Evaluation of the implementation of human milk supply for prematures in a neonatal intensive care unit

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Abstract

Objectives: to assess the supply of human milk exclusively to prematures in a Neonatal Intensive Care Unit and the influence of external and organizational contexts on the degree of implementation of this intervention.

Methods: this is an implementation evaluation with analysis of the external context (sociodemographic situation of mothers, support network and industry marketing) and organizational context (belonging to the hospital unit). To define the degree of implementation, the Analysis and Judgment Matrix was used, considering the compliance dimension, and the availability and technical-scientific quality sub-dimensions. The data used were obtained through interviews, semi-structured questionnaires and analysis of documents from the institution.

Results: the degree of implementation of the intervention was 80.74%, proving to be satisfactory, with emphasis on the technical-scientific quality sub-dimension.

Conclusions: the success in the supply of human milk is linked to public policies, the support and guidance offered to mothers in the hospital unit, presence of a support network, knowledge of mothers about the benefits of breastfeeding, adequate infrastructure and availability of supplies. The prematures being hospitalized in a child-friendly hospital contributed to the implementation of the intervention.

Key words *Human milk, Premature newborn, Neonatal intensive care unit, Maternal-child health services, Health evaluation*

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Introduction

Exclusive breastfeeding (EBF) is recognized worldwide as a practice that provides the greatest benefits to premature babies, defined as those born before 37 weeks of gestation, and is the natural way to supply essential nutrients for healthy growth and development.[1-3]

Studies show that low birth weight prematures fed on breast milk have shorter hospitalization, better prognosis for neurological development, lower risk of developing enterocolitis, decrease weight loss, and increase survival, compared to those breastfed with nutritional formulas.[4]

In view of the benefits of human milk (HL) and in order to reduce infant mortality rates in the country, several actions have been developed in order to promote, protect, and support breastfeeding, such as the creation of the *Normas Brasileiras de Comercialização de Alimentos para Lactentes* (NBCAL) (Brazilian Standards for the Commercialization of Foods for Infants), through Law No. 11. 265/2006,[5] creation of the *Rede Brasileira de Bancos de Leite Humano* (rBLH-BR) (Brazilian Network of Human Milk Banks), *Iniciativa Hospital Amigo da Criança* (IHAC) (Child-Friendly Initiative Hospital), *Implantação do Método Canguru*, (Implementation of the Kangaroo Method) publication of Ordinance No.930/2012,[6] guaranteeing free access to parents with the hospitalized newborn (RN), during 24 hours, among others.[7]

Despite the importance of breastfeeding, the birth of a premature newborn (PMNB) can impose several barriers on this practice. The delay in the beginning of milk production, difficulties in extraction techniques, lack of support from health professionals, and separation from the binomial are noteworthy.[8,9] Other factors such as the woman's socioeconomic status, infrastructure of the unit, the organization of the services on health work process, and the infant food industry's marketing may also contribute to early weaning in the Neonatal Intensive Care Unit (NICU).[10,11]

Thus, strategies to strengthen breastfeeding should be implemented and monitored by the institution through the evaluation of work processes and services provided.

In the public health, the main purpose of evaluation is to support the decision-making processes within the *Sistema Único de Saúde* (SUS) (Brazilian Public Health System), subsidizing to identify problems and reorient actions and services developed by the institution.[12]

Evaluation consists fundamentally of making a valued judgment about an intervention or about any of its components with the purpose of helping in the decision making process. In the implementation analysis, it is possible to measure the influence of contextual factors on the effects and the degree of implementation of the intervention.[13]

Given the above, as the factors that may contribute to early weaning are known, more effective interventions can be targeted to mitigate such factors, favoring the success of breastfeeding (BF). The objective of this research is to evaluate the provision of exclusive HM to premature babies in a NICU and the influence of the external and organizational contexts on the degree of implementation of this intervention.

Methods

This is an implementation of an evaluation withanalysis of the external and organizational contexts, whose design is a single case study, with a single level of analysis, cross-sectional and with data triangulation, combining qualitative and quantitative data collection methods and sources.

For the case selection, the sample was convenience and the inclusion criterion was to be accredited by IHAC. As the main researcher already performed her activities at the *Hospital Materno Infantil de Brasília* (HMIB), this unit was chosen for the development of this study.

