Original Article

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DEVELOPMENTAL CARE OF PREMATURE NEWBORNS: STUDY ON PRACTICES IN PORTUGUESE NEONATAL UNITS

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ABSTRACT

Objective: the present and future well-being of hospitalized newborns and their parents are connected to analyze the application frequency of the central practices of developmental care to premature newborns in Portuguese neonatal care units and to identify their relationship with organizational variables.
Method: cross-sectional, descriptive-correlational study. Using a non-probabilistic network sampling technique, a sample of 217 nurses from Portuguese neonatal units who answered the Quantum Caring Practice Self-Assessment online questionnaire was obtained, previously translated and validated for Portuguese nurses.
Results: the results revealed that for 65.4% of nurses, Developmental Care practices are sometimes performed and 14.3% consider that they are rarely performed. Only 18.9% of the nurses in the study consider that these practices are performed frequently. The most frequent practices were those related to the therapeutic environment and prevention of pain and stress. The least frequent was positioning and skin care. The results also showed that the frequency of developmental care practices differs depending on the geographical location of the units and is higher in units with a higher level of treatment differentiation and that have established a specific program/protocol of developmental care.
Conclusion: although feasible, Developmental Care practices are not performed consistently in Portuguese neonatal care units. A global change in team culture, more training, implementation of protocols and organizational investment in this area is needed.

DESCRIPTORS: Nursing. Neonatal Intensive Care Units. Premature newborn. Child development. Neonatology.

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CUIDADOS CENTRADOS NO DESENVOLVIMENTO DO RECÉM-NASCIDO PREMATURO: ESTUDO SOBRE AS PRÁTICAS EM UNIDADES NEONATAIS PORTUGUESAS

RESUMO

Objetivo: analisar a frequência da aplicação das medidas centrais dos cuidados desenvolvimentais ao recém-nascido prematuro em unidades de cuidados neonatais portuguesas e identificar a sua relação com variáveis organizacionais.
Método: estudo transversal, descritivo-correlacional. Utilizando técnica de amostragem não probabilística em rede, foi obtida uma amostra de 217 enfermeiros de unidades neonatais portuguesas que responderam online ao questionário *Quantum Caring Practice Self-Assessment*, traduzido e validado para enfermeiros portugueses.
Resultados: os resultados revelaram que para 65,4% dos enfermeiros as práticas de cuidados centrados no desenvolvimento são realizadas às vezes e 14,3% consideram que *raramente* são realizadas. Somente 18,9% dos enfermeiros inquiridos consideram que essas práticas são realizadas frequentemente. Destacaram-se como práticas mais frequentes, as ligadas ao Ambiente terapêutico e Prevenção da dor e stress. As menos frequentes foram as medidas de Posicionamento e Cuidados à pele. Os resultados demonstraram ainda que a frequência das práticas de cuidados desenvolvimentais difere consoante a localização geográfica das unidades e é mais elevada nas unidades com maior nível de diferenciação de cuidados e que têm instituído um programa/protocolo específico de cuidados desenvolvimentais.
Conclusão: as práticas de cuidados centrados no desenvolvimento não são realizadas de forma consistente nas unidades de cuidados neonatais portuguesas, apesar de serem exequíveis. É necessária uma mudança global na cultura das equipas, mais formação, implementação de protocolos e investimento organizacional nesta área.

DESCRITORES: Enfermagem. Unidades de Terapia Intensiva Neonatal. Recém-nascido prematuro. Desenvolvimento Infantil. Neonatologia.

ATENCIÓN DEL DESARROLLO DEL RECIÉN NACIDO PREMATURO: ESTUDIO SOBRE LAS PRÁCTICAS EN UNIDADES NEONATALES PORTUGUESAS

RESUMEN

Objetivo: analizar la frecuencia de aplicación de las medidas centrales de atención del desarrollo a los recién nacidos prematuros en las unidades de atención neonatal portuguesas e identificar su relación con las variables organizacionales.
Método: estudio transversal, descriptivo-correlacional. Utilizando una técnica de muestreo en red no probabilística, se obtuvo una muestra de 217 enfermeros de unidades neonatales portuguesas que respondieron el cuestionario en línea Quantum Caring Practice Self-Assessment, traducido y validado para enfermeros portugueses.
Resultados: los resultados revelaron que el 65,4% de los enfermeros a veces realizan prácticas de cuidado centradas en el desarrollo y el 14,3% considera que rara vez se realizan. Sólo el 18,9% de los enfermeros del estudio considera que estas prácticas se realizan con frecuencia. Las prácticas más frecuentes fueron las relacionadas con el ambiente terapéutico y la prevención del dolor y el estrés. Las menos frecuentes fueron las medidas de Posicionamiento y Cuidado de la Piel. Los resultados también mostraron que la frecuencia de las prácticas de atención del desarrollo difiere según la ubicación geográfica de las unidades y es mayor en las unidades con un mayor nivel de diferenciación de tratamiento y que se ha establecido un programa/protocolo específico de atención del desarrollo.
Conclusión: as prácticas de atención centradas en el desarrollo no se realizan de manera consistente en las unidades de atención neonatal portuguesas, aunque son factibles. Se necesita un cambio global en la cultura de equipo, más capacitación, implementación de protocolos e inversión organizacional en esta área.

