

Assessment of Knowledge, Attitude and Practice of Nurses towards Oxygen Therapy at Wolaita Sodo University Comprehensive Teaching and Referral Hospital, Ethiopia, 2021

Hindu Argeta^{1†}, Biskut Bezabih², Elsabeth Kebede¹

ABSTRACT

Background: Oxygen therapy is a medical treatment prescribed to prevent or treat hypoxemia. Based on a WHO report every year at least 1.4 million deaths occur due to the lack of supplemental oxygen therapy and inappropriate administration of oxygen. Oxygen therapy is the administration of oxygen as a medical intervention, which can be used for a variety of medical conditions. Patients can be harmed by receiving too little or too much oxygen. In addition, assessment of the need for oxygen in most cases is a nursing responsibility. Administering oxygen therapy (OT) has an essential role in preventing/ managing hypoxemia in both acute and chronic conditions. It should be adjusted to achieve the normal oxygen saturation of 94% to 98% in most cases.

Objective: To assess the knowledge, attitude, and practice of nurses on supplemental oxygen therapy in Wolaita Sodo University Teaching and Referral Hospital, 2021.

Methods: An institution_based cross-section study design was conducted to collect data from 268 sampled nurses in the hospital. A structured questionnaire was used to assess KAP related to oxygen therapy of nurses currently working at Wolaita Sodo University Comprehensive Specialized Hospital. The attitude was assessed using a Likert scale from 1 to 5, whereas practice was assessed as a yes/ no categorical variable supported by an observational checklist developed from the literature. Data were collected using structured questionnaires that measure nurses' knowledge, attitudes, and practice regarding supplemental oxygen therapy. Data were entered using Epi Data version 3.1 and analyzed using SPSS version 23. The descriptive analysis of frequency distribution was conducted and the data were presented with tables, figures, and diagrams.

Results: Among 268 nurses included in the study with a response rate of 98.17%, 38.2% were males. The mean score on knowledge, attitude, and practice were 3.03 (SD= 1.6665), 13.76(SD= 2.102), and 3.0921(SD= 1.76183) respectively. Levels of knowledge, attitude, and practice on oxygen therapy were poor and good in 119(44.40%) and 149(55.60%) for knowledge; 105(39.20%) and 163(60.80%) for attitude; 70(26.10%) and 198(73.90%) for practice respectively.

Conclusions: This study showed that there is relatively good knowledge, attitude, and practice among nurses than in the previous other studies but it is less than the standard performance. It gives clues for policymakers and stack holders to prepare different training and workshops for nurses regarding oxygen therapy and be updated. National oxygen therapy guidelines or hospital protocols must be developed. Oxygen supply and delivery devices should always be adequate and be used properly.

Keywords: Knowledge, Practice, Nurse, Oxygen

Introduction

Oxygen therapy (OT) is a medical treatment prescribed mainly for hypoxic patients; OT provides oxygen at higher concentrations than that found in the atmosphere (>21%) [1]. It is listed as a core item on the World Health Organization (WHO) model of essential medicines, which is a list of the most effective and safe drugs used in a health care system [2].

In Ethiopia, the optimal amount and method of oxygen delivery vary 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, therapeutic goals, and

¹Department of Emergency and Critical Care Nursing, College of Health Science and Medicine, Wolaita Sodo University, Ethiopia.

²Department of OTN and Surgical, College of Health Science and Medicine, Wolaita Sodo University, Ethiopia.

Author for correspondence: Jacob Stewart, Editorial Office, International Journal of Clinical Skills, London, United Kingdom; E-mail: ijclinicalskill@journalres.com

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 two of the major side effects of OT [3,4]. A favourable effect that improves survival rates has been reported at OT saturations between 94% and 98% for acutely ill patients; however, lower saturation, 88% to 92% should be considered for patients with suspected risk of hypercapnic respiratory failure.

Oxygen Therapy (OT) is a medical treatment used for tissue hypoxia. It has the potential to improve medical outcomes and save lives when used appropriately and cause harm if used inappropriately. Oxygen is listed as a core item in the World Health Organization's (WHO) model of essential medicines used in a healthcare system [4].