Data collection was carried out in the NICU at the HMIB, a unit accredited by the IHAC since 1996, from October 1, 2020 to November 30, 2020 using a semi-structured instrument. According to the rBLH-BR, the Federal District is nationally recognized for its capacity to collect HM, being the only place in the world with 100% coverage of milk banks and collection stations in public and private health units with NICUs, making it a reference in collection and distribution of HM.[14]

The degree of implementing the intervention was assessed using the analysis and judgment matrix (AJM), whose indicators were drawn from the logic model of the intervention and the compliance dimension, with the subdimensions availability and technical and scientific quality, to assess the implementation of the available structure and the actions aimed at the exclusive supply of HM. The logic model, represented in Figure 1, was built based on the technical and regulatory material of the intervention (Table 1).

Two AJMs were prepared, one for each subdimension, and the total of the matrices served as the basis for calculating the judgment of the degree of implementation, obeying the following cut-off points: ≥80% implemented; 40-79.9% partially implemented; ≤39.9% critical implementation. The percentage of adequacy of each indicator was calculated from the formula: (PA x 100) / PE, where PA represents the score achieved and PE to the expected score.

The data used in this research to answer the AJMs were collected from primary sources (interview and semi-structured instrument), in addition to the analysis of the documents of the institution.

The participants' selection was carried out according to the following inclusion criteria: health professionals who

Table 1

Technical Material Used for the Intervention Description.

Technical Material	Object of Interest
Kuschel CA, Harding JE. Multicomponent fortified human milk for promoting growth in preterm infants. Cochrane Database Syst Rev. 2004; (1): CD000343.	Determines whether the addition of multicomponents to human milk promotes improved growth, bone metabolism, and neurodevelopmental outcomes without significant adverse effects in prematures.
Brazil. Law Nº. 11265, of January 3, 2006. Regulates the marketing of food for infants and children of early childhood and also that of related childcare products. Brasília (DF): DOU 4 Jan 2006.	Regulates the marketing of food for infants and young children and related childcare products.
United Nations Children's Fund, World Health Organization. *Iniciativa Hospital Amigo da Criança*: revised, updated and expanded for integrated care: module 1: history and implementation. Brasília (DF): Ministry of Health; 2008.	Describes the global criteria of the IHAC and the Acceptable Medical Reasons for the use of breast milk substitutes.
Brazil. National Health Surveillance Agency (Anvisa). Human milk bank: operation, risk prevention and control. Brasília (DF): Anvisa; 2008.	Describes the actions of promotion, protection and support to breastfeeding and execution of activities of collection of milk production of the nursing mother, selection, classification, processing, quality control and distribution.
Ministery of Health (BR). Minister's Cabinet. Ordinance Nº. 930, of May 10, 2012. Defines the guidelines and objectives for the organization of comprehensive and humanized care to the severe or potentially severe newborn and the criteria for classification and qualification of Neonatal Unit beds within the *Sistema Único de Saúde* (SUS).	Defines the guidelines and objectives for the organization of integral and humanized care to the severe or potentially severe newborn and the criteria for classification and qualification of Neonatal Unit beds within the SUS.
Nyqvist KH *et al*. Neo-BFHI: The Baby-friendly Hospital Initiative for Neonatal Wards. Core document with recommended standards and criteria. Nordic and Quebec Working Group; 2015.	Expands and adapts the Ten Steps to protect, promote and support BF in neonatal wards. Reinforces that all newborns, including those admitted to the neonatal ward, should be breastfed. When there are acceptable medical reasons, milk from the bank or infant formula can be used, in that order of priority. It also brings the use of the aditive.
Ministry of Health (BR). Secretary of Health Care. Department of Strategic Programmatic Actions. Atenção humanizada ao recém-nascido: Método Canguru: manual técnico. Brasília (DF): Ministry of Health; 2017.	Aims at qualified and humanized care bringing together biopsychosocial intervention strategies with an ambience that favors the care of the newborn and the family.
Ministry of Health (BR). Secretary of Health Care. Department of Strategic Programmatic Actions. Bases for the discussion of the National Policy for the Promotion, Protection and Support of Breastfeeding Brasília (DF): Ministry of Health; 2017.	Aimed at contributing to the formulation and pactuation of the National Policy for the Promotion, Protection and Support of Breastfeeding in Brazil.
World Health Organization (WHO). Guideline: protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services. Geneva: WHO; 2017.	Provides global evidence-based recommendations on breastfeeding counseling as a public health intervention to improve breastfeeding practices among pregnant women and mothers who intend to breastfeed, or are breastfeeding.

work in the NICU at the HMIB and perform activities related to the care of prematures; head of the Human Milk Bank (HMB) and the Nutrition sector; prematures with gestational age less than 37 weeks, with admission to the NICU in the first 48 hours of life and a minimum hospitalization of 48 hours in the unit; mothers aged ≥18 years and who are with their child admitted to the NICU. Exclusion criteria were: professionals who refused to participate in the study and who did not provide direct assistance to the prematures; PMNBs who had malformation, were abandoned or died during hospitalization; the mother's refusal to participate in the study and maternal death.

