EFFICIENCY OF THE EDUCATIONAL MATERIAL IN ENHANCING NURSES' UNDERSTANDING OF ENDOTRACHEAL SUCTIONING AT IRAQ/KIRKUK CITY

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ABSTRACT

Background: Endotracheal suction (ETS) is a regular invasive procedure that removes accumulated pulmonary secretions manually in order to maintain the patient's airways while they have an endotracheal tube in place. Objectives: To determine the effectiveness of an educational program on nurse's knowledge regarding endotracheal suctioning at critical care unit in Kirkuk teaching hospital. Design of the Study: Quasi-experimental/ pre-post-test design conducted from October 2023 to March 2024 in order to achieve the objectives of the present study. Sample of the Study: Non-Probability sampling / A purposive sample of (46) critical care unit nurses. Tools of data collection: Two tools were utilized for data collection: The tool I - Structure interview questionnaire schedule for assessment of nurses` knowledge. The tool II - Observation checklist for evaluation of nurses` practices. Results: Majority of nurses` knowledge levels toward endotracheal suctioning before implementing educational program, (82.6%) were poor. After implementing educational program, most of them improved their knowledge level to (37%) Adequate and (19.6%) good. Conclusion: Endotracheal suctioning knowledge of nurses are positively impacted by educational intervention related to this procedure. Recommendation: conduct regular training sessions (workshops and lectures) that are grounded in empirical studies to raise nurses' proficiency in endotracheal suctioning.

INTRODUCTION

Patients who are intubated frequently produce more mucus and have less ability to clear airway secretions, which can raise the risk of respiratory infection (pneumonia), increased airway resistance, workload of respiration, hypoxemia and hypercapnia for the patient. Thus, keeping the airway open and ensuring the greatest amount of gas exchange while providing care for patients receiving mechanical ventilation helps to minimize the above-mentioned issues (Mwakanyanga et al., 2018).

If endotracheal suctioning (ETS) is not performed with correct techniques, the following side effects and hazards are related to this procedure: Bleeding, tracheal mucosa lesions, infections, atelectasis, cardiovascular disease, hypoxemia, and increased intracranial pressure. Therefore, the suction technique should be as quick as possible, lasting around 15 seconds. Prior to suctioning,

0.9% saline is occasionally infused through an endotracheal tube or tracheostomy, however there is little evidence that supports this approach, and it might potentially be harmful (Majeed, 2017).

ETS side effects can be reduced by knowledgeable healthcare providers using the best available evidence to minimize its effects. Health care providers must thus be up to date on the evidence-based practices of ETS in order to carry out the procedures in a scientific manner and lower the risks and complications that may arise for their patients (Heidari et al., 2017). The responsibilities of nurses in the ICU include careful patient observation, intervention to maintain ventilation and oxygenation, and ensuring that patients' requirements are addressed, as a result, they should be knowledgeable about the suctioning method. (Tan, Harrold & Hill, 2017).

Two types of suctioning: Closed suction technique and open suction method. One endotracheal suctioning technique has benefits over the other, as shown by many researches that evaluated the two techniques with relation to physiological problems, oxygenation, and breathing alterations. In contrast to the open suctioning technique, which requires the patient to be disconnected from the ventilator, closed suctioning entails attaching a sterile, closed in-line suction catheter to the ventilator circuit, allowing the suction catheter to pass through the artificial airway without the need for the patient to be disconnected. Disconnection may result in a reduction in functional residual capacity, increased lung recruitment, and even atelectasis, hence closed suction is the preferred approach (Dastdadeh, Ebadi & Vahedian-Azimi, 2016).

Based on assessment of the patient's clinical condition, the requirement for suctioning should be determined. As a normal component of the patient assessment, qualified clinicians should determine whether ETT suctioning is necessary. The following are recommendations for endotracheal suctioning:

Saw tooth pattern on flow-volume loop on ventilator monitor. Coarse crackles auscultated over trachea. Increased peak inspiratory pressure during volume control ventilation. Decreased tidal volume during pressure-controlled ventilation. Deterioration in oxygen saturation and/or arterial blood gas values. Visible secretions in airway. Acute respiratory distress. Increased oxygen demand or strain of breathing (Blakeman et al., 2022).

Importance of study

Despite the availability of scientific evidence supporting the safe and effective completion of endotracheal suctions, many of these suggestions have not been implemented in nurses' clinical settings, probably as a result of a lack of understanding of this process. Nurses frequently carry out conventional or traditional procedures despite established evidence-based guidelines, which suggests that there are gaps between what is known scientifically and what is commonly done. (Mwakanyanga et al., 2018).

