

Child care in enteral nutrition therapy: nursing technicians' theoretical and practical knowledge

Cuidados a criança em terapia nutricional enteral: conhecimento teórico e prático de técnicos de enfermagem

Cuidados al niño en terapia nutricional enteral: conocimiento teórico y práctico de técnicos de enfermería

Larissa Karoline Dias da Silva Casemiro^I, Armando dos Santos Trettene^{II}, Gesiane Cristina Bom^{III},
Priscila Capelato Prado^{IV}, Stefanny Maria Santana de Campos^V, Regina Aparecida Garcia de Lima^{VI}

ABSTRACT

Objective: to evaluate and correlate nursing technicians' theoretical and practical knowledge of nursing care for children in enteral nutritional therapy. **Method:** this analytical, comparative study, conducted between January and April 2015, involved 21 nursing technicians at a tertiary hospital specializing in care for patients with craniofacial anomalies. Data were collected using structured interview guided by an instrument developed by the researchers, and direct observation. A knowledge score of >70% was considered to be satisfactory. Statistical analysis was performed by Pearson correlation to a 5% level of significance. The study was approved by the research ethics committee. **Results:** theoretical accuracy scored 74%, and practical, 71%. The greater the theoretical knowledge, the greater the practical knowledge ($p < 0.001$). **Conclusion:** the nursing technicians generally displayed satisfactory practical and theoretical knowledge of nursing care for children in enteral nutritional therapy.

Descriptors: enteral nutrition; intensive care; nursing care; pediatric nursing.

RESUMO

Objetivo: avaliar e correlacionar o conhecimento teórico e prático dos técnicos de enfermagem sobre assistência de enfermagem à criança em terapia nutricional enteral. **Método:** estudo analítico, comparativo, realizado com 21 técnicos de enfermagem de um hospital terciário, especializado no atendimento de pacientes com anomalias craniofaciais, realizado entre janeiro e abril de 2015. Para a coleta de dados, foram utilizadas entrevista estruturada, guiada por um instrumento elaborado pelos pesquisadores, e observação direta. Considerou-se como conhecimento satisfatório >70%. Para a análise estatística utilizou-se a Correlação de Pearson com nível de significância de 5%. O estudo foi aprovado pelo Comitê de Ética em Pesquisa. **Resultados:** o acerto teórico foi de 74% enquanto o prático foi de 71%. Verificou-se que quanto maior o conhecimento teórico, maior foi o prático ($p < 0,001$). **Conclusão:** em geral, os técnicos de enfermagem apresentaram conhecimento satisfatório, tanto prático, quanto teórico, referente à assistência de enfermagem a crianças em terapia nutricional enteral.

Descritores: Nutrição enteral; cuidados críticos; cuidados de enfermagem; enfermagem pediátrica.

RESUMEN

Objetivo: evaluar y correlacionar los conocimientos teóricos y prácticos de los técnicos de enfermería sobre el cuidado de enfermería para niños en terapia nutricional enteral. **Método:** estudio analítico comparativo, realizado junto a 21 técnicos de enfermería de un hospital terciario, especializado en la atención de pacientes con anomalías craneofaciales, realizado entre enero y abril de 2015. Para la recolección de los datos se utilizó la entrevista estructurada guiada por un instrumento desarrollado por los investigadores y la observación directa. Se consideró como conocimiento satisfactorio > 70%. Para el análisis estadístico se utilizó la Correlación de Pearson con un nivel de significación del 5%. El estudio fue aprobado por el Comité de Ética en Investigación. **Resultados:** El porcentaje de precisión teórica fue del 74%, mientras que el práctico fue del 71%. A mayor conocimiento teórico, mayor conocimiento práctico ($p < 0.001$). **Conclusión:** en general, los técnicos de enfermería presentaron conocimientos satisfactorios, tanto prácticos como teóricos, sobre el cuidado de enfermería para niños en terapia nutricional enteral.

Descriptores: nutrición enteral; cuidados intensivos; atención de enfermeira; enfermería pediátrica.

INTRODUCTION

Nursing has a fundamental role in the success of enteral nutrition therapy, as nursing professionals are responsible for accessing the gastrointestinal tract, maintaining a clear pathway, managing the diet and preventing and monitoring complications. Training family members and caregivers is also part of the responsibility of nursing professionals. The success of this therapy directly influences the quality of the care provided^{1,2}. However, there is a wide divergence between theoretical knowledge and clinical practice^{3,4}.

