Journal of Integrative Nursing and Palliative Care (JINPC)

Original Article

Volume 4 | Page 128-139

Enteral Nutrition in Palliative Care: Nurse Knowledge and Quality Perceptions in Clinical Practice

Natalia Cano[1*], Ricardo Fuentes[2], Irene Iglesias[1]

[1]*Faculty of Education Sciences, University of Cádiz, 11519 Puerto Real, Spain*
[2]*Human Anatomy, School of Medicine, University of Cádiz, Plaza Fragela s/n, 11003 Cadiz, Spain.*

Abstract

In palliative care, tailoring nutrition to patients' needs and life expectancy is vital for supporting essential bodily functions and overall well-being. This study examined nurses' understanding of enteral nutrition practices and their perceptions of the quality of nutritional care provided in palliative care settings. A descriptive cross-sectional study was conducted in 25 palliative care units in Izmir, Türkiye, from June to September 2022. The sample included 205 nurses. Data collection tools comprised a Personal Information Form, an Enteral Nutrition Knowledge Questionnaire, and the Nurses' Perceived Nutrition Care Quality Assessment Scale. The study followed the STROBE guidelines. The majority of nurses were female (94.6%) and held bachelor's degrees (78.5%). Median scores were 15 (range 2–27) for enteral nutrition knowledge and 36 (range 9–45) for perceived care quality. Nurses who had received enteral nutrition training scored significantly higher ($p < .001$), while having a palliative care certificate did not influence knowledge levels ($p = .846$). Those without knowledge in nutrition counseling reported lower perceptions of care quality ($p = .001$). Knowledge scores were positively associated with the frequency of tube feeding procedures ($r = .173$, $p = .013$), but not with years of professional experience ($p = .126$) or duration in palliative care ($p = .839$). Nurses in palliative care generally perceive nutritional care quality as satisfactory, but their knowledge of enteral nutrition is moderate. Critical gaps were identified in areas such as fluid management, jejunostomy tube maintenance, and enteral medication administration, underscoring the need for targeted, practical educational programs to enhance nursing competencies in enteral nutrition.

Keywords: Palliative care, Enteral nutrition, Nursing knowledge, Quality of care, Nurse education

Introduction

Advances in medical technology and increasing life expectancy have led to a growing population living with chronic and life-limiting conditions [1-3]. Consequently, healthcare professionals are increasingly providing care for patients requiring palliative support due to serious illnesses [2,3]. Palliative care offers comprehensive support to individuals of all ages experiencing severe health-related suffering, particularly those approaching the end of life [4]. According to the World Health Organization (WHO), palliative care aims to enhance the quality of life for patients and their families confronting life-threatening illnesses. This approach emphasizes the early recognition, assessment, and management of pain and other physical, psychosocial, and spiritual needs to alleviate suffering [2]. The overarching goal is to allow patients to spend their remaining time in comfort and dignity [4,5]. Nutrition plays a fundamental role in maintaining physiological function for patients in palliative care. Yet, symptoms such as nausea, vomiting, oral lesions, diarrhea, and general discomfort can severely compromise nutritional intake, resulting in malnutrition [3].

Corresponding author: Natalia Cano
Address: Faculty of Education Sciences, University of Cádiz, 11519 Puerto Real, Spain
E-mail: ✉ natalia_cano88@hotmail.com
Received: 27 September 2023; **Revised:** 04 December 2023; **Accepted:** 09 December 2023; **Published:** 21 December 2023

How to Cite This Article: Enteral Nutrition in Palliative Care: Nurse Knowledge and Quality Perceptions in Clinical Practice. J Integr Nurs Palliat Care. 2023;4:128-39. https://doi.org/10.51847/8iR6tiWfgJ

Malnutrition can accelerate loss of body mass, reduce immune function, impair organ systems, and negatively influence disease progression, quality of life, hospitalization length, and mortality risk [6,7]. Therefore, palliative care patients should be routinely screened for malnutrition risk, and early nutritional interventions should be initiated as needed [5]. Not all patients, however, are suitable candidates for enteral nutrition; decisions should be guided by nutritional assessments, functional status, and validated tools such as the Modified Glasgow Prognostic Score. Nutritional strategies should balance energy requirements with individual preferences to optimize quality of life [8].

Nurses are central to multidisciplinary palliative care teams, playing a critical role in ensuring adequate nutrition and improving patients' overall well-being [9-11]. Their responsibilities often include inserting and maintaining feeding tubes, calculating caloric needs, implementing and adjusting nutrition plans, and monitoring changes in patient status [9,12,13]. Knowledge gaps, inconsistent practices, and deviations from feeding guidelines can contribute to malnutrition among critically ill and palliative care patients [9,11,14–17].

While artificial nutrition is indicated in some conditions—such as short-term intensive care, chronic neurological or gastrointestinal diseases, and vegetative states—its use may be inappropriate in patients with very limited life expectancy. For those expected to survive only days to weeks, artificial nutrition may offer minimal benefit and could increase burdens. In such cases, interventions should focus on oral supplements, symptom relief, and comfort rather than aggressive enteral or parenteral feeding [18,19].

Enteral nutrition, which delivers nutrients via feeding tubes for patients unable to consume food orally, is commonly used in palliative care [3,20]. Accordingly, nurses in these units must have sufficient knowledge of enteral feeding practices. Although several studies have evaluated nurses' knowledge of enteral nutrition [12,21–24], research exploring nurses' perceptions of nutritional care quality in palliative care remains limited [11,25,26]. In Turkey, where studies on palliative care nutrition are scarce, examining both nurses' knowledge and their perceptions is particularly important.

The objective of this study is to assess the knowledge levels of nurses working in palliative care units regarding enteral nutrition practices and their perceptions of the quality of nutritional care in their settings.

Method

Study design

This research employed a cross-sectional, descriptive, quantitative design.

Setting and sample

The study was conducted from June to September 2022 across 25 palliative care units in public hospitals in İzmir, Turkey. The target population included 237 nurses working in these units, all of whom were invited to participate individually by the researchers. The final sample consisted of 205 nurses who met the inclusion criteria and consented to participate. Eligibility required participants to have at least six months of experience in palliative care and to voluntarily agree to take part. Nurses who submitted incomplete responses were excluded from the study.

