Original Article

A comparison of performing tube feeding with the standard procedures at selected educational and treatment centers of Isfahan University of Medical Sciences, Iran

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Abstract

Background: Tube feeding is used for patients, who are not able to eat orally but their digestive system can digest food. This method is safe and economical for patients, maintains the functions of the digestive system and reduces the risk of infection and sepsis. However, incorrect administration of this method of feeding results in problems such as aspiration pneumonia, infection, diarrhea, NG tube obstruction, and etcetera. If tube feeding is performed according to its standard procedure, it can have a major role in reducing complications, providing adaptability and the desired lifestyle, reducing the duration of hospitalization, and reducing the relevant costs.

Materials and Methods: This research is a descriptive-analytic cross-sectional study on 37 nurses who worked in the general surgery and neurology wards and fed patients suffering from gastrostomy. A valid and reliable checklist was used for data collection. To analyze the data, the descriptive statistical method (frequency and mean) and inferential method (paired t-test, Spearman Correlation Coefficient and variance Analysis with repetition of observations) were used.

Findings: The findings showed that the mean score of measures in all the stages (before, during, and after administration) was significantly lower than the standard ($p < 0.001$). There was a significant reverse relation between the score of measures in all the three stages (before, during, and after administration), and work record and work experience in the ward. Furthermore, the mean score of measures in all the three stages was significantly different between female and male subjects (p value = 0.031), in that the mean score of women was higher than that of men. There was also a significant difference between the mean score of measures in all the three stages, and the employment status of samples; so that the mean score of provisionally employed personnel was higher than that of permanently employed personnel.

Conclusions: The findings of the research showed that the mean score of measures before, during, and after administration of feeding through gastrostomy was lower than the standard ($p < 0.001$). Therefore, a gastroenterology advisor, a clinical nurse and a nutrition specialist should train the patients and their families, and the personnel about preparation and storage of food, method of administering food, protection of tube entrance and NG tube by considering the problems and complications arising from this type of feeding. Based on the findings of the present research, it is necessary to retrain the nurses and especially male nurses, nurses with more work experience, and permanently employed nurses in terms of correct performance of clinical nursing skills including this type of feeding.

Key words: Tube feeding, nursing management, gastrostomy, nutritional support

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Introduction

Nutrition is an essential element of health. It is necessary for life, natural growth, protection and recovery of tissues, cellular metabolism, function of organs, energy for movement, and maintenance of body temperature. The human body needs sufficient combinations of foodstuffs for the function of cells. Meal planning, based on different roles of nutrition in metabolism and health, is necessary in the programs for taking care of patients because sickness process, age, gender and activity of medicines affect foodstuffs and food needs. Oral feeding is the most efficient method of feeding the patients. However, when a patient is not able to eat orally, another method is required for his nutritional support, the best of which is tube feeding or NG tube, in which food is entered into

the digestive system through a tube.[1] One of the advantages of this type of feeding is that it allows the stomach to act as a natural reservoir and to adjust the amount and type of food released into the intestine.[2] Moreover, since food is received without any dependence on appetite or swallowing ability, it helps in reducing the catabolic response related to injury, preserving the mucosal integrity of the intestine, decreasing the colonization of intestine bacteria, and recovering from injuries.[3] This feeding method is used for conditions such as unconsciousness, inability to swallow, trauma or stomach cancer, oral trauma, oral surgery, anorexia, or for the people who need additional feeding due to specific conditions such as burns, infection, surgery, or fracture.[4]

