Combined pro-breastfeeding practices are advantageous in facilities providing maternity and newborn services

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Abstract

This study aimed to evaluate the association between a set of pro-breastfeeding practices in facilities providing maternity and newborn services and the prevalence of exclusive breastfeeding at 30 days postpartum, considering the contribution of each practice. A cross-sectional study nested within a cohort study was conducted with 287 women who delivered healthy term infants in two hospitals in southern Brazil. They were interviewed at home at 30 days postpartum. The following practices were evaluated: skin-to-skin contact soon after birth, breastfeeding in the first hour, uninterrupted rooming-in, professional support with breastfeeding, breastfeeding guidance, encouragement to breastfeed on demand, no supplementation with infant formula, and no pacifier use. A score of pro-breastfeeding practices was calculated using a logistic model, which allowed each practice to have its discriminatory capacity and difficulty estimated individually. Poisson regression was used to estimate the association between exclusive breastfeeding at 30 days and the pro-breastfeeding practice score. The prevalence of exclusive breastfeeding at 30 days was 61.7%. The practices with greatest discriminatory capacity, that is, those that contributed most to the score estimates, were professional support with breastfeeding, breastfeeding guidance, and encouragement to breastfeed on demand. The most difficult ones were breastfeeding in the first hour, encouragement to breastfeed on demand, and non-utilization of infant formula. For each unit (standard deviation) of increase in the score, there was an increase of 20% in the prevalence of exclusive breastfeeding at 30 days. We conclude that the set of pro-breastfeeding practices assessed here increased the effect of these practices on exclusive breastfeeding rates at 30 days.

KEYWORDS

breastfeeding, maternal and child health, perinatal care, newborn, maternity hospital

1 | INTRODUCTION

Despite the evidence supporting the positive impact of exclusive breastfeeding on infant and maternal health, the prevalence of this

practice continues to give grounds for concern. The World Health Organization (World Health Organization, 1998) recommends breastfeeding for 2 years or more, and exclusive breastfeeding in the first 6 months of life (World Health Organization, 2009), but this

powerful health promotion measure is still little adopted. Worldwide, only 43% of children under 6 months are exclusively breastfed (World Health Organization, 2017). In Brazil, despite an increase in the prevalence of exclusive breastfeeding in children under 6 months from 2.9% in 1986 to 37.1% in 2006, the most recent national survey conducted in 2013 showed that the rate stagnated at about that level (36.6%; Boccolini, Boccolini, Monteiro, Venancio, & Giugliani, 2017). Also, only 60.7% of Brazilian infants are exclusively breastfed at 30 days of age (Brazil, 2009). This scenario justifies the need to intensify efforts and identify effective strategies to promote exclusive breastfeeding.

It is known that some pro-breastfeeding practices in facilities providing maternity and newborn services are associated with increased duration of breastfeeding. Examples include breastfeeding in the first hour of the infant's life, absence of supplementation with infant formula (DiGirolamo, Grummer-Strawn, & Fein, 2001; DiGirolamo, Grummer-Strawn, & Fein, 2008; World Health Organization, 1998), and not offering a pacifier (DiGirolamo, Grummer-Strawn, & Fein, 2008). In addition, a dose-response relationship between the number of practices experienced by the mother-infant dyad in facilities providing maternity and newborn services and the duration of exclusive breastfeeding has been demonstrated (Perez-Escamilla, Martinez, & Segura-Perez, 2016). However, to the authors' knowledge, no studies so far have evaluated the effect of a set of pro-breastfeeding practices in facilities providing maternity and newborn services on the prevalence of exclusive breastfeeding, considering the specific contribution of each practice to this effect. Thus, the objective of this study was to assess the association between a set of pro-breastfeeding practices in facilities providing maternity and newborn services, especially those recommended by the Baby-Friendly Hospital Initiative (BFHI), and the prevalence of exclusive breastfeeding at 30 days of the infant's life, considering the impact of each individual practice on the outcome of interest.

2 | METHODS

This cross-sectional study was nested in a contemporary cohort study whose main objective was to investigate factors associated with maternal satisfaction with the attention received during delivery and in relation to breastfeeding. The study is currently underway and the mother-infant dyads should be followed until the children are 2 years old.