Data collection

Researchers provided brief explanations about the study during face-to-face visits and invited eligible nurses to participate. Appointments were arranged according to the nurses' work schedules. During each session, the study objectives and procedures were explained verbally, and participants reviewed and signed informed consent forms. The consent process emphasized confidentiality, voluntary participation, and the exclusive use of collected data for research purposes. Questionnaires were completed in a comfortable setting and typically required 8–10 minutes. The researcher was present throughout to answer questions and offer guidance as needed. A flowchart detailing participant selection and study progression is presented in **Figure 1**.

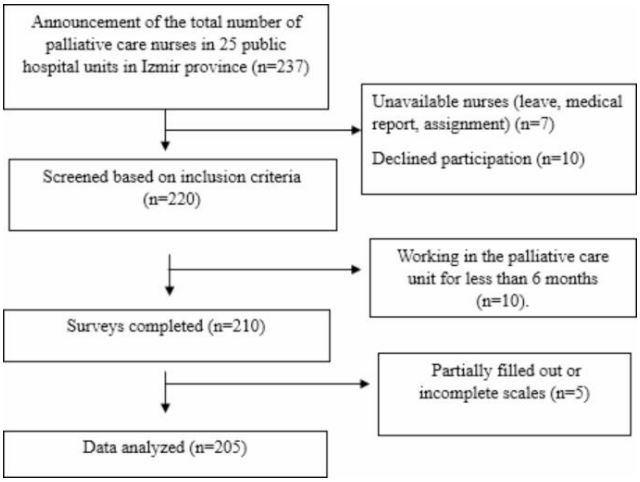

Figure 1. Participant selection flowchart

Data collection instruments

Demographic and professional information was gathered using a Personal Information Form, developed by the researchers from existing literature [3, 7, 11, 13, 21, 24]. The form included 14 items covering variables such as age, gender, educational attainment, work experience, professional certifications, training in enteral nutrition, and other relevant characteristics.

Nurses' understanding of enteral nutrition was assessed with the Enteral Nutrition Practices Knowledge Form [23]. This tool has two sections: the first section comprises 17 multiple-choice items addressing enteral nutrition solutions, assessing tolerance, equipment usage, feeding duration, nasogastric tube placement, and potential complications. The second section contains 10 statements on indications, solution types, complications, and procedures related to enteral feeding. Respondents answer "True," "False," or "I don't know/No opinion," with correct answers scored as 1 and incorrect or uncertain responses scored as 0. Total scores range from 0 to 27, with higher scores reflecting stronger knowledge of enteral nutrition practices.

Perceptions of nutritional care quality were evaluated using the Perceived Nutritional Care Quality Section of the "Scale for Evaluating the Perceived Quality of Nutritional Care" developed by Theilla *et al.* [24] and validated in Turkish by Kısacık *et al.* [27]. This section comprises nine items rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with scores ranging from 9 to 45. Higher scores indicate more favorable perceptions of care quality. Permission to use both instruments was obtained from the original authors.

Data analysis

Analyses were conducted with SPSS 22.0. Descriptive statistics, including means, standard deviations, medians, ranges, and frequencies, summarized participant characteristics and responses. The Shapiro-Wilk test assessed data normality. Non-parametric tests were applied for non-normally distributed variables: the Mann-Whitney U test for comparisons between two groups, and the Kruskal-Wallis test for comparisons among three or more groups. Significant Kruskal-Wallis results were followed by Tamhane's T2 post hoc test. Fisher's Exact test was used when Chi-square assumptions were not met. Spearman's correlation evaluated associations among non-normally distributed variables. Logistic regression models, using dichotomized outcomes based on median splits, were applied to determine factors associated with enteral nutrition knowledge and perceived nutritional care quality. Statistical significance was set at $p < 0.05$.

Results

Of the 237 eligible nurses, 205 participated (response rate 86.5%). Most participants were female (94.6%) and held a bachelor's degree (78.5%), with a median age of 36 years (range 21–51). Among the nurses, 37.6% had never received training in enteral nutrition, while 66.3% did not hold a palliative care certificate. Nutrition counseling availability varied across units: 19.5% did not provide counseling, 29.8% provided counseling to all patients, and 39.5% offered counseling selectively. Additionally, 11.2% reported being unaware of the nutrition counseling practices in their units. Median professional experience was 14 years (range 1–34), and median experience in palliative care units was 3 years (range 1–16).

The median knowledge score on the Enteral Nutrition Practices Knowledge Form was 15 (range 2–27), and the median score for perceived nutritional care quality was 36 (range 9–45). Analysis of individual knowledge items revealed particularly low correct response rates (<25%) for topics related to fluid requirements during enteral feeding, jejunostomy tube maintenance, enteral medication administration, and appropriate tube selection for liquid feeding solutions.

Table 1. Palliative care nurses sociodemographic and institutional characteristics ($n = 205$)

Characteristic	n	%
Gender		
Female	194	94.6
Educational Level		
Health Vocational High School	8	3.9
Associate Degree	15	7.3
Bachelor's Degree	161	78.5
Master's Degree	21	10.2
Palliative Care Certification		
Yes	69	33.6
Received Enteral Nutrition Training		
Yes	128	62.4
Provides Nutritional Counseling		
– To All Patients	61	29.8
– To Some Patients	81	39.5
– No	40	19.5
– No Knowledge	23	11.2
Most Frequently Used Nutritional Support		
Oral Nutritional Supplements (ONS)	37	18.0
Tube Feeding		
– PEG	71	34.7
– Nasogastric (NG)	61	29.8
Parenteral Nutrition	36	17.5

ONS: Oral nutritional supplement, NG: Nasogastric tube, PEG: Percutaneous endoscopic gastrostomy

However, knowledge was notably low regarding the use and maintenance of feeding sets and bags, nursing measures to prevent gastrointestinal complications during enteral nutrition with solutions, proper storage of enteral products, care of nasogastric (NG) and percutaneous endoscopic gastrostomy (PEG) tubes, and appropriate infusion rates for nasojejunal (NJ) feeding.

