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Assessing gastric residual volume: a description of nurses' clinical practice

Aferição do volume residual gástrico: retrato da prática clínica de enfermeiros

Verificación del volumen gástrico residual: retrato de la práctica clínica de enfermeros

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ABSTRACT

Objective: To analyze the differences in nurses' clinical practice for assessing residual gastric volume and identifying the theoretical framework which supports their practice. **Method:** A cross-sectional study carried out by sending an online questionnaire by e-mail to nurses registered at the Regional Nursing Council of the State of São Paulo. **Results:** This study included 598 nursing professionals, with 484 only providing care to adults and 114 exclusively to children. The gastric residual volume test is performed by 83.4% of nursing professionals; in most cases the suspension and prescription of enteral nutritional therapy are performed by the physician. Suspension of enteral nutritional therapy among adults predominantly occurs when the gastric residual volume is equal to 200 ml, and in children when values are less than 100 ml. Procedure after diet suspension involves the return of aspirated gastric contents and maintaining the catheter closed until the next hour in 48.3% of the procedures among adults, and 68.4% among children. 42.9% of the participants in this study were not aware of the theoretical basis that supports the test performance. **Conclusion:** We can highlight the need for nurses' training and further studies focused on the practice for assessing gastric residual volume.

DESCRIPTORS

Diet; Enteral Nutrition; Gastric Emptying; Nursing Care.

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INTRODUCTION

Enteral nutritional therapy (ENT) has undergone significant growth over the last few years combined with scientific development that supports it, and the benefits associated with the early initiation of nutritional therapy among critically ill patients with nutritional problems reflect on improved immune function and decreased metabolic complications, thus improving the prognosis of patients[1].

Within this context, the nursing team has a prominent role in the multidisciplinary team, acting in the identification, support, administration and clinical evolution of patients undergoing nutritional therapy. Therefore, these professionals often face the problems associated with administration of ENT; among them is the gastric residual volume (GRV), meaning the inadequate absorption of the administered ENT volume, which may be indicative of gastric intolerance and have direct impacts on therapy administration continuity[2].

The practice of analyzing GRV is frequent in intensive care units; however, it still represents a controversial practice. Several international entities such as the American Society for Parenteral and Enteral Nutrition (ASPEN) and national entities such as the Brazilian Society of Enteral and Parenteral Nutrition (*Sociedade Brasileira de Nutrição Enteral e Parenteral – SBNPE*) and the Brazilian Association of Nutrology (*Associação Brasileira de Nutrologia – ABRAN*) currently emphasize the lack of studies that support the most appropriate way of assessing GRV, and whether or not it is associated with a better prognosis or occurrence of complications such as an increased incidence of pneumonia due to regurgitation and aspiration, in addition to the difficulty in establishing standards to be followed in relation to the volume[3-4].

National guidelines recommend measuring GRV according to the institutional protocol, although criteria to be followed are not established, leaving the question open on how to evaluate the values found and what measures should be implemented[3].

Internationally, ASPEN recommends that GRV between 200 and 500 ml deserve attention from the multidisciplinary team, recommending implementing measures that reduce the risk of aspiration; however, this entity does not recommend suspending the diet for GRV values below 500 ml in the absence of other signs indicating intolerance[4].

Considering that the current international recommendations generate questions and the national recommendations encourage hospitals to create their own protocols, this study aimed to analyze the practice for managing residual gastric volume (GRV) among clinical nurses from different health units of the state of São Paulo, and to identify the theoretical foundation that subsidizes their practice.

METHOD

This cross-sectional study was carried out by sending an online questionnaire to the e-mails of the nurses registered at the Regional Nursing Council of the State of São Paulo (*Conselho Regional de Enfermagem do Estado de São Paulo – COREn-SP*).

The questionnaire proposed by the authors included questions related to the socio-demographic characterization of the participants and aspects related to the practice or not of GRV assessment by nurses in different health units. Its construction was based on aspects pointed out by the American Society for Parenteral and Enteral Nutrition (ASPEN), the Brazilian Society of Enteral and Parenteral Nutrition (SBNPE) and the Brazilian Association of Nutrology (ABRAN)[3-4].

The link for the questionnaire proposed by the authors underwent apparent validation and content by three nurses with doctorate degrees experienced in handling nasogastric and/or enteric catheters and the use of GRV measurement in their clinical practices. The judges evaluated the quality of the questions' presentation and the completeness of the information. The judges suggested changes in order to make the questions and alternatives clearer, which were accepted by the authors.