The target population of the study consisted of women giving birth at two facilities providing maternity and newborn services, one public and one private, in the city of Porto Alegre, state of Rio Grande do Sul, southern Brazil. The first facility is part of a general university hospital, predominantly public, accredited by the BFHI since 1997; the other service is part of a private general hospital and did not have the BFHI certification. Both hospitals are centres of excellence and referral institutions for the care of pregnancies at usual risk and high risk, having performed, in the year 2016, 3,725 and 4,182 deliveries, respectively.

Key messages

- The set of pro-breastfeeding practices assessed here contributed to increase the prevalence of exclusive breastfeeding at 30 days of the infant's life, regardless of the individual contribution of each practice.
- Each unit (standard deviation) of increase in the pro-breastfeeding practice score represented a 20% increase in the prevalence of exclusive breastfeeding at 30 days of the infant's life.
- Professional breastfeeding support, breastfeeding guidance, and encouragement to breastfeed on demand were the practices that contributed most to the score.

Participants were selected daily, including weekends, in the rooming-in ward of the facilities, from January to July 2016, when the expected number of women for the study was reached ($n = 354$). Selection occurred within the first 24 hr postpartum, by drawing lots among the women who met the following inclusion criteria: residing in the city of Porto Alegre; having delivered a liveborn, full-term (gestational age ≥ 37 weeks), singleton infant; and having initiated breastfeeding. Mother-infant dyads showing any complications that prevented them from being together in the maternity ward or for breastfeeding were not included in the study. For the safety of the research team, women living in violent neighbourhoods, that is, where local community health worker visits had been discontinued, were not included in the study.

Eligible women were invited to participate in the study, asked to sign an informed consent form, and then an interview was arranged in their homes or at another place of their choice the week after the infant completed 30 days of life. In the interviews, standardized questionnaires were used, containing questions aimed at obtaining data on sociodemographic characteristics, maternal health, pregnancy, delivery and immediate postpartum characteristics, and also questions about the infant's first month of life. The interviews lasted approximately 60 min and were conducted by 10 interviewers, all from the health field, previously trained for the task.

To guarantee the quality of data collection, a few key questionnaire answers were double-checked by one investigator in approximately 5% of the sample, selected randomly, through telephone contact.

The practices initially selected for assessment were: skin-to-skin contact soon after delivery, newborns put to the breast in the first hour of life, uninterrupted rooming-in, professional support with breastfeeding, breastfeeding guidance, encouragement to breastfeed on demand, no supplementation with infant formula, no pacifier use, presence of a companion during delivery, and presence of a companion during rooming-in. Most of these practices are addressed in the Ten Steps to Successful Breastfeeding of the BFHI (World Health Organization, 2018). Only practices that could be perceived by the

women were chosen for the study; thus, practices such as staff training were not addressed.

The Statistical Package for the Social Sciences (SPSS) version 21.0 (IBM, SPSS, Chicago, Illinois, USA) and SAS Studio (SAS on demand for academics) were used for statistical analysis. Means and standard deviations (SD) were used for variables with normal distribution, and medians and interquartile ranges for other quantitative variables. Relative and absolute frequencies were presented for categorical variables.

A latent variable that summarizes in a single measure the results of breastfeeding promotion and support practices, called the pro-breastfeeding practice score, was developed for the present study. Both the weight of the practices and the women's experience regarding the practices contributed to this score. The weight consisted of a combination of two aspects of each practice, namely, its discriminatory capacity and difficulty. Thus, women who experienced practices with higher weight had higher values, whereas those who experienced only practices with lower weight had lower scores. Because pro-breastfeeding practices were assessed using dichotomous responses (where yes meant having experienced the practice, and no meant having not experienced the practice), this score was created by adjustment of the two-parameter logistic model from the item response theory (Andrade, Tavares, & da Cunha Valle, 2000), which allowed to determine the discriminatory capacity (a_i in Table 3) and difficulty (b_i in Table 3) of each practice. Discriminatory capacity consists of the ability of each practice to discriminate the women among the population of interest in relation to their true level in the pro-breastfeeding score (latent variable). In this way, the model allowed us to evaluate which practices contributed most to the score estimates. The difficulty parameter, in turn, allowed us to sort the practices and identify which ones required a higher pro-breastfeeding practice score for them to be experienced (i.e., practices more difficult to perform), and which were more likely to be experienced even with a lower pro-breastfeeding practice score (i.e., easier practices).