Table 2. Knowledge levels regarding enteral nutrition practices ($n = 205$)

Item	Correct Responses	%
Section 1: Core Practices		
1. Preferred solution types for enteral feeding	127	61.9
2. Accurate statement about continuous enteral nutrition	17	8.2
3. Maximum hang time for enteral solutions in feeding sets	121	59.0
4. Sign of delayed gastric emptying during enteral feeding	69	33.6
5. Frequency of checking gastric residual volume in intermittent feeding	91	44.3
6. Replacement interval for enteral nutrition bags and tubing	181	88.2
7. Storage conditions and duration for opened enteral products	159	77.5
8. Maximum volume per bolus in intermittent feeding	54	26.3
9. Maximum duration per meal in intermittent enteral feeding	77	37.5
10. Head elevation angle to prevent aspiration during/after feeding	131	63.9
11. Incorrect nursing action to avoid abdominal bloating and vomiting	166	80.9
12. Incorrect practice in medication administration with enteral nutrition	24	11.7
13. Key nursing actions to prevent nasogastric tube blockages	150	73.1
14. Risk of administering cold enteral feeding solution	175	85.3
15. Incorrect intervention to prevent nausea/vomiting in enteral patients	179	87.3
16. Incorrect method to prevent bacterial growth in feeding systems	174	84.8
17. Method not used to verify nasogastric tube placement	168	81.9
Section 2: Advanced Concepts & Myths		
18. Parenteral nutrition should be first choice when oral intake is impossible	94	45.8
19. Enteral formulas fully meet all fluid needs	6	2.9
20. Water should be given via jejunostomy tube to keep it patent	20	9.7
21. Enteral feeding is suitable in intestinal obstruction, ileus, severe diarrhea, etc.	135	65.8
22. Nasojejunal feeding may cause dumping syndrome due to rapid intestinal delivery	154	75.1
23. Polyurethane or silicone tubes are preferred for enteral nutrition	165	80.4
24. Hypertonic enteral solutions can trigger diarrhea	92	44.8
25. Fast infusion of hypertonic solutions may lead to dehydration	102	49.7
26. Polyvinyl tubes are ideal when complication risk is low	21	10.2
27. PEG stoma site should be cleaned with 0.9% NaCl or antiseptic	161	78.5

Correct responses regarding feeding practices and nursing measures to prevent NG tube obstruction were observed at rates exceeding 75% **(Table 2)**. When overall performance on the Enteral Nutrition Practices Knowledge Form was analyzed, 0.98% of participants (n = 2) answered less than 25% of the questions correctly, 23.41% (n = 48) answered 25–50% correctly, 68.29% (n = 140) answered 50–75% correctly, and 7.32% (n = 15) answered more than 75% of the questions correctly **(Figure 2)**.

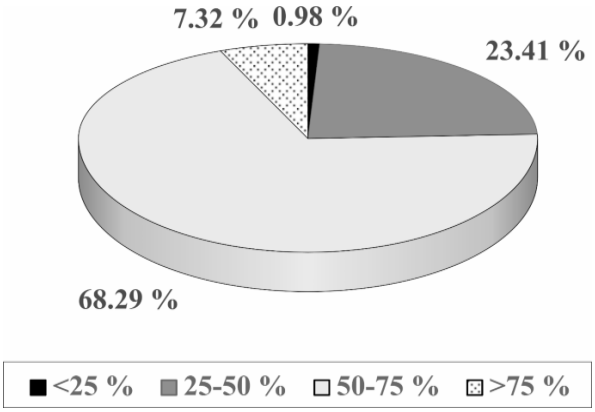

Figure 2. Distribution of palliative care nurses according to their correct answer rates to the enteral nutrition practices knowledge form

No statistically significant differences were observed in correct answer rates on the Enteral Nutrition Practices Knowledge Form based on the possession of a palliative care certificate. Nurses who had received enteral nutrition training, however, scored significantly higher than those without such training ($p < .01$) **(Table 3)**. Despite the higher knowledge scores among trained nurses, no significant differences were found in Perceived Nutritional Care Quality Scores between trained and untrained groups ($p = .190$). Similarly, the presence of a palliative care certificate did not significantly affect total knowledge scores on the Enteral Nutrition Practices Knowledge Form ($p = .846$) or Perceived Nutritional Care Quality Scores ($p = .496$).

Table 3. Distribution of correct answer rates based on palliative care certificate and enteral nutrition training status ($n = 205$)

The correct answer rates	**Palliative care certification**				***p***
	Yes		**No**		
	n	**%**	***n***	**%**	
<%25.0	2	2.9	0	0	0.129
%25.0–50.0	19	27.5	29	21.3	
%50.0–75.0	42	60.8	98	72.0	
>%75.0	6	8.7	9	6.6	
Total	69	100.0	136	100.0	
	Enteral Nutrition Training				
	Yes		No		*p*
	n	%	n	%	
<%25.0	2	1.5	0	0	0.008*
%25.0–50.0	20	15.6	28	36.3	
%50.0–75.0	93	72.6	47	61.0	
>%75.0	13	10.1	2	2.6	
Total	128	100.0	77	100.0	

Fisher's Exact testi, * $p < .05$

The presence of a nutrition consultant in the unit did not significantly affect nurses' total scores on the Enteral Nutrition Practices Knowledge Form ($p = .543$). However, it was associated with a significantly higher Perceived Nutritional Care Quality Score ($p < .05$). Post hoc analysis using the Tamhane-2 test revealed that units with a nutrition consultant had higher perceived nutritional care quality compared to units without a consultant ($p = .01$), indicating a statistically significant difference **(Table 4)**.

Correlations were examined between the total Enteral Nutrition Practices Knowledge Score and several factors, including Perceived Nutritional Care Quality, monthly frequency of tube feeding, oral nutrition supplement (ONS) administration, parenteral nutrition administration, years of professional experience, and years of palliative care experience. A positive correlation was observed between the total knowledge score and the monthly frequency of tube feeding.

