



Case series and protocol for the use of trans lactation in hospitalized newborns

Maíra Domingues Bernardes Silva¹ 

Alana Benevides Kohn¹ 

Raquel de Vasconcellos Carvalhaes de Oliveira¹ 

Barbara Almeida Soares Dias² 

Enirtes Caetano Prates Melo¹ 

¹Fundação Oswaldo Cruz (FIOCRUZ), Rio de Janeiro, Rio de Janeiro, Brasil.

²Universidade Federal de Roraima (UFRR), Boa Vista, Roraima, Brasil.

Corresponding author:

Barbara Almeida Soares Dias

E-mail: barbaraalmeidasd@gmail.com

Excerpt from the doctoral thesis: “Breastfeeding in highly complex neonatal and infant care: a cohort study” [In Portuguese: “Aleitamento materno na atenção neonatal e infantil de alta complexidade: estudo de coorte”], defended in 2020, in the Postgraduate Program in Public Health Epidemiology at the Escola Nacional de Saúde Pública Sérgio Arouca, Fundação Oswaldo Cruz (Fiocruz/ENSP), Rio de Janeiro, Rio de Janeiro, Brazil.

Submitted: 4 September, 2023

Accepted: 13 August 2025

Published: 31 December 2025

Guest Editor: Maria Aparecida Gaiva

Associate Editor: Bianka Sousa Martins Silva

How to cite this article: Silva MDB, Kohn AB, Oliveira RVC, Dias BAS, Melo ECP. Case series and protocol for the use of supplemental feeding tube device in hospitalized newborns. Rev. Eletr. Enferm. 2025;27:77211. <https://doi.org/10.5216/ree.v27.77211> English, Portuguese

ABSTRACT

Objectives: to develop and implement a protocol for the trans lactation method in hospitalized newborns and to describe the sociodemographic and clinical profile of newborns who received this method during hospitalization. **Methods:** this descriptive analytical study was conducted at a Brazilian institution specializing in high-risk neonatal and child care. Initially, a protocol on the use of trans lactation method was developed and implemented. Subsequently, newborns receiving the SFTD were characterized according to their feeding practices at hospital discharge, using mean, absolute, and relative frequencies. **Results:** the protocol for use with indications and the trans lactation method was developed, validated by consensus, and made available for use at the institution. Of the 28 newborns who received trans lactation, 46.4% maintained exclusive breastfeeding (EBF) upon hospital discharge. The duration of the use of trans lactation ranged from one to 29 days, including preterm and low-birth-weight newborns, and those with perinatal morbidities. Most of them remained on breastfeeding at hospital discharge. **Conclusion:** the protocol allows for standardization of trans lactation method with appropriate indications and may positively impact breastfeeding care, especially in at-risk populations. The trans lactation method likely contributed to encouraging and maintaining EBF during hospitalization.

Descriptors: Breast Feeding; Milk Banks; Child Health; Health Promotion.

INTRODUCTION

The short- and long-term benefits of breastfeeding for mothers and children are well described in the literature⁽¹⁻⁴⁾. This practice is particularly important for preterm, low-birth-weight, and vulnerable newborns with morbidities and malformations, given its impact on the reduction of neonatal and infant mortality⁽⁵⁻⁷⁾. One of the situations that can reduce the prevalence and duration of breastfeeding is the hospitalization of children in high-risk units^(8,9). In these settings, newborns are exposed to both in-service and individual determinants involved in high-risk care, such as more complex clinical aspects of the newborn and clinical and emotional aspects of the mother, which can affect breastfeeding practices.

To improve the lower-than-desirable breastfeeding rates worldwide⁽¹⁰⁾, researchers and healthcare professionals must identify modifiable determinants associated with the practice. This can help them develop cost-effective strategies and interventions for the success of this feeding practice. As a result, national and international programs and public policies to promote and support breastfeeding have been developed to promote greater adherence to these strategies during hospitalization (Baby-Friendly Hospital Initiative – BFHI; Human Milk Bank – HMB; Kangaroo Mother Care, among others)^(11,12), and encourage the continuation of this practice until two years of age or beyond.

© 2025 Universidade Federal de Goiás. Este é um artigo de acesso aberto distribuído nos termos de licença Creative Commons.



Regarding the provision of human milk or commercial infant formula to newborns admitted to the Neonatal Intensive Care Unit (NICU) in institutions without HMB availability, there are strategies that increase the chances of successful breastfeeding without bottle feeding or the use of artificial nipples^(13,14).

Among these strategies are cup feeding and transactation method, which are simple interventions with positive effects on breastfeeding success⁽¹⁵⁻¹⁸⁾.

Cup feeding is an alternative method for newborns who do not feed directly from the breast⁽¹⁹⁾. On the other hand, transactation involves using a container with milk, preferably human milk, connected to the breast via a tube. One end is attached to the breast areola and in this position, inserted into the newborn's mouth (if the mother prefers, she can hold the tube in place without needing to fix the device), while the other end remains inside the container/cup. Thus, when sucking, the newborn receives the supplement, providing full appetite satisfaction and a pleasurable moment for both mother and child⁽²⁰⁾.

Although the available evidence on transactation is limited⁽¹⁷⁾ and its use lacks standardization, this method has been recommended, especially by healthcare professionals with expertise in clinical breastfeeding practice. Many health departments in different countries also recognize the benefits of transactation in stimulating milk production^(18,20-23). It is an alternative to bottle feeding when supplementation is indicated^(16,23), as it favors the transition to breastfeeding and early hospital discharge⁽²³⁾. Additionally, it can be useful in resolving some difficulties in breastfeeding⁽¹⁶⁾.

Considering the benefits observed in clinical practice and the limited studies in this area, as well as the lack of consensus regarding the standardization of transactation method to support breastfeeding, more research and guidelines are needed to ensure best practices in its use by nurses and other healthcare professionals^(16,22,23).

This study aims to develop and implement a protocol for the transactation method in hospitalized newborns and to describe the sociodemographic and clinical profile of newborns who received this method during hospitalization. The purpose is to advance evidence-based practice and standardize guidance for both families and healthcare professionals regarding the method, while also describing the sociodemographic and clinical profile of the newborns who received transactation during their hospitalization.

