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NATIONAL SURVEY ON BREASTFEEDING KNOWLEDGE AMONGST RESIDENTS IN PEDIATRICS IN SPAIN

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ABSTRACT

Background: Increasing breastfeeding rates is a desirable goal for improving maternal and child health. Pediatricians have a main role in this subject. The objective was to document breastfeeding knowledge in Pediatric residents, and its relationship with the BFHI (Baby Friendly Hospital Initiative) status of their hospitals.

Methods: Transversal study with a validated online survey (ECoLa). Polietapic sampling of Pediatric residents in Spain by strata (BFHI degree) and clusters (hospitals). Estimated sample size was 142 residents. 312 surveys were sent to 21 hospitals. Main variable was the percentage of correct answers to survey questions, it was analyzed with non parametric techniques.

Results: 189 answers (response rate 60%). Global median (Me) of correct answers was 76.9% (95% Confidence Interval [95CI] 74.2-79.6). There was no difference among first and second year residents (Me=76.9%) and third and fourth year residents (Me=73.1%) ($p=0.541$). Residents from BFHI hospitals (Me=84.6%) achieved better results than those from non-BFHI hospitals (Me=73.1%) ($p=0.002$). Variability at non-BFHI hospitals was considerable, where some hospitals showed unacceptable scores. Prevalence of courses was greater at BFHI hospitals (95% vs 52%).

Conclusions: There are some deficiencies in Pediatric residents' breastfeeding training. There are hospitals whose residents have an insufficient breastfeeding knowledge. No low scores were found in residents from BFHI hospitals. We consider necessary to systematize and universalize breastfeeding training during Pediatric Residency.

Key words: Breast feeding, Pediatrics, Internship and residency, Medical education, Surveys and questionnaires.

RESUMEN

Encuesta nacional sobre conocimientos de lactancia materna de los residentes de pediatría en España

Fundamentos: Una de las metas para mejorar la salud materno-infantil es aumentar las tasas de lactancia, y la Pediatría tiene un papel fundamental en ello. El objetivo del estudio fue averiguar el nivel de conocimientos sobre lactancia materna de los residentes de Pediatría y su relación con la acreditación IHAN (Iniciativa para la Humanización de la Asistencia al Nacimiento y la Lactancia).

Métodos: Se realizó un estudio transversal mediante encuesta validada (ECoLa) de cumplimentación online. Se elaboró un muestreo por estratos y conglomerados de los residentes de Pediatría en España. El tamaño muestral necesario fue de 142 sujetos. Se enviaron 315 encuestas a 21 hospitales. La variable principal fue el porcentaje de aciertos a las preguntas de la encuesta, que se evaluó con técnicas no paramétricas.

Resultados: Hubo 189 respuestas (tasa de respuesta del 60%). La Mediana (Me) global de aciertos fue del 76,9% (Intervalo de Confianza al 95%=[IC95] 74,2-79,6). La mediana de aciertos no difirió entre residentes de primer y segundo año (Me=76,9%) y los de tercer y cuarto año (Me=73,1%) ($p=0,541$). Los residentes de los hospitales acreditados por la IHAN (Me=84,6%) obtuvieron mejores resultados que los de hospitales no acreditados (Me=73,1%) ($p=0,002$). En los hospitales no acreditados, la variabilidad de conocimientos fue amplia, con puntuaciones muy bajas en algunos de ellos. El porcentaje de residentes que había realizado cursos específicos fue muy superior en los hospitales acreditados por la IHAN (95% vs 52%).

Conclusiones: Se detectan lagunas en la formación en lactancia de los residentes de Pediatría. Existen hospitales cuyos residentes tienen unos conocimientos en la materia claramente insuficientes, aunque no se hallan carencias en residentes de hospitales acreditados por la IHAN. Consideramos necesario universalizar y sistematizar la formación en lactancia.

Palabras clave: Lactancia materna, Pediatría, Internado y residencia, Educación médica, Encuestas y cuestionarios.

INTRODUCTION

Breastmilk supplies newborn infants with the specific compounds they need to grow and develop, not only from a nutritional point of view, as breastmilk also provides hormones, anti-inflammatory and anti-infectious agents, cells, growth factors and particles such as DNA and RNA. The close physical contact between mother and child that breastfeeding implies is also essential for the physical and emotional development of the human newborn. Breastfeeding protects the mother-child relationship in the short, medium and long term and strengthens their emotional bond. Society as a whole benefits when mothers breastfeed, unnecessary costs are saved and it protects the environment^(1,2).

Global goals have been established to achieve at least 50% of exclusive breastfeeding during the first 6 months of baby's life⁽³⁾, but in Spain, only 39.9% of infants benefit from it⁽⁴⁾.

