

The role of Speech-Language Pathology in bottle feeding infants discharged from intensive care unit

Alimentação com mamadeira de egressos da unidade de terapia intensiva neonatal: ações da Fonoaudiologia

Ediana Cristina Roquette Loures¹, Maria Cecília Marconi Pinheiro Lima², Marcelo Corrêa Alves³, Antonio de Azevedo Barros Filho⁴

ABSTRACT

Purpose: To retrospectively analyze the results of speech therapy activities that are part of the monitoring of bottle feeding infants discharged from the Neonatal Intensive Care Unit. **Methods:** We conducted a descriptive study regarding the actions carried out with bottle feeding infants from a Neonatal Intensive Care Unit who had received speech-language therapy. From the 11 participants, nine were preterm, adequate for gestational age, between 27 and 35 weeks; two were born full-term, one big and one adequate for gestational age, respectively with diagnoses of leucomalacia and jejunal atresia. The following variables were analyzed: mode of feeding, bottle container, bottle nipple, speech-language pathology evaluation and treatment in the first two therapy sessions. **Results:** In the first assessment, all infants were using bottles containers and nipples randomly selected by their mothers. In the second assessment, most of the utensils followed the recommendation, but the wrong body position and the signs of discomfort persisted. Mothers were oriented a second time regarding feeding mode. Statistical analysis confirmed that speech-language evaluation and treatment significantly affected the decision of mothers to replace utensils, resulting in reduction of signs of discomfort. **Conclusion:** The study highlights the need to carefully monitor the bottle feeding procedure and to detail the specific feeding characteristics of children discharged from the Neonatal Intensive Care Unit.

Keywords: Infant; Breast feeding; Bottle feeding; Speech, language and hearing sciences; Observation

INTRODUCTION

Infants discharged from the Neonatal Intensive Care Unit (NICU) may be affected by total or partial weaning and be exposed to bottle feeding after hospital discharge. Despite the very few studies on the monitored use of bottles and artificial bottle nipples, the indiscriminate use of these devices as a form of infant feeding are often reported. This field has become

of great interest and includes now even professional speech therapy activities. Moreover, it is important to study the use of bottles to feed infants discharged from the NICU to protect that population from risks associated with this practice.

In some cases, bottle use results from difficulties in adapting to the breastfeeding technique, which may be a factor that contributes to weaning. Improper positioning of mother and child can make it difficult for the baby to take the nipple, it may interfere with the milk extraction dynamics, make it difficult to empty the breast, decrease milk production and ultimately lead the mother to offer her child other foods using a bottle⁽¹⁾.

Other factors were also associated with bottle-feeding, e.g., the longer the hospital stay, the greater the possibility of exclusive bottle feeding. The strategies to make the transition from enteral feeding to oral feeding in premature infants with low birth weight or other complications commonly include devices used to develop the suction habit, such as pacifiers, bottles and artificial nipples^(2,3).

Artificial nipples, pacifiers, bottles and nipple shields may cause oral dysfunctions because infants tend to quickly adjust orally to the nipple features after a few feeding sessions. Subsequently, the prolonged use of bottle feeding may have a negative effect on the oral motor development; it may be

Research conducted at the Reference Center on Child Development (CRDI) – Fênix, Hospital Municipal Dr. Mário Gatti – Campinas (SP), Brazil.

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(1) Hospital Municipal Dr. Mário Gatti, Prefeitura Municipal de Campinas – Campinas (SP), Brazil.

(2) Department of Human Development and Rehabilitation, School of Medical Sciences, Universidade Estadual de Campinas – UNICAMP – Campinas (SP), Brazil.

(3) Graduate Program (Doctorate degree) in Anatomy, Morphology Department, Piracicaba School of Dentistry, Universidade Estadual de Campinas – UNICAMP – Campinas (SP), Brazil.

(4) Department of Pediatrics, School of Medical Sciences, Universidade Estadual de Campinas – UNICAMP – Campinas (SP), Brazil.

