

## CRITICAL CARE NURSES' LEVEL OF KNOWLEDGE AND PRACTICE ABOUT TRACHEOSTOMY CARE: A DESCRIPTIVE STUDY

Mohamed Goda Elbqry<sup>1,2</sup>

<sup>1</sup>Department of Medical Surgical Nursing, College of Nursing, Qassim University, Saudi Arabia.

<sup>2</sup>Medical Surgical Nursing Department, Faculty of Nursing, Suez Canal University, Ismailia, Egypt.

E-mail: [m.elbqry@qu.edu.sa](mailto:m.elbqry@qu.edu.sa)

ORCID : <https://orcid.org/0000-0002-0654-9702>

### Abstract

**Background:** Tracheostomy care is a standard nursing practice used in critical care units (CCUs) to reduce tracheostomy-related problems. **Aim:** This study aimed to assess critical care nurses' level of knowledge and practice about tracheostomy care. **Subject and Method:** A descriptive cross-sectional research design utilizing a non-probability purposive sample of 100 nurses who were compatible and worked in the critical care units at Suez Canal University hospitals in Ismailia City from July 2021 to September 2021. Data were gathered using an online self-report survey to assess their level of knowledge and an observational checklist to evaluate their practice level about tracheostomy care in the stated settings. **Results:** The current result exhibited that most of the studied nurses' level of knowledge and practice about tracheostomy care was unsatisfactory. There was a statistically significant difference between the mean level of both knowledge and practice about tracheostomy care with demographic data ( $p \leq 0.05$ ). **Conclusions:** Clearly, more than half of the study nurses were aged between 20-29 years old (mean age was  $29 \pm 36.2$ ) and less than two-thirds of them were female. The level of knowledge and practice among critical care nurses about tracheostomy care was unsatisfactory. **Recommendations:** Suggesting an urgent in-service training module to improve nurses' performance about tracheostomy care and maintain a continuous competency evaluation. Future research studies must aim for a national representation of the participant nurses to gain a better assessment of their training and educational needs as well as update policy and practice.

**Keywords:** Critical Care Nurses, Knowledge, Practice, Tracheostomy.

### 1. Introduction

A tracheostomy is a tracheal surgical incision created to allow a substitute route of breathing [1]. It is accomplished in about 11–13% of critically ill patients who have been orally intubated for a period of 7–14 days and still need extended mechanical ventilation. It provides a secure airway, promotes respiration, removes secretion, permits speaking, enables oral feeding, and promotes patients' mobility [2,3]. Despite this, it is associated with immediate and long-term complications and requires advanced nursing care. Despite the available nursing training and based on related literature, ungraduated educational programs, or/and hospital in-service training programs, several

studies revealed that nurses' level of knowledge and practice are below optimum among nurses practicing even with or without mechanical ventilation [4].

Internationally, there are differences in tracheostomy care within healthcare settings because nearly 80% of nurses do not follow designed guidelines or recommendations [3,5]. Because of inadequate tracheostomy care knowledge and practice, it may result in both immediate and long-term complications [5]. Preventing these complications requires adequate knowledge and practice of standardized tracheostomy care protocols. Nursing care for a patient with a tracheostomy is vital because inappropriate or inadequate care may lead to complications and even death. It focuses on restoring the patient's physiologic stability, relieving pain, avoiding complications, and educating the patient about self-care [1].

Therefore, appropriate tracheostomy care practices improve patient comfort, lower the risk of laryngeal damage, require less sedation, speed up weaning off the ventilator, and reduce hospital length of stay [6]. However, poor tracheostomy care practices could lengthen hospital stays and raise both short-term problems (infection, accidental decannulation, tube obstruction, and bleeding) and long-duration complications (upper airway blockage, weaning failure, and scarring) [7]. Identifying nurses' knowledge and practice about tracheostomy care may reduce the mortality rate, prevent complications, reduce the length of hospital stay, and lower financial costs [8].

