CoDAS
ISSN 2317-1782 (Online version)

Original Article
Artigo Original

Intervention time until discharge for newborns on transition from gavage to exclusive oral feeding

Tempo de transição alimentar na técnica sonda-peito em recém-nascidos baixo peso do Método Canguru

Andréa Monteiro Correia Medeiros[1]
Blenda Karen Batista Ramos[1]
Déborah Letticia Santana Santos Bomfim[1]
Conceição Lima Alvelos[1]
Talita Cardoso da Silva[1]
Ikaro Daniel de Carvalho Barreto[2]
Felipe Batista Santos[3]
Ricardo Queiroz Gurgel[3]

Keywords

Breast Feeding
Enteral Nutrition
Bottle Feeding
Patient Discharge
Kangaroo Mother Care Method
Newborn

ABSTRACT

Purpose: Measure the intervention time required for transition from gavage to exclusive oral feeding, comparing newborns exposed exclusively to the mother's breast with those who, in addition to breastfeeding, received supplementation using a cup or baby bottle. **Methods**: Analytical, longitudinal, cohort study conducted with 165 newborns (NB) divided into groups according to severity of medical complications (G1-with no complications; G2-with significant complications), and into subgroups according to feeding mechanism (A and B). All NBs were low birth weight, on Kangaroo Mother Care, and breast stimulated according to medical prescription and hospital routine. Regarding feeding pattern, subgroup A comprised NBs exclusively breastfed at hospital discharge, whereas subgroup B was composed of NBs fed through cup/bottle at some time during hospitalization. The number of days spent in each stage of transition was recorded for each NB. **Results**: History of clinical complications significantly influenced total intervention time. Study participants in subgroups G1-A (10 days), G1-B (9 days), and G2-A (12 days) displayed greater chances of early discharge compared with those in subgroup G2-B (16 days). **Conclusion:** NBs with no important history of clinical complications displayed greater chances of early hospital discharge. NBs with significant history of clinical complications that underwent gavage to exclusive breastfeeding transition presented smaller intervention time than those that required supplementation using cup/bottle. Feeding transition using the gavage-to-exclusive oral feeding technique is recommended for Speech-language Pathology practice in Neonatology.

Descritores

Aleitamento Materno
Nutrição Enteral
Alimentação Artificial
Alta do Paciente
Método Canguru
Recém-nascido

RESUMO

Objetivo: Verificar o tempo despendido na transição da alimentação por gavagem para via oral exclusiva, na técnica sonda-peito, comparando RNs baixo peso, considerando suas intercorrências clínicas/médicas, submetidos ao peito exclusivo com aqueles que, além do peito, receberam complemento por copo/mamadeira. **Método:** Estudo de coorte, analítico e longitudinal, com 165 RNs, divididos quanto à gravidade de intercorrências clínicas (G1 e G2) e quanto à via de dieta (A e B). Todos RNs eram baixo peso, do Método Canguru, estimulados no peito, conforme prescrição médica e rotina hospitalar. Pertenciam ao subgrupo A: RNs estimulados exclusivamente no peito, que mantiveram peito exclusivo no momento da alta, e ao subgrupo B: RNs que utilizaram copo/mamadeira em algum momento da internação hospitalar em complementação ao peito. Foi registrado o número de dias que o RN permaneceu em cada etapa da transição. **Resultados:** O histórico de intercorrências médicas influenciou significativamente o tempo total de transição. Subgrupos G1-A (10 dias), G1-B (9 dias) e G2-A (12 dias), quando comparados ao grupo G2-B(16 dias), evidenciaram maior chance de alta antecipada. **Conclusão:** RNs sem intercorrências clínicas importantes apresentaram chance de alta mais breve. RNs com intercorrências clínicas, que fizeram a transição da gavagem exclusivamente no peito, tiveram tempo de transição menor que aqueles que utilizaram complementação por copo/mamadeira. A transição alimentar pela técnica sonda-peito é importante para ser preconizada na atuação fonoaudiológica em Neonatologia.

Correspondence address:
Andréa Monteiro Correia Medeiros
Departamento de Fonoaudiologia, Universidade Federal de Sergipe – UFS
Av. Marechal Rondon, s/n, Cidade Universitária Prof. José Aloísio de Campos, Jardim Rosa Elze, São Cristóvão (SE), Brasil, CEP: 49100-000.
E-mail: andreamcmedeiros@gmail.com

Received: May 04, 2017

Accepted: September 21, 2017

Study carried out at Maternidade Nossa Senhora de Lourdes - Aracaju and at the Universidade Federal de Sergipe – UFS - São Cristóvão (SE), Brasil.

[1] Departamento de Fonoaudiologia, Universidade Federal de Sergipe – UFS - São Cristóvão (SE), Brasil.

[2] Departamento de Informática e Estatística, Universidade Federal Rural de Pernambuco – UFRPE - Recife (PE), Brasil.

[3] Departamento de Medicina, Universidade Federal de Sergipe – UFS - Aracaju (SE), Brasil.

Financial support: Edital n.º 14/2012/POSGRAP/UFS – PIBIC/PICVOL 2012.

Conflict of interests: nothing to declare.

INTRODUCTION

Breastfeeding favors the correct development of orofacial structures, due to the sucking movement the newborn (NB) performs during milking[1]. Some NBs, considered at risk, are born unfit to receive a full oral diet and require gavage feeding.

Traditionally, two factors are considered to be major in neonatal risk: low birth weight (NB born <2.500 grams) and prematurity (NBs born before 37 weeks of gestational age), following the World Health Organization classification: extreme premature infants (<28 weeks), very premature (28 to 31 weeks and 6 days), moderate to late preterm infants (32 to 36 weeks and 6 days)[2].

The transition from oral feeding to gavage is important for the neonate at risk because it guarantees nutritional intake that allows its growth, physiological stability and progress in feeding function[3]. Guidance for oral feeding has been made based on criteria such as corrected gestational age and weight, considering the necessary neuromuscular maturity[4].

Aspects such as behavioral status, readiness for sucking[4,5], presence of oral reflexes[6], stomatognathic system characteristics[7], suction capacity, caloric balance, respiratory and clinical status, and maturation of coordination of sucking, swallowing, and breathing functions[8-10] are relevant for prescribing the feeding technique to be adopted[9].

