Literature Review

TEXTO & CONTEXTO ENFERMAGEM
TEXT & CONTEXT NURSING TEXTO & CONTEXTO ENFERMERÍA

CARE GIVEN TO NEWBORNS FED BY GASTRIC TUBE: CONCEPTS AND PRACTICES

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ABSTRACT

Objective: to describe the conduct related to feeding care through gastric tube in neonates hospitalized in the Neonatal Intensive Care Unit, from scientific articles published in the last five years.
Method: an integrative literature review was developed in the databases: MEDLINE, LILACS, SciELO, CINAHL and BDENF. The search for the studies was carried out in August 2016, in English, Spanish and Portuguese.
Results: 33 articles were analyzed. The level of evidence was classified as level IV (30%), level VI (27%), level II (15%), level III (18%), level I, V and VII with 3% each. The analytical categories were: Gastric tubes, their materials and their use in the Neonatal Intensive Care Unit, Nursing care for enteral nutrition through gastric tube in the Neonatal Intensive Care Unit, From the tube the oral route. The time to reach total enteral nutrition is lower, as is the decrease in length of hospital stay. The largest losses of milk fat are during gastroclysis at the expense of gavage. The relationship of food tolerance to dietary dosage form and volumes is not yet conclusive. Nursing stands out: in favor of the bond with the family, in the physical examination and evaluation, in the positioning, in the non-nutritive suction during the diet, in the oral stimulus, in the observation and conduct regarding the gastric residue.
Conclusion: due to the heterogeneity of the data, more randomized and qualitative clinical trials are required to better support the conduct and improvement of nursing care.

DESCRIPTORS: Enteral nutrition. Intensive care units, neonatal. Nursing care. Infant, newborn. Feeding methods.

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CUIDADOS COM RECÉM-NASCIDOS ALIMENTADOS POR SONDA GÁSTRICA: CONCEITOS E PRÁTICAS

RESUMO

Objetivo: descrever as condutas relacionadas a cuidados na alimentação através de sonda gástrica em recém-nascidos internados na Unidade de Terapia Intensiva Neonatal, a partir de artigos científicos publicados nos últimos cinco anos.
Método: desenvolveu-se uma revisão integrativa de literatura nas bases de dados: MEDLINE, LILACS, SciELO, CINAHL e BDENF. A busca pelos estudos foi realizada no mês de agosto de 2016 nos idiomas inglês, espanhol e português.
Resultados: foram analisados 33 artigos. Quanto ao nível de evidência, os artigos foram classificados em nível IV (30%), nível VI (27%), nível II (15%), nível III (18%), nível I, V e VII com 3% cada. As categorias analíticas foram: Sondas gástricas, seus materiais e sua utilização na Unidade de Terapia Intensiva Neonatal, Cuidados de enfermagem referentes à nutrição enteral através de sonda gástrica na Unidade de Terapia Intensiva Neonatal, Da sonda para via oral. O tempo para alcançar a nutrição enteral total é menor, assim como ocorre a diminuição do tempo de internação. As maiores perdas de gordura do leite são durante a gastróclise em detrimento da gavagem. A relação da tolerância alimentar com a forma e os volumes da administração da dieta ainda não são conclusivos. A enfermagem se destaca: no favorecimento do vínculo com a família, no exame físico e avaliação, no posicionamento, na sucção não nutritiva durante a dieta, no estímulo oral, na observação e conduta quanto ao resíduo gástrico.
Conclusão: devido à Heterogeneidade dos dados, mais estudos clínicos randomizados e qualitativos são necessários para melhor embasamento nas condutas e aprimoramento dos cuidados de enfermagem.

DESCRITORES: Nutrição enteral. Unidades de terapia intensiva neonatal. Cuidados de enfermagem. Recém-nascido. Métodos de alimentação.

CUIDADOS CON RECIÉN NACIDOS ALIMENTADOS POR SONDA GÁSTRICA: CONCEPTOS Y PRÁCTICAS

RESUMEN

Objetivo: describir las conductas relacionadas a los cuidados en la alimentación a través de la sonda gástrica en recién nacidos internados en la Unidad de Cuidados Intensivos Neonatal, a partir de artículos científicos publicados en los últimos cinco años.
Método: se desarrolló una revisión integradora de la literatura en las bases de datos: MEDLINE, LILACS, SciELO, CINAHL y BDENF. La búsqueda por los estudios se realizó en el mes de agosto de 2016 en los idiomas inglés, español y portugués.
Resultados: se analizaron 33 artículos. Respecto al nivel de evidencia, los artículos se clasificaron en nivel IV (30%), nivel VI (27%), nivel II (15%), nivel III (18%), nivel I, V y VII con 3% cada uno. Las categorías analíticas fueron: Sondas gástricas, sus materiales y su uso en la Unidad de Cuidados Intensivos Neonatal; Cuidados de enfermería referentes a la nutrición enteral a través de la sonda gástrica en la Unidad de Cuidados Intensivos Neonatal; De la sonda a la vía oral. El tiempo para alcanzar la nutrición enteral total es menor, así como ocurre con la disminución del tempo de internación. Las mayores pérdidas de grasa de la leche se dan durante a gastroclisis en detrimento de la alimentación forzada. La relación de la tolerancia alimentaria con la forma y los volúmenes de la dosis de la dieta todavía no son concluyentes. La enfermería se destaca en el favorecimiento del vínculo familiar, en el examen físico y la evaluación, en el posicionamiento, en la succión no nutritiva durante la dieta, en el estímulo oral, en la observación y la conducta respecto al residuo gástrico.
Conclusión: debido a la neutrogeneidad de los datos, se hace más necesario llevar a cabo más estudios clínicos randomizados y cualitativos, para una mejor base en las conductas y una mejora de los cuidados de enfermería.

