



Acta Scientiarum. Health Sciences

ISSN: 1679-9291

eduem@uem.br

Universidade Estadual de Maringá
Brasil

Duarte Lopes, Ingra Monique; Alves da Silva, Edson Antonio; Ferreira Miyata de Oliveira, Daniela; Conegero Sanches, Andreia Cristina

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Acta Scientiarum. Health Sciences, vol. 39, núm. 2, julio-diciembre, 2017, pp. 157-165
Universidade Estadual de Maringá
Maringá, Brasil

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Concepts applied in daily practice in administration of medicines via nasogastric tube by the nursing team

Ingra Monique Duarte Lopes^{1*}, Edson Antonio Alves da Silva², Daniela Ferreira Miyata de Oliveira³ and Andreia Cristina Conegero Sanches³

¹Programa de Residência em Área Profissional de Saúde em Farmácia, Universidade Estadual do Oeste do Paraná, Rua Universitária, 2069, 85819-110, Cascavel, Paraná, Brazil. ²Centro de Ciências Exatas e Tecnológicas, Universidade Estadual do Oeste do Paraná, Cascavel, Paraná, Brazil. ³Centro de Ciências Médicas e Farmacêuticas, Universidade Estadual do Oeste do Paraná, Cascavel, Paraná, Brazil. *Author for correspondence. E-mail: ingramonique@gmail.com

ABSTRACT. The study aimed to assess the current situation of medication administration via nasogastric tube (VNGT) and identify weaknesses in the process. As a tool, the application of questionnaires to the professionals of the nursing service was used. The questionnaire contained questions and each of them, during the correction, was assigned a specific score. The participant could according to the evaluation system get a grade of 0 to 100 points. Among the participants, 66.7% stated that they had already received some guidance on medication administration via the tube, and after correction and assignment of the notes, the averages obtained were: 47.3 points by the nurses; 38.7 points by nursing technicians; 34.5 points for resident nurses; and 37.0 points by the nursing assistants. The findings of the study indicate that there is a difference between the usual practice and the recommended practice in the literature and the professionals knowledge about administration of medication VNGT is still limited. The insertion of the pharmacist in the multidisciplinary team and disseminating knowledge on incompatibilities, interactions and reactions are of great importance for the improvement of this scenario.

Keywords: pharmaceutical preparations, enteral nutrition, nutritional therapy, nursing care.

Conceitos aplicados na prática diária na administração de medicamentos via sonda nasoenteral pela equipe de enfermagem

RESUMO. O estudo teve por objetivos avaliar o panorama atual da administração de medicamentos via sonda nasoenteral (VSNE) e identificar as fragilidades nesse processo. Como ferramenta utilizou-se a aplicação de questionários aos profissionais do serviço de enfermagem. O questionário continha questões e a cada uma delas, durante a correção, atribuiu-se uma pontuação específica. O participante poderia de acordo com o sistema de avaliação obter uma nota de 0 a 100 pontos. Dentre os participantes, 66,7% afirmaram já ter recebido alguma orientação sobre a administração de medicamentos, via sonda, e após correção e atribuição das notas, as médias obtidas foram: 47,3 pontos pelos enfermeiros; 38,7 pontos pelos técnicos em enfermagem; 34,5 pontos pelos enfermeiros residentes; e 37,0 pontos pelos auxiliares de enfermagem. Os achados do estudo indicam que existe diferença entre a prática usual com o recomendado na literatura e o conhecimento dos profissionais sobre administração de medicamentos VSNE ainda é limitado. A inserção do farmacêutico na equipe multidisciplinar e disseminação do conhecimento referente às incompatibilidades, interações e reações presentes são de grande importância para a melhoria deste cenário.

Palavras-chave: preparações farmacêuticas, nutrição enteral, terapia nutricional, cuidados de enfermagem.