Information on the outcome—exclusive breastfeeding at 30 days of the infant's life—was obtained in the interview with the mother the week after the end of the first month after delivery. Exclusive breastfeeding was considered to be present when the infant was given breast milk directly from the mother's breast, or expressed breast milk or human milk from another source, with no other liquids or solids except for drops or syrups containing vitamins, oral rehydration salts, mineral supplements, or medications (World Health Organization & UNICEF, 1989).

To determine the association between exclusive breastfeeding at 30 days of life and the pro-breastfeeding practice score, prevalence ratios (PR) and 95% confidence intervals (95% CI) were estimated using Poisson regression models with robust variance. For this analysis, $p < .05$ was considered significant.

The adjustment variables used in the Poisson regression models were: mother's age and years of schooling (quantitative variables), place of delivery (public or private hospital), type of delivery, mother's skin colour, parity, and cohabitation with the infant's father (categorical variables). These variables were chosen as adjustment variables because they have been frequently associated with breastfeeding (Boccolini,

Carvalho, & Oliveira, 2015). The linearity assumption of quantitative variables was evaluated using a test based on quartiles (Collett, 2003).

The study was conducted in compliance with the norms that regulate investigations involving humans (Resolution 466/2012 of the Brazilian National Health Council) and was approved by the research ethics committees of the institutions involved (protocol 1.288.088 at the public hospital and 1.204.288 at the private hospital).

3 | RESULTS

A total of 354 women were initially included but only 287 completed the study (194 from the public and 93 from the private maternity service).

The 67 women lost to follow-up were similar to those who completed the study in terms of type of delivery, parity, and infant's sex, but had fewer years of schooling ($p < .01$) and showed a higher prevalence of white skin colour ($p = .032$).

The mean age of the women was 29 years ($SD = 6.6$), ranging from 16 to 45 years. Most had white skin colour, had completed elementary school (≥ 8 years of schooling), and lived with the infant's father; half of the women were primiparous (Table 1). All the women selected for the study started breastfeeding in the hospital, and the majority (95.8%) continued breastfeeding at the time of the interview, that is, between 31 and 37 days of the infant's life. The prevalence of exclusive breastfeeding at 30 days of life was 61.7%: 62.8% among women from the public hospital ($n = 194$) and 59.1% among those from the private hospital ($n = 93$).

The prevalence of the pro-breastfeeding practices evaluated in this study is presented in Table 2. Most of the women in the two hospitals had experienced uninterrupted rooming-in, professional support with breastfeeding, breastfeeding guidance, and were encouraged to breastfeed on demand. Some practices were more frequent in the public hospital, namely, skin-to-skin contact soon after birth, no supplementation with infant formula, and no pacifier use.

Among the practices initially chosen for assessment, presence of a companion in the delivery room and presence of a companion during rooming-in did not show discriminatory capacity and were therefore excluded from the model. A possible explanation for this finding is that nearly 98% of the women had a companion both in the delivery room and during rooming-in.

As shown in Table 3, the practices showing the greatest discriminatory capacity results ($a_i > 1$) (Andrade, Tavares, & da Cunha Valle, 2000; Cúri, 2006) were professional support for breastfeeding, breastfeeding guidance, and encouragement to breastfeed on demand. These three practices, among the eight assessed, contributed most—or had the greatest weight—in estimating the pro-breastfeeding practice score.

As for the level of difficulty of the eight practices, having the newborn put to the breast in the first hour of life was the most difficult one, that is, only women with a true score level greater than approximately 1 SD below the mean ($b_i = -0.90$, Table 3) had a probability of more than 0.5 of experiencing the practice. This practice was followed in difficulty level by encouragement to breastfeed on demand

TABLE 1 Sociodemographic and hospital care characteristics of women and their children included in the study ($n = 287$), Porto Alegre, RS, Brazil, 2016

