Journal of Research in Medical and Dental Science
2020, Volume 8, Issue 5, Page No: 110-118

Available Online at: www.jrmds.in
eISSN No.2347-2367: pISSN No.2347-2545

Nurses Training and Confidence in Management of Tracheostomy Patients in a Community Hospital in Saudi Arabia

Ahmad K. Alnemare*

Department of Otolaryngology, College of Medicine, Majmaah University, Al-Majmaah 11952, Saudi Arabia

ABSTRACT

Introduction: Several studies in the past have reported a lack of awareness, knowledge, and practice for tracheostomy care by staff nurse members, caregivers, and even trained family members. It has been found that nurses are not adequately aware of the updated guidelines of tracheostomy care.

Aims: This study aimed to identify the pre and postgraduation clinical support and confidence levels among nurses for the management of tracheostomy.

Material and Methods: This study was a cross-sectional prospective observational study. Ethical approval was obtained from the regional ethical committee before the induction of the survey. A pilot study was conducted to test the questionnaire. The study was done in the month of July 2020 in Alfi General Hospital, Saudi Arabia. A standard, strucured questionnaire consisting of 20 items was used for the assessment among 132 study participants.

Results and Discussion: About 85% of the participants were overseas staff members, and most of them got a bachelor's degree in nursing. Work experiences over 5 years and over 10 years were found in 30.3% and 36.4% of participants, respectively. About 75% of participants reported having over 40-hour working hours. A correlation was found of training and support with training confidence (r=0.736, p<0.001).

Conclusion: The confidence level of the nurses was average, which can be considered an acceptable level for tracheostomy care. Experience, updated learning curricula, and a good recruitment strategy are keys to achieving a high level of care.

Key words: Training, Confidence, Tracheostomy care

HOW TO CITE THIS ARTICLE: Ahmad K Alnemare, Nurses Training and Confidence in Management of Tracheostomy Patients in a Community Hospital in Saudi Arabia, J Res Med Dent Sci, 2020, 8(5): 110-118

Corresponding author: Ahmad K Alnemare
e-mail ✉: a.alnemare@mu.edu.sa
Received: 26/07/2020
Accepted: 24/08/2020

INTRODUCTION

Tracheostomy is a surgical intervention that provides an alternative method to the normal airway when the upper airway is obstructed [1,2]. It is routinely performed in the ear-nose-throat (ENT) departments and Intensive Care Units (ICUs) [3] for various reasons, including as a bypass of an obstructed upper airway, and for facilitating ventilator support, removing the secretion of airways, and helping in transporting oxygen to the lungs in a safe way [4]. As per a global survey, 10-24% of intensive care patients need tracheostomy for prolonged respiratory support [5].

In contrast to many medical interventions, the duration of tracheostomy is not limited, and varies from one patient to another. However, patients are often decannulated before discharge [6]. Therefore, tracheostomy dependent patients are in permanent need of care for function monitoring and early prevention of complications [1]. Today, there is an increasing tendency to perform tracheostomy worldwide; therefore, more and more patients require to be nursed in non-specialized units (general wards and outpatient) for better carem [6,7]. Patients expect that nurses be competent, confident, and professionally responsible in providing tracheostomy care, which implies that they need to possess the adequate skills and knowledge [8]. Care provision for patients living with tracheostomy has been defined as a "high-risk, low incidence nursing skill." However, it is mostly taught by transmission of knowledge from one nurse to another [9]. Therefore, it is thought that nurses who work outside the ICU do not have the adequate knowledge and skills in providing tracheostomy care [10-12].