When NG tube is administered for a short period, the tube is placed into the stomach for less than 4 weeks (NG Tube). However, when this type of feeding is required for more than 4 weeks, the tube is directly entered into the stomach (gastrostomy) or jejunum (jejunostomy) through the stoma on the stomach wall. Gastrostomy is one of the most useful and stable techniques of NG tube which is available for the patients who need a long-term nutritional support. However, there are many emotional, physical, mental and cultural problems for placement, preservation, administration and stoppage of this type of feeding. Nurses are considered as an important support and information resource to help patients in choosing this type of nutrition. Patients suffering from gastrostomy face complications such as aspiration, NG tube obstruction, diarrhea, nausea, vomiting, bloating, stoma infection,[2] fever or dehydration, mouth dryness, low skin turgor, physical complications, and aspiration pneumonia, which may lead to morbidity and mortality, stomach cramps, bleeding around the tube, red skin around stoma, thirst, weakness, high fever, urine reduction due to infection and dehydration, feeding intolerance, pale or dark skin, coughing, stridor, wheeze, restlessness, anxiety, constipation, and medicine side effects.[4] Feeding contamination in this method is the main concern. Studies have shown that more than 30% of foodstuffs in this method are contaminated by different types of microorganisms, and this is mainly due to preparation or performance of feeding, which can result in major clinical infections in the patient.[5] Infection of this type of feeding may lead to flatulence, pneumonia, aspiration and colonization of microbes in the patient's body.[6]

In a study by Mathus-Vliegen et al. on 37 tube-fed patients, microbial contaminations in the NG tube were studied by culturing NG tube sets and the caps. In 29 patients (78%), at least one microbe was observed, and those contaminations were related to the function of nurses. It has been recommended that applying nursing precautions, such as correct washing of hands during the administration of this feeding method, and controlling the residual volume, is necessary in order to reduce this complication.[5] Another issue related to this method is the way the medications are administered, since it requires nursing intervention and the required skills, such as preparation of medicine, determination of NG tube place, washing the tube, and investigation and identification of potential complication. If the medicines are not correctly administered, it will lead to harmful results such as tube obstruction, diarrhea, pneumonia, aspiration, and increase in health care system costs due to increase of hospitalization period. NG tube obstruction has been reported in 35-67% of the cases. In a study, the nurses estimated that 50% of NG tube obstructions were due to incorrect prescription of medicines.[8] However, despite the above complications, feeding through gastrostomy is a safe method, which is compatible with the body and provides desirable consequences in the illness process of the patient. This method is also cost effective, which is why it is the most preferable and desirable method.[3] Administering NG tube is the specific responsibility of nurses. If it is applied along with the desirable nursing care and administration, it will play a key role in the success of this nutritional support method.[9] Nursing care of this group of patients is mostly based on previous trainings and habits of nurses rather than recent researches. However, relevant directions, standards and recommendations should be used to administer this method of feeding and to provide the best possible care.[3] In this regard, nurses should have sufficient knowledge about this method, its common complications, and necessary nursing interventions for performing this method in order to prevent possible complications. The quality of execution of this method has a direct relationship with the reduction of complications arising from this type of feeding. Complications of feeding through gastrostomy may be minimized by providing standard nursing interventions. Considering the above subjects, and my personal experiences and my colleagues' experiences, it seems that there is a difference between the current feeding procedure in hospitals and its standards. Therefore, we decided to investigate and describe the current situation, and to conduct the present study aiming to: 1) determine the mean score (out of 100) before, during and after NG tube administration, 2) compare the mean of NG tube administration method in different stages (before, during and after administration), and 3) determine the relationship between the score of NG tube administration method with some demographic specifications (age, gender, education, experience, work

experience in the ward, employment status) in the selected educational and treatment centers of Isfahan University of Medical Sciences, Isfahan, Iran.