The recommendations need to be accompanied by effective support measures⁽⁵⁾. This practical support can be very varied between centres and among different health workers. The main reasons for breastfeeding cessation are related to common problems⁽⁶⁾, such as perceived insufficient milk, difficulties with breast attachment, mastitis or poor weight gain. A lack of training among professionals in the management of these issues, along with a low awareness of the disadvantages of formula feeding can hinder many mothers' breastfeeding goals.

The BFHI strategy (Baby-friendly Hospitals Initiative) promotes the best practices for care during childbirth and breastfeeding. Its implementation improves breastfeeding and child health rates⁽⁷⁾ and it is recommended as a minimum standard practice in maternity hospitals^(6,8). BFHI designated

hospitals must meet certain conditions stipulated in their "Global Criteria" (summarized in the Ten Steps to Successful Breastfeeding Guide). Among the criteria is to demonstrate an exclusive breastfeeding rate at hospital discharge above 75%, a requirement that rose to 80% in 2018⁽⁸⁾, and to adhere to the International Code of Marketing of Breastmilk Substitutes. In Spain, facilities obtain this designation in four progressive phases: 1D, 2D, 3D and 4D⁽⁹⁾. Phase 1D only documents the commitment of the hospital administration and the breastfeeding committee to bring about change towards good practice. When a hospital reaches phase 4D it is conferred the Baby-Friendly (BF) designation.

Training health workers in breastfeeding improves breastfeeding rates^(10,11) and the pediatricians opinion is especially important in breastfeeding support^(10,12). However, scientific literature reports that in many occasions pediatricians and residents in pediatrics are lacking in sufficient training^(13,14,15) and they are often influenced by their personal experience⁽¹⁶⁾. The Residency in Pediatrics training program in Spain covers training in breastfeeding although not in a standardized way⁽¹⁷⁾. Participation in breastfeeding courses is voluntary and dependent on the interest of each resident and hospital.

Since the publication of the most comprehensive report about training in breastfeeding among Spanish residents in pediatrics in the year 2003⁽¹⁸⁾, promotion and protection of breastfeeding has improved substantially in Spain⁽¹⁹⁾: the number of BF designated or working towards BF designation facilities has increased and the Spanish Pediatric Association has developed an active Breastfeeding Committee.

The aim of this study was to assess the current state of knowledge regarding breastfeeding among Spanish residents in pediatrics.

SUBJECTS AND METHODS

A cross-sectional study was conducted by means of a questionnaire-based survey among Spanish residents in pediatrics. The Residency in Pediatrics in Spain is a 4-year program (residents are known as R1, R2, R3 or R4 depending on the year they are in) and the curricular year begins in June. The survey took place in April-May 2016. In Spain, in the year 2016 there were 1,612 places for residents in pediatrics in 105 hospitals. Of these residents, 70.5% trained in non-BF designated hospitals, 20.3% in hospitals working towards BF designation (Phases 1D-3D) and 5.7% in BF designated hospitals. For a type I error of 5%, a standard deviation of 15.9 points⁽²⁰⁾ and a standard error of measurement of 5 points we calculated a sample size of 142 surveys. We defined three strata according to BF designation, with a proportionate number of residents each. We performed a stratified and cluster (hospitals) randomized sampling. We contacted the Head Resident of each hospital personally and asked them to distribute the surveys among their residents. To improve each Head Resident's response rates we sent a pre-invitation, a link to the survey and three reminders spread out over 7 and 14 days to their residents. The authors contacted the Head Residents on several occasions to improve response rates⁽²¹⁾. In order to compensate the losses, 315 surveys were sent. We requested the participation of all the residents of each hospital, but, in facilities that had more than 20 residents, we selected a maximum of five surveys per year by randomized sampling to avoid the excessive weight of the large hospitals.

Data was obtained by completion of an online form from Google platform with control of duplicates, no blank questions allowed and direct import of the data to a LibreOffice spreadsheet. We gathered general information about the participants (gender, age, year of residency, previous training in breastfeeding

and personal experience in breastfeeding). To measure the knowledge about breastfeeding we used the ECoLa questionnaire (Encuesta de Conocimientos en Lactancia, "Questionnaire about breastfeeding knowledge")⁽²⁰⁾. The complete data dictionary as well as the study database and complementary resources are available at aelama.org⁽²²⁾. It also includes supplementary information on sampling and variables available as additional resources.

We considered the residents' scores according to their hospitals BF designation and stage of training: first and second year residents (younger residents) or third and fourth year residents (older residents). The comparisons between groups were performed using confidence intervals at 95% (CI 95%) and the hypotheses contrasts were performed using Wilcoxon and Kruskal-Wallis tests, considering P value with Bonferroni correction $p < 0.025$. We used R for the statistical analysis⁽²³⁾.

