



ICU Nurses' Performance and Perception of Tube Feeding

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Abstract

Background: Tube feeding is one of the supportive feeding methods for patients admitted to intensive care units (ICUs). However, tube feeding used in ICUs has received less attention compared to other care procedures. Therefore, assessing nurses' perceptions and performance is essential, as they play a vital role in the correct practice of tube feeding and the prevention of its complications for patients.

Objectives: The present study examined ICU nurses' performance and perceptions of tube feeding in teaching hospitals affiliated with Zahedan University of Medical Sciences in 2023.

Methods: This descriptive study was conducted on 83 nurses working in the ICUs of hospitals affiliated with Zahedan University of Medical Sciences in 2023. The participants were selected through convenience sampling. Data were collected using a demographic information questionnaire, the Nurses' Perceptions of Tube Feeding Scale, and the Tube Feeding Performance Evaluation Checklist. Data analysis was performed with SPSS-21 software using descriptive statistics and independent samples *t*-test.

Results: The findings showed that the average work experience of ICU nurses was 6.28 ± 4.59 years. The mean overall performance score of the nurses was 59.62 ± 4.17 , and the overall score of the nurses' perception of tube feeding was 10.43 ± 1.66 out of 14, confirming the ICU nurses' positive perception of tube feeding.

Conclusions: The findings suggested that ICU nurses' perception of tube feeding was positive and higher than average, but their performance was lower than average. Given the importance of nutrition for patients admitted to the ICU and the crucial role of nurses, it is essential that ICU nurses perform tube feeding optimally and in compliance with pertinent procedures and standards.

Keywords: Intensive Care Unit (ICU), Perception, Tube Feeding, Performance

1. Background

Nutrition is a basic human need (1). This need changes when a person is admitted to the hospital (2). Thus, the nutritional status of patients, especially those admitted to the intensive care unit (ICU), may undergo extensive changes. Critically ill patients are usually admitted to the ICU (3) and are at a greater risk of malnutrition, which is associated with poorer clinical outcomes (4). The prevalence of malnutrition in ICU patients has been reported to vary from 44 to 88% (5). Several factors, such as decreased appetite due to the disease, increased need for nutrients, and

malabsorption, affect the occurrence and exacerbation of malnutrition (6).

Other risk factors for malnutrition include nausea, vomiting, diarrhea, and constipation, which are more common in ICU patients than in other patients (7). Hence, adequate nutritional support is important for the comprehensive care of patients in the ICU (8). Starting parenteral and enteral nutrition is essential for preventing malnutrition and its complications, as it is one of the essential care needs in ICU patients (6).

Nutritional support includes tube (enteral) and intravenous feeding (2), which is performed according to specific protocols and based on the patient's condition (9). Heyland et al. showed that tube feeding is

used for 33 to 92% of ICU patients (10). Compared to intravenous feeding, tube feeding has fewer side effects, such as reduced infection rates and prevention of digestive system atrophy. Additionally, it improves the clinical outcomes of patients, reduces the length of ICU and hospital stays, and lowers the risk of malnutrition during hospitalization (9).

The role of nurses in tube feeding involves placing a nasogastric tube, administering food and medicine, preventing complications related to tube feeding, and monitoring the patient's response to tube feeding (8). Since nurses play a vital role in tube feeding and patient care, their knowledge and performance will significantly impact the clinical outcomes of patients (11). One of the factors affecting performance and behavior is the understanding of the facts. Therefore, a better understanding of professional skills leads to better and higher-quality performance. A profound understanding and optimal performance of care procedures can improve the quality of care and fulfill the main goal of healthcare services: The delivery of care with the desired and standard quality (12).

The research settings in previous studies were different from that of the present study. Standard performance is affected by various factors, and its assessment in different places and times will yield different outcomes. Although providing the required nutrition and meeting nutritional needs are among the duties of nurses, the absence of a specific and standard program, reliance on personal taste and trial and error, occurrence of side effects, increased length of stay in the ICU, subsequent increase in treatment costs, and the prolongation of the need for mechanical ventilation due to malnutrition (9) warrant the need for further research in this field.

Since prescribing food is the responsibility of doctors and nutritionists, but nurses have a direct role in its administration, this can affect their perceptions and performance. Hence, it is essential to evaluate the perceptions and performance of nurses working in the ICU.

2. Objectives

To this end, the present study sought to examine ICU nurses' performance and perceptions of tube feeding in hospitals affiliated with Zahedan University of Medical Sciences in 2023.

3. Methods

This descriptive study was conducted on 83 nurses working in the ICUs of teaching hospitals affiliated with

Zahedan University of Medical Sciences in 2023. The participants were selected through convenience sampling based on the inclusion criteria. The inclusion criteria were: Having at least a bachelor's degree in nursing, working in the ICU full-time, and having at least one year of service records in the ICU.