Correspondence address: Ediana Cristina Roquette Loures. R. Joaquim Novais, 70/71, Cambuí, Campinas (SP), Brasil, CEP: 13015-915. E-mail: edianaloures@terra.com.br

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strongly associated to dental malocclusion, oral respiration and oral motor disorders^(4,5).

The present study aimed to describe and analyze the results of speech therapy guidelines on bottle feeding of infants discharged from the Neonatal Intensive Care Unit (NICU). In fact, it confirms the significant relevance of the speech therapy intervention in the initial stage of infant's oral adjustment to the nipple from the first feeds on and stresses the importance of this issue for children's health.

METHODS

We conducted a retrospective study of a descriptive analytical type about actions aimed at infants discharged from the Neonatal Intensive Care Unit (NICU) who were submitted to speech therapy. The study was approved by the Ethics Committee of the Hospital Municipal Dr. Mário Gatti, where it was carried out. We selected infants of a multidisciplinary pediatric outpatient care unit.

Inclusion criteria were: infants younger than six months who needed to be bottle-fed during their stay and after their discharge from the NICU; their medical chart had to contain records on the first two consecutive speech therapy evaluations and a discharge record showing that their development matched their chronological age. We excluded infants submitted to alternative feeding ways during the consultation period, as well as cases of craniofacial malformation.

Data of the first two consultations were collected from medical records of patients. Routine speech therapy evaluations included asking mothers to demonstrate how they were feeding their children using the bottle. The speech therapist watched and recorded the form of food and type of device used by the mothers.

The studied variables of both consultations were divided into two groups and analyzed according to the descriptive method. The first group consists of variables related to the feeding mode, the material used by the mothers and the bottle utensils. The second group of variables contains behavioral information collected according to the items that make up both the Family Interview and the Subjective Evaluation Form of Oropharyngeal Swallowing of the Baby used for this study⁽³⁾.

Group 1

a) Feeding mode: Mixed feeding refers to breastfeeding with supplementation. Artificial feeding refers to absence of breastfeeding⁽⁶⁾.

b) Containers: part of the bottle that stores the food⁽⁷⁾.

c) Bottle nipple: part of the bottle made of latex or silicone that features either a regular or an orthodontic format and which is used by the child to suck its food⁽⁷⁾.

Group 2

a) Speech-language evaluation: survey of oral structures and their functions⁽³⁾ based on the following items:

- Orofacial function: Fair: if the infant shows oral protective and adaptive reflexes in the absence and presence of

food. The integrity of functions is observed during non-nutritive and nutritive sucking, swallowing of saliva and food, preparative oral answer for the reception of food by the mouth, mouth opening, lips sealed during suction, force and pressure exerted by the oral structures during feeding. Unsatisfactory: if the sucking/swallowing/breathing scheme fails. Lack of coordination occurs when the sucking, swallowing and breathing functions interact in a disorderly manner. The speech-therapy examination checks the number of suctions per pause: presence, absence and spontaneous breaks⁽³⁾.

- Body positioning: Correct: if there is a craniocervical posture rectification and a balance between the structures of the tongue, mandible, temporal bone, cervical vertebrae, laryngeal cartilages, hyoid bone, sternum and scapula. Incorrect: if failures or absence of control of the positions of these structures are found⁽²⁾.

- Utensils: Evaluation of containers and nipples used for feeding regarding nutritive sucking, supporting action of the muscle tone, satiety, food viscosity, type of nipple and containers used⁽²⁻⁴⁾.

- Discomfort: The absence of discomfort occurs when the following is observed: rhythmic respiratory pause with suction bursts, coordination of oral structure movements during sucking and swallowing, lips sealed, silent breathing. Discomfort is characterized by the following signals during and after breastfeeding: variation of tone and body posture, skin color changes, nose wing flapping, apnea, accumulation of saliva, tongue and jaw tremors, loss of milk by the labial commissures, coughing, choking, sobbing, crying, moaning and grimacing^(3,5).

b) Speech therapy procedures, defined as guidelines and changes that are suggested to eliminate the difficulties found during the evaluation⁽³⁾. The speech therapy evaluation is used to define the subsequent procedures. For some infants, minor modifications already solve their difficulties. However, others may require specific devices and facilitating feeding maneuvers.