The study was approved by the Research Committee of the "Hospital Universitario 12 de Octubre" in Madrid. The data was collected anonymously.

RESULTS

We selected 21 hospitals: 2 BF designated hospitals, 4 hospitals working on BF designation and 15 non-BF designated hospitals. Inside 315 surveys that were sent, we received 189 (response rate of 60%). We randomly eliminated 12 answers from two hospitals with more than 20 residents, leaving 177 surveys for analysis.

The socio-demographic characteristics are shown in [table 1](#). We found no socio-demographic differences among the residents according to the type of hospital, however, the residents from non-BF designated hospitals qualified their training in breastfeeding more poorly and

Table 1
Sample characteristics.

Stratum		Total	Non-BF	1D BF	4D BF	p
Sample size (%)		177 (100.0)	114 (64.4)	41 (23.2)	22 (12.4)	-
Sex (female) (%)		152 (85.9)	100 (87.7)	33 (80.5)	19 (86.4)	0.521
Age (years) (%)	≤ 24	1 (0.6)	0 (0.0)	0 (0.0)	1 (4.5)	0.170
	25-29	163 (92.1)	105 (92.1)	38 (92.7)	20 (90.9)	
	30-34	9 (5.1)	7 (6.1)	2 (4.9)	0 (0.0)	
	35-39	4 (2.3)	2 (1.8)	1 (2.4)	1 (4.5)	
Personal breastfeeding experience (%)		14 (7.9)	5 (4.4)	6 (14.6)	3 (13.6)	0.065
Months of experience(*) (average (sd))		7.00 (4.90)	6.8 (6.2)	5.6 (4.2)	9.7 (4.7)	0.566
Year of residency (%)	1st	48 (27.1)	33 (28.9)	10 (24.4)	5 (22.7)	0.907
	2nd	47 (26.6)	32 (28.1)	9 (22.0)	6 (27.3)	
	3rd	41 (23.2)	23 (20.2)	12 (29.3)	6 (27.3)	
	4th	41 (23.2)	26 (22.8)	10 (20.4)	5 (22.7)	
Self perceived quality of training(†) (%)	Median	3	3	4	5	<0.001
	1 (worse)	12 (6.8)	12 (10.5)	0 (0.0)	0 (0.0)	
	2	22 (12.4)	19 (16.7)	3 (7.3)	0 (0.0)	
	3	59 (33.3)	44 (38.6)	13 (31.7)	2 (9.1)	
	4	62 (35.0)	34 (29.8)	20 (48.8)	8 (36.4)	
	5 (better)	22 (12.4)	5 (4.4)	5 (12.2)	12 (54.5)	
Attendance to specific courses (%)		114 (64.4)	60 (52.6)	33 (80.5)	21 (95.5)	<0.001
Hours of courses length(*) (average (sd))		17.26 (12.75)	18 (13)	16 (13)	16 (10)	0.625
Thinks breastfeeding as a necessary skill‡ (%)		173 (97.7)	112 (98.2)	39 (95.1)	22 (100.0)	0.384

Total analyzed size is 177, as a maximum of 5 residents per training year were allowed for each hospital; BF: Baby Friendly hospital according to Baby Friendly Hospital Initiative; sd: standard deviation; (*) Of whom who have had personal breastfeeding experience or attendance to courses, respectively; (†) About breastfeeding; (‡) Full text of the question was: 'Do you think you should be an expert in diagnosing and providing solutions to specific breastfeeding problems?'

their attendance to courses in breastfeeding was lower. Independent of the type of hospital, most of the residents considered the importance of receiving training in breastfeeding.

In [table 2](#) the overall percentage of correct answers and percentages according to year of residency program, type of hospital, attendance to courses and personal experience in breastfeeding are shown. Training at a BF designated hospital and attending specific courses are

the factors associated with better scores. The percentage of correct answers of residents with personal experience in breastfeeding was 82.7% and that of residents without was 73.1% ($p=0.03$). The results per hospital are shown in [figure 1](#).

The percentage of correct answers to each question of the survey (both overall and stratified) are shown in [table 3](#). It is worth noting that 51% of residents did not know of the International Code

Table 2
Main results. Score as percentage of correct answers: globally and by sample subgroups.