Introduction

Enteral nutritional therapy (ENT) is a set of procedures used to provide the necessary nutrients to the gastrointestinal tract via a tube or through a catheter and is essential in the hospital setting (Rodrigues, Martins, Raposo, & Chicourel, 2014). However, some specificities must be observed, ENT is indicated when the patient maintains his gastrointestinal tract functioning and with the capacity to digest and absorb nutrients, even partially, and when the oral intake is not adequate or the patient does not voluntarily take at

least 60 % of your daily needs. A clear example of a potential patient to use ENT is the critical patient, hospitalized in the Intensive Care Unit (ICU), in an attempt to promote the maintenance and recovery of their nutritional status. When it meets the minimum requirements and can be performed, ENT is considered safe and satisfactory to provide the necessary nutrients to patients in special situations, and may include the use of formulas, such as oral supplementation or meal substitution (Santos et al., 2012; Carvalho et al., 2010; Nunes et al., 2013).

Patients in use of a nasogastric tube (NGT), when they do not have effective swallowing and are at risk for pulmonary aspiration, use the route of enteral nutrition also for the administration of the medicines, characterizing this as a routine procedure in hospital practice (Carvalho et al., 2010). The Resolution of the Collegiate Board of Directors - RCD nº 63, of July 6, 2000 of the *Agência Nacional de Vigilância Sanitária* [ANVISA] (Brasil, 2000), regulates the use of the tube for the administration of medicines, when necessary. The route evidently has some advantages, such as the wide availability of drugs for oral use, low cost and absence of risks associated with administration by more invasive routes (intravenous, intramuscular, subcutaneous or intradermal). However, the incorporation of medicines in this route also has some disadvantages, since they can interact directly or indirectly with enteral nutrition. Thus, an ENT is a highly complex procedure, requiring the commitment and training of a multidisciplinary nutritional therapy team (MNTT), also regulated by RDC nº. 63, this team must be composed of at least one doctor, one pharmacist and a nurse, which perform functions directly related (Carvalho et al., 2010; Nunes et al., 2013).

The Decree nº 94.406 of June 8, 1987 (Brasil, 1987) regulates the exercise of nursing and according to this, the administration of medication is the responsibility of the nurse, even if it is performed by another member of the team (Mota et al., 2010). Also, during the medicine cycle, the doctor is responsible for medication selection and should be cautious as oral medications are not evaluated by manufacturers and regulatory agencies for use in NGT (Carvalho et al., 2010; Basso & Pinheiro, 2014). The pharmacist has a duty to ensure the rational use of medicines and to work with patients and health professionals in order to resolve or prevent problems that may interfere with pharmacotherapy (Basso & Pinheiro, 2014). In this way, multiprofessional work minimizes the risk of failures that may compromise nutritional therapy as well as the efficacy of pharmacological treatment (Rodrigues et al., 2014).

The diversity of pathologies and their specificities, sometimes demand the use of specific formulations, which are unavailable in the market or are not standardized in the institution due to their low consumption. The lack of the necessary formulation causes incorrect grinding or dispersing techniques of the pharmaceutical forms, often modifying the physical form of a drug presentation and altering its route of administration. In the hospital environment, the routine for the

preparation of pharmaceutical forms to enable administration VNGT consists basically in tablet grinding or capsule opening and dispersion of its contents in water for subsequent administration (Nunes et al., 2013).

The use of the same tube, both for the administration of enteral nutrition and for the administration of medications, may result in interactions between its components (Beckwith, Feddema, Barton, & Graves, 2004). For such interactions to be minimized, some factors must be adequately controlled. As regards the medicinal product, the acidity, osmolality and sorbitol content of the liquid formulations, as well as the volume of the drug to be administered, must be observed; as for the diet, it is essential to control the presence of food, vitamins and the concentration of electrolytes in the stomach (Carvalho et al., 2010). The grinding of solid forms, prior to its administration, may present several drawbacks, which are aggravated when these include alteration of the pharmacokinetics and pharmacological action of the medicine.

In the hospital environment, the Medication Standardization Commission is responsible for selecting the medicines and pharmaceutical forms that will be available. At this point, it is worth considering that liquid presentations may be a more economical and rational option than the adaptation of tablets, if there is such alternative, since liquid formulations, adapted or not, facilitate the administration and compliance of the treatments, besides avoiding unnecessary losses, reducing health costs. The preferred alternative for the adaptation of solid dosage forms would be the preparation of extemporaneous formulations with the use of suitable excipients. However, it is difficult to ensure the stability of these formulations, prepared from crushed tablets, or powders contained in capsules, by the absence of tests proving their quality, safety and efficacy (Nunes et al., 2013).