METHODS

This descriptive analytical study was conducted at a Brazilian tertiary referral center specializing in high-risk neonatal and pediatric care, the Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira, part of the Fundação Oswaldo Cruz (IFF/FIOCRUZ), located in Rio de Janeiro, Brazil.

This study is part of a larger project that followed children from birth to six months of life⁽²⁴⁾.

The first stage of this study involved the development of a protocol by a panel of experts in early 2017, based on best practices for

the use of transactation, and a plan for its implementation by the HMB of the IFF/FIOCRUZ, a National Reference Center for HMB (rBLH-BR).

The following challenges were addressed in the development of the protocol: (i) lack of standardization of the use of the method by the healthcare team; (ii) lack of understanding of its indications for use; (iii) the need to recognize the benefits of transactation; (iv) risk of contamination and tube waste at home; and (v) maternal difficulty understanding the indications and benefits, adherence, and implementation of transactation.

The method of systematically structuring judgment and comparison processes was considered in the development of the protocol, from an expert panel composed of four healthcare professionals involved in breastfeeding care and support at the IFF HMB. During in-person meetings, the indications and procedures were described based on the most recent literature on the topic and clinical expertise. Educational materials (brochure) were also planned and prepared with photographs to facilitate families' understanding of the transactation method.

The protocol remains in use by the IFF/FIOCRUZ HMB healthcare team and is reviewed annually by the expert panel. The transactation method can be applied by any healthcare professional or by mothers themselves, as long as prior guidance is offered and they demonstrate understanding of its use. The protocol for using the method includes supporting educational materials describing the entire process.

In the second stage of this study, the applicability of the protocol implementation plan was assessed based on a case series. All eligible newborns were hospitalized and the transactation method was used to offer human milk or commercial infant formula, with or without other feeding methods, such as cup or bottle feeding.

The newborns were selected from a source population of cohort participants, consisting of children recruited at the described unit and followed for the first six months of life. The follow-up period began on March 13, 2017, and ended on October 12, 2018.

Data sources were the newborns' medical records and face-to-face interviews with their mothers during hospitalization. Information on prenatal care, delivery, mother, child, breastfeeding, and feeding practices was obtained.

Quality assurance and control protocols were maintained throughout data collection. These included training and certification of the data collection team, pre-testing of the instruments, and a pilot test during the first month of fieldwork.

Data entry into the registry system occurred through a web application developed for this study, accessed on a mobile device or computer with internet access. Further details about participants and the procedures adopted in data collection are described in a previous study⁽²⁴⁾.

In this section of the main study, the variables of interest included:

- a) characteristics of the newborn: age in days, sex, twinning, preterm birth, 5-minute Apgar score, birth weight, peri-

- natal and surgical morbidities, congenital malformations, gestational morbidities, feeding with human milk or infant formula; use of a cup; nothing by mouth (NPO, *nil per os*); use of an orogastric (OG) or nasogastric (NG) tube; use of a bottle; use of a pacifier; and time using the SFTD method.
- b) maternal characteristics: age, education, income, received breastfeeding guidance during prenatal care, had skin-to-skin contact with the newborn, and mother-infant separation in the first 12 hours of life.
 - c) newborn feeding practices at hospital discharge.

Descriptive analysis was performed using the R software (version 3.6.3., 2023, R Core Team, New Zealand) and expressed as absolute and relative frequencies, means, minimum and maximum values, and 95% confidence intervals (95% CI) for the proportions.

The main research project for this study was approved by the Research Ethics Committee of the IFF/FIOCRUZ, Certificate of Presentation for Ethical Consideration (CAAE) number 62931416.6.0000.5269.

RESULTS

Four professionals participated in the protocol development process: a pediatric nurse, two physicians—a pediatrician and a neonatologist—and a nurse from the Hospital Infection Control

Committee of the IFF/FIOCRUZ. The final version of the protocol was produced by consensus of the expert panel and included indications of the method and the procedures to be performed (Table 1).

Illustrations were added to the protocol to guide its implementation by nursing mothers and their families, and facilitate the understanding and memorization of some steps and procedures (Figure 1).

Twenty-eight newborns who received trans lactation method during hospitalization participated in the study. Of these, 82.1% (n = 23) were being breastfed at hospital discharge, of which 46.4% (n = 13) were on exclusive breastfeeding (EBF).

The duration of trans lactation varied from one to 29 days, with a mean of 5.7 days. The mean age of infants at the start of trans lactation was 28 days, ranging from two to 108 days.

The characteristics of the newborns on EBF at hospital discharge show they were part of different risk groups, such as preterm newborns, low birth weight newborns, newborns with perinatal morbidities, and congenital malformations requiring surgical correction (Table 2).

Of the 13 preterm newborns, nine were breastfeeding at hospital discharge. Of the 15 newborns with congenital malformations requiring surgical correction, 13 were breastfeeding at discharge, eight of whom were on EBF.

Of the 26 newborns who received pasteurized human milk from the HMB, 80.8% (n = 21) remained breastfeeding, and among

Table 1 - Protocol for use of trans lactation method, Rio de Janeiro, Brazil, 2018