Administering SOT has an essential role in preventing and managing hypoxemia in both acute and chronic conditions. SOT is considered a key instrument in resuscitating patients during general evaluation [5,6]. SOT has a pivotal role in saving the lives of many patients with heart and lung diseases if used at an appropriate time and in an appropriate amount according to WHO updated guidelines [4,7].

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 two of the major side effects of OT [8, 9]. A favourable effect that improves survival rates has been reported at OT saturations between 94% and 98% for acutely ill patients; however, lower saturation, 88% to 92% should be considered for patients with suspected risk of hypercapnic respiratory failure [9]. A study done in Bethesda on trauma patients admitted to the ED room reported that the mortality rate in patients who received pre-hospital OT was higher than in those who did not receive OT [10].

Long-term OT is the provision of oxygen supplements over a minimum of 15 hours per day, including an overnight period. The benefit of long-term OT has been controversial and much disputed within the field of chronic obstructive pulmonary disease [9,11]. There is evidence on OT in patients with mild or moderate hypoxemia may improve their neurocognitive function and quality of life, but it might not reduce the mortality rate.

According to the study conducted in Ethiopia; Addis Ababa governmental hospital, the mean score of knowledge, attitude, and practice (KAP) concerning O_2 use was 3.03 (SD=1.6665), 13.76 (SD=2.102), and 3.0921 (SD=1.76183) respectively; 38.2% of participants were males and their median age was 26-30 years. The level of KAP of oxygen therapy was poor and good in 97 (63.8%) and 55 (36.2%) of nurses concerning knowledge 71 (46.7%) and 81 (53.3%) regarding attitude and 86 (56.6%) and 66 (43.4%) with regards to practice [12].

Based on research studies conducted in different countries there is a knowledge and practice gap in oxygen therapy among practising nurses in hospitals [6, 12]. For instance; the study conducted in Addis Ababa showed that there are knowledge, attitude, and practice gaps among nurses who were working in an ED of a public hospital in Addis Ababa. To the authors' knowledge, it is hard to find studies that have been conducted in the study setting to identify the knowledge and practice of nurses in public hospitals. Therefore, this study aims to assess and identify the knowledge, attitude, and practice of nurses with OT.

Methods

Study area and period

The study was conducted by Wolaita Sodo University Comprehensive specialized hospital. The Hospital is located in Wolaita Sodo which is 394 km far from Addis Ababa, the capital city of Ethiopia in the Southern direction and is also 134 km far from Hawassa city, the capital of the SNNPR regional state. The hospital provides preventive, curative, and rehabilitative services for the catchment and surrounding population. As well it is a teaching and training centre for the University health science students and continuous professional development programs. The study was conducted from September to October 2014 at Wolaita Sodo University Teaching and Referral Hospital.

Study design

An institution_based simple cross-sectional design was used.

Source Population

The source population was nurses in the study

Assessment of Knowledge, Attitude and Practice of Nurses towards Oxygen Therapy at Wolaita Sodo University Comprehensive Teaching and Referral Hospital, Ethiopia, 2021

Research Article

hospital were used as a source population.

Study Population

Among a total of 1247 nurses, all nurses and midwives who were working in emergency departments were the study population.

Inclusion Criteria

All Bsc nurses and diploma nurses (diploma, BSc. or above) who were working in the study hospital were included in the study.

Exclusion Criteria

Nurses who were having an incomplete response to the questionnaire and nurses with annual leave, maternity and sick leave during the study period were excluded.

Sample Size and Sampling Technique

The Sample size was calculated using the single population proportion formula

$$n = \frac{(Za/2)^2 p(1-p)}{d^2}$$

Description:

n = required sample size ; *Z* = confidence level at95% (standard value of 1.96)

p = estimated prevalence of the variable (56.4%) (Knowledge level of O₂ therapy by nurses)

d = margin of error at 5% (standard value of 0.05)

Calculated sample size was 378. However, the population is 723 (less than 10,000); the required sample size is calculated using the finite Population Correction for Proportions formula. n = no

. .