Orofacial maneuvers used to promote nutrition during breastfeeding are oromotor training devices used to monitor the feeding pace and control the quantity of suctions per breathing pause. At the same time, infant body positioning should result in correction of the cranio-cervical posture and balanced body structures during feeding. A subjective evaluation of the feeding process is required to decide if the container should be replaced, if a 240 ml bottle container should be used, if the nipple should be replaced by a different one that's more appropriate in size, material and format.

The evaluation data recorded were revised manually, digitalized and stored as they were collected. We used McNemar's statistical tests and chi-square tests with a significance level of 0.05.

RESULTS

Eighty eight infants were admitted during the analyzed time period. Of these, 56 were using a bottle, but only 11 met our inclusion criteria, i.e., eight male and three female infants.

Nine were preterm and lay within the gestational age (between 27 and 35 weeks), two were term infants. Of these, one was large and the other one was normal for its gestational age. They were diagnosed with laryngomalacia and jejunal atresia, respectively. Infants were characterized according to gender, date of birth, weight and gestational age at birth and their chronological age during the consultations 1 and 2 (Chart 1).

We collected information regarding the conditions of feeding mode, container, nipple type, and altered function during the speech therapy evaluation and procedure at consultation 1 (Chart 2).

We also illustrate the conditions of feeding mode, container, nipple type and altered functions during the speech therapy evaluation and procedure at consultation 2 (Chart 3).

We further surveyed the conditions of feeding, utensils, evaluation, and behavior of infants during and after breastfeeding, as well as the mean age of subjects at consultations 1 and 2 (Table 1).

Statistical analysis of consultations 1 and 2 showed that the items 'container', 'nipple' and 'discomfort' showed a

significant relationship in the Speech Therapy Evaluation and Procedure. Items 'container' and 'nipple' showed a difference between consultations 1 and 2. We noticed a decrease in the discomfort evaluation rate after feeding with adapted utensils (container and nipple).

DISCUSSION

Artificial feeding is not a recent phenomenon. It came up early in the history of mankind and has persisted throughout its course. It became more common during the process of industrialization, when its multifactorial nature began to be understood. Currently, bottle feeding is associated with the use of infant formulas offered as a means of supplementing the diet of the newborn. An interdependent relationship can be established between inadequate breastfeeding techniques, the introduction of infant formula and bottle feeding⁽⁸⁻¹⁴⁾. According to the literature, factors such as low birth weight, prematurity, inadequate breastfeeding techniques, hospitalization, intubation and the use of probes may be associated with some

Chart 1. Characterization of infants regarding the following variables: gender, date of birth, weight, and gestational age at birth and chronologic age at consultations 1 and 2

| Infant | Gender | DN | Weight (g) | IG | ICron-1 | ICron-2 |
|--------|--------|----------|------------|------|---------|---------|
| 1 | M | 21/07/05 | 1280 | 28+5 | 2m+8d | 3m+6d |
| 2 | M | 29/07/05 | 1060 | 28+1 | 2m+16d | 2m+23d |
| 3 | F | 29/07/05 | 1215 | 28+1 | 2m+16d | 2m+23d |
| 4 | M | 08/08/05 | 975 | 27+5 | 3m+9d | 3m+16d |
| 5 | M | 17/10/05 | 4230 | 39+5 | 23d | 30d |
| 6 | M | 30/10/05 | 1560 | 32 | 45d | 49d |
| 7 | M | 02/01/06 | 3060 | 35+3 | 21d | 4m+23d |
| 8 | F | 08/10/05 | 1075 | 27 | 5m+6d | 5m+8d |
| 9 | F | 01/03/06 | 1670 | 31+5 | 1m+12d | 1m+23d |
| 10 | M | 02/03/06 | 1565 | 32+3 | 1m+4d | 1m+11d |
| 11 | M | 22/03/06 | 2745 | 37 | 2m+3d | 2m+7d |