## **2. Aim of the study**

Therefore, the aim of this current study was to assess critical care nurses' level of knowledge and practice about tracheostomy care.

## **3. Subject and Method**

### **3.1 Study design and setting**

The research design used in this study was a descriptive cross-sectional. It was conducted among studied nurses at the Intensive care unit (ICU), Cardiac care unit (CCU), Cardiothoracic care unit (CTICU), and Hepatic intensive care unit (HICU) at Suez Canal University hospitals in Ismailia City from July 2021 to September 2021.

### **3.2 Sampling and sample size**

A nonprobability purposive sample method of all available nurses who matched the inclusion criteria in the four selected units was used in this study to assess the level of knowledge and practice about tracheostomy care. Using Raosoft's sample size calculator, the sample size was determined. The suitable sample size was determined to be 100 nurses based on the predicted measurement, a margin of error of 5%, a drop-out rate of 10%, a confidence level of 95%, a population size of 120, a response distribution of 50%, and other factors. A recruited sample was chosen that met the following criteria: (a) had a nursing license; (b) were currently employed in CCU units; (c) gave their willingness to participate; and (e) had not recently participated in any tracheostomy care training program.

### 3.3 Tools for Data Collection: Two tools were used in the existing study.

Demographic data sheet the researcher designed it to assess demographic features such as age, gender, education level, working experience, and type of critical care units. An online self-report survey: it 30-multiple-choice questions with four options for each question that was distributed into five scopes to assess information regarding: “anatomy of trachea,” 3-items; “tracheostomy,” 5-items; “tracheostomy tube,” 4-items; “tracheostomy care,” 6-items; “tracheostomy suctioning,” 4-items; and “Nursing responsibility about tracheostomy care,” 8-items. It was adapted by the researcher from previous related studies [1,9,10]. It was designed on Microsoft Form 365 in a simple design with comprehensive language. The link was shared with the recruited nurses to assess their level of knowledge about tracheostomy care.

The true answer was given one mark, while the false answer was given a zero grade. The total number of true answers was collected and divided by the sum. Moreover, a satisfactory level of knowledge is considered to be at least 60%. Observational checklist: it was a valid and reliable 18-step checklist that was adopted by researchers from related previous research studies and literature [11,12,13]. It was utilized to evaluate the level of the studied nurses' practice in tracheostomy care. It involved pre-procedure 5-steps, procedure 10-steps, and post-procedure 3-steps. Every competent step was given one grade, but the incompetent was given zero. satisfactory level is considered competent  $\geq 70\%$ . Tools validity and reliability clarified its relevance, comprehensiveness, and respectively high internal consistency for tools II, and II were (0.73) and (0.88). No changes were detected in the post-piloting tools for 10% of the nurses who presented that they were applicable, clear, and feasible.

Utilizing IBM SPSS Statistics (Version. 25) the data was arranged, amended, reviewed, analyzed, and tabulated. The normality test was examined by the Kolmogorov-Smirnov test, which clarified parametric data, and the normality test was  $\geq 0.05$ . Descriptive statistics were used to clarify the data as frequencies and percentages regarding the sample, knowledge, and practice of tracheostomy care. To compare the differences in sociodemographic variables' levels of knowledge and practice, the t-test, one-way analysis of variance (ANOVA), and Scheffe's test were utilized. At  $p\text{-value} < 0.05$ , a correlation was considered statistically significant.

Filed of Work: From April through the end of November 2021, general research work for this study's data collection method began and was finished. The researcher identified, introduced herself, and explained the study's purpose to each participant before beginning data collection. Every nurse was selected and interviewed to collect the necessary data for the study. Once the study's aim was clarified in the classroom in the selected unit, the studied nurses were asked to sign the informed consent form, and the survey links were shared before each shift. Following their approval, the researcher collected data in three days weekly in all shifts within 3–7 minutes for every participant to share the survey link and fill out it to assess their demographic features and level of knowledge about tracheostomy care. Everyone's level of practice at the time of implementing actual tracheostomy care was assessed using a standardized observational checklist without any interruption of care to assure its continuity and patency. They believed the information would be kept private and utilized just for the study.

