


# Care actions for newborns and factors associated with longitudinality in the follow-up care in the neonatal period

## Care actions for the newborn

Josilene Maria Ferreira Pinheiro, PhD<sup>a</sup>, Ketyllem Tayanne da Silva Costa, BS<sup>b,\*</sup> , Clelia de Oliveira Lyra, PhD<sup>c</sup>, Flavia Andreia Pereira Soares dos Santos, PhD<sup>d</sup>, Rodrigo Pinheiro de Toledo Vianna, PhD<sup>e</sup>, Kenya de Lima Silva, PhD<sup>f</sup>, Fábila Barbosa de Andrade, PhD<sup>g</sup>

### Abstract

As newborns are highly vulnerable, they require essential care for adequate child development. This study aimed to assess the care provided to newborns during the first 28 days of life and identify factors associated with adequate care. This was a longitudinal study conducted with 415 mothers and full-term newborns from 4 public maternity hospitals in Natal, Brazil, in 2019. Assistance, socioeconomic, and demographic data were collected 3 times: 48 hours, 7 days, and 28 days after birth. Pearson's chi-square and Poisson regression tests were used with a confidence interval of 95%. Most mothers were between 20 and 29 years old (46.5%), had a high school or higher education (65.3%), a partner (79%), an income of  $\leq 1$  minimum wage (64, 6%), and were multiparous (62.9%). A total of 29 actions performed in maternity hospitals and 11 in primary healthcare were evaluated. Among the first, 8 (27.6%) were satisfactory; 11 (37.9%), partially satisfactory; and 10 (34.5%), unsatisfactory. In primary care, 2 actions (18.2%) were considered satisfactory; 3 (27.3%) partially satisfactory; and 6 (54.5%) unsatisfactory. In the multivariate analysis of the composite indicators related to adequacy of care, women undergoing vaginal delivery, those who are multiparous, and maternity hospitals at usual risk were associated with better adequacy of care indicators ( $P \leq .05$ ). Maternity hospitals accredited to the Baby-Friendly Hospital Initiative had lower chances of the adequacy of promotion to exclusive breastfeeding. The sample loss rate was 13.7% in the first week and 16.6% at the end of the study period. There was inadequacy in the performance of care actions for newborns regarding access and comprehensiveness of care. These weaknesses highlight the need for reassessing skills and coordinating actions in the child's healthcare network.

**Abbreviations:** APS = primary healthcare, BCG = Bacilo Calmettcalmette-Guérin, BFHI = baby-friendly hospital initiative, CI = confidence interval, EBF = exclusive breastfeeding, PNAISC = National Policy for Integral Attention to Children's Health, PR = prevalence Ratio, SUS = system usability scale, UNICEF = United Nations Children's Fund.

**Keywords:** child health, health policy, newborn

## 1. Introduction

Child healthcare is a global priority and is guaranteed by public policies in Brazil, given the vulnerability of children and the many risk factors associated with higher rates of infant morbidity and mortality. For adequate assistance, comprehensiveness, and longitudinality of care, Brazil created the National Policy for Integral Attention to Children's Health (PNAISC) for

health promotion, disease prevention, protection, and recovery, with special attention to early childhood, articulating the different levels of complexity of the health system.<sup>[1]</sup> The current Child Health Policy was established in 2011 by the Ministry of Health, with the aim of improving integrality of care based on 5 priority axes of the Sustainable Development Goals.<sup>[2]</sup>

For comprehensive care of the neonate (the first 28 days of the child's life), the PNAISC recommends safe and humanized

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<sup>a</sup> Doctor in Public Health Federal University of Rio Grande do Norte, Rio Grande do Norte, Brazil, <sup>b</sup> Departamento de Enfermagem, Federal University of Rio Grande do Norte, Brazil, <sup>c</sup> Doctor in Health Sciences. Professor of the Federal University of Rio Grande do Norte; Natal, Rio Grande do Norte, Brazil, <sup>d</sup> Departamento de Enfermagem Federal University of Paraíba, Brazil, <sup>e</sup> Doctor in Collective Health. Professor of the Federal University of Paraíba, Brazil, <sup>f</sup> Departamento de Enfermagem, Federal University of Paraíba, Brazil, <sup>g</sup> Departamento de Enfermagem. Federal University of Rio Grande do Norte, Brazil.

\*Correspondence: Ketyllem Tayanne da Silva Costa, Federal University of Rio Grande do Norte, Departamento de Enfermagem, Salgado Filho Avenue, Natal, Rio Grande do Norte 59075-000, Brazil (e-mail: ketyllemcosta@gmail.com).