^INurse. MSc, Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo Brazil. E-mail: laryssakaroline@hotmail.com

^{II}Enfermeiro. PhD. Professor, Hospital de Reabilitação de Anomalias Craniofaciais da Universidade de São Paulo. Brazil. E-mail: armandotrettene@usp.br

^{III}Nurse. MSc, Hospital de Reabilitação de Anomalias Craniofaciais da Universidade de São Paulo. Brazil. E-mail: gesianeboom@usp.br

^{IV}Nurse. PhD, Hospital de Reabilitação de Anomalias Craniofaciais da Universidade de São Paulo. Brazil. E-mail: priprado@usp.br

^VNurse. MSc. Professor, Universidade do Estado de Mato Grosso. Cárceres, Mato Grosso, Brazil. E-mail: stefannymsc@usp.br

^{VI}Nurse. PhD. Professor, Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Brazil. E-mail: limare@eerp.usp.br

Assuming that the theoretical and practical knowledge determines the quality of care, making a situational diagnosis on the relationship between theoretical and practical knowledge may support training actions and help restructuring the work process in accordance with the goals of excellence in care, patient safety and evidence-based nursing care.

Given the above, the following questions have arisen: do nursing technicians have satisfactory theoretical and practical knowledge regarding nursing care for children receiving enteral nutrition? Is there a correlation between theoretical and practical knowledge? Is there a correlation between theoretical and practical knowledge and socio-demographic variables?

In this context, the objective of the present study was to evaluate and correlate the theoretical and practical knowledge of nursing technicians regarding nursing care for children receiving enteral nutrition.

LITERATURE REVIEW

Nutrition is a basic human need fundamental to the various organic functions. Nutritional depletion leads to unfavorable clinical evolution, as it disrupts homeostasis, impairs the immune response, compromises the healing process, increases susceptibility to nosocomial infections, and increases the incidence of pressure ulcers, leading to higher morbidity and mortality. Thus, nutritional support is essential to reduce the impact of physiological stress, to prevent or treat malnutrition and to support the recovery of patients, including children^{5,6}.

The benefits of early initiation of enteral nutrition with adequate volume, energy and protein have been associated with better patient prognosis, decreased length of stay and reduction of total costs⁷.

Children in special situations, which include syndromes and anomalies, often develop transient or permanent dysphagia and require feeding tubes and enteral nutrition⁸. In addition, they often present respiratory alterations, which makes oral feeding unfeasible and justifies the need for enteral nutrition therapy⁶.

A recent study has pointed out the need to look at errors in nursing care with a critical eye, aiming to promote a safety culture in health institutions³. Another study found some gaps in the theoretical and practical knowledge of the nursing staff regarding monitoring of gastric residual, verification of tube placement, risks and benefits of tube feeding, and management of the most severe complications⁴.

METHODOLOGY

Analytical, comparative, quantitative study, conducted in a semi-intensive care unit (SICU) of a tertiary and referral public hospital from January to April 2015.

The SICU has eight beds for the care of children aged between 29 days and two full years with craniofacial anomalies and/or related syndromes, which usually lead to breathing and eating problems, including dysphagia.

This study included nursing technicians working at the SICU. The sample consisted of 21 participants, representing all professionals, including those designated to cover vacation, leaves of absence and other planned or unplanned absences. The inclusion criterion was to be working in the unit for more than six months. Nursing technicians who were on vacation or on leave during the data collection period were excluded.

The study was approved by the Research Ethics Committee of the Institution through letter 441032 and opinion CAAE: 1008158. All participants signed the Informed Consent Term, in compliance with Resolution No. 466/2012 of the National Health Council.

The collection of data regarding the evaluation of theoretical knowledge occurred through a structured interview, aimed at avoiding possible bias, since self-administered questionnaires with multiple choice questions can induce answers. Data collection occurred in a private environment outside working hours, in a single encounter.