Proper care providing by nurses to the patients with tracheostomy is critical as adequate management of tracheotomies can help in increasing patients' comfort; reducing the incidence of laryngeal injury, sedation, and length of hospital stay; and accelerating weaning from the ventilator [13]. Moreover, tracheostomies are associated with serious risks of infection, airway occlusion, apnea, pneumothorax, and aspiration [14,15], and lack of skills

and experience in performing the procedure is a major cause of suboptimal care and higher morbidity during the transfer of patients from ICUs to general wards [16]. Many studies have demonstrated a relation between a tracheostomy and increased post-ICU mortality [17,18]. which may be due to inadequately experienced nursing staff responsible for care of tracheostomized patients in the wards [11]. In the United States, a national survey stated that most of the complications that affect more than 90% of tracheostomy patients one week after surgery involve potentially preventable deficits in family education and nursing care. These include short term complications such as infection, tube obstruction, and hemorrhage; and long-term complication such as failure to decannulate and upper airway obstruction [19]. Another study conducted in 2004 by Cox et al. reported that high mortality rate (28.6%) among tracheostomy patients during their hospitalizations could be because of catastrophic medical complications experienced by patients due to poor tracheostomy care [20]. Accordingly, a nurse to patient ratio of 1:1 is recommended in tracheostomy care to ensure patients' close monitoring and rapid addressal of alarming states [21].

Critical illness is accompanied by low recovery periods and the nursing staff plays a major role in helping patients and their families navigate through this difficult time [22]. The complex needs of tracheostomized patients need to be considered for procedures like tube changing, suctioning, and other emergencies. Therefore, knowledgeable nursing staff availability is critical at the site [23]. Garner et al. stated that 33% medical practitioners reported discharge planning and education to be the responsibility of ward nurses; this shows that the nursing staff is often assumed to have knowledge of long-term tracheostomy care [24]. Multiple studies have also demonstrated that using educational interventions focusing on the knowledge and implementation of evidence-based practices can help in improving tracheostomy care [10, 11, 25]. Sodhi, in his study, found that using a tracheostomy care nursing learning program for nursing staff from non-critical areas resulted in better management of tracheostomy care related complications, including emergency tube changes and hypoxia in allocated areas, without any need for help from critical care consultants. It also led to a decrease in the average length of hospital stay [26].

There is an increasing literature on improving tracheostomy care [27]. However, several studies have recorded a lack of awareness, knowledge, and practice for tracheostomy care by staff nurse members, caregivers, and even trained family member [28-30]. It has been found that nurses are not aware of the updated guidelines of tracheostomy care [31]. This leads to unsafe practice. There is also a variation in the knowledge and confidence of the nurses, which may be due to non-attendance in the ENT ward in the past [32,33]. Thus, this study aimed at identifying the pre and postgraduation clinical support and confidence level among nurses regarding the management of tracheostomy.

MATERIALS AND METHODS

This study was a cross-sectional prospective observational study. Ethical approval was obtained from the regional ethical committee before the induction of the survey. A pilot study was conducted to test the questionnaire. The study was done in the month of July 2020 in Zulfi General Hospital, Saudi Arabia. A standard, structured questionnaire consisting of 20 items was used for assessment among 132 study participants. Each participant gave an agreement upon ethical approval before enrollment.

The nursing staff dealing with tracheostomy patients was the target population of our study. A random sampling method using random number generator was implemented. This sampling method was adopted for its help in ensuring an even distribution of participants in the sample among different demographic factors. After collecting data from the target group of nurses, each nurse was given a number, and then the random number generator method was implemented. As we aimed to choose participants with different demographic characteristics, we revised after collecting 50 responses, to quickly check for the distribution of the sample among the demographic factors. In the next group, we targeted the demographic group that seemed to be with a lower number, without affecting the random sampling process.

The questionnaire used in our study was quoted from Ward's questionnaire [34]. Only 21 subsets of questions were included for the purpose of this study. The following sections were included:

Part one (5 items): Demographic and socioeconomic data.

Part two (4 questions): Tracheostomy care exposure.

Part three (11 questions): Undergraduate and postgraduate tracheostomy training and confidence level.

Power analysis for an independent sample t-test was conducted in G-POWER to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, a medium effect size (d = 0.5), and two tails. The aim of the random sampling method was to ensure allocation of an equal number of participants in each group of demographic factors. However, it was not possible to achieve that because there were not enough nurses to fill each group with an equal number with other factors. Still, we tried our best to make it as close as possible. Based on the assumptions, the desired sample size came out to be 128.