DESCRIPTORES: Enfermería. Unidades de Cuidados Intensivos Neonatales. Recién nacido prematuro. Desarrollo infantil. Neonatología.

INTRODUCTION

On a global scale, prematurity is a relevant phenomenon in the assessment of perinatal health indicators. 15 million premature babies are born each year, i.e. 1 in 10 babies are born prematurely. Despite advances in neonatal care, prematurity is still associated with a high risk of neurodevelopmental impairment (motor, sensorineural, cognitive and/or behavioral sequelae), thus team work in the neonatal intensive care units (NICU) is imperative to minimize the complications of prematurity and help families to adapt to the reality[1–3].

Away from maternal endogenous stimuli, the premature newborn (PNB) is subject to the intensive care environment with its sensory stimuli overload, influencing the central nervous system development and, therefore, in need of specialized perinatal care[4]. Even the PNB with "no complications" are children at increased risk of learning difficulties, attention deficit and hyperactivity, visual/auditory alterations, language disorders, emotional/behavioral disorders and low self-esteem[2,5].

The existing evidence on the interaction between environment and brain development has been extensively studied, and best practices in neonatal care have been reviewed and encouraged[1,3,6]. It is in this context that "Developmental-Care" (DC) gains more prominence, resulting in systematized practices, promoting the child's neurological development, appropriate to the individual needs of each PNB/family.

Care should be based on prevention, not only in terms of physical health but also on mental health, therefore, strategies that preserve mental well-being and prevent pathologies associated with early life trauma are required[2].

The implementation of early intervention programs in the neonatal period, focused on child development, is justified by its benefits, both for PNB (improvement of physiological parameters, better behavioral, neurological and clinical responses), and for the family (better perception of their parental skills; lower stress levels), and for professionals (greater sensitivity to environmental stimuli and better performance in care provision)[2,4].

DC practices have already been developed in many NICUs. However, these practices are often inconsistent and unsupported from the point of view of their design, and there is a need to define them as DCs, and to operationalize them by means of guidelines[1–2,7]. In addition, the scarcity of professionals sensitized to a systematic practice of such care suggests the need for more team training[1–2,7].

The Universe of Developmental Care (UDC) model, based on the Synactive Theory of Development, provides a new framework for evidence-based developmental care practices[2,8–9]. The model highlights five core practices for organized care centers, responding to the holistic needs of the PNB-Family dyad in its interaction with the environment:

1. Therapeutic environment, which includes the physical, human and organizational environment, which influence the quality and consistency of care;

2. Prevention, evaluation and management of pain and stress, given the vulnerability of the PNB to pain and stress and their implications to the physical, psychological and behavioral levels;

3. Sleep protection, as sleep plays a critical role in synactive development, learning and memory;

4. Age-appropriate activities of daily living, which include support for positioning, feeding of newborns and skin care because these activities affect physiological variables, sleep, functional mobility of joints, sensory processing and neurodevelopment of the PNB;

5. Family-centered care, given that the role of the family in the life of the newborn is irreplaceable and has an impact, in the short and long term, on the physiological and psycho-emotional events of the same.

The existence of several international studies on the consistency of developmental care practices in NICU[3,7,9–12], evaluated, in particular, through the perception of professionals about these

practices, motivated the need to know the phenomenon in the Portuguese reality. Thus, the objectives of the study are: 1) to analyze the application frequency of the Developmental Care (DC) practices to PNBs in Portuguese NICUs of the National Health Service (NHS); and 2) to identify the existence of relationships between the application frequency of these practices and some organizational characteristics of the NICU.

METHOD

To achieve the objectives of the study, a descriptive-correlational study was conceived, approved by the Ethics Committee of the Research Unit in Health Sciences - Nursing (UICISA-E) of the Higher School of Nursing of Coimbra.

The scenario was defined as the set of 43 NICUs of the maternal and child referral network of the National Health Service, existing at the time of the study, as these represent almost all NICU beds in the country. The target population consisted of nurses working in these units (n=953),who were invited by means of fixed advertisement on the Order of Nurses (OE) website, to participate in the study by filling out an online questionnaire on the Google forms platform, available for three months. A sample of 217 nurses (22.3%) was found using this non-probabilistic network sampling technique, between November 4, 2016 and January 6, 2017.