#### 4. Results

The results comprise an exploration of the study participants’ demographic features, knowledge, and practices about tracheostomy care. The study survey’s link was given to 97 nurses and completed in the current study settings. It is clear from **Table 1** that more than half (59.7%) of the study nurses were aged between 20 and 29 years old, and their mean age was  $29 \pm 6.2$ . Concerning gender, less than two-thirds (63.9%) of them were female. Regarding educational level, it was revealed that less than half (4.3%) of them have a technical institute, and nearly half (49.5%) of them have less than 5 years of experience. Moreover, most of the participants (80.5%) obtained training courses about tracheostomy care.

Furthermore, it’s shown in **Figure 1** that more than one-quarter of the studied participants worked in the intensive care unit.

**Table 2:** It is demonstrated from the study that nurses’ mean and standard deviation regarding their overall level of knowledge were  $14.12 \pm 6.21$  and their median was 15.00. Moreover, regarding the overall level of practice in tracheostomy care, the mean and standard deviation were  $(8.12 \pm 4.21)$  and their median was (9.00).

Concerning the satisfactory level of the studied nurses’ knowledge, Figure 2 shows that less than half (46%) of the study nurses had a satisfactory level of knowledge about tracheostomy care, while more than half of them (54%) had an unsatisfactory level. Furthermore, approximately one-third (32%) of the participants had a satisfactory level of practice about tracheostomy care, while two-thirds of them had an unsatisfactory level. Statistically, there was a significant positive correlation between the overall level of knowledge and practice about tracheostomy care ( $t = 11.02$ ;  $p\text{-value} = 0.001^*$ ).

As regards the studied nurses’ demographic features, their relationship with associated variables about tracheostomy care Table 3 demonstrated that there was a highly statistically significant relationship between total nurses' satisfactory level of knowledge and practice about tracheostomy care and their demographic features (age, educational level, working experience, and obtaining training courses) ( $P \text{ value} < 0.01$ ).

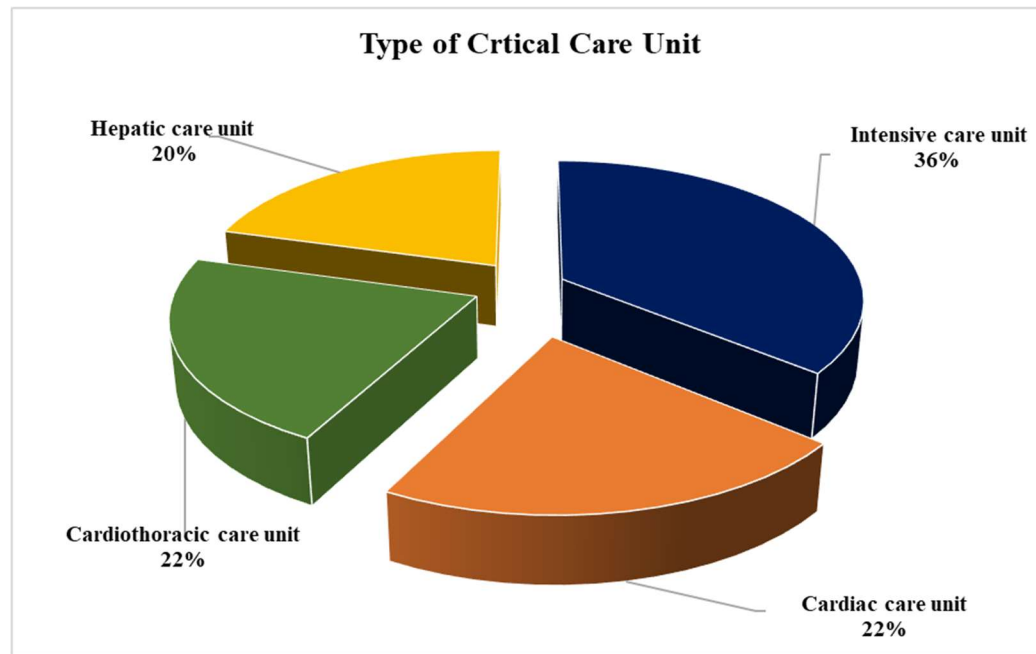
Table 1: Frequency and distribution of the studied nurses regarding their demographic features ( $n=97$ ).

