximetry is useful in

detecting and monitoring hypoxemia. Concerning the indication for acute oxygen therapy, 40 (33.1%) of the nurses said a symptomatic anemia is an indication for acute oxygen therapy.

**Table (3): Knowledge of Nurses on Supplemental Oxygen Therapy (n=120)**

Variable	Category	Frequency	Percent
Supplemental Oxygen therapy is used to prevent and treat hypoxia	Aware	67	55.8
	Not aware	53	44.8
Pulse oximetry monitoring is affected by nails varnish/ paint, hypothermia, and or patient position	Aware	47	39.2
	Not aware	73	60.8
The normal oxygen saturation for adult is 95–100%	Aware	71	59.2
	Not aware	49	40.8
Supplemental oxygen therapy is indicated during surgery	Aware	62	51.7
	Not aware	58	48.3
Non-rebreathing oxygen face mask with a reservoir bag is used to deliver higher oxygen concentration than a nasal prong	Aware	58	48.1
	Not aware	62	51.9
Supplemental oxygen therapy is indicated during shock	Aware	61	50.8
	Not aware	59	
Supplemental oxygen is contraindicated for untreated pneumothorax	Aware	42	35
	Not aware	78	65
Humidifier reduces the risk of dry oxygen and its side- effects	Aware	82	68.1
	Not aware	38	31.9
During oxygen therapy, apply water-based gauze if lips or nose become dry	Aware	57	47.5
	Not aware	63	52.5

Table 3, show only 67 (55.8%) were aware that SOT should be administered to treat and prevent hypoxia, while 62 (51.7%) nurses were aware that SOT is indicated during surgery. Regarding normal oxygen saturation, 71 (59.2%) of nurses aware. Most of the respondents 62(51.9%) were not aware that a

non-rebreathing oxygen face mask with a reservoir bag is used to deliver a higher oxygen concentration than nasal prong. In this study, about 50.6% of the nurses had good knowledge whereas 49.4% of nurses had poor knowledge of oxygen therapy. The mean knowledge score of the participants was 4.95 ±2.45.

**Table 4: Practice of Nurses on Oxygen Administration (n=120)**

Variable	Category	Frequency	Percent
Assessing of oxygen saturation before administration.	Yes	45	37.5
	No	75	62.5
Prepare all necessary equipment before administration	Yes	37	30.8
	No	83	69.2
Use appropriate device size and way.	Yes	62	51.7
	No	58	48.3
Check the device before administration.	Yes	41	34.2
	No	79	65.8
Assessing of oxygen saturation during administration.	Yes	25	20.8
	No	95	79.2
Measuring the flow rate appropriately during administration.	Yes	31	25.8
	No	89	74.2
Measuring the patients' vital signs during administration.	Yes	24	20
	No	96	80

Based on the observed practice of supplemental

oxygen administration Table 4 show 31.5 % of the

nurses had good practice and the majority (68.5%) of nurses had poor practice of supplemental oxygen administration. Only 37.5 % and 51.7 % of the nurses assessed oxygen saturation and use appropriate device size and way during supplemental oxygen

administration, respectively. Observational practice check lists were used to assess nurse's practice on supplemental oxygen administration. The mean practice score was  $2.57 \pm 1.62$ .