The application frequency of the Developmental Care (DC) practices to the PNB, from the perspective of nurses, was measured through the Quantum Caring Practice Self-Assessment scale"[2]. The original scale consists of 73 items, grouped into five dimensions: D1. Therapeutic environment [items 1-15]; D2. Prevention, evaluation and management of pain and stress [items 16-25]; D3. Sleep protection [items 26-35]; D4. Age-appropriate activities of daily living, which are divided into subdimensions SD1. Positioning, SD2. Power and SD3. Skin care [items 36-59]; D5. Family-centered care [items 60-73].

In order to carry out this study, the scale was translated and subjected to content validation by a panel of neonatal nursing experts, with proper authorization from the author. The application references of the Quantum Caring Practice Self-Assessment scale were, at the time of study, limited to the books and the program designed by the author[2,10], and there were no publications of their use in different contexts. This is a 5-point Likert scale (0-4), which corresponds to the frequency perceived by the respondent for each item: Never (0); Occasionally (1); Sometimes (2); Often (3); Always (4). The possibility "I don't know or does not apply" ("I don't know or N/A" is also admitted, and in this case no score is awarded. The internal consistency of the Portuguese version of the scale and its subdimensions was analyzed, verifying a high internal consistency (α-*Cronbach*=0.964), after a D5 dimension item was removed; Family-centered care. In order to maintain compliance between the analysis of the results and the conceptual framework, it was considered that the "desirable/recommended frequency" of the application of the Developmental Care (DC) practices to the PNB for the NICU corresponded to the score ≥ to 3.

The independent variables considered were characteristics of the NICU that could be related to the application frequency of the Developmental Care (DC) practices to the PNB, namely the geographical location area of the NICU (North, Center, Lisbon and Tagus Valley, South and Autonomous Regions), the dimension of the NICU (number of beds ≤10/>10), the level of differentiation of the NICU (invasive ventilation Yes/No) and the existence of a DC program (No program/with NIDCAP/with another DC program).

Demographic and professional variables of the participants (age; gender; academic degree; specialized training; and time of professional practice in NICU) were also included.

All data was collected through the questionnaire created on Google forms. The online questionnaire consisted of three parts: the first questioned about the demographic and professional data of the respondents, the geographic location region of the NICU, the number of beds in the NICU, the performance of invasive ventilation, and the existence of a specific DC program/protocol; the second corresponded to the Quantum Caring Practice Self-Assessment;[2] the third and final was an open question, aimed at identifying barriers to the daily practice of care focused on the development of PNB. A pilot test of the questionnaire was performed on three neonatology nurses and two neonatal nursing professors, with an interview after completion, which allowed to assess clarity, make small graphic corrections and, simultaneously, verify the time required for its total completion.

The link to the questionnaire, only available on the OE website, opened with information about the study and the type of participation requested, including a request for informed consent, mandatory for the nurse to have access to fill out the questionnaire. Confidentiality of the answers was guaranteed, as well as the anonymity of the nurses interviewed. Only the main investigators had access to the data and the same were destroyed after analysis and interpretation.

During the three months of data collection, the study was disseminated through telephone contacts, social networks, groups, forums and websites directly or indirectly linked to nursing and neonatal care. Thus, the objective was to obtain a high number of participants to ensure valid results.

Statistical data analysis was performed using the Statistical Package for Social Sciences 24.0 (SPSS) program. The dependent variable was analyzed for each dimension and sub-dimension of the scale, as well as in the total, and the respective score was determined corresponding to the arithmetic mean of the non-missing items. This average by dimension, sub-dimension and total was only calculated for cases in which valid responses were obtained for at least 80% of the respective items, which explains the different sample numbers in the presentation of the results.

Taking into account the nature of the variables and that the assumption of distribution normality can only be assumed in three dimensions/subdimensions of the dependent variable (Kolmogorov-Smirnov: $p>0.05$), the research hypotheses were tested using the nonparametric Kruskal-Wallis and Mann-Whitney tests, for a significance level of 5%.

RESULTS

The group of participants consisted mostly of women (91.7%), whose mean age was 38±8.6, minimum age of 21 and maximum of 62 years. Just over half of the respondents had more than 10 years of professional experience in the NICU (53.5%). Only 15.2% of the nurses stated that they had less than three years of experience. Table 1 shows the distribution of participants according to the characteristics of the NICU where they work (number of beds, invasive ventilation and existence of DC program). The predominance of responses from nurses working in NICU with more than 10 beds and invasive ventilation is common, i.e., larger and more differentiated units.

Frequency of implementation of Developmental Care (DC) practices

Data analysis indicates that 65.4% of the nurses studied reported that the of Developmental Care (DC) practices to the PNB are sometimes performed and only 18.9% report frequent application. In the perception of 14.3% of nurses, these practices are rarely performed. The percentages for a more frequent practice of DC are found in the Therapeutic environment and prevention, assessment and management of pain and stress practices. It is in these dimensions that the means closest to the score of 3 are identified, corresponding to a frequent practice of DC. However, in the prevention, evaluation and management of pain and stress, a significant standard deviation of 0.71 is highlighted (Table 2).

