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Research Article

Evaluation of the Expertise of Healthcare Providers in Tracheostomy Care

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A B S T R A C T

Introduction: The tracheostomy is a surgical airway management method for establishing a direct airway via the neck and trachea. This study aimed to gauge the extent of proficiency that healthcare providers possessed regarding tracheostomy care.

*Materials and Method:*Pre-tested subjective and objective questionnaires were distributed to all healthcare workers responsible for administering care to patients with tracheostomy and the responses were recorded.

Results: The average comfort score was 36.83 out of 50. With the objective questionnaire, it was observed that the majority of the participants had inadequate knowledge of crucial aspects like extended tracheotomy tubes, tracheotomy speaking valves, decannulation, and ventilation for post-laryngectomy patients. The findings indicated that the level of expertise of healthcare professionals regarding tracheostomy care was not adequate. Only individuals with extensive experience in this discipline were capable of achieving a score that exceeded the average.

Conclusion: The importance of continuous education and training in the healthcare sector is underscored by the evaluation of knowledge in tracheostomy care. Healthcare providers must remain informed about the most recent protocols and techniques in order to deliver the highest quality of care as medical practices continue to evolve.

Keywords: Tracheostomy, Tracheostomy Speaking Valve, Decannulation, Post-Laryngectomy

Introduction

Tracheostomy is a surgical method that is frequently performed in the field of otolaryngology.[1] Its objectives include establishing an airway in specific instances of obstruction, facilitating extended mechanical ventilation in moribund patients, broncho-pulmonary toileting, protecting the airway or maintaining it, and reducing dead space.[2] The most critical component of achieving favourable patient outcomes is postoperative care. Inadequate training and the absence of standard criteria can complicate this fundamental practice.[3] In both wards and intensive care setups, the nursing staff and physicians are crucial in bedside management. Subsequently, all healthcare providers who are directly responsible for administering postoperative care to patients of this nature must be capable of performing this task effectively.

Materials and Methodology

The study was conducted in the Department of Otorhinolaryngology, Chettinad Hospital and Research Institute following approval from the Institutional Ethics Committee from Feb 2023 - Feb 2024. It employed a cross-sectional design The collection of data was done by administering questionnaires to a sample of 160 healthcare professionals after obtaining Informed consent.

Inclusion Criteria

Healthcare personnel, including doctors and nurses involved in tracheostomy care.

Exclusion Criteria

Participants who had incomplete questionnaires or missing data.

Procedure

Details of the healthcare providers who were willing to participate in the study were noted including demographic details, department, years of experience, perception of knowledge, and frequency of dealing with tracheostomy care. Data from the study participants was collected using a pre-tested semi-structured subjective questionnaire - " Tracheostomy Education Self-Assessment Questionnaire "[4](Annexure 1) and an objective questionnaire - "Tracheostomy Objective Questionnaire"[4] (Annexure 2). The questionnaires were carefully devised after a comprehensive analysis and assessment of appropriate literature. The questions employed were uncomplicated and direct, focusing on suctioning, deflation of the cuff, tube obstruction, and feeding practices in patients with tracheostomy.

The data were gathered and evaluated with SPSS version 29 and statistical analysis was done. The chi-square test was employed to compute the associations with the subjective and objective knowledge scores. A p value of less than 0.05 was deemed statistically significant.

Results

The majority of the participants (45%) were in the age range of 26 to 30 years. Out of the total participants, 81 (50.63%) were male and 79 (49.38%) were female. Among the 160 participants, 96 (60.00%) were doctors, while the remaining 64 (40.00%) were nurses (Table 1).

The assessment of levels of comfort in tracheostomy care management was conducted using a self-assessment questionnaire. The average comfort score out of 50 was 36.83 ± 6.59 with a range of 24 to 50. A total of 110 participants reported a comfort score of 75% or above, which accounted for 68.75% of the total. In contrast, 50 individuals (31.25%) reported comfort scores below 75%.

The specific knowledge deficits that were discovered are as follows: 38% of participants were unaware that the purpose of the obturator, as depicted in an image, was for the reinsertion of a tracheotomy tube. 22% of the participants were unaware of the intended function of a cuffed tracheotomy tube. 43% of the participants were unaware of the appropriate level of cuff pressure and the significance of maintaining proper cuff pressure. 49% were unaware of the benefits of a double-cannula tracheotomy tube. 68% of individuals could not comprehend the indication for an extended tracheotomy tube. 52% lacked comprehension of the functioning of a tracheotomy speaking valve and 37% of participants were unable to identify an incorrect statement in a clinical scenario question. 40% were unaware of the presentation of a tracheo-innominate artery fistula and 72% of the participants lacked comprehension of the essential criteria required for tracheotomy decannulation. 39% of the participants did not want to do bag-mask ventilation on a patient with an inadvertently removed tracheotomy tube. 65% of the participants were unaware of the proper techniques for providing ventilation to post-laryngectomy patients.