Oral motor maturation and the transition from the oral gavage diet may be hampered by factors such as long hospital stay, prolonged use of gastric tubes and deprivation of sensorial stimuli in the oral region, delaying hospital discharge[9].

The exclusive gavage feeding / gastric tube (breast-probe) transition technique is reported as an important intervention strategy[11,12], avoiding the indication of the cup and / or bottle.

In view of the use of transition from gavage feeding directly to the breast[11,12] and the controversy over the supply of diet supplementation through a glass and / or bottle[11,13], the objective of this study was to quantify the time (in days) for the transition from gavage to exclusive oral route (breast, cup and / or bottle) at each stage of the breast-probe technique, comparing low birthweight NBs (LBNB) on Kangaroo Method, considering the history of their clinical complications, who maintained exclusive breastfeeding until hospital discharge with those who received complement by glass and / or bottle at some time of hospitalization.

METHODS

Study conducted in Unidade de Cuidados Intermediários Canguru (UCINCa) of a public Maternity from Northeast region of Brazil. Approved by Ethics Committee from the instituition, under the number CAAE 02304812.0.0000.0058. A cohort, analytical and longitudinal study on the time spent in the transition stages from gavage feeding to breast, in LBNB of Kangaroo Method.

The technique of transition from gavage to breast[11,12] is characterized by the following steps: The first step is the stimulation of non-nutritive sucking (NNS), while diet is provided by gavage. The stimulation is performed with a "gloved finger" (GF) - finger of the speech therapist introduced into NB oral cavity and/or in "empty breast" (EB) - mother's breast has been emptied as completely as possible, enabling NB to train the suction at the same time that the diet is offered through the orogastric tube. When the infant has an adequate suction pattern, the next step is the "partially filled breast" with complement by orogastric tube (PFB+OGT). In this stage, the NB is placed in the partially emptied breast (the previous milk was extracted) and begins the coordination training of the suction-swallowing-breathing functions (SSB), being also offered supplementation of milk by gavage. In the next step, breastfeeding plus complement by orogastric tube (breast+OGT), there is no more emptying of the breast, although there is still the OGT. In the last step, the newborn is breastfed without the use of the orogastric tube (exclusive breast).

In some cases, the cup is used as a food alternative in the transition to the breast[14-16] to avoid the use of bottles, due to the phenomenon "confusion of nozzles"[17-20]. The supply of breast enhancement per cup and / or bottle was recorded when they were used during hospital admission.

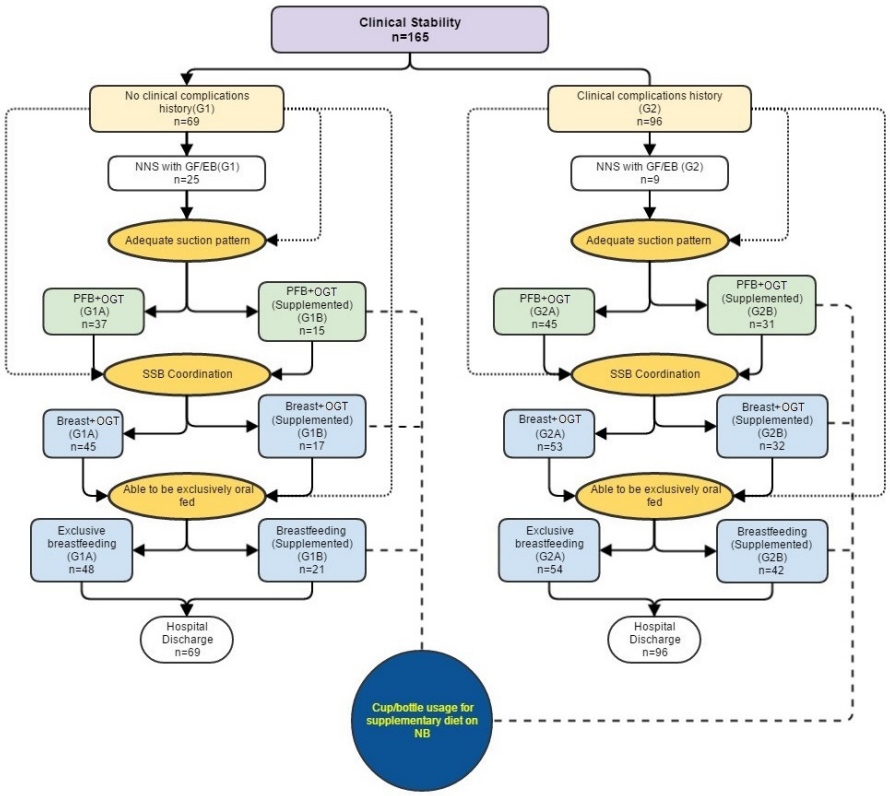
The exclusive oral route is considered when meeting the criteria of weight gain, adequate oral motor pattern with SSB coordination, corresponding to free breast supply demand[8], which may occur without complement (A) or with complement by cup / bottle (B).

A total of 165 NBs, of both genders, were stimulated in the breast. As criteria for inclusion, low birth weight NBs belonged to the Kangaroo Method, were exclusively gavage fed and were clinically stable at the beginning of the breast-probe technique, and the responsible person/legal guardian consented to participate in the study by signing the Term of Free and Clarified Consent (TFCC).

The NBs were divided into two groups (G1 and G2) for medical complications[5,7] and duration of therapy with antibiotics. Group G1 was composed of NBs who had a stable respiratory condition (no use or use less than 14 days of Oxygen support - O_2), absence of infections requiring isolation, neuropathy and / or heart disease, without antibiotic use or use for up to six days. The G2 group consisted of NBs who had some important medical complications, such as respiratory instability (apnea, O2 use for 14 days or more), presence of infection / sepsis, anemia, neuropathy, cardiopathy and antibiotic use for a period of seven days or more (Figure 1).

All the NBs were stimulated in the breast, being divided into subgroups (A and B) according to how they received the diet. The medical prescription of diet, according to the routine of the maternity, was the official adopted diet. Subgroup A: NBs stimulated exclusively in the breast and who maintained exclusive breast at discharge. Subgroup B: NBs who used a cup and / or bottle at some time during hospital stay to complement the breast supply.