Indications	
(i)	Stimulating milk production (after the newborn has fed on both breasts);
(ii)	Temporarily offering the newborn prescribed supplemental milk (pasteurized human milk, raw human milk, or commercial infant formula) to avoid bottle feeding;
(iii)	Adoptive breastfeeding after a medical evaluation of laboratory tests similar to those ordered during prenatal care (serology for hepatitis B, hepatitis C, syphilis, cytomegalovirus, HTLV, and HIV); and
(iv)	Breastfeeding in a non-pregnant mother of a female same-sex couple after a medical evaluation of laboratory tests similar to those ordered during prenatal care (serology for hepatitis B, hepatitis C, syphilis, cytomegalovirus, HTLV, and HIV).
Procedure	
i.	Prepare the necessary resources: 70% alcohol, scissors, a gastric or tracheal suction tube (number 4), a container with pasteurized donor human milk, raw human milk, or commercial infant formula;
ii.	Sanitize your hands (mothers and healthcare professionals). Put on procedure gloves, a cap and mask (healthcare professionals);
iii.	Use a gastric or tracheal suction tube (number 4);
iv.	Cut the holes at the end of the tube when they are far apart, leaving only a single outlet (when the holes are close together, cutting is optional);
v.	Insert the colored end of the tube into the container with pasteurized, raw human milk, or commercial infant formula (when human milk is not available);
vi.	Offer both breasts until the newborn shows the first signs of satiety or irritability;
vii.	Position the container with milk below the level of the newborn's head (to avoid gravity flow);
viii.	Insert the tube 1.5–2 cm through the corner of the mouth, directing it toward the palate.
ix.	Check milk flow during the newborn's sucking, occasionally checking for continuous flow by lifting the colored end of the tube (air flow into the tube can be seen with a continuous positive flow during suction).
x.	At the hospital, discard the tube after each use. At home, store the tube in a container with a lid (previously disinfected with 70% alcohol) in the refrigerator for up to 24 hours. To store the tube, it is necessary to sanitize it after each use with the following steps: (a) Wash the inside of the tube with a single squirt of a syringe (10 milliliters) with filtered, boiled, room-temperature water; (b) Aspirate and discard excess water from the inside of the tube; (c) Fill the syringe with air and inject air into the tube to dry it (repeat the drying step one more time);
xi.	Register the mother's understanding and performance of the method, as well as the child's reaction and response to the procedure applied by the mother and/or healthcare professional in the medical records.

Figure 1 - Illustrations added to the protocol to provide educational support for nursing mothers and their families on the use of translactation at the home and in hospital setting, Rio de Janeiro, Brazil, 2018



Note: (a) Hand hygiene; (b) Disinfection of scissors with 70% alcohol; (c) Cutting the non-colored end of the tube (optional); (d) Insertion of the tube through the baby's corner of the mouth; (e) Translactation with donated human milk from the HMB; (f) Flow check; (g) Equipment for cleaning the tube when using at home; (h) Washing of the inside of the tube with boiled, filtered, and lukewarm water; (i) Storing of the tube in the refrigerator when using at home. Images with permission.

Source: Silva⁽²⁵⁾

Table 2 - Characteristics of hospitalized newborns who received the translactation method at some point during their hospitalization, according to feeding practices at hospital discharge (n = 28), Rio de Janeiro, Brazil, 2018

Continua...

Variables	EBF ^A		Translactation		AF ^B		Total
	n (%)	IC95%	n (%)	IC95%	n (%)	IC95%	
Maternal age							
< 20 years	2 (40.0)	7.3 - 83.0	3 (60.0)	17.0 - 93.0	0	0 - 54.0	5 (17.9)
20-34 years	9 (47.4)	25.0 - 71.0	5 (26.3)	10.0 - 51.0	5 (26.3)	10.0 - 51.0	19 (67.9)
> 35 years	2 (50.0)	15.0 - 85.0	2 (50.0)	15.0 - 85.0	0	0 - 60.0	4 (14.3)
Total	13 (46.4)	28.0 - 66.0	10 (35.7)	19.0 - 56.0	5 (17.9)	6.8 - 38.0	28 (100.0)
Maternal education							
Up to primary school	5 (55.6)	23.0 - 85.0	3 (33.3)	9.0 - 69.0	1 (11.1)	0.58 - 49.0	9 (32.2)
High school or higher	8 (42.1)	21.0 - 66.0	7 (36.8)	17.0 - 61.0	4 (21.1)	7.0 - 46.0	19 (67.8)

Table 2 - Characteristics of hospitalized newborns who received the trans lactation method at some point during their hospitalization, according to feeding practices at hospital discharge (n = 28), Rio de Janeiro, Brazil, 2018

Continue...

Variables	EBF ^A		Trans lactation		AF ^B		Total
	n (%)	IC95%	n (%)	IC95%	n (%)	IC95%	
Income ^C							
< 2 minimum wages	6 (46.2)	20.0 - 74.0	3 (23.1)	6.2 - 54.0	4 (30.8)	10.0 - 61.0	13 (54.2)
> 2 minimum wages	6 (54.5)	25.0 - 82.0	5 (45.5)	18.0 - 75.0	0	0 - 32.0	11 (45.8)
Sex							
Female	8 (47.1)	24.0 - 71.0	7 (41.2)	19.0 - 67.0	2 (11.8)	2.1 - 38.0	17 (60.7)
Male	5 (45.5)	18.0 - 75.0	3 (27.3)	7.3 - 61.0	3 (27.3)	7.3 - 61.0	11 (39.3)
Twins							
No	13 (61.9)	39.0 - 81.0	6 (28.6)	12.0 - 52.0	2 (9.5)	1.7 - 32.0	21 (75.0)
Yes	0	0 - 44.0	4 (57.1)	20.0 - 88.0	3 (42.9)	12.0 - 80.0	7 (25.0)
Preterm							
No	10 (66.7)	39.0 - 87.0	4 (26.7)	8.9 - 55.0	1 (6.7)	0.4 - 34.0	15 (53.6)
Yes	3 (23.1)	6.2 - 54.0	6 (46.2)	20.0 - 74.0	4 (30.8)	10.0 - 61.0	13 (46.4)
5-minute Apgar score							
> 7	11 (45.8)	26.0 - 67.0	9 (37.5)	20.0 - 59.0	4 (16.7)	5.5 - 38.0	24 (85.7)
< 7	2 (50.0)	15.0 - 85.0	1 (25.0)	1.3 - 78.0	1 (25.0)	1.3 - 78.0	4 (14.3)
Birth weight							
< 1.500g	0	0 - 54.0	3 (60.0)	17.0 - 93.0	2 (40.0)	7.3 - 83.0	5 (17.9)
1.500 - 2.500g	3 (33.3)	9.0 - 69.0	4 (44.4)	15.0 - 77.0	2 (22.3)	3.9 - 60.0	9 (32.1)
> 2.500g	10 (71.4)	42.0 - 90.0	3 (21.4)	5.7 - 51.0	1 (7.2)	0.37 - 36.0	14 (50.0)
Perinatal morbidity							
No	4 (100.0)	40.0 - 100.0	0	0 - 60.0	0	0 - 60.0	4 (14.3)
Yes	9 (37.5)	20.0 - 59.0	10 (41.7)	23.0 - 63.0	5 (20.8)	7.9 - 43.0	24 (85.7)
Congenital malformation							
No	5 (38.5)	15.0 - 68.0	5 (38.5)	15.0 - 68.0	3 (23.1)	6.2 - 54.0	13 (46.4)
Yes	8 (53.3)	27.0 - 78.0	5 (33.3)	13.0 - 61.0	2 (13.4)	2.3 - 42.0	15 (53.6)
Gestational morbidity							
No	8 (50.0)	28.0 - 72.0	5 (31.3)	12.0 - 59.0	3 (18.7)	5.0 - 46.0	16 (57.1)
Yes	5 (41.7)	16.0 - 71.0	5 (41.7)	16.0 - 71.0	2 (40.0)	2.9 - 49.0	12 (42.9)
Pacifier use							
No	9 (60.0)	33.0 - 83.0	3 (20.0)	5.3 - 49.0	3 (20.0)	5.3 - 49.0	15 (53.6)
Yes	4 (30.8)	10.0 - 61.0	7 (53.8)	26.0 - 80.0	2 (15.4)	2.7 - 46.0	13 (46.4)
Newborn received human milk							
No	1 (50.0)	9.5 - 91.0	1 (50.0)	9.5 - 91.0	0	0 - 80.0	2 (7.2)
Yes	12 (46.2)	27.0 - 66.0	9 (34.6)	18.0 - 56.0	5 (19.2)	7.3 - 40.0	26 (92.8)
Cup use							
No	2 (28.6)	5.1 - 70.0	4 (57.1)	20.0 - 88.0	1 (14.3)	0.8 - 58.0	7 (25.0)
Yes	11 (52.4)	30.0 - 74.0	6 (28.6)	12.0 - 52.0	4 (19.0)	6.3 - 43.0	21 (75.0)
Newborn received infant formula							
No	10 (100.0)	66.0 - 100.0	0	0 - 34.0	0	0 - 34.0	10 (35.8)
Yes	3 (16.7)	4.4 - 42.0	10 (55.6)	31.0 - 78.0	5 (27.8)	11.0 - 54.0	18 (64.2)
Nothing by mouth (NPO)							
No	4 (80.0)	30.0 - 99.0	1 (20.0)	1.1 - 70.0	0	0 - 54.0	5 (17.9)
Yes	9 (39.1)	20.0 - 61.0	9 (39.1)	20.0 - 61.0	5 (21.7)	8.3 - 44.0	23 (82.1)