The data collection instrument included four phases, with the first three phases taking place in October, 2020, and the fourth phase in November, 2020:

Phase I

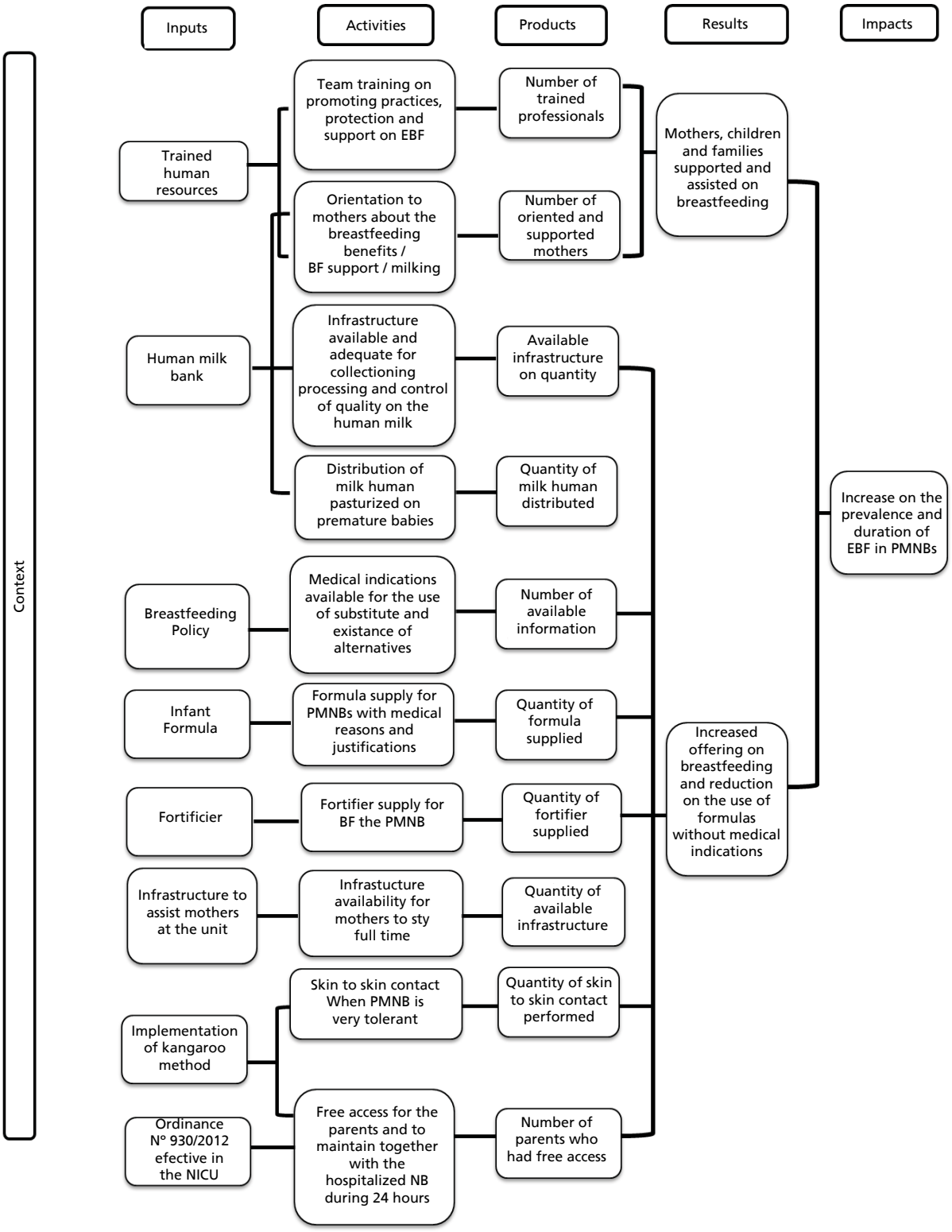
Consultation of diet charts of 53 PMNBs admitted to the NICU, including the following data from medical records: sex; gestational age; birth weight; breastfeeding onset (<24h, 24 to 48h or >48 hours from birth); nutritional therapy (HM, infant formula and fortifier); via administration; justification for the use of infant formula.