Categories	Group	Median	(CI 95%)	IQR (%)	Minimum	Maximum	Test p-value
Global score	All	76.9	(74.2-79.6)	61.5-84.6	19.2	100.0	-
By residence program year	1-2	76.9	(71.3-82.5)	53.8-88.5	26.9	100.0	T Wilcoxon $p=0.541$
	3-4	73.1	(69.1-77.1)	61.5-84.6	19.2	96.2	
By BF phase	Non-BF	73.1	(68.5-77.7)	53.8-84.6	19.2	100.0	T Kruskal Wallis $p=0.002$
	1D BF	73.1	(67.4-78.8)	61.5-84.6	34.6	96.2	
	4D BF	84.6	(79.4-89.8)	76.9-92.3	53.8(*)	96.2	
By Attendance to breastfeeding courses	Yes	80.8	(77.9-83.7)	69.2-88.5	26.9(*)	100.0	T Wilcoxon $p=0.0001$
	No	57.7	(52.0-63.4)	46.2-75.0	19.2	96.2	
By personal breastfeeding experience	Yes	82.7	(71.3-94.1)	69.2-96.2	53.8	100.0	T Wilcoxon $p=0.035$
	No	73.1	(69.8-76.4)	57.7-84.6	19.2	96.2	

CI: Confidence Interval; IQR: Interquartile Range; BF: Baby Friendly hospital according to Baby Friendly Hospital Initiative; (*) Value at a distance from percentil 25 greater than $1.5 \times \text{IQR}$, so it can be considered an extreme value (outlier).

of Marketing of Breast-milk Substitutes (question 20); 50% did not know how to recognize basic warning signs in the breastfed newborn in the

first days of life (question 9); 31% was not able to mention quote 2 correct criteria of breastfeeding assessment (question 18); 34% would limit

Table 3
Percentage of correct answers on each test item.