Variables	No	(%)
<b>Age</b>		
▪ 20–29	58	59.7
▪ 30–39	22	22.7
▪ $\geq 40$	17	17.6
	Mean $\pm$ SD ( $29 \pm 6.2$ )	
<b>Gender</b>		
▪ Male	35	36

▪ Female	62	64
<b>Educational level</b>		
▪ Diploma	38	39.2
▪ Technical institute	42	43.3
▪ Bachelors	13	13.4
▪ Postgraduate graduates	4	4.1
<b>Working experience</b>		
▪ Less than 5 years	48	49.5
▪ 5–10 years	39	40.2
▪ More than 10 years	10	10.3
Mean±SD (7.2±5.1)		
<b>Obtaining Training courses</b>		
▪ Yes	19	19.5
▪ No	78	80.5

**SD: Standard deviation**

Figure 1: Frequency and distribution of the studied nurses regarding their type of critical care units (n=97).



**Table 2:** Mean and Standard deviation of the studied nurses according to their overall level of knowledge and practice about tracheostomy care (n=97).

Variables	Overall level of knowledge	Overall level of practice
	(1-30)	(1-17)

	Total score	% score	Total score	% score
▪ Median	15.00	56.21	9.00	61.20
▪ Min. – Max.	0.0 – 30.0	0.0 – 100.0	0.0 – 17.00	0.0 – 100.0
▪ Mean ± SD.	14.12 ± 6.21	63.21 ± 12.14	8.12 ± 4.21	63.21 ± 12.14

SD: Standard deviation

Figure 2: Satisfactory level of the studied nurses' knowledge, practice, and their correlation about tracheostomy care (n=97).

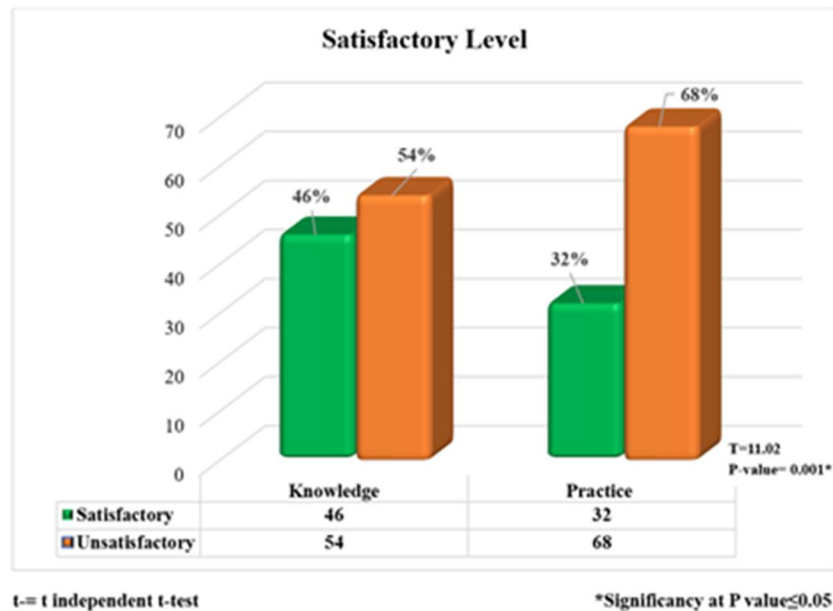


Table 3: Variables of the studied nurses' demographic features, its relationship with the total level of knowledge and practice about tracheostomy care (n=97)

