Knowledge of healthcare professionals about nonpharmacological pain management in the neonate in a Brazilian rooming-in: a survey study with factor analysis

Conhecimento dos profissionais de saúde sobre o manejo não farmacológico da dor neonatal em um alojamento conjunto no Brasil: estudo tipo survey com análise fatorial

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ABSTRACT

BACKGROUND AND OBJECTIVES: Neonatal pain management is considered one of the eight principles of neonatal care. This study aims to investigate the construct reflecting neonatal non-pharmacological pain management, in a Brazilian rooming--in unit, and identify the preferred intervention.

METHODS: This survey study included 47 health professionals assessed through an in-person questionnaire. Factor analysis was conducted with a rotation using the Varimax method. Cronbach's alpha was 0.78.

RESULTS: The construct comprised three factors in the following order: 1) knowledge and impact of neonatal pain on parents, 2) the benefits of pain treatment, and 3) non-pharmacological interventions. Breastfeeding is part of the first factor, revealing its particular importance. The reduction of luminosity is part of the second factor. Non-nutritive sucking with sweet solution, kangaroo position, and music therapy are part of the third factor.

CONCLUSION: The construct observed in this rooming-in identified three factors and suggests that breastfeeding is the preferred intervention to implement for non-pharmacological pain management in the neonate.

Keywords: Breastfeeding, Factor analysis, Newborn, Pain, Pain management.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O manejo da dor neonatal é considerado um dos oito princípios do cuidado neonatal. O presente estudo teve como objetivo investigar o construto que reflete o manejo não farmacológico da dor neonatal em uma unidade de alojamento conjunto brasileira e identificar a intervenção preferencial.

MÉTODOS: Este estudo de pesquisa incluiu 47 profissionais de saúde avaliados por meio de um questionário presencial. A análise fatorial foi realizada com uma rotação usando o método Varimax. O alfa de Cronbach foi de 0,78.

RESULTADOS: O construto foi composto por três fatores na seguinte ordem: 1) conhecimento e impacto da dor neonatal nos pais, 2) benefícios do tratamento da dor e 3) intervenções não farmacológicas. A amamentação faz parte do primeiro fator, revelando sua importância especial. A redução da luminosidade faz parte do segundo fator. A sucção não nutritiva com solução doce, a posição canguru e a musicoterapia fazem parte do terceiro fator.

CONCLUSÃO: O construto observado nesse alojamento conjunto identificou três fatores e sugere que o aleitamento materno é a intervenção preferencial a ser implementada para o controle não farmacológico da dor no recém-nascido.

Descritores: Aleitamento materno, Análise fatorial, Dor, Manejo da dor, Recém-nascido.

INTRODUCTION

Pain is "an unpleasant sensory and emotional experience associated with or resembling that associated with actual or potential tissue damage". Recently, the International Association for the Study of Pain (IASP) revised the definition of pain, giving it a more widespread understanding. In this regard, a person's report of an experience of pain should be respected. Importantly, the

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HIGHLIGHTS

- The construct of neonatal pain management observed included knowledge about neonatal pain and the impact of neonatal pain on their parents, the benefits of pain treatment, and non-pharmacological interventions.
- Breastfeeding took a more relevant place than the other non-pharmacological interventions for pain management.
- Other methods of relevance were reduction of luminosity, non-nutritive sucking with a sweet solution, kangaroo position, and music therapy.

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inability to communicate verbally, as occurs in the neonatal period, does not negate the possibility of an experience of pain[1,2]. Another essential perspective on pain refers to human rights and patients' rights. Nobody should ever be subjected to pain, which includes painful procedures, without pain management, and this commitment guarantees human dignity during health care[3]. Also, both preterm and term newborns (NB) can recognize, process, and respond to a painful stimulus[4]. Pain in the neonate has consequences that go beyond the neonatal period, such as feeding difficulties, hyperalgesia, and developmental impairment[5].

It has been pointed out that pain is underdiagnosed and undertreated in hospitalized children, especially in the neonate[6]. Options for pain management in the neonate include pharmacological and non-pharmacological interventions, such as breastfeeding and non-nutritive sucking. These methods utilize environmental and behavioral approaches by activating a "gate control mechanism" that prevents the pain sensation from traveling to the central nervous system, and although they are considered safe, they are not systematically applied[7].