The correct administration of medicines via tubes requires knowledge about the characteristics of the different oral dosage forms available in the market, as well as the possibility or not of their use and the correct technique for the manipulation. A modification of a commercially available pharmaceutical form may lead to increased toxicity, an appearance of undesirable effects, reduced efficacy, incompatibility and instability of the medicinal product, as well as potential risks to health practitioners who may handle them without the appropriate technical knowledge for this activity (Mota et al., 2010; Nunes et al., 2013).

Despite the increasing number of studies and bibliographic databases with information that guides

the correct preparation and administration of oral dosage forms via enteral tube, there is still a great discrepancy between what is advocated in the literature and what occurs in the usual clinical practice. Most of the recommendations for the viability of the solid forms for administration VNGT are still empirical (Thomson, Naysmith, & Lindsay, 2000). Considering the difficulty in predicting which changes may occur when enteral nutrition and a drug are concurrently given, the use of liquid dosage forms when available on the market is further preferred (Nascimento & Ribeiro, 2010; Nunes et al., 2013).

Based on the above, the objective of this study is to evaluate the knowledge of the various professionals involved in the administration of medicines VNGT in the institution under study, in order to identify the fragilities present during this process.

Material and methods

It is a cross-sectional descriptive study, consisting of a survey of the nursing professionals knowledge about the administration of medicines VNGT and the identification of the fragilities found by the participants during the same process. The present study was carried out in a teaching hospital located in the western region of Paraná, Brazil, and authorized by the Research Ethics Committee (REC) of the State University of Western Paraná, under number 1.254.869.

The study included nursing professionals who had an employment relationship with the institution, as well as resident nurses, who worked in the following sectors: Adult Intensive Care Unit (ICU-A), Medical Clinic and Surgical Clinic (F2), Neurology and Orthopedics (G3). Professionals working in the pediatric sectors (Neonatal ICU, Neonatal Intermediate Care Unit and Pediatrics) were excluded because of their specificities and the use of offlabel medication; Emergency and Emergency Room due to high patient and professional turnover; Maternity, as few drugs are administered via nasogastric tube; Surgical Center (SC) and Obstetric Center (OC) due to the characteristics of the service.

The hospital where the study was carried out has 195 beds, of which 147 are inpatient beds, distributed in the following specialties: 13 beds for Medical Clinic, 15 beds for Surgical Clinic, 44 beds for Gynecology and Obstetrics, 26 beds for Pediatrics, 26 beds for Neurology and Orthopedics, 6 beds for Cardiovascular and 17 beds for Psychiatry. It also has complementary beds and several: 10 beds in the Neonatal ICU sector, 15 beds

of ICU-A, 5 beds of Pediatric ICU, 10 beds in the UCI-N Unit and 8 beds in the Emergency Room, with 100% of their beds destined to SUS patients. It covers four regional, of the Health Secretariat of Paraná, for a population of approximately 2 million inhabitants. It is a teaching hospital that seeks to offer excellence and quality in health care, in the generation of knowledge and social responsibility, providing a differentiated service to society through professional expertise and multidisciplinary promoting the preservation of life.

During the period in which the questionnaires were applied, according to data collected in the institution Nursing Department, ICU-A sectors, G3 and F2 counted on 65, 30 and 31 nursing professionals respectively, distributed as follows: 11 nurses and 54 technicians and/or assistants in the ICU, 5 nurses and 25 nursing technicians and/or auxiliaries in G3 and 5 nurses and 26 nursing technicians and/or auxiliaries in F2, in addition to 3 resident nurses, one in each of the sectors included in the study.

As data collection instrument used the questionnaire (Appendix I), which was carried out from October 16, 2015 to December 5, 2015. The questionnaire applied to participants was adapted from Chicarro, Jimenez, Zanuy, Muñoz and Tejada (2012), and contains closed and open-ended questions. All the nursing professionals of the selected wings were approached by the evaluator during their working hours, individually or in groups, according to the availability of each sector.

