Nursing care and records in enteral nutrition by nasogastric tube: Turkey sample

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Abstract

Objectives: The aim of this study was to determine the concordance of nursing care and records in enteral nutrition by nasogastric or nasoenteric tubes with expert opinions and recommendations.

Methods: Following admission to the emergency department of a university hospital between June 2010 and June 2011, the records of 102 adult patients fed by nasogastric or nasoenteric tube inpatient in intensive care unit (n=48) and surgery units (n=56) were investigated retrospectively.

Results: The average age of these patients was 56.6±19.1. Fifty-six patients were man (54.9%) and 46 women (45.1%). The period of time between admission and the beginning of enteral nutrition was 4.5±3.8 days on average. The average duration of nasogastric or nasoenteric tube feeding was 9.4±7.4 days. Only the tube placement of all patients in the intensive care unit (n=48) were confirmed by radiography and the gastric residual volumes were assessed ($p<0.05$). During enteral nutrition, all the patients received routinely mouth care; the bedside formula container were changed every 24 hours; 20.5% of patients were not elevate the head of the bed 30-450; 22.5% received no interventions to prevent of feeding tube occlusion, and 100% had interruptions on nutrition for various reasons.

Conclusion: Most nursing interventions in enteral nutrition were found to be non-concordant with evidence-based guidelines and recommendations. It was concluded that continuous education of nurses and the use of clinical protocols as a part of the care were necessary.

Keywords: Enteral nutrition, nursing care, evidence-based practice.

Introduction

Today, enteral nutrition is an important practice, which is preferred for feeding critical patients and is used to prevent the catabolic process caused by severe diseases.[1] Enteral nutrition has a lower complication risk and higher physiological response compared to parenteral nutrition.[2-4] Despite its benefits, it has probable side effects and risks.[3,5]

During enteral nutrition through the nasogastric or the nasoenteric tube, gastrointestinal, mechanical and metabolic complications may develop.[6,7] Most of the complications related to enteral nutrition develop when proper nursing care is not administered. Therefore, the primarily responsibility of the nurses is to prevent complications, to recognize changes in patients when complications develop, to comment and take necessary precautions, and to reporting to physician.[8] Nursing care, having a key role in the success of enteral nutrition, should make nutrition easy, improve patient comfort and reduce complications.[9,10] In accordance with evidence-based guidelines or recommendations, a systematic and elaborate approach is important to increase the benefits from treatment acquired and to reduce the probable risks.[3,9] It is known that the level of nurses' information on this issue is inadequate,[3,11,12] their responsibilities on nutritional interventions are not clear,[10] and nursing care is carried out by conventional methods rather than evidence-based practice.[5,13] It is of vital importance to carry out enteral nutrition practice according to evidence-based practice to improve nursing care quality. In Turkey, there is a limited number of studies on this subject. The aim of this study was to investigate nursing interventions on enteral nutrition through nasogastric or nasoenteric tube and related nursing records, and the assessment of their concordance with expert opinion and recommendations.

Methods

This descriptive, cross-sectional designed study was performed in a university hospital. Among 1290 adult patients presenting to the emergency

department between June 2010 and June 2011 and hospitalized in the intensive care unit and surgical units, 102 (7.8%) patients that had been fed through nasogastric or nasoenteric tube were included in the study. The medical and nursing care records of these patients were retrospectively investigated. Institutional consent was obtained prior to the study. The nurses in clinics in which the study was carried out were responsible for all the enteral nutrition practices, except for nutrient selection and feeding tube insertion. While there is no written guideline in units regarding enteral nutrition, there is a "Multidisciplinary Nutrition Committee" working in the hospital. In this committee, a physician, a dietitian, a pharmacist, and a nurse work, who provide counseling services.

Parameters evaluated in the study:

Demographic data (age, gender, presence of surgical intervention, period of stay in the units) data related to enteral nutrition (indication for enteral nutrition, days from admission to the beginning of enteral nutrition, enteral nutrition duration and type), and data related to the feeding tube (methods of test of its placement, position, number of tubes used per patient) were all obtained from medical records.