	Total (n = 287)		Public (n = 194)		Private (n = 93)		
Variables	n	%	n	%	n	%	p
Maternal characteristics							
Age (years)							
≤19	23	8.1	23	11.9	0	0	
20–34	199	69.3	149	76.8	50	53.8	
≥35	65	22.6	22	11.3	43	46.2	.000
Years of schooling							
≤8 years	44	15.3	44	22.8	0	0	
>8 years	242	84.3	149	77.2	93	100	.000
Skin colour							
White	216	75.3	131	67.5	85	91.4	
Black/brown	71	24.7	63	32.5	8	8.6	.092
Parity							
Primiparous	142	49.5	84	43.3	58	62.4	
Multiparous	145	50.5	110	56.7	35	37.6	.904
Socioeconomic classification ^a							
A/B	163	56.8	72	37.1	91	97.8	
C/D/E	122	42.5	120	61.9	2	2.2	.540
Cohabitation with baby's father							
Yes	248	86.4	158	81.4	90	96.8	
No	39	13.6	36	18.6	3	3.2	.160
Newborn characteristics							
Sex							
Male	136	47.6	96	49.5	40	43	
Female	151	54.6	98	50.5	53	57	.226
Hospital care							
Type of delivery							
Vaginal	149	51.9	133	68.6	16	17.2	
Caesarean	138	48.1	61	31.4	77	82.8	.084
Pro-breastfeeding score	Mean 0.083	SD ^b (0.688)	Mean 0.017	SD ^b (0.659)	Mean −0.293	SD ^b (0.702)	

Missing information: socioeconomic classification (2); years of schooling (1).

^a Obtained from the Brazilian ABEP Socioeconomic Classification Table—Categories A/B indicate better socioeconomic level (ABEP, 2016).

^bStandard deviation.

($b_i = -1.08$, Table 3) and no supplementation with infant formula ($b_i = -1.08$, Table 3).

The Poisson regression model with robust variance (Table 4) estimated that each unit (*SD*) of increase in the pro-breastfeeding practice score represented a 20% increase in the prevalence of exclusive breastfeeding at 30 days of life.

4 | DISCUSSION

The prevalence of exclusive breastfeeding at 30 days of the infant's life found in the present study (61.7%) was similar to that estimated

in the II Survey on the Prevalence of Breastfeeding in Brazilian Capitals and the Federal District, namely, 60.7% in Brazil as a whole and 60.6% in Porto Alegre (Brazil, 2009). The stagnation in the prevalence of exclusive breastfeeding in infants under 6 months in Brazil detected in the latest Brazilian nationwide survey on breastfeeding rates conducted in 2013, which reported 37.1% in 2006 and 36.6% in 2013 (Boccolini, Boccolini, Monteiro, Venancio, & Giugliani, 2017), points to the need to intensify breastfeeding protection, promotion, and support. The findings of this study reinforce that there is still much room for the implementation of good practices in facilities providing maternity and newborn services as a strategy to improve breastfeeding rates.

TABLE 2 Pro-breastfeeding practices in the maternity hospitals, according to type of hospital—Public or private, Porto Alegre, RS, Brazil, 2016

	Total		Public (n = 194)		Private (n = 93)		
Pro-breastfeeding practices	n	%	n	%	n	%	p
Skin-to-skin contact soon after birth							
Yes	191	66.6	149	76.8	42	45.2	<.001
No	90	31.4	41	21.1	49	52.7	
Newborn put to breast in the 1st hour of life							
Yes	189	65.9	129	66.5	60	64.5	.688
No	95	33.1	62	32	33	35.5	
Uninterrupted rooming-in							
Yes	267	93	184	94.8	83	89.2	.089
No	20	7	10	5.2	10	10.8	
Professional support with breastfeeding							
Yes	269	93.7	183	94.3	86	92.5	.411
No	16	5.6	9	4.6	7	7.5	
Breastfeeding guidance							
Yes	236	82.2	160	82.5	76	81.5	.870
No	51	17.8	34	17.5	17	18.3	
Encouragement to breastfeed on demand							
Yes	207	72.1	138	71.1	69	74.2	.567
No	75	26.1	53	27.3	22	23.7	
No supplementation with infant formula							
Yes (no use)	191	66.6	140	72.2	51	54.8	.005
No (use)	94	32.8	53	27.3	41	44.1	
No pacifier use							
Yes (no use)	217	75.6	176	90.7	41	44.1	<.001
No (use)	70	24.4	18	9.3	52	55.9	

Skin-to-skin contact soon after birth: for more than 10 min.