The Speech language pathology data collected in the medical record were transposed to a protocol that contemplated gestational age at birth (GAB), birth weight (BW), time (in days) of antibiotic use and respiratory support, and type) of clinical complication (s). We also recorded the days of life (DL) and corrected gestational age (CGA) that the NB presented at the beginning of each stage of the transition from gavage to exclusive oral route.



Caption: Distribution of NBs regarding absence (G1) or presence (G2) of clinical complications history, and division according to the way of receiving the diet: A: NBs stimulated exclusively in the breast, and who maintained exclusive breast at discharge; B: NBs who used a cup and / or bottle at some point during hospital stay to complement the breast supply. Division of newborns as to feed the various stages of transition gavage for exclusive breast: Non-nutritive sucking (NNS) - with "gloved finger" (GF) or "empty breast" (EB), "Breast partially filled" with complement by orogastric tube (OGT + PFB), breast plus complement by orogastric tube (breast + OGT) breast without using orogastric tube (exclusive breast); and when there is use of complement per cup / bottle (complement); SSB - Suction, Swallowing and Breathing

Figure 1. Flowchart referring to the distribution of newborns during the transition from oral gavage to exclusive oral route at the Intermediate Care Unit Kangaroo, Brazil, 2014

Although the groups had different CGA at birth, this difference was compared at the initial time of data collection in the breast-probe technique. Data were recorded regarding the time (in days) when the NB was maintained at each stage of the transition, from the initial phase, which corresponds to the NNS, until hospital discharge.

The descriptive measures used to characterize GAB, BW and CGA in the groups, subgroups and interaction were mean and standard deviation (SD), as well as for the times between the steps and global, median, interquartile range (IQR) and confidence interval (CI).

To evaluate GAB, BW, CGA and time in the steps between the groups (G1 and G2), subgroups (A and B) and interaction (G1-A, G1-B, G2-A and G2-B) Mann-Whitney (two groups), Kruskal-Wallis (three or more groups) and Dunn-Bonferroni (multiple comparisons) were performed.

To evaluate time differences in the groups, subgroups and interaction, the Breslow test was used. Survival curves were constructed using the Kaplan-Meier estimator and the risk ratios were calculated using the Cox regression. To verify the homogeneity of the frequencies of the age groups distributed in the groups and subgroups, the Chi-square test with correction of Monte-Carlo in order to estimate p-values as close to exact (99.9% CI and 100,000 repetitions) was used. For all analysis, $p < 0.05$ and the software R Core Team 2015 were used.

RESULTS

The 165 NBs participating in this study, of both genders, were submitted to the transition from feeding to gavage to the breast, following the maternity routine in which the study was performed, which follows the assumptions of humanized attention to low weight NB, with indication of early breast stimulation, as a consensus among mothers, family members and healthcare professionals[14].

All NBs were underweight and were hospitalized in the UCINCa (in mother housing -NB), having the mother desire to breastfeed. The NBs, to initiate stimulation in the breast-probe technique, met the criteria of clinical stability and full enteral nutrition (via orogastric tube), with medical release to begin the training.

GAB ranged from 25 to 39.28 weeks, with a mean age of 32.45 (SD: 2.51) weeks and BW from 665 to 2180 grams, with a mean weight of 1418.12 (SD: 298.76) grams.

The stratification of the participants regarding GAB followed the ensuing distribution, according to the classification: 12 (7.3%) extreme premature (<28 weeks); 57 (34.5%) very premature

(28 weeks to 31 weeks and 6 days); 92 (55.8%) premature, moderate to late (32 weeks to 36 weeks and 6 days); 4 (2.4%) full-term newborns (37 to 42 weeks) (Table 1).

Association between GAB ranges in groups and interaction was obtained. This GAB variability was evidenced when the characterization data were analyzed in the groups, with significant differences ($p < 0.001$) (Table 2).

According to clinical complications, group G1 was composed of 69 (41.8%) NBs and group G2 was composed of 96 (58.2%) NBs. In each group (G1 and G2), the NBs presented significantly different GAB and BW (Table 1), but at the beginning of the transition in the breast-probe technique, they had a mean CGA of 35.12 (SD: 2.23) weeks, being equivalent when comparing groups, subgroups and interaction (Table 2).

All 165 NBs were submitted to the breast-probe technique. However, according to the way of receiving food, during the period of hospitalization until discharge, the NBs were divided into Subgroup A: 102 (61.8%) NBs stimulated exclusively in the breast, and maintained exclusive breast at the time of discharge; and Subgroup B: 63 (38.2%) NBs who used a glass and / or bottle at some time during hospital stay to complement the breast supply.

Regarding BW, NBs presented significant differences between groups G1 and G2 ($p < 0.001$), but not for subgroups A and B. (Table 2). At the beginning of the transition, they had a mean global weight of 1585.9 (SD: 216.29) grams.

In relation to the mean weight (in grams), at the moment of the NNS stage, performed with only 34 individuals (21.12%) of the total population, NBs presented: 1560.6 (SD: 202.0) in G1A, 1708 (SD: 214.6) in G1B, 1511.9 (SD: 179.4) in G2A and 1562.4 (SD: 248.7) in G2B, with significant differences between groups G1 and G2 ($p = 0.013$), in the subgroups A and B ($p = 0.043$) and in the interaction ($p = 0.002$). At discharge: 1781.7 (SD: 204.2) in G1A, 1906.4 (SD: 159.9) in G1B, 1778.7 (SD: 171.0) in G2A and 1846.8 (SD: 316.4) in G2B, with significant differences in subgroups A and B ($p = 0.007$) and in the interaction ($p = 0.008$). As for weight gain (in grams) during the time spent in the art: 221.1 (SD: 125.1) in G1A, 197.8 (SD: 153.2) in G1B, 267.4 (SD: 142. 4) in G2A and 284.3 (SD: 215.0) in G2B, without significant differences between group and / or subgroup.

Of the total sample (165 individuals), not all of them went through all stages of the transition due to the clinical criteria for indicating each stage of the technique.