Shortly after birth, newborns are submitted to routine care, which includes painful procedures such as vaccines, vitamin K intramuscular injection, and glucose monitoring, highlighting the importance of improving the quality of care for these patients by reducing pain[8]. Also, neonatal pain management is considered one of the eight principles of neonatal care, supported by robust evidence, but this needs to be systematically applied to practice[9]. Implementation of clinical protocols for pain management in the neonate is not easy and should also consider local resources, the knowledge that health professionals have about this issue, education, and clinical empathy, considering that the neonate's perspectives should be valued[10]. Efforts should be made to combine the best scientific evidence with health professionals' knowledge and preferences to favor protocol implementation. In this scenario, studies that identify the preferred interventions for pain management in the neonate are welcome.

Therefore, the objective of this study was to investigate the construct that reflects neonatal non-pharmacological pain management, in a Brazilian rooming-in and identify the preferred intervention.

METHODS

A survey study was conducted on health professionals' construct about pain management in the neonate. The scenario was a rooming-in at a tertiary public hospital located in São Paulo, Brazil, with 16 rooming-in beds and performing around 250 childbirths per month. A protocol for pain management in the neonate is being discussed in the unit. This study hypothesized that some non-pharmacological interventions could be more relevant to health professionals, and this could help the implementation of a local protocol.

Participants

The rooming-in team comprised 51 health professionals, who were invited to participate. The inclusion criteria were being a health professional who worked in the rooming-in ward. Exclusion criteria were health professionals who refused to participate and those who were on vacancy during the data collection. Four professionals refused and 47 were included.

Data collection

Data were collected between October 2022 and January 2023. The information was obtained in person, by a Redcap questionnaire regarding health professionals' characteristics, their knowledge about neonatal pain (pain scale, training, protocols, pain registration, neonatal pain experience for parents, heel-stick, vaccine administration, blood collection for exam, newborn screening test) and non-pharmacological interventions (breastfeeding, non-nutritive sucking, kangaroo position, non-nutritive sucking with sweet solution, music therapy, aromatherapy, reduction of luminosity, body massage, benefits of pain treatment). This questionnaire was developed according to another study[11] and the researchers' knowledge and experience about this issue, on a five-level Likert scale (1-totally disagree; 5-totally agree).

This study was approved by the Ethics Committee for Research with Human Beings of the institution (CAAE 58094822.0.0000.5504).

Sample calculation

The sample size was calculated using the Raosoft software (www.raosoft.com/samplesize.html). For an estimated target population of 51 health professionals, a 50% response distribution, a maximum estimation error of 5%, and a confidence level of 95%, a minimum of 46 participants was obtained.

Statistical analysis

Factor analysis was applied to determine health professionals' construct about neonatal pain management using the Stata software (*Stata Corp*, *L.C*; version 18.0). This is a multivariate method that reduces a group of variables into a smaller set of factors that represent the underlying latent structural dimensions. In this way, it was possible to identify the construct that summarized and explained the set of all variables studied. At first, the correlations between the variables were analyzed, and those > 0.3 were included. Of the 30 variables, 10 remained in the model. The proportion of variables and the sample size was 1:4.7, which was considered appropriate. The Kaiser Meyer Olkin (KMO) test was applied to the selected matrix and resulted in a 0.76 proportion of the common variance. The Bartlett Test of Sphericity (BTS) was $P < 0.001$.

This initial analysis revealed that factorization would be adequate, and the extraction of factors was performed using the principal components model. The factors were selected by the latent root criterion (Eigenvalue), keeping those with Eigenvalues greater than 1.0. The rotation of the factors to adjust the loads was performed using the Varimax method. The variables were related to the factors according to their highest rotated loads, and the factors were named according to the variables with the greatest weight in their construction. Variances, commonalities, and factor loading are presented. The internal consistency of the questionnaire was evaluated by the Cronbach's alpha value, which was 0.78. It has been recommended that this should be over

0.70[12]. This study followed the CROSS guideline for survey studies[13]. The data were presented as the median and interquartile range (IQR), frequencies, and percentages (%).