Missing information: skin-to-skin contact (6); newborn put to breast in the life (3); professional support with breastfeeding (2); encouragement to breastfeed on demand (5); no supplementation with infant formula (2).

An association was found between the prevalence of exclusive breastfeeding at 30 days of the infant's life and maternal experience regarding pro-breastfeeding practices in facilities providing maternity and newborn services, represented by a pro-breastfeeding practice score. The analysis revealed that regardless of a greater or lesser influence of individual practices, the set of practices as a whole seemed to be important for the outcome investigated. Each unit (SD) of increase in the pro-breastfeeding practice score represented a 20% increase in the prevalence of exclusive breastfeeding at 30 days of the infant's life. This finding reinforces the importance of combined breastfeeding

TABLE 3 Estimated parameters of pro-breastfeeding practices carried out in two maternity hospitals according to the two-parameter logistic model, Porto Alegre, RS, Brazil, 2016

Pro-breastfeeding practices	a_i (SE)	b_i (SE)
1. Skin-to-skin contact soon after birth	0.53 (0.21)	-1.55 (0.62)
2. Newborn put to breast in the 1st hour of life	0.88 (0.27)	-0.90 (0.27)
3. Uninterrupted rooming-in	0.59 (0.35)	-4.71 (2.54)
4. Professional support with breastfeeding	3.08 (1.26)	-1.81 (0.24)
5. Guidance on breastfeeding	1.46 (0.43)	-1.44 (0.28)
6. Encouragement to breastfeed on demand	1.15 (0.34)	-1.08 (0.25)
7. No supplementation with infant formula	0.76 (0.25)	-1.08 (0.34)
8. No pacifier use	0.51 (0.23)	-2.29 (0.99)

Abbreviations: a_i , discriminatory capacity of practice i ; b_i , difficulty of practice i ; SE, standard error.

TABLE 4 Multivariate analysis of the association between pro-breastfeeding practices in two maternity hospitals and the prevalence of exclusive breastfeeding at 30 days of the infant's life, Porto Alegre, RS, Brazil, 2016

Model	PR	95% CI	p
Pro-breastfeeding practice score	1.2	[1.04, 1.42]	.012
Pro-breastfeeding practice score + adjustment variables	1.2	[1.03, 1.42]	.020

Abbreviations: 95%CI, 95% confidence interval for prevalence ratio; p , probability value obtained by fitting the Poisson regression model with robust variance; PR, prevalence ratio. Pro-breastfeeding practices score: skin-to-skin contact soon after birth, newborn put to breast in the 1st hour of life, uninterrupted rooming-in, professional support with breastfeeding, breastfeeding guidance, encouragement to breastfeed on demand, no supplementation with infant formula, no pacifier use. Adjustment variables: type of hospital, type of delivery, maternal skin colour, parity, age, years of schooling, cohabitation with child's father and infant's sex.

promotion and support practices in facilities providing maternity and newborn services for the initiation and maintenance of breastfeeding and serves as an argument for the promotion of practices aimed at improving breastfeeding indicators (DiGirolamo, Grummer-Strawn, & Fein, 2008; Perez-Escamilla, Martinez, & Segura-Perez, 2016).

All the practices assessed are, to some extent, included in the BFHI Ten Steps. Thus, this study corroborates previous investigations that have shown a positive impact of the BFHI on breastfeeding indicators (Braun et al., 2003; Coutinho, Lima Mde, Ashworth, & Lira, 2005; de Oliveira, Camacho, & Tedstone, 2003; Lamounier et al., 2008; Passanha, Benicio, Venancio, & Reis, 2015; Perez-Escamilla, Martinez, & Segura-Perez, 2016; Venancio, Saldiva, Escuder, & Giugliani, 2012). This impact has already been demonstrated also in the city where the present study was carried out (Braun et al., 2003) and in Brazil as a whole (Venancio, Saldiva, Escuder, & Giugliani, 2012). The most recent

literature review evaluating the impact of BFHI on breastfeeding (Perez-Escamilla, Martinez, & Segura-Perez, 2016) suggested a dose-response relationship between the number of practices experienced and the probability of improving breastfeeding outcomes. In addition, it highlighted the important interrelationship between the practices; they are interconnected at both structural and physiological levels, that is, some practices have a reflection on the proper implementation of others. Taking no supplementation with infant formula as an example, if the other practices advocated in the Ten Steps are well established, there will be no need to offer any food to the infant other than breast milk.