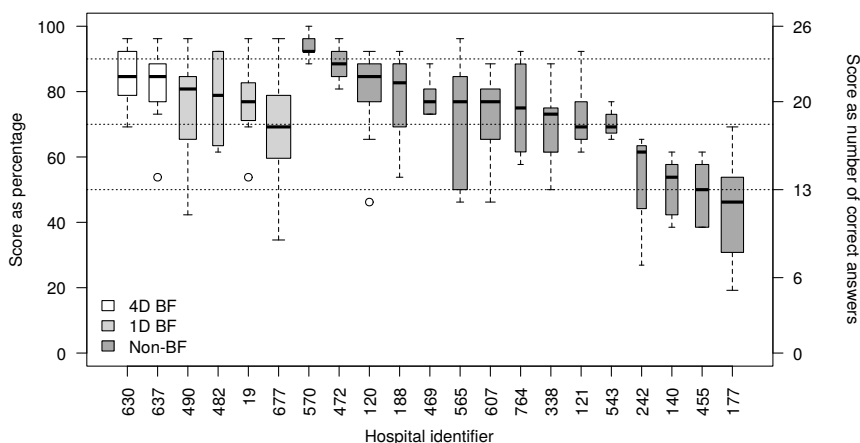
Item	Scenario (abbreviated statement) ^(*)	Average of correct answers % (sd)							
		All n=177	By BF phase				By residence program year		
			Non-BF n=114	1D BF n=41	4D BF n=22	p	1-2 n=95	3-4 n=82	p
1	Mastitis	0.92 (0.27)	0.93 (0.26)	0.93 (0.26)	0.86 (0.35)	0.571	0.94 (0.24)	0.90 (0.30)	0.401
2	Feeding on demand	0.72 (0.45)	0.68 (0.47)	0.78 (0.42)	0.77 (0.43)	0.420	0.75 (0.44)	0.68 (0.47)	0.345
3	Increased morbimortality risk with exclusive formula feeding	0.64 (0.48)	0.68 (0.47)	0.56 (0.50)	0.59 (0.50)	0.319	0.72 (0.45)	0.56 (0.50)	0.032
4	Breastfeeding when cesarean section	0.84 (0.37)	0.84 (0.37)	0.76 (0.43)	1.00 (0.00)	0.041	0.86 (0.35)	0.82 (0.39)	0.405
5	Way to feed with formula	0.68 (0.47)	0.62 (0.49)	0.68 (0.47)	1.00 (0.00)	0.002	0.69 (0.46)	0.67 (0.47)	0.734
6	Breastfeeding and phototherapy	0.77 (0.42)	0.78 (0.42)	0.76 (0.43)	0.77 (0.43)	0.950	0.72 (0.45)	0.84 (0.37)	0.047
7	First feed in the delivery room	0.83 (0.38)	0.84 (0.37)	0.78 (0.42)	0.86 (0.35)	0.608	0.84 (0.37)	0.82 (0.39)	0.660
8	Breastfeeding in very premature infants	0.94 (0.23)	0.92 (0.27)	0.98 (0.16)	1.00 (0.00)	0.206	0.93 (0.26)	0.96 (0.19)	0.289
9	Clinical case of a newborn not demanding breastmilk	0.50 (0.50)	0.49 (0.50)	0.44 (0.50)	0.68 (0.48)	0.172	0.49 (0.50)	0.51 (0.50)	0.818
10	Prolonged breastfeeding	0.64 (0.48)	0.58 (0.50)	0.73 (0.45)	0.82 (0.39)	0.041	0.64 (0.48)	0.65 (0.48)	0.954
11	Clinical case of low weight gain as a single finding in a breastfed child	0.80 (0.40)	0.78 (0.42)	0.78 (0.42)	0.91 (0.29)	0.379	0.82 (0.39)	0.77 (0.42)	0.387
12	Breastfeeding and complementary feeding	0.66 (0.47)	0.60 (0.49)	0.76 (0.43)	0.82 (0.39)	0.045	0.63 (0.48)	0.70 (0.46)	0.376
13	Difference from foremilk and hindmilk	0.57 (0.50)	0.58 (0.50)	0.54 (0.50)	0.59 (0.50)	0.879	0.61 (0.49)	0.52 (0.50)	0.251
14	Recognize a poor breastfeeding latch	0.81 (0.40)	0.82 (0.39)	0.73 (0.45)	0.91 (0.29)	0.223	0.82 (0.39)	0.79 (0.41)	0.635
15	WHO recommendations on breastfeeding	0.84 (0.37)	0.80 (0.40)	0.88 (0.33)	1.00 (0.00)	0.046	0.84 (0.37)	0.84 (0.37)	0.991
16	Most important action in a nursing mother with cracked nipples (4 options)	0.83 (0.38)	0.82 (0.39)	0.83 (0.38)	0.91 (0.29)	0.570	0.83 (0.38)	0.83 (0.38)	0.968
17	Clinical case of a growth spurt (4 options)	0.60 (0.49)	0.55 (0.50)	0.56 (0.50)	0.91 (0.29)	0.006	0.58 (0.50)	0.62 (0.49)	0.563
18	List 5 features of a correct latch (free text)								
	a) Feature 1	0.75 (0.43)	0.68 (0.47)	0.85 (0.36)	0.91 (0.29)	0.018	0.73 (0.45)	0.78 (0.42)	0.409
	b) Feature 2	0.69 (0.46)	0.62 (0.49)	0.80 (0.40)	0.82 (0.39)	0.036	0.67 (0.47)	0.71 (0.46)	0.632
	c) Feature 3	0.69 (0.46)	0.65 (0.48)	0.73 (0.45)	0.86 (0.35)	0.115	0.64 (0.48)	0.76 (0.43)	0.102
	d) Feature 4	0.56 (0.50)	0.53 (0.50)	0.54 (0.50)	0.82 (0.39)	0.037	0.59 (0.49)	0.54 (0.50)	0.482
	e) Feature 5	0.45 (0.50)	0.41 (0.49)	0.51 (0.51)	0.55 (0.51)	0.354	0.49 (0.50)	0.40 (0.49)	0.221
19	Prenatal visit: proactivity and respect for a mother considering formula feeding (5 options)	0.98 (0.13)	0.99 (0.09)	0.98 (0.16)	0.95 (0.21)	0.439	0.98 (0.14)	0.99 (0.11)	0.651
20	International Code of Marketing of Breast-milk Substitutes (5 options)	0.49 (0.50)	0.45 (0.50)	0.49 (0.51)	0.68 (0.48)	0.133	0.49 (0.50)	0.48 (0.50)	0.801
21	Clinical case of breastfeeding and drugs (5 options and free text)	0.87 (0.34)	0.87 (0.34)	0.85 (0.36)	0.91 (0.29)	0.823	0.84 (0.37)	0.90 (0.30)	0.236
22	Self-confidence when evaluating a breastfed (4 options) ^(†)	0.55 (0.50)	0.49 (0.50)	0.56 (0.50)	0.82 (0.39)	0.018	0.49 (0.50)	0.61 (0.49)	0.127

(*) Full text can be found in the www.aelama.org/investigacion/conocimientos-en-profesionales/encuesta-nacional2016; BF: Baby Friendly hospital according to Baby Friendly Hospital Initiative; (†) Answer to this item is not considered as correct, but as desirable.

the number of feeds in infants older than 6 months (question 12), and 36% do not acknowledge the nutritional value of breastmilk in young children older than 12 months (question 10). 28% percent of Spanish residents in Pediatrics would recommend limiting the number and duration of feeds (question 2).