To select participants, the researcher attended the ICUs at Ali Ibne Abitalib and Khatam al-Anbiya Hospitals in Zahedan every day during the morning, evening, and night shifts for one month. Participants were selected from among the nurses who met the inclusion criteria. During this month, no nurse attended all three work shifts in one day at the hospital, and nurses who were assessed once were not examined again if they were present in the ICU during other shifts on other days.

The data in this study were collected using a demographic information questionnaire, the Nurses' Perceptions of Tube Feeding Scale, and the Tube Feeding Performance Evaluation Checklist.

3.1. Demographic Information Questionnaire

The questionnaire was used to assess the nurses' characteristics, including age, gender, marital status, education, and employment status.

3.2. Nurses' Perceptions of Tube Feeding Scale

This scale was developed by Hosseinrezaei et al. (12) following a study by Chan et al. (13) and other related studies in the literature (9, 10, 14-17) to measure nurses' perceptions of tube feeding. The scale contains 14 scenarios designed to assess nurses' perceptions of the nutritional performance of patients admitted to the ICU. The items examine the nurses' perception of the appropriate time to start feeding, preventing infection, ensuring the proper placement of the tube, preventing pulmonary aspiration, preventing tube blockage, the duration of interruption of feeding for performing procedures, and managing complications arising during tube feeding. Each scenario has only one correct answer, with the minimum and maximum scores on this scale being 0 and 14, respectively.

The validity and reliability of the scale were assessed by Hosseinrezaei et al. The total validity index for the entire scale was reported as 0.90. Cronbach's alpha was used to assess the reliability of the scale, with the corresponding value reported to be less than 0.5 (12). In the present study, the reliability of the scale was confirmed with a Cronbach's alpha of 0.94.

3.3. Tube Feeding Performance Evaluation Checklist

This instrument contains 31 items that assess the actions taken before, during, and after the performance of tube feeding. The items are scored on a 4-option Likert scale as follows: Performed correctly (2), performed incorrectly (1), not performed (0), and no need for tube feeding (deleted) (13, 18). The validity and reliability of the checklist were assessed by Safavi Bayat et al. The content validity ratio (CVR) of the checklist was calculated as 0.85. The reliability of the checklist was evaluated as 0.842 using the test-retest method, confirming the high reliability of the checklist over time. The internal consistency of the checklist was confirmed with a Cronbach's alpha of 0.823 (8).

After the protocol for the study was approved, the researcher attended the ICUs at Ali Ibne Abitalib and Khatam al-Anbiya Hospitals in Zahedan every day during the morning, evening, and night shifts for one month to collect information from ICU nurses who met the inclusion criteria. Accordingly, the eligible nurses were selected as participants in the study. The nurses' performance was evaluated through direct observation and using the checklist. Moreover, the Nurses' Perceptions of Tube Feeding Scale was completed by the nurses during their off-duty hours and free time. Data analysis was performed with SPSS-21 software. The data were summarized using descriptive statistics, including mean and standard deviation. Additionally, the independent samples *t*-test was used to compare the mean scores of the nurses' performance and perceptions of tube feeding according to their demographic characteristics. A significance level of 0.05 ($P < 0.05$) with a 95% confidence interval was considered in the study.

4. Results

The data showed that the average age of the nurses was 33.16 ± 7.59 years. Additionally, 58 nurses (59.2%) were female, and 25 nurses (40.8%) were male. Furthermore, 47 nurses (56.6%) were single, and 36 nurses (43.4%) were married. The nurses had been working in the ICU for an average of 8.72 ± 6.66 years, and their mean service record in the ICU was 6.28 ± 4.59 years (Table 1).

As stated earlier, the participants' performance was assessed using a checklist. The scores from the checklist were converted to a 0-100 scale. A score of 80 to 100 indicated good performance, a score of 60 to 80 indicated moderate performance, and a score below 60 indicated poor performance. In this study, the mean score for the nurses' performance was 59.62 ± 4.17 , as shown in Table 2.

The overall score of the nurses' perception of tube feeding was 10.43 ± 1.66 out of 14, confirming the ICU nurses' positive perceptions of tube feeding. The highest mean score was related to scenario 11, with a mean score of 0.83, followed by scenarios 10 and 14, both with a mean score of 0.81. These results indicate that the nurses had a good perception of preventing tube blockage and infection, as well as managing complications caused during tube feeding. The lowest mean score (0.31) was related to scenario 4, indicating that the nurses scored the lowest on the prevention of pulmonary aspiration, as displayed in Table 3.

