

Preparation of nurses for providing treatment in care of patients with tracheostomy

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Abstract Tracheostomy is a relatively common procedure in today's medicine, although it always carries a great deal of risk. Nurses play an important role in the follow-up care of the tracheostomy patient. However, at present, we are still facing the fact that they are not sufficiently prepared to treat such patients. The aim of this study was to investigate the preparedness of nurses in OAIM and ICU in providing nursing care to tracheostomy patients. A semi-structured questionnaire of our own design was used to collect data and distribute online. The research sample consisted of 112 respondents (nurses), working in the OAIM or ICU department, who had encountered nursing care of a patient with tracheostomy by analysis and statistical processing. We found that nurses possess knowledge in the studied area in the range of 50-80%, where 50% is considered as the very low limit of satisfactory results.

Key words: Tracheostomy. Readiness of nurses. Nursing care. Department of anaesthesiology and intensive care medicine. Intensive care unit.

1. SPECIFIC CARE OF THE PATIENT WITH TRACHEOSTOMY

We consider patients with tracheostomy as bio-psycho-social beings, therefore the specific care of such a patient includes every aspect of him/her. Multidisciplinary teams are needed to improve patient care; members should be aware of all related aspects of care and potential complications associated with tracheostomy placement (Alsunaid et al., 2021). The author (Mahfoz, 2022) in his study states that in many regions of the world, tracheostomy care is a major health concern. Many patients die as a result of lack of nurses' awareness about tracheostomy care. The nurse needs to be able to recognize when a patient has a build-up of secretions in the airway, which may compromise its patency, and how they need to respond in such a case (Mussa et al., 2021). Humidification as one of the specifics of patient care prevents the airway from drying out, preventing the formation of thick secretions that dry on dry airway walls, cannulae, increasing the risk of choking (Birk et al., 2017).

The nurse and any other healthcare professional should also know how to communicate with the tracheostomy patient. Since a tracheostomy patient does not produce any voice or spoken word, we have to use alternatives to communicate with the patient. Just because the patient does not speak does not mean that they have no needs or requirements. We should always be patient with such a patient, reserve enough time for him/her to express what he/she needs or wants. He may try to show us, he may use non-verbal expressions, the nurse may try to read lips or use other methods of communication (Rose et al., 2021).

As stated by the authors (Avsar et al., 2024) the level of preparedness of nurses in providing nursing care is important in terms of patient safety and quality of care. Also, the authors (Huston et al., 2017) argue that if nurses are not prepared, it can lead to negative consequences for patient safety such as increased incidence of nursing errors and delayed patient recovery. It is critical to assess nurses' preparedness in providing nursing care and compare the findings with current nursing knowledge and competencies (Kim, Shin, 2022).

The patient with a tracheostomy feels fear, helplessness, and needs answers to questions, even though several studies show that tracheostomy patients can eat and drink through the mouth and not through a nasogastric or other probe. There are, of course, many factors to consider regarding a patient's candidacy for evaluation, such as patient care goals, level of alertness, medical stability, current diagnosis, past medical history, comorbidities, disease trajectory, vital signs, and overall clinical picture. Frequent questions are mainly regarding the pattern of food intake. We agree with all the areas mentioned. When providing specific care to tracheostomy patients on the wards, we mainly encounter communication barriers. Furthermore, the patient's fear and apprehension about following meals, which in some cases has developed into refusal of food and the need for parenteral nutrition to replenish the patient's nutrients, minerals and vitamins.

1.1 Oral hygiene

In patients with tracheostomy, regular oral hygiene is necessary to prevent leakage of secretions from the oral cavity over the obturator cuff of the cannula. Leakage of secretions can cause microaspiration and impair healing of the stomal area. Oral hygiene also prevents disease changes on teeth and gums, avoids infections that could spread to the stoma entrance area, drying and bad breath (Gmur et al., 2013). In their book (Bartunek et al., 2016), they state that oral care in UPV patients in anaesthesia-resuscitation units represents an elementary role in the prevention of pathological changes in the oral cavity and in the prevention of the development of infectious ventilator-associated pneumonia. Also, the authors (Ewan et al., 2015) argue that nursing care should include oral care to prevent the occurrence of aspiration ventilator pneumonia, which even today represents the most common nosocomial infection in patients admitted to intensive care units. The extent to which the risk of complications of artificial lung ventilation (ALV) will increase also depends on the attending staff. Knowledge of the correct oral care practices for patients on UPV by the attending staff is essential for the successful prevention of ventilator-associated pneumonia and the development of possible negative consequences on the course of hospitalization as well as the patient's overall health.

