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Knowledge levels and practices of intensive care nurses regarding enteral nutrition in patients receiving inotropic treatment: a descriptive, cross-sectional study

Níveis de conhecimento e práticas dos enfermeiros de cuidados intensivos sobre nutrição enteral em pacientes que recebem terapia inotrópica: um estudo descritivo, de corte transversal

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ABSTRACT

Objective

This study aimed to investigate the level of knowledge of intensive care nurses about enteral nutrition of patients receiving high-dose inotropic therapy in the intensive care unit.

Methods

This descriptive and cross-sectional study collected data from 302 nurses working in intensive care units of a teaching and research hospital between April and July 2022. The data were collected using the Sociodemographic Information Form and the Enteral Nutrition Knowledge and Practices Questionnaire.

Results

In the study, it was found that nurses mostly gave correct responses to the questions about the ways of administration of enteral nutrition (99%), complications of enteral nutrition (97.7%), follow-up of complications (97.7%), and evaluation of nutritional tolerance in patients with decreased inotrope requirement (94.4%). It was seen that the least correct responses were given to the questions related to the follow-up of gastric residual volume in patients receiving inotrope therapy (34.4%) and the feeding rate until hemodynamic stability was achieved in patients with decreased inotrope requirement (39.7%). A statistically significant result found that nurses with intensive care certificates had better knowledge of enteral nutrition ($p < 0.01$).

Conclusion

The study found that intensive care nurses' knowledge of enteral nutrition practices was at a good level. In contrast, their knowledge of the nutritional practices of patients receiving inotropic therapy should be improved.

Keywords: Critical care. Critical care nursing. Enteral nutrition. Nurse. Nutrition.

RESUMO

Objetivo

O objetivo deste estudo foi investigar o nível de conhecimento dos enfermeiros de cuidados intensivos sobre nutrição enteral de pacientes que recebem terapia inotrópica em doses elevadas na unidade de cuidados intensivos.

Métodos

Este estudo é descritivo e do tipo *cors-sectional*. Os dados foram recolhidos de um total de 302 enfermeiros que trabalharam nas unidades de cuidados intensivos de um hospital de ensino e investigação entre abril e julho de 2022. Os dados foram recolhidos com o Formulário de Informação Sociodemográfica e Questões de Conhecimento e Prática sobre Nutrição Enteral.

Resultados

Verificou-se que os enfermeiros deram na sua maioria respostas corretas às perguntas sobre as formas de administração da nutrição enteral (99%), complicações da nutrição enteral (97,7%), acompanhamento das complicações (97,7%), e avaliação da tolerância nutricional em pacientes com necessidades reduzidas de inotrópico (94,4%). As respostas menos corretas foram dadas às perguntas relacionadas com o seguimento do volume residual gástrico em pacientes que receberam terapia com inotrópico (34,4%) e a taxa de alimentação até se alcançar a estabilidade hemodinâmica em pacientes com necessidade reduzida de inotrópico (39,7%). Constatou-se ser estatisticamente significativo que os enfermeiros com certificado de cuidados intensivos tinham melhores conhecimentos de nutrição enteral ($p < 0.01$).

Conclusão

Como resultado do estudo, verificou-se que o nível de conhecimento dos enfermeiros de cuidados intensivos sobre as práticas de nutrição enteral estava a um bom nível, e que o nível de conhecimento sobre as práticas nutricionais dos pacientes que recebem terapia inotrópica deveria ser melhorado.

Palavras-chave: Cuidados críticos. Enfermagem de cuidados críticos. Nutrição enteral. Enfermeiras e enfermeiros. Nutrição.

INTRODUCTION

Nutrition is the sufficient consumption and appropriate use of a variety of nutrients by the body to support growth, development, renewal, and function. People need nutrition to sustain their lives. Reaching the daily calorie and energy requirement for optimal and balanced nutrition is important. Malnutrition is defined as inadequate nutrition, which can function. Insufficient calorie and energy intake can negatively impact the patient's prognosis [1].

Assessing and planning nutritional status is a part of the intensive care treatment starting from patient admission. The patient's nutritional status is evaluated according to the clinical condition, disease, anthropometric measurements, and laboratory values, such as plasma proteins, albumin, and nitrogen balance. Oral nutrition is the first option for patients in the Intensive Care Unit (ICU). However, enteral nutrition is used for patients who cannot be fed orally for various reasons [2,3].