**Table 5: Regression Analysis for Practice of Nurses on Oxygen Therapy.**

Variable	Practice Level		COR (95% CI)	AOR (95% CI)
	Good, n (%)	Poor, n (%)		
Sex				
Male	14 (43.8.)	18 (56.2)	1	1
Female	21 (23.9)	67 (76.1)	0.626 (0.275-1.422)	1.57 (0.306–8.06)
Educational Status				
Diploma Nurse	30 (46.9)	34 (53.1)	1	1
Degree (BSc Nurse)	16 (28.6)	40 (71.4)	12.08 (4.62–31.60) *	10.87 (3.25–30.51) *
Supplemental Oxygen therapy training				
Yes	10 (41.7)	14 (58.3)	11.08 (4.62–31.60) *	9.71 (3.94–27.48) *
No	17 (17.7)	79 (82.3)	1	1
Availability of SOT guideline				
Yes	27 (61.4)	17 (38.6)	10.96 (4.24–28.32) *	8.21 (4.01–24.78) *
No	13 (17.1)	63 (82.9)	1	1
Adequate supply of O <sub>2</sub> and delivery system				
Yes	26 (59.1)	18 (40.9)	8.72 (3.47–21.96)	6.21 (3.56–20.23) *
No	14 (18.4)	62 (81.6)	1	1
Workload affects SOT				
Yes	21 (55.3)	17 (34.3)	9.26 (3.64–23.58) *	0.452 (0.01–25.43)
No	17 (20.7)	65 (79.3)	1	1

Note: \*P≤0.05. Abbreviations: N, number; %, percent; COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval.

Table 5, show about two-thirds of nurses who had SOT training had good practice on supplemental oxygen administration. In this study, nurses who had a BSc degree were 10-times (adjusted odds ratio [AOR]=10.87, 95% CI=3.25–30.51) more likely to have good practice of supplemental oxygen administration compared to those who had a diploma. Nurses who had good of SOT training were 9-times (AOR= 9.71, 95% CI=3.94–27.48) more likely to have good practice of supplemental oxygen administration than those who had no training of SOT.

#### 4. Discussion

Oxygen therapy is the administration of oxygen as a medical intervention, which can be for a variety of medical and surgical conditions. Patients can be affected by getting no oxygen or too little or too much oxygen. It is appropriate to provide the optimal concentration of supplemental oxygen to the acutely ill hypoxemic patient; inadequate oxygen administration may result in cardiac arrhythmias, tissue injury, renal injury, and ultimately cerebral damage (10).

Our study revealed that 49.4% of participant had poor knowledge of oxygen therapy. This finding is comparable with study done by Daou BEL (8). Study done in Beirut hospitals (55.1%) and Eritrean hospitals (56.7%), of nurses had a low level of knowledge regarding oxygen therapy (9), this discrepancy might be due to the sample size, study setting, and study period difference. Study in Nottingham University

Hospitals stated that nurses should know oxygen therapy indications, normal oxygen saturation at different ages, including normal respiration rates (11). This study approved that nurse who were working in the hospital during the study period and in the study, areas have a knowledge gap on oxygen therapy. Our study revealed that the practice of nurses on oxygen therapy had a strong relation with nurses' knowledge, education level, availability of OT guidelines, and oxygen therapy training which agree in line with study done at Addis Ababa, Ethiopia, (12); Turkey, (13) and Piryani RM, (14). In this study, nurses do not have adequate knowledge about oxygen therapy that make challenges of oxygen administration in the hospital identified by the nurses were: inadequate knowledge of healthcare professionals regarding oxygen therapy, lack of training of nurses related to oxygen therapy, inadequate supply of equipment and oxygen, and unavailability of a standardized protocol for oxygen therapy. our study is in line with study done by Weldetsadik AS, (7); Piryani RM, (14) and (Aloushan AF (10).

The practice level of nurses on oxygen administration in this study showed that only 68.5% of the nurses had good practice. This finding is lower than studies conducted in Addis Ababa hospitals (43.4%) (15); Eritrean hospitals (45%) (9) and Egypt hospital (74.5%) (4). The result might be due to the lack of nurses training regarding OT, unavailability of oxygen administration guidelines, and increased workload of nurses (because nurses' activities are more than their job description). Based on this study barrier, the factors which could affect the good

practice of oxygen administration, are the unavailability of a standardized protocol about oxygen therapy, lack of training about OT, and an inadequate supply of O<sub>2</sub> and delivery system. The study finding is supported by research conducted in Egypt, ( Mayhob M. 2017)(4) ; Eritrea.(9) and Lemma G.(16)

## 5. Conclusions and Recommendations

Our study shows that there is a clear gap of knowledge and practice among nurses related to SOT use. This gap may include a shortage of training on SOT, unavailability of national as well as hospital SOT guidelines and excessive nurse workload. Education programs on best practice on SOT through conferences, workshops, lectures and research are needed to raise awareness and to develop a clear policy that follows guidelines. and important to raise the awareness and practice of nurses about SOT. Hospital nurses also need to be made aware and skillful regarding the updated guidelines for SOT. The unavailability of well-functioning equipment and poor maintenance of non- functional oxygen machines are the most serious and additional burdens of nurses to SOT. Therefore, the hospital should have well-trained and always stand by the biomedical technologists to solve such problems.