Cross-tabulation of the subjective and objective scores with the different characteristics of the participants (age, profession, department, and expertise) was done but there was no statistically significant difference (Table 2).

Table 1.Demographic Profile of the Participants

N = 160

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
< 26	51	31.88
26–30	72	45.00
31–35	18	11.25
> 35	19	11.88
Gender		
Male	81	50.63
Female	79	49.38
Profession		
Nurses	64	40.00
Doctors	96	60.00
Department		
ICU	34	21.25
General medicine	54	33.75
Surgical department	46	28.75
Emergency department	26	16.25

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Level of experience		
< 1	52	32.50
1–3	45	28.13
3–5	25	15.63
5–10	19	11.88
> 10	19	11.88
Level of familiarity with literature		
Inadequate	20	12.50
Average	64	40.00
Satisfactory	63	39.38
Excellent	13	8.13
Frequency of dealing with a tracheostomy		
Daily	4	2.50
2–3 times in a week	8	5.00
Weekly once	32	20.00
Monthly once	116	72.50

Discussion

Tracheostomy is regarded as the most ancient and very efficient surgical technique for patients in critical care units and emergencies. The method is commonly employed for patients with respiratory failure and patients who need mechanical ventilation because of a blockage in their upper respiratory system. It is also utilised for patients who have had an endotracheal tube inserted for more than a week and those who require periodic suctioning to maintain lung health.[5,6]

Tracheostomy has shown a substantial global rise in usage, with approximately one-third of ICU patients who need extended mechanical breathing support undergoing the procedure.[7]

Tracheostomy presents clinical challenges for healthcare personnel due to the complex indications, precise timings, and optimum technique involved.[8] The management of these patients requires precise nursing skills due to the potentially life-threatening consequences even from little errors. This makes it a skill with a low incidence rate but high risk, necessitating specialised nursing knowledge, attention, and unit.[9] Despite the growing importance of

Table 2.Cross-Tabulation of the Subjective and Objective Assessment Scores with Age, Profession, Department, and Level of Experience

Characteristics	Average Score of Subjective Questionnaire	Chi-Square and pValue	Average Score of Objective Questionnaire	Chi-Square and pValue
Age (years)				
< 26	27.85	7.164, 0.305	18.49	6.329, 0.089
26–30	35.52		11.41	
31–35	32.09		66.54	
> 35	34.27		17.27	
Profession				
Nurses	32.21	5.672, 0.219	44.83	7.760, 0.094
Doctors	33.05		54.27	
Department				
Intensive care unit	39.17	11.472, 0.071	58.95	1.892, 0.279
Medical ward	33.11		67.19	
Surgical ward	24.96		71.14	
Emergency	35.52		44.6	
Level of experience (year)				
< 1	25.27	6.431, 0.201	22.75	1.353, 0.584
1–3	33.13		23.49	
3–5	33.39		35.41	
5–10	44.01		66.54	
> 10	34.27		71.27	

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tracheostomy and its increasing use in patients, there is a lack of standardised knowledge, principles, and criterion-based treatment for tracheostomy.

Efficient tracheostomy care encompasses understanding the types and dimensions of the tube, cleansing the inner cannula, eliminating secretions, dressing the stoma, and providing wound care.

Despite the progress in medical technology and the development of less invasive techniques for maintaining airflow, patients with severe and persistent respiratory failure still require immediate airway intubation, which is achieved through a tracheostomy. Healthcare staff are consistently the primary point of contact for patients with tracheostomy. Healthcare professionals who possess extensive knowledge and expertise in tracheostomy management can effectively care for patients, minimising the risk of serious consequences. Additionally, they can also provide training to caregivers responsible for the patient's well-being at home.

The aim of this study was to assess the level of comfort and depth of knowledge among healthcare professionals when caring for tracheostomy patients, using a subjective and objective questionnaire. The study sought to ascertain variables that influence the level of comfort experienced by healthcare workers, to establish the average comfort score for the participants and to ascertain their knowledge levels in this domain. The study found that the average comfort score of healthcare professionals was 36.83. Additionally, 68.75% reported a comfort score of 75% or higher, while 31.25% reported a score below 75%.

