

Original articles

Food transition in premature newborn children: interfering factors

Ellen Viviane do Nascimento Amoris¹<https://orcid.org/0000-0002-0489-9311>Edinalva Neves Nascimento²<https://orcid.org/0000-0002-8154-0716>

¹ Rede de Reabilitação Lucy Montoro, Marília, São Paulo, Brasil.

² Secretaria da Saúde de Marília, Marília, São Paulo, Brasil.

Conflict of interests: Nonexistent



ABSTRACT

Purpose: to check the variables which interfere in the transition from the alternative way of feeding to the beginning of proper oral mode.

Methods: 30 preterm newborns from a Neonatal Intensive Care Unit (NICU) participated, with initial weight of 1,500 grams, interned between May and July 2018. The study of the medical records of babies was performed in relation to comorbidities such as length of stay, weight, gestational age, use of mechanical ventilation, as well as quantitative and correlational analysis of the data.

Results: among the participants, 27 newborns began being fed in an orogastric manner and three, in a nasogastric way, and in some cases, artificial nipples were used. The average of gestational age coincided with the possibility of the proper via oral feeding. The longest time of transition was exactly with the newborns who had had clinical complications.

Conclusion: the clinical complication interfered in the time and prevalence of the alternative way of feeding during the process of food transition which, associated with the use of artificial nipples, may have interfered in the early weaning and in the failure of exclusive breastfeeding.

Keywords: Breast Feeding; Infant, Premature; Intensive Care Units; Alternative Feeding; Child Health Services

Received on: November 28, 2019

Accepted on: August 5, 2020

Corresponding address:

Ellen Viviane do Nascimento Amoris
Avenida José Rino nº525, Janio da Silva
Quadros
CEP: 17511-731 – Marília, São Paulo,
Brasil
E-mail: Fgaellenamoris@hotmail.com

INTRODUCTION

Feeding supplies all nutritional needs and promotes children's proper growth, as well as contributes to psychosocial development, state of alertness, cognition, motor development, neurological maturation, and mother-child interaction¹. Some newborn children are considered at risk due to prematurity and low weight, and thus, they need an alternative way of feeding².

Studies show that deglutition is mature around the eleventh week of pregnancy, suction around the thirty-second week, breathing and deglutition around the thirty-fourth week of pregnancy³. During suction the mandible movements, like opening, protrusion, closing, and retrusion are done. The coordination of these movements together with breathing and deglutition prevent children from choking, and thus avoids bronchoaspiration⁴. When there is not synchrony of these oral movements, other alterations associated to deglutition are identified, such as food refusal, fatigue, cough, oral escape, nasal regurgitation, cyanosis, and lung problems during breastfeeding⁵.

Many newborn children are born weeks before the expected development and therefore they need a long period until these functions are established and can be fed safely⁶. Prematurity can hamper newborn feeding because of the immaturity in deglutition's biomechanics. These functions facilitate the readiness for oral feeding when they are properly coordinated⁷.

The most used alternative methods of feeding premature newborn children in the service in study involve the nasogastric tube, orogastric tube, and the use of the cup. The cup technique allows an easy and safe feeding, being largely used in the practice until the infant has vigor and maturity necessary to breastfeeding. That technique is associated to a significant increase in the exclusive breastfeeding rates in the occasion of the rise, however, with a longer hospitalization period⁸.

The studies reveal that in clinical practice there is still difficulty in realizing the ideal moment for the beginning of transition from gastric feeding to oral way, being the height and gestational age some of the criteria of the transition. Most of the professionals do not evaluate specifically in a way that takes into account the aspects and conditions of the development with the oral motor skill⁹.

The speech therapist is the health professional who offers support to the mother-child dyad in the act of breastfeeding, especially in the Neonatal Intensive Care Unit (NICU). This professional contributes to the

success of breastfeeding, helping with the correct position, handle, and milking. However, in order to do his job with quality, it is necessary to know the factors which interfere in the transition from the alternative way of feeding to breastfeeding.

Thus, the aim of this study was to analyze the variables which interfere in the transition from alternative way of feeding to the beginning of proper oral way in premature infants.