Phase II

Semi-structured interviews with the mothers of PMNBs, of which 11 were nursing mothers and nine were daily nurse-mothers. The nursing mothers were considered as those who could get a bed in the unit for 24 hours/day, while the daily nurse-mothers spent the day in the unit

Figure 1

Logic model of exclusive human milk supply for premature newborns in the neonatal intensive care unit.



EBF = exclusive breastfeeding; EB = breastfeeding; NICU = Neonatal Intensive Care Unit; PMNBs = premature newborns; N = Number.

Table 2

Contextual Elements of Exclusive Human Milk Delivery for Premature Infants in the Neonatal Intensive Care Unit.

Context Type	Context Description
External Context	Marketing of the baby food industry[8,24]
	Support from family and other members of the social group in which the woman is inserted[8,18]
	Sociodemographic situation (economic class; maternal schooling; employment status of the woman[8,23,26]
Organizational context	Infraestruture unit[11,27]
	Support from health professionals on breastfeeding[8,18]
	Presence of human milk, infant formula, and fortifier in the unit[21]
	Applicability of public policies in favor of breastfeeding[3,7]
	Human milk extraction techniques[2,8]

and returned to their homes at the end of the day. Each mother who authorized the recording of the interview was identified with the letter M and the interview number (M1, M2, M3...) to maintain the participants' anonymity.

The variables collected in the interviews were: sociodemographic data (age, marital status, schooling, family income, and profession); prenatal care; availability of support network; information on breastfeeding (guidance, extraction techniques, difficulties and facilities during breastfeeding/extraction, skin-to-skin contact, access to the NICU, and type of infant feeding); unit infrastructure (place for milk extraction, food provided to mothers, physical space, and accommodations).

Phase III

An online instrument was applied to 51 health professionals at the NICU, and the head of the MBH and Nutrition using the Google Forms tool, through a link sent by WhatsApp, whose quantitative results were automatically generated. Of all NICU health professionals who answered the questionnaire, 31.4% were physicians, 25.5% nursing technicians, 21.6% nurses, 11.8% physical therapists and 9.8% speech therapists.

The NICU health professionals were questioned about the infrastructure conditions for accomdating mothers, skin-to-skin contact, free access of mothers to the NICU as provided in the Ordinance No.930/2012,6 knowledge of the breastfeeding policy of the HMIB, whether they had already been trained by the IHAC course, facilitators and barriers to breastfeeding prematures in the unit, actions to provide guidance and encourage breastfeeding, difficulties in prescribing HM, and reasons for prescribing infant formula, according to the recommendations of the World Health Organization (WHO).[15]

The head of Nutrition responded to the instrument regarding the food provided to mothers of PMNBs and the presence of infant formula and fortifier in the unit. The head of the MBH responded regarding the presence of HM; infrastructure; difficulties in keeping stocks stored; and guidance on breastfeeding/extraction. They were also asked about the impact of the COVID-19 pandemic on HM storage.

Phase IV

An analysis of the documents from the institution was carried out, which included the analysis of the records on HM, fortifier, and infant formula; and analysis of the NICU's breastfeeding policy.

Quantitative data collected in the interviews and consultation of diet charts were compiled in an Excel spreadsheet, version 2007. Regarding qualitative data, the recorded interviews were transcribed and grouped by subject, and the mothers' statements were used to confirm and clarify the quantitative findings. The answers to the open questions were classified by category, and content analysis was performed.[16]

The analysis of the external and organizational context was performed as shown in Table 2. The external context was described from the interviews with the mothers, being possible to identify the facilities and barriers in the breastfeeding process, sociodemographic aspects such as schooling, marital status and womean's employment status and availability of family support network. The industry marketing was evaluated by applying the online instrument with the NICU prescribing physicians.

The organizational context was described based on aspects related to the physical structure of the unit, such as a private place for breast milking, adequate food during the stay in the unit, and accommodations for the mothers' 24-hour stay in the hospital; presence of HM, fortifier, and infant formula; training of health professionals; professionals' knowledge regarding the practices aimed

for the promotion, protection, and support of EBF; and actions for breastfeeding guidance and encouragement.

This study was approved by the Research Ethics Committee of the *Escola Nacional de Saúde Pública* (CAAE: 35533320.6.0000.5240) and of the *Fundação de Ensino e Pesquisa em Ciências da Saúde* (CAAE: 35533320.6.3001.5553).