Table 4. The impact of a palliative care certificate, enteral nutrition training, and nutrition counseling on the total knowledge score related to enteral nutrition practices and the perception score of nutritional care quality ($n = 205$)

Variables		Enteral nutrition practices knowledge form score		Perceived nutritional care quality score	
		Median score (Min-Max)	*p*	Median score (Min-Max)	*p*
Palliative Care Certification	Yes	15 (2–22)	0.846	36 (9–45)	0.496
	No	15 (7–27)		36 (10–45)	
Enteral Nutrition Training	Yes	16 (2–27)	< .001[a]*	36 (9–45)	0.190
	No	14 (7–21)		36 (13–45)	
Nutritional Counseling	Yes	15(8–27)	0.543	37(9–45)	.001[b]*
	No	15(2–22)		35(19–43)	
	I don't know	15(7–20)		32(13–44)	

[a]Mann-Whitney U Test, [b]Kruskal Wallis Test, * $p < .05$

Table 5. The correlation between the perception score of nutritional care quality and the total knowledge score related to enteral nutrition practices ($n = 205$)

		Perceived nutritional care quality score	Total score for the enteral nutrition practices knowledge form
Monthly Tube Feeding Frequency	r[c]	0.048	0.173
	p	0.497	0.013*
Monthly ONS Frequency	r	− 0.036	0.011
	p	0.613	0.876
Monthly Parenteral Nutrition Frequency	r	− 0.105	0.038
	p	0.137	0.588
Years of Palliative Care Experience	r	0.14	− 0.10
	p	0.839	0.888
Years of Professional Experience	r	0.107	− 0.56
	p	0.126	0.429
Perceived Nutritional Care Quality Score	r	1	0.089
	p	-	0.202
Total Score for Enteral Nutrition Practices Knowledge Form	r	0.089	1
	p	0.202	-

ONS: Oral nutritional supplement, [c]Spearman Korelasyon Testi, * $p < .05$

A positive correlation was identified between the total Enteral Nutrition Practices Knowledge Score and the monthly frequency of tube feeding ($r = .173$, $p = .013$). No statistically significant correlations were found with the other variables **(Table 5)**.

Logistic regression analysis examining factors associated with Enteral Nutrition Practices Knowledge and Perceived Nutritional Care Quality Scores is presented in **Table 6**. Nurses who had received enteral nutrition training demonstrated significantly higher knowledge scores ($B = 3.148$, $p < .001$). In contrast, possessing a palliative care certificate, monthly parenteral nutrition frequency, duration of palliative care experience, and total years of professional experience did not significantly influence knowledge scores. Additionally, a higher monthly tube feeding frequency was positively associated with knowledge scores ($B = 1.036$, $p = .037$). The model accounted for 15% of the variance in knowledge scores (Nagelkerke $R^2 = 0.150$).

Table 6. Logistic regression models showing variables associated with enteral nutrition practices knowledge and nutritional care quality perception scores ($n = 205$)

	Enteral nutrition practices knowledge score			Nutritional care quality perception score		
	B	%95 confidence intervals	*p*	B	%95 confidence intervals	*p*
Palliative Care Certification *(Ref.=No)*	0.688	0.354–1.339	0.271	0.584	0.301–1.135	0.112
Enteral Nutrition Training *(Ref.=No)*	3.148	1.680–5.901	< 0.001*	1.670	0.896–3.112	0.106
Montly Tube Feeding Frequency	1.036	1.002–1.072	0.037*	1.037	1.006–1.069	0.019*
Monthly Parenteral Nutrition Frequency	0.994	0.974–1.013	0.521	0.963	0.939–0.987	0.003*

Years of Palliative Care Experience	1.034	0.954–1.121	0.415	1.084	0.985–1.193	0.980
Years of Professional Experience	0.982	0.947–1.019	0.334	1.018	0.982–1.056	0.331
Nagelkerke R^2		0.150			0.129	

Concerning the perception of nutritional care quality, nurses who managed tube feeding more frequently reported higher perception scores (B = 1.037, p = .019). Conversely, higher frequency of parenteral nutrition was associated with lower perception scores (B = 0.963, p = .003). Other factors—including holding a palliative care certificate, having received enteral nutrition training, and years of professional or palliative care experience—did not significantly influence perceived nutritional care quality. The regression model accounted for 12.9% of the variance in perception scores (Nagelkerke R^2 = 0.129).

Discussion

The study findings suggest that nurses' understanding of enteral nutrition practices is strongly affected by participation in formal enteral nutrition training and by the frequency of tube feeding in their clinical units. In contrast, having a palliative care certificate showed no significant impact, highlighting the need to integrate more targeted enteral nutrition content into certification programs. The positive correlation between tube feeding frequency and both knowledge and perceived care quality indicates that practical, hands-on experience is critical in building nursing competence. In comparison, the negative effect of frequent parenteral nutrition on perceived care quality may reflect nurses' perceptions of its complexity and challenges, whereas enteral nutrition is viewed as a more straightforward intervention with clear benefits for patient care.

The demographic context in Turkey is relevant to these results. Historically, nursing was legally restricted to women between 1954 and 2007, creating a persistent perception of nursing as a female-dominated profession. Although men are now permitted to enter the field, the profession remains largely female, as reflected in this study's sample (94.6% female), consistent with previous Turkish studies [23, 27].

The growth of palliative care services in Turkey has also influenced the study context. The Pallia Turk project, part of the National Cancer Control Program (2009–2015), expanded palliative care centers starting in 2012–2013 [28]. Despite this expansion, nurse employment in these units is still limited, resulting in relatively short tenures; in this study, median experience in palliative care units was three years (range 1–16). This indicates that palliative care nursing is still developing in Turkey, with more experienced nurses remaining in these roles for longer periods.

Palliative care prioritizes symptom relief and quality of life for terminally ill patients, addressing pain, discomfort, and emotional distress [29]. Malnutrition is a frequent complication that worsens disease progression and increases the need for nutritional interventions [30]. Enteral nutrition plays a vital role in mitigating malnutrition and supporting patient well-being, emphasizing the importance of nurses having sufficient knowledge and skills in this area [29–31]. Studies in Turkey report malnutrition risks exceeding 90% in palliative care units, with enteral nutrition provided to 20–60% of patients [20, 32, 33].