Purpose of the study

Evaluating the effect of educational program on Nurses' Endotracheal Tube Suctioning Knowledge.

Recommended guidelines for endotracheal suctioning according to (Blakeman et al., 2022)

No	Guidelines	Recommended
1	Suctioning catheter	Should occlude less than half of the lumen of the ETT
2	Frequency	ETS should be performed only when necessary
3	Depth of suctioning	Minimum invasion to the length of the ETT only
4	Time of suctioning	Should last no longer than 15 seconds
5	Suctioning pressure	Should be lowest as much as possible
6	Normal Saline	Not recommended instillation of normal saline (N/S)

7	Oxygenation	There should be pre-oxygenation by the delivery of 100% oxygen for at least 30 seconds prior to and after the suctioning procedure
8	Hyperinflation	Hyper-oxygenation prior to suctioning should be combined with hyperinflation (20–30 cmH$_2$O)
9	Negative Pressure applying	To be done while withdrawing the catheter
10	Closed vs Open suctioning	closed suction systems are recommended

Hypotheses: The results of the investigation, it was predicted, would show:
Null hypothesis (H0):

There are no notable variations in nurses' post-test regarding increasing their knowledge.
Alternative hypothesis (H1):

There are significant variations in nurse's post-test regarding increasing their knowledge.

METHODOLOGY

A quantitative descriptive study/ Quasi-experimental/one group pre-post-test design conducted from October 2023 to March 2024 in order to achieve the objectives of the present study. The study sample (non-probability sampling / a purposive sample) included (46) nurses from Kirkuk teaching hospital employing in critical care unit.

Tools of data collection: Structure interview questionnaire schedule:

This instrument was advanced by the researchers based on the review of the significant literature (Majeed, 2017). It was used to determine level of knowledge about endotracheal suction (the instrument contained of the overdue two portions:

Part 1: - Characteristics of Nursing Staff: It compromised information about age, gender, level of education, years of experience as a nurse, years of experience in critical care unit and participating in training course about endotracheal suctioning.

Part 2: - Knowledge questionnaires sheet: that established by the researchers after studying of the associated literature that contains 20 items to assess nurses' knowledge regarding to assessment of knowledge about endotracheal tube suction. The researchers used this tool two times (pre-educational intervention and after intervention (post two weeks) to evaluate the effectiveness on knowledge.

The Statistical Package for the Social Sciences (SPSS) version 26.0 was used for the statistical analysis. Both descriptive and inferential statistical methods were used. A p value ≤0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Table (1) Shows that (60.9%) of the sample were in age group between (25-29) years old, while (34.8%) of the sample were in age group ranged from (20-24) years old with (4.3%) of nurses more than 30 years old, with mean 25.48 yrs.; and standard deviation 2.76 yrs. Regarding gender, the participated Nurses in the study had equal percentage. Among the participants, the highest percentage of them had awarded a college level (84.8%). Considering years of experience in nursing field, (89.1%) were 1-3 years, and (10.9%) were 3-5 years. The nurses` experience in critical care unit (87%) were 1-2 years and (13%) were 2-3 years, most of studied sample had not received training courses regarding endotracheal suctioning, and accounted 47(82.6%).

Table (2) demonstrate that the levels of nurses` knowledge toward endotracheal suctioning before implementing educational program, (82.6%) were poor and (17.4%) average. After implementing educational program, the nurses` knowledge were (17.4%) poor, (26.1%) Average, (37%) Adequate and (19.6%) good.

Table (3) show that nurses' knowledge had statistically highly significant relationship with both of nurses' experience in ICU at (p= 0.007) and participating in training course about ETS at (p= 0.002). While there was not any relationship between nurses' knowledge with age, gender, educational level and experience as a nurse at p-value less than (0.05).

Table (1): Distribution of Socio-Demographical Characteristics Variables of Studied Sample (N=46).

Variables	Groups	Frequency	percentage
Age in years	20-24	16	34.8
	25-29	28	60.9
	>30	2	4.3
	Mean ± SD	25.48 ± 2.76	
Gender	male	23	50
	female	23	50
Level of education	Diploma	7	15.2
	Bachelors	39	84.8
	Master and PHD	_	_
Nursing experience	1-3 years	41	89.1
	3-5 years	5	10.9
	>5 years	_	_
	Mean ± SD	2.22 ± 0.6	
experience in critical care unit	1-2 years	40	87.0
	2-3 years	6	13.0
	>3 years	_	_
	Mean ± SD	1.6 ± 0.34	
participating in training course about endotracheal suctioning	no	38	82.6
	yes	8	17.4

Table (2): Levels of nurses Knowledge toward endotracheal suctioning in critical care units before and after educational program.