Data collection took place by sending the instruments to the nurses who have an e-mail account registered at the COREn-SP until October 2014. The data collection instrument was hosted on a specific site for this purpose. This website includes a system for the questionnaire which does not allow participants to progress in completing the information unless they are in agreement with the clear and Informed Consent Form (ICF), and they were not allowed to skip essential questions for evaluating the study objectives.

Thus, completion of the questionnaires was waited on for three months, which corresponded to ninety days from sending the invitation letters; after this occasion, filling out the instrument was blocked by the researchers.

Of the 92,000 e-mails sent to the nurses, 1,014 responses were received for the consultation conducted up to the proposed deadline. From these, 598 respondents who agreed to participate in the investigation by signaling their intention on the clear and Informed Consent Form (ICF) and who completely answered the instrument sent to them were included in the study.

It is worth emphasizing that although the email was sent to all registered emails at the COREn-SP, situations that could not be controlled by the authors can arise such as difficulties related to e-mail providers, full inboxes, and outdated or incorrect emails which may have affected the total number of received replies.

Data analysis was performed in a descriptive manner. The results were presented according to frequency distributions and statistical descriptive measurements such as arithmetic mean, standard deviation, median, minimum and maximum values for the quantitative variables. The double entry data technique was used and the collected data were analyzed by the *Statistical Package for the Social Sciences* (SPSS) software version 20.0.

This project was approved by the Research Ethics Committee of the School of Nursing of the Universidade de São Paulo under number 544.073/2014, in compliance with the Guidelines and Norms Regulating Research involving human beings based on Resolution No. 466 of 2012 of the National Health Council.

RESULTS

The sample consisted of 598 nursing professionals, mostly females (511, 85.5%), of which 445 (74.4%) reported being specialists (Table 1), with a mean age of 33.10 years (SD± 7.6 years), a minimum age of 22 and a maximum of 59 years.

Most of the professionals work in public (261, 44.1%) or private hospitals (245, 41.4%), with an emphasis on Intensive Care Units (ICUs) (226, 37.8%), and Clinical-Surgical Hospitalization Units (216, 36.1%), especially attending adults (484, 80.9%) (Table 1).

Table 1 – Sociodemographic characterization – São Paulo, SP, Brazil, 2016.

Variables	N	%
Gender		
Males	87	14.5
Females	511	85.5
Level of training		
Specialization	445	74.4
Master's Degree	32	5.4
Doctorate	8	1.3
Post-doctorate	7	1.2
Blank/Do not have a title	106	17.7
Type of Institution*		
Public hospital	261	44.1
Private hospital	245	41.4
Long-Term Institution	54	9.1
Outpatient (clinic)	17	2.9
Others	15	2.5
Working Area		
Intensive Care Unit	226	37.8
Clinical-Surgical Hospitalization Unit	216	36.1
Emergency	55	9.2
Outpatient	23	3.8
Others	78	13.1
Attended Patients		
Adults	484	80.9
Children	114	19.1

* 6 Missing. Note: (N=598).

Of the 598 nurses in the sample, 83.4% (n=499) performed the GRV test in their units. The nursing team is usually responsible for the GRV test, with an emphasis on nurses (497, 83.1%), followed by nursing technicians (451, 75.4%) and nursing assistants (249; 41.6%). The devices most commonly used in the units in which the nurses act are the Dobbhoff catheter (414, 69.2%) or Levine catheter (335, 56.0%) (Table 2).

The most cited theoretical foundation that bases the GRV test practice was the *SBNPE* (137, 22.9%), followed by that of the Multiprofessional Commission for Enteral and Parenteral Feeding (*Comissão Multiprofissional de Alimentação Enteral e Parenteral – CMAEP*) (128, 21.4%) and by ASPEN (93, 15.5%). However, we can also highlight the responses of professionals who reported regarding the theoretical basis by only following the guidelines of physicians (77, 12.9%) or nutritionists (71, 11.9%). It is also worth noting that 184 (30.8%) professionals reported not being aware of the theoretical basis of the practice, and 2 (12.2%) performed the practice without any theoretical support (Table 2).

Table 2 – Distribution of characteristics regarding the practice of gastric residual volume test – São Paulo-SP, Brazil, 2016.