Evidence indicates that early nutritional interventions in palliative care can be beneficial. Current ASCO guidelines suggest that nutritional support mainly provides a supportive role, particularly in patients undergoing active cancer therapy, improving treatment adherence and clinical outcomes [34]. For patients with incurable conditions, the benefits are more limited, mainly addressing hunger and malnutrition, with temporary improvements in quality of life [31]. Decisions regarding artificial nutrition in end-of-life care require careful consideration of ethical, religious, and clinical factors, with a focus on patient-centered benefits and minimizing unnecessary interventions [35, 36].

Training in enteral nutrition equips nurses to evaluate patients' nutritional requirements, administer feeds safely, monitor for complications, and educate patients and families. In this study, 62.4% of participants had received enteral nutrition training. Previous research in Turkey shows a wide range (7.8%–62%) of nurses trained in enteral nutrition, reflecting institutional, patient population, and temporal differences [23, 27, 37, 38]. Education programs have been shown to improve nurses' knowledge and performance in enteral nutrition [22, 39–41]. Similarly, nurses in this study with formal training scored higher on the knowledge assessment ($p < .01$). However, even among trained nurses, only 10.16% answered more than 75% of the questions correctly, while 17.18% answered fewer than half correctly. These results suggest that targeted, continuous educational efforts are necessary to enhance nurses' enteral nutrition knowledge, optimize patient care, and ensure safe and effective feeding practices.

The findings of this study indicate that nurses' knowledge of enteral nutrition in palliative care settings is generally moderate, consistent with prior research in Turkey [23, 27]. Earlier studies have highlighted gaps in areas such as storage of enteral products, evaluating tolerance to feeding, interpreting gastric residual volumes, and administering medications through feeding tubes [23]. In contrast, nurses demonstrated stronger knowledge in

managing skin around stomas, proper feeding positions, and interventions to prevent nausea and vomiting [27, 37]. Similarly, in the current study, the lowest correct response rates were observed for questions concerning daily fluid requirements during tube feeding (2.9%), maintaining jejunostomy tube patency (9.8%), and administering medications via feeding tubes (11.71%).

For patients receiving tube feeding, fluid needs are typically calculated at 1 mL per kcal, unless fluid restriction applies. Because most standard enteral formulas are around 75% water, additional fluids—roughly 25% of the total volume—are usually required, supplemented by water used for flushing the tube [23, 42, 43]. A large proportion of nurses (97%) did not recognize that enteral formulas alone do not meet total fluid needs, suggesting limited understanding of fluid management in tube-fed patients.

Proper tube maintenance is essential to prevent blockages. Continuous feeds require flushing every 4–6 hours, intermittent feeds before and after each session, and unused tubes should be flushed every 8 hours. Additional flushing before and after drug administration helps avoid interactions that can obstruct the tube [44]. While 73% of nurses correctly answered questions on nasogastric tube care, fewer than 10% knew how to maintain jejunostomy tube patency, likely because nasogastric and PEG tubes are more commonly used in practice.

Administering medications through feeding tubes is another critical area. Studies show that nurses often lack knowledge regarding safe drug administration, drug–formula interactions, and appropriate flushing techniques [45–47]. Training programs have been effective in improving nurses' knowledge and practice in this area. For example, in-service education in Iran improved ICU nurses' practices and pharmacist collaboration [21], and training in Jordan enhanced nurses' skills in tube cleaning, drug preparation, and dosage recognition [48]. A similar Turkish program targeting nurses in neurology, palliative care, and ICU units improved their enteral medication administration knowledge and attitudes [49]. In this study, only 11.7% of nurses answered medication administration questions correctly, emphasizing the need for focused education in palliative care units to strengthen nurse competence and patient safety.

The Turkish Ministry of Health's Palliative Care Nursing Certification Program, established in 2015, offers 35 hours of theory and 80 hours of practical training over five years [50]. While theoretical content includes enteral and parenteral nutrition, practical sessions give limited coverage of these topics. Only one-third of participants had completed this certification, and among them, just 7% scored above 75% on the knowledge assessment, suggesting that practical training in enteral nutrition should be enhanced to improve knowledge and skills.

Nutrition Support Teams (NSTs) in hospitals have been shown to improve individualized patient care, reduce complications, identify malnutrition early, and decrease healthcare costs [51–54]. Globally, NSTs are becoming more common, yet nearly half of ICU nurses in Turkey report that their hospitals lack such teams [55]. This highlights the need for broader implementation of NSTs in hospitals to support nurses in delivering high-quality nutritional care.

In this study, nearly one-third of nurses (29.8%) reported that nutrition counseling was provided for all patients requiring nutritional support, while 39.5% stated that such services were available only for some patients. Interestingly, 11.22% of participants were unsure whether nutrition consultation was offered in their units, highlighting a need for clearer communication and training regarding unit-specific nutrition practices. These findings suggest that palliative care units should implement structured education and orientation programs that clearly outline nutrition support protocols to ensure all staff are informed and practices are consistent.

The results also showed that formal training in enteral nutrition significantly improved nurses' knowledge, whereas holding a palliative care certificate did not have a measurable effect. This indicates that certification programs may need to include more practical content on enteral nutrition to be more effective. Additionally, nurses who frequently administered tube feedings demonstrated higher knowledge and perceived quality of care, emphasizing the role of hands-on clinical experience in developing competency. In contrast, higher rates of parenteral nutrition were associated with lower perceived quality, suggesting that nurses may view this form of nutrition as more technically challenging or less straightforward. The relatively less invasive nature of enteral nutrition and its direct impact on patient care likely explain why it is perceived more positively. These results underscore the importance of providing comprehensive, targeted training in both enteral and parenteral nutrition to improve nurse competence and patient outcomes.

Previous studies support these findings. For example, Kurt and Ceyhan found that training significantly increased ICU nurses' knowledge of enteral nutrition [56]. Similarly, Carrasco *et al.* demonstrated that simulation-based educational interventions enhanced nurses' understanding of enteral feeding practices [57]. Yu *et al.* reported that implementing a structured enteral nutrition quality control system improved both knowledge and patient safety [58]. Together, these studies highlight the value of ongoing education and structured support in optimizing nurses' skills and improving care.