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care actions from the gestational period: qualified prenatal care, access to a healthcare network, birth preferably through vaginal delivery, promotion of exclusive breastfeeding (EBF) from skin-to-skin contact, breastfeeding in the first hour of life, immunization, neonatal screening tests for early detection of diseases, identification documents, continuity of care in primary care through home visits, medical consultation, and monitoring of weight gain.<sup>[1]</sup>

In the last 30 years, since the creation of the Unified Health System, Brazil has advanced its health policies in terms of access to and coverage of care, increasing breastfeeding rates, and reducing infant mortality.<sup>[3,4]</sup> However, despite numerous strategies, laws, programs, and policies prioritizing physical facilities, inputs, dimensioning, and professional training for adequate and humanized care, some recommended actions did not reach the desired coverage.<sup>[5]</sup>

The promotion of EBF is an action recommended by the World Health Organization and the United Nations Children's Fund (UNICEF) to reduce infant mortality. These advocate a prevalence of 80% for breastfeeding in the first hour of life and at least 50% at 6 months.<sup>[5,6]</sup> However, despite the advances made in recent years, Brazil still registers lower rates,<sup>[7-10]</sup> but with evolution in the first 6 months of life, as recorded in the last national survey, reaching a rate of 45.7%.<sup>[11]</sup>

The recommendation for neonatal screening tests established by the National Neonatal Screening Program includes performing blood tests on the newborn, "heel test" for detection of phenylketonuria, congenital hypothyroidism, sickle cell disease and other hemoglobinopathies, cystic fibrosis and congenital adrenal hyperplasia, and biotinidase deficiency in addition to clinical screenings, such as ocular neonatal screening-TNO, red reflex test, and "test of the little eye"; hearing neonatal screening-TNA and "little ear test"; screening for congenital heart disease and "little heart test"; and test to diagnose tongue brake problems ("linguinha test"). Despite a national norm, the coverage of these tests does not occur in all neonates presenting regional inequalities.<sup>[12]</sup>

Actions include immunization through the administration of hepatitis B and Bacilo Calmette-Guérin (BCG) vaccines, which prevents severe forms of meningitis and tuberculosis. These are recommended in the first hours of a newborn's life, achieving 1 of the best coverage in Brazil for the infancy period.<sup>[13]</sup>

For the longitudinality of care in the child's healthcare network, qualified discharge, guarantee of access, and issuance of the system usability scale (SUS) follow-up card are essential for the child's entry into the healthcare network. The delivery of the Child Health Card is also important for health surveillance, with includes monitoring the child's growth and development in the early years. However, the coverage achieved in its completion is deficient, reaching approximately 60%.<sup>[8,14]</sup> Professional visits in the first week, the heel prick test, medical consultation, and surveillance measures are configured as determinants of better indicators of health and a reduction in infant mortality.<sup>[1,15,16]</sup>

The literature points out that social inequalities; inequities in access; and numerous individual, socioeconomic, and demographic factors are related to low coverage of services, early weaning, and neonatal morbidity and mortality. However, few studies have evaluated care services such as guidance and practice actions by health institutions and professionals in maternity, e-hospitals, and primary healthcare (APS). Despite a well-designed care network in Brazil, the country's current political situation, economic crisis, and epidemiological situation can compromise child healthcare.<sup>[17]</sup>

This study evaluates the adequacy of the quality of assistance and care for newborns during the first 28 days of life, which can be an important instrument for planning and decision-making to guarantee the integrity and longitudinality of childcare.

## 2. Methods

### 2.1. Study design, population, and sample

A longitudinal study was conducted in 2019 in 4 public maternity hospitals in the city of Natal, Rio Grande do Norte, Brazil: 1 federal maternity hospital managed by the Federal University of Rio Grande do Norte (A), 2 by the municipality (B and D), and 1 by the state (D). State and federal governments offer highly complex care and serve the population of the metropolitan region and municipalities in the interior of the state.

The research population consisted of full-term newborns ( $\geq 37$  weeks) with birth weight  $\geq 2500$  g, Apgar score at 10 and 50 minutes ( $\geq 7$ ), and singleton pregnancy. Newborns with congenital malformations, twins who visited the intensive care unit, and mothers who were not in good health to respond to the research instrument were excluded.