DESCRIPTORES: Nutrición enteral. Unidades de cuidados intensivos neonatal. Cuidados de enfermería. Recién nacido. Métodos de alimentación.

INTRODUCTION

With increasing survival rates among sick newborns (NBs), morbidity reduction and better long-term prognoses have become a priority. Thus, neonatal nutrition is essential for adequate growth and development of newborns in the Neonatal Intensive Care Unit (NICU).[1] Enteral feeding through gastric tube supplies nutritional and nutritional needs in the impossibility of breastfeeding by immaturity or inability to coordinate suckling, deglutition and breathing of the newborn.[2–3]

The gastric tube can be classified according to the place of insertion. The orogastric is inserted through the oral cavity and the nasogastric inserted through one of the nostrils, the distal end of which is positioned in the upper part of the stomach. In NB, it is preferable to insert the tube through the mouth, because insertion through the nostril obstructs nasal breathing.[4] The installation and maintenance of the tube can generate significant problems for the health of the NB, such as the positioning of the tube in the airways and not in the stomach. It is also necessary to observe changes in heart rate, respiratory rate and blood pressure in response to the vagal stimulus when introducing the tube.[5]

It is important to emphasize that the technical regulation for enteral nutrition therapy and the technical norm for nursing team work in nutritional therapy established in Brazil determines that it is the responsibility of the nurse to administer enteral nutrition (EN), besides the prescription of care to establish enteral access via oro/nasogastric or transpyloric route, ensure radiological examination to confirm the location of the catheter, to ensure that the occurrences and data referring to the patient are recorded correctly, in addition to guiding the patient about the EN therapy.[6–7] The NICU nursing team should remain under the constant supervision of a nurse with specific training in neonatology, since only he/she is competent to supervise the work of the nursing team regarding the organization of the unit and procedures, highlighting the passage of an oroghatic tube. NB in gastric tube use needs to be cared for by a team aware of the peculiar characteristics that surround this being, of the various adaptive transformations through which it will pass during the adjustment to extra uterine life, among which the need for nutrition.[8]

Therefore, it is fundamental for nurses to keep abreast of the scientific advances in the EN area in such a particular environment as the NICU. In keeping with this perspective, the study object are the care of the feeding through gastric tube in NB. The objective of this research was to describe the conduct related to feeding care by gastric tube in neonates hospitalized in the Neonatal Intensive Care Unit, based on scientific articles published in the last five years.

METHOD

An Integral Review of Literature was developed, which contributes to the synthesis of the results of relevant and globally recognized research, facilitating the incorporation of evidence for practical use.[9] For formulation of the question of research of the study was the PICOT format (P: target population, I: intervention or area of interest, C: compare types of intervention or groups, O: results or effects achieved with intervention and T: time needed to obtain the result): are the infants hospitalized in NICU (P) using a gastric tube (I) given types or care techniques for feeding (O)? Since it is not an interventionist clinical research, the topics C (comparison) and T (time) are not mandatory.[10]

The search was performed in August 2016. The databases used were Latin American and Caribbean Literature in Health Sciences (LILACS), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (MEDLINE), Scientific Eletronic Library Online (SciELO) and Nursing Database (BDENF), with filters limiting the results in complete articles, with temporal range of the last five years (2011 to 2016) and humans.

In LILACS, SciELO and BDENF the Health Sciences Descriptors (DeCS) were used in Portuguese: enteral nutrition and neonatal intensive care units. Together with the keywords considered

synonymous: gastric feeding tubes; tube feeding; gastric tube and neonatal intensive care unit; uti neonatal.[11] The combination with the Boolean operators AND and OR were: (enteral nutrition OR gastric feeding tubes OR tube feeding OR gastric tubes) AND (neonatal intensive care units OR neonatal intensive care unit OR neonatal ICU). In the MEDLINE and CINAHL the English descriptors were used: enteral nutrition and neonatal intensive care units and the keywords considered synonymous of these descriptors: gastric feeding tube; gastric tube; tube feeding and intensive care units, neonatal; newborn intensive care units.[11] The combination between them was: (enteral nutrition OR gastric feeding tube OR gastric tube OR tube feeding) AND (neonatal intensive care units OR intensive care units, neonatal or newborn intensive care units).