METHODS

The project was forwarded to the committee of Ethics and Research of The Medicine College of Marília – FAMEMA, SP, Brazil, being approved by report no. 2,695,362, according to the attributions defined by Resolution CNS 466/2012 and Operational Standard no. 001/2013. In this study, we dismissed the use of Informed Consent Form, because it is about analysis of medical records.

This study was quantitative and correlational, whose population was constituted of pre-term newborn children, of both sexes, who were hospitalized in the Neonatal Intensive Care Unit (NICU) between May and July 2018.

This research was conducted in a Child Friendly Hospital which integrates the Health Care Network (HCN) of the area of coverage of the Regional Health Department DRS IX, being a reference to the attendance of 62 municipalities of the state of São Paulo, Brazil. The institution has service of medium and high complexity in the assistance to pregnant women and high-risk and vulnerable newborn children of the region, through the spontaneous demand or referrals of other institutions.

The Hospital offers multiprofessional attendance, composed of a Neonatologist, a Pediatricist, a Gynecologist, an Obstetrician, a Clinical Surgeon, a Nursing Team, a Physiotherapist, a Psychologist, a Social Worker, a Nutritionist, a Pharmacist, a Speech Therapist, besides students of Multiprofessional Residency.

As it is considered a Hospital which is part of Child-Friendly Hospital Initiative (CFHI) of the Ministry of Health, in partnership with the United Nations International Children's Emergency Fund (UNICEF), the attendance is geared to breastfeeding and mothers pay visits in all schedules of feeding according to the medical prescription.

This research did not pose any risk to the participants' health, because its main aim was to identify in

the medical records and daily notes during the period of hospitalization which could interfere in the transition from the alternative way of feeding to the beginning of the oral way, in a way that it could influence in the success of breastfeeding.

The criteria of inclusion established consisted of pre-term newborn children at gestational ages of 32nd to 36th weeks and six days; weight superior to 1,500 grams; good pattern of suction; good clinical stability; use of alternative way of feeding (orogastric or nasogastric tube) and hospitalized in NICU.

Newborn children who remained in NICU in serious conditions, at gestational ages higher than 37 weeks, weight inferior to 1,500 grams; neurological alterations, genetic syndromes/malformations, and infectious diseases which could make breastfeeding impossible were excluded of the research.

Based on the criteria listed above, 33 records were excluded, whereas two newborn children passed away, seven had weight inferior to 1,500 grams; 19 were born at fixed term, in other words, higher than 37 weeks of gestational age. Two of these were born with the Human Immunodeficiency Virus, one of them with Down Syndrome, and two of them with other Syndromes under investigation.

Initially, some newborn children were submitted to non-nutritious and nutritious speech therapy evaluation, while others did not go through this step, considering that the beginning of oral way was introduced by medical conduct or at days when there was no speech

therapist, as, for instance, on weekends. In the evaluation, the following suction criteria were considered: state of consciousness of the newborn (alert, sleepy, excited); the oral reflexes (rooting, suck, bite, and gag reflexes); intraoral pressure, suctions per pauses, tongue cupping, cyanosis, and stress signs (cry, respiratory change).

During this period of hospitalization, the ingestion of exclusive and mixed (use of lactic formulas) breastfeeding by the use of cup or small sucking bottle was registered.

The documental analysis of the control sheet of the diets attached to each record was done, whose data were collected between May and July 2018, through the Appendix 1.

For the analysis of the data, the records were typed and stored in Microsoft Office Excel spreadsheet. For a better analysis of the variables, Table 1 was elaborated, in which the results about the duration/time (in number of days) of the transition from the diet by orogastric tube to the beginning of exclusive oral way were presented.

RESULTS

In the first stage, the records of 63 newborn children were analyzed. According to the criteria established, it was possible to analyze 30 records of pre-term newborn children, being 16 females and 14 males. The number of days of hospitalization of each child is shown in Figure 1.