The main original contribution of this study was the formulation of a pro-breastfeeding practice score using an item response theory model, namely, the two-parameter logistic model. This model was chosen because of its ability to relate the probability of responses given to items to a latent trait (da Silva Fink et al., 2018), and to make better use of the information available in the items, one by one, when compared with the classical test theory. Currently, item response theory models have been widely used in health sciences for the elaboration of latent variable measurement instruments. These models replace the traditional classical test theory, which is concerned with explaining the total final result, that is, the sum of the responses given to a series of items. Some limitations of the classical test theory have been pointed out, in particular, not taking into consideration the parameters of difficulty or discriminatory capacity (Castro, Trentini, & Riboldi, 2010). Even though our study did not aim to evaluate the association of each individual practice with the outcome, some behavioural tendencies could be observed during the development of the score. For example, having the newborn put to the breast in the first hour of life proved to be the most difficult practice; that is, women experiencing it were likely to have previously experienced the other practices. Next came the practices of encouraging breastfeeding on demand and no supplementation with infant formula. According to previous studies that evaluated some of the practices examined here, breastfeeding in the first hour of life, no supplementation with infant formula, and no pacifier use were the practices most strongly associated with longer breastfeeding duration (DiGirolamo, Grummer-Strawn, & Fein, 2008). A recent study conducted in Canada also showed that babies who were breastfed exclusively during their stay in the maternity ward were breastfed for longer when compared with those who received formula (median: 11 vs. 7 months; Vehling et al., 2018), corroborating the findings of the present study.

Conversely, professional support with breastfeeding, breastfeeding guidance, and encouragement to breastfeed on demand contributed most to the estimation of the pro-breastfeeding practice score. This does not mean that the practices that contributed less to the score were less important and that those that contributed more were more important. The methods used in this study allowed us to evaluate the practices in two different aspects (discriminatory capacity and difficulty) and mainly to estimate a single measure for all of them (designated here as a pro-breastfeeding practice score), which considered, in addition to maternal responses to the practices (yes or no), the importance of each one based on the different aspects mentioned

above. This means that each practice had a different weight in the estimation of the score, which is a single general measure for the set of eight practices evaluated. Thus, our findings suggest that there should be a greater concentration of efforts on the part of professionals to implement the most difficult practices, not neglecting the others, but keeping in mind that if the most difficult practices are experienced, the others will likely be experienced as well.

Our analysis also revealed that the most discriminatory practices were directly related to the performance of the health professional; that is, receiving encouragement, support, guidance, which highlights the importance of investing in the training and development of these professionals at all levels of care. Preparing health professionals to be able to promote breastfeeding, improving their knowledge, skills, and consequently their professional practice can result in more women having access to adequate breastfeeding counselling, guidance, and management from pregnancy until the termination of breastfeeding, as already pointed out by other authors (Edmunds, Lee, Eldridge, & Sekhobo, 2017; Haroon, Das, Salam, Imdad, & Bhutta, 2013; Jesus, Oliveira, & Moraes, 2017; McFadden et al., 2017).

This is the first study to evaluate a set of pro-breastfeeding practices in facilities providing maternity and newborn services, taking into account the contribution of each practice within the set and associating it with exclusive breastfeeding rates at 30 days of the infant's life. In addition to the novelty of the study and the different statistical approach employed, other strengths include its methodological quality, with data collected in face-to-face interviews, and the rigour with which the data collection was performed, with continuous quality control to ensure homogeneity in interviews, in addition to the fact that the interviews were conducted the week after the infant had completed 30 days of life, practically eliminating the possibility of recall bias.

Among the limitations of this study lies the fact that women who resided in violent neighbourhoods were not included, potentially affecting the external validity of the study. As a result, the present findings can be generalized only to populations with a similar profile to that of the sample here assessed.

In conclusion, the present findings demonstrated an association between the prevalence of exclusive breastfeeding at 30 days of the infant's life and the set of pro-breastfeeding practices assessed, indicating the importance of combining different pro-breastfeeding practices in order to contribute to the increase of exclusive breastfeeding rates. Also, the strong influence of practices that are directly related to the performance of the health professionals, whether in the form of encouragement, support, or guidance, suggests the need for investing in training at all levels of care, so that more women have access to adequate breastfeeding counselling during pregnancy and throughout the breastfeeding period.