The authors (Sánchez et al., 2020) also state in their study that patients are at potential risk of developing pneumonia, with poor oral hygiene and due to bacterial colonization of the airways. In order to implement effective prevention, the link between oral health and pneumonia needs to be verified. The oral hygiene procedure is carried out in such a way that if the patient is conscious, he/she is familiarised with the procedure. The patient is placed in the correct sitting or Fowler's position. If the patient does not have a problem with upper limb mobility, we motivate and involve him in the procedure, thus promoting his independence. In an unconscious or UPV-connected patient, we change the position minimally. If necessary, we suction the patient's oral cavity before hygiene, thus getting rid of accumulated secretions from the mouth (Müller, Kovářová, 2015). The equipment we need for oral hygiene in a non-self-sufficient patient includes: oral blades covered with a mule that is firmly fixed, a pean with swabs, brushes with flavours, solution, an emersion tray, a cup with water, cellulose cotton wool, a towel or disposable pad, a flashlight, a suction cup, suction coils, protective equipment such as gloves, drapes, goggles, and a face shield (Vytejšková et al., 2013).

The same author describes the course of oral hygiene, which should be quick and gentle so as not to induce a gag reflex in the patient. Using a soft toothbrush, the nurse first gently cleans the tooth surfaces. Using moistened swabs or flavoured brushes, the patient's tongue is wiped from the root to the tip. The palate, upper and lower gums are then cleaned both externally and internally and finally the buccal mucosa is cleaned. We can use special brushes with holes which we attach to the suction cup and gently remove the plaque with it. Oral hygiene is performed in ventilated unconscious patients every 3-4 hours or as needed (Vytejšková, 2013). We know from our own experience that inadequate oral hygiene in a tracheostomy patient can endanger their health or their life.

1.2 Open and closed tracheostomy cannula suctioning

Nurses caring for tracheostomy patients must use their clinical judgement as well as evidence-based safe suctioning practice. Preparation, correct equipment and suction pressures, safe suctioning procedure and post-procedure assessment (Ireton, 2007). As such, suctioning is essential to maintain airway patency, to remove mucus and to prevent blockage of the tracheostomy cannula.

Suctioning takes place at different time intervals and depends on several indications. Indications for suctioning include: audible or visual signs of secretions in the tube, signs of respiratory distress, suspected partially or completely blocked patency in the airway, desaturation, vomiting, changes in ventilation pressures in a ventilated patient, and in conscious patients there may be a verbal request for suctioning from the cannula (Májek, Török, 2022).

The authors also state that the goal of suctioning is to maximize removal of secretions from the airways while minimizing desaturation and tissue damage. Suctioning should only be performed if it is audible and visible that secretions are present in the airway or if obstruction is suspected (Boroughs and Dougherty, 2015; Mitchell et al., 2013). However, other reasons for suctioning are also included by the author (Mitchell et al., 2013) as reduced breath sounds or reduced oxygenation. The author (Watters, 2017, p. 813) argues that rather than relying on a set schedule, the need for suctioning should be tailored to the individual patient. Suctioning may be needed more frequently during infections or respiratory illnesses. When performing suctioning, authors (Boroughs, Dougherty, 2015; McClean, 2011) agree that rapid suctioning is safer and more effective. Therefore, they recommend twisting the suction coil between the thumb and index finger during insertion and removal to ensure maximal removal of secretions from all areas of the tracheal tube and also recommend a 5-second interval to prevent atelectasis and desaturations. This theory was confirmed by author McClean, who conducted a pilot study where he found that such suctioning actually removed a greater amount of secretions than when suctioning only when the suction coil was advanced or withdrawn. There are two separate techniques for suctioning, namely open and closed suction systems. Open system suctioning is performed with disposable sterile suction catheters with aseptic conditions being observed by inserting the catheter without active suctioning using a sterile instrument into the tracheostomy cannula to its end, then pulling it out 1 cm and starting suctioning while pulling out the suction catheter (Ministry of Health, 2021). In one of the authors' studies (Hlinková et al., 2013), they state that sufficient hand hygiene and the use of protective clothing should be performed before open suctioning of the patient.