Variables	N	%
Performs the GRV test (N=598)		
Yes	499	83.4
No	98	16.4
Blank	1	0.2
Professional who performs the GRV test*		
Nurse	497	83.1
Nursing technician	451	75.4
Nursing assistant	249	41.6
Nutritionist	2	0.3
Physician	2	0.3
Type of device used by patients*		
Dobbhoff Catheter	414	69.2
Levine Catheter	335	56.0
Gastrostomy	217	36.3
Jejunostomy	99	16.7
Theoretical basis for practice*		
American Society for Parenteral and Enteral Nutrition (ASPEN)	93	15.6
Brazilian Society of Enteral and Parenteral Nutrition (SBNPE)	137	22.9
Multiprofessional Commission for Enteral and Parenteral Feeding (CMAEP)	128	21.4
Physician guidance	77	12.9
Nutritionist guidance	71	11.9
Not sure	184	30.8
No theoretical basis	12	2.0

Legend: *Question with more than one possible answer,

Among those who provide care to adult patients (484, 80.9%), nurses adopted a 200 ml volume as an indication for NCD suspension in 220 (45.4%) cases. Among children, the majority reported volumes smaller than 100 ml (32, 28.1%); however, there are values that can be considered conflicting, since the value of 600ml was referenced as indicative for ENT suspension in 1 (0.9%) case (Table 3).

Regardless of the attended public, the participating nurses reported that the physician was the professional responsible for suspending the diet in 352 (72.7%) cases among adults, and 109 (95.6%) among children (Table 3).

In relation to the conduct performed after suspending the diet among those who attend adults, 234 (48.3%) returned the previously aspirated gastric content being considered as excess, and the probe remains closed until the next time; when noticing the excess volume, 206 (42.6%) disregard it and the diet is installed only in the next time; 55 (11.4%) reported medicine administration, and 40 (8.3%) reported other procedures (Table 3).

Among those attending children, 78 (68.4%) returned the previously aspirated gastric content being considered excess, and the probe remains closed until the next time; 26 (22.8%) disregard the excess volume and install the diet in the next time; 19 (16.7%) reported other procedures, and three (2.6%) reported medicine administration (Table 3).

Regardless of the patient being a child or an adult, the professionals responsible for the prescribing ENT are similar: among adults it is the physician (368, 76.0%), the nurse (198, 40.9%) and the nutritionist (143, 29.5%); among children, the physician (105, 92.1%), followed by the nurse (23, 20.2%) and finally the nutritionist (12, 10.5%) (Table 3).

Table 3 – Description of diet prescription and suspension after the gastric residual volume test – São Paulo, SP, Brazil, 2016.

Variables	Attended patients			
	Adults		Children	
	N	%	N	%
Volume indicated for diet suspension*				
Less than 100 ml	99	20.4	32	28.1
200 ml	220	45.4	13	11.4
300ml	53	11.0	3	2.6
400ml	17	3.5	-	-
500ml	35	7.2	2	1.7
600 ml	8	1.7	1	0.9
Others	44	9.1	62	54.4
Blank/Did not respond	8	1.7	1	0.9
Professional responsible for suspending the diet*				
Physician	352	72.7	109	95.6
Nurse	262	54.1	37	32.5
Nutritionist	138	28.5	8	7.0
Nursing technician	5	1.0	0	0
Nursing assistant	3	0.6	0	0
Procedure after suspending the diet*				
Returning the aspirated contents to the patient and keeping the tube closed until the next time	234	48.3	78	68.4
Disregarding the excess volume and installing the diet in the next time	206	42.6	26	22.8
Use of medication	55	11.4	3	2.6
Others	40	8.3	19	16.7
Professional responsible for prescribing the diet*				
Physician	368	76.0	105	92.1
Nurse	198	40.9	23	20.2
Nutritionist	143	29.5	12	10.5

* Question with more than one possible answer.

DISCUSSION

Most of the nursing professionals participating in this study and who perform the GRV test have specializations and work in the ICU or in the clinical-surgical hospitalization units, since malnutrition and other indications for ENT such as insufficient food supply, stroke, motor impairment or trauma, among others, combined with the complexity of the patients attended are more common in these units[5-7].

ENT has the purpose of maintaining and recovering nutritional status through controlled intake of nutrients to replace or complete the feeding in patients unable to perform oral intake, such as those affected by pathologies of the gastrointestinal tract, orotracheal intubation or neurological disorders with impairment of the level of consciousness, being indicated for patients unable to reach at least 70% of their daily nutritional recommendations[4,8]. ENT is contraindicated in situations in which the gastrointestinal tract is not intact and/or functional, such as in situations of paralytic ileus, mechanical obstruction of the gastrointestinal tract (GIT), vomiting or severe diarrhea[9].