1 + (no - 1)N

This gives a sample size of 248 and by considering the 10% non-response rate; finally calculated sample size became 273.

Data collection tools and techniques

A questionnaire in English was adopted from previous studies and literature done among nurses. Reliability and content validity was done before final data collection through pretesting done in Dubbo saint marry primary hospital. The questionnaire included demographic information such as gender, age, category of the profession and total duration of work. There was an additional four sections: OT knowledge, OT attitude, and OT practice. The questions were asked using a Likert scale in which "strongly agree" scored five and "strongly disagree" scored one. The questionnaires were self-administered to the participants by data collectors and were collected one hour after distribution on the same day.

Data Analysis

After data collection, the questionnaires were entered into SPSS and checked for correctness. Data were managed and analyzed using SPSS. The Statistical Package for the Social Sciences V.23 (SPSS) was used for data management and analysis. Descriptive statistics 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. Prevalence was calculated with 95% CI. The mean scores were calculated for the KAP and categorized further into categorical variables: knowledge was reported as having good knowledge or poor knowledge; attitude was presented as good and poor attitude, and practices were categorized as good and poor practices. All categories were done based on a Likert scale of 1 to 5.

Quality Control Measures

A brief orientation and training were given to data collectors and supervisors and during data collection, the supervisor monitored closely on each day of data collection. A Pre-test of the questionnaires was conducted.

Ethics Approval and Consent to Participate

The research proposal was approved by the Wolaita Sodo University College of Health Sciences and Medicine ethical committee. Before data collection, each study participants were well informed about the study, and informed verbal consent was secured from the study participants; study participants' confidentiality was maintained; no personal identifiers were used in the data collection questionnaire, and codes were used in place of them.

Operational Definitions

Good knowledge

Nurses who scored the correct response or

Research Article Argeta, et al.

answers to knowledge questions above the mean result.

Good attitude

Nurses who scored the correct response or answers to attitude questions above the mean result.

Good practice

Nurses who scored the correct response or answers to practice questions above the mean result.

Poor knowledge

Nurses who answer knowledge questions below the mean result.

Poor attitude

Nurses who scored the correct answer to attitude questions below the mean result.

Poor practice

Nurses who gave the correct answer to practice questions below the mean result.

Results

Socio-demographic Characteristics of Nurses

A total of 268 nurses with a response rate of 98.13% participated in the study. Among the study participants, 68.90% were females. Age categories ranged from 20 years - 30 years, 174(64.90%), 30 years - 40 years 86(32.10%), and >40 years 8(30%) respectively. Among 268 nurses the type of nursing profession were diploma nurses 27(17.8%), BSc nurses 104(68.4%) (Table 1).

Knowledge of Nurses about Oxygen Therapy

Among a total of 14 knowledge questions provided, the mean knowledge score of the participants was 11.20 ± 1.75 . The majority, 250 (93.30%) were aware that SOT should be administered to treat and prevent hypoxia, while 153 (57.10%) nurses were aware that SOT is contraindicated for untreated pneumothorax. Regarding normal oxygen saturation,

Table 1: Socio-demographic characteristics of nurses working in WSUCST hospital, Ethiopia, 2021 (N=268).				
Variable	Category	Frequency	Percent(%)	
Sex	Male Female	81 187	30.20 69.80	
	Total	268	100	
Age	20 years to 30 years 30 years to 40 years >40 years	174 86 8	64.90 32.10 3.00	
	Total	268	100	
Religion	Protestant Orthodox Muslim	156 85 18	58.20 31.70 6.70	
	Total	268	100	
Educational background	Diploma Nurse Degree (BSC Nurse)	81 187	30.20 69.80	
	Total	268	100	
Marital Status	Single Married Divorced	99 169	36.90 63.10	
	Total	268	100	
Work experiences	≤ 5 years 5 years to 10 years 11 years to 30 years ≥ 30 years	41 39 163 25	15.2 14.5 61.0 9.3	
	Total	268	100	
Type of Ward	Emerg ency Paediatrics Surgical Medical Oby-gyn Other	90 61 27 28 44 18	33.6 22.8 10.1 10.4 16.4 6.0	
Duration of work in Oxygen Therapy	≤ 1 year 1 years to 5 years 6 years to 10 years >10 years	36 71 90 71	13.4 26.5 33.6 26.5	
	Total	268	100	