Enteral nutrition is preferred to oral nutrition for critically ill patients who cannot be fed orally due to gastrointestinal and cardiovascular problems, trauma, burns, and neuromuscular disorders in the intensive care unit [3]. Enteral nutrition involves continuous or intermittent feeding through a tube, such as an orogastric/nasogastric catheter or Percutaneous Endoscopic Gastrostomy (PEG) [4,5]. This method reduces intestinal permeability, maintains the intestinal barrier, and protects against ischemia-reperfusion injury [6].

In intensive care units, enteral nutrition is important in preventing nutritional deficiencies. The goal of adequate nutrition is to minimize malnutrition-related problems, improve wound healing, minimize illness severity, prevent immunological deficiency, and lower mortality and morbidity rates. Additionally, a study has shown that morbidity and mortality rates were reduced if patients' daily caloric and energy requirements were adequately met [7].

Complications may develop during enteral nutrition, including metabolic abnormalities such as hyperglycemia, fluid and electrolyte imbalances, and gastrointestinal alterations such as diarrhea, constipation, nausea, vomiting, and distension [8,9]. Nurses are responsible for assessing the patient's caloric needs, ensuring the feeding tube is correctly placed, and caring for the feeding tube. To prevent aspiration, nurses should ensure the correct positioning of the tube, assess bowel sounds and gastric residual volume (GVR), and monitor the patient for symptoms such as diarrhea, abdominal distension, nausea, and vomiting [3,8,9].

Patients receiving inotropic therapy should be applied to a specific enteral nutrition strategy in the ICU. When tissue perfusion is compromised, people may experience organ failure in the lungs, kidneys, liver, and gastrointestinal organs. Therefore, caution should be required to prevent gastrointestinal organ reperfusion injury when administering enteral nutrition [6]. In enteral nutrition, feeding should be ceased when inotropic drug doses exceed a certain level (e.g., dopamine >10 ug/kg/min, norepinephrine >0.5 ug/kg/min). When the patient's need for inotropes decreases, hypoperfusion symptoms disappear, mean arterial pressure (>60 mmHg) rises, and enteral nutrition can be restarted [10]. Patients receiving low-dose inotropic therapy (e.g., dopamine <10 ug/kg/min, norepinephrine <0.5 ug/kg/min) on enteral nutrition should be fed at a maximum of 20ml/hour until hemodynamic stability is achieved [11,12].

Patients' nutrition should be prioritized in the ICU as much as treatment. It is important that all healthcare team members, particularly nurses, should have adequate nutrition knowledge. Ensuring patients receive adequate enteral nutrition can aid in their recovery [13]. The nurse's role is to assess the nutritional status of ICU patients receiving inotropic or non-inotropic treatment. The nutritional needs of patients should be assessed and monitored for potential complications. A study conducted with the participation of intensive care nurses determined that nurses perceived clinical nutrition practices as a secondary nursing role [14]. However, no publication was found in the literature regarding the follow-up and practices of nurses in patients receiving inotrope treatment.

METHODS

This study aimed to investigate the level of knowledge of intensive care nurses about enteral nutrition of patients receiving high-dose inotropic therapy in the intensive care unit.

This study is descriptive and cross-sectional. The study population consisted of 417 nurses working in the adult intensive care units of a training and research hospital. The sample size was calculated to be 302 with a 95% confidence interval and $\pm 5\%$ margin of error. A total of 302 nurses working in an intensive care unit and volunteering to participate in the study consented to take part. All participants met the inclusion criteria. The STrengthening the Reporting of OBservational (STROBE) checklist was used for study reporting.

The data were collected from an education and research hospital adult ICUs, including anesthesia ICUs, general ICUs, cardiology ICUs, cardiovascular surgery ICUs, and neurology ICUs between April and July 2022. The form was completed by the nurses individually within 5-10 minutes.

The forms were left to the nurses who could not complete them during working hours and were collected the next day.

Sociodemographic information form: The sociodemographic information form consists of 12 questions, including age, gender, and education. The researchers prepared it based on the literature.

Enteral Nutrition Knowledge and Practices Questionnaire: The questionnaire comprises 20 questions that assess nurses' knowledge and practices regarding enteral nutrition in critically ill patients receiving inotropes. The questionnaire was developed by the researchers based on the literature [1,7,8,15]. A pool of 21 items was created for the questionnaire to assess knowledge and practices. The questionnaire enables nurses to determine their level of knowledge about enteral nutrition in critically ill patients receiving inotropes.