The results on the duration / time (in number of days) of the diet transition by orogastric tube up to orally exclusive, for each group (G1 and G2), subgroup (A and B) and interaction will be presented in each step of the technique (Table 3). Of the total sample (165 individuals), only 34 individuals (21.12%) performed NNS GF + EB. Only 1 individual spent 2 days in this stage (G1-A), the others took only 1 day.

The results were different for Group (G1 = 3 days and G2 = 3.5 days), but were not significant for subgroup (A and B) and interaction (Table 3).

As for the number of days that NBs went through the breast + OGT step, there were differences for Group (G1 = 5 days and G2 = 6 days), subgroup (A = 5 days and B = 8 days) and interaction. G1-A was the group that stayed the shortest time (5 days) and G2-B for the longest (9 days) (Table 3 and Figure 2).

In relation to the number of days that NBs remained in the breast until discharge, there was no significant difference for groups, subgroups and interaction (Table 3). (All groups and subgroups remained around 3 to 4 days). The data are presented in the descriptive figure for better visualization (Figure 2).

G1 (69 NBs) presented an average of 10.86 (SD: 5.314) days, while G2 (96 NBs) had a mean of 15, 35 (SD: 8.514) days. There was a significant difference for groups with a mean time of 9 days for G1 and 13 days for G2 ($p < 0.001$) and interaction with a median time of 10 days for G1-A, 12 days for G2-A, 9 days for G1- B and 16 days for G2-B ($p < 0.001$). Subgroup A (HR: 1.89; $p < 0.001$) also had a higher chance of pre-discharge at any time in the study compared to subgroup B, as well as the

Table 1. Characterization of the individuals regarding the distribution into groups and subgroups, regarding gestational ages (at birth and corrected at the beginning of the transition)

	Gestational Age at Birth				p-value
	<28w N (%)	28-31w6d N (%)	32-36w6d N (%)	37-42w N (%)	
Subgroup					
A	4 (3.9)	35 (34.3)	59 (57.8)	4 (3.9)	0.078
B	8 (12.7)	22 (34.9)	33 (52.4)	0 (0)	
Group					
G1	0 (0)	15 (21.7)	50 (72.5)	4 (5.8)	<0.001
G2	12 (12.5)	42 (43.8)	42 (43.8)	0 (0)	
	Corrected Gestational Age in the beginning of Transition				p-value
	<28w N (%)	28-31w6d N (%)	32-36w6d N (%)	37-42w N (%)	
Subgroup					
A	0 (0)	6 (5.9)	80 (78.4)	16 (15.7)	0.061
B	1 (1.6)	0 (0)	46 (73)	16 (25.4)	
Group					
G1	1 (1.4)	0 (0)	55 (79.7)	13 (18.8)	0.094
G2	0 (0)	6 (6.3)	71 (74)	19 (19.8)	

Caption: N = number of observations; w = weeks; d = days; A = Exclusive Breast; B = Breast+Cup and/or Bottle; G1 = Group without complications; G2 = Group with complications. Chi-squared with Monte-Carlo correction (100.000 replicates)

Table 2. Characterization of the individuals regarding means and standard deviation of gestational age and birth weight, and corrected gestational age at the beginning of the transition

	GAB (weeks) Mean (SD) Median	BW (grams) Mean (SD) Median	CGA (weeks) Mean (SD) Median
Group			
G1 (N=69)	33.74 (1.93) 33.71	1607.10 (258.82) 1665.00	35.23 (2.17) 35.00
G2 (N=96)	31.52 (2.47) 32.00	1390.57 (293.81) 1392.50	35.02 (2.27) 34.57
p-valor¢	<0.001*	<0.001*	0.349
Subgroup			
A (N=102)	32.78 (2.41) 33.00	1506.00 (268.52) 1517.50	35.00 (2.08) 34.71
B (N=63)	31.92 (2.59) 32.40	1440.84 (340.54) 1470.00	35.29 (2.45) 35.14
p-valor¢	0.110	0.227	0.416
Group × Subgroup			
G1-A (N=48)	33.80 (2.18)a 33.71	1592.46 (262.76)a 1637.50	35.30 (1.77) 34.92
G2-A (N=54)	31.86 (2.25)b 32.28	1429.15 (251.78)b 1455.00	34.73 (2.30) 34.49
G1-B (N=21)	33.61 (1.22)a 33.71	1640.57 (252.61)a 1685.00	35.06 (2.93) 35.14
G2-B (N=42)	31.07 (2.69)b 31.71	1340.98 (337.03)b 1305.00	35.40 (2.21) 34.92
p-valor£	<0.001*	<0.001*	0.531

*Significant at p<0.05; ¢Mann-Whitney Test; £Kruskall-Wallis test
Caption: GAB = Gestational Age at Birth; BW = Birth Weight; CGA = Corrected Gestational Age in the beginning of Transition; G1 = Group without complications; G2 = Group with complications; A = Exclusive Breast; B = Breast+Cup and/or Bottle; SD = Standard Deviation; a,b = Subgroups significantly different with p<0.05 for Dunn-Bonferroni Multiple Comparison Test