Strengths and Limitations

This study's strengths include the use of validated tools to evaluate both nurses' knowledge and perceptions of nutrition care quality. The analysis examined relationships between variables using multiple statistical methods

and incorporated contextual factors, such as gender imbalance in the nursing workforce and the evolving palliative care landscape in Turkey, providing richer insight into the results.
However, the study also has limitations. Data were collected from a single province, which may limit generalizability to other regions. The sample size of 205 nurses provides valuable local insight but may not fully reflect the diversity of palliative care nursing in Turkey. Additionally, self-reported data may not always accurately capture actual practices. Future research should use larger, more representative samples and incorporate objective assessments to validate the findings.

Conclusion

Nurses play a critical role in ensuring high-quality nutritional care in palliative settings. This study found that nurses demonstrated moderate knowledge of enteral nutrition, with gaps in critical areas such as calculating fluid requirements and maintaining tube patency. Formal training in enteral nutrition and frequent exposure to tube feeding were associated with higher knowledge scores, while the presence of nutrition consultants improved perceived care quality. Conversely, frequent use of parenteral nutrition was linked to lower perceived quality, highlighting the need for targeted interventions in this area.
To enhance nutrition care in palliative units, it is important to implement regular training programs, establish nutrition support teams, and standardize best practices for enteral nutrition. Education should focus on essential aspects such as fluid management, tube maintenance, and medication administration, while interdisciplinary collaboration through nutrition counseling teams can help optimize patient outcomes.

Abbreviations

WHO: World Health Organization
NST: Nutrition Support Team
ONS: Oral Nutritional Supplement
NG: Nasogastric Tube
NJ: Nasojejunal
PEG: Percutaneous Endoscopic Gastrostomy

Acknowledgments: None.

Conflict of interest: None.

Financial support: None.

Ethics statement: None.

References

1. World Health Organization. (2021). Body mass index – BMI. https://www.euro. who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/bo dy-mass-index-bmi. (Date of access: 23.01.2023).
2. Cimete G. End-of-Life Care: a holistic Approach in terminally ill patients. Istanbul: Nobel Medical Publishing; 2002. (in Turkish).
3. Sánchez-Sánchez E, Ruano-Álvarez MA, Díaz-Jiménez J, Díaz AJ, Ordonez FJ. Enteral nutrition by nasogastric tube in adult patients under palliative care: a systematic review. Nutrients. 2021a;13(5):1562. https://doi.org/10.3390/nu13051562
4. Radbruch LDL. Redefining palliative care—A new consensus-based defini- tion. J Pain Symptom Manage. 2020;60(4):754–64. https://doi.org/10.1016/j.jpainsymman.2020.04.027
5. Aslan Y. Overview of the palliative care models in Turkey and the world. Anatol Curr Med J. 2020;2(1):19–27. https://doi.org/10.38053/agtd.632674
6. Çınar H, Kaya Y, Özyurt N, Çakır L, Ongun A. Assessment of nutritional status in palliative care patients. Journal of Clinical Medicine Family Medicine. 2016; 8(3):15–18. (in Turkish) https://dergipark.org.tr/en/pub/ktah/issue/45394/487558
7. Seol EM, Koh CK, Kim EK. Critical care nurses' perceptions of parenteral and enteral nutrition at the end-of-life in South Korea. J Palliat Care. 2020;35(2):110–5. https://doi.org/10.1177/08258597198638
8. de Oliveira LC, Rosa KSDC, Gaspar T, Paiva BSR, Paiva CE, Peres WAF. Clinical usefulness of the patient-generated subjective Global Assessment and modi- fied Glasgow Prognostic score in decision making concerning the indication of enteral nutritional therapy in patients with incurable cancer receiving palliative care. Nutrition. 2023;112:112057. https://doi.org/10.1016/j.nut.2023.112057