Assessment of Knowledge, Attitude and Practice of Nurses towards Oxygen Therapy at Wolaita Sodo University Comprehensive Teaching and Referral Hospital, Ethiopia, 2021

258(96.30%) of them answered correctly. Almost all respondents (248, 92.50%) were aware that a non-rebreathing oxygen face mask with a reservoir bag is used to deliver a higher oxygen concentration than a nasal prong (Table 2).

In this study, about 55.60% of the nurses had good knowledge whereas 44.40% of nurses had poor knowledge of oxygen therapy (Table 3).

An attitude of Nurses toward Oxygen Administration

Among a total of 7 attitude questions provided, the mean attitude score of the participants was 6.30 ± 1.54 (Table 4).

In this study, about 60.80% of the nurses had a good attitude, whereas 39.20% of nurses had a poor attitude toward oxygen therapy (Table 5).

The practice of Nurses in Oxygen administration

Observational practice cheek lists were used to assess nurses' practice on supplemental oxygen

administration. Only 21.9% and 27.9% of the nurses assessed oxygen saturation and vital signs during supplemental oxygen administration, respectively (Table 6).

The mean practice score was 2.37 ± 1.76 (Table 7).

Based on the observed practice of supplemental oxygen administration, about 73.90% of the nurses had a good practice and the rest (26.10%) of nurses had a poor practice of supplemental oxygen administration. (Table 8).

Discussion

Oxygen therapy is the administration of oxygen as a medical intervention, which can be used 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

Table 2: Nurses' knowledge of Supplemental Oxygen Therapy in WSUCST hospital, Ethiopia, 2021. (n=268).				
Variable	Category	Frequency	Percent(%)	
Supplemental Oxygen therapy is used to prevent and treat hypoxia	Aware	250	93.30	
	Not aware	18	6.70	
The normal oxygen saturation for an adult is 95% to 100%	Aware	258	96.60	
	Not aware	10	3.40	
Supplemental oxygen therapy is indicated during surgery	Aware	258	96.60	
	Not aware	10	3.40	
Supplemental oxygen therapy is indicated during shock	Aware	161	60.10	
	Not aware	107	39.90	
Pulse oximetry monitoring is affected by nails varnish/ paint, hypothermia, and or patient position	Aware	242	90.20	
	Not aware	26	9.70	
The humidifier reduces the risk of dry oxygen and its side- effects	Aware	204	76.10	
	Not aware	64	23.90	
Non-rebreathing oxygen face mask with a reservoir bag is used to deliver higher oxygen concentration than a nasal prong	Aware	248	92.50	
	Not aware	20	7.50	
During oxygen therapy, apply water_based gauze if lips or nose become dry	Aware	232	66.60	
	Not aware	36	13.40	
Supplemental oxygen is contraindicated for untreated pneumothorax	Aware	153	57.10	
	Not aware	115	42.9	
For severe lung diseases, patients can take oxygen therapy	Aware	206	76.90	
	Not aware	62	23.10	
The oximeter can be affected by nail, position, or hypothermia	Aware	242	90.30	
	Not aware	26	9.70	
Supplemental oxygen is used in surgery	Aware	258	96.30	
	Not aware	10	3.70	
know oxygen therapy indication	Aware	259	96.60	
	Not aware	9	3.40	
Know oxygen therapy contraindication	Aware	258	96.30	
	Not aware	10	3.70	

Table 3: Nurses' knowledge levels of Supplemental Oxygen Therapy in WSUCST hospital, Ethiopia, 2021(n=268).				
Variable	Values	Frequency	Percent(%)	
Knowledge	Poor knowledge	119	44.40	
Kilowiedge	Good knowledge	149	55.60	

Research Article Argeta, et al.