The Content Validity Index (CVI) was used to evaluate the content validity of the Enteral Nutrition Knowledge and Practices Questionnaire items. The expert panel comprised of two associate professor nurses with publications in intensive care, a nursing lecturer with a doctoral degree and experience in intensive care, and a nurse with a master's degree working in intensive care. In the calculation of the CVI, each item was evaluated by the experts as 1 "not appropriate," 2 "somewhat appropriate," 3 "quite appropriate," 4 "very appropriate," and the CVI was found to be 0.78 [16,17]. The Enteral Nutrition Knowledge and Practices Questionnaire was revised based on expert evaluations, resulting in a final version that improved clarity. The questionnaire consisted of 20 items and required no further modifications.

The first 14 items of the 20 questions are related to enteral nutrition, and the last seven are related to enteral nutrition in patients receiving inotropes (Table 2). Five of the 20 items contain false statements [2,5,8,18,19] in the questionnaire. The nurses responded to the items by selecting "I agree" or "I disagree". Using an answer key in which the information in each item was labeled as true or false, the nurses were evaluated as "knowing" or "not knowing" each item based on their responses. Correct responses were scored 1 point, while incorrect responses received 0 points. The questionnaire had a minimum score of 0 and a maximum score of 20, with higher scores indicating a greater level of knowledge. On 24.12.2021, the Scientific Research Ethics Committee (No.: E-46418926-050.99-91132) granted permission to conduct the study. After verbally explaining the study to the nurses who volunteered to participate, their written consent was obtained using the consent form.

The SPSS 25.0 (SPSS Inc., Chicago, IL, USA) statistical package program was used to evaluate the data obtained. When evaluating the normal distribution of the data in the study, skewness and kurtosis values of ± 2 were considered normal, as stated in the literature [20]. Descriptive statistics were used to examine sociodemographic characteristics. An independent-sample t-test and a one-way ANOVA test were used to assess the relationship between the Enteral Nutrition Knowledge and Practices Questionnaire and the nurses' demographic characteristics and administering enteral nutrition in the ICU. A Pearson's correlation coefficient test was utilized to identify relationships between variables. Linear regression analysis was used to determine Enteral Nutrition Knowledge and Practices Questionnaire predictors. $p < 0.05$ was considered statistically significant and 95% confidence interval.

RESULTS

The mean age of intensive care unit nurses was 27.42 ± 3.99 years. 69.2% of the nurses were female, and 74.2% were undergraduates. While 68.2% of the nurses included in the study had been working in the profession for 1-5 years, 66.6% had worked as intensive care nurses for 1-5

years. One-fourth (26.2%) of the participants had an intensive care certificate, and approximately three-quarters (72.8%) had received training on enteral nutrition. The rate of nurses who knew the correct rate of initiation of enteral nutrition was 95.4%. As an enteral feeding method, 89.7% used a nasogastric catheter, 7.9% used a percutaneous endoscopic gastrostomy tube, 3% used an orogastric catheter, and only 1.3% used a jejunostomy (Table 1).

Table 1 – Sociodemographic characteristics (n=302).

Variables	Mean±SD	Min-Max
Age	27.42±3.99	18-46
Variables	n	%
Gender		
Female	209	69.2
Male	93	30.8
Education		
Associate degree	52	17.2
Undergraduate education	224	74.2
Master's degree education	26	8.6
Duration of employment (Years)		
<1	19	6.3
1-5	206	68.2
>6	77	25.5
Duration of employment an intensive care unit (Years)		
<1	46	15.2
1-5	201	66.6
>6	55	18.2
Intensive care nursing certificate		
Yes	79	26.2
No	223	73.8
Receiving enteral nutrition education		
Yes	220	72.8
No	82	27.2
Enteral nutrition administration (Weekly)		
1-3	85	28.1
4-6	109	36.1
>7	108	35.8
Enteral feeding methods*		
Ng	271	89.7
Og	9	3.0
PEG	24	7.9
Jejunostomy	4	1.3

Note: *More than one option is checked.