Note: DN = date of birth; IG = gestational age; ICron-1 = chronologic age at consultation 1; ICron-2 = chronologic age at consultation 2; M = male; F = female; m = months; d = days

Chart 2. Feeding mode, container, nipple type, speech therapy evaluation and procedure at Consultation 1

| Infant | MA | Container (ml) | Nipple | Evaluation | Procedure |
|--------|------------|----------------|--------|---------------|-----------|
| 1 | Mixed | 50 | SC | PI/UI/DES | P/R/B |
| 2 | Mixed | 150 | SO | FOI/PI/UI/DES | P/R/B |
| 3 | Mixed | 150 | SC | PI/UI/DES | P/B |
| 4 | Mixed | 240 | SC | PI/UI | P/B |
| 5 | Mixed | 150 | SO | PI/UI/DES | MAN/P/R/B |
| 6 | Artificial | 50 | LC | PI/UI/DES | P/R/B |
| 7 | Mixed | 240 | SC | PI/UI | P/B |
| 8 | Artificial | 240 | SC | FOI/PI/UI/DES | P/R/B |
| 9 | Mixed | 150 | SC | PI/UI/DES | P/R/B |
| 10 | Mixed | 150 | SC | PI/UI | P/B |
| 11 | Mixed | 240 | SC | FOI/UI/DES | MAN/P/B |

Note: MA = feeding mode; LC = regular latex nipple; SC = regular silicone nipple; SO = orthodontic silicone nipple; FOI = evaluation of unsatisfactory orofacial functions; PI = incorrect positioning; UI = incorrect utensils; DES = discomfort; MAN = orofacial maneuvers; P = positioning; R = container; B = nipple

Chart 3. Feeding mode, container, nipple type, and speech therapy evaluation and procedure at Consultation 2

| Infant | MA | Container (ml) | Nipple | Evaluation | Procedure |
|--------|------------|----------------|--------|-------------|-----------|
| 1 | Mixed | 150 | SO | FOI/PI/ DES | P/R |
| 2 | Artificial | 150 | SO | PI/RI | P |
| 3 | Mixed | 150 | SO | PI/UI | MAN/P |
| 4 | Mixed | 150 | SC | FOI | P |
| 5 | Mixed | 240 | SO | PI | P |
| 6 | Mixed | 240 | SC | FOI/UI/DES | B |
| 7 | Mixed | 240 | SO | Sa | Sa |
| 8 | Artificial | 240 | SO | PI/DES | P |
| 9 | Mixed | 240 | SO | DES | P |
| 10 | Mixed | 240 | SO | PI | P |
| 11 | Mixed | 240 | SO | PI | P |

Note: MA = feeding mode; LC = regular latex nipple; SC = regular silicone nipple; SO = orthodontic silicone nipple; FOI = evaluation of unsatisfactory orofacial functions; PI = incorrect positioning; UI = incorrect utensils; DES = discomfort; Sa = satisfactory; MAN = orofacial maneuvers; P = positioning; R = container; B = nipple

Table 1. Surveyed conditions of feeding, utensils, evaluation, and behavior of infants during and after breastfeeding, as well as the mean age of subjects during consultations 1 and 2