Direct observation was used to evaluate practical knowledge. The participants were observed without their knowledge by the researchers during their work shifts. The objective was to identify the performance of nursing care to patients on enteral nutrition. At each shift, two nurse evaluators who worked in the unit routinely and who received previous training conducted the observations. For the formalization of the analysis, the observations were recorded in an instrument developed by the researchers, in which the study variables were described followed by the options "performed" and "not performed", in the form of a check-list. All participants were observed during 36 working hours, generating 252 practical evaluations.

The evaluation of theoretical and practical knowledge included monitoring of gastric residual, aspiration of gastric residual if volume is greater than 30% of the total diet, verification of tube placement, administration of tube feeding at room temperature, maintenance of the permeability of the tube, nasal and oral hygiene, specifications of the enteral feeding equipment, patient in upright position during enteral feeding, interruption of enteral feeding administration before and during long procedures.

Satisfactory knowledge was defined by scores greater than 70%⁹. The predictor variables were practical and theoretical knowledge and the outcome variable was the correlation between them. Statistical analysis was performed using Pearson's correlation with a significance level of 5% ($p \leq 0.05$).

RESULTS AND DISCUSSION

Regarding the characterization of the participants, most were female (95%), with a mean age of 37 years (± 9), training time of 10 years (± 4), working time of six years (± 4) and with a single employment bond (90%).

Theoretical knowledge reached 74% correct and practical knowledge reached 71%; therefore, both were satisfactory. The correlation between theoretical and practical knowledge showed that even though theoretical knowledge was satisfactory, practical knowledge was unsatisfactory in the variables: certification of tube placement ($p < 0.001$) and interruption of enteral feeding administration before and during long procedures ($p = 0.04$). See Table 1.

TABLE 1: Correlation between theoretical and practical knowledge of nursing technicians regarding nursing care on enteral nutrition therapy. Bauru. SP, Brazil (N=21).

Questions	TR/PR	TR/PR	TW/PW	TW/PW	P
Tube placement	9.5	71.4	-	19	<0.001 ^(*)
Moments in which nasal and oral hygiene should be performed	71.4	-	28.6	-	0.041 ^(*)
Performing hygiene	85.7	-	-	14.3	-
Position during administration of enteral feeding	71.4	-	-	28.6	-
Ideal temperature for administration	100	-	-	-	-
Maintenance of the permeability of the tube	90.5	-	9.5	-	0.480
Monitoring of gastric residual	100	-	-	-	-
Conduct in the presence of gastric residual	33.3	-	-	66.7	-
Interruption of the diet for long procedures	52.4	38.1	4.8	4.8	0.046 ^(*)
Equipment Specifications	28.6	-	71.4	-	<0.001 ^(*)

Notes - TR: theoretical right PR: practical right; TW: theoretical wrong; PW: practical wrong.

^(*) Statistically significant difference ($p < 0.05$). Pearson's correlation.

It was found that the theoretical knowledge was unsatisfactory and the practical knowledge was satisfactory in the variables: specifications of the enteral feeding equipment ($p < 0.01$) and nasal and oral hygiene ($p = 0.04$). Regarding the variable monitoring of gastric residual, 67% of participants had unsatisfactory theoretical and practical knowledge. See Table 1.

It was also evidenced that the greater the theoretical knowledge, the greater the practical knowledge ($p < 0.001$), according to Figure 1.

Nursing has a prominent role in the success of enteral nutrition therapy, which includes, among other measures, maintaining the permeability of the feeding tube^{10,11}. In this regard and in relation to theoretical and practical knowledge, it was observed that most participants administered water after feeding and before and after medication administration.

A study conducted in a home care program of a university hospital in the city of São Paulo, with 36 patients in home enteral nutrition, found that the incidence of unplanned extubation was 67%. Causes included, among others, obstruction of the device¹⁰. The obstruction of feeding tubes is related to the precipitation of nutritional formulas when they come into contact with acidic substances or some medications, which may decrease the bioavailability of medications¹².