The sample size calculation was based on previous studies, which considers a prevalence of 70% for the actions evaluated. For a population estimated at 14,000 live births per year in the 4 maternity hospitals, equivalent to the total number of births in 2018, considering an accuracy of 5 percentage points, a confidence level of 95%, and a non-response rate of up to 25%, at least 400 mother or child binomials would be needed. The sample was distributed proportionally among maternity hospitals with respect to the number of births in each hospital.

All interviewers were duly trained, and the instrument used for data collection was an electronic form, which was applied with the aid of equipment with a touch screen and previously tested in a pilot study with a sample different from that used in this study. All interviewed mothers signed an informed consent form agreeing to participate in the study.

Data were collected between February and August 2019. The mothers were interviewed 3 times: after 48 hours of life of the newborn in the maternity room through a face-to-face interview and complementation of information in the medical record when necessary, after the first week of the baby's life through a telephone call, and when the baby completed 28 days of life through a telephone call. Three unsuccessful telephone contact attempts were considered lost to follow-up.

The following actions recommended being developed in the maternity hospital were investigated: the presence of a companion at birth; skin-to-skin contact; breastfeeding in the first hour; vaccination for hepatitis B and BCG vaccine; neonatal screening tests; issuance of the SUS card; delivery of the health card of the child; guidelines on breastfeeding; breastfeeding position; breast care; colostrum; milking; the umbilical stump; bathing the newborn; not offering other milk, bottle, and pacifier; not smoking and drinking; on the use of medications; hospital discharge guidelines; and scheduling the first consultation.

The following actions recommended to be carried out under APS were also investigated: home visits by a health professional during pregnancy, guidelines on breastfeeding during the visit, registration of the newborn's weight, conducting screening tests, newborn consultation, appointment of growth, and development follow-up.

All responses to variables related to maternity and primary care were dichotomized into yes or no or considered as missing data when the information was not provided by the mother.

Information was also collected on the administrative nature of the maternity hospital (municipal, state, or federal); level of complexity of care (low or high); accreditation to the Baby-Friendly Hospital Initiative (BFHI) (yes or no); ratio of the number of pediatricians in the delivery room ( $<1$ ,  $>1$ ); ratio of the number of professionals (pediatricians, obstetricians, nurses, nursing technicians, nutritionists, speech therapists, social workers, psychologists, physiotherapists, and ophthalmologists) per obstetric beds in rooming-in ( $\geq 1.24$ ,  $< 1.24$ ); maternal age ( $\leq 20$  years, 20–29 years, and  $> 30$  years); maternal schooling (elementary, secondary, or higher education); family income ( $>1$  minimum wage,  $\leq 1$  minimum wage), consideration for a minimum wage of R\$ 998.00; place of residence (capital or countryside), parity

(multiparous or primiparous), type of delivery (vaginal or cesarean), number of prenatal consultations performed ( $\geq 6$  consultations,  $< 6$  consultations); issuance of the SUS card (yes or no); and appointment scheduling after delivery (yes or no).

**2.2. Analysis procedure**

A descriptive analysis of all study variables was performed. Each investigated care action was classified according to the following criteria: “satisfactory” when offered to 75% or more of the total mothers; “partially satisfactory” when offered to 50% up to less than 75% of the total mothers; and “unsatisfactory” when offered to less than 50% of mothers.

The evaluated actions were then grouped to build 6 indicators:

- (1) Indicators of care in the delivery room: the presence of a companion during delivery, skin-to-skin contact, and breastfeeding in the first hour.
- (2) EBF promotion indicators: skin-to-skin contact; breastfeeding in the first hour, guidelines, and position guidelines; breast care, colostrum, and milking guidelines; guidelines for not offering other milk, a bottle, and a pacifier.
- (3) Indicators of rooming-in procedures: vaccination for hepatitis B and BCG and performing the little heart, eye, ear, and tongue tests.
- (4) Indicators of healthy habit guidelines: guidelines for not smoking, drinking, or using illicit drugs and the use of medications and food guidelines.
- (5) Qualified discharge indicators: receipt of the child’s health card, discharge guidelines to seek health service, and guidelines for performing the neonatal screening test.
- (6) Indicators of the first week of comprehensive health: home visit by a health professional, guidelines on breastfeeding, performing the heel prick test, and scheduling an appointment for the newborn.

Each indicator was evaluated in a dichotomized manner: “fully met” or “yes” when all the respective actions were performed for each mother or “not met” when 1 or more actions had not been performed.