It was decided to use the keywords beyond the descriptors to broaden the search. The inclusion criteria were: scientific articles related to care management for dietary intake by gastric tube in NB in the NICU in Portuguese, English or Spanish; with access to the full article; published between August 2011 and August 2016 until the date of the search. Exclusion criteria were: duplicitous articles that contributed only to the composition or supplementation of the milk administered at NICUs, care referring only to gastrostomy, only NICU breastfeeding and parenteral nutrition. The articles were selected by two reviewing researchers at different times after reading the titles, abstracts and reading in full of the material comparing the result between the two being excluded or added after a joint analysis of the divergences.

Because it was an integrative review of the literature, the research was followed to identify the problem, bibliographical research, evaluation of included studies, data presentation and analysis.[12] A form for data collection was created for this study based on the adaptation of the instrument for validated integrative review for better observation and analysis of each article.[13] The items in this form were: title, year of publication, database, name of journal, language of publication, authors' country of origin, type of study, level of evidence, objectives, main results and conclusions.

The analysis was constructed from the procedures of the integrative review including plausibility, comparisons, pattern search, abstract, data in general and the construction of a logical chain of evidence allowing a basic numerical visualization of the distribution of the studies. The results were analyzed and represent the main data of all the material that allowed the construction of categories.[12]

RESULTS

There were 68 articles in MEDLINE, 67 in LILACS, 11 in BDENF, nine in SciELO and 35 in CINAHL. Duplicate articles and those that did not meet the previous criteria as shown in Figure 1 were excluded. The difference between the reviewers resulted in the exclusion of two articles from MEDLINE by the second reviewer, since it was only the components of the milk and the other only of breastfeeding in the NICU.

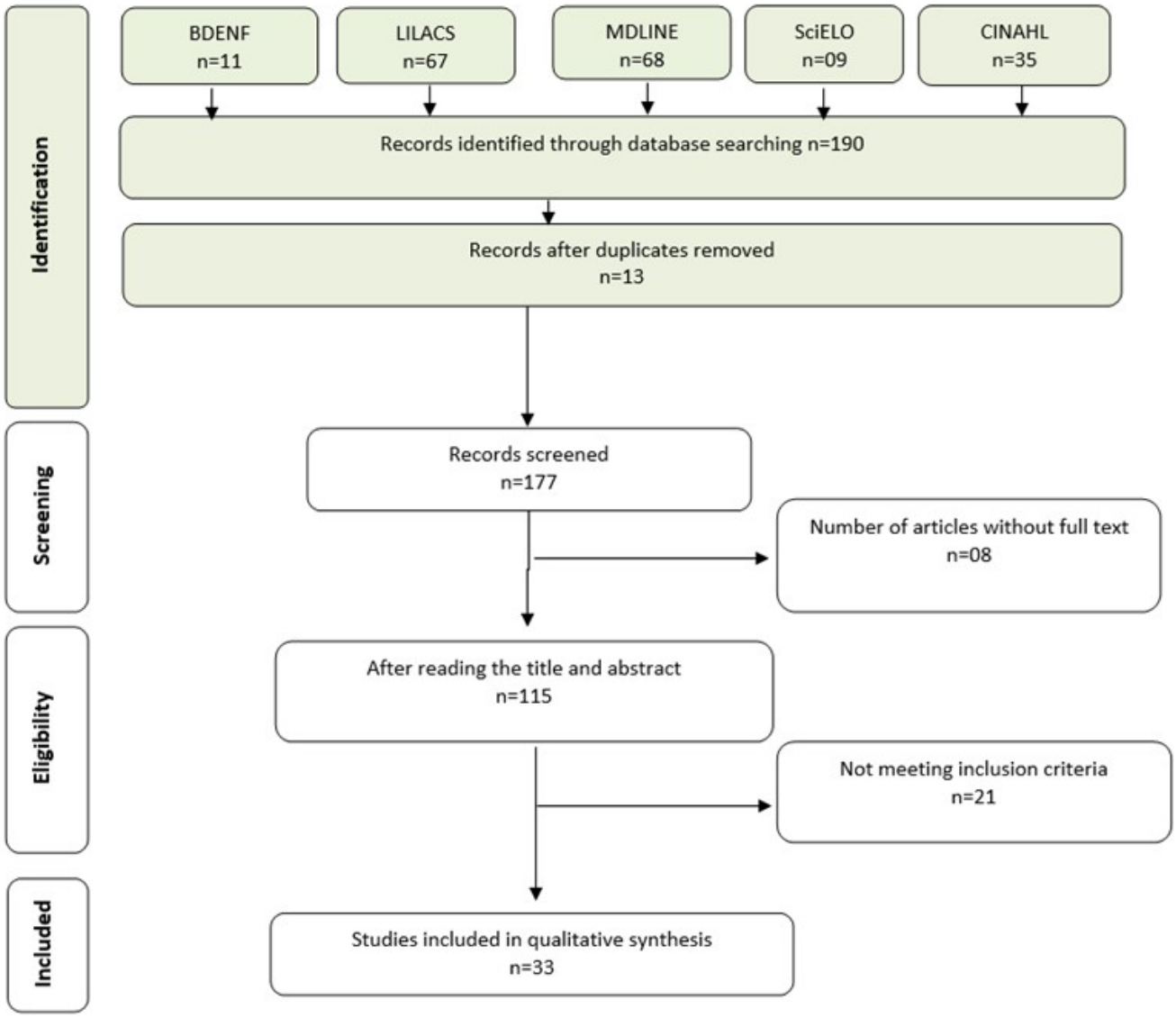

Figure 1 – Search Flow and Deletion of Articles by Database - August (2011 to 2016).