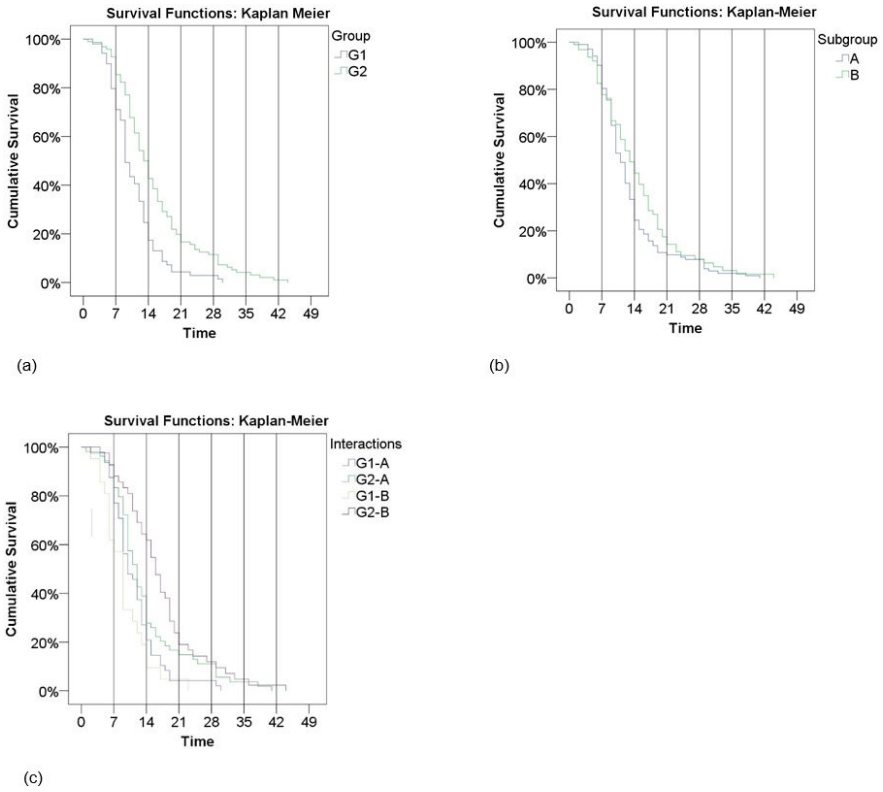
Table 3. Median time (in days), duration in the stages of transition from gavage to exclusive oral route, until hospital discharge

	NNS GF+EB/OGT Median (IQR)	N	PFB+OGT Median (IQR)	N	Breast+OGT Median (IQR)	N	Breast to Discharge Median (IQR)	N
Group								
G1 (N=69)	1.04 (0)	25	3 (4)	52	5 (5.35)	62	4 (4.5)	69
G2 (N=96)	1 (0)	9	3.5 (3)	76	6 (7)	85	3 (4)	96
p-valor¢	0.878		0.044*		0.015*		0.119	
Subgroup								
A (N=102)	1.06 (0)	16	3 (3)	82	5 (5)	98	3 (3)	102
B (N=63)	1 (0)	18	3 (4)	46	8 (6)	49	4 (4)	63
p-valor¢	0.772		0.214		0.002*		0.430	
Group × Subgroup								
G1-A (N=48)	1.07 (0)	14	3 (3.5)	37	5 (5)a	45	3 (4.75)	48
G2-A (N=54)	1 (0)	2	4 (4)	45	6 (4)a	53	3 (3)	54
G1-B (N=21)	1 (0)	11	2 (2)	15	7 (7.5)a.b	17	5 (3.5)	21
G2-B (N=42)	1 (0)	7	3 (3)	31	9 (9.25)b	32	4 (4.5)	42
p-valor£	0.699		0.059		0.002*		0.213	

*Significant at p<0.05; ¢Mann-Whitney Test; £Kruskall-Wallis test
Caption: N = number of observations; NNS GF+EB/OGT = number of days in the non-nutritive sucking stage with "gloved finger" or "empty breast" (concomitant with the orogastric tube); PFB+OGT = number of days in partially filled breast stage + orogastric tube; Breast+OGT = number of days in the breast stage + orogastric tube; Breast to discharge = number of days in the breast step to discharge; G1 = Group without complications; G2 = Group with complications; A = Exclusive Breast; B = Breast+Cup and/or Bottle; a,b = Subgroups significantly different with p<0.05 for Dunn-Bonferroni Multiple Comparison Test; IQR = Interquartile Range

G1-A groups (HR: 2.07; p = 0.001) and group G1-B (HR: 3.02; p <0.001) had a higher chance of early discharge at any time in the study compared to the G2-B group (Table 4).

Survival curves estimated by Kaplan-Meier demonstrate that the G2 group has a later rise over time. At 14 days, only 57.3% of patients in the G2 group were discharged, compared to 82.6% in the G1 group. As for subgroups A and B, there is no difference over time. As for the interaction, we can verify that the G2-B group is discharged later, being able to detach at 14 days of transition with only 38.1% of patients with discharge, compared to 70.2% in the G1-A group, 72.2% in the G2-A group and 90.5% in the G1-B group (Figure 2).



Caption: The graphs show the% of NBs that have not yet been discharged over time comparing the groups (G1 and G2), subgroups (A and B) and interaction (G1-A, G1-B, G2-A and G2-B) between group and subgroup

Figure 2. Survival Functions Curves estimated by Kaplan-Meier estimator, divided by Groups (a), Subgroups (b) and Groups × Subgroups (c), regarding the time spent until hospital discharge

Table 4. Survival analysis of the time in days between the beginning of the breast-probe technique and the hospital discharge

	MT (IQR)	Breslow (p-value)	Unadjusted HR (CI95%)	p-value
Group				
G1 (N=69)	9 (7)	15.64 (<0.001)	1.89 (1.37-2.61)	<0.001
G2 (N=96)	13 (9)		1	
Subgroup				
A (N=102)	11 (6)	1.95 (0.162)	1.28 (0.93-1.75)	0.134
B (N=63)	13 (10)		1	
Group × Subgroup				
G1-A (N=48)	10 (6)	24.73 (<0.001)	2.07 (1.35-3.17)	0.001
G2-A (N=54)	12 (7)		1.43 (0.95-2.15)	0.086
G1-B (N=21)	9 (7)		3.02 (1.76-5.19)	<0.001
G2-B (N=42)	16 (9)		1	

Caption: MT = Median time between the beginning of transition and hospital discharge; IQR = Interquartile Range; HR = Hazard Risk; CI95% - 95% Confidence interval; G1 = Group without complications; G2 = Group with complications; A = Exclusive Breast; B = Breast+Cup and/or Bottle

DISCUSSION

The main focus of NB speech therapy is to promote a safe and efficient diet through SSB coordination[6]. Nowadays, there is a great effort on the part of health professionals and public policies so that this population can be fed in the breast[21]. The transition from gavage feeding directly to the breast is a safe alternative for the feeding transition of NB at risk, although the indication of the cup and bottle is still a practice used in this population during hospitalization. The results discussed here address the use of the breast-probe technique from the time spent by the low-weight NBs in their use, which is used exclusively or with complement by another feeding route.

