INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

ASSESSING KNOWLEDGE AND ATTITUDE AMONG NURSING STAFF REGARDING TRACHEOSTOMY CARE AT THE UNIVERISTY OF LAHORE TEACHING HOSPITAL

Original Research

Qubra Bibi[1]*, Muhammad Saifullah[1], Aleena Arooj[2], Muhammad Liaqat[3]
[1]Intern Trainee, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
[2]Assistant Professor, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
[3]MSDU, Lahore School of Radiology, The University of Lahore, Lahore, Pakistan.
Corresponding Author: Intern Trainee, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan. Qubrabibibsn2025@gmail.com
Acknowledgement: The authors express gratitude to all nursing staff who participated in this study for their valuable time and contributions.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Tracheostomy is a critical surgical procedure that provides an alternative airway for patients with respiratory compromise or requiring prolonged mechanical ventilation. Effective management of tracheostomy care is essential to prevent complications such as tube obstruction, infection, and accidental decannulation. Nursing staff play a pivotal role in tracheostomy management, yet variations in knowledge and attitude can impact patient safety. Despite the increasing use of tracheostomy in critical care settings, gaps in standardized training and guideline-based practices remain a concern.

Objective: This study aimed to assess the knowledge and attitude of nursing staff regarding tracheostomy care at the University of Lahore Teaching Hospital.

Methods: A quantitative, cross-sectional descriptive study was conducted among 36 nurses working in surgical wards, intensive care units, and critical care settings. A structured questionnaire assessed demographic data, knowledge, and attitude toward tracheostomy care. The knowledge section included ten multiple-choice questions scored as 1 for incorrect and 2 for correct answers, while attitude was evaluated using a five-item linear scale. Data were analyzed using descriptive statistics with SPSS version 25.0.

Results: Among the participants, 41.7% were male and 58.3% were female. Good knowledge (>15/20) was observed in 72.2% of nurses, while 22.2% had average knowledge (13–15/20), and 5.6% demonstrated poor knowledge (≤12/20). Regarding attitude, 69.4% had a positive approach (>5/10), whereas 30.6% exhibited a poor attitude (≤5/10). Higher education and greater clinical experience correlated with better knowledge and attitude scores.

Conclusion: Although the majority of nurses demonstrated good knowledge and a positive attitude toward tracheostomy care, a small proportion exhibited deficits that could impact patient outcomes. Targeted educational programs, hands-on training, and structured guidelines are recommended to enhance nursing competency in tracheostomy management.

Keywords: Attitude, critical care, intensive care units, knowledge, nursing staff, tracheostomy, tracheostomy care.

INTRODUCTION

Tracheostomy is a critical surgical procedure often performed in intensive care settings to establish an alternative airway for patients who require prolonged mechanical ventilation or have upper airway obstruction. Despite its significance, the procedure presents various challenges related to patient safety and optimal care management. Tracheostomy care is a high-risk, low-incidence skill requiring specialized nursing knowledge and meticulous handling. Even minor mismanagement can result in severe complications, including laryngotracheal stenosis, surgical emphysema, tube obstruction, stomal infection, and pneumothorax (1). The increasing use of tracheostomy in clinical settings necessitates a standardized approach to care; however, there remains a noticeable gap in knowledge, guidelines, and practice among nursing staff, which can directly impact patient outcomes (2). Effective tracheostomy management involves understanding the type and size of the tracheostomy tube, regular cleaning of the inner cannula, suctioning and secretion removal, stoma dressing and wound care, as well as ensuring adequate humidification of supplemental oxygen to prevent tube blockage and maintain mucosal integrity (3). Postoperative tracheostomy care is primarily managed by nursing staff in intensive care units and general wards, making their expertise crucial in preventing life-threatening complications such as accidental decannulation, hemorrhage, and airway obstruction (4). Although otolaryngologists and surgeons perform the tracheostomy procedure, ongoing nursing care determines patient recovery, comfort, and overall outcomes. Evidence suggests that deficiencies in nursing knowledge regarding tracheostomy care are widespread, leading to inconsistent practices and an increased risk of adverse events (5).