Table 2 - Characteristics of hospitalized newborns who received the translactation method at some point during their hospitalization, according to feeding practices at hospital discharge (n = 28), Rio de Janeiro, Brazil, 2018

Conclusion.

Variables	EBF ^A		Translactation		AF ^B		Total
	n (%)	IC95%	n (%)	IC95%	n (%)	IC95%	
Use of OG/NG ^D							
No	8 (80.0)	44.0 - 96.0	2 (20.0)	3.5 - 56.0	0	0 - 34.0	10 (35.7)
Yes	5 (27.8)	11.0 - 54.0	8 (44.4)	22.0 - 69.0	5 (27.8)	11.0 - 54.0	18 (64.3)
Bottle use							
No	12 (80.0)	51.0 - 95.0	3 (20.0)	5.3 - 49.0	0	0 - 25.0	15 (53.6)
Yes	1 (7.7)	0.4 - 38.0	7 (53.8)	26.0 - 80.0	5 (38.5)	15.0 - 68.0	13 (46.4)
Time of translactation							
1 - 14 days	13 (50.0)	32.0 - 68.0	9 (34.6)	18.0 - 56.0	4 (15.4)	5.0 - 36.0	26 (92.9)
15 - 29 days	0	0 - 80.0	1 (50.0)	9.5 - 91.0	1 (50.0)	9.5 - 91.0	2 (7.1)

Note: ^AEBF - Exclusive Breastfeeding; ^BAF - Artificial Feeding; ^CMinimum Wage 2016 = R\$ 880.00; n = 24 due to 4 blank answers; ^DOG/NG - Orogastic/Nasogastric Tube.

Source: Silva⁽²⁵⁾

them, most remained on EBF. On the other hand, a higher proportion of supplemented breastfeeding and formula feeding at hospital discharge was observed among newborns who received infant formula (Table 2).

In addition, in newborns who used a cup, the proportion of EBF at hospital discharge was higher, unlike those who used a bottle or pacifier. Even so, when weaning, most infants transitioned to supplemented breastfeeding (Table 2).

The newborns' length of hospital stay ranged from three to 114 days. The individual characteristics of the cases can be seen in Table 3. Of the 13 (46.42%) newborns on EBF at hospital discharge, seven had gastroschisis. Among the ten (35.71%) newborns on partial breastfeeding, six weighed between 1,500 and 2,500 grams and had significant morbidities.

DISCUSSION

This study contributes to healthcare practice by providing an evidence-based translactation protocol developed through expert consensus. Through its implementation in a highly complex NB care setting, breastfeeding remained a part of the hospital routine.

The use of the protocol favors the standardization of the method, appropriate prescription, minimizes the risk of infection, reduces home supply costs, and increases maternal confidence in performing the appropriate method without the use of artificial nipples.

The analysis of the case series provided a characterization of newborns who received translactation method and the identification of outcomes related to feeding practices at hospital discharge, highlighting the contribution of this technology to establish EBF.

At hospital discharge, most newborns who received the translactation method were breastfeeding, and approximately half of these remained on EBF. The use of a cup and pasteurized human milk from the HMB, alone or in combination, is a facilitating strategy and predicts a higher prevalence of breastfeeding^(9,26).

Exclusive breastfeeding at hospital discharge predicts a longer

duration of this practice in at-risk populations (premature newborns, low birth weight newborns, those with a congenital malformation requiring surgical correction, or with genetic syndrome)⁽⁸⁾. Therefore, additional efforts to strengthen the breastfeeding culture in neonatal units are imperative. Hospital practices should promote a favorable environment to encourage and maintain breastfeeding, taking advantage of the opportunity for these families to connect with the health service.