Variables	Total Knowledge Level		Total Practice Level			
	No	%	Mean±(SD)	P-value	Mean±(SD)	P-value
<b>Age</b>						
▪ 21–30	58	59.7	26.50 (2.30)		21.16 (3.21)	
▪ 31–39	22	22.7	23.01 (3.10)	0.002*	23.10 (6.42)	0.01*
▪ ≥40	17	17.6	8.30 (2.01)		6.73 (2.63)	
<b>Gender</b>						
▪ Male	36.1	36.1	19.24 (6.80)		26.41 (1.20)	
▪ Female	63.9	63.9	21.30 (6.24)	0.08	21.75 (8.14)	0.51
<b>Educational level</b>						
▪ Diploma	38	39.2	29.10 (1.02)		24.87(4.00)	
▪ Bachelors	42	43.3	21.01 (5.26)		21.041 (2.76)	

▪ Technical Institute	13	13.4	26.01 (1.16)	0.001*	26.41 (3.16)	0.05*
▪ Postgraduate nursing	4	4.1	8.11 (2.98)		1.74 (1.81)	
<b>Working experience</b>						
▪ Less than 5 years	48	49.5	24.51 (4.82)		29.65 (1.99)	
▪ 5–10 years	39	40.2	22.37 (4.72)	0.05*	21.54 (3.22)	0.001*
▪ More than 10 years	10	10.3	13.42 (9.29)		13.16 (12.00)	
<b>Obtaining Training courses</b>						
▪ Yes	19	19.5	16.91 (6.80)		26.31 (6.12)	
▪ No	78	80.5	26.32 (1.92)	0.01*	20.67 (2.02)	0.001*

**t-test or one-way ANOVA test**

**\*Significantly at  $p \leq 0.05$ .**

## 5. DISCUSSION

The aim of the current study was to assess critical care nurses' level of knowledge and practice about tracheostomy care at critical care units. This was completed through a descriptive cross-sectional research design of nurses working across critical care units at Suez Canal University hospitals. With reference to the study's nurses' demographic features, the present study demonstrated that more than two-quarters of the studied nurses were aged between 20 and 29 years, and their mean  $\pm$  standard deviation was  $29.5 \pm 3.2$ . Moreover, less than two-thirds (64%) of them were female. This result was supported by Abdou Eltaib, et al. (2021), who specified that more than half of the study participants were definitely female, and their age ranged between 23 and 30 years [14]. Nurses' performance has been assessed for similar purposes at a selected hospital in Gwalior City by Tyagi, (2019), who stated disagreement with the current study result, which showed that most of the nursing staff are male, and their mean age was 27.26 years [15]. It is correct because the intensity and number of graduated nurses in Egypt were female nurses, and many of them graduated after two years of study after secondary school.

In terms of educational accomplishment, the recent study clarified that more than one-quarter of the studied nurses had a technical institute, and about half (49.5%) of them had had <5 years of experience with their mean  $\pm$  standard deviation ( $7.2 \pm 5.1$ ). Furthermore, more than two-quarters (80.5%) of the studied nurses obtained training courses related to tracheostomy care. The current result had a similarity with the study of Mussa, et al. (2021), who illustrated that less than three-quarters of the study nurses had a technical institute of nursing school, while less than three-quarters of them had working experience ranging between 2 and 5 years [16]. In the same vein, this finding was disagreed with by Mahfoz (2022), who cited that more than three-quarters of the studied nurses had a bachelor's nursing degree, and most of them had 6–10 working experience years [17]. According to the researcher's perspective, hospitals still have minimal consequences for academically trained nurses compared to those with higher graduate credentials.

As regards the studied nurses' working place in the critical care units, more than one-quarter (36%) of the studied nurses were recruited in the intensive care unit, while less than one-quarter (20%)



of them were recruited in the hepatic intensive care unit (MICU). Also, most (80.5%) of them did not obtain retaining courses about tracheostomy care. This present issue was supported by Bonvento, et al. (2017), who found that more than half of the study nurses worked in intensive care unit to provide care for intubated ventilated patients [18]. In dissimilarity with these findings, Mwakanyanga, et al. (2018) cited that there are more general critical care units [19]. The researcher reported that nursing staff in intensive care units are more likely to provide care to ventilated patients who require a long hospital stay and require continuous training courses.

