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Original Article

Knowledge on Tracheostomy Among Nurses Working in Anaesthesia Departments and Intensive Care Units at Misurata in Medical Center and National Cancer Institute, Misurata, Libya (an important health education indicator for healthcare management, public health, and anesthetic disciplines)

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ABSTRACT

Background: Airway obstruction is a medical emergency that requires artificial support for the airway, such as using endotracheal tubes or creating a tracheostomy. To maintain airway patency, a specialized nurse is required to provide care for this type of patient**. The aim** of this study was to assess the nurses' level of knowledge of tracheostomy among nurses working at Misurata Medical Center and the National Cancer Institute, Misurata, Libya. **Materials and Methods**: An observational quantitative hospital-based survey using self-administered structured questionnaire was conducted among convenience sample of 75 nurses working in the medicine, surgical, and pediatric intensive care units at Misurata Medical Center and National Cancer Institute in Misurata, Libya. **Results:** Majority of nurses (93.3%) had good level of knowledge, and (6.7%) nurses had low level of knowledge. There was no significant association, there were no significant association between nurses' knowledge and age, gender, education level as well as work experience (*P*-value >0.05). **Conclusion:** The level of knowledge was high. Therefore, we hope and strongly support the continuing professional development during service for registered nurses working in the medicine, surgical, and pediatric intensive care units by conducting more courses and workshops to raise the knowledge and practice level.

Keywords: Nurses, Knowledge, tracheostomy, Misurata Medical Center, National Cancer Institute.

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INTRODUCTION:

Tracheostomy is a procedure where a hole is made at the front of the neck. A tube is inserted through the opening and into the windpipe (trachea) to help you breathe. It is one of the most frequently performed surgical procedures in intensive care unit (ICU) patients. As many as 10% of patients requiring at least 3 days of mechanical ventilation will eventually receive a tracheostomy for prolonged mechanical ventilation or airway support, or patients receive MV for more than 14 days. With the development of less invasive tracheostomy techniques that can be performed safely at the patient's bedside, the frequency of performing tracheostomy appears to be increasing [1]. Nurses are an integral part and frontline care providers of any health care system. The expansion and strengthening of surgical care requires sufficient and well-trained healthcare workers. Currently, the need for such an effective workforce outstrips the supply of trained personnel at all levels of service delivery. This requires an effective and sustained health education program under continuous assessments [2].The acute shortage of nurses in Libya puts pressure on nursing education programs to increase the number of nursing students across the entire region. With the expected nursing shortage comes an increase in hospitals' hiring of new graduates with minimal knowledge. Unfortunately, new graduates often prove to lack the competence to perform in the real nursing environment. According to an international medical corps report during the Libyan revolution in 2011, the majority of the expatriate nurses had left the country**;** the national capacity for Libyans to address these shortages will be vital to the recovery of fragile health systems and their ability to meet future needs [2]. According to the rational model, effective practice will be achieved when the people have a high level of knowledge and a positive attitude towards behavior [3]. Hence, this study is carried out to Nurse's level of knowledge of tracheostomy among nurses at Misurata Medical Center and National Cancer Institute in Misurata, Libya

MATERIALS AND METHODS:

Study design and setting

An observational quantitative hospital-based survey using a self-administered structured questionnaire was conducted at the Misurata Medical Center and National Cancer Institute; both are government healthcare facilities and are considered the largest hospitals in Misurata. They provide health care to patients from inside and outside the city of Misurata. The focus was on the intensive care unit within the hospital, which contains three intensive care units, which are: ICU medicine, ICU surgery, and ICU pediatric. These units are frequented by a large number of patients who need tracheostomy care on a regular basis, and are staffed by a limited number of nurses whose academic degrees, ages, genders, and annual experience vary.

Study population and period

Nurses working in various Intensive Care Units (ICUs) at Misurata Medical Center and the National Cancer Institute were the target group in this study. The first part of the study was conducted over a period of four months from the end of February to the end of June 2024. The first phase, which covered the development and validation of the questionnaire as well as the collection of data, the finalization, and writing the report, took place in the remnant period.