The absence of uniform training and standardized guidelines contributes to variations in nursing practices, ultimately affecting the safety and efficacy of tracheostomy management. Studies indicate that up to 30% of tracheostomy-related complications arise due to inadequate nursing care, emphasizing the need for structured educational interventions (6). Despite the growing number of patients requiring tracheostomy, a significant proportion of nurses lack confidence, expertise, and the necessary skills to handle such patients effectively (7). Research conducted globally highlights that the understanding of tracheostomy care among non-specialist healthcare providers remains suboptimal, with complication rates ranging from 12.6% to 30% (8). This underscores the importance of providing evidence-based education to nurses at all levels to enhance competency and improve patient safety. A significant barrier to effective tracheostomy care is the variation in nurses' attitudes and willingness to engage in continuous learning. Nurses' perceptions about tracheostomy care influence their motivation to pursue training and their ability to educate patients and families about post-discharge care. Negative attitudes, often stemming from a lack of confidence or inadequate exposure to standardized care protocols, can hinder patient-centered nursing interventions (9). In contrast, structured training programs that integrate both theoretical and hands-on learning have been shown to improve nurses' confidence, clinical judgment, and overall patient outcomes (10). Educational interventions, including video-assisted training, hands-on simulations, and continuous professional development, have demonstrated significant improvements in nurses' knowledge and their ability to manage tracheostomy-related complications effectively (11).

Existing research highlights substantial gaps in tracheostomy knowledge among nursing professionals, regardless of geographic location or healthcare setting. A study conducted in Karachi reported that 60% of nurses had inadequate knowledge regarding tracheostomy care, raising concerns about patient safety and the effectiveness of nursing interventions (12). Similar findings were reported in the United States, where only 50% of nurses could identify essential aspects of tracheostomy care, further underscoring the need for competency-based training (13). A strong correlation has been observed between nurses' level of education, clinical experience, and their ability to manage tracheostomy patients effectively. Studies suggest that hospitals with well-structured training programs experience fewer tracheostomy-related complications and shorter hospital stays among affected patients (14). Given the increasing reliance on tracheostomy in critical care settings, the need to assess and improve nursing staff knowledge and attitudes has become imperative. Enhancing nurses' competencies through structured education can lead to better patient monitoring, early identification of complications, and improved overall management of tracheostomized patients (15). The implementation of standardized tracheostomy care protocols is essential to reduce practice variations and ensure optimal patient outcomes. By addressing knowledge gaps and fostering a positive attitude toward tracheostomy care, healthcare institutions can enhance patient safety, reduce morbidity, and improve the overall quality of nursing care (16). This study aims to evaluate the knowledge and attitudes of nursing staff regarding tracheostomy care at the University of Lahore Teaching Hospital. The findings will contribute to identifying areas where targeted educational interventions are needed, ultimately improving nursing practices and patient outcomes. The primary objectives of this study are to determine the level of knowledge among nursing staff regarding tracheostomy care and to assess their attitudes toward managing tracheostomy patients.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

METHODS

A quantitative, descriptive, cross-sectional study was conducted to assess the knowledge and attitude of nursing staff regarding tracheostomy care at the University of Lahore Teaching Hospital. This study aimed to evaluate the level of understanding among nurses working in critical care settings and to identify gaps that could impact patient outcomes. The study variables included independent factors such as age, gender, and qualification, while the dependent variables encompassed knowledge and attitude toward tracheostomy care (17). The research was conducted at the University of Lahore Teaching Hospital (UOL), targeting nursing staff working in critical care units, including the Medical Intensive Care Unit (MICU), Surgical Intensive Care Unit (SICU), Coronary Care Unit (CCU), and Neonatal Intensive Care Unit (NICU). A convenience sampling technique was employed for participant selection. The sample size was determined using Slovin's formula, resulting in a final sample of 36 nursing staff members. The study was carried out from September 2024 to January 2025 (12).