The use of a pacifier and/or bottle was observed at some point during the hospital stay, particularly in partially breastfed newborns (70.0%). All children on formula feeding at hospital discharge used a bottle at some point. Practices such as the use of pacifiers, commercial infant formula, and bottles inhibit EBF^(24,27-29). In these cases, discontinuation of exclusive breastfeeding was observed in approximately one-fifth of the newborns and partial discontinuation in approximately one-third, corroborating the profile identified in previous studies^(24,27-29).

Despite this finding, approximately 80% of the infants were breastfeeding at hospital discharge, which is a very positive outlook considering the profile of the newborns and the care setting (NICU). The majority received the SFTD method for less than 14 days. This result suggests favorable evidence for the use of the translactation through a standardized procedure and with appropriate prescription as an important temporary resource for transition to breastfeeding, supporting and promoting the establishment and maintenance of breastfeeding in the hospital setting.

The BFHI is based on the adherence of hospitals and birth centers to the ten steps necessary for successful breastfeeding. Of these, step nine expresses the need to "Counsel mothers on the use and risks of using bottles, teats, and pacifiers"^(11,12) for newborns, with the goal of maintaining breastfeeding. Therefore, adopting methods that support the feeding transition to breastfeeding is essential, especially in vulnerable populations that require specific breastfeeding management measures.

The transition to breastfeeding should begin after clinical sta-

Table 3 - Individual characteristics of newborns who received translactation method during hospitalization according to the type of breastfeeding (n = 28), Rio de Janeiro, Brazil, 2018

Continue...

ID ^A	Birth weight	Gestational age	Twins	Perinatal and surgical morbidities	Pacifier use	Length of hospital stay (days)	Prenatal guidance on BFB	Skin-to-skin contact	Mother-infant separation in the first 12 hours of life	Time on translactation (days)
Exclusive Breastfeeding										
1	1500 - 2500g	< 37	No	Gastroschisis, anorectal anomaly, congenital syphilis	No	35	Yes	Yes	Yes	6
2	> 2500g	> 37	No	Gastroschisis	No	22	No	No	Yes	3
3	> 2500g	> 37	No	No morbidity	No	28	No	No	Yes	2
4	> 2500g	> 37	No	No morbidity	No	8	No	Yes	No	1
5	1500 - 2500g	< 37	No	No morbidity	No	18	Yes	No	No	7
6	> 2500g	> 37	No	Gastroschisis, anorectal anomaly	Yes	33	Yes	No	Yes	4
7	> 2500g	> 37	No	Intestinal atresia	Yes	29	Yes	No	Yes	3
8	1500 - 2500g	> 37	No	Gastroschisis, sepsis	No	25	No	No	No	6
9	> 2500g	< 37	No	Gastroschisis	Yes	14	Yes	No	No	4
10	> 2500g	> 37	No	Gastroschisis	No	47	Yes	No	Yes	2
11	> 2500g	> 37	No	Gastroschisis, sepsis, urinary tract infection	Yes	52	Yes	No	Yes	12
12	> 2500g	> 37	No	No morbidity	No	3	Yes	Yes	No	1
13	> 2500g	> 37	No	No morbidity	No	5	Yes	Yes	No	1
Partial Breastfeeding										
14	1500 - 2500g	> 37	No	Fetal growth restriction	No	18	Yes	No	No	1
15	> 2500g	> 37	No	Anorectal anomaly	Yes	17	No	Yes	Yes	5
16	> 2500g	> 37	No	Omphalocele, anorectal anomaly	Yes	29	Yes	No	Yes	3
17	1500 - 2500g	< 37	Yes	Exposure to hepatitis C	No	16	Yes	No	Yes	1
18	< 1500g	< 37	Yes	Respiratory distress, acute fetal distress, neonatal jaundice	Yes	31	Yes	No	Yes	3
19	< 1500g	< 37	Yes	Respiratory distress, acute fetal distress, neonatal jaundice	No	31	Yes	No	Yes	4

Table 3 - Individual characteristics of newborns who received translactation method during hospitalization according to the type of breastfeeding (n = 28), Rio de Janeiro, Brazil, 2018

Conclusion.

ID ^A	Birth weight	Gestational age	Twins	Perinatal and surgical morbidities	Pacifier use	Length of hospital stay (days)	Prenatal guidance on BFB	Skin-to-skin contact	Mother-infant separation in the first 12 hours of life	Time on translactation (days)
20	1500 - 2500g	> 37	No	Anorectal anomaly, congenital megacolon	Yes	72	Yes	No	Yes	29
21	< 1500g	< 37	No	Congenital pneumonia	Yes	90	No	No	Yes	2
22	> 2500g	< 37	Yes	Atresia duodenal	Yes	39	No	No	Yes	7
23	1500 - 2500g	< 37	No	Gastroschisis	Yes	8	Yes	No	Yes	11
Artificial feeding										
24	< 1500g	< 37	No	Respiratory distress, hyaline membrane	Yes	114	No	No	Yes	3
25	> 2500g	> 37	No	Gastroschisis	No	67	No	No	Yes	19
26	< 1500g	< 37	Yes	Heart disease	Yes	54	Yes	No	Yes	11
27	1500 - 2500g	< 37	Yes	Bilateral hydronephrosis	No	29	Yes	No	Yes	4
28	1500 - 2500g	< 37	Yes	Respiratory distress	No	29	Yes	No	Yes	4

Note: ^AID – Individual; ^BBF – Breastfeeding.

Source: Silva⁽²⁵⁾

bilization and the ability to coordinate sucking, swallowing, and breathing, indicating safety to initiate oral feeding. During this period, feeding decisions are guided, influenced, and supported by healthcare professionals. However, studies indicate substantial gaps in the knowledge and skills of healthcare professionals at technical and higher education levels for specialized breastfeeding care^(4,30).

Extremely/moderately preterm newborns, low birth weight newborns and those with congenital pathologies are often unable to initiate breastfeeding soon after birth^(31,32), which can result in delayed initiation of breastfeeding. However, most infants with perinatal morbidities and congenital malformations, whether surgical or not, are able to breastfeed during hospitalization, as long as specific measures and actions are taken to support breastfeeding⁽³¹⁾. In this study, the high-risk groups that received the translactation method were breastfeeding at hospital discharge, and EBF prevailed in newborns with surgical anomalies. This result highlights the need for greater investment and efforts in the use of facilitating strategies, focusing on the best breastfeeding practices, especially for high-risk newborns.