The findings related to nurses' knowledge level and practices of enteral nutrition in patients receiving high-dose inotropes are presented in Table 2. It was found that the nurses participating in the study received an average score of 16.76 ± 1.93 from the Enteral Nutrition Knowledge and Practices Questionnaire. The majority of nurses (99%) answered the question "In enteral nutrition, nutrients are given to the patient continuously or intermittently by various routes (nasogastric tube, orogastric tube, gastrostomy tube, jejunostomy tube...)" correctly. It was found that 97.7% of the nurses responded correctly to the "Complications of enteral nutrition include nausea, vomiting, diarrhea, constipation, and aspiration" and the "Patients on enteral nutrition are monitored regularly for abdominal distension, bowel sounds, pain, diarrhea, and constipation." It was found that 94.4% of the nurses responded correctly to the "Nutritional tolerance is assessed in patients whose need for inotropes decreases" regarding enteral nutrition in critically ill adult patients receiving high-dose inotropes. In comparison, 34.4% of the nurses responded correctly to the "GVR is assessed

twice daily in patients receiving inotrope therapy” question. In addition, 39.7% answered the “In patients whose need for inotropes decreases, enteral nutrition is given up to 100 ml per hour until hemodynamic stability is achieved.” question correctly. Almost three-quarters of the nurses agreed with the statements “Enteral nutrition is the preferred type of nutrition.” and “In enteral nutrition, feeding is stopped when inotropic drug doses exceed a certain level (norepinephrine >0.5 ug/kg/min, dopamine >10 ug/kg/min, epinephrine >0.2 ug/kg/min)”. 83% of nurses responded correctly to the “When the patient’s need for inotropes decreases and mean arterial pressure (>65 mmHg) rises, enteral nutrition starts.” Almost all nurses answered correctly “Nutritional tolerance is assessed in patients whose need for inotropes decreases.”

The level of knowledge and practice of enteral feeding in patients receiving high-dose inotropes was statistically significantly higher in nurses with a certificate than those without a certificate ($t=0.055$; $p<0.01$). In the study findings, no statistically significant difference was found between the nurses’ knowledge level and practice scores of enteral nutrition in patients receiving high-dose inotropes and their gender, educational status, occupation, and working time in the intensive care unit (Table 3). Also, there was no significant correlation between nurses’ age and the Enteral Nutrition Knowledge and Practices Questionnaire (Table 4). In Table 5, linear regression analysis was used to determine whether demographic factors affected the Enteral Nutrition Knowledge and Practices Questionnaire. As a result of the analysis, it was found that explained 4% of the variance ($R=0.201$, $R^2=0.040$, $F=1.539$, $p=0.143$).

Table 2 – Enteral Nutrition Knowledge and Practices Questionnaire (n=302).

Enteral Nutrition Knowledge and Practices	Correct responses	
	n	%
Adult patients		
1. In enteral nutrition, nutrients are given to the patient continuously or intermittently by various routes (nasogastric tube, orogastric tube, gastrostomy tube, jejunostomy tube...).	299	99.0
2. In bolus feeding, 200-300 ml of nutritional solution is given quickly with a syringe 10-15 times a day. (False)	212	70.2
3. In intermittent feeding, nutrition is given at resting intervals.	292	96.7
4. In continuous feeding, the nutritional solution is administered continuously at a rate appropriate to the patient’s caloric requirements.	274	90.7
5. In stable patients, enteral nutrition is started within 96 hours. (False)	168	55.6
6. In enteral nutrition, the patient’s nutritional status is determined according to caloric needs.	287	95.0
7. Gastric residual volume monitoring is not required during enteral nutrition. (False)	237	78.5
8. Gastric residual volume is monitored every 4 hours.	186	61.6
9. Enteral nutrition is discontinued if the gastric residual volume is ≥ 500 ml.	274	90.7
10. Abdominal distension is evaluated if the gastric residual volume is high (>500 ml) on enteral nutrition.	288	95.4
11. Abdominal distension in enterally fed patients may develop due to the medications (inotropes, opioids, etc.) used by the patient.	287	95.0
12. Complications of enteral nutrition include nausea, vomiting, diarrhea, constipation and aspiration.	295	97.7
13. Patients on enteral nutrition are monitored regularly for abdominal distension, bowel sounds, pain, diarrhea, and constipation.	295	97.7
In critically ill adult patients receiving high doses of inotropes		
14. Enteral nutrition is the preferred type of nutrition.	221	73.2
15. In enteral nutrition, feeding is stopped when inotropic drug doses exceed a certain level (norepinephrine >0.5 ug/kg/min, dopamine >10 ug/kg/min, epinephrine >0.2 ug/kg/min).	225	74.5
16. When the patient’s need for inotropes decreases and mean arterial pressure (>65 mmHg) rises, enteral nutrition starts.	251	83.1
17. In patients whose need for inotropes decreases, enteral nutrition is given up to 100 ml per hour until hemodynamic stability is achieved. (False)	120	39.7
18. Nutritional tolerance is assessed in patients whose need for inotropes decreases.	285	94.4
19. Gastric residual volume is assessed twice daily in patients receiving inotrope therapy. (False)	104	34.4
20. If the gastric residual volume is ≥ 400 ml in patients receiving inotropic therapy, enteral nutrition is interrupted.	251	83.1
Mean total score of the form*	16.06 \pm 1.84 (9-20)	