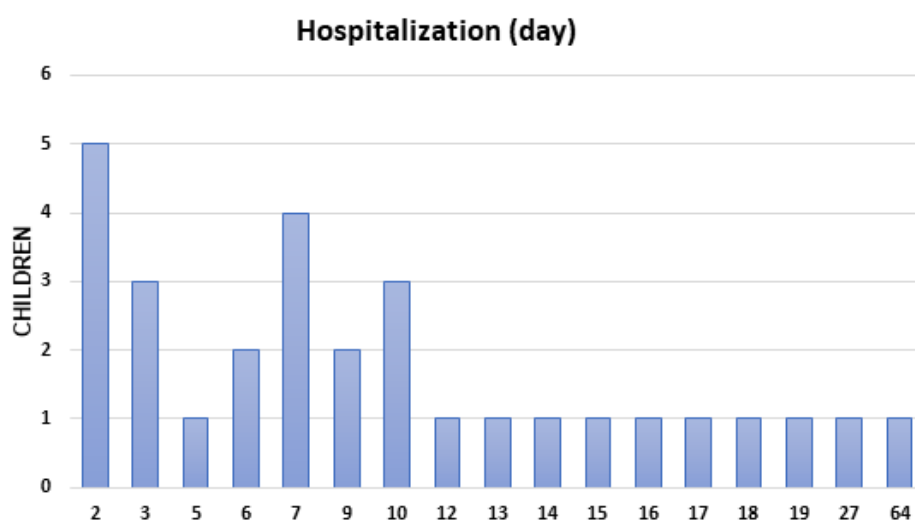


Figure 1. Number of days of children's hospitalization

The data collection was done every day during the hospitalization period. Of the correlated factors, we found gestational age, weight, orotracheal intubation, use of CPAP, orogastric and nasogastric tube, and time of hospitalization, that could interfere in feeding transition.

The shortest gestational age during this period was 32 weeks, the longest was 36 weeks and six days, the average being 35.972, approximately 36 weeks and two days.

In newborn children with gestational age of 33 weeks, we observed more comorbidities, like, for instance, orotracheal intubation, use of non-invasive mechanic ventilation (CPAP) and longer stay in hospitalization, in other words, these factors interfered directly in the transition to the beginning of the oral way. The newborn children ate the ages of 35 and 36 weeks made use of only one day with the alternative way, which indicates that at this age there is actually maturation of the stomatognathic system and it fosters the beginning of the oral way.

Table 1. Respiratory and feeding condition of the newborn children

NB	GA	OTI	CPAP	Days OGT	Days NGT
NB 1	33w5d	-	1d	4d	1d
NB 2	33w5d	-	-	4d	-
NB 3	35w1d	-	1d	3d	-
NB 4	36w	-	-	4d	-
NB 5	36w	-	-	2d	-
NB 6	33w4d	-	-	-	4d
NB 7	34w4w	-	-	7d	5d
NB 8	32w	-	-	3d	1d
NB 9	34w	-	-	2d	-
NB 10	33w4d	-	-	4d	1d
NB 11	33w2d	2d	5d	9d	1d
NB 12	35w4d	-	-	2d	1d
NB 13	34w	-	1d	-	4d
NB 14	32w6d	-	-	1d	2d
NB 15	35w	-	1d	1d	-
NB 16	35w	-	1d	1d	-
NB 17	35w	-	-	1d	-
NB 18	33w	-	1d	2d	3d
NB 19	36w	-	4d	3d	-
NB 20	36w6d	-	1d	1d	-
NB 21	36w	-	3d	1d	3d
NB 22	35w	-	-	2d	-
NB 23	36w1d	-	-	1d	-
NB 24	36w	-	3d	3d	-
NB 25	33w	15d	5d	9d	14d
NB 26	36w	-	-	1d	-
NB 27	33w	-	2d	2d	7d
NB 28	36w2d	-	1d	2d	-
NB 29	32w2d	-	-	-	3d
NB 30	33w	1d	1d	5d	3d

Abbreviations

NB= newborn
 GA= gestational age
 OTI= orotracheal intubation
 OGT= orogastric tube
 NGT= nasogastric tube

In premature infants with corrected chronologic age, it was possible to conclude that the beginning of oral way happened in around 6.7% in newborn children at 32 and 33 weeks. Besides, 27% had the beginning of the oral way at 34 and 36 weeks of corrected gestational age, 10% began at 37 weeks and 3.4% at 39 weeks of corrected age. With these values, the results reinforce

that the beginning of the oral way in premature occurs around the 34th week with maturation of deglutition.