Inclusion criteria comprised staff nurses working in MICU, SICU, CCU, and NICU with clinical experience ranging from 0 to 5 years and an age range of 18 to 30 years. Exclusion criteria included Bachelor of Science in Nursing (BSN) and Master of Science in Nursing (MSN) students, staff members who declined to participate, and individuals employed at institutions other than the University of Lahore Teaching Hospital (11). Knowledge was operationally defined as the level of understanding among nursing staff regarding tracheostomy care, assessed through a structured questionnaire containing ten multiple-choice questions. Responses were scored as 1 for incorrect and 2 for correct answers. The knowledge scores were classified as poor (≤12), fair (13–15), and good (≥16), ensuring a standardized assessment approach. Attitude was defined as the behavioral perception of nursing staff toward tracheostomy care, evaluated through a five-item linear scale. Responses were scored with 2 points for "Yes" and 1 point for "No." A total score of ≤5 indicated a poor attitude, whereas a score of ≥6 was considered indicative of a good attitude (8).

Data collection was conducted using a self-administered questionnaire, which included 15 statements assessing demographic details, knowledge, and attitude. The reliability and validity of the research instrument were ensured through pretesting, with a content validity ratio (CVR) of 0.8, confirming the tool's reliability and relevance. Participants were given approximately 10 to 15 minutes to complete the questionnaire. Before data collection, the purpose and objectives of the study were explained, and written informed consent was obtained from all participants. The assessment of knowledge and attitude was carried out based on the predefined scoring criteria (18). Quantitative data were analyzed using descriptive statistical techniques to examine relationships between variables. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Results were presented in the form of mean scores, frequencies, and percentages to provide a comprehensive understanding of the level of knowledge and attitude among the nursing staff (2). Ethical considerations were strictly maintained throughout the study. Approval was obtained from the Institutional Review Board (IRB) of the University of Lahore Teaching Hospital. Participants' rights were respected, and all data collected were kept confidential. Anonymity was ensured, and participants were informed that their involvement was voluntary, with the option to withdraw at any stage without any consequences. They were also assured that there were no risks or disadvantages associated with their participation.

RESULTS

The study included 36 participants, of whom 41.7% were male and 58.3% were female. The majority (83.3%) were aged between 18 to 25 years, while 16.7% were between 25 to 30 years. In terms of clinical experience, 41.7% had 0–2 years of experience, 27.8% had 2–5 years, and 30.6% had 3–5 years. Assessment of knowledge regarding tracheostomy care showed that 66.7% of participants correctly identified that the trachea extends downward to the level of the 6th thoracic vertebra, whereas 33.3% answered incorrectly. A total of 63.9% correctly identified the trachea as the windpipe, while 36.1% did not. Regarding the measurement of the trachea, 58.3% provided correct answers, whereas 41.7% were incorrect. The function of the trachea in the cough reflex was correctly identified by 75% of participants, while 25% provided incorrect responses. The classification of tracheostomy as permanent or temporary was correctly recognized by 75%, while 25% were incorrect. The definition of tracheostomy as an indwelling tube inserted into the trachea was correctly answered by 77.8% of participants, whereas 22.2% answered incorrectly. Knowledge regarding the indications for tracheostomy, including severe burns and laryngeal obstruction, was correctly recognized by 63.9%, whereas 36.1% were incorrect. Understanding of tracheostomy tube components, such as the cuff, inner, and outer cannula, was correctly identified by 72.2%, while 27.8% provided incorrect responses. The normal range for tracheostomy tube cuff pressure (20–25 mmHg) was correctly identified by

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

55.6%, while 44.4% were incorrect. The criteria for selecting a tracheostomy tube, including length and inner diameter, were correctly identified by 77.8%, while 22.2% answered incorrectly.

Overall, 5.6% of participants demonstrated poor knowledge, scoring ≤12 out of 20. A total of 22.2% had average knowledge, scoring between 13 and 15, while 72.2% demonstrated good knowledge, scoring above 15. Regarding attitudes toward tracheostomy care, 86.1% of participants reported feeling confident in evidence-based practice, whereas 13.9% did not. A total of 75% believed that their workplace had an optimal team approach for tracheostomy care, while 25% did not. Similarly, 75% felt comfortable managing tracheostomy patients within their team, whereas 25% did not. When managing patients requiring ventilator assistance, 69.4% of participants felt confident, while 30.6% did not. Availability of expert clinical support within the team was perceived positively by 58.3% of participants, whereas 41.7% felt a lack of support. Overall, 30.6% of participants demonstrated a poor attitude, scoring ≤5 out of 10, while 69.4% exhibited a positive attitude, scoring above 5.