The identification of the articles according to their level of evidence was based on the model of the Evidence Based Practice that classifies the research depending on the methodological approach hierarchically ranging from 1 to 7.[9,14] According to the evidence-based distribution, 30% of the articles composed level III (well-delineated cohort and case-control studies) 27% at level VI (a single descriptive or qualitative study) 18% at level III (well-delineated clinical trials without randomization) at 15% Level II (at least one randomized controlled trial) and levels I (meta-analysis or systematic review of experimental or clinical studies), V (systematic review of descriptive and qualitative studies) and VII (expert opinion, in this case a protocol), 3% each.[9,14]

It can be inferred, according to the origin of the authors, that the sampling of selected articles implies realities on the theme of different countries and continents, which favors an analysis of the data with national and international value, according to Table 1.

Table 1 – Identification of the sample of articles by country between 2011-2016 on care related to gastric tube feeding of neonates in the Neonatal Intensive Care Unit (n = 33).

Country of origin of the authors	N	%	Number of articles/level of evidence
USA*	9	27	level I: 1; level II: 2; level III: 1; level IV: 4; level VI: 1
Brazil	5	15	level III: 1; level IV: 3; level VI: 1
Italy	4	12	level IV: 2; level VI: 2
China	2	6	level II: 1; level IV: 1
Japan	2	6	level III: 2
Sweden	2	6	level VI: 2
Germany	1	3	level V: 1
Canada	1	3	level VI: 1
Korea	1	3	level VI: 1
Egypt	1	3	level III: 1
Israel	1	3	level II: 1
Turkey	1	3	level III: 1
Australia, New Zealand	1	3	level VI: 1
Norway, United Kingdom, Australia	1	3	level VI: 1
Chile, Argentina, USA*	1	3	level II: 1
Total	33	100	level I: 1; level II: 5; level III: 6; level IV: 10; level V: 1; level VI: 9; level VII: 1

*USA

The main themes of the articles were organized into three analytical categories: Gastric tubes, their materials and their use in the NICU; Nursing care referring to EN through a gastric tube in the NICU; From the tube to the oral route.

Gastric tubes, their materials and use in the Neonatal Intensive Care Unit

The gastric tube is a flexible tube, with simple technology, usually inserted through the mouth of the infant until it reaches the stomach and is fixed externally. Food and medicines can be given slowly or rapidly to the stomach via syringe or pump infusion. It is widely used in the NICU, since many newborns cannot swallow safely due to prematurity or other health problems.[15] Many gastric tubes are made of polyvinyl chloride (PVC). However, this material may present a risk of absorption of phthalates, which, for preterm NB, which has enzymatic and renal immaturity, may present male reproductive problems and hepatic toxicity. A meta-analysis showed that an NB of up to 2000g can be exposed to 1.98mg/kg phthalates only by gastric tube in seven days of use and in 24 hours the decomposition of the material begins to release phthalates.[16]

Milk can be given by gavage (by gravity) or by continuous administration (also called gastroclysis with time programmed by syringe infusion pump by a 120cm perfusion device connected to the gastric tube). In the use of a silicone gastric tube, milked maternal milk presents a significant reduction of fat if administered by gastroclisis and the thawing process significantly increases lactose and milk protein levels.[17] The tubes' gauges, the material - DEHP-*free* (without Di (2-ethylhexyl) phthalate) and PVC-*free* (without polyvinyl chloride) and infusion time (30 or 60 minutes) as variables did not present significant losses of fat. The infantile formula did not present losses, however the fat after infusion of thawed human milk in the gastric tube has a much greater reduction than the raw one.[18] Human milk remains the best food to be offered to newborns, but nutritional losses of fat by the tube

should be considered.[17] The time of gastroclysis per infusion pump in 1 hour or 2 hours also shows no difference in the amount of final fat, however it is significantly lower than the milk administered by gavage. Another advantage of gavage is to "imitate" the intake of the diet by the NB in the stomach as if it were orally, being considered more physiological than the gastróclise.[19]

It is important to look for errors during diet administration. A differentiation between enteral and parenteral catheters by the color of the non-compatible connector between the different routes makes it an important device in NICUs.[20] Still about errors, the research developed with resident physicians detected that 90.6% of the radiographs with non-radiopaque gastric tubes were interpreted correctly, so, even in a small percentage, there is a possibility of evaluation errors. In the NICU, the correct positioning of catheters and catheters avoids or minimizes complications.[21] However, although radiography is the primary method of confirming the placement of gastric tubes, it may expose children to radiation.[22] The airway auscultation location may also be faulty if the tube is in the third part of the tracheobronchial region. The evaluation of the aspirate of the gastric residue (GR) is also used, however, it can be difficult to identify the aspirate in a NICU, as the salivary and milky residue can be confused with tracheal secretion. The pH of the GR may also present errors, as there may be drug interference that changes the pH to greater than 5, in addition to some samples obtaining indefinite pH evaluation.[22]