| Conditions | | Consultation 1 | | Consultation 2 | | p-value |
|------------|---------------------------------|----------------|-------|----------------|-------|----------------------|
| | | n | % | n | % | |
| Feeding | Mixed | 9 | 81.81 | 9 | 81.81 | 1.0000 ² |
| | Artificial | 2 | 18.18 | 2 | 18.18 | 1.0000 ² |
| Containers | 70 ml | 2 | 18.18 | 0 | 0.00 | - |
| | 150 ml | 5 | 45.45 | 4 | 36.36 | 0.7389 ² |
| | 240 ml | 4 | 36.36 | 7 | 63.63 | 0.3657 ² |
| Nipple | Silicone/regular latex | 9 | 81.82 | 2 | 18.18 | 0.0348 ^{2*} |
| | Orthodontic silicone | 2 | 18.18 | 9 | 81.82 | 0.0348 ^{2*} |
| Evaluation | Satisfactory orofacial function | 8 | 72.72 | 7 | 63.63 | 0.7055 ¹ |
| | Incorrect positioning | 10 | 90.90 | 6 | 54.54 | 0.1025 ¹ |
| | Utensils | 11 | 100 | 1 | 9.09 | 0.0016 ^{1*} |
| | Discomfort | 8 | 72.72 | 4 | 36.36 | 0.0455 ^{1*} |
| Procedure | Orofacial maneuvers | 2 | 18.18 | 1 | 9.09 | 0.5637 ¹ |
| | Positioning | 11 | 100 | 9 | 81.81 | 0.1573 ¹ |
| | Replacement of containers | 5 | 45.45 | -- | -- | 0.0253 ^{1*} |
| | Replacement of nipples | 11 | 100 | 1 | 9.09 | 0.0016 ^{1*} |
| Mean age | | 2m 11d | | 2m 22d | | |

* Significant values (p<0,05)

¹ McNemar test

² Chi-square test applied to compare ratio between consultations

Note: m = months; d = days

signs of discomfort observed during and after breastfeeding, as it was the case with the population selected for this study^(2,3).

Regarding containers, few authors discuss the influence of the different models on feeding and usage recommendations⁽⁹⁾. In Brazil, Law no. 11265 of January 3, 2006⁽⁷⁾ regulates the marketing of foods for infants and children, but it makes no specific reference to the use of different bottle types. Clinical experience shows that 240 ml containers are best for feeding at the initial stage. They may be used with smaller volumes as well, which results in an empty space inside the bottle that makes it easier to obtain a better feeding rate and a greater

control of the food flow extracted by the nipple hole.

As for the nipple types, there is no consensus in the literature about the details of the oral adjustment of the newborn to artificial nipples^(4,9). In practice, the orthodontic silicone nipple has the advantage of directing the food flow towards the palate, but some infants do not adapt to its anatomical shape and may have difficulties in adjusting to it. Regular silicone nipples direct the food jet to the back of the tongue or, in some cases, directly to the oropharynx, which can cause pulmonary aspiration and choking in some infants.

Analysis of the information on selected utensil revealed

that the mothers readily accepted the container change orientation. At the first consultation, only four infants used 240 ml containers, whereas at the second consultation, their number had increased to seven. The statistical test confirmed that after the counseling session with an expert, mothers changed their behavior regarding nipple selection, as well. At the first consultation, two infants used orthodontic nipples, whereas at the second one, nine infants had begun to use silicone orthodontic nipples.

The orientation by the speech therapist may have influenced a change in three of seven cases, which started using containers smaller than 240 ml. These containers had not been the initial choice of the mothers. We also instructed mothers that the nipple had to be correctly sized and that it could not be adulterated or hyper-perforated. In general, infants adjusted well to the recommended nipple, which resulted in a sequence of sucking, swallowing and breathing pause without milk loss by labial commissures, nipple bonding or infant tiredness after extracting the liquid.

Incorrect body positioning at the first consultation was identified, i.e., we found failures in craniocervical postural control and balance of oral structures. At the second consultation, inadequately positioned infants during and after feeding were still the case. Child positioning featuring unaligned head and trunk during feeding was reported in a study on infants who were bottle-fed during the first months of life⁽²⁾.

The description and analysis of the speech therapy orientation aimed at infants discharged from the NICU showed that correcting and instructing mothers on how to use bottle utensils reduced discomfort during feeding. However, some discomfort was still observed after feeding. That fact provides evidence that replacing both the nipple and the container helps, but is not enough to entirely eliminate reactions of discomfort. Both the individual evaluation of the oral adjustment of infants to the utensils and the correction of their body position are required as well. The literature contains reports on signs of discomfort similar to those we observed, including variations in tone or posture, skin coloration changes, nose wing flapping, apnea, accumulation of saliva, tongue and jaw tremors, sobbing, crying, moaning, grimacing, among others⁽³⁾.