The population studied was of low birth weight NB (mean = 1481 grams), not classified as premature, since the individuals had gestational ages between 25 and 39.28 weeks, with mean CGA at the beginning of the transition of 35.12 weeks. This mean age coincides with the possibility of adequate oral feeding, since the coordination of SSB functions[11,22] usually occur after 34 weeks[6,23], and studies have also mentioned earlier ages to start sucking and swallowing training (32 to 34 weeks)[24,25]. This could explain the low number of NBs in the present study that started the food transition from the NNS, since the NBs already had an average CGA expected for an adequate sucking pattern, with SSB coordination, and this average CGA is considered safe for the supply of oral feeding[6].

It's noteworthy that the NNS technique was little used in the researched population, for about 1 day, in contrast to the study that reported that NB is on average 4 days in this stage[26]. It was also observed that NNS was performed mainly in EB and not so much in GV, indicating a tendency of stimulus to suction directly in the breast, as it appears in the literature[14,27] which refers to EB as being important for the easy applicability and encouragement of breastfeeding, promoting early sucking experience, even before the removal of the tube.

The NNS has been related to an oral stimulation program in NBs fed by gavage[14,28], being indicated to obtain a favorable suction pattern, aiming at the adequacy of tonicity and mobility of the muscles involved in this function[12]. When there is improvement of muscle quality and functionality, with a favorable maturation pattern, the suction is performed in the "partially filled breast"[12].

In the present study, routine and prescriptive dynamics of the maternity medical staff were obeyed, and cases that had no indication for NNS initiated the breast-probe technique directly in the stage "partially filled breast", which had mean days (G1 = 3 and G2 = 3.5 days) near the NNS time (4 days) reported in a previous study[11]. The fact that the population belongs to the Kangaroo Method, which advocates early contact between mother and baby[14], may have contributed to the fact that most of them have done the immediate training in the PFB + OGT stage, emphasizing humanized assistance, with emphasis on biological and psycho-affective issues[9].

In the PFB + OGT and breast + OGT stages, there were significant differences between G1 and G2. G1 NBs were less time (3 days, 5 days, respectively) in those steps involving the probe complement. NBs with important medical complications (G2) required more time (3.5 days, 6 days, respectively) with dietary supplementation by tube, corroborating the literature that the clinical picture of important medical complications could be related to delayed stimulation and even compromise the child's development[11,29].

In the PFB + OGT stage, differences were only found between groups G1 and G2, but cup / bottle use did not influence the training time of this stage. Regarding the use of the bottle, a study revealed that there were no significant differences in the acceptance of breastfeeding when compared to the population that used a cup or bottle during the hospital stay[13]. Training in the partially filled breast is usually indicated to decrease SSB incoordination, since milk flow (ejection) is reduced with partial emptying of the breast. Enables the NB to improve its coordination skills and the tonicity and mobility of phonoarticulatory organs[12] (lips, tongue, cheeks), essential for success in the later stage of the technique (breast + OGT).

In the breast + OGT stage, there were differences between groups, as well as in subgroups and interaction. G1 kept less time than G2. Among the subgroups without complications (G1A and G1B), there was no difference in transition time, evidencing that cup / bottle use did not negatively affect the time spent in this stage, when considered NBs with good health history. This data also agrees with the study that refers to the similarity in the transition time between NBs fed on both the cup and the bottle, even with breast acceptance[13].

On the other hand, in the group with complications (G2A and G2B), there was a difference in transitional time in the breast + OGT stage (6 days and 9 days, respectively), showing that the use of the gavage transition directly to the exclusive breast allowed a shorter time in this stage, precisely for NBs who had a less satisfactory clinical history. This data demonstrates that in NBs with complications, the transition to exclusive breastfeeding occurred more briefly. Recent knowledge about the relevance of complications and interventions during hospitalization and its repercussions on posterior neurodevelopment[14] has been considered fundamental in the understanding of this population.

When comparing groups submitted to the transition from gavage to exclusive breast, G1A and G2A presented similar median transitional time (10 days and 12 days, respectively), showing that, regardless of the history of clinical complications, there was shorter time in the breast + OGT stage. This result is very important and emphasizes the importance of the use of the tube-to-breast transition technique in this population. On the other hand, NBs with a history of important clinical complications, which used cup / bottle (G2B), had their transition time increased (16 days). It was noted that G2B

required a longer time (9 days) in the breast + OGT stage, with significant differences between it and all the other subgroups that did not use a cup / bottle. Despite this, the use of the glass has been prescribed, following the Iniciativa Hospital Amigo da Criança (IHAC), in the transition from the gavage to the oral route when it is necessary to supplement the breastfeeding and also when the mother is temporarily absent or incapacitated to breastfeed[14]. On the other hand, it is important to consider that, having subgroup B remained longer in the breast + OGT stage, may have contributed to clinical prescription of alternative feeding techniques, since the fact that NBs did not evolve as quickly as those on exclusive breastfeeding may have generated the indication of glass and / or bottle by the medical team, as an attempt to establish the full oral route in this group.

The success in the breast + OGT step is relevant for indication and performance in the exclusive oral route, with aspects such as ability in SSB coordination, adequate weight gain and the non-occurrence of clinical alterations such as: changes in glycemic level, heart rate and the presence of cyanosis and jaundice[30], are parameters for withdrawal of the probe as an alternative route of feeding.

When feeding became exclusive oral (breast at discharge stage), there were no more time differences between G1 and G2, (4 days and 3 days, respectively) nor for subgroups and interaction. On the other hand, weight was not the determining factor for choosing the type of diet offered (exclusive breast or complement use per cup / bottle), since the NBs that used the cup / bottle already presented greater weights from the moment of evaluation, which continued to occur at the time of discharge and when total weight gain during the period of hospitalization. The weight gain was significantly higher in the population that used the complement per cup / bottle, coinciding with reports in the literature that, often, alternative ways of providing diet are indicated to guarantee weight gain[25]. It is a fact that the NBs of the present study obtained greater weight gain when using a supplement, however, it was not the weight gain that determined the indication of the cup / bottle, since the subgroup A NB were discharged even though they were significantly less heavy than those of subgroup B. This data may be related to the insertion of the population studied here in the Kangaroo Method, which advocates outpatient follow-up after hospital discharge when NB has a minimum weight of 1500 grams[14], besides other favorable clinical, familial and social conditions. It should be noted that the mean birth weight of both groups studied was already higher than this value.