Knowledge level	Before educational program		After educational program	
	Frequency	percentage	Frequency	percentage
Poor Knowledge (<50%)	38	82.6	8	17.4
Average Knowledge (50-69%)	8	17.4	12	26.1
Adequate Knowledge (70-79%)	0	0	17	37
Good Knowledge (80% & Above)	0	0	9	19.6
Total	46	100	46	100

Table (3): Relationship between nurses' knowledge (N= 46) and their sociodemographic characteristics.

Demographic characters	Mean ± SD	Test of sig.	P value
Age(years)			
20-24	2.6875 ± 0.87321		
25-29	2.5000 ± 1.07152	F= 0.346	0.710
>30	3.0000 ± 1.41421		NS
Gender			
Female	2.7826 ± 0.85048	t= 1.336	0.189
Male	2.3913 ± 1.11759		NS

Educational level			
Diploma	2.5714 ± 0.78680	t= -0.044	0.965
Bachelors	2.5897 ± 1.04423		NS
Years of experience as a nurse			
1-3 years	2.6341 ± 0.99388	t= 0.913	0.366
3-5 years	2.2000 ± 1.09545		NS
Years of experience in ICU			
1-2 years	2.5250 ± 1.06187	t= -2.829	0.007
2-3 years	3.0000 ± 0.00000		HS
Participating in training course about ETS			
No	2.4474 ± 1.03185	t= -3.429	0.002
Yes	3.2500 ± 0.46291		HS

Discussion of The Study Results

Endotracheal suctioning is one of the most communal insidious actions achieved in patients with an artificial airway. So, the nurses must have acquired enough information to prevent complications. Therefore, it is mandatory for nurses to be aware of the current evidence-based guidelines related to the procedure (Kanwal Qaiser, 2020)

Continued Nursing Education is the key concept that instills nurses with contemporary knowledge. It allows the nurses to become aware of evidence-based guidelines in caring for patients to provide cost effective care for hastened recovery with negligible complications (Eslamian, Moeini, M & Soleimani, 2015).

Regarding the nurses' age, the findings of the present study found that more than half of the study sample were in the age group between (25-29) years old, more than one third of the sample were ranged (20-24) years old and less than one fifth were more than 30 years old, with mean and SD (25.48 ± 2.76); This result is lower than that obtained by (Aboalizm & Elhy, 2019) who reported that the mean and SD of nurses age were (26.29±4.11).

The result of present study agrees with a study conducted at al-Najaf city/Iraq and Syria that founded the age group between (25-29) years old was the most frequent percentage among the different age groups participating in the study (Kadhim & Mhabes, 2020; Abo Jeesh, Mohammed & Ahmed, 2021).

according to the gender of nurses, half of them were male and another half were female, this result disagrees with a descriptive cross-sectional observational designed study by (Mwakanyanga, Masika & Tarimo, 2018) at five hospitals in Dar es Salaam who reported that three quarters of participants were female. Also disagree with cross-sectional designed study conducted by (Majeed, 2017) at Baghdad Teaching Hospital (Intensive care unit) who reported that the two third of nurses were male.

Concerning the level of education in the current study, the majority of nurses working in critical care unit were bachelor's degree and less than one fifth were diploma degree, this finding is agrees with Quasi experimental study conducted by (Abdelazeem, Fashafsheh, & Fadllalah, 2019) at Sudan / Governmental hospitals cardiac surgery intensive care units were: Sudan Heart Center, Ahmed Gasim Cardiac surgery Center and Alshaab Cardiac and Thoracic Surgery Teaching Hospital who reported that the majority of nurses working in critical care unit were bachelor's degree.

The result of current study found that the majority of nurses' experience were less than three years and less than one fifth of nurses' experience were more than three years, this result not match with a study conducted at al-Najaf city/Iraq by (Kadhim & Mhabes, 2020) to assess nurses practices regarding endotracheal suction, who reported that the majority of nurses experience were more than 5 years.

According to a descriptive cross-sectional observational study by (Mwakanyanga, Masika & Tarimo, 2018) at five hospitals in Dar es Salaam to assess nurses' knowledge and practices toward endotracheal suction that revealed the majority of nurses experience less than 5 years.

According to the results of this study, the majority of nurses' experience in critical care unit were less than two years, and this is due to the hard work pressures within critical care unit, the nurses are transferred themselves to departments and units that have an easy work environment (poor hospital management). These experiences, reflect on nurses` knowledge & practices

A cross sectional study conducted by (Kadhim & Mhabes, 2020) at Al-Najaf city to assess nurses' practices toward endotracheal suctioning, stated that more than half of nurses experience in critical care unit were less than three years.