In Japan, indigo-carmine (IC) is used as confirmation of the tube site only during exchange of gastric tubes. The CI is a food coloring dye used in the form of solution, the concentration being 2.6mg in 1000ml of water and that 1ml solution is diluted in 30ml using 2ml/kg of the NB. It is injected into the stomach by the gastric tube to be replaced giving the bluish color to the GR that can be aspirated through the new gastric tube. However, this method showed failures in 5.6% of the cases of 55 exchanges of tubes analyzed.[22]

With the survival of very low birth weight infants, there is concern and interest in reducing morbidities, with EN being essential for adequate growth and development.[1] Nutritional management includes the type of food, when EN should begin, speed of dietary volume progression, administration techniques, and food tolerance assessment.[23] Although EN is usually postponed in high-risk neonates, there is little evidence to justify this approach.[24] The need to rapidly reach total EN in preterm infants with very low birth weight (1,000g to 1,500g) leads to conflicts due to physiological immaturity of the gastrointestinal tract and also due to the occurrence of many comorbidities in the neonatal period.[25] However, the administration of minimal or trophic EN, started one to two days after the birth of preterm NB, has shown a decrease in intestinal atrophy, especially when human milk is used.[26]

However, differences were identified between the initiation and progression of the preterm diet in the NICU of the studies analyzed. A systematic review identified the variation of volume increase of the diet between 20, 25 and 30ml/kg/day as safe in pre-terms greater than 1000g on the first day of life.[26] Differences in the routine administration of EN in preterm infants in the NICUs of Canada, Australia and New Zealand have also been demonstrated, which rarely use continuous feeding for infants less than 28 weeks of gestation, but are used by most NICUs in Norway and Sweden, Ireland and the United Kingdom. Comparing the NICUs of these regions, Scandinavians start EN earlier, followed by the UK and Ireland.[27]

Although EN in preterm extreme low birth weight (from 500g to 999g) is currently initiated earlier than in the past, a large variety of ducts remain in the different NICUs. The majority in Australia initiate the EN by gastric tube in these NB ranging from the first day of life to the fifth. The volume and frequency changes administered are 0.5ml to 1.0ml and 4 to 8 hours apart.[28]

The early nutrition regimen shows to be safe, administering a diet of 1ml/kg in newborns from 500g to 1000g at birth every 2 hours; from 1001g to 1250g, 20ml/kg/day; 1251g to 1500g, 25ml/kg/day; 1501g at 1700g or higher, 30ml/kg/day on the first and second days of life, increasing the

volume of the diet on the third day of life. However, there are no differences in cases of necrotizing enterocolitis (NEC), sepsis, abdominal distension or vomiting among infants who received EN within the first 24 hours of life and infants who received after 24 hours of life.[24] In contrast, EN administered before the first 24 hours of life of neonates small for gestational age is related to a shorter time to reach total EN (≥150ml/kg), begin to gain weight faster and early hospital discharge NICU.[24,29] Regarding GR readministration, a randomized study with preterm gestational ages of 23 to 28 weeks receiving minimal or trophic EN (24ml/kg/day) demonstrated that there is no difference in time to reach total oral feeding, nor in the development of NEC and death between readministering the GR left by the NB by discounting the volume of the new diet or neglecting the GR by administering the total volume of the diet[30]

A retrospective study analyzed the importance of trophic feeding (20 to 30ml/kg/day) initiated in newborns who would be submitted to correction of left heart hypoplasia two days before the surgical procedure. They noted that trophic feeding is not only safe and well tolerated but also improves the results of decreased water overload, reduced duration of mechanical ventilation, and newborns can tolerate a total EN more rapidly.[31] In a Nebraska NICU, EN is initiated on the 3rd day of life, with trophic feeding (up to 20ml/kg/day) continuously for 5 to 7 days by advancing the volume of the diet to 20ml/kg/day for the purpose of reach 150ml/kg/day.[32] Continuous feeding is routine in an NB of less than 28 weeks of GI in almost half of the NICUs in Scandinavia and in approximately one-sixth of the units in Ireland and the United Kingdom but rarely applied in Australia, New Zealand and Canada.[27]

The goal of stable pre-term diet volume is 140-160ml/kg/day in almost all Canadian units and 161-180ml/kg/day or higher in other regions.[27] Among the benefits of reaching total EN are decreased need for a central venous catheter, decreased risk of infections, and reduced length of hospital stay.[25]

The elimination of meconium from very low preterm has been suggested as important in interference with food tolerance. However, a multicentric study demonstrated that saline and glycerinated enemas applied to infants with up to 96 hours of life stimulating the elimination of meconium did not alter food tolerance, nor did it decrease cases of necrotizing enterocolitis, and intraventricular hemorrhage, and this was not a recommended routine.[33]