The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive (mean and SD of demographics and scores) and inferential tests (independent t-test and ANOVA, along with post hoc analysis where the results were statistically significant) were conducted, with demographic variables as the independent variables, and scores on training and support and training confidence as the dependent variables. A p-value<0.05 was taken to be statistically significant. While t-test was used to determine correlations between place of degree and occupational

status with training and support, and training confidence; ANOVA was used to determine significant differences in training and support, and training confidence based on experience in nursing. Training and support, and training confidence were compared using three demographic factors: place of getting the degree (within vs. outside the country), experience in nursing, and hours of work. These three factors were chosen as each of them is believed to contribute to greater confidence among nurses. Descriptive scores were used to determine the scores of questions that helped us to determine some factors as the most tracheostomized population with nurse's deal with it most of time during their work. Ethical clearance was obtained from concerned authorities with IRB no 20-438E.

RESULTS

Section one: Demographics & socio-economic data

About 85% of the participants were overseas staff members, as shown in Table 1. Most of them had a bachelor's degree in nursing. Work experience of over 5 years and over 10 years was found in 30.3% and 36.4% of participants, respectively. About 75% of participants had over 40 hours of work duration.

Table 1: Demographic details of the participants.

Demographic details	N	%
Place of getting the degree		
From the Kingdom	20	15.2
From outside the Kingdom	112	84.8
Qualifications		
Bachelor's	125	94.7
Diploma	6	4.5
Master's degree	1	0.8
Experience in nursing		
1-5 years	40	30.3
6-10 years	48	36.4
11-15 years	33	25
>15 years	11	8.3
Number of working hours (weekly)		
1-9 hours	0	0
20-29 hours	1	0.8
30-39 hours	31	23.5
40+ hours	129	75.8

Section two: Tracheostomy training and support in Zulfi hospital

Most of the participants in this study indicated that they did not spend any of their clinical time working with children (75%) and adolescents (83.3%). However, this reduced to 46.2% in the geriatric population and 12.1% in adults. Meanwhile, 65% of them indicated that they spent all their clinical time managing adults. Furthermore, 100%, 98.5%, 97%, 97%, 63.3%, and 49.2% of the participants reported not spending any time managing tracheostomies in outpatient, emergency department, operating room, ENT service, inpatient, and ICU settings, respectively (Table 2).

Table 2: Responses of nurses on tracheostomy care exposure.

Questions	All		Most		Half		Some		None	
	N	%	N	%	N	%	N	%	N	%
What proportion of your active clinical time is spent working with the following populations?										
Children (0–11yrs)	17	12.9	0	0	2	1.5	12	9.1	101	76.5
Adolescents (12–17yrs)	1	0.8	2	1.5	12	9.1	7	5.3	110	83.3

Adults (18–65yrs)	65	49.2	35	26.5	12	9.1	4	3	16	12.1
Seniors (65+ years)	42	31.8	20	15.2	5	3.8	4	3	61	46.2
In which of the listed job setting(s) do you currently manage patients with tracheostomies?										
Emergency Department	0	0	0	0	2	1.5	0	0	130	98.5
Intensive Care Unit	37	28	28	21.2	2	1.5	0	0	65	49.2
Operating Room	1	0.8	0	0	0	0	3	2.3	128	97
Inpatient	5	3.8	1	0.8	25	18.9	17	12.9	84	63.6
Outpatient	0	0	0	0	0	0	0	0	132	100
ENT service	0	0	1	0.8	0	0	3	2.3	128	97

Almost a third of the sample indicated that they did not spend any active clinical time in the management of patients with tracheostomy (34.1%), while 25% of them indicated spending 1-9 % of their time, 11.4% spending 25-49 % of their time, and 11.4% spending 50 % of their time for the same propose. Moreover, 37.1% of the participants indicated that they did not deal with any tracheostomy patients, while 27.3%, 20.5%, and 15.2% indicated dealing with less than 10, 10-50, and over 50 such patients, respectively (Table 3).