All twin newborns on EBF weaned early. This outcome was also observed in a previous study⁽³³⁾ involving twins, in which supplementation in this group was associated with early weaning [RR 2.51; (95% CI 1.35; 4.65)].

In the transition from a NPO diet to exclusive breastfeeding, cup feeding and the translactation method are alternative methods to the use of prescribed supplementary milk (pasteurized human milk, raw human milk, or commercial infant formula). Cup feeding is an established facilitating strategy for breastfeeding^(15,26), especially when latching has not yet been established. This corroborates the findings of the present study, in which positive results with cup feeding were also identified.

In the use of syringes and finger feeding, known in Brazil as *sonda-dedo* ('finger-tube') method, the newborn suckles human milk or commercial infant formula by means of a gastric tube connected to a syringe and attached to the little finger⁽³⁴⁾. However, both methods should not be recommended due to the choking risks associated with the syringe plunger pressure and milk fluidity, in addition to the limited studies on the use of finger feeding. In a study that compared safety, loss of volume offered and duration of offering⁽³⁴⁾ the impact of this latter method on the prevalence and duration of EBF up to the sixth month of life and its long-term impacts were not found.

In a study, the finger-feeding method has proven effective for successful breastfeeding. However, the authors did not randomly assign groups that used or did not use the method and they also did not mention the limitation that the total (median) time of finger-feeding was shorter among those who successfully breastfed⁽³⁵⁾.

Given these limitations, we consider it premature to recommend finger-feeding and syringes as facilitating strategies. In clinical practice, we also observe newborns' difficulties in establishing a correct latch, similar to what occurs when using artificial nipples, leading to "nipple confusion", a phenomenon widely recognized in

healthcare^(24,34,36).

In the setting of this investigation, finger-feeding is not adopted due to the short-term impact on breastfeeding establishment. The use of bottles and similar resources affects EBF and can influence breastfeeding practices due to "flow confusion" and "nipple confusion"^(24,27,28). Furthermore, it can reduce milk production and confuse the mother, weakening maternal confidence in breastfeeding⁽²⁸⁾.

A systematic review revealed the effect of pacifier use on the low prevalence and duration of EBF⁽²⁹⁾. In daily clinical practice, newborns using pacifiers present short-term responses such as: refusal to breastfeed; low daily weight gain (baby does not fully suckle and, consequently, does not receive hindmilk, which is richer in fat); and pacifier dependence (which worsens with increased frequency of use). Frequent complaints from mothers include recurrent cracked nipples and pain due to nipple erosion with concomitant chafing and burning sensations⁽³⁷⁾.

Given the need to offer prescribed supplemental milk, it is essential that the newborn has a proper latch and a nipple shield is not used to avoid nipple confusion⁽¹³⁾. When the newborn begins to experience greater-than-expected daily weight gain, it is recommended to gradually reduce supplemental milk intake as soon as possible, within the child's clinical capabilities, until transitioning to EBF. Cases of adoptive breastfeeding and non-pregnant mothers in same-sex couples, based on laboratory tests indicating no contraindications to breastfeeding, may be the target of a plan with several actions to stimulate lactation.

The translactation method should only be used in newborns with a well-established latch and never in conjunction with nipple shields. A cohort study demonstrated that nipple shields do not promote EBF in preterm newborns⁽¹³⁾. When the newborn requires supplemental feeding but is separated from the mother or does not latch adequately to the areola, the use of a cup should be planned with parallel guidance and adjustment of latch and position, and then begin the translactation method as soon as possible.

For milk production in women with newborns admitted to the NICU, certain strategies should be implemented in conjunction with the translactation method⁽³⁸⁾, such as offering both breasts, breastfeeding on demand, increasing maternal fluid intake, and resting whenever possible.

Previously breastfeeding the newborn on both breasts before starting the translactation method provides a more appropriate response whenever it is necessary to increase milk production. Otherwise, optimal production will not be achieved. To assess the increase in milk production, some important indicators among the existing parameters are the failure to accept the entire volume of supplemental milk prescribed and offered through the translactation method, and the demonstration of satiety upon sucking at the breast.

The protocol developed in this study includes the provision of educational materials to families, which can favor the promotion and support of breastfeeding and reduce early weaning.

Implementing the protocol within the NICU requires effort and adherence from the entire healthcare team involved in caring for

the most vulnerable newborns. Healthcare professionals are jointly responsible for promoting breastfeeding in highly complex care settings. Therefore, they must be willing to modify their behaviors and skills to offer evidence-based practices. Strengthening the breastfeeding culture in the NICU can change behavior and improve established care to ensure better breastfeeding outcomes.

Although the translactation method has been used for over 15 years, no data have been produced for analysis on its use. Therefore, in the context of this study, it was not possible to compare results observed after the implementation of the protocol developed by specialists. Furthermore, the small number of study participants may be due to this being the first year of implementation of the protocol with indications for translactation method. The findings of this study should be interpreted with these considerations in mind.

Finally, as translactation method has proven to be a strategy that facilitates breastfeeding in the hospital setting, it is recommended that health professionals of the neonatal unit direct, influence, and support breastfeeding incentive methods. Additionally, the HMB team should be considered a potential source of advice, as they are professionals with greater expertise in breastfeeding practices.

The findings reinforce the hypothesis of a positive relationship between the use of translactation method, based on a well-established protocol, and a higher prevalence of breastfeeding at hospital discharge. Given the favorable evidence, analytical studies are needed to evaluate the effect of translactation method on breastfeeding duration, especially in specific groups with unique characteristics and greater vulnerability to negative outcomes.

Future research could explore the validity of this strategy in other settings, as hospitals with neonatal units may benefit from implementing the translactation protocol developed in this study.

CONCLUSION

Implementing the translactation protocol yields positive results for breastfeeding in highly complex neonatal and infant care, as it enables operational standardization and supports its indication and use.