The length of stay at each stage varied according to the prescription, which observed the maturity of NBs and SSB coordination, among other clinical aspects. The data found were relevant and suggest that the dietary transition training of the orogastric tube directly to the breast, without complementation by cup / bottle, considering favorable clinical conditions, may contribute to exclusive breastfeeding.

There was a significant difference between groups (G1 and G2) (9 days and 13 days, respectively) and interaction. The statistically significant differences showed that the worst performance (longer transitional time) was with NBs who had complications and used cup / bottle (G2B) (16 days), while the best (shorter) time was those of NBs without complications, who transitioned exclusively (G1A) or non-exclusive (G1B) to the breast (10 days and 9 days, respectively). Among the NBs with complications (G2A and G2B), there were also significant differences, and the NBs that exclusively used the gavage transition technique presented a shorter transitional time (12 days) than NBs that received complementation by cup / bottle (16 days). These results are in contrast to the previous study[11], whose average transitional time was 12.31 days, with a longer time spent in NBs without clinical complications.

The great contribution of the present study is to show that the clinical complications influence the time of the food transition from gavage to the exclusive oral route; and that the use of the breast-probe technique, with exclusive breastfeeding, when it comes to NBs with important clinical complications, had a shorter transition time, than in cases where breast-feeding by bottle / bottle was offered.

This study has limitations inherent to observational studies, especially regarding the quantification of the volume of diet (in mililiters) received in the stimulation of the breast that involved the transition from gavage to oral feeding. While the volumes prescribed and offered by gavage, and in utensils like cup and bottle, can be measured, the amount of milk offered in the breast can't be measured. However, this point was compensated by the determination of the parameters observed by the medical team for the evolution of NB in each of the stages, such as adequate suction pattern, SSB coordination and oral feeding capacity, together with observation of clinical stability, weight gain and follow-up of correction of gestational age. It is also important to emphasize the importance of the transition from gavage to oral feeding to be mediated by speech-therapy intervention. Future work may address the role of this intervention in the development of the stomatognathic system of this population, including in relation to the outcome of the breastfeeding situation after hospital discharge.

CONCLUSION

The present study quantified the time (in days) for the transition from oral gavage to exclusive oral route (breast, cup and / or bottle), at each stage of the transition, from non-nutritive suckling (NNS) up to hospital discharge. Low-weight NBs, with or without major clinical complications, were able to breastfeed (exclusively or with complement per cup / bottle).

However, the history of medical complications influenced the total time of transition, and NBs without important clinical complications presented a shorter discharge chance.

However, NBs with clinical complications that had the gavage transition exclusively in the breast also had a shorter intervention time compared to NBs with complications that used cup / bottle complementation.

The data found were relevant and suggest that feeding transition training directly to the breast, without complementation by cup / bottle, especially when considered historical and clinical conditions, may contribute to exclusive breastfeeding. It is worth mentioning the importance of the speech-therapy intervention in the monitoring of the dietary pattern of NBs.

We point out the importance of the breast-probe technique, which can be recommended for the speech-therapy work in Neonatology, involving the entire multidisciplinary team, as a means to encourage exclusive breastfeeding.

ACKNOWLEDGEMENTS

To Maternidade Nossa Senhora de Lourdes for the availability of space for research. To Universidade Federal de Sergipe (UFS), through its Pró-reitoria de Pós-graduação e Pesquisa (POSGRAP) and Coordenação de Pesquisa (COPES), for enabling this work to be conducted.