Closed-system suctioning is accomplished by deploying the suction system in a protective package containing the suction catheter, introducing it to the end, pulling it up, and initiating suctioning while simultaneously withdrawing the catheter. After suctioning, the catheter is flushed with saline or sterile water, disconnected from the suction device, capped and replaced every 24-72 hours according to the manufacturer's recommendations (Ministry of Health of the Slovak Republic, 2021). There are many studies comparing these two suction systems. Especially in ventilated patients at risk of ventilator-associated pneumonia. One of them is a study by the authors (Elmansoury, Said, 2014) who in their study investigated whether there is a difference in the incidence of ventilator associated pneumonia with the use of an open suction system or a closed suction system. The conclusion of the study was that there was no difference in the incidence of ventilator-associated pneumonia between the two groups. The authors' studies (Seyed Hossein Ardehali et al., 2020, Denissa Faradita Aryania, Judith Tannerb, 2018) also found that there was no difference in the incidence of ventilator-associated pneumonia when using open or closed type of suction.

We know from our own experience that suctioning is an important aspect of oral hygiene and airway cleaning. Our suctioning habits of the patient are mainly based on visual or auscultatory cues, not on a time interval, so as not to irritate the patient unnecessarily with the suction coil. Closed suctioning is used more often in our department, as open suctioning has a higher risk of introducing infection into the

airway by sterilising the suction coil. We use a system that is replaced after 72 hours or as needed.

2. SURVEY

Working with patients who have a tracheostomy can be quite challenging. As nurses are largely involved in their care, they should be sufficiently theoretically prepared and practically skilled. It is for this reason that an empirical investigation was undertaken to find out how prepared hospital nurses are to provide nursing care to patients with tracheostomies.

2.1 Methodology, Set, Objectives

For data collection, we chose a semi-structured questionnaire of our own design, which was intended for nurses working in the OAIM or ICU. In our questionnaire, we used most of the closed-ended questions with a total of 22 questions for faster and clearer completion. For some questions we used Likert scale (agreement scale). The total number of respondents was 112. Our aim was to find out the knowledge of nurses about oral hygiene in tracheostomy patient with respect to education. Nurses with first degree education constituted the largest number of 40 (36%), followed by nurses with secondary education 36 (32%), then nurses with second degree education 32 (29%). Diploma nurses had the lowest representation in the research with a number of 4 representing 3% of the total number.

2.2 Results

Respondents were divided into two groups based on their response to a question about educational attainment. Nurses who had as their highest educational attainment a HND or diploma in nursing were placed in the first group. Nurses with a first, second or third degree were placed in the second group.

We compared the items related to the knowledge of oral hygiene in tracheostomy patient. One knowledge item was a 3-choice item, with only one of them being correct. For the second item, respondents were asked to answer using a 5-point scale. Since the numerosity of both groups is greater than 30, we used parametric Student's t-test and F-test for validation.

Table 1 Respondents' knowledge by highest educational attainment

Student's t-test	lower (high school)	higher (university)
Mean	0,95	1,24
Variance	0,41	0,44
F-test (p-value)	0,416	
Number	40	72
Test statistic	-2,22	
p-value	0,028	

Table 2 Transformation of items

Claim	Answers	Transformation
The oral hygiene procedure should be:	Quick	1 point
	other answers	0 point
Neglected oral hygiene poses a risk of developing aspiration ventilator-associated pneumonia.	5 - strongly agree	1 point
	4 - rather agree	
	other answers	0 point

From the results, we can see that the mean value is higher in the group of university-educated nurses. The first group consisted of 40 nurses with secondary and higher vocational education. These respondents answered 0.95 questions correctly on average. In the second group, there were 72 college-educated nurses. They answered correctly on average 1.24 questions. The variances are comparable: 0.41 in the first group, 0.44 in the second. Since the p-value of the F-test is 0.416, we used the t-test with equality of variances to compare the means.