The independent samples *t*-test was used to investigate the relationship between nutritional skills, personal characteristics (gender, marital status, level of education), and the overall performance score of the participants. The results showed no significant difference between the perception and performance scores of the participants and their characteristics (Table 4).

5. Discussion

The present study examined ICU nurses' performance and perceptions of tube feeding in the teaching hospitals affiliated with Zahedan University of Medical Sciences in 2023. The findings indicated that ICU nurses had poor performance but a moderate perception of tube feeding. The ICU nurses in this study had a good perception of preventing tube blockage and infection, and managing complications during tube feeding. They also had a good perception of ICU feeding protocols and the timing of starting feeding after transferring the patient to the ICU.

Similarly, Gupta et al. examined ICU nurses' perceptions of tube feeding and reported that the majority of nurses were aware of and understood nutritional guidelines. Moreover, many nurses were aware of the ICU feeding protocols. Additionally, all nurses had a correct understanding of the initiation of tube feeding and stated that tube feeding should be started as soon as possible, within 24 to 48 hours after the patient is admitted to the intensive care unit. They also understood that the absence of bowel sounds is not an absolute contraindication to starting enteral nutrition (16). Gupta et al. (16) found that nurses have a good understanding and knowledge of feeding protocols in the intensive care unit, as confirmed in the present study.

Moreover, Komen reported that all nurses believed that enteral feeding should be started as soon as possible (within 24 - 48 hours of the patient's stay in the ICU). The nurses also believed that the absence of bowel

Table 1. The Participants' Demographic Data

Variables	Frequency (%)
Gender	
Female	58 (59.2)
Male	25 (25.5)
Marital status	
Single	47 (48.0)
Married	36 (36.7)
Education	
Bachelor's degree	81 (82.7)
Master's degree	2 (2.0)
Employment	
Official	43 (43.9)
Contractual	4 (4.1)
Fixed term	3 (3.1)
Plan-based	33 (33.7)

Table 2. The Descriptive Statistics for the Nurses' Tube Feeding Performance

Tube Feeding Performance Score	Performance Assessment	Frequency (%)
< 60	Poor	38 (45.6)
60 - 80	Moderate	45 (54.4)
80 - 100	Good	0 (0)

sounds is not an absolute prohibition for starting enteral feeding. The passage of the nasogastric tube before the start of enteral feeding was considered mandatory by 86% of the respondents (19).

The findings from the present study suggested that the nurses' performance scores were below average and weak. Similarly, Hosseainrezaei et al. examined the performance levels of nurses working in the intensive care units in Kerman and showed that the performance of nurses was below the standard level (12). Moreover, Taherkhani et al. found that the mean performance of nurses in tube feeding was lower than the standard mean value (20). Shahin et al. investigated ICU nurses' performance concerning nutrition and diet in the ICU of hospitals affiliated with the Egyptian University of Medical Sciences and evaluated the effect of a designed training program. The results confirmed the poor performance of nurses in nutritional care (11).

On the other hand, Mehrnoosh et al. examined the tube-feeding performance of nurses in ICUs of hospitals in Ardabil and confirmed the moderate performance of nurses (21). In addition, Safavi Bayat et al. compared the knowledge and performance of nurses in terms of ICU tube feeding with the standards available in medical centers affiliated with Qom University of Medical

Sciences and reported moderate tube-feeding performance of ICU nurses (8).

The present study also examined the relationship between the demographic characteristics of nurses and their performance and perceptions of tube feeding. There was no significant difference between male and female nurses in terms of their tube-feeding performance. Contrary to the findings of the present study, Taherkhani et al. showed that the performance of female nurses in intravenous feeding was significantly better than that of male nurses (20). Safavi Bayat et al. also found a significant difference in the performance of male and female nurses (8).

Furthermore, the data in the present study showed no significant difference between the employment status and performance of nurses, as confirmed by Taherkhani et al. (20). However, Ashouri and Fatehi found that the performance of officially employed nurses was significantly better compared to nurses with other employment statuses (1).

5.1. Conclusions

The findings of the present study indicated that ICU nurses had a relatively high perception of tube feeding,

Table 3. The Descriptive Statistics for the Participants' Responses to the Items on the Nurses' Perceptions of Tube Feeding Scale