The gastric tube can also be considered in some cases as the easiest way to feed. NB with cleft lip and/or palate are constantly submitted to nasogastric examination considered by the speech therapy article as unnecessary. In many cases it occurs because of lack of incentive to alternatives to oral feeding and to breastfeeding, as the use of bottles with latex nipples, spoons or cups.[34]

Nursing care for enteral nutrition through a gastric tube in the Neonatal Intensive Therapy Unit

Nursing care has been shown to be essential for the success of the transition from gastric tube feeding to exclusive breastfeeding of very low preterm NB. Nurses explain to mothers the benefits of human milk, hear about feelings about breastfeeding, begin instructions on how to milk the breasts and collect breast milk for maintenance of lactation and administration of milk by gastric tube. Interventions are also adapted according to maternal health status and with doubts about the baby's clinical condition. Skin-to-skin contact should be promoted as soon as the NB becomes clinically stable. Nurses should encourage mothers to give drops of their own milk during Kangaroo position. As soon as the health condition of the newborn allows, mothers should be encouraged to breastfeed even for a short time.[35]

Regarding the evaluation of food tolerance, it is important to identify the characteristics of the GR. It is necessary that nurses know how to evaluate the color of the GR since it is these professionals who see and report their characteristics determining the progress of the diet.[28] A high GR is considered when it is greater than 50% of the previous diet volume. Physical examination should

include abdominal distension, dark green or biliary GR, frequency of emesis, increased apnea or bradycardia, instability of the temperature or blood in the stool. According to the protocol established at the NICU of Nebraska, in the absence of these signs, the GR should be readministered and the normal volume of the diet continued, consideration should be given to the last bowel movement of the newborn, to maintain prone or right lateral decubitus and to check if the tube is proper.[32] If there are signs of food intolerance, the doctor or nurse should evaluate the radiograph. If it is normal, it follows the procedure described, or if the GR is discounted by the volume of the diet or the diet is not administered. Consideration should be given to starting the diet continuously and reducing the volume of the diet by 20%. The same pipelines are worth if the NB leaves a large GR the second time. If the radiograph is not normal, investigate ENC, sepsis and the paralytic ileus.[32]

Nurses evidenced in a comparative study the interference of the positioning of the newborn after the gavage of the diet to decrease the GR. They noticed that the first 30 min after feeding are crucial for decreasing the volume of the GR, the prone position being better than the supine position when the administered diet volumes are 50 ml/kg/day or 100 ml/kg/day. They suggest that the preterm infants are positioned prone within the first half hour after feeding and then the decubitus can be changed according to the behavior of the newborn.[36] The tube should also be rinsed with sterile water to reduce lipid losses.[19]

Non-nutritive sucking (NNS) before, during and after feeding of the NB by gastric tube also has benefits. It can be used to make the NB alert during feeding by maintaining better interaction with the caregiver, especially the parents, providing optimal physical and neurological behavior. The levels of oxygen saturation increase with the NNS and the transitional time of feeding by tube to the maternal breast decreases.[37] The parents of newborns who need to be fed through a gastric tube consider this technology to be difficult in relation to their participation in the care of their children in the NICU.[38] Although the food may be the mother's own milk, the tube often becomes an extension of the infant's body that maintains distance at the time of feeding.[15] Parents can also help during gavage by holding the syringe with milk, which contributes to the development of bonding with the baby.[19] Women who are mothers of infants admitted to the NICU feel valued when they can contribute to the process of feeding the baby. In Philadelphia, nurses encourage mothers to milk the breast perform the NB oral stimulation with milk through a *swab*.[39]

From the tube to the oral route

Barriers against the transition from feeding of the tube to the oral route should be reviewed within the NICU, such as lack of accommodation for mothers, limited access to the kangaroo method, lack of trained professionals to breastfeed and the routine use of bottles. It is suggested to encourage breastfeeding, *i.e.* breastfeeding during the day every 3 hours, with supplementation of milk volume, if necessary, and that at night the milk should be administered by gavage, which should be initiated between the 32 to 34 week gestational age. When the NB is fed with the necessary volume in 24 hours without gavage it is considered that it reached the total oral feeding.[40]

In another technique for the transition from gastric tube feeding to maternal breast, NNS training with a gloved finger is considered first, after oral feeding (the milk being fed to the newborn to milk the posterior milk) and the supply of the breast. Weaning from the tube directly into the mother's breast brings qualitative advantages, since the baby establishes an adequate stimulation of the orofacial muscles. Exclusive feeding in the mother's womb is achieved on average at 36.61 gestational weeks.[41]

Often, nurses from the NICU set up informal routines for oral preterm feeding assessment. The article proposes the use of the oral and motor assessment scale of the neonate (Neonatal Oral Motor Assessment Scale - NOMAS), validated in the USA. It allows punctuation and differentiation of disorganization (duration, duration and frequency of suctions) by feeding on oral and motor dysfunction