Data related with nursing interventions (confirmation of tube placement, patient's body position during the enteral nutrition, frequency of bedside formula container change, frequency of nutrient formula preparation, oral and nasal skin care, prevention of tube occlusion, assessment of gastric residual volume, assessment the intolerance, interruption of tube feeding and causes, medications applied through the feeding tube) were obtained from the nursing care records. There were no exclusion criteria in this study.

Statistical analyses

The data evaluation was performed using the "SPSS for Windows 11" package program. The numerical variables were summarized as mean ± SD and the categorical variables as numbers and percentages. The x2 test, independent samples t-test and the Pearson correlation were used to analyse relationship between various factors related to enteral nutrition. Statistical analysis was given to a value of $p < 0.05$.

Results

The average age of the patients was 56.9±19.5 (range: 19-91 ages). Fifty-six patients were man (54.9%) and 46 women (45.1%). The characteristics of 102 adult patients fed enterally have been presented in Table 1.

Table 1. The characteristics of patients who fed enterally (N=102)

Variables		ICUn (%)	Surgicn (%)	p value
Age (years)	x±SD	56.5±18.4	56.7±19.8	p>0.05
Gender	Female Male	18 (17.6) 30 (29.4)	28 (27.5) 26 (25.5)	p>0.05
Surgical intervention	Yes No	39 (38.2) 9 (8.8)	38 (37.3) 16 (15.7)	p>0.05
Indication for tube feeding	Support treatment Malnutrition	33 (32.4) 15 (14.7)	41 (40.2) 13 (12.7)	p>0.05
Placement of tube	Gastric Jejunal	30 (29.4) 18 (17.7)	54 (52.9) -	p<0.001
Type of nutrution	Intermittent Continious	30 (29.4) 18 (17.7)	54 (52.9) -	p<0.001
Number of tubes used per patient	1 2	42 (41.2) 6 (5.9)	52 (51) 2 (1.9)	p>0.05
Initiation time of enteral nutrition (days)	x±SD	5.3 ± 4.5	3.8 ± 2.9	p>0.05
Duration of enteral nutrition (days)	x±SD	9.9 ± 7.7	8.9 ± 7.2	p>0.05
Lenght of hospital stay (days)	x±SD	17.1 ± 9.7	13.9 ± 9.9	p>0.05

**ICU=Intensive care unit*

The period of time between admission and the beginning of enteral nutrition was 4.5±3.8 (range: 1-23 days) days on average. The average duration of nasogastric tube feeding was 9.4±7.4 days, ranging from 3 to 34 days. The patients stayed in the units an average of 15.4±9.9 days (range 4-50 days). When compared with intensive care unit, patients in surgical units were started on enteral nutrition earlier. Although the nutrition duration and the length of hospital stay were shorter, there was no significant difference ($p>0.05$) (Table 1). The initiation time of enteral nutrition and duration of enteral nutrition were found to be positively correlated with the length of hospital stay ($r=0.638$, $r=0.842$, respectively) ($p<0.001$).

Immediately after insertion of the tube by the physicians, confirmation of tube placement was carried out by radiography in all patients in intensive care unit (n=48; 47.1%), and by gastric content aspiration and auscultation in all patients in the surgery units (n=54; 52.9%). During enteral nutrition, there was no information related with secondary method to confirm placement of feeding tubes by nurses in any of the patient records. The applied and the recorded nursing interventions have been presented in Table 2.