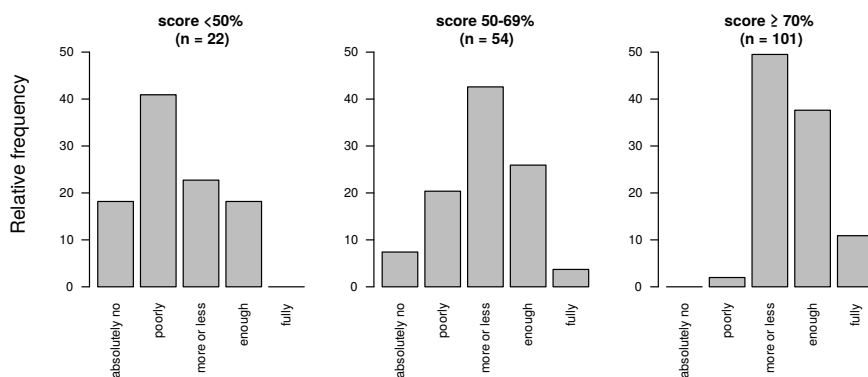
The residents that had taken part in breastfeeding courses obtained better results with a median of correct answers 22.3 percentage points higher than residents who had not attended courses (table 2). The relationship between self-confidence in their own competence and the level of knowledge is shown in figure 2.

Figure 1
Successes percentage by hospitals according to BF accreditation.



Scores of the different hospitals ordered within their strata. Box and whisker plot. For each hospital, a box represents the interquartile range (IQR), the central line represents the median, the upper and lower whiskers reach respectively the maximum or minimum value at a distance of $1.5 \times \text{IQR}$ from the box. Extreme values are represented individually. Box width is proportional to the square of the sample size.

Figure 2
Confidence in the own capabilities according to successes percentage.



Do you feel confident to diagnose and offer solutions to specific breastfeeding problems?

DISCUSSION

Residents in Pediatrics in Spain as a whole show acceptable knowledge, and higher compared to the results observed 13 years ago⁽¹⁸⁾ and to Canadian residents⁽¹⁵⁾.

The improvement of knowledge has been described by other authors: an American revision describes an improvement of knowledge among pediatricians⁽¹⁷⁾. It is important to note that the questionnaire used evaluates knowledge and basic skills⁽²⁰⁾ and that as the survey was performed towards the end of the curricular year the R4 residents would obtain their specialist qualification a few days after the collection of data.

We have not found better scores among the older residents. We have not found differences between global scores or in each particular question according to year of residency training. It has been reported that specific training in breastfeeding improves the knowledge of health professionals^(24,25). In our sample, 64.4% of the total number of residents had attended specific courses in breastfeeding, a percentage much higher than among the Canadian sample (48%)⁽¹⁵⁾. This progress in training is likely influenced by the efforts directed specifically at residents in Pediatrics carried out by the BFHI and the Breastfeeding Committee of the Spanish Pediatrics Association. These efforts include national courses at a very low cost, such as the course in Teruel run by BFHI-Spain, which has gathered annually around 90 first and second year residents for the last 10 years. Other training examples are different online educational options⁽²⁶⁾. In any case, it is noteworthy that a significant 35.6% of residents refer not having attended any courses in breastfeeding and that the attendance to such courses was a lot higher among residents from BF designated hospitals or hospitals working on achieving the designation compared to non-BF

designated facilities. This is probably because, in our country, despite the evidence regarding its importance, training in breastfeeding is not normalized, so undertaking a medical residency in pediatrics does not necessarily imply the acquisition of the minimum knowledge and skills required⁽²⁰⁾, but rather depends on the will of the physician or each hospital⁽¹⁹⁾.

In the BF designated hospitals, residents' knowledge was higher compared to the other hospitals, with a median of correct answers 11.5 percentage points higher compared to non-BF designated hospitals. In the 1D BF hospitals and especially in the non-designated hospitals the dispersion of the scores was large and scores in all ranges were found: hospitals with high scores and hospitals in which the median of correct answers was close to 50% and where none of the residents attain 70% of correct answers. It is also noticeable that among the group of non-BF designated hospitals, the lowest score, at 19% of correct answers, was not considered an anomalous value. This contrasts with the little dispersion among the scores from BF designated hospitals in which the scores were found in a high and limited range. In BF designated hospitals, practically all residents surpass 70% of correct answers.

Other authors have reported differences in health professionals knowledge depending on their personal experience^(15,27). In our study, only 14 residents had personal experience in breastfeeding and the difference ($p=0.035$) does not allow conclusions to be drawn on this point.

Regarding the survey's questions, it is worth noting that most residents were familiar with the international recommendations on duration of breastfeeding and knew where to search for information about medications and breastfeeding. We also observed significant improvements in the knowledge of Spanish residents compared to similar questions surveyed years

ago by Temboury⁽¹⁸⁾, although, when it comes to knowing the importance of assessing a feed or knowing how to recognize a growth spurt Spanish residents obtain lower scores than their Canadian peers⁽¹⁴⁾.