It was made clear by the current study that less than half of the studied nurses had a satisfactory level of knowledge about tracheostomy care. In addition, the mean± standard deviation of the studied nurses according to their overall level of knowledge about tracheostomy care was  $14.12 \pm 6.21$  as a total score with a median of 15.00. This study's findings were supported by Abdulrahman, et al. (2021) and Khanum, et al. (2023). In both studies, it was presented that most of the studied nurses had a satisfactory level of knowledge about tracheostomy care [20, 21]. While in the opposite direction of this current study's findings, Yelverton, (2015) and Varshney, (2017), which in both studies displayed that most of the study nurses had an inadequate level of knowledge for tracheostomy care [22, 23]. Inadequate level of participants' knowledge about tracheostomy care was related to a low level of experience, low interest in more scholarship, low quality of educational workshops, as well as poor adherence to designed national upgrading policies and procedures.

In the parallel line regarding the level of the studied nurses' practice about tracheostomy care, less than one-quarter of the studied nurses had a satisfactory level of practice. Moreover, the mean± standard deviation of the studied nurses according to their overall level of knowledge about tracheostomy care was  $(63.21 \pm 12.14)$  as a total score with a median of (61.20). Furthermore, the current study clarified that there was a high statistically significant relationship between the studied nurses' level of knowledge and practice about tracheostomy care ( $t= 11.02, p= 0.001^*$ ). This current study's result was similar to those of Dhaliwal, et al. (2018) and Gaterega, et al. (2021). Both studies illustrated that most of the studied nurses had an unsatisfactory level of practice in tracheostomy care [24, 25]. There was disapproval of this study's results by Sabry, et al. (2020), and Nabil, et al. (2022) exhibited that most of the studied nurses had a satisfactory level of practice in tracheostomy care at the mentioned study settings [26, 27]. Incompetent level of participant performance is considered with their age, busy time, unaccountable nurse-patient ratio during care, and loss of ability to catch training-related courses.

The existing study stated that there was a highly statistically significant correlation between the study nurses' level of performance (knowledge and practice) about care of tracheostomy at  $p \leq 0.05$ . Moreover, there was a significant relationship between the studied nurses' demographic features (age, educational level, working experience years, and obtaining training courses) and their total level of knowledge and practice about tracheostomy care at  $p \leq 0.05$ , but there was no relation between the demographic features' gender item and the studied nurses' total level of knowledge and practice about tracheostomy care at  $p=0.08$  and  $0.51$  consecutively. In the same concerns, it was agreed with Elmansy. (2021) statement that there was a significant positive relation between



the studied nurses' performance [28]. There were no limitations in the current study.

## 6. CONCLUSION AND RECOMMENDATIONS

Based on the results of this present study, it can be concluded that more than half of the study nurses were aged between 20-29 years old (mean age was  $29 \pm 36.2$ ) and less than two-thirds of them were female. Furthermore, most of the studied nurses had an unsatisfactory level of knowledge and practice about tracheostomy care. In the same way, there is a highly statistically significant correlation between total nurses' level of knowledge and practice. Consequently, suggesting an urgent in-service training module to improve nurses' performance in tracheostomy care and maintaining a continuous competency evaluation are crucial for carrying out optimal care. Future research studies must aim for a national representation of the participant nurses to gain a better assessment of their training and educational needs as well as update policy and practice.

### Abbreviations

CCUs	Critical Care Units
CCU	Cardiac care unit.
CTICU	Cardiothoracic care unit.
HICU	Hepatic intensive care unit.
ICU	Intensive care unit.

**Data availability:** Upon an appropriate request, the author will make the data sets generated and examined during this study available.