In this research was the presentation of medicines administered by tube, 40 patients (39.2) in the intensive care unit and 36 patients (35.3%) in the surgical units receiving one or more drugs in pills

Table 2. Nursing interventions related to enteral nutrition (N=102)

Practice/intervention/comments	Recorded interventions	
	ICU (n=48) n (%)	Surgical units (n=54) n (%)
Confirmation of tube placement		
Radiography	-	-
Mark the feeding tube with indelible ink at the exit side from the lip or naris	-	-
Check this mark before feeding or administering medication	-	-
Body position		
Elevate the head of the bed 30-45^0	37 (36.3)	44 (43.1)
Assess of gastric resudual volume	48 (47.1)	-
Assess of gastrointestinal intolerance	48 (47.1)	54 (52.9)
Routinely oral and nasal care	48 (47.1)	54 (52.9)
Avoidance of bacterial contamination		
Wipe top of formula cans with alcohol routinely change bedside formula container every 24 hours	-	-
Replace formula every 4 hours in open feeding systems	48 (47.1)	54 (52.9)
Storage in a refrigerator of opened formula	48 (47.1)	54 (52.9)
	-	-
Prevention of tube occlusions		
Routinely flush tube with water	37 (36.3)	42 (41.2)
Flush tube with 30 ml every 4 hours	4.7±3.7	8.1±4.1
Treatment of tube occlusions		
If flushing with warm water is ineffective, use pancreatic enzyme solution	-	-
Interruptions of feeding	48 (47.1)	54 (52.9)
Stop enteral nutrition immediately before minor procedures and restart within 1 hour after procedure	-	-
Avoid stopping enteral nutrition for more than 4 hours before major procedures	-	-

or capsules (that crushing or dissolving before administration). Drugs administered simultaneously with enteral nutrition were antihypertensives in 50.9% (n=52), antiepileptics in 19.6% (n=20), antipsychotics in 17.6% (n=18), analgesics in 15.7% (n=16), and anticoagulants in 11.6% (n=12).

Discussion

Although there is no data related to early enteral nutrition having improved the results, The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends beginning of nutrition in all critical patients who are hemodynamically stable and normal gastrointestinal system functions in 24-48 hours.[1,14] The results of this study showed that the period of time between admission and the beginning of enteral nutrition in 102 patients was later than the recommendations of ESPEN, particularly in intensive care unit patients. This condition may be related to unstable hemodynamic conditions and abnormal gastrointestinal system functions. Thus, 77 patients (75.4%) had undergone surgical interventions (Table 1). In the study of Gupta et al.[15], it was determined that enteral feeding was not begun early in intensive care units and nutrition was delayed. Whereas critical patients need early and specific nutrient support and have high metabolic requirements.[16] Early start of enteral nutrition support provides gastrointestinal system function and integrity, thereby decreasing the translocation in microorganisms. These positive benefits result in decreased number of complications, decreased length of hospital stay and lowered risk of death.[15]

In the present study, there was a positively significant relation between the beginning time of enteral feeding and enteral feeding duration, and the length of hospital stay ($p<0.001$). Furthermore, in previous studies, starting nutritional support more than 3 days after admission to the intensive care unit was associated with an increased length of stay;[17] the prolongation of the nutrition duration was significantly related to the length of hospital stay.[6]

The most important complication related with enteral nutrition was oropharyngeal or gastric content aspiration.[5] Aspiration pneumonia is among the most common causes of death and its incidence varies between 5% and 58%.[7] To prevent aspiration with high mortality, the tube insertion site should be confirmed,[3,6,7,17,19] the head of the bed should be elevated during enteral nutrition,[3,5-7,13,17,19-21] gastric residual volume should be checked,[3-5,7,17,20,22] and routinely oral care[5,6] is recommended.