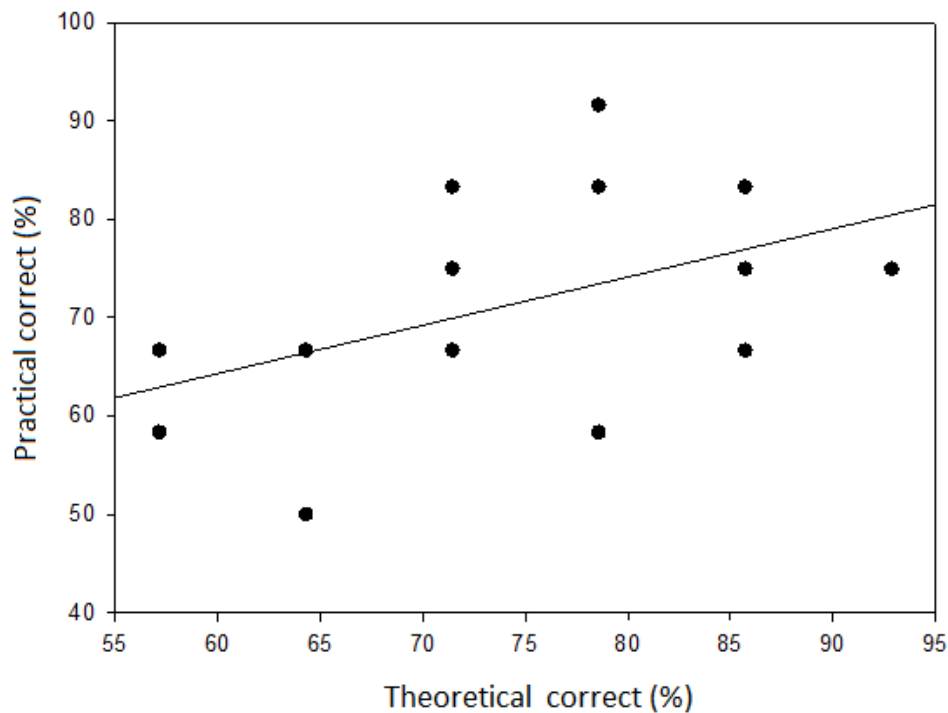


FIGURE 1. Correlation between theoretical and practical knowledge. Bauru, SP, Brazil, 2015.

A study showed that there was no pause between medication administration and enteral feeding for 33% of medications that required water fasting. It also mentioned that the administration of water in the tubes did not occur in 94% of the cases, indicating insufficient knowledge about this care¹³. It is evident that health professionals must know drug-nutrient interactions.

The use of inappropriate dosage forms in enteral tubes or inadequate medication dilutions is pointed as an important etiological factor for obstruction. Therefore, liquid pharmaceutical forms are preferred, especially in pediatric care, since tubes have a smaller caliber, and thus are more susceptible to obstruction^{12,14}.

In cases of continuous enteral feeding, the tube should be flushed every 4 hours. The inadvertent loss of feeding tubes, for obstructions or other reasons, has been monitored as an important indicator of quality of care¹⁰. It is worth noting that flushes with sterile water before and after medication administration aim not only to maintain the permeability of the feeding tube, but also to prevent medication interactions^{14,15}. Administration of enteral nutrition should preferably be done with infusion pumps, which provide a continuous flow, offer a lower risk of tube obstruction and avoid oscillations of the volume infused^{6,11}.

Another variable addressed in this study was the interruption of enteral feeding before long procedures. This intervention aims to minimize the occurrence of gastric reflux, which can lead to episodes of bronchopulmonary aspiration. This intervention has been strongly recommended in guidelines^{14,16}. However, these procedures should be minimized, considering that inadvertent suspension of enteral nutrition directly affects the volume received and has negative effects on patient prognosis¹⁵.

A study found that 54% of patients had enteral nutrition interrupted to perform examinations or procedures and did not receive their daily volume of diet¹⁵. Therefore, procedures, particularly long ones, must be optimized and performed simultaneously. In the present study, it was observed that most participants did not have their diet interrupted.

The use of feeding tubes increases the risk of bronchopulmonary aspiration¹⁷. In this context, keeping the head of the bed elevated at 30°-45° has been strongly recommended, as it reduces the incidence of complications, including regurgitation, vomiting, and consequently, bronchopulmonary aspiration^{5,6,17}. This measure is especially important for children with respiratory difficulties, who have a high incidence of reflux.

It is worth noting that aspiration of large volumes is not necessary for the occurrence of pneumonia; instead, micro-aspirations occurring insidiously are identified as an important etiological factor¹⁷.