The comparison of knowledge and attitude levels concerning demographic factors such as experience revealed a significant association between years of experience and the competency of nursing staff in tracheostomy care. Nurses with 0–2 years of experience had an average knowledge score of 14.75 and an average attitude score of 6.17, indicating a lower level of competency compared to those with greater experience. Participants with 2–5 years of experience demonstrated a moderate increase in knowledge (16.67) and attitude (7.33) scores, while those with 3–5 years of experience had the highest scores, with a mean knowledge score of 18.17 and an attitude score of 8.42. The statistical analysis using ANOVA confirmed a significant difference in both knowledge ($p = 0.00006$) and attitude ($p = 0.00001$) across different experience groups, suggesting that increased experience positively correlates with better tracheostomy care knowledge and attitude.

The relationship between education level and knowledge/attitude scores also demonstrated a notable trend. Nurses holding a Diploma had the lowest mean knowledge (14.75) and attitude (6.17) scores, while those with a BSN degree performed moderately better, with knowledge and attitude scores of 16.67 and 7.33, respectively. Participants with an MSN degree exhibited the highest competency, with an average knowledge score of 18.17 and an attitude score of 8.42. ANOVA results confirmed that the differences in knowledge ($p = 0.00006$) and attitude ($p = 0.00001$) among different educational levels were statistically significant. This indicates that higher educational attainment is strongly associated with improved knowledge and a more positive attitude toward tracheostomy care.

Table 1: Demographic characteristic of participants

Gender	**Frequency (%age)**
Male	15 (41.7)
Female	21 (58.3)
Age	
18-25	25 (83.3)
25-30	6 (16.7)
Experience	
0-2	15 (41.7)
2-5	10 (27.8)
3-5	11 (30.6)
Total	36 (100)