Table 1 - Distribution of participants (n=217) by Neonatal Intensive Care Units, depending on geographic region and characteristics of the same. Portugal, 2017.

UTIN*		Geographic Region											
		Center		Lisbon and Tagus Valley		North		Autonomous Regions		On		Total	
		n	% region	n	% region	n	% region	n	% region	n	% region	n	% total
Number of Beds	≤10 beds	33	47.1	16	24.2	15	39.5	8	33.3	8	42.1	80	36.9
	>10 beds	37	52.9	50	75.8	23	60.5	16	66.7	11	57.9	137	63.1
Invasive Ventilation	Yes	52	74.3	64	97	31	81.6	24	100	15	78.9	186	85.7
	No	18	25.7	2	3	7	18.4	–	–	4	21.1	31	14.3
DC program†	Without	52	74.3	44	66.7	21	55.3	9	37.5	7	36.8	133	61.3
	NIDCAP‡	5	7.1	5	7.6	12	31.6	1	4.2	9	47.4	32	14.7
	Other	13	18.6	17	25.8	5	13.2	14	58.3	3	15.8	52	24

*Neonatal Intensive Care Units; †Developmental Care; ‡Newborn Individualized Developmental Care and Assessment Program

Table 2 - Statistics-summary of the application frequency of Developmental Care (DC) Practices in Portuguesa Neonatal Intensive Care Units. Portugal, 2017. (n=217)

Central Practices of DC*	Md.	$\bar{x}$	s	Min.	Max.
D†1. Therapeutic environment	2.76	2.76	0.53	0.80	3.80
D†2. Prevention, assessment and management of pain and stress	2.70	2.64	0.71	0.60	4.00
D†3. Sleep Protection	2.40	2.33	0.62	0.20	3.60
D†4. Age-appropriate activities of daily living	2.35	2.31	0.62	0.71	3.68
SD‡1. Positioning	2.10	2.08	0.73	0.10	3.60
SD‡2. Feeding	2.59	2.59	0.65	0.50	4.00
SD‡3. Skin care	2.33	2.29	0.85	0.33	4.00
D†5. Family-centered care	2.54	2.52	0.51	0.38	3.69
Total	2.52	2.49	0.52	0.67	3.58

*Developmental Care; †Dimension; ‡Sub-dimension

The lowest mean frequency was found in positioning, with a high standard deviation (0.73) and also with the lowest minimum and maximum values. Next, Skin Care, also with a high standard deviation (0.83) and Sleep Protection, which also recorded very low minimum and maximum values.

Family-Centered Care (FCC) and Sleep Protection are the central practices that most often apply in the NICU (67.3% and 59.9%, respectively). However, their practice is only often or always assumed to 18.0% in FCC and 14.3% in Sleep Protection.

Through the descriptive analysis carried out item by item, it was possible to identify the most and least frequently performed practices.

Regarding practices performed frequently or always (average score ≥3), in D1. Therapeutic Environment, the eyes of the PNB are protected from direct light; the exposure of the PNB to harmful odors is managed; positive olfactory and gustatory experiences are provided to the PNB; the PNB is positioned slowly and carefully; care adapted to gestational age or developmental support is provided; the team complies with the hand hygiene protocol and responds promptly to the PNB´s alarms and crying, regardless of whether it is assigned to that PNB or not. In D2, Prevention, evaluation and management of pain and stress, all painful and stressful procedures are managed effectively and a validated and age-appropriate pain assessment scale of the PNB is used. In D3. Sleep protection, skin-to-skin contact (kangaroo method) is an integrated practice in daily care for newborns who do not present contraindications and parents are instructed on the importance of safe sleep protocols in the hospital and at home. In SD1. Positioning, newborns are positioned in flexion, with postural containment and alignment. In SD2. Feeding, breast milk is recommended for all newborns hospitalized in the NICU and bottle feeding is interrupted when the PNB is no longer involved in this activity safely, regardless of the volume ingested. In SD3. Skin care, dressings are removed gently to minimize skin injury and no solutions that contain toxic chemicals are applied. In D5. Family-Centered Care, parents are invited and encouraged to be present during the procedures; parents are expected to be able to care for their child in the NICU; parents are taught, instructed and trained to provide care to their child in the NICU; parents are considered visitors; and the presence of parents in the NICU is recorded.