Table 3: Time spent on caring for a tracheostomy patient.

	N	%
Within the last year, what percentage of your active clinical time consisted of the management of patients with a tracheostomy?		
None	45	34.1
1-9%	24	18.2
10-24%	33	25
25-49%	15	11.4
50%	15	11.4
How many patients have you worked with who are tracheostomized and ventilator assisted?		
None	49	37.1
1-10	36	27.3
11-50	27	20.5
More than 50	20	15.2

Section three: Training confidence

Coming to this section, whose results are presented in Table 4, about 33% of participants reported that they never received credit hours in the past for tracheostomy management. About 50% of them did not even get any clinical supervision. Around two-thirds of participants ignored any tracheostomy competency training program, and 47% of participants did not feel or were unsure if they were up to date with any clinical updates regarding tracheostomy care.

Table 4: Responses on tracheostomy training and confidence level.

Questions	**N**	**%**
Before treating patients independently, approximately how many hours of formal training (i.e., undergraduate lectures, workshops) did you receive in tracheostomy management?		
None	43	32.6
1-10.	73	55.3
11–20	16	12.1
Before treating patients independently, how many hours of clinical supervision did you gain in tracheostomy management (postgraduate)?		
None	67	50.8
1-10.	52	39.4

11–20	12	9.1
More than 20	1	0.8
Does your department have a formal tracheostomy competency training program?		
Yes	35	26.5
Currently developing one	9	6.8
No	88	66.7
Please indicate what tracheostomy-related professional development activities you have undertaken? (you can choose more than one)		
Workshops	51	38.6
Conference	19	14.4
Visited specialist center(s)	48	36.4
Other	14	10.6
Do you feel up to date with the available evidence-based practice in tracheostomy management?		
Yes	69	52.3
Not sure	27	20.5
No	36	27.3
Do you feel up to date with the advances in tracheostomy technology, including the specialized tracheostomy tube options available?		
Yes	41	31.1
Sometimes	53	40.2
No	38	28.8

Table 5 shows that 47% of participants reported that tracheostomy courses are better delivered in the undergraduate period, while 22% of participants suggested postgraduate courses for tracheostomy. Around 60% of participants found updated courses to involve materials other than tracheostomy. They also suggested having a team-based approach for better management of tracheostomy (47.7%). Almost 60% of them were confident about managing tracheostomy cases in their field, while 47.7% were confident in managing tracheostomy in ventilated patients.

Table 5: Responses on tracheostomy training and confidence level (continued).

Questions	**N**	**%**
What training, if any, would you find beneficial to assist you in managing patients who are tracheostomized?		
No training	22	16.7
Undergraduate courses	62	47
Postgraduate workshops	29	22
Internship rotation in ENT services.	19	14.4
Tracheostomy only.		
Yes	75	56.8
No	57	43.2
Tracheostomy and requiring ventilator assistance		
Yes	55	41.7
No	77	58.3
Does the setting in which you work have an optimal team approach for the management of patients with a tracheostomy?		
Yes	63	47.7
Sometimes	57	43.2
No	12	9.1

Do you feel confident to manage the majority of patients with a tracheostomy within your team?		
Not at all confident	13	9.8
Not very confident	3	2.3
Neutral	39	29.5
Confident	77	58.3
Within your multidisciplinary team, do you feel confident in managing patients with a tracheostomy who also require ventilator assistance?		
Not at all confident	17	12.9
Not very confident	16	12.1
Neutral	36	27.3
Confident	63	47.7

In Figure 1, the mean and standard deviation of training and support, as well as training confidence, were found to be 7.848 ± 3.383, and 21.689+4.554, respectively. However, almost half of the participants seemed to have weak training and support (51.5%), while 38.6% had average, and only 9.8% had high training and support. Furthermore, 22.7% of them had weak, 86.2% had average, and 9.1% had high training confidence. The answers were coded as following (all: 1, most: 2, half: 3, some: 4, non: 5). While relating demographic data with training and support (Table 6), it was found that job experience and occupational status were highly significantly related to training and support, and training confidence ($p<0.05$). However, the place of getting the degree did not have a significant impact on training and support, and training confidence ($p>0.05$). Figure 2 depicts the correlation found of training and support with training confidence ($r=0.736$, $p<0.001$).