Note: *Mean \pm SD (Min-Max).

Table 3 – The relationship between the Enteral Nutrition Knowledge and Practices Questionnaire and sociodemographic characteristics of nurses.

Sociodemographic Characteristics of Nurses	Enteral Nutrition Knowledge and Practices Questionnaire			
	Mean±SD	Statistics	95% CI of the Difference	
			Lower	Upper
Gender				
Female	16.07±1.66	t=2.688 p=0.954	-0.43815	0.46459
Male	16.05±2.19			
Education				
Associate degree	15.85±1.78	F=2.120 p=0.122	-0.7440	0.3649
Undergraduate education	16.04±1.87			
Master's degree education	16.73±1.54			
Duration of employment (Years)				
<1	15.74±1.52	F=0.399 p=0.672	-1.2433	0.4937
1-5	16.11±1.88			
>6	16.01±1.80			
Duration of employment in an ICU (Years)				
<1	15.89±1.68	F=0.295 p=0.745	-0.8154	0.3692
1-5	16.11±1.84			
>6	16.02±1.98			
Intensive care nursing certificate				
Yes	16.54±1.80	t=0.055 p=0.007	0.18363	1.12022
No	15.90±1.82			
Receiving enteral nutrition education				
Yes	16.16±1.83	t=0.192 p=0.136	-0.11258	0.82101
No	15.80±1.85			
Enteral nutrition administration (Weekly)				
1-3	16.01±1.58	F=0.145 p=0.865	-0.5404	0.5089
4-6	16.03±1.88			
>7	16.14±1.99			

Note: $p < 0.001$. F: One-way ANOVA; t: One sample t-test.

Table 4 – The correlation between the Enteral Nutrition Knowledge and Practices Questionnaire and the age of participant nurses.

Variables	Enteral Nutrition Knowledge and Practices Questionnaire	
	Statistics	
Age	r	0.026
	p	0.650

Table 5 – Linear regression analysis of predictors of the Enteral Nutrition Knowledge and Practices Questionnaire.

Variables	β	SE	Beta	t	p	95% CI for B	
						Lower Bound	Upper Bound
(Constant)	17.047	1.077		15.824	0.000	14.927	19.167
Age	0.013	0.036	0.027	0.347	0.729	-0.059	0.084
Gender	0.015	0.230	0.004	0.067	0.946	-0.438	0.469
Education	0.353	0.217	0.096	1.628	0.105	-0.074	0.779
Duration of employment	-0.086	0.310	-0.025	-0.276	0.783	-0.697	0.525
Duration of employment in an ICU	-0.256	0.286	-0.081	-0.898	0.370	-0.819	0.306
Intensive care nursing certificate	-0.674	0.260	-0.161	-2.594	0.010	-1.185	-0.163
Receiving enteral nutrition education	-0.243	0.257	-0.059	-0.944	0.346	-0.748	0.263
Enteral nutrition administration	0.079	0.135	0.034	0.584	0.560	-0.187	0.345

$R=0.201$, $R^2=0.040$, $F=1.539$, $p=0.143$

Note: The Enteral Nutrition Knowledge and Practices Questionnaire was the dependent variable. β : Unstandardised Coefficients; SE: Standard Error.