Studies have shown that malposition of feeding tubes range between 1.9% to 89.5%,23 and that the auscultation method and gastric content aspiration provided a false safety in confirming of tube placement;[3,17,23] malposition of the tube is a factor related to an increased aspiration risk.[5,17] The American Gastroenterological Association (AGA) has recommended that radiography is direct evidence for confirmation of tube placement.[3,6,7,17] The American Association of Critical Care-Nurses (AACN) recommends using a segondary methods to confirm placement of feeding tubes. The method consists of marking the feeding tube with indelible ink at the exit site from the lip or naris at the time of radiography.[17] This mark must be confirmed by a nurse before feeding or administering medications through the feeding tube.[9,17,19] In spite of these recommendations, it is a notable finding that the tube placement was confirmed by radiography in all intensive care unit patients, and by auscultation in all surgery patients. Furthermore, there were no records indicating that the tubes were marked by a indelible ink and the tube placement was checked by nurses before feeding or medication administrations (Table 2). This may be a result of the perception that there is no obligation to record this information or that reliable methods directed to prevention or control of aspiration risk are not put into practice.

The American Gastroenterological Association recommends elevating the head of bed to a minimum of 300 to 450 to reduce the risk of microaspiration.[3,5-7,17,19-21] Furthermore, it is recommended that this position should be kept at least for one hour after feeding has been completed.[7,22,24] In this study, while 79.4% (n=81) of the patients were given a 30-45 degrees semi-recumbent position during feeding, 20.6% (n=21) laid in the supine or lateral position during feeding. After nutrition was completed, there were no records whether the patients were further kept in an elevated position at least for one hour or not (Table 2). This may

be a result of the inadequate knowledge levels of nurses related with the enteral nutrition and absence of a clinical protocol. Knowledge levels related with enteral nutrition showed a significant difference according to the education levels and the clinical experience of the nurses.[18] In another study, in units where clinical protocols guiding the nurses were found, the mortality rate was seen to have decreased by 10% compared to that without protocols[3]. Kenny and Goodman[13] reported that tube feeding education increased the knowledge levels of nurses and all the nurses placed all the patients in a proper position during nutrition. Another factor that causes an increased aspiration risk related with enteral nutrition is high gastric residual volume. Many factors such as opioids, surgical intervention, trauma, shock and respiratory failure decrease the gastric motility. High gastric residual volume delays the gastric emptying and leads to gastrointestinal intolerance, regurgitation and aspiration risk. Therefore, gastric residual volume assessment is important.[3,5,7,17,19,20] In the present study, the nurses checked and recorded the gastric residual volume only in all the intensive care unit patients (Table 2).

This shows the knowledge and practice difference of nurses related with the enteral nutrition. In the literature, it has been reported that the nursing care of patients fed by the enteral route was performed using the conventional methods rather than the evidence-based practice; differences were observed in both the in-facility and between the institutions with regard to care procedures.[13] In a study in a university hospital of Turkey with a Nutrition Support Unit, 282 applications performed by 26 nurses were observed and all the observations showed that nurses routinely checked the feeding tube placement and gastric residual volume.[8] In another study on three different hospitals without clinical protocols, the knowledge levels of nurses regarding enteral nutrition, their perception of responsibilities, the records and the practices were investigated. As a result, the nurses' source of information was determined to be their colleagues in their units; none of the nurses evaluated the gastric residual volumes, and the nursing practice in each institution was different.[25]

Another risk factor that may be modified with regard to reducing the aspiration risk is oral hygiene. In the literature, aggressive oral care has been reported to reduce the risk of aspiration pneumonia by 60%.[24] In this study, all patients received routinely oral care in accordance with the recommendations[5,24] (Table 2).

One of the practices to which attention should be paid in patient care with enteral tube feeding is assessment of gastrointestinal intolerance (complications such as nausea, vomiting, gastric distention, diarrhea, constipation).[5,7,16,19,26] In the present study, gastrointestinal intolerance was followed and recorded in all patients according to the recommendations (Table 2). While some of gastrointestinal complications commonly seen in patients in whom enteral feeding was administered were not directly correlated with the nursing care, the role of nurses is to aid in preventing and recovering of the complications. Therefore, it is important that nurses should evaluate the patients regularly for signs of intolerance and report to physician for early diagnosis and treatment.[6,19,27]