The explanatory variables of this study were the other investigated variables, and the association of each variable with each constructed indicator was tested using Pearson’s chi-square test. All results with p-values less than or equal to 0.20 were included in a multiple Poisson regression model for each indicator, with the indicator as the dependent variable of the model. The variables that obtained P-value of  $\leq .05$  remained in the 6 final models. The values of the respective prevalence ratios are presented with 95% confidence intervals.

**2.3. Ethical considerations**

This study was approved by the Research Ethics Committee of the Hospital Universitário Onofre Lopes with opinion No. 3.133217, in line with Resolution No. 466/2012, which includes guidelines and regulatory standards for research involving human beings. Consent was obtained from parents or legal guardians of participants under the age of 18 years.

**3. Results**

**3.1. Participant characteristics**

A total of 415 mother and child binomials were included in the study, 45.8% of which were managed by the municipality, 23.1% by the state, and 31.1% by the Federal University of Rio Grande do Norte. In the first week, this number was reduced to 358 (13.7% loss) and, at the end of 28 days, to 346 (16.6% loss at the end of follow-up).

Considering the characteristics of the interviewed mothers, 46.5% of them were between 20 and 29 years old, 65.3% had

a high school or higher education, 79.0% had a partner, 64.7% had an income of  $\leq 1$  minimum wage, and 64.3% did not perform paid work. The percentage of multiparous women was 62.1%, and those residing in the city of Natal was 60.7%. Of the newborns, 52.5% were boys, and 66% were self-reported brown. Given the inclusion criteria, the mean gestational age was 39.2 weeks, birth weight was 3324g, length was 49cm, and mean Apgar scores at 10 and 50 min were 8.3 and 8.9, respectively (Table 1).

**3.2. Assistance actions offered to the mother and child binomial in the neonatal period**

Of the 29 actions performed in the maternity hospital and 11 in APS, none had 100% coverage. Among those from the maternity ward, 8 (27.6%) were satisfactory, 11 (37.9%) were partially satisfactory, and 10 (34.5%) were unsatisfactory; that is, they were offered to less than half of the mothers who assisted in the maternity ward. In primary care, 2 (18.2%) actions were

**Table 1**  
**Maternal and newborn sociodemographic characteristics. Natal/RN, 2019.**

Maternal sociodemographic characteristics	n	%
<i>Age range, yrs</i>		
< 20	79	19.0
20 to 29	193	46.5
$\geq 30$	143	34.5
<i>Maternal schooling</i>		
High school/Higher education	271	65.3
Elementary school	144	34.7
<i>Marital status</i>		
Married/Stable unionsolteiro	328	79.0
Unmarried/widow/divorced	87	21.0
<i>Occupation</i>		
Without pay	267	64.3
With pay	117	28.2
<i>Renda</i>		
>1 minimum wage	147	35.4
$\leq 1$ minimum wage	268	64.6
<i>Place of residence</i>		
Capital city	252	60.7
Country town	163	39.3
<i>Give birth</i>		
Primiparous	154	37.1
Multipara	261	62.9
<i>Type of birth</i>		
Normal	224	48.4
Surgical	191	51.6
<b>Newborn characteristics</b>		
<i>Sex</i>		
Female	197	47.5
Male	218	52.5
<i>Color</i>		
White	137	33.0
Brown	274	66.0
Black	4	1.0
<i>Birth weight</i>		
5.5 to 8.8 lb	375	92.1
>8.8 lb	32	7.9
	<b><math>\mu</math></b>	<b>DP</b>
Gestational age	39.2	1.3
Weight (lb)	7.3	1055.1
Length (in)	19.3	0.9
Head circumference (in)	13.7	0.7
Apgar 1-min	8.3	1.0
Apgar 5-min	8.9	0.4

$\mu$  = average, DP = standard deviation, in = inch, lb = pound.

considered satisfactory, 3 (27.3%) were partially satisfactory, and 6 (54.5%) were unsatisfactory. Among all the actions, vaccination for hepatitis B was with the highest coverage (97.6%), and appointment scheduling at the Basic Health Unit had the worst coverage, which was performed in 3.6% of the total number of interviewed mothers in the maternity group (Table 2).

Of the continuity of care in APS, only the little eye and foot tests (96.7% and 93.6%, respectively) achieved satisfactory coverage. The other tests were partially satisfactory, similar to growth and development appointments. However, the coverage of other actions referring to the first week or first month of comprehensive health was unsatisfactory. Among the newborn screening tests, the tongue test still did not reach coverage of at least 50% of the newborns.