Table 6: Relation between demographic data and training and support, and training confidence.

		Training and support	**ANOVA or T-test**			**Training confidence**	**ANOVA or T-test**	
Demographic	**N**	**Mean ± SD**	**test value**		**P-value**	**Mean ± SD**	**test value**	**p-value**
Place of getting the degree								
From the Kingdom	20	8.750 ± 1.943			0.197	21.500 ± 2.306		
From outside the Kingdom	112	7.688 ± 3.562	t	1.297		21.723 ± 4.853	-0.201	0.841
Experience in nursing job								
1-5 years	40	6.500 ± 3.072				20.900 ± 2.296		
6-10 years	48	7.250 ± 3.278				20.500 ± 4.921		
11-15 years	33	10.212 ± 3.070				24.182 ± 5.382		
>15 years	11	8.273 ± 2.195	f	9.641	0.000*	22.273 ± 3.797	5.329	0.002*
Number of hours of working								
30-39 hours	31	6.701 ± 3.427				19.968 ± 4.969		
40+ hours	100	8.280 ± 3.121	T	2.391	0.018*	22.260 ± 4.308	2.494	0.014*
Demographic	N	Training and support	ANOVA or T-test			Training confidence	ANOVA or T-test	
		Mean ± SD	test value		P-value	Mean ± SD	test value	p-value
Place of getting the degree								
From the Kingdom	20	8.750 ± 1.943				21.500 ± 2.306		
From outside the Kingdom	112	7.688 ± 3.562	t	1.297	0.197	21.723 ± 4.853	-0.201	0.841
Experience in nursing job								
1-5 years	40	6.500 ± 3.072				20.900 ± 2.296		
6-10 years	48	7.250 ± 3.278				20.500 ± 4.921		
11-15 years	33	10.212 ± 3.070				24.182 ± 5.382		
>15 years	11	8.273 ± 2.195	f	9.641	0.000*	22.273 ± 3.797	5.329	0.002*

Number of hours of working								
30-39 hours	31	6.701 ± 3.427				19.968 ± 4.969		
40+ hours	100	8.280 ± 3.121	T	2.391	0.018*	22.260 ± 4.308	2.494	0.014*

Figure 1: Bar chart on training and support and training confidence.