Enteral nutrients are ideal media for bacterial growth.[21] Bacterial contamination of the gastrointestinal tract during enteral nutrition may also led to intolerance.[7,17] Aseptic techniques, such as hand hygiene,[7] cleaning the tops of formula cans with alcohol swabs before opening,[17] routinely changing the bedside container of formula every 24 hours,[6,7,9,17,21] replacing formula every 4 hours in open systems,[9,17] storing in the refrigerator of open formulas,[7] are used to reduce bacterial contamination. There is no reliable evidence that closed system feeding is better than the open system.[9,17] In this study, concordant with the recommendations, the bedside formula container were regularly changed every 24 hours by nurses, but the nutrient formula was replaced every eight hours instead of four (Table 2). There was no record related with hand hygiene, clean the tops of formula cans with alcohol swabs and the storage conditions of the open formula. This condition may be explained by lack of regular records directed to nursing care, absence of obligation to record this information or ignorance of the relation between these practices and possible complications. In a study investigating the practice and records directed towards the enteral feeding practice of nurses in Turkey, there were unrecorded applications and the most important cause for absence of the records was excess workload.[8]

One of the important practices of patient care in enteral nutrition is preventing tube occlusion. Occlusions inside feeding tubes are often caused by coagulation of protein-based formulas as the comes in contact with acidic environments or certain medications. An increase in tube occlusions is also associated with the performance of gastric residual checks.[9] To maintain tube patency, the feeding tube should be washed with 20-100 ml warm water every four hours or after per medication administration;[7,9,17,21] in case of occlusion, if washing with warm water is inadequate, pancreatic enzyme solution should be used,[4,9] administration of pills or capsules form medications should be avoided,[17,21] if medications must be administered through the feeding tube, liquid forms should be preferred.[21] It was found that the feeding tubes of all patients in this study were washed by 20-100 ml water, but the frequency of washing was longer in the surgical units (8.1±4.1; range 2-12 hours) than the intensive care unit (4.7±3.7; range 2-12 hours), and there was a significant difference (t=-3.846; p=0.001) (Table 2). It was also found that most patients received one or more medications in pills or capsules form (n=76; 74.5%) through the feeding tube. In a survey study, 33% of 1167 intensive care unit nurses administered a mean of 8.9 medications daily through the enteral nutrition tube.[28] In another study on 49 nurses working at the intensive care unit, 42.8% administered the prescribed solid medications by crushing, 32.6% by dissolving in 20 ml water, 65.3% did not make any recommendations to physicians with regard to the choice of medication type.[29]

It is recommended that interruptions during enteral nutrition should be reduced, nutrition should be continued until medical and diagnostic procedures begin, nutrition should be restarted in one hour following minor procedures and in four hours' time following major procedures as long as there is no specific contraindication, and this interruption should not last for more than four hours.[17,19] In current study, in spite of the recommendations, nutrition was found to be interrupted in all patients for different reasons, such as care practices, diagnostic tests, impaired general status and physician requests (Table 2).

However, there was no data available regarding the time the enteral nutrition was stopped. Elpern et al.[30] found that mean length of interruptions in enteral feeding was 5.23 hours per patient per day. The top 3 reasons for the interruptions were preparation for test (35.7%), changes in body positions (15%), and high gastric residual volumes (11.5%). Apart from the care practices, although the decision for interruption is not made by nurses, continuity is a part of the care and it is among the responsibilities of nurses.

Conclusion

The results of this study show that many nursing care practices are not appropriate for evidence-based guidelines and recommendations. Safe and effective enteral nutrition requires careful and elaborate medical treatment and nursing care. We recognize that evidence-based guidelines and continuous education of nurses are steps towards changing practice. When the study results are considered, clinical guidelines directed to nurses should be used as a part of care.

Study limitations

This study was performed at a university hospital. However, the results may not reflect the whole population in Turkey. Another limitation of the study was that the data depended on the recorded data and its retrospective design.

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