### 3.3. Determinants of care indicators

When analyzing the association between the indicators of care in the maternity, care in the delivery room, promotion to EBF, procedures

in rooming-in, healthy habit guidelines, and qualified discharge, we observed in the final Poisson multiple regression model (Table 3) that the indicators of care in the delivery room had 41% more coverage for vaginal deliveries (Prevalence ratio (PR) = 1.41; Confidence interval (CI): 1.22–1.61) than for cesarean deliveries. BFHI-accredited maternity hospitals had 37% lower coverage than other maternity hospitals (PR = 0.60; CI: 0.63–0.68) (Table 3).

Similarly, the indicator of actions to promote EBF had 25% lower coverage in BFHI maternity hospitals than that in other hospitals (PR = 0.75; CI: 0.68–0.86) (Table 3).

However, indicators related to procedures in rooming-in, guidelines for healthy habits, and high qualifications performed better in low-risk maternity hospitals than in high-complexity hospitals. The prevalence ratios and 95% confidence intervals observed for these 3 indicators were 1.85 (1.61–2.11), 1.17 (1.08–1.26), and 1.53 (1.02–3.30), respectively (Table 3).

Finally, the indicator related to continued care in the first week of comprehensive health was 6% worse for families living

**Table 2**

**Assessment of care actions, related to their respective indicators, recommended for the care of the newborn. Natal/RN, 2019.**

#### Actions carried out at the maternity hospital (n = 415)

Action	Indicator	%	Adequacy*
Hepatitis B vaccination	Accommodation	97.6	Satisfactory
Conducting the heart test	Accommodation	93.0	Satisfactory
BCG vaccination	Accommodation	87.0	Satisfactory
Colostrum guidelines	EBF	87.0	Satisfactory
Umbilical stump guidelines		86.5	Satisfactory
Breastfeeding position guidelines	EBF	85.0	Satisfactory
Breastfeeding guidelines	EBF	81.4	Satisfactory
Discharge guidelines to seek Health Service	Qualified discharge	79.9	Satisfactory
Breast care guidelines	EBF	74.7	Partially satisfactory
Presence of a companion at birth	Birth room	74.0	Partially satisfactory
Conducting the eye test	Accommodation	60.0	Partially satisfactory
Skin-to-skin contact	Birth room/EBF	59.3	Partially satisfactory
Breast milk pumping guidelines	EBF	58.8	Partially satisfactory
Breastfeeding in the first hour	Birth room/EBF	58.5	Partially satisfactory
Guidelines for not offering another milk	EBF	54.5	Partially satisfactory
Newborn bathing guidelines		51.4	Partially satisfactory
complementary feeding offer		51.3	Partially satisfactory
Guidelines for not offering a pacifier	EBF	51.3	Partially satisfactory
Guidelines for not offering a bottle	EBF	50.8	Partially satisfactory
Food guidelines	Healthy habit	49.5	Unsatisfactory
Guidelines for not smoking/drinking	Healthy habit	45.5	Unsatisfactory
Neonatal Screening Tests guidelines		42.7	Unsatisfactory
Discharge guidelines to perform Neonatal Screening Test	Qualified discharge	42.7	Unsatisfactory
Conducting the ear test	Accommodation	33.5	Unsatisfactory
Medication use guidelines	Healthy habit	32.0	Unsatisfactory
Issuance of the SUS card	Qualified discharge	23.1	Unsatisfactory
Conducting the tongue test		19.0	Unsatisfactory
Issuance of birth certificate		15.1	Unsatisfactory
Appointment scheduling in Basic Health Unit	Integral health	3.6	Unsatisfactory

#### Actions carried out in Primary Health Care†

Action	Indicator	%	Adequacy
Eye test in the neonatal period		96.7	Satisfactory
Foot test in the neonatal period	Integral health	93.6	Satisfactory
Ear test in the neonatal period		68.2	Partially satisfactory
Foot test in the first week		67.9	Partially satisfactory
Appointment scheduling growth and development		63.8	Partially satisfactory
Newborn weight record		49.9	Unsatisfactory
Tongue test in the neonatal period		48.9	Unsatisfactory
Home visit in the neonatal period		30.5	Unsatisfactory
1st appointment scheduling		28.2	Unsatisfactory
Breastfeeding guidelines	Integral health	26.9	Unsatisfactory
Home visit in the first week	Integral health	24.6	Unsatisfactory

\* Satisfactory ( $\geq P75$ ). Partially satisfactory ( $>P25 < P75$ ). Unsatisfactory ( $\leq P25$ ).

† For the evaluation of these actions, information was collected in the first week (n = 358) or at the end of the first month (n = 346).

EBF = exclusive breastfeeding.