### Abbreviations

SOT, supplemental oxygen therapy; OT, oxygen therapy; WHO, World Health Organization; BSc, Bachelor of Sciences; O<sub>2</sub>, oxygen; SPSS, Statistical Package for Social Sciences.

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### References

Goharani, R., Miri, M., Kouchek, M. and Sistanizad, M. \_Familiarity of Physicians and Nurses with Different Aspects of Oxygen Therapy; a Brief Report., Emergency (Tehran, Iran), (2017) ; 5(1), p. e39).

Eastwood, G., M., Michael, C., Peck, L., Baldwin, I., Considine, J., & Bellomo, R. Critical care nurses' opinion and self-reported practice of oxygen therapy: A survey. Australian Critical Care Journal; (2012); 25; 23-30).

World Health Organization. Essential Medicines and Health Products: WHO MODEL Lists of Essential Medicines. Geneva: WHO; 2016;33–47.

Mayhob M. Nurses' knowledge, practices and barriers affecting a safe administration of oxygen therapy. J Nurs Health Sci. 2017;7 (3):42–51).

Newnam KM. Oxygen saturation limits and evidence supporting the targets. Adv Neonatal Care. 2014;14(6):403–9.

Kane BI, Decalmer SA, O'Driscoll BR. Emergency oxygen therapy: from guideline to implementation. Breathe. 2013; 9:246–53).

Weldetsadik AS. Assessment of nurse's knowledge, attitude and practice about oxygen therapy at emergency

departments of one federal and three regional hospitals in Addis Ababa, Ethiopia. 2015. <http://etd.aau.edu.et/handle/123456789/1888?show=full>

Daou BEL, Hussein K. Assessment of nurses' knowledge and interventions regarding oxygen therapy and related complications in Beirut hospitals. Health Care Curr Rev. 2018;6.

Ghebremichael FG, Thomas LM, Yohannes A, et al. Assessment of nurses' knowledge, attitude and practice about oxygen therapy in emergency and ICU departments of Orotta National Referral Hospital. Int J Med Health Prof Res. 2019;6(1):102–111.

Aloushan AF, Almoaiqel FA, Alghamdi RN, et al. Assessment of knowledge, attitude and practice regarding oxygen therapy at emergency departments in Riyadh in 2017: a cross-sectional study. World J Emerg Med. 2019;10(2):88.

Kane B, Decalmer S, O'Driscoll BR. Emergency oxygen therapy: from guideline to implementation. Breathe. 2013;9(4):246–253.

Budinger GRS, Mutlu GM. Balancing the risks and benefits of oxygen therapy in critically ill adults. Chest. 2013;143(4):1151–1162.

Demirel H, Erek Kazan E. Knowledge levels of nurses about oxygen therapy in Turkey. Int J Health Serv Res Policy. 2020;5(1):1–14.

Piryani RM, Ma PR, Suneel P, Shama P, Jasmine G, Pooja S. Knowledge of Staff Nurses about Oxygen Therapy Working in Intensive Care Areas of Universal College of Medical Sciences Teaching Hospital Bhairahawa, Nepal. EC Emergency Medicine and Critical Care. 2020:1–10.

Budinger GRS, Mutlu GM. Balancing the risks and benefits of oxygen therapy in critically ill adults. Chest. 2013;143(4):1151–1162.

Lemma G. Assessment of nurse's knowledge, attitude and practice about oxygen therapy at emergency departments of one federal and three regional hospitals in addis ababa, Ethiopia. 2015.