9. Albanesi B, Piredda M, Marchetti A, Mastroianni C, Magnani C, Artico M, et al. Oncology and palliative care nurses' knowledge and attitudes toward artificial nutrition and hydration for patients at end of life in Italy: a cross-sectional survey. Cancer Nurs. 2021;44(2):E99–107. https://doi.org/10.1097/ncc.0000000000000803
10. Kasar KS, Yıldırım Y. Palliative care in advanced dementia patients. Turkiye Klinikleri J Nurs Sci. 2017;9(2):164–70. https://doi.org/10.5336/nurses.2016-52492
11. Sánchez-Sánchez E, Ramírez-Vargas G, Peinado-Canas A, Martín-Estrada F, Díaz-Jimenez J, Ordonez FJ. Nurse and nursing students' opinions and per- ceptions of Enteral Nutrition by Nasogastric Tube in Palliative Care. Nutrients. 2021b;13(2):402. https://doi.org/10.3390/nu13020402
12. Hadera T, Worku T, Tuli W. Nurses knowledge, practice, and associated factors with enteral nutrition in adult intensive care units of public hospitals. Ethiop J Health Sci. 2022;32(2):423–32. https://doi.org/10.4314/ejhs.v32i2.23
13. Morphet J, Clarke AB, Bloomer MJ. Intensive care nurses' knowledge of enteral nutrition: a descriptive questionnaire. Intensive Crit Care Nurs. 2016;37:68–74. https://doi.org/10.1016/j.iccn.2016.07.001
14. Behara AS, Peterson SJ, Chen Y, Butsch J, Lateef O, Komanduri S. Nutri- tion support in the critically ill: a physician survey. J Parenter Enter Nutr. 2008;32(2):113–9. https://doi.org/10.1177/0148607108314763
15. Cahill NE, Murch L, Cook D, Heyland DK, Canadian Critical Care Trials Group. Barriers to feeding critically ill patients: a multicenter survey of critical care nurses. J Crit Care. 2012;276:727–34. https://doi.org/10.1016/j.jcrc.2012.07.006
16. Persenius MW, Wilde-Larsson B, Hall-Lord ML. To have and to hold nutritional control: balancing between individual and routine care: a grounded theory study. Intensive Crit Care Nurs. 2009;25(3):155–62. https://doi.org/10.1016/j.iccn.2009.03.002
17. Fischer AK, Rampertab SD, Mullin GE. Nutritional support: Adults, enteral. In *Encyclopedia of human nutrition* (pp. 258–263). Third Edition. Elsevier Inc. 2013. https://doi.org/10.1016/B978-0-12-375083-9.00203-8
18. Druml C, Ballmer PE, Druml W, Oehmichen F, Shenkin A, Singer P, Soeters P, Weimann A, Bischoff SC. ESPEN guideline on ethical aspects of artificial nutrition and hydration. Clin Nutr. 2016;35(3):545-56. https://doi.org/10.1016/j.clnu.2016.02.006
19. Crawford GB, Dzierżanowski T, Hauser K, Larkin P, Luque-Blanco AI, Murphy I, et al. Care of the adult cancer patient at the end of life: ESMO Clinical Practice Guidelines. ESMO Open. 2021;6(4):100225. https://doi.org/10.1016/j.esmoop.2021.100225
20. Yuruyen M, Polat O, Denizli BO, Cirak M, Polat H. Survival and factors affecting the survival of older adult patients in palliative care. Ir J Med Sci. 2022;192(4):1561–7. https://doi.org/10.1007/s11845-022-03186-5
21. Hossaini Alhashemi S, Ghorbani R, Vazin A. Improving knowledge, attitudes, and practice of nurses in medication administration through enteral feeding tubes by clinical pharmacists: a case–control study. Adv Med educ Pract. 2019;10:493–500. https://doi.org/10.2147/AMEP.S203680
22. Jeesh YAA, Khalid EF-EM, Elbashier IMA. The effect of an educational program on nurses' practices regarding the implementation of patient care and safety measures during nasogastric tube feeding in the critical care units in Syria. Eur Sci J. 2021;17(29):59. https://doi.org/10.19044/esj.2021.v17n29p59
23. Koçhan E, Akın S. Evaluation of knowledge levels of nurses about enteral and parenteral nutrition practices. JAREN. 2018;4(1):1–14. https://doi.org/10.5222/jaren.2018.001
24. Miriam Theilla RN, Cohen J, Singer P, Liebman C, Kagan I. The assessment, knowledge and perceived quality of nutrition care amongst nurses. J Nutri Med Diet Care. 2016;2(1):1–5. https://clinmedjournals.org/articles/jnmdc/jour nal-of-nutritional-medicine-and-diet-care-jnmdc-2-012.pdf
25. Berggren E, Ödlund Olin A, Orrevall Y, Strang P, Johansson SE, Törnkvist L. Early palliative home care: evaluation of an interprofessional educational interven- tion for district nurses and general practitioners about nutritional care. SAGE Open Med. 2017;18:5:2050312117726465. https://doi.org/10.1177/2050312117726465
26. Ke LS, Chiu TY, Lo SS, Hu WY. Knowledge, attitudes, and behavioral intentions of nurses toward providing artificial nutrition and hydration for terminal cancer patients in Taiwan. Cancer Nurs. 2008;31(1):67–76. https://doi.org/10.1 097/01.NCC.0000305672.98587.63
27. Kısacık GÖ, Çoşğun T, Taştekin A. The psychometric properties of the turkish version of the assessment questionnaire of the importance of nutritional assessment, the level of knowledge and perceived quality of nutritional care for nurses. Journal of Ege University Nursing Faculty. 2019; 35(3):123–135. (in Turkish) https://dergipark.org.tr/tr/pub/egehemsire/issue/50903/582134
28. Şahan Uslu F, Terzioğlu F. Palliative care education and organization in the world and Turkey. Cumhuriyet Nursing Journal, 2015;4(2):81-90. (in Turkish) https://dergipark.org.tr/en/download/article-file/513799
29. Cotogni P, Stragliotto S, Ossola M, Collo A, Riso S. Intersociety Italian Working Group for Nutritional Support in Cancer. The role of nutritional support for cancer patients in palliative care. Nutrients. 2021;13(2):306. https://doi.org/10. 3390/nu13020306