A quasi-experimental research design with pre-posttest conducted by (Aboalizm & Elhy, 2019) at Egypt to evaluate the effectiveness of educational intervention on Nurses' knowledge and practices regarding endotracheal tube suctioning, showed that more than half of nurse's experience in critical care unit were more than six years.

The current study showed that the majority of study sample do not participate in training course about endotracheal suctioning. This finding is agreeing with that obtained by (Kadhim & Mhabes, 2020) who reported that the majority of nurses do not participate in training course about endotracheal suctioning. A hospital base semi - Quasi experimental study was conducted in ICU nursing staff, prospective pre- and post-test design by (Aboalizm & Elhy, 2019) who stated that the half of nurses were participated in training course about endotracheal suctioning.

CONCLUSION

The present study has come with the following conclusions: During the nurses' knowledge assessment phase, a considerable proportion of nurses were found to have inadequate knowledge related to endotracheal suctioning. The success of the educational program demonstrated an important enhancement in the nurses' endotracheal suctioning knowledge.

Recommendations

The most important advice is to conduct regular training sessions (workshops and lectures) that are grounded in empirical studies to raise nurses' proficiency regarding endotracheal suctioning. Further research is needed with larger sample of critical care nurses and another hospital in Kirkuk city to determine the barriers that prevent nurses from updating their expertise and skills.

REFERENCES

Abdelazeem, E., Fashafsheh, I., & Fadllalah, H. (2019). Effect of training program on nurses knowledge and competence regarding endotracheal tube and tracheostomy care in mechanically ventilated patients. Int J Nurs, 6(1), 48-57.

Abo Jeesh, Y. A., Mohammed, K., & Ahmed, E. (2021). Effectiveness of Teaching Program on Critical Care Nurses' Performance during Endotracheal Suctioning in the Intensive Care Units in Syria. ESJ Natural/Life/Medical Sciences available at, Doi, 10.

Aboalizm, S. E., & Elhy, A. H. A. (2019). Effect of educational intervention on nurses' knowledge and practices regarding endotracheal tube suctioning. *SSRG International Jurnal of Nursing and Health Science*, 5(3).

Benz Mwakanyanga, E. T., Masika, G. M., & Tarimo, E. A. (2018). Intensive care nurses' knowledge and practice on endotracheal suctioning of the intubated patient: A quantitative cross-sectional observational study. *PloS one*, *13*(8), e0201743.

Blakeman TC, Scott JB, Yoder MA, Capellari E, Strickland SL. AARC clinical practice guidelines: artificial airway suctioning. Respir Care. 2022;67(2):258–71.

Dastdadeh R, Ebadi A, Vahedian-Azimi A. Comparison of the Effect of Open and Closed Endotracheal Suctioning Methods on Pain and Agitation in Medical ICU Patients: A Clinical Trial. Anesth Pain Med. 2016 Jul 31;6(5):e38337. doi: 10.5812/aapm.38337. PMID: 27847697; PMCID: PMC5101537.

Eslamian, J., Moeini, M., & Soleimani, M. (2015). Challenges in nursing continuing education: A qualitative study. Iranian journal of nursing and midwifery research, 20(3), 378.

Heidari M, Shahbazi S. Nurses' awareness about principles of airway suctioning. J Clin Diagnostic Res. 2017;11:LC17–9. https://doi.org/10.7860/JCDR/2017/25550.10452.

Kadhim, J. J., & Mhabes, F. G. (2020). Effectiveness of an Educational Program on Critical Care Nurses' Practices Regarding Endotracheal Suctioning of Adult Patients Who are Mechanically Ventilated in Hospitals at AL-Najaf, Iraq. Indian Journal of Forensic Medicine & Toxicology, 14(4).

Kanwal Qaiser, R. N., RM, P., RN BSN, M. S. N., Yasmeen Saggu, R. N., RM, D., DWA, M., ... & Sumaira Naz Generic, B. S. N. (2020). Endotracheal Suctioning: Effectiveness of Structured Training Program in Enhancing Performance Knowledge of Intensive Care Unit Nurses.

Majeed, H. M. (2017). Assessment of knowledge and practices of intensive care unit nurses about endotracheal suctioning for adult patients in Baghdad teaching hospitals, Iraq. *Int J Res Med Sci*, *5*(4), 1396-1404.

Tan, C. S., Harrold, M., & Hill, K. (2017). Approaches and adjuncts used by physiotherapists when suctioning adult patients who are intubated and ventilated in intensive care units in Australia and New Zealand: a cross-sectional survey. Australian Critical Care, 30(6), 307-313.