Results

The implementation degree of exclusive supply of HM for premature infants was 80.7%, a satisfactory percentage, with emphasis on process indicators.

The first set of results refers to the characterization of the degree of implementation for the availability subdimension, which takes into account the structure indicators (input component), as shown in Table 3. The implementation of the input component was 77.0%, considered partially implemented. The availability of HM from the HMB and fortifier, and the infrastructure for the mothers' reception with a focus on accommodations were the inputs that presented the lowest percentages of adequacy (50% and 20%, respectively).

At the time the questionnaire was applied, stocks of HM, fortifier, and infant formulas were stored. However, in the last 12 months, there was a shortage at some point or a critical period of lack of fortifier and HM. In the absence of HM, it was recommended that "*Infants with 25ml of prescribed diet per schedule, weighing more than 1850 grams, use formula for premature infants*."

Among the difficulties encountered in keeping the HM stored, the head of the HMB reported lack of equipment maintenance and lack of human resources. Although the stocks were stored, PMNBs did not receive all the volume of HM they needed. This statement is confirmed by the NICU mother's speech in which her baby used formula.

Regarding accommodations, this item, which was considered only 20% implemented, was evaluated by both mothers and NICU professionals. Of all mothers, 25% considered the accommodations as great; 50% reported them as good and 25% as poor. The main complaints/dissatisfactions of nursing mothers were related to the beds they occupied: inadequate cleanliness, size and lack of ventilation, in addition to the absence of a laundry room to wash and dry the mothers and babies' clothes.

The daily nursing-mothers pointed out inadequacies in the bathrooms (lack of private bathroom, bad aspect, broken bathrooms and far from the NICU), chairs (broken and in insufficient quantity) and lack of place for bathing and resting.

The mothers' age ranged from 18 to 41 years, with a mean of 29 years (standard deviation = 7.7); 50% of them were "housewives"; 40% had completed high school; 75% were married or in a stable union, with a mean family income of one to two minimum wages. Regarding the current pregnancy, all of them had prenatal care, with an average of 8 consultations. The mothers who were interviewed, reported having a support network to help them with the baby and other children's care; 100% could count on at least one family member and 10% could also count on friends.

According to the professionals, only 7.8% considered the physical space and accommodations appropriate and sufficient to meet all mothers of premature babies in the NICU.

Regarding the characterization of the degree of implementation for the Technical-Scientific Quality index, the process indicators (activities component) were taken into account, as shown in Table 4.

The implementation of the activity component was 84.4%, being considered adequate. Only two items presented values ≤50% of adequacy.

Free access to the NICU was reported by 75% of the mothers and 58.8% of the health professionals, showing divergences between the answers.

Of the main reasons for prescribing infant formula in the NICU, physicians reported the lack of milk in the HMB and the pathologies that preclude the use as intolerance, inborn error of metabolism, cow's milk protein allergy and surgical NB; 66.7% were able to report at least three acceptable medical reasons for the use of formula.

The high volume of HM demanded per child was reported as one of the reasons for prescribing infant formula and one of the main difficulties in prescribing HM from HMB, in addition to staff misinformation, lack of guidance in management and durability of milk (8.3% each).

The predominant nutritional therapy throughout hospitalization was exclusive breast milk/HM, totaling 88.6%.

Regarding infrastructure, the unit provided eight beds for the mothers to stay in the unit for 24 hours and food during hospitalization. However, the lack of beds available for mothers accounted for 75% of the difficulties in staying in the unit full time for 24 hours. The place for milking (inside the NICU) was assessed as great by 55% of the mothers, and the main complaint was about privacy (66.6%).

Regarding feeding, 45% of the mothers reported it as optimal, 35% good and 20% poor. In the reports, optimal feeding was associated as being healthy, balanced, rich, and distributed at regular times. Bad eating was associated with little variety, appearance, taste, and not following food preferences.

The support of health professionals for breastfeeding was reported by 90% of the mothers. The most predominant form of help was information associated with practical help (77.3%), where the professional orients the mother verbally and helps her place the premature baby in the breast. Among the guidelines received, the extraction

Table 3

Analysis and Judgment Matrix for the Availability Index.