The finding that the set of practices as a whole increased exclusive breastfeeding rates at 30 days of the infant's life has significant implications for public policies, reinforcing the need for a greater effort in implementing the whole set of practices, and not only one or some of the Ten Steps recommended by the BFHI. Moreover, the evidence

that some practices require more efforts to be implemented than others is extremely important for health managers and professionals in designing appropriate strategies to attain the most difficult ones.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

ERJG and CG conceived of the presented idea. AMBLB developed the theory. AMBLB, JCA, AFKS, and ACMM carried out the data collection and participated in the development of the paper. AMBLB and SC performed the computations. All authors discussed the results and contributed to the final manuscript.

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REFERENCES

- ABEP - Associação Brasileira de Empresas de Pesquisa. (2016). Critério Brasil 2015 e atualização da distribuição de classes para 2016. Retrieved from <http://www.abep.org/Servicos/Download.aspx?id=12>
- Andrade, D. F., Tavares, H. R., & da Cunha Valle, R. (2000). *Teoria da resposta ao item: conceitos e aplicações*. São Paulo, Brazil: Associação Brasileira de Estatística.
- Boccolini, C. S., Boccolini, P. D. M. M., Monteiro, F. R., Venancio, S. I., & Giugliani, E. R. J. (2017). Breastfeeding indicators trends in Brazil for three decades. *Revista de Saúde Pública*, 51, 108. <https://doi.org/10.11606/S1518-8787.2017051000029>
- Boccolini, C. S., Carvalho, M. L. D., & Oliveira, M. I. C. D. (2015). Factors associated with exclusive breastfeeding in the first six months of life in Brazil: A systematic review. *Revista de Saúde Pública*, 49. <https://doi.org/10.1590/S0034-8910.2015049005971>
- Braun, M. L. G., Giugliani, E. R. J., Soares, M. E. M., Giugliani, C., de Oliveira, A. P., & Danelon, C. M. M. (2003). Evaluation of the impact of the Baby-Friendly Hospital Initiative on rates of breastfeeding. *American Journal of Public Health*, 93(8), 1277–1279. <https://doi.org/10.2105/AJPH.93.8.1277>
- Brazil. (2009). II Pesquisa de Prevalência de Aleitamento Materno nas Capitais Brasileiras e Distrito Federal. Retrieved from http://bvsms.saude.gov.br/bvs/publicacoes/pesquisa_prevalencia_aleitamento_materno.pdf
- Castro, S. M. D. J., Trentini, C., & Riboldi, J. (2010). Item response theory applied to the Beck Depression Inventory. *Revista Brasileira de Epidemiologia*, 13(3), 487–501. <https://doi.org/10.1590/S1415-790X2010000300012>
- Collett, D. (2003). *Modelling survival data in medical research* (2nd ed.). New York: Chapman and Hall/CRC.
- Coutinho, S. B., Lima, M. D. C., Ashworth, A., & Lira, P. I. C. (2005). The impact of training based on the Baby-Friendly Hospital Initiative on breastfeeding practices in the northeast of Brazil. *Jornal de Pediatria*, 81(6), 471–477. <https://doi.org/10.2223/JPED.1422>
- Cúri, M. (2006). *Analysis of questionnaire with embarrassing items*. São Paulo, Brazil: USP.
- da Silva Fink, J., de Mello, E. D., Beghetto, M. G., Luft, V. C., de Jesus Castro, S. M., & de Mello, P. D. (2018). Nutritional Assessment Score: A new tool derived from Subjective Global Assessment for hospitalized adults. *Clinical Nutrition*, 37(2), 706–711. <https://doi.org/10.1016/j.clnu.2017.02.019>
- de Oliveira, M. I., Camacho, L. A., & Tedstone, A. E. (2003). A method for the evaluation of primary health care units' practice in the promotion, protection, and support of breastfeeding: Results from the state of Rio de Janeiro, Brazil. *Journal of Human Lactation*, 19(4), 365–373. <https://doi.org/10.1177/0890334403258138>