Sampling and sample size

In this study, the sampling method employed was a non-probability convenience sampling technique. This approach was chosen due to the specific criteria and accessibility of the target population, which consisted of nurses working in various Intensive Care Units (ICUs) at Misurata Medical Center and the National Cancer Institute. According to the information and statistical unit of both healthcare facilities, the estimated total number of ICU nurses was 75. Based on the Krejcie and Morgan table for a given population, the total sample size for the study should be 65 nurses. However, convenience sample (n=75) was used to minimize the dropping and to increase the power of the study. This sample was distributed across three distinct ICU departments within the facilities: ICU Medicine: 28 nurses - ICU Surgery: 36 nurses - ICU Pediatric: 11 nurses these departments were selected to provide a comprehensive overview of the knowledge levels across different ICU specialties.

Data collection tool

With assistance from supervisor, about 80% of the questions in the knowledge part of the questionnaire were extracted and adapted from questionnaires that had been used in previous studies [4,5]. The research questionnaire that was initially developed in the English language, then translated to Arabic to be used in assessment of the of knowledge level towards tracheostomy among the selected nurses.

Ethical approval

The study protocol was officially approved and institutional ethical clearance was obtained from the medical research ethical committee in Misurata Medical Center and National Cancer Institute. Written informed consents were obtained from the participant nurses prior attend the questionnaire survey.

Methods of data analysis

Descriptive statistics were applied to describe all the categorical variables (frequency distributions and percentages) for evaluating the knowledge of nurses regarding tracheostomy. Chi-square was used to establish the relationship between demographic data and nurse knowledge regarding tracheostomy care. The *p*–value of less than 0.05 was considered as significant. Statistical package for social sciences (SPSS) version 20 was used in data analysis.

RESULTS:

Socio-Demographic Data

Table 1 shows the results of age groups, gender, educational levels, departments and working experience of the participants. The sample was 75 nurses working in three different selected departments at the study places. According to the age, 58(77.3%) were between 20 and 30 years, 11(14.7%) aged from 31 and 40 years and 6(8.0%) in the age range of 41–50 years. In terms of gender 44(38.7%) were male and 31(41.3%) were females. According to educational level, 36(48.0) were bachelors nurse, 21(28.0%) a higher diploma holding nurses, 14(18.7%) six months course registered nurses and 4(5.3%) had three month course certificate. With regards to working department, 28(37.3%) of the participants were working in ICU medicine, 36(48.0%) at ICU surgery, while 11(14.7%) in ICU pediatric. Regarding working experience, 45(60.0%) having an experience less than 5 years, 25(33.3%) having working journey from 6 to 10 years of, 4(5.3%) showed working duration between 11 and 15 years and only 1 (1.3%) worked for more than 16 years.

Table 1: Socio-demographic variables of respondents (n=75)

Variables	Categories	*N*	%
Age	20-30 years	58	77.3
	31-40 years	11	14.7
	41-50 years	6	8.0
Gender	Male	44	58.7
	Female	31	41.3
Educational	Bachelors	36	48.0
	Higher diploma	21	28.0
	Six month course	14	18.7
	Three month course	4	5.3
Department	ICU medicine	15	20
	ICU surgery	36	48.0
	ICU pediatric	11	14.7
	Anaesthesia departments	13	17.3
Experience	0-5years	45	60.0
	6-10years	25	33.3
	11-15years	4	5.3
	16and above	1	1.3

The general knowledge level of nurses

The pie chart showing the distribution of knowledge levels among the nurses, with 70 (93.3%) nurses were having good knowledge of tracheostomy and 5 (6.7%) nurses only were having poor knowledge Figure 1.