Table 4: Nurses' mean and SD of attitude to supplemental oxygen therapy in WSUCST hospital, Ethiopia, 2021 (n=268).				
Outcome	Mean	Std. Deviation		
Attitude	5.32	1.750		

Table 5: Nurses' attitude levels on supplemental oxygen therapy in WSUCST hospital, Ethiopia, 2021 (n=268).			
Outcome	Values	Frequency	Percent
Attitude	Poor attitude Good attitude	105 163	39.20 60.80

Table 6: Nurses Practice on Oxygen Administration in WSUCST hospital, Ethiopia, 2021 (n=268).			
Variable	Category	Frequency	Percent(%)
Assess oxygen saturation before administration	Yes	251	93.70
	No	17	6.30
Assess oxygen saturation during administration	Yes	232	86.60
	No	36	13.40
Check the device before administration	Yes	242	90.30
	No	26	9.70
Collect all necessary equipment before administration	Yes	234	87.30
	No	34	12.70
Adjust the flow rate appropriately during the administration	Yes	251	93.70
	No	17	6.30
Use appropriate device size and way	Yes	251	93.70
	No	17	6.30
Follow the patient's vital signs during the administration	Yes	241	89.90
	No	27	10.10

 Table 7. The summarized mean and SD Practice on oxygen therapy, WSUCST hospital from Oct 10 to Oct 25, 2021

 (n=268).

Drastica	Mean	Std. Deviation	
Practice	6.30	1.540	

Table 8: The summarized level of Practice on oxygen therapy at WSUCST hospital from Oct 10 to Oct 25, 2021 (n=268).				
Variable	Values	Frequency	Percent(%)	
Practice	Poor practice	70	26.10	
	Good practice	198	73.90	

injury, and ultimately cerebral damage.

In this study, 44% of nurses had poor knowledge of oxygen therapy. This finding is comparable with research done in Beirut hospitals (55.1%) and Eritrean hospitals (56.7%), a nurses who had a low level of knowledge regarding oxygen therapy but lower than in Addis Ababa, Ethiopia, which shows that 63.8% of nurses had poor knowledge regarding oxygen therapy. This discrepancy might be due to the sample size, study setting, and study period difference. Research in Nottingham University Hospitals stated that nurses should know oxygen therapy indications, and normal oxygen saturation at different ages, including normal respiration rates. This study approved that nurses who were working in the hospital during the study period and in the study areas have a knowledge gap on oxygen therapy.

The practice level of nurses on oxygen administration in this research showed that only 74% of the nurses had good practice. This finding is lower than studies conducted in Addis Ababa hospitals 31(43.4%), Eritrean hospitals 32(45%), and Egypt hospitals 33(74.5%). This might be due to the difference in nurses' training regarding OT, unavailability of oxygen guidelines, administration 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 for oxygen therapy, lack of training about OT, and an inadequate supply of O₂ and delivery system. This finding is supported by research conducted in Egypt, Addis Ababa, Ethiopia and Eritrea respectively.

Good knowledge among nurses who were working

Research Article

in the hospital was found to be 149(50.60%) whereas nurses with poor knowledge were 119(44.40%) which is lower than the mean score of 11.2(SD=1.75). Assessment of nurses' knowledge of oxygen therapy was mainly focused on the indications of oxygen therapy, normal oxygen saturation, and rate of respiration in children. The guidelines from Western Australian Hospitals, British Thoracic Society, Nottingham University Hospitals, Ipswich Hospital, and Royal United Hospitals stated that nurses should know oxygen therapy indications and normal oxygen saturation at different ages including normal respiration rates. This study approved that nurses who were working in the EDs during the study period and in the study areas have a knowledge gap on oxygen therapy.

A good attitude or positive attitude was found to be 163(60.80%) with a mean score of 5.32(SD=1.720) and poor practice was 105(39.20%) which is lower than the mean score. The guideline for Oxygen therapy and delivery devices for paediatrics describes nurses should have an encouraging attitude toward the need for oral and nasal hygiene in children and use humidification devices when administering oxygen therapy. Even if more than half of nurses have a positive attitude toward oxygen therapy much more awareness should have to be done.