The most present ENT devices in the study were the Dobbhoff catheter, which is generally employed in the post-pyloric position and is indicated for patients with risk of aspiration, gastroparesis and gastric emptying delay[7], and the Levine catheter which is recommended for gastric allocation, and allows greater tolerance to a variety of formulas and a larger volume of infused diet, which may lead to an increased risk of aspiration; on the other hand, we can highlight the better cost-effectiveness of this catheter when compared to gastrostomies or jejunostomies[10].

In analyzing these aspects, a recent meta-analysis observed that the post-pyloric position may result in better nutritional supply, in addition to decreasing GRV; however, it is unclear whether clinical outcomes associated with aspiration, pneumonia, or mortality show any improvement with this catheter positioning[11].

Intolerance to ENT is often used as a synonym for GIT dysfunction, affecting up to 50% of patients undergoing mechanical ventilation. It is characterized by slow gastric emptying, leading to signs and symptoms associated with elevated GRV, potential risk of reflux and aspiration, in addition to gastrointestinal changes such as abdominal distension, constipation, vomiting, diarrhea, increased abdominal circumference and subjective discomfort[2,4].

Despite intolerance to ENT being associated with several aspects, it is often observed that the nursing team uses GRV measurement as the only way of measuring these changes; a fact observed in a longitudinal American study evaluating 332 nurses, which found that 89% of respondents use this strategy for evaluating food intolerance[12]. In this same sense, a previous investigation verified that 97.1% of nurses among 2,298 respondents use the GRV assessment as a sign of ENT intolerance, although other aspects have also been reported such as abdominal distension (88.5%), vomiting (86.0%), auscultation of abdominal sounds (79.7%), nausea (79.6%) and gastric discomfort (79.3%)[13].

This aspect was also evidenced in the present study when observing that implementing the GRV test was reported by the majority of the sample. Most of the professionals who attend adults suspend the diet when the GRV is equal to or greater than 200 ml, and in children when it is less than 100 ml, in which the established procedure predominantly involves the return of the aspirated excess gastric content and closure of the catheter until the next ENT administration.

Controversies concerning standardization for the best way to act regarding GRV are observed in the literature[2] among national and international guidelines. In this sense, the ASPEN recommendation suggests evaluating GRV every six hours or before each infusion when using intermittent feeding. If the GRV is greater than 500 ml, the diet should be interrupted for two hours and the GRV reassessed, resuming the diet if the aspirated volume is less than 500 ml and interrupting it if the volume is maintained[14].

In Brazil, SBNPE and ABRAN claim that there is no consensus on ideal values[3]. However, it is should be pointed out that the national guidelines have not been updated since 2011.

Elevated GRV results are considered parameters indicative of disorders associated with gastric emptying, pneumonia, regurgitation and aspiration, and which lead to suspending the ENT administration more frequently when values between 200 ml and 250 ml are found[2,4,13]. Although one study found that at least one-third of nurses report interruption of ENT when GRV values are equal to or less than 150 ml[13].

It should be emphasized that GRV should not be used as a risk marker for aspiration in a standardized way among critically ill patients. Implementing measures to reduce the risk of aspiration is suggested for patients with GRV between 200 and 500 ml, avoiding ENT suspension only based on GRV evaluation without other symptoms of food intolerance; however, we emphasize that the quality of evidence supporting this recommendation is considered low[4].

A study aimed at evaluating the association of ENT intolerance and mortality in 1,712 ICU patients observed that the most frequent symptoms were vomiting, absence of abdominal sounds, abdominal distension and GRV greater than 500 ml in 24 hours, and that the presence of three or five of these symptoms were associated with higher mortality[15].

Among those attending children, given the diversity of the age range there are various suggestions in the scientific literature regarding the values to be considered. One study indicates GRV greater than 10 ml/kg for children and volumes above 400 ml for adolescents of up to 50 kg; in these cases, ENT interruption and re-evaluation of GRV with alteration of the diet infusion volume, if necessary, and establishing prokinetic agents are recommended[16]. Other researchers suggest a percentage approach to assessing GRV in children by defining ENT intolerance when GRV is greater than 50% of the infused diet, or in the presence of vomiting and abdominal distension[17].

In this study, we found that most of the participating nurses reported physicians as the professionals responsible for suspending and prescribing ENT. This is in accordance with the national legislation which establishes that the physician is the professional responsible for the indication and medical prescription of ENT, and the nutritionist for the dietary prescription of ENT; this means the type and amount of nutrients appropriate to the patient, considering the pathology and conditions of the digestive tract. On the other hand, nurses are responsible for several activities mainly related to ENT administration, in addition to being involved in the education of patients and family members[18].