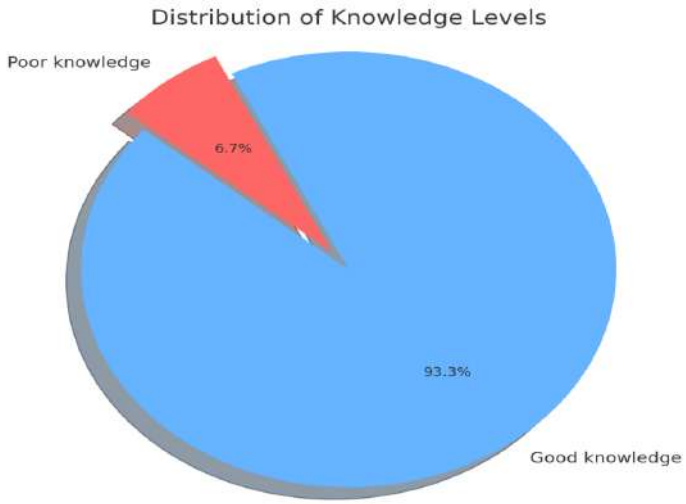

Figure1: showing the distribution of knowledge levels among the nurses

Responses to knowledge items among the nurses

Table 2 shows knowledge of the participants about tracheostomy, trachea and tracheostomy tube. About 65 (86.7%) of the participants responds correctly to the definition of trachea while 10 (13.3%) failed to the question. There were 18 (24%) knew the extension level of trachea while 57 (76.0%) did not know. More than half of the participants responds correctly to the measure of trachea 55 (73.3%), while 20 (26.7%) gave wrong answer. The majority of the participants correctly identified the number of hyaline cartilages 60 (80.0%) while the 15(20%) showed incorrect responses. About 62(82.7%) knew what a tracheostomy indicates, while 13 (17.3%) did not know. Al mostly 51(68.0) knew the function of trachea while 24 (32%) % did not know. About 65 (86.7%) answered correctly about the types of tracheostomy, while 10 (13.3%) wrong answered. In terms of long-term use, the correct answers represented 62 (82.7%), while13 (17.3%) represented the wrong answers. 60 (80%) of the participants were able to answer correctly about the use of a tracheostomy in cases of burns, laryngeal obstruction, and when the inability to insert a tracheostomy tube. However, 15 (20.0%) were unable to answer. Regarding the tracheostomy tube, less than half (48%) correctly identified the appropriate size for an adult tracheostomy tube (10-12 mm), while 39 (52.0%) failed. The majority of respondents 68 (90.7%) were able to identify the criteria for tracheostomy tube selection while 7 (9.3%) were unable to do so. Above the half of the participants responded correctly to parts of the tracheostomy 62 (82.7%) while 27 (33.8%) had wrongly answered this statement. While over half 48 (64.0%) correctly identified the standard cuff pressure range (20-25 mmHg), while 27 (36.0%) demonstrated a wrong answers. Almost 57 (76.0%) of respondents stated correctly that respiratory failure is the reasons for using a tracheostomy, while 18 (24%) showed wrong responses. About 69 (92%) of the participants answered correctly that tracheal suction is considered a sterile procedure, while 6 (8.0%) answered wrong. The knowledge regarding normal pressure suctioning of the trachea was 66 (88 %) correct, while 9 (12 %) was incorrect. About the duration of suction, 63 (84.0%) answered correctly and 12 (16.0%) answered incorrectly. Regarding the ideal time to provide tracheostomy care, 50 (66.7%) of responses were correct and 25 (33.3%) were incorrect. Almost, 59 (78.7%) of nurses answered correctly the information that the pressure in the tracheal cuff should not exceed 25 mm Hg, while 16 (21.3%) answered incorrectly. 58 (77.3%) of participants responded correctly to the information that cuff deflation helps prevent laryngeal edema, but 17 (22.7%) had answered incorrectly. 63 (84 %) of nurses knew that normal saline solution 0.9% may help liquefy secretions during suction, and 12 (16.0%) did not know that. Regarding knowledge about presence of an endotracheal tube the patient can eat, 42 (56.0%) of nurses had answered