The translactation method, whether combined or not with the use of a cup to provide pasteurized human milk from the HMB, proved to be a strategy that promotes breastfeeding in highly complex neonatal and infant care. Among the newborns who received the translactation method and were on EBF at hospital discharge, different risk groups were observed, such as preterm newborns, low birth weight newborns, those with perinatal morbidities, or those with congenital malformations requiring surgical correction.

REFERENCES

- Kordy K, Gaufin T, Mwangi M, Li F, Cerini C, Lee DJ, et al. Contributions to human breast milk microbiome and enteromammary transfer of *Bifidobacterium breve*. *PLoS One*. 2020 Jan 28;15(1):e0219633. <https://doi.org/10.1371/journal.pone.0219633>
- Moossavi S, Azad MB. Origins of human milk microbiota: new evidence and arising questions. *Gut Microbes*. 2019 Nov 4;12(1):1667722. <https://doi.org/10.1080/19490976.2019.1667722>
- Ruiz L, Garcia-Carral C, Rodrigues JM. Unfolding the human milk microbiome landscape in the omics era. *Front. Microbiol*. 2019 June 25;10:1378. <https://doi.org/10.3389/fmicb.2019.01378>
- Rollins NC, Bhandari N, Hajeebhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? *Lancet*. 2016 Jan 29;387(10017):491-504. [https://doi.org/10.1016/S0140-6736\(15\)01044-2](https://doi.org/10.1016/S0140-6736(15)01044-2)
- Patel AL, Kim JH. Human milk and necrotizing enterocolitis. *Semin Pediatr Surg*. 2017 Nov 6;27(1):34-8. <https://doi.org/10.1053/j.sempedsurg.2017.11.007>
- Kim EJ, Lee NM, Chung SH. A retrospective study on the effects of exclusive donor human milk feeding in a short period after birth on morbidity and growth of preterm infants during hospitalization. *Medicine (Baltimore)*. Sep 2017;96(35):e7970. <https://doi.org/10.1097/MD.00000000000007970>
- Laborie S, Abadie G, Denis A, Touzet S, Fischer Fumeaux CJ. A Positive Impact of an Observational Study on Breastfeeding Rates in Two Neonatal Intensive Care Units. *Nutrients*. 2022 Mar 8;14(6):1145. <https://doi.org/10.3390/nu14061145>
- Silva MDB, Oliveira RVC, Alves DSB, Melo ECP. The effect of risk at birth on breastfeeding duration and exclusivity: a cohort study at a Brazilian referral center for high-risk neonates and infants. *PLoS One*. 2021 Aug 6;16(8):e0255190. <https://doi.org/10.1371/journal.pone.0255190>
- Silva MDB, Oliveira RVC, Alves DSB, Melo ECP. Predicting risk of early discontinuation of exclusive breastfeeding at a Brazilian referral hospital for high-risk neonates and infants: a decision-tree analysis. *Inf Breastfeed J*. 2021 Jan 4;16:2. <https://doi.org/10.1186/s13006-020-00349-x>
- Development Initiatives Poverty Research. 2018 Global Nutrition Report: shining a light to spur action on nutrition [Internet]. Bristol: Development Initiatives Poverty Research; 2018 [cited 2025 July 03]. 165 p. Available from: <https://globalnutritionreport.org/reports/global-nutrition-report-2018/>
- Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Bases para a discussão da Política Nacional de Promoção, Proteção e Apoio ao Aleitamento Materno [Internet]. Brasília: Ministério da Saúde (BR); 2017 [cited 2025 July 3]. 68 p. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/bases_discussao_politica_aleitamento_materno.pdf
- World Health Organization (WHO/UNICEF). Baby Friendly Hospital Initiative. Ten steps to successful breastfeeding [Internet]. Geneva: World Health Organization (WHO/UNICEF); 2018 [cited 2025 July 7]. Available from: <https://www.unicef.org/documents/baby-friendly-hospital-initiative>
- Maastrup R, Walloe S, Kronborg H. Nipple shield use in preterm infants: Prevalence, motives for use and association with exclusive breastfeeding-Results from a national cohort study. *PLoS One*. 2019 Sep 20;14(9):e0222811. <https://doi.org/10.1371/journal.pone.0222811>
- Williams T, Nair H, Simpson J, Embleton N. Use of Donor Human Milk and Maternal Breastfeeding Rates: A Systematic Review. *J Hum Lact*. 2016 Feb 17;32(2):212-20. <https://doi.org/10.1177/0890334416632203>
- McKinney CM, Glass RP, Coffey P, Rue T, Vaughn MG, Cunningham M. Feeding Neonates by Cup: A Systematic Review of the Literature. *Matern Child Health J*. 2016 Mar 25;20:1620-33. <https://doi.org/10.1007/s10995-016-1961-9>
- Penny F, Judge M, Brownell E, McGrath JM. What Is the Evidence for Use of a Supplemental Feeding Tube Device as an Alternative Supplemental Feeding Method for Breastfed Infants? *Adv Neonatal Care*. 2018 Feb;18(1):31-7. <https://doi.org/10.1097/ANC.0000000000000446>
- Mohandas S, Rana R, Sirwani B, Kirubakaran R, Puthussery S. Effectiveness of Interventions to Manage Difficulties with Breastfeeding for Mothers of Infants under Six Months with Growth Faltering: A Systematic Review Update. *Nutrients*. 2023 Feb 16;15(4):988. <https://doi.org/10.3390/nu15040988>
- Aydin C, Aytekin Ozdemir A, Kahveci H. The Effect of Supplemental Feeding Tube Device on Time to Transition to Exclusive Breastfeeding and Discharge: A Randomized Controlled Trial with Preterm Infants. *Breastfeed Med*. 2024 Sep 13;19(9):707-14. <https://doi.org/10.1089/bfm.2024.0084>
- World Health Organization (WHO/UNICEF). Baby-friendly Hospital Initiative training course for maternity staff: trainer's guide [Internet]. Geneva:

World Health Organization and the United Nations Children's Fund (WHO/UNICEF); 2020. [cited 2025 July 07]. 407 p. Available from: <https://www.who.int/publications/i/item/9789240008915>

20. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Saúde da criança: aleitamento materno e alimentação complementar [Internet]. Brasília: Ministério da Saúde (BR); 2015 [cited 2025 July 03]. 184 p. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/saude_crianca_aleitamento_materno_cab23.pdf

21. Walker M. Breastfeeding Management for the Clinician: Using the Evidence. Burlington: Jones & Bartlett Learning; 2016.