The speech-therapy procedure at the first consultation revealed a need to correct the feeding position of all infants. At the second consultation, most mothers needed to be re-oriented to correct their infant's body position during and after the feeding and at rest. Eventually, after replacing all the

utensils and correcting the infant's body position, there was a significant decrease in expressions of discomfort during and after feeding. We noticed that the approach regarding utensils and body positioning persisted in the actions of the speech therapist. The discomfort after feeding decreased as the body position was improved and more appropriate utensils were adopted during the period of the two initial consultations.

We are fully aware of the fact that the problems and difficulties to control the variables which compose this study, as well as the size and characteristics of the sample, may bias the interpretation of the results. Therefore, we decided to explore conduct details and behavioral changes observed in the population after the orientation by the speech-therapists.

There is evidence that the procedure to guide and correct the bottle feeding mode favored breastfeeding, since the mixed feeding mode is the one that's most adopted by mothers. The mixed feeding mode remained constant during the first two consultations; it was predominant in nine infants, while two were exclusively bottle-fed.

The combination of utensils and infant body position results in a decrease in discomfort during and after feeding. It is essential to correct orofacial adaptations that result from the use of utensils early to avoid full weaning and prevent future damage to infant health and development.

The speech-therapy evaluation highlights that the bottle-feeding mode should be addressed and corrected at the first consultations after hospital discharge, which is essential to reduce discomfort. It is also a major factor to strengthen the bond between the mother and her child and promotes weight gain of infants. In addition to that, it empowers the family and provides it with tools for infant feeding, encouraging autonomous care of infants after hospital discharge.

CONCLUSION

The effectiveness of interventions in bottle feeding depends not only on the utensils used for feeding, but also on the subjective oromotor evaluation of the infant during feeding and at rest. Detailing and analyzing the actions of the speech therapist contribute to the decision making process of health care professionals regarding bottle use.

This study reveals issues that will certainly contribute to the scientific progress in speech therapy. It further reveals the specific aspects of the oromotor development in infant feeding.

RESUMO

Objetivo: Analisar retrospectivamente os resultados das orientações fonoaudiológicas sobre aleitamento com mamadeira de lactentes egressos da Unidade de Terapia Intensiva Neonatal. **Métodos:** Trata-se de um estudo descritivo referente às ações realizadas com lactentes egressos da Unidade de Terapia Intensiva Neonatal que receberam acompanhamento fonoaudiológico. Dos 11 sujeitos participantes, nove eram prematuros, adequados para a idade gestacional, entre 27 e 35 semanas; dois nascidos a termo, um grande e um adequado para a idade gestacional e com diagnóstico de laringomalácia e atresia de jejuno, respectivamente. Foram analisadas as variáveis: modo de aleitamento, recipiente da mamadeira, bico da mamadeira, avaliação e condutas fonoaudiológicas nas duas primeiras consultas dos lactentes. **Resultados:** Na primeira avaliação todos os lactentes usavam recipientes de mamadeira e bicos selecionados pelas mães. Na segunda avaliação, a maior parte dos utensílios havia sido trocada pelos modelos orientados, mas o posicionamento corporal incorreto e os sinais de desconforto persistiam. As orientações sobre modo de aleitamento foram retomadas. A análise estatística confirmou que a avaliação e as condutas fonoaudiológicas afetaram significativamente na decisão das mães pela troca dos utensílios, com posterior diminuição dos sinais de desconforto pelos lactentes. **Conclusão:** O estudo destaca a necessidade da observação minuciosa do fonoaudiólogo no procedimento de aleitamento com mamadeira e do detalhamento das especificidades do cuidado com a alimentação das crianças que saem da Unidade de Terapia Intensiva Neonatal.

Descritores: Lactente; Aleitamento materno; Alimentação artificial; Fonoaudiologia; Observação

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