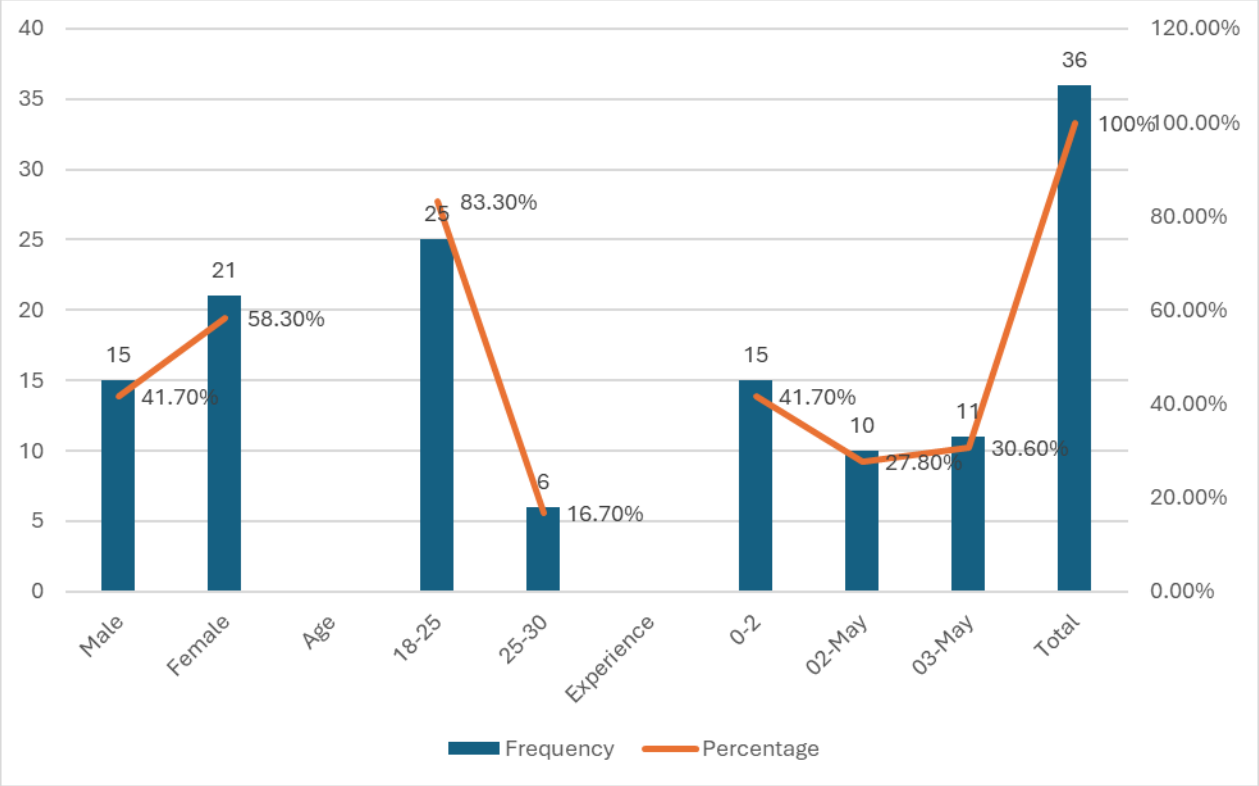


Table 2: Assessment of knowledge regarding tracheostomy care

Question	Incorrect (Frequency, %)	Correct (Frequency, %)
Trachea extends downwards the level of 6th thoracic.	12 (33.3%)	24 (66.7%)
Trachea is known as the windpipe.	13 (36.1%)	23 (63.9%)
Trachea approximately measures 10 to 11 cm number of hyaline cartilage.	15 (41.7%)	21 (58.3%)
Important function of trachea is cough reflex.	9 (25.0%)	27 (75.0%)
Types of tracheostomy are permanent and temporary.	9 (25.5%)	27 (75.0%)
Tracheostomy refers to an indwelling tube inserted into the trachea.	8 (22.2%)	28 (77.8%)
Tracheostomy is indicated in severe burns, laryngeal obstruction, and when an endotracheal tube cannot be used.	13 (36.1%)	23 (63.9%)
Parts of tracheostomy tube are cuff, inner, and outer cannula.	10 (27.8%)	26 (72.2%)
The normal measurement of tracheostomy tube cuff pressure is 20-25 mmHg.	16 (44.4%)	20 (55.6%)
Length and inner diameter in millimeters are the criteria you base on while choosing a tracheostomy tube.	8 (22.2%)	28 (77.8%)

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table 3: Sum of Knowledge N regarding tracheostomy care

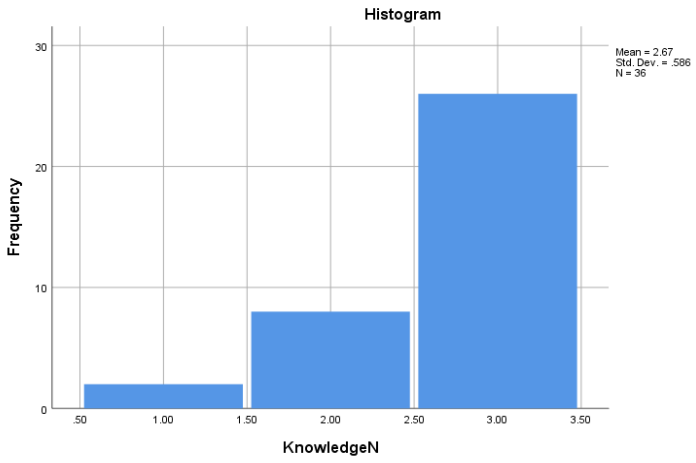
Level of Knowledge	Frequency (%age)
Poor knowledge less than ≤60%(≤ 12 out of 20)	2 (5.6%)
Average knowledge> 60% but ≤75% (≥13 to 15 out 20)	8 (22.2%)
Good knowledge >75%(>15 out of 20)	26 (72.2%)
Sum	36 (100.0%)