The p-value of the t-test is 0.028. This value is below the significance level of 0.05. Therefore, we can conclude that nurses' knowledge about oral hygiene in tracheostomy patient varies according to educational attainment. Nurses with higher education demonstrated better knowledge than nurses with lower education.

2.3 Discussion

From the knowledge gained so far, we know that performing oral hygiene is one of the most important procedures in tracheostomy patients, whether analgosedated on artificial lung ventilation or conscious without oxygen therapy. As reported by (Vytejčková et al., 2015), it is important to maintain a healthy oral cavity in critically ill patients. The microbial flora is concentrated in dental plaque, which is also found on the tooth surface and forms a biofilm on which other microorganisms are very well trapped. Excessive accumulation of plaque and bacteria can cause colonization of the oropharynx, contributing to the development of chronic obstructive pulmonary disease, endocarditis, bacteremia, ventilator-associated pneumonia, and others. We used two statements in the questionnaire to obtain information about the preparedness of nurses in performing oral hygiene. First, we asked the respondents whether they knew what the oral hygiene procedure should be. Respondents were asked to state that it should be performed quickly so that prolonged performance would not provoke an irritating cough or gag reflex in the patient.

The option that it should be done quickly was indicated by 45 (40.18%) of the respondents, who thought that the performance has no time constraint was as high as 42 (37.5%) and the option that the performance should be done slowly was 25 (22.32%). Although it is evident that most of the correct answers were not even half but only 40.18% of the total 100% respondents, which we consider unsatisfactory. However, very similarly, nurses thought that performing oral hygiene is without time constraint. The next statement in the questionnaire we wanted to know whether nurses agree or disagree that neglected oral hygiene leads to a higher risk of developing ventilator assisted pneumonia (VAP). In this case, the nurses were asked to indicate their agreeing responses. The number of nurses who marked the strongly agree option was 54 (48.21%), the agree option was marked by 28 (25%), making a total of 73.21%. This figure shows us that more than half of the nurses know that there is such a risk in neglected oral hygiene. There were also nurses who disagreed with the statement. A total of 24 (21.43%) nurses marked disagree and 6 (5.36%) nurses marked don't know option. Our findings can be compared with the results of the authors' research (Alja'afreh et al., 2018), who also investigated the nurses' readiness in providing oral hygiene in tracheostomy patients.

However, their finding was that although nurses are knowledgeable enough to perform, many find it an unpleasant task. Our finding was also positive as more respondents answered each item correctly. Further investigation can be done to find out how nurses perceive this performance, whether they will show a positive attitude or it will be the same as in the research of the aforementioned authors. Also in the study of authors (Singh et al., 2022) focused on oral

hygiene in relation to the occurrence of VAP in which they found that nurses should know the correct evidence based oral hygiene practice. Based on the results of the study, they concluded that tooth brushing along with oral care provides an additional benefit in preventing VAP in patients on mechanical ventilation.

2.4 Conclusion

It is important that nurses directly involved in the postoperative care of tracheostomy patients can provide appropriate tracheostomy care, are aware of the potential complications associated with tracheostomy and are able to manage these complications, particularly in an immediate life-threatening situation. Unfortunately, the unavailability of standard tracheostomy management guidelines and inadequate staff training can make this essential practice much more difficult and frightening (Khanum et al., 2022). They demonstrated adequate levels of knowledge among healthcare professionals ranging from only 48% to 50% and revealed that there are still gaps in various aspects of tracheostomy care and management. Nurses with inadequate knowledge put the patient's health, their progress in treatment even their life at risk (Lewith, Athanassoglou, 2019).

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