(hypo or hypertonia of the tongue and retraction) together with the gestational age markers of oral feeding (at least 5 ml of milk), gestational age that reached total oral feeding (100ml/kg/day without gastric tube for at least 48h) and the transition time from initiation of oral feeding to total oral feeding.[42] The protocol used in this article that adopted NOMAS specifies that the transition should start around 72h after the NB completes 32 weeks of gestational age with 5 ml of milk 3 times a day. When there are no signs of stress and incoordination, the spacing decreases to 6-6h and consumes at least 10ml/kg and then advances to 3 in 3h. If the NB does not take the entire prescribed diet in 20min, the rest is given by tube. If the infant is breast fed, it should be weighed before and after feeding, weighing up to 1g more.[42]

The definition of failure in the transition from gastric or oral feeding can result in the implantation of gastrostomy. In order to assist in the promotion of oral feeding of preterm infants with indication for gastrostomy, occupational therapists and neonatology nurses developed a method of evaluation and assistance by associating the stimulus by NNS; the supply of 5 to 10 ml of milk progressively increased; and gauge observation (comparing pressure and motility waves through a nasogastric tube with manometric devices connected to a transducer) of the stimulation of suction, peristalsis, relaxation and contraction of esophageal sphincters together with the coordination between sucking, swallowing and breathing. This method provided the adaptation of the oral feeding technique to the needs of each child, achieving that 51% of gastrostomy indication cases were reversed against only 10% before their use.[43]

Another protocol deals with the reduction of the volume of 5 in 5ml per day of the milk administered by gavage in the period of suction and swallowing of milk in maternal breast. The gradual reduction of the milk administered by catheter should match the weight gain until the gavage of the milk is only 10 to 15ml, then the catheter can be removed and the breastfeeding happens to be on demand. The nurses realized that this protocol increased the mothers' confidence in their own abilities in breastfeeding, less stress and calmer breastfeeding, and less need for nursing intervention.[44]

The oral stimulation of the newborn with raw breast milk in *swab* is an important motivator for mothers to maintain lactation and care for newborns with diaphragmatic hernia.[40] Milked mother's milk can be used as an olfactory sensory stimulus. NBs that are stimulated to smell mother's milk during gavage reach the oral feeding earlier, increase weight gain and are discharged before the infants who do not receive this stimulus.[45]

Regarding the position of the NB, although the nurses' preferred NB settings for oral feeding by bottle feeding are those of the baby in a vertical position (sitting) or lying on the side in order to facilitate the progression of the baby's ability preterm infants in oral feeding, there is no significant improvement in development compared to infants fed in semi-reclining decubitus.[46]

DISCUSSION

The articles found have a very informative content, however the data are also characterized with great heterogeneity related to the care with gastric tube feeding. The first outstanding care was with regard to the choice of material of the tubes.[15–18] Can be differentiated from other catheters by color and connector.[20] In addition, the release of phthalates by PVC was highlighted.[16] In Brazil, an EN care protocol published in 2014 recommends changing the gastric tubes every 72 hours if the nasal route is introduced, alternating the nostrils and if it is orogastric, it must be changed every 7 days. There is no reference to the release of phthalates, but rather to the decrease in flexibility of the material that can cause injury.[47] Taking into consideration the use of PVC tubes it is advisable that the exchange of them be carried out within 24 hours, thus avoiding the absorption of phthalates.

The studies also discussed the way of diet administration pointing to the higher losses of milk lipids in the administration by gastroclysis in detriment of the gavage.[17–19] However, some protocols

cited remain with the use of continuous EN (gastroclysis) for the extreme pre-terms.[27,32] In Brazil, we can cite the care protocol of a national reference institute in neonatal care, in which the gastroclysis feeding is used in infants who do not tolerate large volumes in a short period of time, as the with a weight less than 1kg, with gastroesophageal reflux and mechanical ventilation. Therefore, this type of diet administration in a slow and time-determined manner by an infusion pump is used even though it is not considered a physiological method.[2]

Radiography is considered the best way to confirm the positioning of the gastric tube although no method is completely safe.[21–22] One article brought the possibility of using blue dye (IC) when the gastric tube is replaced.[22] It is important to highlight that all methods presented some failure percentage in the identification of the tube positioning, so the combination of techniques can contribute to the reduction of errors.

Regarding the beginning of EN administration in the NICU, the articles do not present consensus on time after birth, before 24 hours of life until 5 days after birth, and administered volume that varies even between the same weight range of extreme preterm infants, between 1ml/kg/day, maintaining an average of 20ml/kg/day up to 30ml/kg/day. And the volume considered as total enteral nutrition being used from 100ml/kg/day to 180ml/kg/day.[1,24,26,27,30–32] In São Paulo, the protocol used recommends a minimum EN of 10 to 15ml/kg/day which would be 2 to 3ml every 4 or 6 hours for 2 to 5 days progressing from 15 to 20ml/kg /day.[47] The comparison retains relatively the average of the indications in the articles, but still with differences.