Inputs	Availability Index	Response	ES	AS	Percent of adequacy	Perception of users (mothers)
HMB	There was HM	Yes	2	2	100%	
	In the last 12 months there was no lack of HM	Already lacked	2	1	50%	*M4: Actually, it's because the milk bank can't supply the quantity that Sarah takes today. And since I am not at home at night, ishe has to take formula.*
Fortifier	Adequate structure according to ANVISA	Yes	6	6	100%	
	There was fortifier	Yes	2	2	100%	
	In the last 12 months there was no lack of fortifier	Already lacked	2	1	50%	
Infant Formula	There was infant formula for specific cases	Yes	2	2	100%	
	In the past 12 months there was no lack of formula	No Lack	2	2	100%	
Adequate infrastructure for the mothers in the unit	Private place for milking;	Yes (HMB) 55% of the mothers – great	4	3	75%	*M6: There are some men who are very clueless. Today there was one there. Totally clueless. He only goes when people are milking. When the woman is there with her breast out. He stays by my daughter's side.*
	Accomodations	7.8% of the professionals: adequate 25% of the mothers – great	5	1	20%	*M3: I think there should be a better place, because we stay out in the corridors and there is no bathroom to bathe. Once I got all dirty. Then I had to leave. One day I arrived here at 9 in the morning and left at 10 at night. And I left because I was exhausted. There could have been a small room or something.* *M9: It's good. I don't think it is very comfortable. For example. I had to sleep on the bench up here. So, they are not very comfortable.* *M11:It's bad because the bathroom was broken, the chairs are few for many mothers. The closest bathroom there is, there are times when you go there and it's broken. So, if you need to use the bathroom, you have to go to the other side of the hospital.*
	Food during the stay in the unit;	The unit provides 5 meals. Considered adequate; 45% of the mothers: great 45.1% of the professionals	10	7	70%	*M2: I don't think it's good. Because of the appearance and taste.* *M4: the food is great, rich. It comes with juice, fruit and dessert* *M5: it's Great, right, because it doesn't leave us hungry and feeds us well.* *M8: The food is not great because sometimes you order something and keep repeating it, you understand? But the food is good. I have nothing to complain about, you understand?*

Trained Human Resources	The professional has already been trained by the IHAC course;	Yes (heads of HMB and Nutrition); 70.6% of the professionals	5	4	80%
	There was a written breastfeeding policy;	Yes	1	1	100%
NICU Breastfeeding Policy	The policy included public breastfeeding policies such as Kangaroo Method (skin-to-skin contact), NBCAL, IHAC and Ordinance No. 930/2012	Yes	4	4	100%
	Did the policy address medical reasons for the use of substitute?	Yes	1	1	100%
TOTAL			48	37	77.08%

ES = Expected Score; AS = Achieved Score; ANVISA = National Health Surveillance Agency; HMB = Human Milk Bank; HM = human milk; IHAC = *Iniciativa Hospital Amigo da Criança*; NBCAL = Brazilian Standard for the Commercialization of Foods for Infants and Children of Early Childhood, Nipples, Pacifiers and baby bottles.

Table 4

Analysis and judgment matrix for the technical-scientific quality index.

Activities	Technical-scientific quality index	Response	ES	AS	Percentage of adequacy	Perception of users (mothers)
Professionals' knowledge regarding the practices aimed at the promotion, protection and support of EBF	Proportion of professionals who perform actions to orient and encourage breastfeeding;	86.3% (yes) Most of the professionals reached 5 points	10	8	80%	
Orientation and support to mothers on breastfeeding	Proportion of mothers that were oriented and stimulated regarding breastfeeding;	18 (90%)	5	5	100%	
	Proportion of mothers that are breastfeeding and were oriented;	19 (95%)	10	10	100%	
	Proportion of mothers that are breastfeeding and were not oriented	1 (5%)	4	4	100%	
	Proportion of mothers that are not breastfeeding and were oriented	1 (5%)	3	3	100%	
	Proportion of mothers that are not breastfeeding and were not oriented;	None	2	2	100%	
	Proportion of mothers and professionals that informed to perform the skin to skin contact (Kangaroo Method);	75% of the mothers 100% of the professionals	4	3	75%	*M3: I have already performed the skin to skin contact. It was inside the NICU.* *M4: The skin to skin contact was at the NICU, because during childbirth there was no way* *M9: It was at the NICU. At childbirth there was none.* *M10: At childbirth there was that moment they bring, but at the NICU I had it, once*