As practices that occur occasionally or never (average score< 2), are highlighted in D1. Therapeutic Environment, the protection of the privacy of parents with the PNB and the accountability of team members for the provision of DC. In D2, Prevention, assessment and management of pain and stress, the recording of non-pharmacological interventions and the use of the kangaroo method to manage pain. In D3, Sleep Protection, the parents of newborns make a sleep diary and practice their child's sleeping routines before discharge; and the team periodically participates in in-service training on sleep safety. In SD1, Positioning, the PNBs are contained (placed in swaddling) for weight monitoring and bathing; the recommendation for newborns to be held using the kangaroo method is discussed daily in the nurse handover; and the team periodically does in-service training on the kangaroo method, including the recommended PNB transfer technique. In SD2, the team periodically receives training on signs of readiness of the PNB to start oral feeding. In SD3, Skin care, the skin and mucous membranes integrity is evaluated at least once a day using a validated scale appropriate to age, and colostrum and/or breast milk is used for the mouth care of newborns who are not being fed orally. In D5, Family-centered care, parents participate in nursing handovers; parents have access to family support groups or peer support groups; culturally sensitive parenting resources are available in the NICU; and the team is trained in service on cultural sensitivity for needs arising from the socio-demographic characteristics of the population covered by the NICU.

Application frequency of Developmental Care (DC) practices to PNB and NICU characteristics

Table 3 shows the application frequency of the practices according to the characteristics of the NICU.

Table 3 - Application frequency of Developmental Care (DC) practices according to the geographical location area of the Neonatal Intensive Care Unit, the number of beds, invasive ventilation and the existence of a specific Developmental Care (DC) program/protocol. Portugal, 2017. (n=217)

Central Practices of DC† (Dimensions and Subdimensions)		USIN Geographical Location‡						Number of NICU beds‡			Invasive ventilation in the NICU‡			DC program†			
		Center	Lisbon and Tagus Valley	North	Autonomous Regions	On	Test Kruskal-Wallis	≤10 beds	>10 beds	Mann-Whitney Test	No	Yes	Mann-Whitney Test	Without	NIDCAP§	Other	Kruskal-Wallis Test
D‖ 1. Therapeutic environment	n	70	66	36	23	19		78	136		30	184		130	32	52	
	Md	2.62	2.73	2.90	3.13	3.00	X^2=13.085 p=0.011*	2.70	2.83	U=4189.0 p=0.011*	2.60	2.80	U=2110.00 p=0.039*	2.60	3.10	3.10	X^2=44.14 p=0.000*
	$\bar{x}$	2.66	2.72	2.82	3.07	2.81		2.62	2.85		2.61	2.79		2.58	3.03	3.07	
	s	0.48	0.57	0.48	0.42	0.66		0.59	0.48		0.48	0.54		0.52	0.37	0.42	
D‖ 2. Prevention, assessment and management of pain and stress	n	70	66	3.8	24	19		80	137		31	186		133	32	52	
	Md	2.50	2.80	2.60	3.30	2.50	X^2=22.100 p=0.000*	2.65	2.80	U=4550.0 p=0.037*	2.60	2.80	U=2292.50 p=0.068	2.50	2.84	3.25	X^2=46.76 p=0.000*
	$\bar{x}$	2.46	2.68	2.61	3.20	2.54		2.49	2.73		2.45	2.67		2.39	2.89	3.12	
	s	0.72	0.72	0.71	0.48	0.61		0.73	0.69		0.59	0.73		0.69	0.47	0.59	
D‖ 3. Sleep protection	n	69	66	38	24	18		79	136		30	185		132	31	52	
	Md	2.30	2.40	2.25	2.70	2.60	X^2=5.925 p=0.205	2.20	2.50	U=3560.0 p=0.000*	2.22	2.40	U=2218.00 p=0.078	2.20	2.70	2.84	X^2=47.25 p=0.000*
	$\bar{x}$	2.29	2.39	2.21	2.49	2.33		2.07	2.48		2.19	2.35		2.11	2.64	2.72	
	s	0.518	0.67	0.60	0.65	0.75		0.68	0.52		0.44	0.64		0.59	0.50	0.48	
D‖ 4. Age-appropriate activities of daily living	n	67	65	37	24	19		77	135		29	183		129	32	51	
	Md	2.04	2.50	2.50	2.40	2.46	X^2=14.027 p=0.007*	2.08	2.46	U=3431.0 p=0.000*	2.15	2.37	U=2157.00 p=0.106	2.12	2.68	2.71	X^2=46.15 p=0.000*
	$\bar{x}$	2.10	2.41	2.41	2.33	2.42		2.07	2.44		2.13	2.33		2.07	2.63	2.69	
	s	0.59	0.62	0.66	0.52	0.62		0.61	0.58		0.53	0.63		0.54	0.47	0.61	
SD¶1. Positioning	n	69	65	37	24	19		77	137		30	184		130	32	52	
	Md	1.70	2.30	2.25	2.30	2.70	X^2=19.250 p=0.001*	1.62	2.30	ln=2918.0 p=0.000*	1.61	2.20	ln=1743.00 p=0.001*	1.72	2.68	2.70	X^2 =62.13 p=0.000*
	$\bar{x}$	1.79	2.20	2.17	2.29	2.32		1.71	2.29		1.69	2.15		1.77	2.57	2.56	
	s	0.65	0.71	0.75	0.65	0.88		0.72	0.65		0.57	0.74		0.64	0.56	0.62	
SD¶2.Feeding	n	66	64	37	24	17		75	133		27	181		127	31	50	
	Md	2.50	2.73	2.75	2.37	2.50	X^2=7.027 p=0.134	2.57	2.62	U=4619.5 p=0.377	2.75	2.50	U=2003.00 p=0.130	2.50	2.57	2.94	X^2=13.41 p=0.001*
	$\bar{x}$	2.54	2.66	2.75	2.36	2.54		2.53	2.63		2.78	2.56		2.48	2.60	2.88	
	s	0.60	0.67	0.71	0.54	0.71		0.70	0.62		0.59	0.65		0.62	0.58	0.68	
SD¶3.Skin care	n	67	65	32	21	17		74	128		25	177		126	30	46	
	Md	1.83	2.50	2.50	2.33	2.33	X^2=8.093 p=0.088	2.00	2.50	U=3604.0 p=0.005*	1.67	2.33	U=1735.50 p=0.081	1.83	2.67	2.67	X^2=29.53 p=0.000*
	$\bar{x}$	2.07	2.44	2.39	2.34	2.42		2.08	2.42		2.03	2.33		2.05	2.74	2.70	
	s	0.93	0.78	0.94	0.72	0.59		0.85	0.82		0.92	0.83		0.82	0.57	0.83	
D‖ 5. Family-Centered Care	n	67	65	34	23	19		78	130		29	179		129	30	49	
	Md	2.38	2.69	2.54	2.61	2.25	X^2=8.093 p=0.088	2.32	2.64	U=3105.5 p=0.000*	2.18	2.54	U=1790.50 p=0.007*	2.38	2.66	2.85	X^2=35.57 p=0.000*
	$\bar{x}$	2.39	2.61	2.59	2.66	2.33		2.31	2.64		2.30	2.55		2.36	2.69	2,83	
	s	0.46	0.55	0.46	0.32	0.64		0.51	0.46		0.44	0.51		0.48	0.41	0.44	
Total	n	69	66	37	24	19		79	136		31	184		132	32	51	
	Md	2.31	2.53	2.64	2.69	2.67	X^2=13.499 p=0.009*	2.37	2.61	U=3590.0 p=0.000*	2.36	2.55	U=3590.00 p=0.000*	2.32	2.80	2.94	X^2=58.85 p=0.000*
	$\bar{x}$	2.35	2.55	2.54	2.68	2.49		2.29	2.61		2.33	2.52		2.28	2.77	2.86	
	s	0.48	0.55	0.51	0.39	0.59		0.52	0.48		0.39	0.53		0.46	0.35	0.44	