According to the pre-term newborn infants' weight, the lowest was 1,604g and the highest was 3,765g, with the average of 2,232g. Among them, 83% had weight loss before the beginning of the oral way, totaling 25 newborn children.

NB	Weight at birth	Weight in the beginning of oral way	Difference of weight
NB 1	2134g	1920g	- 214g
NB 2	1876g	1736g	- 140g
NB 3	2370g	2175g	- 195g
NB 4	2264g	2022g	- 242g
NB 5	2346g	2130g	- 216g
NB 6	2012g	1900g	- 112g
NB 7	1604g	1465g	- 139g
NB 8	1945g	1774g	- 171g
NB 9	2315g	2130g	- 185g
NB 10	1728g	1730g	+ 2g
NB 11	2606g	2396g	- 210g
NB 12	2895g	2728g	- 167g
NB 13	1875g	1785g	- 110g
NB 14	1890g	1770g	- 120g
NB 15	2295g	2144g	- 151g
NB 16	2335g	2335g	No alteration
NB 17	2575g	2598g	+ 23g
NB 18	1880g	1880g	No alteration
NB 19	2475g	2146g	- 329
NB 20	3765g	3600g	- 165g
NB 21	2395g	2200g	- 195g
NB 22	2260g	2088g	- 172g
NB 23	2405g	2405g	No alteration
NB 24	2610g	2490g	- 120g
NB 25	1945g	1560g	- 385g
NB 26	2210g	2090g	- 120g
NB 27	2010g	1900g	- 180g
NB 28	2365g	2182g	- 183g
NB 29	1795g	1615g	- 180g
NB 30	1805g	1610g	- 195g

Abbreviations: NB = newborn; g = grams

Figure 2. Weight at birth and weight in the beginning of oral way

Concerning clinical complications, there were newborn children who used non-invasive mechanical ventilation (CPAP) for a minimum of one day and maximum of five days. Those who needed orotracheal intubation stayed for at least one day and at most 15 days until the beginning of the oral way.

Of this group, 23 newborn children were submitted to the evaluation of non-nutritious suction (stimulus done with gloved finger in the oral cavity) before they began the feeding by oral way. One newborn infant was evaluated both in non-nutritious suction and in nutritious. One newborn infant was evaluated in nutritious and mother's breast. Two of them were evaluated directly in mother's breast. Of the total of 30 newborn children analyzed, only three initiated the diet directly by nasogastric way, going directly to the oral way, in other words, they did not go through any of the previous evaluations. It happened due to the fact that the newborn children may have initiated the oral way on weekends without the speech therapy evaluation or directly by medical conduct.

According to the results of this research, not all the newborn children went through all the stages of transition. Regarding breastfeeding, 19 newborn children received hospital discharge in free demand breastfeeding and 11 newborn children in mixed feeding with the use of small sucking bottle. Disregarding the first-time mothers and the ones who had a previous experience of breastfeeding, the use of nipple was kept because of the small volume of mother's milk production and also the neglect of the infant.

DISCUSSION

During this process of transition to oral way, some factors can interfere due to global immaturity¹⁰. Even if the criterion of gestational age is preconized in the liberation to the beginning of the oral way, this factor alone cannot be decisive¹¹.

The population studied was of low-weight newborn children (average = 2,232 grams) with average of gestational age of 36 weeks and two days, coinciding with the possibility of adequate oral way. This could explain the high number of newborn children who had hospital discharge in breastfeeding. In the results we observed that the gestational age and the corrected age enabled the lesser time of stay with alternative way, reinforcing that at this age there really is the maturation of the stomatognathic system and fostering of the beginning of oral way.