	Proportion of mothers and professionals who reported having free access to the NICU, during 24 hours.	75% of the mothers 58.80% of the professionals	4	2	50%	*M4: Actually, the only established time is the entrance, right, which is from 8:45 am. Then it is free. For me, being a mother, it's free.* *M8: Well, they says it is free, but in fact sometimes we get there and we are doing some procedure, we have to leave the bed, even if it is a procedure in another baby, we have to keep leaving [...] then it is not free.* *M9: It is restricted. You can only stay after 8:45. So there are some hours you can't stay there.*
Provision of exclusive HM, except in specific cases;	Proportion of PMNBs in AME;	47 (88.67%)	10	10	100%	
	Proportion of PMNBs on formula with acceptable medical reasons;	5 (83.3%)	10	10	100%	
	Proportion of PMNBs using formulas without acceptable medical reasons.	1 (16.6%)	5	3	60%	
Indication of infant formula considering acceptable medical reasons	Proportion of physicians who know how to report the reasons for prescribing breast-milk substitutes.	8 (66.6%)	10	5	50%	
TOTAL			77	65	84,41%	

ES = Expected Score; AS = Achieved Score; EBF = exclusive breastfeeding; NICU = Neonatal Intensive Care Unit; PMNBs = premature newborns; HM = human milk.

techniques accounted for 90%, followed by diet schedules (55%), breast preparation (45%), and the advantages of breastfeeding (40%).

When asked about breastfeeding, 95% were breastfeeding/extracting breast milk; 60% had difficulties in the BF process, especially extracting (50%). As for the aspects that have contributed to the breastfeeding process, 35% reported the importance of milk for the baby's health and 50% reported the support from health professionals and the BLH.

The applicability of public policies in favor of breastfeeding was verified through the practice of skin-to-skin contact, being reported by 100% of professionals and 75% of mothers. This practice is carried out in the unit mainly during the diet (37.25%) and according to the clinical condition/stability of the NB (27.45%).

The unit's breastfeeding policy included the BFHI's ten steps for successful breastfeeding; woman-friendly care; permanence of parents and free access to the NB. The annex also included the acceptable medical reasons for the use of LM substitutes and the NBCAL.

According to the NICU health professionals, the facilitators of breastfeeding premature infants are: staff encouragement and guidance (50.9%); free access/mother's presence (25.4%); Kangaroo Method/skin-to-skin contact (15.9%); mother and child interaction/bond (11.7%); early initiation/stimulation (7.8%); RN conditions (5.8%); desire of the mother (5.8%); training of professionals (3.9%); correct technique/delivery (3.9%); adequate number of professionals at the NICU (3.9%); more nursing mother beds (1.9%); nipple (1.9%); mother's psychological (1.9%) and baby's readiness (1.9%).

Among the difficulties in BF, the professionals highlighted: clinical conditions of the NB (25.4%); absence of the mother (23.5%); lack of guidance/stimulus/support of professionals (19.6%); emotional stress/fear/anxiety/insecurity of mothers (17.6%); lack of information (13.7%); lack of structure/nursing mother beds (7.8%); lack of bonding of the binomial (3.9%). The others represented only 1.9%, and they were: lack of skin-to-skin contact; resistance of the team to wake the baby; length of hospitalization; low production; lack of privacy and maintenance of lactation.

Discussion

Despite the high degree of implementation found and its adequacy according to the parameters established in this research, some aspects that were not adequate and are

related to the external and organizational context may compromise the proper implementation of the intervention.

Regarding the external context, the facilities in the breastfeeding process found in this study were related to the mother's age group, education, marital status, availability of a support network, and the mothers' knowledge about the importance of milk for the baby. The study by Moura *et al*.[17] showed that the recognition of the advantages of LM for the premature baby was the main reason given by mothers for breastfeeding their babies, even in the face of various situations of insecurity, discomfort, and discomfort experienced by them in the context of hospitalization.

With regard to the mother's level of education, many studies have shown that this factor affects the motivation to breastfeed. Mothers with a higher level of education tend to breastfeed for longer, perhaps because of the possibility of greater access to information about the advantages of breastfeeding.[18] Moreover, most were in a stable union. This result is positive, since the support of a partner has a statistically positive relationship with the maintenance and duration of breastfeeding.[19]

Industry marketing was described as a hindering factor in the breastfeeding process evidenced in the external context. Some professionals reported feeling pressured by marketing companies to prescribe infant formula.