**Table 3**  
**Adjusted prevalence ratio of maternal and institutional characteristics related to the performance of all indicator actions. Natal/RN, 2019.**

Maternal characteristics	(1)	(2)	(3)	(4)	(5)
	RP (95% CI)	RP (95% CI)	RP (95% CI)	RP (95% CI)	RP (95% CI)
<i>Give birth</i>					
Multipara					1.73 (1.15–2.61)
Primiparous					1
<i>Type of birth</i>					
Normal	1.41 (1.22–1.61)				
Surgical	1				
Institutional characteristics	(1)	(2)	(3)	(4)	(5)
	RP (95% CI)	RP (95% CI)	RP (95% CI)	RP (95% CI)	RP (95% CI)
<i>Level of complexity</i>					
Low risk			1.85 (1.61–2.11)	1.17 (1.08–1.26)	1.53 (1.02–2.30)
High risk			1	-	1
<i>BFHI Accreditation</i>					
Yes	0.60 (0.63–0.68)	0.75 (0.68–0.86)			
No	1	1			
<i>SUS card issuance</i>					
Yes					
No					

(1) Indicator of care in the Delivery Room: presence of a companion during delivery, skin-to-skin contact, breastfeeding in the first hour.  
 (2) EBF promotion indicator: skin-to-skin contact, breastfeeding in the first hour, breastfeeding guidelines, breastfeeding position guidelines, breast care guidelines, colostrum guidelines, milking guidelines, guidelines for not offer another milk, guidelines for not offering a bottle, guidelines for not offering a pacifier.  
 (3) Indicator of rooming-in procedures: vaccination for hepatitis B, vaccination for BCG, carrying out the little heart test, carrying out the little eye test, carrying out the little ear test.  
 (4) Indicator of guidelines for healthy habits: guidelines for not smoking/drinking/using illicit drugs, guidelines on the use of medications, food guidelines.  
 (5) Qualified discharge indicator: receipt of the child's health card, discharge guidelines to seek a health service, guidelines for performing the neonatal screening test.  
 BFHI = baby-friendly hospital initiative, CI = confidence interval, EBF = exclusive breastfeeding.

**Table 4**  
**Adjusted prevalence ratio of the characteristics related to the performance of all the actions of the first week of comprehensive health indicators. Natal/RN, 2019.**

Maternal sociodemographic characteristics	Indicator* RP (95% CI)
<i>Place of residence</i>	
Capital city	0.94 (0.89–0.99)
Country town	1
Institutional characteristics	
<i>SUS card issuance</i>	
Yes	1.11 (1.03–1.19)
No	1

\* Indicator of the first week of comprehensive health: home visit by the health professional, guidelines on breastfeeding, performing the heel prick test, scheduling the appointment for the newborn.

in the interior than those living in the capital (PR = 0.94; CI: 0.89–0.99) and 11% better for those who received the SUS card (PR = 1.11; CI: 1.03–1.19) (Table 4).

All results were adjusted for other independent variables in the study (Table 1).

**4. Discussion**

This study evaluated the care actions recommended for the care of newborns in the neonatal period, which investigated the performance of the procedures offered and the guidelines performed in maternity hospitals in the APS affiliated with the SUS.

With regard to the actions instituted in the delivery room, the presence of a companion was almost satisfactory, reaching 74% of frequency. This action is guaranteed by Federal Law No. 11,108/2005 for predelivery, childbirth, and postdelivery. However, it remains a practice that is rarely applied, particularly in surgical deliveries. In the survey “Born in Brazil” conducted

between 2011 and 2012, with 2070 participants, the prevalence was only 51.7%, which is lower than that of this study.<sup>[18]</sup> The literature points out the benefits of the presence of a companion, good obstetric practices during childbirth, comfort for women, skin-to-skin contact, and breastfeeding in the first hour.<sup>[19,20]</sup>

Considering the importance and benefits of breastfeeding and breast milk for the health of the mother and child, the assistance actions recommended in the “Ten Steps for the Success of Breastfeeding” established by the UNICEF and which are necessary actions for maternity can be accredited in the BFHI.<sup>[7]</sup> If the guidelines on EBF, colostrum, and breastfeeding positions were satisfactory, the recommendation not to use a pacifier or bottle was almost unsatisfactory, being made to only a little more than half of the mothers.