Regarding the total time (in days) the results showed that the worst performance was exactly with the newborn children at gestational age of 33 weeks who had orotracheal intubation and needed to use the CPAP. Those ones had the need of using orogastric tube and prolonged nasogastric tube, and correspond to the longest period of stay of them. Besides, during the evaluation, these newborn children were in state of sleep, with partial response in rooting reflex, presence of bite reflex, weak intraoral pressure, absence of tongue cupping, pausable suction, and respiratory alterations, in other words, they were inapt to the beginning of the oral way, which shows that the use of mechanical ventilation interferes in this transition.

Among the newborn children without complications, the average was of three and four days using the alternative way of feeding. Of this population, 90% began the feeding by orogastric tube, totaling 27 newborn children, whereas 14 of these successively began by exclusive oral way.

The adequate exclusive oral way corresponds to when the newborn infant is gaining weight, oral pattern with coordination of suction, deglutition, and respiration, although this maturation results in the infant gaining weight¹², as well as the offer of breast in free demand, which may occur without complementation by cup/sucking bottle.

In the first days of life, the newborn children show a ponderal loss of weight, known as a physiologic factor. This evolution is considered as an indicator of adaptation of breastfeeding, the loss of weight being normal until 10% of the weight¹³. This piece of information justifies the high percentage (83%) which corresponds to 25 newborn children who had weight loss, with values that are expected and did not interfere in the transition to the oral way.

Many hospitals used the cup in their clinical practice, which is also considered an alternative way of feeding in the transition to the breast in order to avoid the use of bottles, due to the phenomenon of "confusion of nipples"¹⁴. The use of cups is recommended by the World Health Organization (WHO) for newborn children who are being breastfed. Being a safe method, it is used also with low-weight premature infants at birth, until they are mature enough to be exclusively breastfed¹⁴. When compared to the other ways of feeding, they were used to complement the newborn children who were already being breastfed due to hospital demand, however, its adherence is low, due to mothers' feeling of insecurity in keeping its use at home after discharge.

Regarding exclusive breastfeeding, the study showed that 19 newborn children had hospital discharge being breastfed in free demand, 11 children with mixed feeding and use of small sucking bottle, contributing to the precocious weaning. The Brazilian Regulation for Commercialization of Food for Infants and Young Children (NBCAL) corresponds to a set of laws that standardize the selling of food and products of childcare, and aims at guaranteeing for infants and children the right to breastfeeding. And by means of the law no. 11265/2006, selling nipples is prohibited, as well as their use, which causes precocious weaning¹⁵.

Breastfeeding brings several benefits which contribute to the whole growth and orofacial development, favoring the stomatognathic structures and functions of newborn children. However, the presence of the artificial nipple and certain medical behaviors contribute to the precocious weaning and the failure of exclusive breastfeeding.

Some factors are considered as decisive for newborn children to begin oral way feeding, being the maturation of suction primordial to the beginning of oral way. Thus, certain behaviors vary according to the medical team established in each institution. In general, and according to the literature, the corrected gestational age, weight, and clinical stability are the mostly used parameters by medical teams. Thus, the gain of weight is also relevant during the process of feeding transition, being considered one of the criteria adopted by medical doctors to the discharge of newborn children.

CONCLUSION

The results obtained through this study show that the clinical complications like orotracheal intubation and the use of CPAP interfered in the time of feeding transition from the alternative way to the oral one. Among the factors, the loss of weight did not directly show a significant relation to affect the transition to the oral way.

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Appendix 1. Protocol for the registration of the information in the records



Date: _____ Record Number: _____

IDENTIFICATION

Mother's name: _____
 Newborn's name: _____
 Birth date: _____ GA: _____ Current Age: _____ Corrected Age: _____
 Weight at birth: _____ Current weight: _____
 Apgar: _____ Type of birth: _____
 Diagnosis: _____

FEEDING

() O.W. () NGT () OGT

Type of milk:

DATE							
WEIGHT							
VOL.DIET							
WAY							
OBS:							

DATE							
WEIGHT							
VOL.DIET							
WAY							
OBS:							

GA= gestational age
 O.W.= oral way
 NGT= nasogastric tube
 OGT= orogastric tube
 VOL.DIET= volume diet
 OBS= observation