Materials And Methods

This descriptive-analytic, cross-sectional study presents some information about the method of feeding through gastrostomy of patients in the surgery and neurology wards of selected educational and treatment centers of Isfahan University of Medical Sciences. This single stage study was fulfilled in the spring and summer of 2010. The studied population included all nurses employed in the surgery and neurology wards. The study sample comprised of 37 nurses who met the inclusion criteria and were selected by census from surgery and neurology wards. The data were gathered via direct observation, and checklist, which was prepared by means of some scientific and valid resources. In order to determine validity, the checklist was made available to a number of the academic members of the School of Nursing and Midwifery, Isfahan University of Medical Sciences, Iran. After making changes to the questionnaire based on their comments, the validity of the questionnaire was assessed and approved. For data analysis the descriptive statistical methods (frequency and mean), and inferential statistical tests (paired t-test, Spearman's correlation coefficient, variance analysis together with repetitive observations) were used. The questionnaire consisted of two parts: the first part was demographic information of the wards, and the second part was the tube feeding administration standard checklist that included 45 items and was divided into three stages of before administration (13 questions), during administration (15 questions) and after administration (17 questions). Each question was scored 2 for 'completely done', 1 for 'relatively done', and 0 for 'never done' options. Accordingly, the mean score was calculated from 2. The maximum score in this checklist was 122 and the minimum score was 0, but they were changed to 0-100. Therefore, the score obtained by each research unit was compared with the fixed value of 100 as the standard ideal score for tube feeding administration. Moreover, for analyzing the questions, they were separately compared with the fixed value of 2 (standard value of 'completely done'). The scores from 0 to 33 were considered weak, 33.1 to 66 moderate, and 66.1 to 100 suitable. The researchers attended the wards for four months in the morning and evening shifts, based on the working shifts of nurses under study and the presence of gastrostomy surgery patients. They observed the patient being fed by tube feeding (gastrostomy) and completed the related checklist.

Findings

The research findings related to the mean score (from 100) of the observations prior to administration of nutrition showed that 48.7% obtained an average score of 66-100 meaning desirable, 45.9% gained a moderate mean score of 33.1-66, and 5.4% gained a weak mean score of 0-33. The total mean score was 64.2 and the standard deviation was 17.1. Regarding the determination of the mean score (from 100), observations during administration showed that 16.2% obtained a good score, 64.9% gained a moderate mean score and 18.9% obtained a weak mean score. The total mean score was 46.03 and the standard deviation was 17.00. Regarding the mean score of observations after administration of nutrition, the results showed that 67.6% had a good score, 29.7% had a moderate score, and the total mean score was 68.8%. Regarding the mean score of the method of nutrition administration during the three stages (prior, during and after administration of nutrition), the variance analysis test with repetitive observations showed that the mean score of the measures were not the same in all three stages ($p < 0.001$). The one-sample t-test showed that the mean score of measures were significantly less than the standard of 100 ($p < 0.001$) (Table 1). Moreover, the paired t-test showed that the mean score of measures prior to and after the administration were significantly higher than the measures during administration ($p < 0.004$). Furthermore, comparing the total mean score of method of nutrition administration prior to, during, and after nutrition administration with standard of 100 showed that 38.7% of cases gained a desirable total mean score for all three stages, 54.1% gained a moderate score, and 8.1% a weak score. It also showed that the total mean of the measures during all three stages of nutrition administration was 59.88 ± 14.4. In other words, the majority of the studied subjects were moderate in terms of total mean score during the three stages and had a significant difference with the standard procedure of tube feeding (Table 2).

Table 1. Mean scores of actions taken prior, during and after tube feeding (out of 100)

Statistical Index Actions	Mean	Standard Deviation	T	DF	P
Prior to administration	64.24	17.05	-12.75	36	0.001
During administration	46.03	18.22	-18.01	36	0.001
After administration	68.75	16.98	-11.18	36	0.001
All stages	59.87	14.35	-17.00	36	0.001

Table 2. Frequency distribution and the total mean in three stages of before, during and after tube feeding

Score of Actions in all three stages	No.	Percent
0-33 (weak)	3	8.1
33.1-66 (moderate)	20	54.1
66.1-100 (suitable)	14	37.8
Total	37	100
Mean		59.88
Standard Deviation		14.4

Regarding the correlation between gastrostomy feeding and some demographic specifications, the Pearson's correlation test showed that there was no correlation between the score of the administration during all three stages, and age ($p = 0.1$). However, there was an inversely significant correlation between the score of administration in all three stages, with work experience and duration of serving at wards ($p = 0.001$). The t-test showed that there was a significant correlation between mean score of administration in all three stages, and gender ($p = 0.033$). In other words, the mean score of female nurses (62) was higher than that of male nurses (51) regarding this feeding type. In addition, the t-test demonstrated a significant difference between the mean score of administration in all three stages and the employment status of the samples (formal employment or contract-based) ($p = 0.03$). Namely, the mean score of contractually-employed people (64) was higher than the mean score of formally-employed people (55.4).