Keeping the patient in an upright position, whether associated or not with other interventions, minimizes the occurrence of iatrogenic events, decreases length of stay, morbidity and mortality, reduces costs and improves patient survival rates^{16,17}.

Most participants affirmed that children should remain in an upright position during administration of enteral feeding. This information was corroborated in practice, demonstrating the participants' scientific knowledge about this intervention.

Among the iatrogenic events related to the use of feeding tubes, inadequate placement stands out^{11,18}. There are several methods used by nurses to verify correct placement of the feeding tube, including some that are currently not recommended, as they do not meet patient safety standards¹⁹.

The feeding tube should be fixed with adhesive tape immediately after radiographic confirmation of its location. Special attention should be given when marking the location on the numerical scale of the feeding tube, so that an inadvertent dislocation of the tube can be perceived^{6,11,16}. Skin and mucosal integrity should be constantly monitored^{6,14,16}.

Although not recommended, the auscultatory method is the most used method. However, it cannot replace radiographic confirmation of enteral access device location^{18,19}.

The literature describes that the auscultatory method cannot differentiate sounds produced in the location of the feeding tube when it is outside the stomach, including esophageal and even pulmonary placement. Another limitation of the technique is the difficulty distinguishing sounds produced by the injection of air in the gastric and enteral tubes^{6,14}.

Radiographic confirmation is indicated as the safest procedure; however, as it exposes the patient to radioactivity, it should be used sparingly, especially with pediatric patients¹⁸. In addition, the use of tubes made of non-radiopaque material, such as PVC, makes radiographic confirmation unfeasible. For this reason, the use of radiopaque material has been recommended instead of PVC⁶.

In the unit where the present study was conducted, gastric and intermittent feeding are commonly used, which is in accordance with the literature^{5,14,15}. However, especially in patients with a low level of consciousness and using mechanical ventilation, the benefits of enteral nutrition are evident^{11,16}.

Other procedures can be performed to confirm feeding tube placement: monitoring the pH of the gastric aspirate, testing for gastric enzymes and aspiration of gastric residual. The tube should be tested using at least two of these methods to confirm its location, particularly after episodes of vomiting, regurgitation and severe coughing¹⁹.

The correlation between theoretical and practical knowledge showed that, in practice, few professionals do the auscultation to confirm tube placement before the administration of the diet. In contrast, most of the participants use the aspiration of gastric contents for this purpose. It is worth noting that monitoring of gastric residual is necessary, but it is not sufficient to confirm the placement of the feeding tube^{16,18}.

When analyzing the literature for the construction of the present study, it was observed that current evidence regarding the procedures for confirmation of the gastric feeding tube placement indicate the use of pH testing, but with some restrictions^{14,19}. Thus, the present study led to reflection on the most used methods, which were often considered the best ones. Based on this observation, making pH testing the standard procedure to confirm feeding tube placement has become a goal.

Regarding the monitoring of gastric residual and aspiration of gastric residual if volume is greater than 30% of the total diet, it was found that both theoretical and practical knowledge were unsatisfactory. This result is concerning, since a systematic use of these measures minimizes the occurrence of complications.

Monitoring of gastric residual should be performed before diet administration, in order to respect the gastric volume of the patient. Failure to perform this measure can lead to excessive gastric residual volume, making the

patient prone to vomiting, regurgitation, bronchopulmonary aspiration and pneumonia¹¹. Gastric residual volume should not exceed 30% of the total volume of the diet to be infused¹⁶. In special situations, particularly malnourished children, a limit of 50% of the total diet is allowed, considering metabolic needs and weight gain¹¹. In such cases, the diet should be administered slowly or continuously, and the method of administration should be defined by a multidisciplinary team.

Residual gastric aspirates should be returned to the stomach, since the patient is in the process of digestion, except when it presents blood or foul odor. The appearance of the gastric residual is a predictor of the functioning of the gastrointestinal tract; therefore, color, odor and texture should be considered. Clear and diluted gastric residual can be a sign of adequate gastrointestinal functioning¹⁶.

In this context, the literature points to the benefits of gastric residual monitoring along with two other interventions for the prevention of pneumonia¹⁷.