Professionals who performed the GRV test reported diversity regarding the theoretical basis that supports the practice of GRV testing, not only citing the SBNPE, but also the Multiprofessional Commission of Enteral and Parenteral Food (CMAEP). However, at least one-third of the respondents reported a lack of knowledge on the theoretical basis that subsidizes their practice.

An advance of techniques and knowledge in the health area has highlighted the need for professional improvement connected to continuous training and to developing skills and competences for excellence in nursing care; thus, a deeper understanding of theoretical and practical content is needed for better nursing care for ENT patients.

CONCLUSION

It is concluded that a third of the nurses are unaware of the theoretical basis that subsidizes their practice regarding the object of this study, which can compromise the quality of care and therefore patient safety.

The GRV test was mainly applied to verify food intolerance and it was noted that there is no consensus regarding cut-off values, technique standardization or theoretical reference standardization for the practice, in which the most common GRV value among adults was 200 ml, and less than 100 ml for children.

Therefore, we can highlight the need for investigations that collaborate in determining which would be the ideal protocols for patient care, depending on the type of patient attended, thus favoring reduced nutritional support care failures. Moreover, we can highlight the need for adequate professional training for the practice which will involve daily monitoring of the procedures performed by the team and continuing education, thereby collaborating in the detection of possible errors and better qualifying the care practice.

RESUMO

Objetivo: Verificar diferenças na prática de aferição do volume residual gástrico entre enfermeiros clínicos e identificar a fundamentação teórica que subsidia a prática. **Método:** Estudo transversal realizado por meio do envio de questionário *online* aos e-mails dos enfermeiros cadastrados no Conselho Regional de Enfermagem do Estado de São Paulo. **Resultados:** Participam do estudo 598 profissionais de enfermagem, dos quais 484 prestavam assistência apenas a adultos e 114 exclusivamente à crianças. O teste do volume residual gástrico é realizado por 83,4% dos profissionais da enfermagem, sendo que, em sua maioria, a suspensão e a liberação da terapia nutricional enteral são realizadas pelo médico. A suspensão da terapia nutricional enteral entre adultos ocorre, predominantemente, quando o volume residual gástrico é igual a 200 ml e, entre crianças, se valores menores do que 100 ml. A conduta após a suspensão da dieta envolve a devolução do conteúdo gástrico aspirado e a manutenção do cateter fechado até o próximo horário, em 48,3% dos atendimentos entre adultos e 68,4% entre crianças. Dos participantes da pesquisa, 42,9% desconhecem a fundamentação teórica que subsidia a prática do teste. **Conclusão:** Evidenciou-se a necessidade de capacitação dos enfermeiros e de novas investigações sobre a prática de aferição do volume residual gástrico.

DESCRITORES

Dieta; Nutrição Enteral; Esvaziamento Gástrico; Cuidados de Enfermagem.

RESUMEN

Objetivo: Verificar diferencias en la práctica de verificación del volumen gástrico residual entre enfermeros clínicos e identificar la fundamentación teórica que subsidia la práctica. **Método:** Estudio transversal realizado mediante el envío de cuestionario en línea a los emails de los enfermeros registrados en el Consejo Regional de Enfermería del Estado de São Paulo. **Resultados:** Participaron en el estudio 598 profesionales enfermeros, de los que 484 prestaban asistencia solo a adultos y 114 exclusivamente a niños. La prueba del volumen gástrico residual la lleva a cabo el 83,4% de los profesionales enfermeros, siendo que, en su mayoría, la suspensión y la liberación de la terapia de nutrición enteral la realiza el médico. La suspensión de la terapia de nutrición enteral entre adultos ocurre, predominantemente, cuando el volumen gástrico residual es igual a 200 ml y, entre niños, si los valores son menores que 100 ml. La conducta después de la suspensión de la dieta involucra la devolución del contenido gástrico aspirado y el mantenimiento del catéter cerrado hasta el próximo horario, en el 48,3% de las atenciones entre adultos y el 68,4% entre niños. De los participantes de la investigación, el 42,9% desconocen la fundamentación teórica que subsidia la práctica de la prueba. **Conclusión:** Se evidenció la necesidad de capacitación de los enfermeros y de nuevas investigaciones acerca de la práctica de verificación del volumen gástrico residual.

DESCRIPTORES

Dieta; Nutrición Enteral; Vaciamiento Gástrico; Atención de Enfermería.

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