An objective questionnaire was used to evaluate knowledge about tracheostomy. Our study revealed that the degree of healthcare worker's understanding of tracheostomy care fell short of expectations where 68% did not know the indication for extended tracheotomy tube, 52% of participants did not understand how a tracheotomy speaking valve worked, 72% did not understand the essential criteria for tracheotomy decannulation, and 65% did not know how to provide ventilation to post-laryngectomy patients properly.

The results obtained from the subjective and objective questionnaire were correlated with factors such as their line of work, experience levels, work setting, number of times he/ she deals with a tracheostomy patient, and familiarity with the literature but there were no statistically significant differences.

This was similar to the study conducted by Smith-Miller aimed to evaluate the initial levels of comfort and understanding of ICU nurses before and during a tracheotomy instruction session. The study determined that the initial degree of comfort was quite low and that the initial understanding of the nurses was restricted. The study found no association between the comfort level of nurses and their level of education or experience similar to this study. However, the comfort level dramatically increased following the formal instructional session on tracheostomies.[10]

Similarly, Varshney et al. conducted a study in which 315 nurses were assessed on their suctioning techniques and then answered a questionnaire based on their expertise. Most individuals demonstrated a limited level of expertise, as indicated by the results. [11] Day et al. conducted a study where it was found that many nurses lacked the necessary degree of competence in both knowledge and practice. [12]

Two drawbacks should be taken into account in this study. Firstly, this study was conducted at a single centre, which means that the findings cannot be applied to a broader population. Furthermore, this study only tested the theoretical knowledge without any evaluation of practical skills and therefore, the accuracy of the outcomes in relation to real-time practice is a matter of concern.

Conclusion

The findings indicate that healthcare practitioners' expertise in tracheostomy care was inadequate. Only individuals with more experience were able to answer the questionnaire better than others. Thus, there is a necessity for continued and regular programmes and workshops for parting information on proper techniques involved in administering care to a tracheostomy patient. It is crucial to recognise the inadequacies and training needs of the workers involved and conduct programmes to provide holistic care for such patients.

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Conflict of Interest: None

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Annexure I

Tracheostomy Education Self-Assessment Questionnaire

Questionnaire					
1	**I am confident in speaking to patients and their attenders about tracheotomy.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
2	**I am confident speaking to other team members like therapists and nurses about tracheotomy.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
3	**I am confident speaking to the surgical team about tracheostomies.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
4	**I feel confident assessing a patient who has a tracheostomy.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
5	**I am confident in managing an airway emergency in a tracheostomy patient.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
6	**I am confident of the necessity for and the potential advantages of tracheostomies.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
7	**I am confident with airway anatomy as it relates to tracheostomies, cricothyroidotomy, and laryngectomy.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
8	**I am knowledgeable about different types of tracheostomy tubes and their parts.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
9	**I know what a speaking valve is and am aware of how it works.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident
10	**I am aware of the potential complications of a Tracheostomy and how to recognise them.**				
	Not confident at all	Doubtful	Uncertain	Partly confident	Highly confident

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Annexure 2

Tracheostomy Objective Questionnaire

Objective Test	
1.	**A benefit of tracheostomy over intubation is**
A.	The ease with which the patient can be taken on and off the ventilator
B.	Better comfort with decreased need for sedatives/ analgesics
C.	Lesser laryngeal damage
D.	Lesser damage to subglottic region
E.	Options A, B, C, and D
2.	**An absolute contraindication to performing tracheostomy is**
A.	Settings of the ventilator is: FiO_2 60%, PEEP 10.
B.	Infusion of a heparin drip for pulmonary embolus
C.	A tracheostomy is against the patient's wishes.
D.	The patient had a previous thyroidectomy.
E.	The patient's body mass index is 40.
3.	**A tracheostomy tube is usually introduced**
A.	Via the cricotracheal ligaments
B.	Via the sternohyoid muscle
C.	In between the vestibular and vocal folds
D.	Between 2nd & 3rd tracheal ring
E.	Between 4th & 5th tracheal ring
4.	**The benefit of the cuffed tube over a cuffless tube is**
A.	Administers superior positive pressure ventilation
B.	Swallowing is easier.
C.	Less chances of damage to tracheal wall mucosa
D.	Superior vocalisation, as higher subglottic pressures can be generated.
E.	Lesser incidences of mucus plugging
5.	**A middle-aged woman with a 6-0 double cannula Tracheostomy tube which is cuffed and is on room air but is unable to speak using a speaking Valve. What can be done for better vocalisation?**
A.	The cuff can be inflated for a proper seal.
B.	Insertion of the bigger cuffed tube which will have a larger inner diameter
C.	Capping can be done instead of using a valve.
D.	Usage of a cuffless tube
E.	Removal of mucus plug from inner cannula