Even though the current recommendation is feeding on demand, other authors report worse results in their countries (32.3% recommend limitation in the US⁽¹⁶⁾ or 88.2% in Canada); in Spain, the result is worse compared with a similar question asked in 2003⁽¹⁸⁾, when only 18.8% defended limiting feeds. 36% percent of residents are not aware of the greater morbidity and mortality associated to formula-based feeding (26% in the US⁽²⁸⁾, 29.9% in Canada⁽¹⁴⁾). Only 60% of residents in pediatrics recognize a breastfeeding crisis and would give adequate advice (question 17); and faced with a child who is not gaining the expected weight without other signs of sickness (question 11), 20% would prescribe formula as the first course of action (64% would do so in Canada⁽¹⁴⁾). To summarize, residents have a better domain of the theoretical aspects than the practical ones. On another note, it is worrying that an important number of residents with insufficient knowledge feel confident about their competences.

We have assessed the knowledge about breastfeeding in a representative sample of the medical residents in Pediatrics in Spain, using a validated tool⁽²⁰⁾. The global response rate can be considered good⁽²⁹⁾ (details on the response rates per hospital can be found in the appendix) and superior to similar studies^(14,15,16).

One of the limitations of the study is that attitudes and communicative abilities were not assessed, reported by other authors as relevant aspects⁽¹⁷⁾. It may be interesting to include them in future assessments. Another limitation is that residents from hospitals in phases 2D or 3D were not surveyed. It should be taken into account in new studies, maybe having more strata.

Residents in Pediatrics in Spain are better trained today than a few years ago and probably better than their American or Canadian peers although there are important areas for improvement, particularly regarding practical issues and the International Code of Marketing of Breast-milk Substitutes and the risk of feeding with substitutes. It is worrying that even those with the worst training may see themselves as prepared. All this considered, along with the great disparity in training in different hospitals, shows the need for establishing a regulated breastfeeding training program, with minimum standards within the residency in pediatrics training program.

BF designation appears to have a positive influence in the training of future pediatricians, therefore reinforcing the advancement and support towards this initiative.

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BIBLIOGRAPHY

1. Hansen K. Breastfeeding: a smart investment in people and in economies. *Lancet Lond Engl* 2016;387(10017):416.
2. Bartick MC, Schwarz EB, Green BD, Jegier BJ, Reinhold AG, Colaizy TT et al. Suboptimal breastfeeding in the United States: Maternal and pediatric health outcomes and costs. *Matern Child Nutr* 2017;13(1).
3. World Health Organization, UNICEF. Global Nutrition Targets 2025: Breastfeeding policy brief [Internet]. 2014; Available from: https://www.who.int/nutrition/publications/globaltargets2025_policybrief_breastfeeding/en/.
4. Instituto Nacional de Estadística. Encuesta Nacional de Salud 2017 [Internet]. 2018 [citado 2019 ene 17]; Available from: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176783&menu=resultado&secc=1254736195650&idp=1254735573175.
5. Rollins NC, Bhandari N, Hajeerbhoy N, Horton S, Lutter CK, Martinez JC et al. Why invest, and what it will take to improve breastfeeding practices? *Lancet Lond Engl* 2016;387(10017):491-504.
6. Grupo de trabajo de la Guía de Práctica Clínica sobre lactancia materna. Guía de Práctica Clínica sobre Lactancia Materna [Internet]. Vitoria: Servicio Central de Publicaciones del Gobierno Vasco, Ministerio de Sanidad, Servicios Sociales e Igualdad; 2017. Available from: <http://www.guiasalud.es/egpc/lactancia/completa/index.html>.
7. Feltner C, Weber RP, Stuebe A, Grodensky CA, Orr C, Viswanathan M. Breastfeeding Programs and Policies, Breastfeeding Uptake, and Maternal Health Outcomes in Developed Countries [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2018 [citado 2019 ene 18]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK525106/>.
8. World Health Organization. Implementation guidance: protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services – the revised Baby-friendly Hospital Initiative [Internet]. Geneva: WHO Document Production Service; 2018. Available from: <http://www.who.int/nutrition/publications/infantfeeding/bfhi-implementation-2018.pdf>.
9. Hernández-Aguilar MT, Lasarte-Velillas JJ, Martín-Calama J, Flores-Antón B, Borja-Herrero C, García-Franco M et al. The Baby-Friendly Initiative in Spain: A Challenging Pathway. *J Hum Lact Off J Int Lact Consult Assoc* 2014;30(3):276-82.
10. Holmes AV, McLeod AY, Thesing C, Kramer S, Howard CR. Physician breastfeeding education leads to practice changes and improved clinical outcomes. *Breastfeed Med Off J Acad Breastfeed Med* 2012;7(6):403-8.
11. Handa D, Schanler RJ. Role of the pediatrician in breastfeeding management. *Pediatr Clin North Am* 2013;60(1):1-10.
12. Grawey AE, Marinelli KA, Holmes AV, Academy of Breastfeeding Medicine. ABM Clinical Protocol #14: Breastfeeding-friendly physician's office: optimizing care for infants and children, revised 2013. *Breastfeed Med Off J Acad Breastfeed Med* 2013;8:237-42.
13. Smale M, Renfrew MJ, Marshall JL, Spiby H. Turning policy into practice: more difficult than it seems. The case of breastfeeding education. *Matern Child Nutr* 2006;2(2):103-13.
14. Pound CM, Williams K, Grenon R, Aglipay M, Plint AC. Breastfeeding Knowledge, Confidence, Beliefs, and Attitudes of Canadian Physicians. *J Hum Lact Off J Int Lact Consult Assoc* 2014;30(3):298-309.
15. Esselmont E, Moreau K, Aglipay M, Pound CM. Residents' breastfeeding knowledge, comfort, practices, and perceptions: results of the Breastfeeding Resident Education Study (BREST). *BMC Pediatr* 2018;18(1):170.
16. Feldman-Winter LB, Schanler RJ, O'Connor KG, Lawrence RA. Pediatricians and the promotion and support of breastfeeding. *Arch Pediatr Adolesc Med* 2008;162(12):1142-9.