* p-0.05; †Developmental-Focused Care; ‡Neonatal Intensive Care Units; §Newborn Individualized Developmental Care and Assessment Program; ‖ Dimension; ¶Subdimension

The results show that, considering the entire scale, there is a statistically significant difference in the application frequency of the Developmental Care (DC) practices to the PNB, depending on the geographical location area of the NICU (^{K2}=13.50, p-0.05), however the application frequency is low in all. In the analysis by dimension and subdimension, this difference is only statistically significant in Therapeutic environment; Prevention, evaluation and management of pain and stress; Age-appropriate activities of daily living; and Positioning. The dimensions Therapeutic environment and prevention, evaluation and management of pain and stress obtained the highest average frequencies in the Autonomous Regions. The Center region is the only one that has a frequency less than 2, although only in the Positioning subdimension.

The application frequency of Developmental Care (DC) practices in NICU with a number of beds greater than 10 (Md=2.61) was significantly higher than in the NICU with a number of beds equal to or less than 10 (Md=2.37), U=3590; p-0.001. With the exception of food-related practices in each of the remaining dimensions and subdimensions, a significantly higher application frequency of Developmental Care (DC) practices was found in the NICU with a number of beds >10 (p-0.05).

Regarding the difference between the NICU where invasive ventilation is performed and those where invasive ventilation is not performed, it was found that the application frequency of Developmental Care (DC) practices was significantly higher in those NICU where invasive ventilation is performed (Md=2.55) compared to those where it is not performed (Md=2.36), U=3590; p<0.001.

Finally, as was the case for each of the dimensions and sub-dimensions, the total application frequency of Developmental Care (DC) practices to the PNB was significantly different between the units, depending on whether or not a specific DC program/protocol had been instituted, being higher in those where it was instituted, ^{K2}= 58.85, p<0.001.

DISCUSSION

This study gave an overview of the DC performance in Portuguese NICUs and to relate it with some characteristics of the NICU. In accordance with the conceptual framework and the author of the scale, it was considered that the application of the Developmental Care (DC) practices was desirable or recommended, when it occurred frequently or always.