The actions related to the rooming-in indicator, those that are performed in maternity wards before the mother and baby were discharged, were the most performed, including hepatitis B and BCG vaccination and the little heart test. The National Immunization Policy guarantees a free vaccination schedule, which contributes to covering over 90%. In this study, the BCG vaccine did not reach the desired coverage for the period before hospital discharge; however, it can be administered after discharge and in the neonatal period, as recommended by the policy. This information was not collected in this study.

Brazil has an approximate coverage of 95% for these 2 vaccines, and cases of nonperformance are associated with the absence of an immunizer in health services, limited opening hours of basic health units, lack of trained health professionals, and little knowledge of the benefits of the vaccine.<sup>[13,21]</sup>

As for neonatal screening tests, the PNAISC recommends the tests of the little heart, eyes, ear, and tongue in the first 24 to 48 hours and the heel-prick test after 72 hours, preferably in the first week of life. However, the little eyes and feet tests showed partial adequacy, and the little ear and tongue tests were unsatisfactory, which corroborates the study that points out problems in the care network, structure, and social and regional inequalities. Such weaknesses can compromise the child's quality of life, as the early diagnosis of the heart, eye, otoacoustic, lingual,

metabolic, genetic, enzymatic, and endocrinological diseases favors the most effective interventions.<sup>[12]</sup>

The actions to promote healthy habits, such as not smoking, drinking, and using drugs, as well as on food and medication during the lactation period, showed low performance, with unsatisfactory adequacy. These guidelines are important because they improve binomial feeding, prevent clinical complications in newborns, and ensure adequate growth and development.

After 24 to 48 hours of hospitalization, without complications for the mother and newborn, they were discharged responsibly or through a unique therapeutic project. Responsible or qualified discharge has the objective of guaranteeing care for APS. Thus, the maternity health team must deliver the child's health booklet with adequate information on the child's birth, vaccination, screening tests, breastfeeding, issuance of the civil registry and SUS card, and scheduling an appointment between the 30th and 50th days of the newborn's life.<sup>[1]</sup> In our study, these actions showed unsatisfactory adequacy (3.6%), with mothers and newborns still in the maternity ward and scheduling the first appointment of newborns with APS.

When an appointment is not made at hospital discharge, the same must be done during home visits or on the first visit of the binomial to the health center for maternal evaluation or screening tests to guarantee the continuity and comprehensiveness of care. Home visits, which should preferably be conducted by doctors, nurses, and/or community health agents in the first week of the puerperium, are 1 of the actions recommended by the World Health Organization to reduce neonatal morbidity and mortality; however, in this study, together with the guidelines on breastfeeding and appointment scheduling, home visits were unsatisfactory and were conducted outside the recommended period.<sup>[15]</sup> During home visits, health professionals provide guidance on prenatal care, vaccination coverage, breastfeeding, neonatal screening, weight monitoring, and referral to healthcare facilities.

The composite indicators created in this study were evaluated in relation to their full realization among the evaluated mothers. The indicator of care in the delivery room, which consisted of the presence of a companion, skin-to-skin contact, and breastfeeding in the first hour, was more frequently performed when the delivery was vaginal. This may be a limitation of services when performing surgical deliveries that require greater care and more complex resources.

Unfortunately, the rate of cesarean deliveries in Brazil is high, further aggravating the observed results. It is well known that cesarean delivery causes more discomfort for women, delays in breastfeeding, and difficulty in breastfeeding.<sup>[22]</sup> Consequently, when the newborn is not placed at the breast in the first hour, it can increase the risk of early weaning and infant morbidity and mortality.<sup>[23]</sup>

This study found contradictory results regarding the actions recommended in BFHI-accredited maternity hospitals. According to the evaluation, these units performed worse in terms of the care indicators in the EBF promotion delivery room.

This result can be explained by 2 independent factors. The first is that, of the 4 maternity hospitals, 3 are child-friendly, and the fourth is in the accreditation phase, thus incorporating the routines recommended by UNICEF for the protection, promotion, and support of EBF<sup>[7]</sup> to obtain the title of BFHI. Second, the lack of control and evaluation of BFHI-accredited maternity hospitals may have caused their conduct not to perform properly, thus justifying the observed results.

Studies such as those by Marinelli et al,<sup>[24]</sup> and Silva et al,<sup>[25]</sup> found better rates of breastfeeding and skin-to-skin contact for accredited hospitals, showing improved breastfeeding indicators and an estimated reduction in late neonatal mortality.

The qualified discharge indicator performed better among multiparous mothers. These results differ from the study by Bittencourt et al,<sup>[26]</sup> with the sample of the survey "Nascer no Brasil," which found a lower prevalence in hospital discharge

guidelines and worse adequacy in the continuity of care in APS for multiparous mothers. Having previous experience may explain the results of our study.