During the approach the evaluator informed the professionals about the objectives of the study and the importance of the participation of each one, at the end of the approach the professionals were invited to answer the questionnaire and received the necessary guidelines on how to do it, among the guidelines was reinforced the importance of each participant carrying out the activity individually, without the help or influence of the evaluators or co-workers. The participants then received a questionnaire and, because of the large workflow, were allowed to take possession of the questionnaire until the end of the shift, when the evaluator returned to the sector to collect the questionnaires already answered. All participants who agreed to voluntarily participate in the study signed the ICT.

Among the 24 questions that comprised the questionnaire, 9 questions were used to identify: the average number of patients attended by each participant, the frequency of use of NGT for medication administration, the frequency of obstruction of these tubes; which oral pharmaceutical forms are best known and used by

participants for administration VNGT; the habit of consulting the Pharmacy Service, the prescriber, co-workers or some literature for the clarification of doubts regarding the administration of medicines VNGT; the frequency with which participants receive guidance (courses or continuing education activities) on the administration of medicines VNGT; the difficulties already faced in the routine of work and the most common doubts. The other 15 questions directly assessed the participants knowledge about the techniques recommended in the literature for the administration of medicines VNGT and whether the application of these techniques during the daily practice of the participants was in accordance with the recommendations. Evaluators, based on the score of the original questionnaire and the data collected in the literature, defined criteria for the correction of each question present in the questionnaire and for the attribution of a specific score for each of these questions, it is worth noting that the maximum score for each one of the 15 questions included in this step was 1 point. Correction and assignment of points were performed by the same evaluator, and the pre-defined criteria were also used for all questionnaires. All the criteria and scores attributed to the questions are presented below:

Question 2: are accepted as correct answer, only pharmaceutical forms, and for each pharmaceutical form quoted correctly is assigned 1/3 of the note, therefore, 1 pharmaceutical form = 0.33 points, 2 pharmaceutical forms = 0.66 points and 3 pharmaceutical forms = 1 point. Note: name of the drug or pharmacological class were considered as incorrect answers.

Question 3: Because of the formulation of the question, which is clear in saying 'the most appropriate pharmaceutical form', only the 'Syrups/suspensions/solutions' option is accepted as correct, and when marked with this option only, the interviewee receives the note Integral of the question = 1 point. When the interviewee indicates any other alternative, or more than one of the alternatives, the question is considered incorrect, and his grade is = 0.

Question 4: The question was divided into 2 parts for evaluation, in the first part the respondent receives 0.5 points by checking the 'Diluted', if the other alternative is chosen, automatically the whole grade of the question is = 0 points. In the second part of the question, the candidate receives 0.25 points when he cites the distilled water as a diluent and 0.25 points when he cites the volume used, and the volume of 10 to 50 mL is considered acceptable because of the variety of guidelines and medications

available. The response is also considered correct when the interviewee states that he consults the literature and performs the dilution according to the specific orientation for each drug, the participant then receives 0.5 points.

Question 6: the question's note was assigned according to predefined criteria and analysis of the evaluator, the first criterion is 0.25 points for the interviewee who to quote if the pill is crushed and how, 0.25 points if the respondent quotes the diluent used, 0.25 points if he reports that he washes the container and administers this remaining liquid and 0, 25 points if the person refers to the tube wash. If all the steps are completed the interviewee receives the maximum score of one point.

Question 7: The interviewee receives the full grade if he points out the alternative "None of the above can be crushed.", or, if he ticks one or more of the other alternatives, he receives 1/6 of the note for each hit, in this case, the question considered correct is the one that was not pointed out among the 6 options and the one considered incorrect is the question pointed out, for 1 correct question = 0,16 points, for 2 correct questions = 0,33 points, for 3 correct questions = 0.5 points, for 4 correct questions = 0.66 points, for 5 correct questions = 0.83 points.

Question 8: note = 0 for the 'Yes, always' answer, note = 1 for the 'No, never' answer, and when the answer is 'Few times', the evaluator analyzed the justification when it was present to score, without justification the note = 0.

Question 9: The question was divided into 2 parts for evaluation; in the first part the respondent receives 0.5 points if he indicates the option 'Yes', and 0 points if it marks the alternatives 'No' and 'Sometimes'. In the second part of the question the candidate receives 0.25 points when he cites that he adds diluent to wash the container and 0.25 points when he quotes that this liquid is aspirated with the syringe and administered in the tube.