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6.	**After a routine Tracheostomy tube change, the patient's oxygen saturation remains low at 85%, despite increasing FiO_2 and PEEP. The patient has distant bilateral breath sounds and has crepitus over the anterior chest. What is the probable diagnosis?**
A.	Tension pneumothorax
B.	False passage
C.	Tracheoinnominate fistula
D.	Tracheoesophageal fistula
E.	Large mucous plug
7.	**The tracheostomy tube cuff should never be**
A.	Deflated all the way, because of the high risk that the tube will become dislodged
B.	Inflated to pressure > 10 cm H_2O, because of the risk of obstructing the airway & oesophagus
C.	Inflated to pressure > 10 cm H_2O, because of the risk of causing pressure necrosis
D.	Inflated to pressure > 30 cm H_2O, because of the risk of obstructing the airway & oesophagus
E.	Inflated to pressure > 30 cm H_2O, because of the risk of causing pressure necrosis
8.	**The benefit of a double cannula over a single cannula tube is**
A.	Lesser incidence of damage to the trachea
B.	The inner diameter is more.
C.	Mucous plugs do not occur frequently.
D.	Better vocalisation
E.	Mucous plug can be removed easily.
9.	**A 30-year-old man requires a tracheostomy for muscle weakness secondary to Guillain Barre. On postoperative day 2, the patient's oxygen saturation acutely drops to 80%, and when you evaluate him, you notice that the tracheostomy tube has become dislodged. He is in obvious respiratory distress, tachypneic with bilateral breath sounds. You immediately try to replace the tracheostomy tube but are unable to pass it through the stoma. What is the most appropriate next step in management?**
A.	Stat ABG
B.	Racemic Epinephrine nebuliser
C.	Attempt bag-mask ventilation with a mask over the patient's mouth and nose.
D.	Call anaesthesia or otolaryngology for awake fiberoptic intubation.
E.	Emergent cricothyroidotomy
10.	**A patient with a history of laryngeal cancer after laryngectomy comes in with hypoxic respiratory failure. The patient has an extremely small stoma in the anterior neck. The best way to provide positive pressure breaths to this patient is**
A.	Bag-mask ventilation, ensuring a good seal over their nose and mouth
B.	Transnasal intubation, with a cuffless endotracheal tube
C.	Transoral intubation, with a cuffed endotracheal tube

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D.	Insertion of a small cuffed endotracheal tube placed barely through their stoma
E.	Insertion of an extended-length Tracheostomy (XLT) tube through their stoma
11.	**Before decannulation (removing a patient's tracheostomy tube), the patient should**
A.	Have normal swallowing function
B.	Have a normal voice with speaking valve for 24 hours
C.	Tolerate trach collar trials for 72 hours
D.	Tolerate continuous tracheostomy plug for 24 hours
E.	All of the above
12.	 **What is the function of this part?**
A.	In order to clear the mucus plugs
B.	For better vocalisation
C.	For spigotting
D.	For connecting the tube to ventilator
E.	Facilitates insertion of tube during tracheostomy
13.	**In general, obese patients (compared to non-obese patients) may benefit from a**
A.	Tracheostomy tube with an extra-long proximal segment
B.	Tracheostomy tube with an extra-long distal segment
C.	Tracheostomy tube with an extra-long cuffed segment
D.	Tracheostomy tube with a larger inner diameter tube
E.	Tracheostomy tube with a larger outer diameter tube
14.	**The usual presentation in a case of tracheo-innominate fistula is**
A.	Aspiration pneumonia
B.	Cuff leak
C.	Pneumothorax
D.	Bleeding from tracheostomy tube
E.	Shortness of breath
15.	**One day after a routine tracheostomy tube change from an 8-0 cuffed tube to a 6-0 cuffless tube, the respiratory therapist calls to inform you of a large air leak around the patient's tube. The patient has been off mechanical ventilation for 72 hours, his oxygenation saturation has been > 95%, his tracheostomy tube is in a good position, and he is attempting to speak with a speaking valve, but is unable to make a good voice. The most appropriate next step is to**
A.	Change back to a cuffed tracheostomy tube.

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B.	Change back to a larger tracheostomy tube.
C.	Do nothing, this problem will likely correct itself.
D.	Place the patient back on a ventilator.
E.	Plug the patient's tracheostomy tube.

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