RESULTS

This study included 47 health professionals with a median age of 37 years (IQR 30.5-42.5), 46 (97.8%) were female, and 11 (23.4%) were pediatricians (Table 1). Twenty-three (48.9%) reported that they disagreed that the institution offered training about neonatal pain, 39 (82.9%) reported that some procedures they realized daily could cause pain in the neonate, 44 (93.6%) considered that heel-stick procedure could cause pain and 47 (100%) reported that vaccine administration could cause pain. Although 9 (19.1%) participants reported knowing a pain scale, only 3 (6.4%) named a scale, being 1 COMFORT scale, 1 Neonatal Infant Pain Scale (NIPS) e and 1 Neonatal Pain, Agitation and Sedation Scale (N-PASS).

Ten variables were included in the factor analysis: blood collection for exam can cause pain in the neonate; the neonate has no pain because of nervous system immaturity; when the neonate has pain it causes a bad experience for their parents; breastfeeding is a strategy during a painful procedure to reduce neonatal pain; kangaroo position is a strategy during a painful procedure to reduce neonatal pain; non-nutritive sucking with sweet solution is a strategy during a painful procedure to reduce neonatal pain; music therapy is a strategy during a painful procedure to reduce neonatal pain; reduction of luminosity is a strategy during a painful procedure to reduce neonatal pain; pain treatment does not result in benefits to the neonate; "I am willing to learn how to evaluate and treat neonatal pain".

The analysis of Eigenvalues identified three factors. The three factors were named according to the factor loadings obtained. Thus, factor 1 refers to the knowledge and impact of neonatal pain on parents; factor 2 refers to the benefits of pain treatment; and factor 3 refers to non-pharmacological interventions (Figure 1).

After rotation, these three factors explained 66.6% of the total variance observed (Table 2).

Table 1. Health professionals' characteristics

Variables	n	%
What is your gender assigned at birth?		
Male	1	2.1
Female	46	97.9
What is your workload?		
Diarist	1	2.1
On duty	46	97.9
What is your area of actuation?		
Nursing	8	17.0
Nursing assistant	7	14.9
Nursing technician	21	44.7
Pediatrician	11	23.4
What is your schooling level?		
Under graduation (technician/assistant)	28	59.6
Graduation	5	10.6
Post-graduation	14	29.7
What is your experience of working in the neonatal area?		
Under 1 year	6	12.8
1 to 2 years	9	19.1
3 to 10 years	18	38.3
Over 10 years	14	29.8