Question 10: the note issue was assigned according to predefined criteria and evaluator's analysis, the criteria include: pause diet, report how long before the drug administration the diet is stopped, wash the tube prior to administration, administer one drug at a time, wash the tube after administration, wait 15 to 20 minutes, and resume the diet. For only 1 item quoted is assigned 0.14 points, for 2 items 0.28 points, for 3 items 0.42, for 4 items 0.57 points, for 5 items 0.71 points, for 6 items 0.85 points and for the 7 items 1 point.

Question 11: the respondent receives a note = 1 when he opts for the alternative 'No, because it is

not recommended' and 0 points for the other alternatives.

Question 12: the respondent receives a note = 1 when he opts for the alternative 'Two hours before' and 0 points for the other alternatives.

Question 13: the respondent receives a note = 1 when he opts for the alternative 'Two hours later' and 0 points for the other alternatives.

Question 14: the respondent receives a note = 1 when he opts for the 'Wash before and after administering them' alternative and 0 points for the other alternatives.

Question 15: the respondent receives a note = 1 when he opts for the alternative 'No, in no case should more than one medication be administered at one time' and 0 points for the other alternatives.

Question 16: the respondent gets a note = 1 when he opts for the 'Yes, always' alternative and 0 points for the other alternatives.

Question 19: the respondent gets a note = 1 when he opts for the alternative 'Administering water / heated infusions' and 0 points for the other alternatives.

Whenever the question is left blank, the assigned score is = 0 points, as it implies that the participant does not know the answer to the subject in question. After assigning the scores, each participant received a score from 0 to 100; the 15 points (maximum score that could be obtained) were proportionally transformed into a grade equivalent to 100.

All data collected in the questionnaire were entered into a Microsoft Office Excel 2007 worksheet by the main evaluator and reviewed by a second evaluator. Statistical analyzes were selected by a statistician and performed using the RStudio Desktop software, version 0.98.1103 (2015).

Results and discussion

According to data collected at the Nursing Directorate of the hospital under study, the total number of active employees of the Nursing Service is 129, of whom 41 participated in the study. The characterization of the participants is shown in Table 1.

According to the answers to the questionnaire, the calculation of the averages was performed, it was identified that a nurse attends about 164 patients per month, one technician attends 119, one resident nurse attends 149 and the auxiliary 117 patients per month. Thus, disregarding the categories, each participant attends an average of 137 patients / month.

Table1. Characterization of study participants.

	Female	Male	In blank	Total	
Genre	75.6%	12.2%	12.2%	100%	
	31	5	5	41	
	Morning	Afternoon	Night	Total	
Shift	21.9%	34.2%	43.9%	100%	
	9	14	18	41	
	Nurse	Resident Nurse	Nursing Technician	Nursing Assistant	Total
Position	21.9%	4.9%	63.4%	9.8%	100%
	9	2	26	4	41

Although the work overload does not belong to the items evaluated in the questionnaire, during visits to the hospitalization sectors for disclosure and application of the questionnaires, in some observations made by participants in the questionnaire itself to justify some incorrect behavior, it can be observed that the workload is a very frequent complaint, which, according to participants, often prevents their activities from being carried out in the best possible way. According to the Federal Nursing Council Resolution No 293/2004 (Conselho Federal de Enfermagem, 2004) each hospitalization unit looks at patients with different demands, therefore there is no fixed and determined number of patients that a nursing professional should assume, what the resolution foresees is the use Of an instrument, called the Patient Classification System, which assesses the complexity of patient care and calculates the size of the nursing staff, based on the time taken to provide patient care. The resolution also defines that it is the nurse's job to establish the number of professionals in the sector according to the type of care predominant in the unit, for this, nurses must, according to the established criteria, apply the classification of type of care at least once a day, for 120 days, thus obtains the profile of the patient's degree of dependency and it is possible to calculate the amount of professionals needed to solve the problem of work overload.

Regarding the correct answers to the questionnaire, the average score obtained by the nurses was 47.3, by the technicians 38.7, by the resident nurses 34.5 and by the nursing assistants 37.0. The specific course or orientation on the administration of drugs via the tube was reported by 24 (66.7%) of the participants who answered this question.

Participants were asked about the frequency of patients using NGT and, according to the self-report of each participant, 56.2% of the total number of patients attended per employee were in need of at least one medication administered via tube. Of these, 14.4% had their tubes clogged at least once.