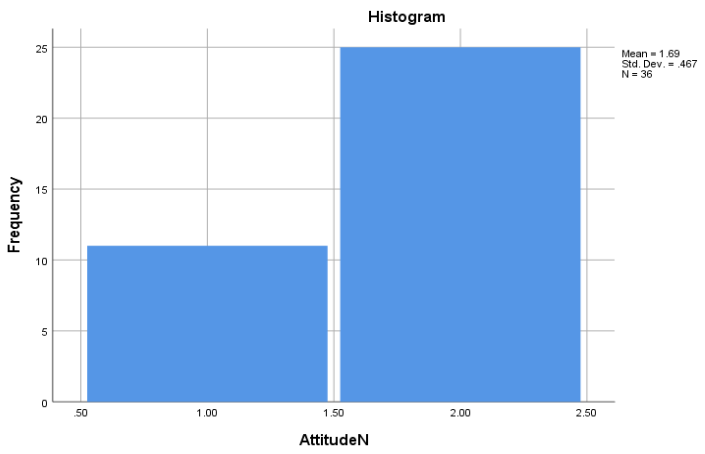
Table 4: Assessment of attitude regarding trachesotomy

Question	Yes (Frequency, %)	No (Frequency, %)
Did you feel confident with available evidence-based practice in tracheostomy care?	31 (86.1%)	5 (13.9%)
Does the setting in which you work have an optimal team approach for the care of patients with a tracheostomy?	27 (75.0%)	9 (25.0%)
Did you feel relaxed to manage the majority of patients with tracheostomy care within your team?	27 (75.0%)	9 (25.0%)
Did you feel relaxed and confident to manage patients with tracheostomy care who also require ventilator assistance?	25 (69.4%)	11 (30.6%)
Did you feel you have expert clinical support within your team in tracheostomy care and management?	21 (58.3%)	15 (41.7%)

Table 5: Sum of attitude

Level of attitude	Frequency (%age)
Poor attitude less than≤ 50%(≤5 out of 10)	11 (30.6%)
Good attitude> 50%(>5 out of 10)	25 (69.4%)
Sum	36 (100%)