- DiGirolamo, A. M., Grummer-Strawn, L. M., & Fein, S. (2001). Maternity care practices: Implications for breastfeeding. *Birth*, 28(2), 94–100. <https://doi.org/10.1046/j.1523-536X.2001.00094.x>
- DiGirolamo, A. M., Grummer-Strawn, L. M., & Fein, S. B. (2008). Effect of maternity-care practices on breastfeeding. *Pediatrics*, 122(Supplement 2), S43–S49. <https://doi.org/10.1542/peds.2008-1315e>
- Edmunds, L. S., Lee, F. F., Eldridge, J. D., & Sekhobo, J. P. (2017). Outcome evaluation of the you can do it initiative to promote exclusive breastfeeding among women enrolled in the New York State WIC program by race/ethnicity. *Journal of Nutrition Education and Behavior*, 49(7), S162–S168.e1. <https://doi.org/10.1016/j.jneb.2017.05.350>
- Haroon, S., Das, J. K., Salam, R. A., Imdad, A., & Bhutta, Z. A. (2013). Breastfeeding promotion interventions and breastfeeding practices: A systematic review. *BMC Public Health*, 13(Suppl 3), S20. <https://doi.org/10.1186/1471-2458-13-S3-S20>
- Jesus, P. C. d., Oliveira, M. I. C. d., & Moraes, J. R. d. (2017). Training of health professionals in breastfeeding and its association with knowledge, skills and practices. *Ciência & Saúde Coletiva*, 22, 311–320. <https://doi.org/10.1590/1413-81232017221.17292015>
- Lamounier, J. A., Bouzada, M. C. F., Janneu, A. M. d. S., Maranhão, A. G. K., Araújo, M. d. F. M. d., Vieira, G. O., & Vieira, T. d. O. (2008). More than one decade of the Baby-Friendly Health Care Initiative in Brazil: Thinking about the future. *Revista Paulista de Pediatria*, 26, 161–169. <https://doi.org/10.1590/S0103-05822008000200012>
- McFadden, A., Gavine, A., Renfrew, M. J., Wade, A., Buchanan, P., Taylor, J. L., & MacGillivray, S. (2017). Support for healthy breastfeeding mothers with healthy term babies. *Cochrane Database of Systematic Reviews*, xxx(2), CD001141.
- Passanha, A., Benício, M. H. D. A., Venâncio, S. I., & Reis, M. C. G. d. (2015). Influence of the support offered to breastfeeding by maternity hospitals. *Revista de Saúde Pública*, 49. <https://doi.org/10.1590/S0034-8910.2015049005354>
- Perez-Escamilla, R., Martinez, J. L., & Segura-Perez, S. (2016). Impact of the Baby-friendly Hospital Initiative on breastfeeding and child health outcomes: a systematic review. *Maternal & Child Nutrition*, 12(3), 402–417. <https://doi.org/10.1111/mcn.12294>
- Vehling, L., Chan, D., McGavock, J., Becker, A. B., Subbarao, P., Moraes, T. J., ... Azad, M. B. (2018). Exclusive breastfeeding in hospital predicts longer breastfeeding duration in Canada: Implications for health equity. *Birth*, 45, 440–449. <https://doi.org/10.1111/birt.12345>
- Venancio, S. I., Saldiva, S. R. D. M., Escuder, M. M. L., & Giugliani, E. R. J. (2012). The Baby-Friendly Hospital Initiative shows positive effects on breastfeeding indicators in Brazil. *Journal of Epidemiology and*

Community Health, 66(10), 914–918. <https://doi.org/10.1136/jech-2011-200332>

World Health Organization. (1998). Evidence for the ten steps to successful breastfeeding. Retrieved from <http://apps.who.int/iris/handle/10665/43633>

World Health Organization. (2009). Infant and young child feeding. Model chapter for textbooks for medical students and allied health professionals. Retrieved from http://whqlibdoc.who.int/publications/2009/9789241597494_eng.pdf

World Health Organization. (2018). Protecting, promoting, and supporting breastfeeding in facilities providing maternity and newborn services: The revised Baby-Friendly Hospital Initiative 2018: Implementation guidance. Retrieved from <https://www.who.int/nutrition/publications/infantfeeding/bfhi-implementation/en/>

World Health Organization & UNICEF. (1989). Protecting, promoting and supporting breast-feeding: The special role of maternity service. Retrieved from http://whqlibdoc.who.int/publications/2009/9789241597494_eng.pdf

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