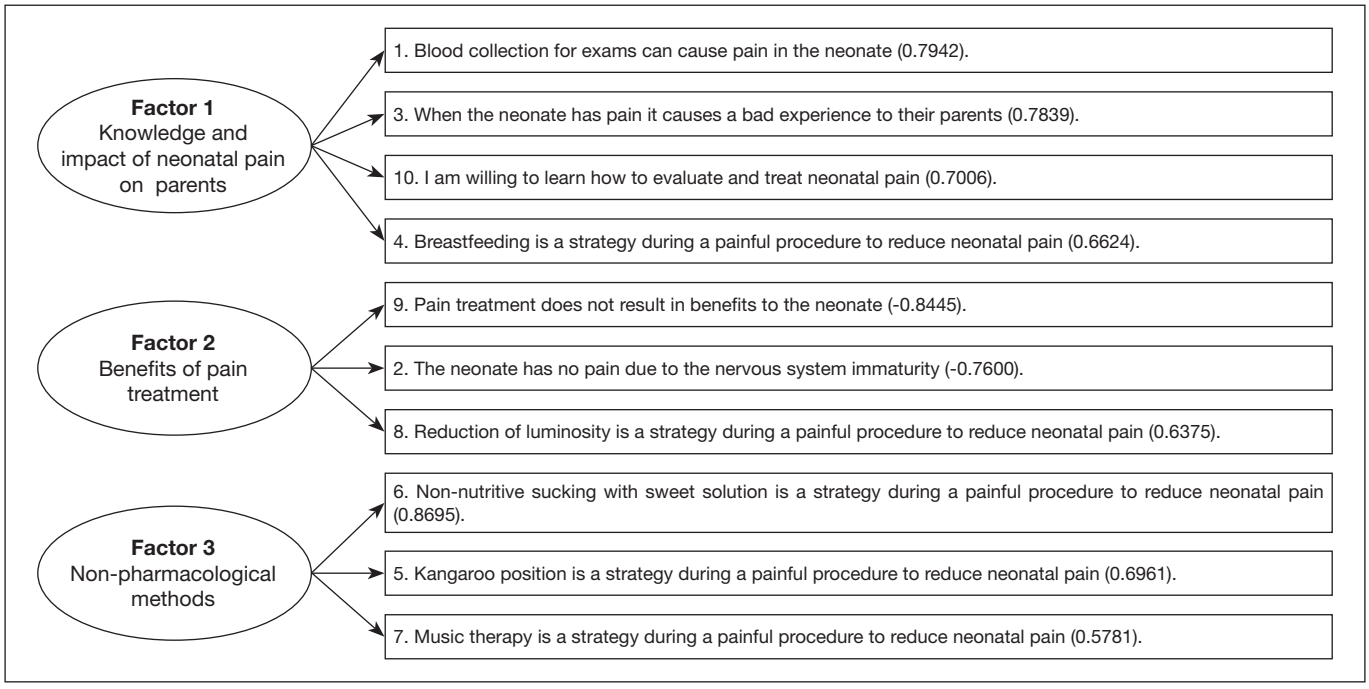

Figure 1. Model resulting from the factor analysis, with the three factors and rotated loads.

Table 2. Factor solution with rotated loads, commonalities, and percentage of explained variance.

Variables	Factor 1	Factor 2	Factor 3	Commonality
1	0.7942			0.7055
2		-0.7600		0.6597
3	0.7839			0.6274
4	0.6624			0.6669
5			0.6961	0.5670
6			0.8695	0.7585
7			0.5781	0.6719
8		0.6375		0.6376
9		-0.8445		0.7423
10	0.7006			0.6251
Eigenvalue	3.8266	1.5251	1.3101	
Explained variance (%)	0.3827	0.1525	0.1310	Total=66.6
Number of variables	4	3	3	
Cronbach's Alpha	0.7418	0.7058	0.6816	Total=0.78

DISCUSSION

In this study, the construct of neonatal pain management included knowledge and impact of neonatal pain on their parents, the benefits of pain treatment, and non-pharmacological interventions. Breastfeeding took a more relevant place than the other non-pharmacological interventions for pain management. Other methods of relevance were reduction of luminosity, non-nutritive sucking with a sweet solution, kangaroo position, and music therapy.

It is important to emphasize that, as it was a low-risk unit, the scope of the present study was related to acute pain associated with procedures. The components of knowledge, the impact of neonatal pain on parents, and breastfeeding were correlated and very important in this study. Breastfeeding is considered a non-pharmacological intervention, and, in this study, it contributed to the first factor and not the third factor with the other interventions, revealing its importance. The benefits of breastfeeding go far beyond pain management, comprising bonding, care, quality of care, nutrition, and most of all, it is a public health imperative that can be more easily implemented[14]. This result suggests that breastfeeding is an effective strategy in the studied scenario and it is important to remember that it does not require a physician's prescription but rather health professionals' knowledge and change in practices.

Curiously, two studies conducted in Brazil with different methodologies observed that sweetened solution was the most frequent strategy for pain management reported by health professionals, but their background included intensive care units, where breastfeeding is less likely to be done, due to the more critical profile of patients, most of them were extremely premature and were submitted to invasive ventilation[15,16].

It is reasonable to think that different scenarios and different methodologies can explain differences in the results. Nonetheless, a common finding among studies was the lack of use of pain scales, revealing a barrier to assessment and, consequently, management of pain in both rooming-in unit and intensive care units[17]. In a study conducted in a Brazilian neonatal intensive care unit, which included 86 health professionals, the authors concluded that lack of training, no use of scales, absence of protocols, and a gap between knowledge and care practices were relevant barriers.

It is essential to highlight that these barriers cross the boundaries of Brazil, though in a different proportion, as previous authors[16] observed in France that 32% of the maternity wards studied did not assess neonatal pain by a scale[18]. Health professionals were willing to learn more about neonatal pain management, and this reflects a great opportunity to improve education about this issue. Pain management strategies in neonatal care are effective and safe. Enhancing knowledge, attitudes, and practices regarding pain management may increase professionals' confidence in their ability to manage pain, as occurred with parents who were educated in pain management[19]. Interestingly, they reported that when the NB feels pain, this causes a bad experience for his parents.