When it is not possible to unclog the catheter, the passage of a new catheter in addition to the discomfort to the patient and the risk of mucosal trauma can lead to an increase in hospitalization costs and nursing staff workload (Farias, Didonet, Predebon, & Schwarzbald, 2011).

As for the forms of administration, 2 (4.9%) participants believe that the best pharmaceutical form to be administered via the tube is the tablets, 31 (75.6%) believe that the syrups/suspensions/solutions are and 8 (19, 5%) did not answer the question. The literature emphasizes liquid forms as preferred for administration of medicines VNGT, since preparations derived from the solid dosage forms may contain undissolved particles which may clog the tube (Dickerson, 2004; Carvalho et al., 2010).

Concerning crushing the pharmaceutical form, seven (17.5%) reported having crushed a modified release tablet a few times, 28 (70.0%) reported always crushing and 5 (12.5%) reported never having crushed. It may be noted that this practice of crushing modified-release tablets is common, however this action may lead to the decrease or loss of medicine effectiveness due to changes in its chemical structure. Each pharmaceutical form has different characteristics and formulations, so that the drug is correctly absorbed and reaches its place of action, therefore, it is always necessary to seek a route of administration or an alternative pharmaceutical form for such cases (Mota et al., 2010).

Regarding the causes attributed to tube obstruction, 3 participants did not answer the question, 32 (84.2%) believe that the obstructions are related to diet formulation and 6 (15.8%) believe that there is no relation between the obstruction and diet formulation; 29 (76.3%) that the obstructions are related to the drugs administered by the tube and 9 (23.7%) believe that there is no relation between the obstruction and the drug administration by this route; And 6 (15.8%) that the obstructions are related to inadequate or insufficient care with the tube while 32 (84.2%) believe that there is no relation between obstruction and tube care.

Pereira, Coelho, Mesquita, Teixeira and Graciano (2013), identified that catheter obstruction is among the main causes of unplanned withdrawal of intensive care tubes and that these obstructions may be related to diet formulation, use of coated medications, and irregular lavage. In this way, all steps involving the administration of a medicine VNGT are of great importance and must be carried out with care to avoid complications arising from the exchange of the tube.

Among other complications related to the use of tube for administration of medications, 24 (68.6%)

participants pointed out that aspiration may occur and 11 (31.4%) do not; 20 (57.1%) that can trigger diarrhea and 15 (42.9%) believe that it is not; And 19 (54.3%) that there is a lack of effectiveness of the drug administered and 16 (45.7%) that the effectiveness is not altered. Six participants did not answer the question.

Unamuno and Marchini (2002) when evaluating the main complications related to the use of tubes, emphasizes that diarrhea is the most commonly encountered complication. One of the factors that can trigger this picture is the use of antimicrobials that alter the intestinal flora producing an excessive growth of the bacteria. Aspiration can occur and is a serious complication, so that aspiration is avoided measures should be taken, such as: keeping the patient in a seated or semi-seated position during the administration of the diet; control the infusion time of the enteral diet, if possible, by means of computerized infusion pumps; to monitor peristalsis; to monitor the residual gastric volume. The same risk applies also to the administration of medicines, and it can be extended the same preventive measure for this, besides always observing the correct positioning of the tube. The lack of effectiveness is often described in the literature, as already mentioned, mainly due to changes in the chemical structure of the drugs.

In cases of doubt, the professional sought by the nurse is the doctor/prescriber, technicians seek mainly guides and manuals, the professionals most sought after by the resident nurse are also the co-workers themselves or the doctor/prescriber while the auxiliaries try to clarify their questions with the doctor/prescriber or by searching guides and manuals.

Within the hospitals, the Multiprofessional Nutrition Therapy Team (MNTT) is responsible for the best therapeutic options compatible with the use of SNE, so that the Pharmacy and Therapeutics Commission (PTC) can later standardize them in the institution and thus make them available. Despite the involvement of MNTT and PTC in the standardization of medicines, the choice of medication to be prescribed is always attributed by the physician, so the importance of multiprofessional work throughout the process. Within MNTT, it is incumbent upon the pharmacist to take action so that problems related to managed medication VNGT are avoided, some possible measures include drawing up lists of medicines with restrictions and therapeutic alternatives, and protocols for manipulation, transformation and administration of medicines VNGT when is required (Carvalho et al., 2010).