Like other international studies that report inconsistent DC practices[3,7,9–12], it is verified in Portugal that these are performed, but their frequency is generally low. In addition, there was an inconsistency in these practices, because some practices are used frequently or always, and others are rarely or only sometimes, not finding a uniform standard. However, the fact that some practices are often or always implemented meant that such practices are feasible. The inconsistency is also confirmed because there are practices in the same dimension with very different application frequencies and with a high standard deviation.

Despite still remaining a complex challenge in neonatal care, the practices of Therapeutic environment and Prevention, Assessment and Management of Pain and Stress are those that already translate more systematic and consistent practices in the set of NICUs, albeit with great variability. However, Positioning and Skin Care turned out to be largely neglected areas.

Looking at each of the dimensions and subdimensions, the Therapeutic Environment is a central practice that provides neuroprotection to the PNB, demonstrates respect for human dignity and offers socio-emotional support through the promotion of the continuous presence of the family. Given the growing body of evidence on the epigenetic vulnerability of PNB and the adversities suffered throughout their lives, the provision of holistic and humanistic care in the NICU cannot be optional[13] and should be contemplated in the process of professional performance evaluation[14]. However, the nurses studied here report that they are rarely held responsible for providing developmental support care.

In the dimension Prevention, Evaluation and Management of Pain and Stress, we found frequent use of validated and age-appropriate pain assessment scales, as well as the effective management of all painful and stressful procedures, as indicated in the literature[10,15]. Even so, the high standard deviation obtained in this dimension indicates the great variability of these practices. If the kangaroo method is a practice often integrated in daily care in the central practices Therapeutic environment and Sleep protection, its use as a non-pharmacological intervention to manage pain during procedures occurs rarely, contradicting the evidence on its effect in reducing responses to pain[16–18]. An accurate record of non-pharmacological pain/stress control interventions is also rare. Despite evidence-based recommendations on the efficacy of using various non-pharmacological and pharmacological interventions to prevent and treat neonatal pain, other research also points to inconsistent clinical practice[2]. Multidisciplinary collaboration, parental presence, pain management protocols and integrated education and auditing approaches deserve to be the target of investment, as they have been associated with more consistent evidence-based care strategies[19–20].

Care practices related to the central Sleep Protection practice are inconsistent. A frequent practice of parents' instruction on the importance of safe sleep in the hospital and at home is positively highlighted. However, it is very important that nurses promote parental skills in their child's sleep routines before discharge, instructing and training on the sleep-wake state and individualized sleep pattern of the NB[2,21]. Nurses require more training on sleep safety, as they are crucial in monitoring the adoption of practices and role modeling, endorsing safe practices for NB sleep which are supported by evidence[2,22].

As for the Positioning of the NB, although this is often performed in flexion, with restraint and postural alignment, emerging needs for neonatal intervention in this area were explicit. Contrary to best practice evidence[10,23–24], newborns are rarely held in swaddling for weight monitoring or bathing. There is inconsistency in the orientation of the head and neck of the NB in the midline, with a rotation of not more than 45 degrees for each side. There are doubts regarding the transfer technique of the NB in the kangaroo method. This reality is worrying, given the central role of positioning in motor development, postural control and sensorimotor integrity that are reflected in the neurological and cognitive development of PNBs, in the short and long term[9–10,24]. The results and the literature mirror the need for more knowledge and greater accountability, education and training of nurses to standardize best practices[10,23–24].

With regard to Feeding, understanding the maturational processes of newborns associated with oral feeding is fundamental for safe, efficient and pleasant feeding experiences[25]. Although some practices have been identified that are in line with the evidence[26–27], we must admit that in general the feeding practices in the NICU do not always reflect this understanding. With nine questionnaires to be eliminated in this subdimension, by omitted answers, we are led to consider what other authors describe as challenges and barriers to breastfeeding in the NICU[2,10]. It suggests that there are difficulties conditioned by the vulnerability of newborns, or by the physical and human environment itself in the NICU, in addition to the lack of support to the nursing mother. "Breastfeeding counselors" are only "sometimes" readily available resources in the NICU and deserve a greater role in supporting breastfeeding.

Very low application frequencies were observed in the Skin Care subdimension. It was also in this sub-dimension that more questionnaires were eliminated due to missing answers. Perhaps because the evidence in this area is more recent, this seems to be a problematic area, requiring immediate intervention in NICUs, with the adoption of protocols that standardize evidence-based practices[10,24].