Assessment of good practice on oxygen therapy was found to be 198(73.90%) with a mean score of 5.32(SD=1.720) and poor practice was 105(39.20%) which is lower than the mean score. Practical questioners were focused on best practices in pulse oximetry, humidification device attachment, and usage of nasal cannula and facemasks. The guidelines from Nottingham University Hospitals, City Hospital/Queens Medical Centre Nursing practice guidelines for the administration of oxygen and Royal United Hospitals and standard guidelines for oxygen administration and monitoring explained that nurses should have to be skilled in the best practices on pulse oximetry, humidification attachment, use of different oxygen devices to save the life of many emergency patients.

Strengths and Limitations

The strength of this study was to study trying to assess nurses' KAP and practices on oxygen therapy and this gives clues and alarms other research to identify the gaps. The study has some limitations like the nature of study design and bias effect since the study used self-reported data or data collected through self-administered questionnaires

Conclusion

In conclusion, this study demonstrates that there is relatively good knowledge, attitude, and practice among nurses related to SOT use but has not been achieved to the expected level. The possible reason for this gap includes a shortage of training on SOT, unavailability of national as well as hospital SOT guidelines, and excessive nurse workload. Education programs on the occupational use of SOT through in-service training and workshops are important to raise the awareness and practice of nurses about SOT. Hospital nurses also need to be made aware and skilful regarding the updated guidelines for SOT. The unavailability of well-functioning equipment and poor maintenance of nonfunctional oxygen machines are the most serious and additional burdens of nurses with SOT.

Recommendations

Therefore, the hospital should have well-trained and always stand by the biomedical technologists to solve such problems. Nurses should be given training on oxygen therapy and be updated and National oxygen therapy guidelines must be there in place.

Author's contribution

Hindus made substantial contributions; Hindus plays a great role design of the study, managing the collected data, analyzing, and preparing the manuscript. Elsabeth participated in supervision and coordination during and final reading and editing of the manuscript. Biskut participates in the reporting and summarization of the research paper and manuscript. All authors read and approved the final manuscript.

Acknolowegment

First, and for most, we would like to express our heartfelt thanks to Wolaiat Soddo University librarian workers for their cooperation during the literature review by providing the necessary material and resources. Finally, we would like to acknowledge all our respondents for accepting to take their time to give much valuable information that made this study successful. We also extend our thanks to our data collectors and supervisors.

References

- 1. Chakrabarti B, Calverley PM. Management of acute ventilator failure. Postgrad Med J 82, 438-45 (2006).
- World Health Organization (WHO). Essential medicines and health products: WHO Model Lists of Essential Medicines. Geneva: WHO, 33-47 (2016).
- 3. Guidelines for acute oxygen therapy for Western Australian hospitals. 2011.
- World Health Organization. Essential Medicines and Health Products: WHO MODEL Lists of Essential Medicines. Geneva: WHO, 33–47 (2016).
- 5. McMullan J, Rodriquez D, Hart KW, et al. 8.

Prevalence of prehospital hypoxemia and oxygen use in trauma patients. Mil Med 178, 1121-1125 (2013).

- Adib-Hajbaghery M, Maghaminejad F, Paravar M. The quality of pre-hospital oxygen therapy in patients with multiple trauma: a cross-sectional study. Iran Red Crescent Med J 16, (2014).
- Hardinge M, Annandale J, Bourne S, 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 70, 1-43 (2015).
- Newnam KM. Oxygen saturation limits and evidence supporting the targets.

Adv Neonatal Care 14, 403-9 (2014).

- Kane Bl, Decalmer SA, O'Driscoll BR. Emergency oxygen therapy: from guideline to implementation. Breathe 9, 246-253 (2013).
- 10. Stockinger ZT, Mcswain NE. Prehospital supplemental oxygen in trauma patients: its efficacy and implications for military medical care. Mil Med 169, 609-12 (2004).
- Ekström M. Clinical usefulness of longterm oxygen therapy in adults. N Engl J Med 375, 1683-1684 (2016).
- Kim V, Benditt JO, Wise RA, et al. Oxygen therapy in chronic obstructive pulmonary disease. Proc Am Thorac Soc 5, 513-8 (2008).