correctly, while 33 (44 %) showed incorrect answers. Regarding signs of tracheostomy infection, 61 (81.3%) of nurses had answered correctly, while, 14 (18.7%) of them showed incorrect responses. 59 (78.7%) knew that six months after removing the tracheostomy tube, tracheal stenosis may occur, while 16 (21.3%) did not know this fact. About the knowledge on the position of the conscious patient during suction, more than half of participants 50 (66.7%) showed a correct responses comparing to 25 (33.3%) who showed incorrect responses. However, for the position of the unconscious patient during suction, only 41 (54.7%) of the answers were correct and 34 (45.3%) were incorrect. The majority of participants (82.7%) understood that pre-oxygenating a patient with an ambu-bag is important before suctioning 69 (92.0%). Concerning of knowledge about complications and interventions (oxygen saturation and arrhythmias) a strong consensus (92% and 93.3%) was observed that suctioning should be stopped if oxygen saturation drops below 90% or if arrhythmias occur.

Table 2: Responses to knowledge items among the participant (n=75)

Item	Correct	%	Wrong	%
Trachea is known as the wind pipe	65	86	10	13.3
Trachea extends downward to level of the 6th thoracic vertebra	18	24	57	76.0
Trachea approximately measure 10 to11cm	55	73.3	20	26.7
Number of hyaline cartilages that present in trachea are 16 to 20	60	80	15	20.0
Tracheostomy refers to indwelling tube inserted into the trachea	62	82	13	17.3
Important function of trachea is cough reflex	51	68	24	32.0
Type of tracheostomy are permanent and temporary	65	86.7	10	13.3
For long term disease, the type of tracheostomy used is long term	62	82.7	13	17.3
Tracheostomy is indicated severe burn, laryngeal obstruction and when indo-tracheal tube cannot insert.	60	80	15	20.0
The appropriate size of tracheostomy tube for adults is 10 to 12mm.	36	48	39	52.0
Length and inner diameter in millimeters are the criteria you base on while choosing a tracheostomy tube	68	90	7	9.3
Parts of tracheostomy tube are cuff, inner and outer cannula	62	82	13	17.3
The normal measurement of tracheostomy tube cuff pressure are 20-25mm of Hg	48	64	27	36.0
Indication of tracheostomy is acute respiratory failure	57	76	18	24.0
Tracheostomy suction is a sterile procedure	69	92	6	8.0

Normal suction pressure while doing tracheostomy suction in adult is 80-120 mmHg	66	88	9	12.0
Suction should not exceed 15 seconds	63	84	12	16.0
Ideal time for giving tracheostomy care is at least every four hour	50	66	25	33.3
The pressure in the tracheostomy cuff should not exceed 25 mmHg	59	78	16	21.3
The cuff deflation will help to prevent laryngeal edema	58	77	17	22.7
Normal saline 0.9% may help to liquefy secretions during suctioning	63	84	12	16.0
In the presence of tracheostomy tube patient can eat food	42	56	33	44.0
The most important sign of infection that can be noticed first by a nurse while giving tracheostomy care is color of stoma	61	81.3	14	18.7
After six months of tracheostomy tube removal there may be formation of tracheal stenosis	59	78.7	16	21.3
For doing suctioning of the conscious	50	66.7	25	33.3
patient the patient should be placed in semi-upright position				
For un-conscious patient suctioning should be done in lateral position	41	54.7	34	45.3
Before suctioning some breathes are given to patient by oxygen and ambo bag at 100%	13	17.3	62	82.7
The tracheal suctioning should be stopped in case of decrease in oxygen saturation less than 90%	69	92	6	8.0
The suction should be stopped in case of arrhythmias	70	93.3	5	6.7
The tracheostomy care done for suctioning of the trachea and care of stoma	70	93.3	5	6.7

Relationship between socio-demographic and total knowledge level

Table3 shows the association between demographic variables and total knowledge score. The result indicated that there was no significant association between demographic variables (age, gender, educational) department and work experience and total knowledge score as the all obtained p-values were > 0.05.