**Conflicts of interest:** The author declares that he has no competing interests.

**Funding statement:** There is no grant or other financial assistance received in this research for commercial or non-commercial use that could inappropriately influence or bias the content of the paper.

**Ethical approval and consent to participate:** The hospital administrators, nursing manager and at Suez Canal University hospitals in Ismailia city approved and coded the research ethics. The studied nurses agreed to data collection after the purpose of the study was explained. The researcher guaranteed that the data would be kept private, anonymous, and utilized solely for the study. They had the right to withdraw from participants at any time.

**Consent for publication:** Not applicable.

**Author Contributions:** The author who contributed to the complete work. The author read, revised, and approved the final manuscript for publication.

**Acknowledgment:** The author would like to appreciate directors of the Critical care units at Suez Canal University Hospitals, Ismailia city, Egypt for providing support in sample collection. A special thank is for the nurses who participated in this study.

### References

[1] Ignatavicius, D. D., & Heimgartner, N. M. (2023). Clinical Companion for Medical-

- Surgical Nursing-E-Book. Elsevier Health Sciences.
- [2] Nazir, S., Riaz, S., Abbas, Z., Akhtar, S., & Latif, W. (2022). Nurses Knowledge and Practices Regarding Tracheostomy Care in ICU Patients. *Pakistan Journal of Medical & Health Sciences*, 16(07), 79-79.
  - [3] Vincent, J. L., Moore, F. A., Bellomo, R., & Marini, J. J. (2022). *Textbook of critical care*. Elsevier Health Sciences. 8<sup>th</sup> ed, pp.702-706.
  - [4] Alessa, R., AlBashtawy, M., AlBashtawy, B., Alkhaldeh, A., Albashtawy, S., & Qaddum, J. (2021). Intensive care units nurse's knowledge and practice regarding the endotracheal tube suctioning". *Ec pulmonology and respiratory medicine*, 10(2021), 29-35.
  - [5] Perry, A. G., Potter, P. A., Ostendorf, W. R., & Laplante, N. (2021). *Clinical nursing skills and techniques-E-Book*. Elsevier Health Sciences. Mosby, 10<sup>th</sup> ed, p. 813.
  - [6] Lewis, S.L., Dirksen, S. R., Heitkemper, M.M. & Bucher, L. (2018): *Medical-Surgical Nursing in Canada-E-Book*. Elsevier Health Sciences. 5<sup>th</sup> ed, p.p 465-470.
  - [7] McGrath, B. A., Ashby, N., Birchall, M., Dean, P., Doherty, C., Ferguson, K., ... & Higgs, A. (2020). Multidisciplinary guidance for safe tracheostomy care during the COVID-19 pandemic: the NHS National Patient Safety Improvement Programme (NatPatSIP). *Anaesthesia*, 75(12), 1659-1670.
  - [8] Harding, M. M., Kwong, J., Roberts, D., Hagler, D., & Reinisch, C. (2020). *Lewis's medical-surgical nursing*. Amsterdam, The Netherlands: Elsevier Health Sciences. 12<sup>th</sup> ed, p.724.
  - [9] Ramakrishnan, V. (2018). *Use of Simulation for Tracheostomy Care, a Low Volume, High Risk Nursing Procedure* (Doctoral dissertation, Walden University).
  - [10] Onuoha, J. (2019). *Developing an Educational Program for Tracheostomy Care* (Doctoral dissertation, Walden University).
  - [11] Nabil Malk, R., Mawed Fahem, E., & Abouda Abdelhamed Sultana, A. (2022). Effectiveness of Training Program regarding Tracheostomy Care on Nurses Performance at Intensive Care Unit. *Egyptian Journal of Health Care*, 13(1), 267-279.
  - [12] Maraş, G. B., Güler, E. K., Eşer, İ., & Köse, Ş. (2017). Knowledge and practice of intensive care nurses for endotracheal suctioning in a teaching hospital in western Turkey. *Intensive and Critical Care Nursing*, 39, 45-54.
  - [13] Ramadan, A. A., Abdelrahman, H. A., & Kandeel, N. (2022). Critical Care Nurses' Practice of Oral Care for Critically Ill Patients with a Tracheostomy Tube. *Mansoura Nursing Journal*, 9(2), 271-280.