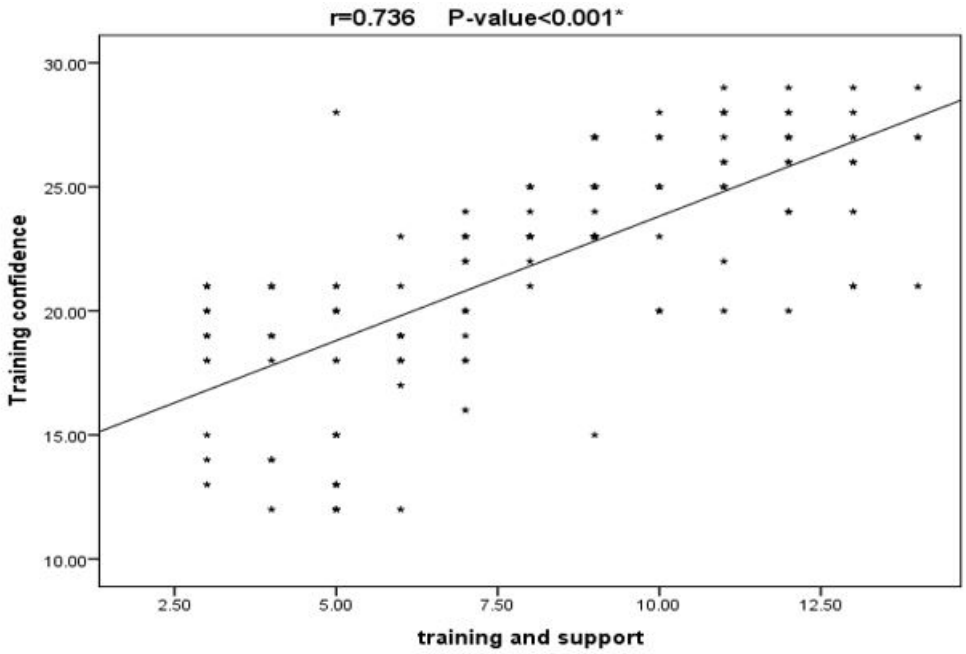

Figure 2: Correlation between Training and support and training confidence.

DISCUSSION

Skills, upgradation of knowledge, and adequate experience are some of the factors that determine improved care in healthcare specialties [10]. These factors are essential among nursing staff for the provision of the best of care to tracheostomy surgery patients [35]. Management of tracheostomies requires a multidisciplinary team-based approach, and support from a well-trained nurse has been shown to decrease complication rates [36].

However, few studies have reported the anxiety that ward nurses feel while taking responsibility for the care of tracheostomized patients in ICUs [37, 38]. Regardless of the experience and specialization of nurses, McKillop (2007) has suggested that continued research is needed to gain nurses' perspectives on the use of best practices and guidelines for critical procedures [39].

There are many tools available to enhance knowledge, performance, and confidence. Firstly, the education rule was developed either at a theoretical and practical level with variable results [29]. A study conducted on newly graduated nurses found no difference in comfort level before educational sessions on tracheostomy and after it and found no correlation between comfort and knowledge level either. Consequently, the study recommended more practical sessions [6]. In contrast, the sound theoretical modules for non-ENT nursing staff members resulted in remarkable knowledge and confidence [6].

Secondly, the standardization of nursing care programs is essential for all nursing institutes [33]. Self-learning methods are a highly beneficial step in the educational process and provide a statistically significant difference in knowledge. Certain studies have suggested the addition of tracheostomy care into basic life support courses (BLS) to secure airway patency [40].

In the current study, most participants reported few hours of education in undergraduate and postgraduate training forums before patients' management started. A statistically significant difference was observed between training achieved and confidence level; there was also a remarkable association between previous training in confidence and non-confidence arms. There is no doubt that enhancing undergraduate training skills is mandatory before patient management. [41].

Paul and colleagues studied the complications of airway management faced by staff nurses [11]. They found that graduate nurses who acquired knowledge in their undergraduate study were more confident than those who acquired it during rotation [11]. Day et al. suggested the critical role of

hands-on experiences [28]. Smith-Miller et al. found no statistical correlation between knowledge and comfort level before and after educational sessions for tracheostomy care [9]. They also found that feedback assessment of performance was linked to higher knowledge thereafter [9]. Further studies are recommended to identify the best method to deliver feedback assessment.

However, standardized clinical and nursing practices, and updates in nursing care are not actually utilized in judgment and decision making of the nursing staff regarding tracheostomy care. In our study, 48% of the participants were not aware of recent advances in tracheostomy care management, nor were they were about the exact practice of it. This lack of knowledge was also noted by Day et al [28].

Theoretically, the level of experience is proportionally correlated with confidence, but the reverse is not the case [30]. We also found that nurses who graduated from outside of Saudi Arabia were not different from those who graduated within the country in terms of their confidence level (p=0.841), which was unlike Al-Khatib and colleagues ' findings, who found the opposite correlation [31]. The equalization may have been achieved by enhancing knowledge systems by applying different teaching methods in nursing colleges in Saudi Arabia [8]. 31 Our message through this study is to encourage further research to cast more light on feedback assessment relating to different issues of ENT-nursing care, not restricted to tracheostomy care.