22. Penny F, Brownel EA, Judge M, Marshall-Crim M, Cartagena D, McGrath JM. Use of a Supplemental Feeding Tube Device and Breastfeeding at 4 Weeks. *MCN Am J Matern Child Nurs.* 2023;48(6):334–40. <https://doi.org/10.1097/NMC.0000000000000962>

23. Çalikuşu İncekar M, Çağlar S, Kaya Narter F, Tercan Tarakcı E, Özpınar E, Demirci Ecevit E. An alternative supplemental feeding method for preterm infants: the supplemental feeding tube device. *Turk J Med Sci.* 2021 Aug 30;51(4):2087–94. <https://doi.org/10.3906/sag-2009-323>

24. Silva MDB, Oliveira RVC, Braga JU, Almeida JAG, Melo ECP. Breastfeeding patterns in cohort infants at a high-risk fetal, neonatal and child referral center in Brazil: a correspondence analysis. *BMC Pediatr.* 2020 Aug 7;20:372. <https://doi.org/10.1186/s12887-020-02272-w>

25. Silva MDB. Aleitamento materno na atenção neonatal e infantil de alta complexidade: estudo de coorte [thesis on the Internet]. [Rio de Janeiro]: Fundação Oswaldo Cruz; 2020 [cited 2025 July 03]. Available from: <https://arca.fiocruz.br/handle/icict/46628>

26. Flint A, New K, Davies MW. Cup feeding versus others forms of supplemental enteral feeding for newborn infants unable to fully breastfeed. *Cochrane Database Syst Rev.* 2016 Aug 31;8:CD005092. <https://doi.org/10.1002/14651858.CD005092.pub3>

27. Feldman-Winter L, Kellams A. In-Hospital Formula Feeding and Breastfeeding Duration. *Pediatrics.* 2020 July 1;146(1):e20201221. <https://doi.org/10.1542/peds.2020-1221>

28. McCoy MB, Heggie P. In-Hospital Formula Feeding and Breastfeeding Duration. *Pediatrics.* 2020 July 01;146(1):e20192946. <https://doi.org/10.1542/peds.2019-2946>

29. Buccini GS, Pérez-Escamilla R, Paulino LM, Araújo CL, Venancio SI. Pacifier use and interruption of exclusive breastfeeding: Systematic review and meta-analysis. *Matern Child Nutr.* 2017;13(3):e12384. <https://doi.org/10.1111/mcn.12384>

30. Pérez-Escamilla R, Martinez JL, Segura-Pérez S. Impact of the Baby-friendly Hospital Initiative on breastfeeding and child health outcomes: a systematic review. *Matern Child Nutr.* 2016 Feb 29;12(3):402–17. <https://doi.org/10.1111/mcn.12294>

31. Silva MDB, Alves DSB, Oliveira RVC, Elias NT, Kohn AB, Melo ECP. Perinatal morbidities, congenital malformations and breastfeeding outcomes. *J Neonatal Nurs.* 2021 June 5;27(6):412–8. <https://doi.org/10.1016/j.jnn.2021.05.003>

32. Machado MCHS, Silva MRT, Almeida MAM, Carvalhaes MABL, Parada CMGL, Tonete VLP. Situação do aleitamento materno no primeiro ano de recém-nascidos prematuros tardios: estudo de coorte. *Rev. Eletr. Enferm.* 2019 Dec 31;21:52382. <https://doi.org/10.5216/ree.v21.52382>

33. Mikami FCF, Francisco RPV, Rodrigues A, Hernandez WR, Zugaib M, Brizot ML. Breastfeeding Twins: Factors Related to Weaning. *J Hum Lact.* 2018 Apr 16;34(4):749–59. <https://doi.org/10.1177/0890334418767382>

34. Moreira CMD, Cavalcante-Silva RGV, Fujinaga CI, Marson F. Comparison of the finger-feeding versus cup feeding methods in the transition from gastric to oral feeding in preterm infants. *J Pediatr.* 2017 Nov-Dec;93(6):585–91. <https://doi.org/10.1016/j.jpeds.2016.12.008>

35. Karabayir N, Mertturk PE, Karaman S, Sebirli MF, Istanbulu MB, Potak M, et al. The Finger Feeding Method and Relactation. *Cureus.* 2022 Apr 11;14(4):e24044. <https://doi.org/10.7759/cureus.24044>

36. Neifert M, Lawrence R, Seacat J. Nipple confusion: toward a formal definition. *J Pediatr.* 1995 June;126(6):S125–9. [https://doi.org/10.1016/s0022-3476\(95\)90252-x](https://doi.org/10.1016/s0022-3476(95)90252-x)

37. Cavalcante VO, Sousa ML, Pereira CS, Silva NO, Albuquerque TR, Cruz RSBL. Consecuencias del uso de pezones artificiales para la lactancia exclusiva: una revisión integradora. *Aquichan.* 2021 Sep 30;21(3):e2132. <https://doi.org/10.5294/aqui.2021.21.3.2>

38. Grzeskowiak LE, Wlodek ME, Geddes DT. What Evidence Do We Have for Pharmaceutical Galactagogues in the Treatment of Lactation Insufficiency? A Narrative Review. *Nutrients.* 2019 Apr 28;11(5):974. <https://doi.org/10.3390/nu11050974>

Contributor roles – CRediT

MDBS: conceptualization; data curation; formal analysis; investigation; methodology; project administration; supervision; writing – original draft and writing – review & editing.

ABK: conceptualization; data curation; formal analysis; investigation; writing – original draft and writing – review & editing.

RVCO: data curation; formal analysis; investigation; methodology; writing – original draft and writing – review & editing.

BASD: investigation; methodology; visualization; writing – original draft and writing – review & editing.

ECPM: conceptualization; formal analysis; investigation; methodology; project administration; writing – original draft and writing – review & editing.

Funding

This research did not receive financial support.

Conflict of Interest

None.