- [14] Abdou Eltaib, F., Mohammed Mohammed Abu Negm, L., & Hussein Bakr, Z. (2021). Effect of Tracheostomy Care Guidelines on Internship Nurses Students' Performance and Confidence Level. *Egyptian Journal of Health Care*, 12(2), 885-899.
- [15] Tyagi H. (2019). Effectiveness of video assisted teaching module regarding tracheostomy care on knowledge among staff nurses at selected hospital of Gwalior city. *Glob Nurs J India*; 2:121-24.
- [16] Mussa CC, Gomaa D, Rowley DD, Schmidt U, Ginier E, Strickland SL. (2021). AARC clinical practice guideline: Management of adult patients with tracheostomy in the acute care setting. *Respir Care*; 66:156-69.
- [17] Mahfoz, T. M. B. (2022). Attitude and practices of tracheostomy care among nursing staff in Saudi Arabia. *BMC nursing*, 21(1), 367.
- [18] Bonvento, B., Wallace, S., Lynch, J., Coe, B., & McGrath, B. A. (2017). Role of the multidisciplinary team in the care of the tracheostomy patient. *Journal of multidisciplinary healthcare*, 391-398.
- [19] 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.
- [20] Abdulrahman, E., Musa, M. T., Eltayeb, R. M., & Ali Fadlalmola, H. (2021). Effect of an Educational Training Program in Tracheostomy Care on Nurses' Knowledge and Skills. *International Journal of Nursing Education*, 13(2).
- [21] Khanum, A., Gulzareen, M. O., Fizza, G., Buksh, F. M., & Nazir, S. (2023). Descriptive Study Evaluating Nurses Knowledge and Practices Regarding Tracheostomy Care in ICU Patients. *Pakistan Journal of Medical & Health Sciences*, 17(06), 134-134.
- [22] Yelverton, J. C., Nguyen, J. H., Wan, W., Kenerson, M. C., & Schuman, T. A. (2015). Effectiveness of a standardized education process for tracheostomy care. *The Laryngoscope*, 125(2), 342-347.
- [23] Varshney, S., Sharma, S. K., & Jelly, P. (2017). Tracheostomy suctioning: Exploration of knowledge and practices of nurses working in selected tertiary care hospitals in Uttarakhand state. *Nursing & Midwifery Research Journal*, 13(2), 68-77.
- [24] Dhaliwal, M. K., Choudhary, R., & Sharma, P. (2018). A Descriptive Study to assess the knowledge and skills on tracheostomy care among staff nurses working in selected hospitals of district Mohali, Punjab. *Asian Journal of Nursing Education and Research*, 8(2), 242-246.
- [25] Gaterega, T., Mwiseneza, M. J., & Chironda, G. (2021). Nurses knowledge and practices regarding tracheostomy care at a selected referral hospital in Rwanda—a descriptive cross-

- sectional study. *International Journal of Africa Nursing Sciences*, 15, 100350.
- [26] Sabry, N. Beshay, I., Abdelaziz Mohamed, M., Ahmed Mohamed, H., & Fathy Mahmoud, S. (2020). Nurses' Performance Regarding Care of Patients with Tracheostomy. *Egyptian Journal of Health Care*, 11(4), 1318-1329.
- [27] Nabil, M. R., Mawed F. E., & Abouda A. Sultana, A. (2022). Effectiveness of Training Program regarding Tracheostomy Care on Nurses Performance at Intensive Care Unit. *Egyptian Journal of Health Care*, 13(1), 267-279.
- [28] Elmansy, F. M. (2023). NURSES' LEVEL OF PRACTICE AND ATTITUDE TOWARD CARE OF PATIENTS PRE/POST LAPAROSCOPIC CHOLECYSTECTOMY. *Ann. For. Res.*, 66(2), 212-226.