The current scenario shows that the pharmacist is not the most sought professional to clarify doubts regarding medicines, so that it becomes recognized in the institution, the pharmacist must maintain a good relationship with the multiprofessional team, and to carry out educational measures regarding their knowledge about medicines.

Questions 12 and 13 evaluated the knowledge about the drug phenytoin and its specificities, only 2 (4.9%) participants pointed out the correct alternative. Nineteen (46.3%) participants pointed out the alternative '15-30 minutes before' in question 12 and 18 (43.9%) participants pointed out the alternative '15-30 minutes later' in question 13.

Phenytoin is an example of a drug that interacts in some way, either with the tube material or with the diet. In an integrative review, Lopes, Gomes, Madeira and Aguiar (2013), demonstrated that concomitant phenytoin administration to EN reduces the solubility of phenytoin and consequently its plasma concentration, which may lead to an increased risk of seizures. The absorption can be reduced by up to 80%, probably due to the complexation of ions to some dietary components, such as proteins and calcium salts, and the adhesion of phenytoin to the tube (Basso & Pinheiro, 2014).

In order to reduce the risk of precipitation and obstruction, it is suggested that, for administration VNGT, phenytoin should be used in its liquid presentation, diluted with 20 to 60 mL of water; Further recommends that EN be discontinued two hours prior to administration and restarted two hours later; And the tube should be washed with 60 mL of water before and after administration of the drug.

Question 14, which evaluates the habit of washing the catheter, revealed that 18 (43.9%) of the participants washed the catheter before and after the administration of drugs against a majority (48.8%) who reported washing only after administration the medication. This practice should be performed, without exception, before and after the administration of the medicines and when applicable, also between the administration of different drugs. Chicharro, Jiménez, Zanuy, Munõz and Tejada (2012), recommend that a volume of 10 to 50 mL of water be used for washing the catheter, thus minimizing the risk of obstructions and the interaction between different drugs, also between drugs and diet.

It can be inferred that although many of the professionals have already received some kind of guidance, the knowledge regarding the administration of medicines VNGT is still limited. As already mentioned, there should be an

interaction between all health staff, including medical professionals, nursing staff, nutrition and pharmacy service.

Training and continuing education actions can be interesting strategies to improve knowledge and practice in the day-to-day consequently, being the pharmacist the 'professional of the medicine', this one has much to contribute for the improvement of the service with greater probability of therapeutic success. The findings of the study can serve as a reference for the pharmacist and the health team in the elaboration of health education actions and, in the future, in proposing educational measures to improve the flaws identified in this process.

For future studies, after applying educational measures based on the present study, the questionnaire can be repeated, comparing the percentage of errors and correctness before and after the training and the development of continuing education actions.

During the execution of this work, some difficulties were found which influenced the development of the same, among them the lack of professional adhesion, which delayed the proposed schedule and also prevented the validation of the questionnaire. We believe that these difficulties are due to the fact that professionals feel evaluated, which can be observed by the fact that only 31.8% of the professionals answered the questionnaire, despite the researcher explaining previously that the latter did not aim at evaluating the professional, but rather the process of administering drugs through the NGT, so that educational measures could be proposed to improve patient care.

Some other limitations are also found in the study, among them, the fact that the participants were in possession of the questionnaire for a certain period, which provides some kind of consultation with bibliographic sources and / or exchange of information among colleagues to respond to the instrument. Another limitation is the fact that the correction was performed by only one evaluator, which does not make it possible to compare results to ensure greater accuracy in the research.

Conclusion

There is still a great difference between the usual practice and the one recommended in the literature, evidenced by the lack of mastery of the health professionals in several steps involved in the administration VNGT. The performance of the pharmacist with the multidisciplinary team, in actions of continuing education, conference and medical prescription screening, are potential strategies to

minimize routine problems and clarify doubts when prescribing or administering a medication VNGT. In this way, the pharmacist configures an important barrier in the identification and prevention of possible errors related to the use of the medicine.

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Received on June 30, 2016.

Accepted on February 14, 2017.