The limitations of this study include the inherent biases of the study design (recall bias, subjectivity, and selection bias). The strengths of this study include the adequate sample size reflecting high power, and the critical insights gained through this study, including the identification of a considerable gap in formal education and training, and the insight that most practice is experience-based, rather than evidence-based.

CONCLUSION

In this study, we found that there is a gap between the education and confidence of nurses when dealing with patients with tracheostomy. We found a lack of formal education and training to be its cause as most participants reported fewer hours of education in undergraduate and postgraduate training forums before patients' management, and 48% of the participants were not aware of recent advances in tracheostomy care management or the exact practice of it. Nurses in Al Zulfi General Hospital reported an average amount of confidence regarding trachoestomy care, similar to the results found on a national level. This indicates that most nurses tend to acquire knowledge about trachesostomy care from older nurses, rather than from their formal education; and that most of the practice is experience-based, rather than being evidence-based, as confidence level was correlated with years of experience. Therefore, experience, updated learning curricula, and a good recruitment strategy are keys to establishing a high level of care.

REFERENCES

1. Freeman BD. Tracheostomy update: When and how. Crit Care Clin 2017; 33:311-22.
2. Quintel M, Bräuer A. Timing of tracheostomy. Minerva Anestesiol 2009; 75:375-83.
3. Heafield S, Karnik A, Rogers M. Tracheostomy management in ordinary wards. Hosp Med 1999; 60:261-262.
4. Onuoha J. Developing an educational program for tracheostomy care. Walden University ScholarWorks 2019.
5. Esteban A, Anzueto A, Alia I, et al. How is mechanical ventilation employed in the intensive care unit? An international utilization review. Am J Respir Crit Care Med 2000; 161:1450-1458.
6. Kutsukutsa J, Mashamba-Thompson TP, Saman Y. Tracheostomy decannulation methods and procedures in adults: A systematic scoping review protocol. Systematic Reviews 2017; 6:239.
7. Everitt E. Care of patients with permanent tracheostomy. Nursing Times 2016; 112:20-22.
8. Woodrow P. Managing patients with a tracheostomy in acute care. Nurs Stand 2002; 16:39-46.
9. Smith-Miller C. Graduate nurses comfort and knowledge level regarding tracheostomy care. J Nurses Professional Develop 2006; 22:222-229.
10. Yelverton JC, Nguyen JH, Wan W, et al. Effectiveness of a standardized education process for tracheostomy care. Laryngoscope 2015; 125:342-347.
11. Paul F. Tracheostomy care and management in general wards and community settings: Literature review. Nurs Crit Care 2010; 15:76-85.