Regarding Family Centered Care (FCC), its practice is inconsistent and systematic, since only 18% of nurses considered its frequent application. There are, however, practices that often suggest the application of principles of a Philosophy of FCC, denoting professional support to newborns and

family, through a process of involvement, participation and partnership, based on the training of families and the negotiation of care[16,28]. Surprisingly, parents were often considered visitors, rather than being considered the target of care, professional team partners, advocates and allies for safe and quality care[29]. Even in NICUs that report having no restrictions on the presence of families, it is not certain that parents and families feel welcome in this highly specialized environment. Small gestures such as greeting, offering adequate seating, having a pleasant attitude or even a warm facial expression can be decisive in the family's involvement in the NICU[28]. According to the regulation of the Order of Nurses, the SIPE specialized nurse should promote "the connection systematically, particularly in the case of the sick newborn or NB with special needs" and use "strategies to promote physical contact between parents/NB"[30].:19194 Early intervention by mental health professionals reduces symptoms of trauma, anxiety and depression, and encourages parent-child connection and safe bonding[16,24]. In view of the results, it is also useful to implement parental support programs with peers; the inclusion of parents in handovers, associated with the principle of respect and dignity, rights to information, collaboration and participation; culturally sensitive care, respecting their values, beliefs and behaviors, as well as sociocultural and linguistic characteristics[10,24,28,31].

As for the characteristics of the NICU that are related to the frequency of DC practices, it was observed that the most differentiated units - those that have more than 10 beds and perform invasive ventilation, as well as those that have some type of DC systematization protocol - are those which have more frequent practices. Nevertheless, the low consistency of DCC was confirmed, and therefore should benefit from a process of improvement of neonatal care focused on development.

In view of the results, we suggest the implementation of a program to systematize DC practices with protocols for each central practice, highlighting priority areas of intervention: the reduction and monitoring of noise and light; improving the organization of care and environmental conditions to promote the continued presence of parents in the NICU; the promotion of positive experiences for the PNB and family, such as perioral stimulation with breast milk, skin-to-skin contact, the early initiation of breastfeeding and the kangaroo method (also as an intervention to manage pain during procedures); sleep protection; positioning; swaddling during weight and bathing; skin care; the involvement and participation of parents in care and the decision-making process; peer support, and encouraging the creation of groups for parents of PNBs; access to mental health professionals.

Regarding training, the positioning of the PNB and skin care are priority areas, although a more detailed data analysis may indicate other important areas depending on the region of the country.

With regard to research, an observational study may confirm these results. It would also be useful to know the perception of parents and other NICU professionals regarding the practices studied.

As strengths of the present study, we highlight that this is the first study conducted in Portugal, to date in the literature, to evaluate the application frequency of the Developmental Care (DC) practices to the PNB in Portuguese NICUs, and its relationship with some characteristics of the NICUs. In view of a sample of 217 nurses, corresponding to about 22% of the estimated target population, it is understood that the use of the online questionnaire and the type of sampling selected was a good option. The Quantum Caring Practice Self-Assessment scale[2] , developed in the light of the best evidence, proved to be well understood and captured the various care performed within the DC in detail, so it can be a useful tool to evaluate the results of an implementation project or improvement in DC. The results identified the main areas that need attention, offering clear and concrete directions for the implementation of improvements, as well as for conducting studies that confirm these results, analyze barriers and evaluate implementation strategies.

Caution while reading some limitations of this study is required. The main limitation is that a self-completed questionnaire was used as a source, instead of the direct observation of practices, which would have been very difficult to achieve. Regarding data analysis, it would have been interesting

to know the nurse/bed ratio in the NICU, however this variable was not contemplated. A probabilistic sampling method, stratified by services, could minimize some factors that could influence the expression of the studied variables, but it could also call into question the anonymity of the services, which is important for the adherence of the questionnaire. Regarding the online approach, it can also be considered that this approach may limit the heterogeneity of the characteristics of the nurses participating in the study. On the other hand, the predominance of responses from nurses working in more differentiated units, where better results were found, may have been a consequence of them being more sensitized to DC.

CONCLUSION

The results of this study show that the frequency of DC practices in Portuguese NICUs, measured through the Quantum Caring Practice Self-Assessment scale, is generally low, falling short of what is desirable or recommended. In addition, the frequency of these practices is significantly variable, showing inconsistency.

There is, therefore, a great margin for improvement in each of the Developmental Care (DC) practices, since in all of them there are still practices that are only rarely performed. We also found that the application frequency of this practice varies depending on the geographical area of the NICU, and tends to increase with their level of differentiation and, more importantly, also tends to increase with the existence of a DC program, which indicates the need to invest in their use.

The consistent implementation of DC requires a global change in the culture and behavior of the multidisciplinary team, in relation to the truly crucial role of this care in the development of PNBs. Regarding the family, nurses have a unique opportunity to facilitate parental involvement and promote empowerment, but this opportunity must be cultivated in a systematic and standardized approach to family-centered care.

Known as the panorama of DC practices in the Portuguese NICU, the challenge is now the implementation of improvement programs sustained in the training of professionals and guided by care protocols, which guarantee developmental care to all PNB and families according to the best evidence.

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