The indicators of procedures in rooming-in, healthy habits, and qualified discharge had better performance in maternity hospitals that offer usual risk care.

The literature points to socioeconomic and cultural factors as determinants of the quality of maternal and child care.<sup>[27]</sup> However, it was observed that only the characteristics of childbirth, such as vaginal delivery and multiparous women, experience prior to childbirth, and maternity hospitals that serve women with usual obstetric risk influenced the care actions recommended in maternity hospitals during the first 48-hours postpartum. Bitencourt et al<sup>[26]</sup> identified that more complex maternity hospitals generally have better infrastructure, more supplies, professionals, and better rates of service adequacy.

However, as shown in this study, a greater number of care professionals were unable to improve the indicators. One should also consider the complexity of obstetric procedures, incorporation of good practices established in hospital units, and dedication and cooperation of a professional team, as recommended by the Rede Cegonha.

The women's and children's healthcare network and the Family Health Strategy are crucial for the continuity of care for this most vulnerable population in APS. However, this study showed that weaknesses in universal access and care persist, which are mostly unsatisfactory and disjointed. When these actions are not offered in their entirety, effectively, and in conditions of vulnerability and biological risk, they can result in increased neonatal and infant morbidity and mortality.<sup>[27,28]</sup>

When evaluating the composite indicator of care in APS, which is added to the foot and eye tests as well as the scheduling of the growth and development consultation, residing in cities in the interior of the state and having the SUS card increased the chances of the adequacy of that indicator. This may be associated with the country town, as they are demographically and territorially smaller and have easier access to the assistance network. Conversely, the SUS card is an identification document that allows appointments and exams to be scheduled, in addition to enabling agility in the regulation of the healthcare network.

As a limitation of this study, there are the losses to follow-up that occurred, which may have biased the results; however, the total losses were small, and the number of studied binomials exceeded the expectation of the sample size calculations. The technique of data collection through telephone calls proved to be efficient, fast, and low-cost, having been satisfactory in completing the follow-up. As mentioned, some memory bias may have affected the results, particularly because it was not possible to confirm the answers with documents.

This problem was minimized by the fact that all questions were simple and referred to a deadline of less than 1 month. The offer of recommended actions for the neonatal period was evaluated, making it necessary to study the institutional and management arrangements of the maternal and child healthcare network as well as the maternal and family characteristics that impact the continuity of care.

## 5. Conclusion

This study showed that the offer of actions recommended by the PNAISC had low coverage among newborns born in the main public maternity hospitals in Natal, not guaranteeing the integrity and longitudinality of quality care within the scope of the hospital and in APS in the neonatal period.

The construction of composite indicators, as conducted in this study, is an efficient strategy to assess and guide actions, considering different stages of the care process during the neonatal period, noting that the actions related to the continuity

of care after the hospital discharge were the ones that showed more unsatisfactory care.

The factors associated with better coverage were maternal characteristics, previously having a child, delivery characteristics, vaginal delivery, service characteristics, and being a low-complex maternity hospital. The worst performance of BFHI maternity hospitals indicates failure in the control and evaluation of these units.

The weaknesses observed in this study reaffirm the need for reassessment of skills and coordinated actions in the child healthcare network, particularly in view of the reduction in investments in structure, processes, and the training of healthcare professionals sensitive to the prevention of child health problems and protection of the child's health.

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## Author contributions

**Conceptualization:** Josilene Maria Ferreira Pinheiro.

**Formal analysis:** Josilene Maria Ferreira Pinheiro, Fábila Barbosa de Andrade.

**Methodology:** Josilene Maria Ferreira Pinheiro.

**Resources:** Josilene Maria Ferreira Pinheiro.

**Supervision:** Fábila Barbosa de Andrade.

**Writing – original draft:** Josilene Maria Ferreira Pinheiro, Ketyllem Tayanne da Silva Costa, Clelia de Oliveira Lira, Flavia Andreia Pereira Soares dos Santos, Rodrigo Pinheiro de Toledo Vianna, Kenya de Lima Silva, Fábila Barbosa de Andrade.

**Writing – review and editing:** Josilene Maria Ferreira Pinheiro, Ketyllem Tayanne da Silva Costa, Clelia de Oliveira Lira, Flavia Andreia Pereira Soares dos Santos, Rodrigo Pinheiro de Toledo Vianna, Kenya de Lima Silva, Fábila Barbosa de Andrade.

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