Nasal hygiene should be performed with swabs soaked in saline, after bathing and whenever necessary. Oral hygiene should be a priority of the nursing staff, and it must include gum, cheek, tongue and palate. In younger children, it can be performed with clean cloths or gauze soaked in water. For children who already have teeth, oral hygiene should be performed with a soft toothbrush²⁰.

Adequate oral hygiene, combined with other interventions, minimizes iatrogenic events, including pneumonia, particularly in patients on enteral nutrition and mechanical ventilation²⁰.

The association between practical and theoretical knowledge showed that, even though most interviewees did not know how to describe hygiene practices, they performed it correctly. It is inferred that the procedure is performed without scientific knowledge.

Among the possible complications associated with enteral nutrition therapy, diarrhea, vomiting and abdominal distension were mentioned. Enteral nutrition may cause hyperglycemia, electrolyte disturbances, diarrhea, vomiting and abdominal distension^{11,21}.

It should be noted that the rate of infusion of enteral nutrition influences the incidence of complications; therefore, the definition of the administration method should consider the patients' individuality^{14,16}. A study has pointed out that gastrointestinal complications were among the main causes for interruption of enteral nutrition⁸.

The use of intermittent feeding is considered more physiological; however, it may be related to a higher incidence of vomiting and diarrhea. The use of processed food is recommended, as it requires less manipulation and, consequently, is associated with a lower risk of contamination^{11,16}.

Diarrhea is often associated with the administration of enteral nutrition by the nursing staff. However, it has a multifactorial etiology, namely: enteric pathogen colonization, hypoalbuminemia, hypoperfusion, medication interaction, use of antibiotics and changes in intestinal motility^{11,16}.

Another variable studied was the specifications of the enteral feeding equipment. The use of devices different from those used for parenteral administration of medications has been pointed as an important factor to prevent the occurrence of iatrogenic events. They are usually blue and should not fit any device besides the feeding probe^{11,15}.

Most participants could not answer the question about the need for different equipment; however, the equipment was applied correctly in practice. This result was associated with the fact that the ideal equipment was standardized. It is inferred that the nursing technicians participating in this study do not have scientific knowledge regarding the use of these equipment.

Participants were asked about the ideal temperature of the enteral feeding formula. The feeding formula, specially if it is handmade, should be kept refrigerated at a temperature between 2 and 8°C for a maximum period of 24 hours after its preparation, and should be administered at room temperature^{11,14}.

The feeding formula should contain the following information on its label: patient's name, hospital registration number, quantitative and qualitative composition of all components, total volume, administration rate, route of access, date and time of manipulation, expiration date, quality control number and storage temperature conditions, name and Professional Council number of the technician responsible for the process¹¹.

It should be emphasized that the manipulation of the enteral formulas, as well as of the patient and of the feeding tube, should only be performed after strict hand hygiene²² or use of alcohol gel, as indicated. This care, although primordial, was not considered in the evaluation of this study because it is an intervention required in all

procedures performed with the patient, not specifically in nursing care for children on enteral nutrition therapy. However, this absence does not minimize the importance of this care.

Given this reality, strategies to improve care for patients on enteral nutrition, such as the formalization of protocols and guidelines for good practices, are evidently important^{5,6,23}.

CONCLUSION

In general, nursing technicians presented satisfactory practical and theoretical knowledge regarding nursing care for children on enteral nutrition therapy. It was observed that the greater the theoretical knowledge, the greater the practical knowledge, indicating a correlation between them.

The fact that this study included only nursing technicians from a single service, which is specialized in the treatment of children with dysphasia is a limitation, and makes it impossible to generalize the results. Another limitation was the scarcity of studies with a similar approach, which restricts the discussion and comparison of results.

Nevertheless, the contributions of this study are relevant for clinical practice and include a reflection on the work process. The results also raise the need for an in-site evaluation of the care provided. In this context, it is necessary to encourage the continuous development of professionals through different strategies, such as participation in scientific events, training, continuing education, among others, considering that the acquisition of theoretical knowledge has a direct effect on practice. We emphasize the importance of effective nursing care that minimizes risks and strengthens patient safety policies.

This study is expected to encourage further research with a view to improving care for patients on enteral nutrition, addressing, for example, the establishment of protocols and their effect in the care process, with patient safety and rehabilitation as its essence.

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