A study conducted in eight countries by WHO showed that health professionals were reported as the main source of education on infant feeding practices, influencing the decision about breastfeeding. Thus, the systematic marketing of infant formula companies seeks to influence health professionals' understanding of BF, convince them of the need for formulas, and use them as marketing channels.[20]

Regarding the Organizational Context, the presence of LH and of the fortifier is essential for the supply to occur in an exclusive way, ensuring better development and ponderal gain of PIs.[1] In this study, the LH stocks were stocked, but babies with high volumes what are babies with high volumes? (> 30ml/hour) tend to receive formula routinely, which can be corroborated with the justifications of the NICU physicians. This shows that, even though LH is present, it is not supplied in sufficient quantity, constantly, for all PIs.

In very low birth weight PIs, the use of fortificants provides increased growth and weight gain rates.[21] However, in the absence of fortificants, premature formulas are used and can be interspersed with HL.[22] Therefore, the lack of fortificants in the unit may compromise the exclusive supply of HL, favoring the increased use of formulas.

According to the global standards and the Compliance Criteria related to the Exclusive Supply of LM to Infants described in the BFHI strategy, the observation of the neonatal ward should confirm that at least 80% of the babies are being fed only LM or BLH milk, or, if they received something else, it was for acceptable medical reasons.[15] Thus, the results of this study show that the supply of LH is in accordance with what is established by the BFHI.

Research has shown that, although it may vary according to the social and cultural contexts in which the woman is inserted, formal support from professionals positively influences the initiation and duration of breastfeeding, and practical help seems to be the most effective means for health professionals to support breastfeeding.[23]

The presence of beds for mothers of PIs enables their permanence in the unit, favoring the provision of LH for the baby. However, the number of beds was not sufficient to meet all mothers of PIs, a factor that compromised the implementation of the structural input component.

In the study by Uema *et al*.,[24] professionals reported that the lack of infrastructure in the neonatal unit is partly responsible for the failure of breastfeeding. The lack of accommodations and the mother's difficulty in staying in the unit were also pointed out as decisive factors by these authors, which reinforces the need for attention to this aspect by HMIB. Thus, the presence of a room with beds for mothers in proportion to the number of NICU beds is extremely important for the promotion of breastfeeding in the unit.

The training of health professionals on BFHI was quite significant, where the vast majority had already been trained by the BFHI and were aware of the breastfeeding policy printed in the unit. This can be seen as a positive factor, since studies show a lower rate of adherence to Step 2 of the BFHI (training the entire health care team in the practices necessary to implement this policy).[25] The BFHI course schedule is available annually in the hospital, which takes place every month, with a workload of 20 and 40 hours, and it is recommended that each professional should attend the course at least every five years.

Given the data presented, the main difficulties of the organizational context that interfere in the breastfeeding process are related to the volume of milk coming from the HLB and low stocks, the unit's infrastructure such as the lack of beds available for 24-hour stay, inadequate place for daily mothers to rest in the unit, lack of privacy in the extraction of the HL in the NICU, and the extraction techniques. The study by Gianni *et al*.[2] also identified extraction as one of the factors hindering breastfeeding in premature infants.

The facilities identified were support and guidance from NICU and BLH professionals, the presence of LH and fortifier, free access to the NICU, skin-to-skin contact, food provided on site, training of professionals and knowledge of the unit's breastfeeding policy, in addition to the unit being accredited by the BFHI and following the ten steps.

One of the limitations of this study was that it was carried out during the pandemic of COVID-19, which made it difficult to apply the data collection instrument and indirectly affected the stocks of HL, since mothers did not go to the unit for the donation of HL and even those with their PIs admitted to the NICU did not stay daily in the unit for extraction.

Given this scenario, we chose to apply the instrument with health professionals in order to reach a larger number of them, which proved to be right considering that there were 51 respondents. This instrument, however, had limitations, since interviews would have provided more in-depth information on the provision of LH.

The supply of LH to preterm infants was satisfactory, and breastfeeding was possible for most preterm infants, despite the challenges inherent to prematurity. The fact that preterm infants were admitted to a child-friendly hospital was a contributing factor to the implementation of the intervention. Thus, it can be considered that success in breastfeeding practices is influenced by public policies.

Health service evaluations, developed with the involvement of users and health professionals, are an important tool in identifying weaknesses in order to seek improvements in the implementation of services. Within this context, knowing the experience of mothers, professionals, and the organization of the institution's work regarding the provision of LH during hospitalization is essential for the promotion of interventions that favor the health of women, children, family, and society.

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Authors' contribution

Reis MMP: data collection and analysis, interpretation, and initial draft of the manuscript. Barros DC and Vitorino SAS: study design and coordination, and critical revision of the manuscript. All authors approved the final version of the article and declare no conflict of interest.

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