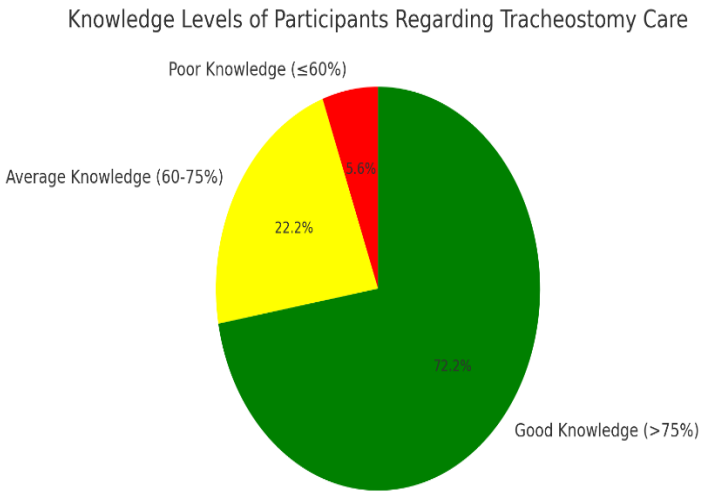


Figure 2 Knowledge Levels of Participants regarding Tracheostomy Care

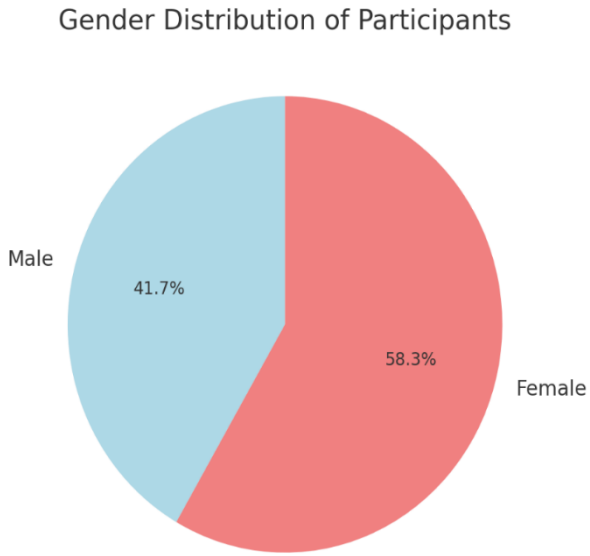


Figure 1 Gender Distribution of Participants

DISCUSSION

The study assessed the knowledge and attitude of nursing staff regarding tracheostomy care at the University of Lahore Teaching Hospital. The findings revealed that 72.2% of participants demonstrated good knowledge, scoring above 15 out of 20, while 22.2% had average knowledge, scoring between 13 and 15. A small proportion, 5.6%, exhibited poor knowledge with scores ≤12. The attitude assessment indicated that 69.4% of participants had a positive approach toward tracheostomy care, whereas 30.6% displayed a negative attitude, lacking confidence in managing tracheostomy patients (18). The results highlight a direct relationship between clinical experience, education level, and competency in tracheostomy care. Nurses with higher education and greater experience demonstrated better knowledge and attitude scores. Participants with diploma-level education and less experience had lower scores, while those holding bachelor's or master's degrees with 2–5 years of experience exhibited a more confident and informed approach. Similar trends have been observed in previous studies, which emphasize the role of structured training and clinical exposure in enhancing nursing competencies. Studies have consistently reported that inadequate education and limited experience contribute to knowledge gaps, which can lead to inconsistencies in tracheostomy care practices, increasing the risk of complications (19).

The study further identified common misconceptions among nursing staff, such as incorrect identification of tracheal anatomy and function. A significant proportion of participants (33.3%) misidentified the trachea's anatomical level, while 36.1% incorrectly referred to the trachea as the windpipe. These findings are consistent with existing research, which suggests that knowledge gaps in airway management are prevalent among nurses who lack specialized training. Standardized education and hands-on training programs have been recommended to address such misconceptions and improve clinical competence in tracheostomy care (20). One of the notable strengths of this study is its focus on a critical aspect of nursing care in intensive care settings, where tracheostomy management is a routine but high-risk procedure. The study provides insight into the knowledge deficits and attitudes of nursing staff, offering a foundation for targeted interventions. However, certain limitations must be acknowledged. The cross-sectional nature of the study restricts the ability to determine causal relationships between education, experience, and knowledge levels. Additionally, the study was conducted with a limited sample size, which may not fully represent the broader nursing population. Data collection was confined to nurses with 0–5 years of experience, limiting the generalizability of findings to more experienced nurses who may exhibit different competency levels (12).

Future research should focus on expanding the sample size and incorporating a longitudinal study design to track changes in knowledge and attitude following educational interventions. Emphasis should be placed on stress management and confidence-building strategies for nurses handling tracheostomy patients. Further studies should aim to fill research gaps by evaluating emergency preparedness and protocol adherence in tracheostomy care. Workshops, hands-on simulation training, and standardized educational programs should be implemented to enhance nursing competency and reduce variability in clinical practice.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

CONCLUSION

The study evaluated the knowledge and attitude of nursing staff regarding tracheostomy care, highlighting the influence of education and clinical experience on competency levels. The findings indicated that while most participants demonstrated a strong foundational understanding of tracheostomy-related concepts, certain misconceptions and gaps in knowledge persisted. Attitude assessments revealed that confidence and preparedness in tracheostomy management varied, with more experienced and highly educated nurses exhibiting greater competence. The study underscores the importance of structured education, hands-on training, and continuous professional development to enhance nursing proficiency in tracheostomy care. Addressing knowledge gaps through targeted interventions can improve patient safety, reduce complications, and standardize nursing practices in critical care settings.

AUTHOR CONTRIBUTIONS

Author	Contribution
Qubra Bibi1*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Saifullah	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Aleena Arooj	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Liaqat	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

REFERENCES

1. Abu-Sahyoun, R., ALBashtawy, M., Mohammad, K., Abu Baker, N., Al-Sheyab, N., Alyahya, M., Nawafleh, H., ALBashtawy, S., Ayed, A., Musa, A., ALBashtawy, B., Al-Amer, R., ALBashtawy, Z., & Alkhawaldeh, A. (2023). Critical Care Nurses' Knowledge of Tracheostomy Care. Iranian Journal of Nursing and Midwifery Research, 28(5), 504–508. https://doi.org/10.4103/ijnmr.ijnmr_180_22

2. Ali, R., Shaikh, M. H., Bibi, A., & Khan, N. (2023). Knowledge of nurses regarding tracheostomy care in tertiary care hospital Karachi. NURSEARCHER (Journal of Nursing & Midwifery Sciences), 3(02)

3. Chitaranjan, G., Kumar, M. A., & Shashi, P. (2024). To Assess the Effectiveness of the Video Assisted Teaching on Knowledge and Practice Regarding Tracheostomy Care among Staff Nurses with a View to Develop Protocol on Tracheostomy Care. South Asian Research Journal of Nursing and Healthcare, 6(01), 1–6. https://doi.org/10.36346/sarjnhc.2024.v06i01.001

4. 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.