12. Hasanvand N, Abedi H. Review of compliance with the standard care for tracheostomy and endotracheal tube in nurses working in intensive care units in Ahwaz Golestan Hospital. Int J Med Res Health Sci 2016; 5:593-597.
13. Dorton LH, Lintzenich CR, Evans AK. Simulation model for tracheotomy education for primary health-care providers. Ann Otol Rhinol Laryngol 2014; 123:11-18.
14. Parker V, Giles M, Shylan G, et al. Tracheostomy management in acute care facilities – A matter of teamwork. J Clin Nurs 2010; 19:1275-1283.
15. Casserly P, Lang E, Fenton JE, et al. Assessment of healthcare professionals' knowledge of managing emergency complications in patients with a tracheostomy. British J Anaesthesia 2007; 99:380-383.
16. Garrubba M, Turner T, Grieveson C. Multidisciplinary care for tracheostomy patients: A systematic review. Crit Care 2009; 13:177.
17. Martinez GH, Fernandez R, Casado MS, et al. Tracheostomy tube in place at intensive care unit discharge is associated with increased ward mortality. Respir Care 2009; 54:1644–1652.
18. Clech C, Alberti C, Vincent F, et al. Tracheostomy does not improve the outcome of patients requiring prolonged mechanical ventilation: a propensity analysis. Crit Care Med 2007; 35:132–138.
19. Das P, Zhu H, Shah RK, et al. Tracheotomy-related catastrophic events: Results of a national survey. Laryngoscope 2012; 122:30-37.
20. Cox CE, Carson SS, Holmes GM, et al. Increase in tracheostomy for prolonged mechanical ventilation in North Carolina, 1993–2002. Crit Care Med 2004; 32:2219-2226.
21. Australian College of Critical Care Nurses Ltd (ACCCN). Position statement on intensive care nursing staffing. Aust Crit Care 2002; 15:6.
22. Paul F, Rattray J. Short-and long-term impact of critical illness on relatives: Literature review. J Adv Nurs 2008; 62:276-292.
23. Ball C. Ensuring a successful discharge from intensive care. Intensive Crit Care Nurs 2005; 21:1–5.
24. Garner JM, Shoemaker-Moyle M, Franzese CB. Adult outpatient tracheostomy care: practices and perspectives. Otolaryngol Head Neck Surg 2007; 136:301-306.
25. Pritchett CV, Rietz MF, Ray A, et al. Inpatient nursing and parental comfort in managing pediatric tracheostomy care and emergencies. Otolaryngol Head Neck Surg 2016; 142:132-137.
26. Sodhi K, Shrivastava A, Singla MK. Implications of dedicated tracheostomy care nurse program on outcomes. J Anesthesia 2014; 28:374-380.
27. Littlewood KE. Evidence-based management of tracheostomies in hospitalized patients Respir Care 2005; 50:516-518.
28. Day T, Farnell S, Haynes S, et al. Tracheal suctioning: An exploration of nurses' knowledge and competence in acute and high dependency ward areas. J Advanced Nurs 2002; 39:35-45.
29. Garner JM, Shoemaker-Moyle M, Franzese CB. Adult outpatient tracheostomy care: Practices and perspectives. Otolaryngol Head Neck Surg 2007; 136:301-306.
30. Veelo DP, Schultz MJ, Phoa KY, et al. Management of tracheostomy: A survey of Dutch intensive care units. Respiratory Care 2008; 53:1709-1715.
31. Al-Khatib T, Mahfoz TB, Arif R. Nurses training, clinical support and confidence in management of tracheostomy patients in Jeddah, Saudi Arabia. Saudi J Otorhinolaryngol Head Neck Surg 2017; 19:51.
32. Al Sharhan S, Sohail M, Ahmad K, et al. Self-reported comfort with tracheostomy tube care Cross-sectional survey of non-ear, nose and throat health care professionals. Saudi Med J 2014; 35:63-66.
33. Haines S, Crocker C, Leducq M. Providing continuity of care for patients transferred from ICU. Professional nurse (London, England). 2001; 17:17-21.
34. Ward E, Jones C, Solley M, et al. Clinical consistency in tracheostomy management. J Med Speech-Language Pathol 2007; 15:7-27.
35. Lewarski JS. Long-term care of the patient with a tracheostomy. Respiratory Care 2005; 50:534-537.
36. Bonvento B, Wallace S, Lynch J, et al. Role of the multidisciplinary team in the care of the tracheostomy patient. J Multidiscip Healthc 2017; 10:391-398.
37. Coad S, Haines S. Supporting staff caring for critically ill patients in acute care areas. Nurs Crit Care 1999; 4:245-248.
38. Green A, Edmonds L. Bridging the gap between the intensive care unit and general wards: The ICU liaison nurse. Intensive Crit Care Nurs 2004; 20:133-143.
39. McKillop A. Evaluation of the implementation of a best practice information sheet: Tracheal suctioning of adults with an artificial airway. JBI Rep 2004; 2:293-308.
40. Parker V, Giles M, Shylan G, et al. Tracheostomy management in acute care facilities – a matter of teamwork. J Clin Nurs 2010; 19:1275-1283.
41. Casserly P, Lang E, Fenton JE, et al. Assessment of healthcare professionals' knowledge of managing emergency complications in patients with a tracheostomy. Br J Anaesthesia 2007; 99:380-383.