DISCUSSION

Gastric tubes are safe to provide nutrition after oral feeding in adult patients in the ICU [2]. Enteral nutrition is fed directly into the gastrointestinal tract through a tube. Also, it can be delivered preprilically directly into the stomach or postprilically directly into the small intestine [18,19]. The study findings determined that almost all nurses knew the correct methods of enteral nutrition administration (question 1). In a previous study by Al-Hawaly et al., most nurses (71.1%) were found to have adequate knowledge of nutrition management. Since the data of this study were collected from nurses working in general wards, nurses' knowledge level is lower than in our study [21]. As in our study, it is thought that intensive care nurses have a high level of knowledge due to continuous enteral nutrition practices.

Nutritional assessment is important for preventing malnutrition in patients receiving treatment in the ICU. It is essential first to determine the patient's calorie target and nutritional needs [2]. Guidelines recommend that the patient's increased caloric needs should be calculated according to the patient's needs [9]. As a result of the study, most nurses (95%) responded correctly to the question about determining the patient's nutritional status according to caloric needs (Question 6). Good nutritional care requires nurses to administer, monitor, and titrate enteral nutrition based on the patient's response. A study showed that nurses believe they have an important role in assessing feed tolerance and providing enteral nutrition [22].

Despite the benefits of enteral nutrition, many complications can occur, especially when administered without adequate knowledge. Inappropriate administration and maintenance of enteral nutrition can lead to complications such as tube obstruction or malposition, nausea, vomiting, pulmonary aspiration, overfeeding, diarrhea, treatment-related complications, infection, and agitation. ICU nurses play a critical role in preventing such complications [23]. Once enteral nutrition is initiated, ICU nurses are responsible for the effective administration, management, evaluation, and follow-up of the patient's nutrition. Therefore, patients should be closely monitored for signs and symptoms of intolerance and potential complications [18,24]. To safely deliver enteral feeding to patients in intensive care, nurses should be knowledgeable enough. Morphet et al. [22] showed that some participants reported a lack of knowledge about potential enteral nutrition complications. Previous studies have identified similar knowledge deficits in nurses [25-27]. Ramuada et al. [27] found that 66.8% of nurses could not identify the potential enteral nutrition complications. In this research, the percentage of accurate responses to the complications-related questions (questions 10, 11, 12, and 13) was more than 95%. In this context, the nurses monitor the potential complications of intensive care patients at an appropriate level. The different results between the studies may be that the nurses in our study received training on enteral nutrition.

Nutritional intolerance, such as high GVR, distension, vomiting, and diarrhea due to motility and absorption disorders during enteral nutrition, are common problems. Aktas et al. [28] found that gastrointestinal problems were the primary cause of enteral feeding discontinuation in 41% of patients. These problems can prevent achieving the desired nutritional goal and lead to insufficient calorie intake [28]. The GVR assessment is used in the intensive care unit to monitor gastrointestinal problems. Guidelines recommend checking GVR at 4-6-hour intervals [15,18,19]. In addition, the BRASPEN guideline does not recommend checking GVR [9]. However, in the units where the data was collected, GVR was controlled every four hours. Our study found that slightly more than half of the nurses answered correctly to the question about the time required for GVR evaluation in adult intensive care patients (question 8). In contrast, only one-third of the nurses answered correctly to

the false suggestion question about GVR follow-up in patients receiving inotrope therapy (question 19). On the other hand, most nurses correctly answered the amount of residual for adult intensive care patients (question 9) and adult intensive care patients receiving inotropes (question 20). At this point, nurses perform many applications on patients in intensive care, which may cause them to reduce the frequency of GVR assessment. Also, a protocol for enteral nutrition is not used in the units where the study was conducted. Bloomer et al. [29] showed that nurses prioritized enteral nutrition less than other care needs in critically ill patients. The same study also found that most participants agreed that enteral nutrition was essential for patient care, but other components were given higher priority [29]. Considering the importance of enteral nutrition in patient recovery, nurses' practices should be updated with evidence-based studies. In-service training should also be emphasized to improve enteral nutrition management. However, intensive care nurses are well-positioned to utilize evidence-based nutrition recommendations in their care practices [18].