17. Meek JY. Pediatrician Competency in Breastfeeding Support Has Room for Improvement. *Pediatrics* 2017;140(4).
18. Temboury Molina MC. [Knowledge of breastfeeding management among residents in pediatrics]. *An Pediatr Barc Spain* 2003;58(3):263-7.
19. Pallás Alonso CR. [Breastfeeding in Spain. A commitment by everyone]. *An Pediatr Barc Spain* 2003;58(3):263-7.
20. Gómez Fernández-Vegue M, Menéndez Orega M. Development And Validation Of A Breastfeeding Knowledge And Skills Questionnaire. *An Pediatr Barc Spain* 2003;58(3):263-7.
21. Sánchez-Fernández J, Muñoz-Leiva F, Montoro-Ríos FJ. Improving retention rate and response quality in Web-based surveys. *Comput Hum Behav [Internet]* 2012 [citado 2018 ago 20];28(2):507-14. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0747563211002408>.
22. Asociación Española de Lactancia Materna. Material complementario a la encuesta nacional de conocimientos en lactancia materna en residentes de Pediatría [Internet]. 2019 [citado 2019 mar 18]; Available from: <http://www.aelama.org/investigacion/conocimientos-en-profesionales/encuesta-nacional2016/>.
23. R Core Team. R: A Language and Environment for Statistical Computing [Internet]. Vienna, Austria: R Foundation for Statistical Computing; 2015. Available from: <http://www.R-project.org>.
24. Feldman-Winter L, Barone L, Milcarek B, Hunter K, Meek J, Morton J et al. Residency curriculum improves breastfeeding care. *Pediatrics* 2010;126(2):289-97.
25. Feldman-Winter L, Szucs K, Milano A, Gottschlich E, Sisk B, Schanler RJ. National Trends in Pediatricians' Practices and Attitudes About Breastfeeding: 1995 to 2014. *Pediatrics* 2017;140(4).
26. Lasarte Velillas JJ, Hernández-Aguilar M-T, Pallás Alonso CR, Díaz-Gómez NM, Gómez Papi A, Fernández Espuelas C, et al. A breastfeeding e-learning project based on a web forum. *Breastfeed Med Off J Acad Breastfeed Med* 2007;2(4):219-28.
27. Brodribb W, Fallon A, Jackson C, Hegney D. The relationship between personal breastfeeding experience and the breastfeeding attitudes, knowledge, confidence and effectiveness of Australian GP registrars. *Matern Child Nutr* 2008;4(4):264-74.
28. Schanler RJ, O'Connor KG, Lawrence RA. Pediatricians' practices and attitudes regarding breastfeeding promotion. *Pediatrics* 1999;103(3):E35.
29. Marchis GD. La validez externa de las encuestas en la web. Amenazas y su control. *Estud Sobre El Mensaje Periodis [Internet]* 2012 [citado 2018 ago 20];(18):263-72. Available from: <https://dialnet.unirioja.es/servlet/articulo?codigo=4213921>.