30. de Oliveira LC, Abreu GT, Lima LC, Aredes MA, Wiegert EVM. Quality of life and its relation with nutritional status in patients with incurable cancer in pallia- tive care. Support Care Cancer. 2020;28:4971–8. https://doi.org/10.1007/s005 20-020-05339-7
31. Bozzetti F. Is there a place for nutrition in palliative care? Support. Care Can- cer. 2020;28:4069–75. https://doi.org/10.1007/s00520-020-05505-x
32. Cadirci D, Ayazöz Y, Koçakoğlu Ş. Evaluation of patients followed in a palliative care unit in Turkey. Turk Geriatri Derg. 2021;24(2):227. https://doi.org/10.3108 6/tjgeri.2021.219
33. Zengin H, Taşçi I. Factors influencing the length of stay in the palliative care unit in patients dischargedhome: results from a tertiary hospital in Turkey. Turk J Med Sci. 2021;21(5):2420–6. https://doi.org/10.3906/sag-2101-307
34. Ferrell BR, Temel JS, Temin S, Alesi ER, Balboni TA, Basch EM, et al. Integration of Palliative Care Into Standard Oncology Care: American Society of Clinical Oncology Clinical Practice Guideline Update. J Clin Oncol. 2017 Jan;35(1):96-112. https://doi.org/10.1200/JCO.201 6.70.1474
35. Itzhaki MH, Noy OH, Kagan I, Papier I, Cherlow Y, Zaharoni H et al. Ethical considerations of medical nutritional therapy at end of life: the Israel perspective.Clin Nutr Open Sci. 2023; 50:16–26. https://doi.org/10.1016/j.nut os.2023.02.002
36. Orrevall Y. Nutritional support at the end of life. Nutrition. 2017;31(4):615–6. https://doi.org/10.1016/j.nut.2014.12.004
37. Özbaş N, Baykara ZG. The determination of the level of knowledge of nurses on enteral tube feeding. J Hum Sci. 2018;15(1):359–67. https://doi.org/10.146 87/jhs.v15i1.3907
38. Kalender N, Nuran Tosun RN. Nursing studies about central venous catheter care: A literature review and recommendations for clinical practice. Int. J. Car- ing Sci. 2015;8(2): 461. https://www.internationaljournalofcaringsciences.org/ docs/26_kalender-1.pdf
39. Ahmed AT, Hassan HB. Interventional nursing program for nurses practices about enteral feeding guidelines in critical units. Indian J Forensic Med Toxicol. 2021;15(2):4574–80. https://doi.org/10.37506/ijfmt.v15i2.15107
40. Kim H, Chang SJ. Implementing an educational program to improve critical care nurses' enteral nutritional support. Aust Crit Care. 2019;32(3):218–22. https://doi.org/10.1016/j.aucc.2018.04.001
41. Bedier NA, EL-Ata ABA, Shehab MS. Effect of educational program on nurses' practice related to care of patients undergoing nasogastric tube feeding. Int.J. Caring Sci. 2016;9(2):432. https://www.internationaljournalofcaringsciences. org/docs/7_Saehab_ABSTRACT_9_2.pdf
42. Akyazı D, Tan E. Nursing practices in nutrition. Edt: Şenoğlu, N. Nutrition Guide, 1st Edition, İzmir: Tepecik Hospital Publications; 2016. (in Turkish) https://www.researchgate.net/profile/Ismail-Yilmaz-8/publication/313204889_NUTISYON_KILAVUZU/links/5892627792851cda256a31f6/NUeTRISYON-KILAVUZU.pdf
43. Arsava EM, Aydoğdu İ, Güngör L, Işıkay CT, Yaka E. Nutritional approach and treatment in patients with stroke, an expert opinion for Turkey. Turkish J Neurol. 2018;24(3):226. https://doi.org/10.4274/tnd.92603
44. Reddick CA, Greaves JR, Flaherty JE, Callihan LE, Larimer CH, Allen SA. Choos- ing wisely: enteral feeding tube selection, placement, and considerations before and beyond the procedure room. Nutr Clin Pract. 2023;38(2):216–39. https://doi.org/10.1002/ncp.10959
45. Gimenes FRE, Pareira RA, Horak ACP, Oliveira CC, Reis AMM, da Silva PICDS et al. Medication incidents related to feeding tube: A cross-sectional study. Afr J Pharm Pharmacol. 2017;11(27):305–313. https://doi.org/10.5897/AJPP20 17.4799
46. Tillott H, Barrett D, Ruan J, Li V, Merrick S, Steed H, Morrissey H, Anthony Ball P. Survey of nurses' knowledge and practice regarding medication administration using enteral tubes. J Clin Nurs. 2020;29(23–24):4614–22. https://doi.org/10.1111/jocn.15498
47. Çelik S, Demiray Y, Acar T, Köymen H, Coşkun Y, Doğru Ö, et al. Evaluation of drug administrations via enteral tube of intensive care nurses. J Contemp Med. 2014;4(1):18–25. (in Turkish) https://dergipark.org.tr/en/pub/g opctd/issue/7310/95647
48. Hdaib NA, Albsoul-Younes A, Wazaify M. Oral medications administration through enteral feeding tube: clinical pharmacist-led educational interven- tion to improve knowledge of intensive care units' nurses at Jordan University Hospital. Saudi Pharm J. 2021;29(2):134–42. https://doi.org/10.1016/j.jsps.202 0.12.015
49. Çevik Ş. The effect of the training about the drug administration through enteral route by crushing and changing the shape of the drug on the knowl- edge and the attitudes of pediatric nurses, Nursing Program, Master Thesis, Gaziantep, 2021, Hasan Kalyoncu University (in Turkish). https://openaccess.hku.edu.tr/xmlui/bitstream/handle/20.500.11782/2394/Ezilerek%20ve%20%C5%9Fekli%20de%C4%9Fi%C5%9Ftirilerek%20enteral%20yol%20ile%20verilen%20ila%C3%A7%20uygulamalar%C4%B1%20konusundaki%20e%C4%9Fitimi%20pediatri%20hem%C5%9Firelerinin%20bilgi%20ve%20tutumlar%C4%B1na%20etkisi.pdf?sequence=1&isAllowed=y

50. Turkish Health Ministry. Palliative care nursing certified training pro- gram standards; 2015. Available at: https://dosyamerkez.saglik.gov.tr/Eklenti/4074/0/palyatif-ba k-hems-sep-standartlaripdf.pdf (Date of access: 02.01.2023) (in Turkish).
51. Shin BC, Chun IA, Ryu SY, Oh JE, Choi PK, Kang HG. Association between indi- cation for therapy by nutrition support team and nutritional status. Medicine. 2018;97(52):e13932. https://doi.org/10.1097%2FMD.0000000000013932
52. Demirel U, Aygün C. Importance of nutritional status of hospitalized patients and estimation of calory requirement. Fırat Medical Journal. 2012;17(2):63–70. (in Turkish) https://www.firattipdergisi.com/text.php3?id=735
53. Lin YM, Wang M, Sun NX, Liu YY, Yin TF, Chen C. Screening and application of nutritional support in elderly hospitalized patients of a tertiary care hospital in China. PLoS One. 2019;14(3): e0213076. https://pdfs.semanticscholar.org/9 cc1/46ede9f708aec73d9fa42d88680b90594c74.pdf5
54. Reber E, Strahm R, Bally L, Schuetz P, Stanga Z. Efficacy and efficiency of nutritional support teams. J Clin Med. 2019;8(9):1281. https://doi.org/10.3390/jcm8091281
55. Kurt D, Paslı Gürdoğan E. Nutritional awareness in intensive care nurses. Istanbul Gelisim Univ J Health Sci. 2023;19240–54. https://doi.org/10.38079/i gusabder.1199757
56. Kurt H, Ceyhan Ö. The effect of enteral nutrition education given to intensive care nurses on their level of knowledge. J Health Sci. 2023;32(1):34–42. https://doi.org/10.34108/eujhs.1109142
57. Carrasco V, De Freitas MIP, São-João TM, Eduardo AHA, Oliveira-Kumakura ARDS. Effect of an educational intervention on nursing knowledge about enteral nutrition therapy: a quasi-experimental study. J Nurs Educ Pract. 2023;13(5). https://doi.org/10.5430/jnep.v13n5p1
58. Yu H, Jiang Z, Li Y, Peng F, Li W, Qu J, et al. Construction and clinical practice of an enteral nutrition nursing quality control system for critically ill patients. Am J Transl Res. 2022;14(12):9031-9039. PMID: 36628229; PMCID: PMC9827343.