Items	Description	True Responses ^a	False Responses ^a	Mean ± SD
1	A critically ill patient with NGT has been transferred to the ICU to continue feeding. The doctor has prescribed feeding with NGT, 200 cc every three hours. When do you start feeding?	66 (79.5)	17 (20.5)	0.79 ± 0.40
2	While feeding the patient with NGT, you will notice that the person in charge of feeding the patient takes out the piston of the syringe and puts it on the table next to the patient's bed, and after filling the syringe with 60 cc of food, he reinserts the piston into the syringe tube. How do you react to this action?	57 (68.7)	26 (31.3)	0.68 ± 0.46
3	Suppose you can't aspirate any liquid from the patient's stomach before starting the bolus feeding, the gastric tube is not twisted inside the mouth, and you hear a slight sound in the auscultation of the stomach after air injection. How do you react in this situation?	66 (79.5)	17 (20.5)	0.79 ± 0.40
4	How do you react if you face the following conditions before (bolus or intermittent) feeding in one turn? In the aspiration, you can see 5 ml of yellow liquid with a pH of 7, and in the epigastric auscultation, the sound of passing air is heard.	26 (31.3)	57 (68.7)	0.31 ± 0.46
5	You see that your colleague, after placing the NGT and making sure that its location is correct, marks the place where the tube exits the nose with a fixed color marker. To what extent this action can be useful for ensuring the location of the tube?	66 (79.5)	17 (20.5)	0.79 ± 0.40
6	During gavage, a nurse changes the position of the patient who has a tracheal tube, puts the patient's head 30 degrees above the body, and then performs the gavage. How do you react to this action?	61 (73.5)	22 (26.5)	0.73 ± 0.44
7	If, while aspirating the patient's stomach contents, you aspirate 185 cc of nutrients and these substances have a pH of 5.5 and are yellow in color, what do you do to start a new diet?	59 (71.1)	24 (28.9)	0.71 ± 0.45
8	When feeding the patient with NGT for the first time, you find 250 cc residual volume in aspiration of gastric contents. What do you do to start feeding again?	66 (79.5)	17 (20.5)	0.79 ± 0.40
9	If you aspirated the contents of the stomach for the second consecutive time and these contents were more than the standard volume, what would you suggest to improve the patient's nutrition?	67 (80.7)	16 (19.3)	0.80 ± 0.39
10	During tube feeding, a nurse observes that she cannot enter the food into the NGT tube even with pressure, what suggestions can you give her as a colleague?	68 (81.9)	15 (18.1)	0.81 ± 0.38
11	You notice that a nurse washes the tube with normal water after every feeding or giving any substance through NGT to the patient. How do you react to her action?	69 (83.1)	14 (16.9)	0.83 ± 0.37
12	The nurse has prepared the patient in the ICU for a minor surgery and for this purpose has stopped the tube feeding 6 hours before the start of the procedure. How do you react to her behavior?	67 (80.7)	16 (19.3)	0.80 ± 0.39
13	What is your first action if your patient burps continuously during bolus (intermittent) feeding?	60 (72.3)	23 (27.7)	0.72 ± 0.45
14	Your patient vomits and has a decreased breathing rate during bolus feeding, what is your priority?	68 (81.9)	15 (18.1)	0.81 ± 0.38

^a Values are expressed as No.(%).

Table 4. A Comparison of the Mean Scores of Performance and Perceptions of Tube Feeding Based on Participants' Demographic Variables

Variables	Perception	P-Value	Performance	P-Value
Gender		0.207		0.388
Male	10.16 ± 1.43		59.68 ± 4.85	
Female	10.55 ± 1.76		59.60 ± 4.02	
Marital status		0.346		0.300
Single	10.27 ± 1.52		59.29 ± 4.55	
Married	10.63 ± 1.82		60.05 ± 3.64	
Education		0.632		0.474
Bachelor's degree	10.41 ± 1.67		59.69 ± 4.19	
Master's degree	11.00 ± 1.41		57.00 ± 2.82	

^a Values are expressed as mean ± SD.

confirming that they were aware of tube feeding protocols and guidelines. However, they failed to perform these protocols efficiently in clinical settings, possibly due to a lack of nursing staff, inadequate time, exhaustion caused by tough work shifts, and the absence of training courses or workshops. The insights from this study can have implications for nursing

supervisors, as well as educational and clinical supervisors in hospitals, to improve the knowledge and performance of nurses regarding tube feeding. Moreover, nursing managers need to organize and hold workshops on tube feeding to enhance nurses' knowledge and performance.

5.2. Limitations

One of the limitations of the study was the potential influence of the content of the instruments on the nurses' behavior. To mitigate this, the researcher provided some instructions about the objectives of the study to the nurses while they were performing related procedures during their work shifts. However, the nurses' perceptions and performance were assessed during subsequent visits to the ICUs.

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Footnotes

Authors' Contribution: All the authors contributed to conducting the study and drafting the manuscript.

Conflict of Interests Statement: There was no conflict of interest in this study.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: This research project was approved by the Ethics Committee of Zahedan University of Medical Sciences (ethics code: [IR.ZAUMS.REC.1402.076](#)). Additionally, the authors complied with all required protocols.

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