5. Mosalli, R., Aboumoustafa, G., Khayyat, W., et al. (2022). Assessment of nurses' knowledge and confidence regarding tracheostomy care in a pediatric long-term care hospital in Saudi Arabia. Risk Management and Healthcare Policy, 15, 1809-1821

6. Sabry Naeem 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. https://doi.org/10.21608/ejhc.2020.274031

7. Marraro GA. Tracheostomy: Shortcut or Real Necessity? Pediatr Crit Care Med. 2020;21(6):603-4.

8. Michael M, Böhm L, Bernhard M. Exchange-Technik – sicherer Wechsel von Larynxtubus auf Endotrachealtubus. Pneumologie. 2023;77(5):308-14.

9. Moser CH, Peeler A, Long R, Schoneboom B, Budhathoki C, Pelosi PP, et al. Prevention of Tracheostomy-Related Pressure Injury: A Systematic Review and Meta-analysis. Am J Crit Care. 2022;31(6):499-507.

10. Mussa CC, Gomaa D, Rowley DD, Schmidt U, Ginier E, Strickland SL. AARC Clinical Practice Guideline: Management of Adult Patients with Tracheostomy in the Acute Care Setting. Respir Care. 2021;66(1):156-69.

11. Pandian V, McGrath BA, Brenner MJ. Capping or Suctioning for Tracheostomy Decannulation. N Engl J Med. 2020;383(25):2480.

12. Thomas, T. T., Rao, V. V., Mahmood, L. S., Bhat, M., & Dsouza, C. (2024b). The Role of a 'Tracheostomy Care Training Module' in Improving the Knowledge, Attitude and Practices Among Nurses in High Dependency Units. Indian Journal of Otolaryngology and Head & Neck Surgery, 76(3), 2706–2713. https://doi.org/10.1007/s12070-024-04489-y

13. Tahir, K., Mushtaq, R., Sattar, A., & Sanam, S. (2024). Knowledge and attitude regarding tracheostomy care among nurses at the Children's Hospital and University of Child Health Sciences, Lahore. International Journal of Social Science Archives, 7(3), 529–539.

14. Khanum, A., Gulzareen, Owais, M., Fizza, G., Buksh, F. M., & Nazir, S. (2023). Descriptive study evaluating nurses' knowledge and practices regarding tracheostomy care in ICU patients. P J M H S, 17(6), 134

15. Berges AJ, Lina IA, Ospino R, Tsai HW, Brenner MJ, Pandian V, et al. Quantifying Viral Particle Aerosolization Risk During Tracheostomy Surgery and Tracheostomy Care. JAMA Otolaryngol Head Neck Surg. 2021;147(9):797-803.

16. Chang J, Sidell DR. Tracheostomy in Infants in the Neonatal Intensive Care Unit. Neoreviews. 2020;21(5):e323-e34.

17. Powell J, Buckley HL, Agbeko R, Brodlie M, Powell S. Tracheostomy trends in paediatric intensive care. Arch Dis Child. 2021;106(7):712-4.

18. Rovira A, Dawson D, Walker A, Tornari C, Dinham A, Foden N, et al. Tracheostomy care and decannulation during the COVID-19 pandemic. A multidisciplinary clinical practice guideline. Eur Arch Otorhinolaryngol. 2021;278(2):313-21.

19. Schweiger T, Evermann M, Roesner I, Denk-Linnert DM, Klepetko W, Hoetzenecker K. Pädiatrische Atemwegschirurgie: Indikationen und Techniken. Zentralbl Chir. 2022;147(3):299-304.

20. Whitmore KA, Townsend SC, Laupland KB. Management of tracheostomies in the intensive care unit: a scoping review. BMJ Open Respir Res. 2020;7(1).