Table 3: Association between socio-demographic whit total knowledge Level

Variables	*Chi-square*	*Df*	*P-value*
Age	21.26	24	0.623
Gender	11.2	12	0.520
Educational	42.23	36	0.220
Department	17.06	24	0.846
Experience	25.85	36	0.894

DISCUSSION:

In this study, out of 75 nurses, 70 (93.3%) showed a good level of knowledge about tracheal care. This is in consistent with the finding of previous study where 71% of nurses had moderate knowledge[6].While finding of another study indicated that, the level of knowledge about tracheal care among nurses was low as only 46.4% of participants had answered the questions correctly[7].In the current study, 88% of nurses were aware about appropriate suction pressure used for tracheal suctioning, whereas the finding of another study as 46% of nurses revealed less knowledge about suction and the pressure used [8]. About 63 (84%) of participants answered correctly that the duration of suction should not exceed 15 seconds, while in another studies[5,9]. only 43 (53.8%) responded correctly regarding this point. Another study showed that 53.3% of working nurses and 40% of student nurses having somewhat adequate knowledge regarding tracheal care [10].

Association of knowledge with socio-demographic characteristics and work experience

In this study, there is no significant association between knowledge and age. This is consistent with finding of previous studies[11.12].However; finding of another study indicated that the knowledge was significantly associated with age as the age group (30-40 years) has the higherlevel of knowledge compared to others [13].

Regarding gender, The result of this study indicated that there is no significant association between gender and knowledge, which is matched with finding of other confirms the studies [5,6].In contrast, another study revealed that gender was significantly associated with knowledge[14].About the education level, the outcome of this study revealed that there was no significant association between knowledge and educational level, which is consistent with finding of another studies [15,16].However, finding of another research showed that a significant relationship between nurses‟ education and knowledge regarding tracheostomy[9].In addition to that, the knowledge was not significantly associated with duration of work journey. However, in converse, significant association was found between years of experience and level of knowledge, as nurses with more than 5 years of experience scored higher in knowledge compared to nurses with less than 1 year of experience[16].

Limitations

Regarding the knowledge survey, the limited number of ICU nurses in Misurata, a small sample size of nurses working in the ICU at Misurata Medical Center and National Cancer Institute was used only. In addition, the findings cannot be generalized to all nurses working in public and private hospitals in Misurata, as the study was conducted only among ICU nurses specializing in tracheostomy care.

Strengths

There was no selection bias of the study as all the nurses in ICU at MMC participated in the study. However, this study is first of its kind in MMC. The study showed a high level of knowledge and high response rate among nurses working in intensive care units within Misurata Central Hospital. Good knowledge among nurses about tracheostomy care can reduce medical errors and increase patient safety in the intensive care unit. The research also encourages the involvement of nurses in continuous evaluation and improvement processes, which enhances their sense of responsibility and participation in improving the quality of health care. This study also provides new findings that can be applied to similar settings. Although the study was conducted among nurses working in intensive care units within Misurata Medical Center, there were no financial or time constraints in the study.

CONCLUSION:

The finding of this study indicated majority of nurses working in intensive care units (surgery, medicine and pediatrics) at Misurata Medical Center having a good level of knowledge. This level of knowledge was not significantly influenced by age, gender, and educational level as well as the duration of working period.

Recommendation

1. A national wide survey should be applied to explore more about tracheostomy knowledge in Libya.
2. Further studies should include the assessment of attitude and practice regarding tracheostomy to give better sight of performance of nurses working in critical areas.
3. Develop informative booklets or reference materials that provide step-by-step guidance for tracheostomy care.
4. Develop manuals of procedures for tracheostomy care.

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Conflicts of interest and funding

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