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Appendix I - Questionnaire

Questionnaire - Medication Administration via tube	
Position: ☐ Nurse ☐ Resident Nurse ☐ Nursing Technician ☐ Nursing Assistant	
Sector: ☐ ICU ☐ G3 ☐ F2	
Shift: ☐ Morning ☐ Afternoon ☐ Night	
1. Approximately how many patients you meet in a week? _____ How many of them have the need for at least one drug administered via tube? _____	7. Check the pharmaceutical forms that you believe may be crushed to be administered via tube: ☐ Coated pills. ☐ Sublingual pills. ☐ Prolonged liberation pills. ☐ Oral tablets. ☐ Chewable tablets. ☐ Modified-release tablet. ☐ None of the above can be crushed.
2. List 3 examples of oral pharmaceutical forms: _____	8. Have you ever crushed a coated pill or a modified-release tablet, such as folic acid, nifedipine, and carbamazepine, to administer via a tube? ☐ Few times. ☐ Yes, always. ☐ No, never.
3. Which of the pharmaceutical forms below you believe is most appropriate to administer via tube? ☐ Powders. ☐ Capsules. ☐ Injectables. ☐ Pills. ☐ Syrups/ suspensions/solutions.	9. After crushing the pills, you wash the container and administer the remaining liquid? ☐ Yes. ☐ No. ☐ Sometimes. If yes, how do you do it? _____
4. If you need to administer some liquid pharmaceutical form via tube, you administer: ☐ Directly ☐ Diluted If you dilute it, how do you do it? _____	10. In the case of a patient with continuous enteral nutrition, how do you proceed? _____
5. Do you have the habit of consulting the Pharmacy Service to check if there is an alternative of the drug in its liquid form? ☐ Yes. ☐ No.	11. Have you ever added a drug to enteral nutrition? ☐ Yes, those needed. ☐ No, because it is not recommended. ☐ Only one, to avoid interaction between them.
6. When you need to crush some pill to administer via tube, how do you do? Describe the whole procedure _____ _____	12. In the case of a patient with continuous enteral nutrition in treatment with phenytoin, how long before administering the drug do you interrupt nutrition? a) 15 to 30 minutes before. b) Two hours before. c) Phenytoin should be given along with nutrition.
13. After administering phenytoin, when you resume the administration of continuous nutrition? a) Immediately after. b) Two hours later. c) 15 to 30 minutes later.	18. What do you primarily attribute to the obstruction of the tube? ☐ To the formulation of the diet. ☐ To the drugs administered by it. ☐ Incorrect or insufficient care with the tube.
14. When you wash the tube to administer the medications? ☐ I do not wash the tube. ☐ I wash before administering them. ☐ I wash only after administering them. ☐ I wash before and after administering them. What do you use for this? _____	19. When a tube becomes clogged, how do you solve the problem? ☐ Administering water / heated infusions. ☐ Administering pancreatic enzymes. ☐ Other way: _____
15. When you need to administer multiple medications via the tube, do you mix them all together? ☐ Yes, since this route of administration allows. ☐ Yes, but not more than 2 medications. ☐ No, in no case should more than one medication be administered at one time	20. Besides obstructions, you believe that the administration of drugs via tube may result in some other complications? ☐ No. ☐ Yes, for example: ☐ Aspiration. ☐ Diarrhea. ☐ Lack of effectiveness. ☐ Others: _____
16. Do you wash the tube between the administration of different drugs? ☐ Depends on the drug. ☐ Yes, always. ☐ I wash the catheter only before and after administering the medications, between one and another it is not necessary.	21. In cases of doubt related to the administration of drugs by catheter, what do you consult? ☐ Coworkers. ☐ Responsible nurse. ☐ Doctor / prescriber. ☐ Pharmacy Service. ☐ Guides and manuals.
17. Approximately how many patients needed any medicine given via tube in the last month? _____ How many tube obstructions do you believe have occurred during this period? _____	22. Have you ever taken a course or received specific guidance on medication administration via tube? ☐ Yes. ☐ No.
23. What are the most recurring questions at the time of drug administration via tube? _____ _____	
24. What problems have you experienced at the time of drug administration via tube? _____ _____ _____	
THANK YOU FOR YOUR COLLABORATION!	