Discussion

The findings of this study demonstrated several main problems in relation with gastrostomy feeding:

1) Tube feeding administration is distant from its standard method; namely the majority of the studied subjects were at the moderate level of administrating this type of feeding (in each one of the three phases of prior to feeding, during feeding and after feeding).

2) Work experience and having expertise in these wards had an inverse impact on method of administrating this feeding type. In other words, the more the work experience and expertise increased, the weaker the method of administration of the task became.

3) There was a significant difference between the method of administrating this feeding method, and sex and the status of employment of nurses. This means that female nurses acted better than male nurses. Moreover, the formally employed nurses acted weaker than the contractually-employed.

Mateo, in a study, entitled Nursing Management of the Enterally-fed Patients, states that the nursing measures taken for tube feeding is greatly different from the standard.[10] Roberts et al. (2003) also states that the role of the nurses is vital for the success of feeding support and tube feeding. In this regard, the presence of standard operating procedures (SOP) and training sessions for appropriate administration of tube feeding is obligatory.[11] Guenter also states that the immunity of the patient, whose feeding is supported this way, depends on the nursing care, appropriate administration, and identification of potential harms, since if these issues are not correctly taken care of, they may bring about some adverse and fatal impacts for the patients.[12] During a study conducted by Bourgault et al. (2007) on the nurses' knowledge of tube feeding, it was stated that administration of feeding should be done based on the standard procedures. Its correct administration is difficult because of the variety of medical orders and lack of nurses' knowledge. In addition, most relevant studies may not be studied by the nursing staff of the ward. In this study, a training course of enteral feeding was appropriately held for nurses and the results showed that their knowledge increased from 45% before training to 84%. The nurses stated that they were highly surprised at the findings of the research, since they thought that their knowledge was sufficient for administrating tube feeding. The items considered for training the nurses were similar to the ones in our checklist.[13] Marshall and West (2006) also state that the nurses play a major role in the appropriate administration of enteral feeding. However, the nurses are different in terms of skills. The effect of insufficient nursing knowledge on feeding type has been reported.[8] In this regard, Ros (2009) also expresses that administrating enteral feeding according to SOP is the best attempt made by every organization in order to have an appropriate result for the patient, which is the reduction of the hospitalization period and mortality. This is due to the fact that feeding support is an essential component in and a valuable strategy of managing ill patients; and nurses play a crucial role in managing enteral feeding. Nurses are placed in a good position for administering enteral feeding with the support of specialists and nutrition experts and other associated professionals. Due to this, enhancement of nurses' knowledge will have a direct effect on the success of feeding support programs including enteral feeding.[14] Skar (2010) et al. have also emphasized using modern knowledge for the correct administration of nursing procedures and the quality of healthcare. All nurses involved in his study emphasized that their knowledge affects their ability of investigating and identifying conditions, and administering skills in an appropriate way.[15] In a study conducted by Lou et al. (2010) on over 308 male nurses employed in clinical centers, the findings

showed that one of the elements affecting the quality of care provided by male nurses is their emotional problems related to the nursing occupation because of the traditional masculine roles played by them in the society. However, the more power and responsibilities are given to male nurses, the better they fulfill their nursing services.[16] With regard to employment status, it generally seems that having job stability (formal employment) reduces motivation for working, which, in turn, will have a direct impact on appropriate skills. However, the science of nursing ethics has had a drastic role in this respect.[17] On the other hand, low working experience may be highly effective in the better administration of nursing care, due to the presence of a smaller gap between the clinical environments and the training. Since nursing training has a crucial role in the ability of performing skills, the best trained nurses will deliver the best possible nursing care.[18] It appears that both elements including job security (formally employed nurses), and being far from the training environment, due to increased work experience, have resulted in reducing the quality of administration of enteral feeding in the present study.

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