REFERENCES

1. Elad D, Kozlovsky P, Blum O, Laine AF, Po MJ, Botzer E, et al. Biomechanics of milk extraction during breast-feeding. Proc Natl Acad Sci USA. 2014;111(14):5230-5. http://dx.doi.org/10.1073/pnas.1319798111. PMid:24706845.
2. Jawaid SA. The global action report on preterm birth. Pulse International. 2012;13(10) [citado em 2017 Maio 4]. Disponível em: http://link.galegroup.com/apps/doc/A291558533/AONE?u=ufrpe_br&sid=AONE&xid=057b7952
3. Thoyre SM. Developmental transition from gavage to oral feeding in the preterm infant. Annu Rev Nurs Res. 2003;21:61-92. PMid:12858693.
4. Fujinaga CI, Moraes AS, Zamberlan-Amorim NE, Castral TC, Silva AA, Scochi CGS. Clinical validation of the preterm oral feeding readiness assessment scale. Rev Lat Am Enfermagem. 2013;21(spec):140-5. http://dx.doi.org/10.1590/S0104-11692013000700018. PMid:23459901.
5. Kish MZ. Oral feeding readiness in preterm infants: a concept analysis. Adv Neonatal Care. 2013;13(4):230-7. http://dx.doi.org/10.1097/ANC.0b013e318281e04e. PMid:23912014.
6. Lau C. Development of oral feeding skills in the preterm infant. Arch Pediatr. 2007;14(Supl 1):S35-41. http://dx.doi.org/10.1016/S0929-693X(07)80009-1. PMid:17939956.
7. Simpson C, Schanler RJ, Lau C. Early introduction of oral feeding in preterm infants. Pediatrics. 2002;110(3):517-22. http://dx.doi.org/10.1542/peds.110.3.517. PMid:12205253.
8. Medeiros AMC, Sá TPL, Alvelos CL, Novais DSF. Intervenção fonoaudiológica na transição alimentar de sonda para peito em recém-nascidos do Método Canguru. Audiol Commun Res. 2014;19(1):95-103. http://dx.doi.org/10.1590/S2317-64312014000100016.
9. Mizuno K, Ueda A. The maturation and coordination of sucking, swallowing, and respiration in preterm infants. J Pediatr. 2003;142(1):36-40. http://dx.doi.org/10.1067/mpd.2003.mpd0312. PMid:12520252.
10. McGrath JM, Braescu AV. State of the science: feeding readiness in the preterm infants. J Perinat Neonatal Nurs. 2004;18(4):353-68. http://dx.doi.org/10.1097/00005237-200410000-00006. PMid:15646306.
11. Medeiros AM, Oliveira AR, Fernandes AM, Guardachoni GA, Aquino JP, Rubinick ML, et al. Caracterização da técnica de transição da alimentação por sonda enteral para seio materno em recém-nascidos prematuros. J Soc Bras Fonoaudiol. 2011;23(1):57-65. http://dx.doi.org/10.1590/S2179-64912011000100013. PMid:21552734.
12. Medeiros AMC, Almeida LF, Jesus GA. Plano Terapêutico Fonoaudiológico (PTF) para recém-nascidos prematuros com dificuldade na amamentação no peito. In: Pró-Fono, editor. Planos Terapêuticos Fonoaudiológicos (PTFs). Barueri: Pró-Fono; 2015. p. 479-486. vol. 2.
13. Medeiros AMC, Bernardi AT. Alimentação do recém-nascido pré-termo: aleitamento materno, copo e mamadeira. Rev Soc Bras Fonoaudiol. 2011;16(1):73-9. http://dx.doi.org/10.1590/S1516-80342011000100014.
14. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Atenção humanizada ao recém-nascido de baixo peso: Método Canguru. 2. ed. Brasília: Ministério da Saúde; 2011. (Série A. Normas e Manuais Técnicos; 98).
15. Gupta A, Khanna K, Chattree S. Cup feeding: an alternative to bottle feeding in a neonatal intensive care unit. J Trop Pediatr. 1999;45(2):108-10. http://dx.doi.org/10.1093/tropej/45.2.108. PMid:10341507.
16. Marinelli KA, Burke GS, Dodd VL. A comparison of the safety of cupfeedings and bottlefeedings in premature infants whose mothers intend tho breastfeed. J Perinatol. 2001;21(6):350-5. http://dx.doi.org/10.1038/sj.jp.7210539. PMid:11593367.
17. Neifert M, Lawrence R, Seacat J. Nipple confusion: toward a formal definition. J Pediatr. 1995;126(6):125-9. http://dx.doi.org/10.1016/S0022-3476(95)90252-X. PMid:7776072.
18. Nyqvist KH, Ewald U. Avaliação eletromiográfica dos músculos faciais durante o aleitamento natural e artificial de lactentes: identificação de diferenças entre aleitamento materno e aleitamento com uso de mamadeira ou copo. J Pediatr. 2006;82(2):85-86. http://dx.doi.org/10.2223/JPED.1452.
19. Rocha NM, Martinez FE, Jorge SM. Cup or bottle for preterm infants: effects on oxygen saturation, weight gain, and breastfeeding. J Hum Lact. 2002;18(2):132-8. http://dx.doi.org/10.1177/089033440201800204. PMid:12033074.
20. Howard CR, Howard FM, Lanphear B, Eberly S, Deblieck EA, Oakes D, et al. Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. Pediatrics. 2003;111(3):511-8. http://dx.doi.org/10.1542/peds.111.3.511. PMid:12612229.
21. Pimenta HP, Moreira MEL, Rocha AD, Gomes SC Jr, Pinto LW, Lucena SL. Efeitos da sucção não-nutritiva e da estimulação oral nas taxas de amamentação em recém-nascidos pré-termo de muito baixo peso ao nascer: um ensaio clínico randomizado. J Pediatr. 2008;84(5):423-7. http://dx.doi.org/10.2223/JPED.1839.
22. França EC, Sousa CB, Aragão LC, Costa LR. Electromyographic analysis of masseter muscle in newborns during suction in breast, bottle or cup feeding. BMC Pregnancy Childbirth. 2014;14(1):154. http://dx.doi.org/10.1186/1471-2393-14-154. PMid:24885762.
23. Gewolb IH, Vice FL, Schweitzer-Kenney EL, Taciak VL, Bosma JF. Developmental patterns of rhythmic suck and swallow in preterm infants. Dev Med Child Neurol. 2001;43(1):22-7. http://dx.doi.org/10.1017/S0012162201000044. PMid:11201418.
24. Neiva FC, Leone CR. Sucking development in pre-term newborns and the influence of nonnutritive sucking stimulation. Pediatr Res. 2003;53(4):498.
25. Yamamoto RCC, Bauer MA, Häeffner LSB, Weinmann ARM, Keske-Soares M. Os efeitos da estimulação sensório motora oral na sucção nutritiva na mamadeira de recém-nascidos pré-termo. Rev CEFAC. 2009;12(2):1-9.
26. McCain GC, Gartside PS, Greenberg JM, Lott JW. A feeding protocol for healthy preterm infants that shortens time to oral feeding. J Pediatr. 2001;139(3):374-9. http://dx.doi.org/10.1067/mpd.2001.117077. PMid:11562616.

27. Narayanan I, Mehta R, Choudhury DK, Jain BK. Sucking on the 'emptied' breast: non-nutritive sucking with a difference. Arch Dis Child. 1991;66(2):241-4. http://dx.doi.org/10.1136/adc.66.2.241. PMid:1900407.

28. Bauer MA, Yamamoto RCC, Weinmann ARM, Keske-Soares M. Avaliação da estimulação sensório-motora-oral na transição da alimentação enteral para a via oral plena em recém-nascidos pré-termo. Rev. Bras. Saude Mater. Infant. Recife. 2009;9(4):429-34. http://dx.doi.org/10.1590/S1519-38292009000400007.

29. Chalfun G, Mello RR, Dutra MVP, Andreozzi VL, Silva KS. Fatores associados à morbidade respiratória entre 12 e 36 meses de vida de crianças nascidas de muito baixo peso oriundas de uma UTI neonatal pública. Cad Saude Publica. 2009;25(6):1399-408. http://dx.doi.org/10.1590/S0102-311X2009000600022.

30. Boccolini CS, Carvalho ML, Oliveira MI, Leal MC, Carvalho MS. Fatores que interferem no tempo entre o nascimento e a primeira mamada. Cad Saude Publica. 2008;24(11):2681-94. PMid:19009148.

Author contributions

AMCM was responsible for conception and study design, analysis and data interpretation, article review and final approval of the publishing version; BKBR, DLSSB, CLA, FBS and TCS were responsible for collecting, analyzing, interpreting the data and writing the article; IDCB was responsible for the statistical treatment, analysis, interpretation of the manuscript data; RQG was responsible for data analysis and interpretation and article revision.