Most of the articles that addressed minimal or trophic enteral feeding agree that its administration is important for hospitalized NB, decreasing the time to reach total NR and discharge.[1,23–32] However, it does not match the results of the comparative meta-analysis in relation to the use of trophic nutrition in the extreme preterm, which did not detect a significant reduction of the time to reach total EN, nor the agility of the hospital discharge, incidence of NEC, infections or cause of mortality. The short-term clinical effect is still uncertain, as is long-term growth and development.[48]

Breast milk is considered to be the best milk for the newborn.[17,23,35] This statement corroborates the data from the systematic review comparing preterm and low birth weight infants with low birth weight and formula infant formula. Mother's milk or donor's milk compared to the formula has lower weight gain and short-term growth, but a reduced risk in the development of NEC.[49]

Nursing was highlighted as essential in the follow-up and positive prognosis of NB related to EN. The centralization of care in the NB and its family, attention to maternal health, encouragement for the contact and bonding of the family with the newborn, the physical examination and evaluation of the general condition of the newborn, the positioning of the newborn during after the administration of the diet by tube, the NNS during the diet, the oral stimulation of the newborn, the observation and conduct regarding the GR, are among the nursing care indicated by the studies.[15,19,28,32,35–37,39]

The relationship between time, position and GR as a nursing intervention promotes the improvement and progression of the feeding of the newborn.[36,46] The prone position in the first half hour after gavage contributes to gastric emptying.[36] In order to minimize the possibility of regurgitation and aspiration, the NB is usually positioned in the right lateral decubitus or prone position.[2] However, positioning for oral administration by bottle does not interfere with the progression and acceptance of the diet.[46]

The verification of the GR before each diet remains as questions to be discussed and the routine can be modified according to institutional protocols. It was considered as a large volume of GR over 50% of the volume of the diet administered previously.[32] In addition to this parameter, there is no reference of the volume of GR for readministration or not, or discount on the next diet. In the study on return of GR, there was no significant difference between readministering or not content.[30] The multiprofessional protocol of a hospital in São Paulo and another nursing protocol in Rio de

Janeiro, explain that the GR must be checked before each diet and the return, or the suspension of the schedule diet, goes depending on the volume and aspect of this content that will be evaluated by nurses and physicians, but also does not determine specific volumes in the neonatal period.[2]

The variation between the protocols for transition from oral to oral gastric diet administration is also diverse. It is important to understand the NICU barriers that make it difficult for the baby to be breastfed exclusively in the mother's womb. Oral stimulation, olfactory, NNS of the newborn and the skin-to-skin contact between mother and baby should be encouraged, helping to increase the possibility of breastfeeding.[37,39,43,45] The diversity between protocols may also be related to the adoption of different methods in the elaboration and validation of the clinical guidelines without uniformity, varying the conducts by lack of a standard methodological path.[50]

It can be seen that the actions that facilitate the transition from gastric tube feeding to the maternal breast are equivalent to those highlighted by the Kangaroo method described by the Brazilian Ministry of Health. The steps of the method range from foster parenting to NNF stimulation, promoting the bond between mother and baby, encouraging skin-to-skin contact and the gradual transition of the suckling tube into the mother's womb.[48] The weight of the newborn should be evaluated once a day before the diet, advising against weighing after feeding, contradicting the diet progression evaluation parameters of one of the articles.[51]

The beginning of oral feeding should be between 32 and 34 weeks of gestational age.[39,42] They suggest half-mothering in the maternal breast, administering the tube complement if necessary.[40–41] When comparing with Brazil, it is observed that the minimum age for oral feeding is usually 34 weeks of gestational age because it is understood that around this age, coordination between sucking, swallowing and breathing.[2,47] Regarding food tolerance and the form and volumes of dietary administration, the data are still inconclusive. However, the variety of data and results from the different studies may also be related to the heterogeneity of different protocols and behaviors.[51]

As the limit of the research, because it is not a meta-analysis or a primary study, has some complementary and some controversial data. Therefore, they are not determinant results for the establishment of closed ducts, and more randomized clinical studies should be performed for a better scientific basis, as well as more qualitative studies in order to improve nursing care based on mothers 'and families' the baby's gastric tube in the NICU.

CONCLUSION

Adequate EN is extremely important for newborns admitted to the NICU. However, there is a lack of evidence to prove the best forms of gastric tube administration, when to start the diet, what is the minimum volume, how to evaluate the progression of the diet, what is the volume of diet that can be considered as a total enteral diet and the techniques of transition from the gastric tube to the oral route.

Despite the number of texts analyzed and the importance in EN in the neonatal period, it was possible to identify the relevance of the nursing care indicated for the best assistance to the NB. As each care must be individualized and centered on the NB and its family, a very rigid protocol may be considered not suitable. Nursing care should be based on evidence. It was possible to answer the question PICOT that directed the study to reach the proposed objective. This study contributes to a comprehensive approach to care for enteral nutrition by nascent gastric tube in the NICU.

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NOTES

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CONTRIBUTION OF AUTHORITY

Study design: Nascimento J.
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Data analysis and interpretation: Nascimento J, Silva LJ.
Discussion of the results: Nascimento J, Silva LJ.
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CONFLICT OF INTERESTS

There is no conflict of interest.

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