In the study, the incorrect suggestion question related to the amount of nutrition to achieve hemodynamic stability in patients with reduced inotrope requirements was the question to which nurses gave the least correct answers (question 17). Enteral nutrition administration directly into the gastrointestinal tract helps restore intestinal motility by supporting normal digestive processes, maintaining gastrointestinal integrity and function, supporting immunity, and minimizing the translocation of bacteria and other organisms [15,16,19,24,30]. Patients who need high dosages of inotropes may experience poor tissue perfusion, and many organs may be affected. Nutritional intolerance may develop as a result of the gastrointestinal system being affected. The feeding rate differs in enterally-fed patients due to intolerance [31]. The ESPEN Guidelines recommend starting enteral nutrition at a low rate (10 ml-max 20 ml per hour) due to intestinal tolerance [6]. Ocal et al. [12] recommend that enteral nutrition be administered to patients who require vasopressors at a rate of no more than 20 ml per hour until hemodynamic stability is achieved. In the study, nurses were thought to need training on this subject because of their inadequate knowledge. Similarly, in the study conducted by Duerksen et al. [32], most nurses stated that their knowledge about nutritional care needed to be updated. Also, Bedir et al. [33] showed an immediate enhancement in nurses' knowledge due to an educational program on nursing practice caring for patients undergoing nasogastric tube feeding. It would be better to organize an educational program for intensive care nurses regularly.

Early initiation of enteral nutrition in intensive care patients is essential to maintaining intestinal health, reducing the severity of the patient's illness, and avoiding a nutritional deficit [22]. The guidelines recommend starting enteral nutrition within 24-48 hours [15]. In the study findings, slightly more than half of the nurses answered this question correctly (question 5). This result may be because the physician decided on enteral nutrition in the units where the study was conducted, and the nurses needed more knowledge about this subject. In addition, the lack of a protocol used in the unit may be another reason. Similarly, in a study that was carried out in South Africa, only 42% of the participants knew the right time to administer enteral nutrition [27]. A study investigating the factors affecting the barriers to enteral nutrition showed that constructing a protocol for the feeding process and using an evidence-based guideline is important in the ICU [34].

Guidelines recommend that enteral nutrition should be started as early as possible in patients on inotropic therapy below a certain dose [6,9]. Our survey results showed that almost three-quarters of nurses know that enteral feeding is preferred in patients receiving inotropic therapy (Question 14) and that feeding should be stopped when inotropic doses exceed a certain level (Question 15). At the same time, nutritional tolerance should be assessed in patients whose need for inotropes is

decreasing to support enteral nutrition initiation. In this study, almost all nurses reported assessing nutritional tolerance with decreasing inotropes dose (Question 18). As most of the patients in the intensive care unit where the study was conducted were critically ill, it is thought that the nurses gained knowledge and experience regarding inotropic therapy and, in this case, were able to perform enteral nutrition practices correctly in critically ill patients receiving inotropes.

According to the data, the knowledge and practices of nurses with a certificate in enteral nutrition were better than those without a certificate. The knowledge level of the nurses was good because the intensive care certificate training included training content related to enteral nutrition. The accuracy of enteral nutrition practice in intensive care units will be improved by increasing the number of certified nurses. In addition, Duerksen et al. [32] stated that nurses' knowledge about nutritional care must be updated regularly. These findings emphasize the importance of determining the educational needs of nurses in terms of fulfilling their essential roles in nutritional care and the necessity of professional and effective educational interventions.

As a study finding, it was determined that demographic factors (ICU certificate, enteral nutrition education, and practice status) significantly affected ICU nurses' knowledge and practice levels regarding enteral nutrition practices. Given that nutrition in the ICU contributes positively to patient recovery, nurses should pay more attention to this issue. However, it is believed that increasing the work experience of nurses, especially in the ICU, will contribute to the nutrition of patients receiving high-dose inotropes. More experienced nurses can be assigned to the care of patients receiving inotrope therapy. Also, it may be recommended that experienced nurse's mentor inexperienced nurses and increase certification training.

CONCLUSION

Enteral nutrition has an essential place in the prevention of nutritional deficiencies in intensive care units. As a result of the study, it was found that the knowledge and practice level of intensive care nurses regarding enteral nutrition practices was at a reasonable level. In contrast, their knowledge and practice level regarding the nutritional practices of patients receiving inotropic therapy should be improved. Since the enteral nutrition plan differs in critically ill patients receiving inotropes compared to patients who do not, in-service training should be repeated every year. In parallel with this, written guidelines on enteral nutrition should be used in the units. It is important to improve the competencies of nurses in nutritional care, with the training organized to positively affect patient care and treatment outcomes and increase the quality of care provided to the patient.

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