This result can be understood in the context of quality of care, as if neonatal pain was associated with a low quality of care experienced by parents. One experience of care is a combination of service delivery and the patient's experience. Unfortunately, little attention has been given in the literature to the experience of parents of NB[20,21]. The study[16] reported that 52.9% of health professionals always informed parents about painful procedures to be performed in the neonate, revealing a great gap in this practice.[16] Considering this context, this result may reflect professionals' sensitivity to the neonate well-being and the link between patient and family care in the studied unit. If the NB feels bad, it is reasonable to think that parents feel bad too.

The second factor identified in this group of professionals was formed by the components of the benefits of pain treatment, the recognition that NB can feel pain, and the use of reducing luminosity as a strategy to manage pain. This result agrees in part with the literature. The author[15] observed in a different scenario that, although 98.2% of health professionals reported the importance of treating neonatal pain, only 19.3% reported that neonatal pain management reduced suffering and stress and 3.5% reported that this improved prognosis, revealing a lack in knowledge of the burden of neonatal pain[15]. The studied unit has a room for neonatal vaccination where luminosity is controlled, and this may have influenced this result.

It is well-recognized that pain management in the neonatal period is associated with a better quality of life, especially in preterm infants. Painful and stressful experiences early in life are associated with depression and anxiety disorders across the lifespan. Much of the neural foundation of socioemotional development is profoundly modified as a response to stress. Interestingly, the developing brain follows a coordinated growth of specific brain regions, and this is called maturation covariance[22]. The accelerated maturation of salience-related brain regions in preterm NB was detrimental to other networks[23].

Thus, management of pain in the neonatal period is beneficial in the short and long terms.

Also, the NB can feel pain, as the physiological components of pain are developed during the fetal period, and this bad experience may be similar to or even worse than pain in adults.[4] In this study, health professionals were aware of this. Although there is no robust evidence about light control for pain management, the present authors approached this question from an environmental perspective. Aberrant light and excessive sound are considered sensory stimuli that may interfere negatively with brain development[24]. Besides, when measuring the discomfort caused by auditory and luminous stimulation, pain scores change as light levels change in preterm infants, suggesting that the connections between multisensory perception and nociception should be better investigated[25]. A multimodal approach is required to better assess pain and environmental stimuli in the NB.

In the present study, the non-pharmacological interventions for pain control in NB, which constituted the third factor, were non-nutritive sucking with a sweet solution, kangaroo position, and music therapy. These variables were correlated. This result reflects the studied group of health professionals and NB' profiles, suggesting that these three strategies could be easily implemented in the unit. But these results are different from some Brazilian studies which included the intensive care scenario, such as the authors[16], who observed that 25.5% of health professionals reported that they rarely put in kangaroo position and 15.7% reported that sometimes they put them in non-nutritive sucking for pain management[16]. These differences can be explained by clinical instability and respiratory support, as pointed out previously. These conditions impair sucking and extensive manipulations.

In the unit, non-nutritive sucking with a sweet solution is the preferred method used by physicians when they need to perform a procedure, and this may have influenced the results. An overview of systematic reviews that investigated the efficacy and safety of non-pharmacological interventions revealed that facilitated tucking, small volumes of sweet solutions, kangaroo position, and familiar smells were recommended, reporting no or minimal adverse effects[7].

Non-nutritive sucking provides analgesia during heel-stick procedures in term NB, and the combination of non-nutritive sucking and 25% oral glucose results in a return to baseline parameters more quickly in preterm NB[26,27]. Also, kangaroo position seems to be effective and remains efficacious over time in preterm NB submitted to repeated painful procedures, and it provides humanized care for NB[28]. Although methodological differences in studies have influenced the consistency of results, kangaroo position seems to be effective in relieving pain in infants, and most of all, it can be easily applied by all health professionals[29].

Skin-to-skin care and delayed cord clamping have been reinforced in the delivery room in the studied institution, and this may have influenced this result. Music therapy was included in the third factor. It is possible that health professionals, according to previous knowledge, and cultural aspects, think that music can alleviate pain in NB**.** This strategy has been pointed out as support for preterm infants who undergo painful or stressful procedures[30]. Although this approach may sometimes be difficult to implement, it was interesting that it was reported by the professionals. In the context of prematurity, music therapy produced significant effects both on patients and their parents, helping the establishment of family and patient-centered care. This approach resulted in physiological and behavioral responses[31].

Non-pharmacological interventions are safe and easy to implement. Breastfeeding during painful procedures does not require a medical prescription, and it is universally recommended. Reduction of luminosity, non-nutritive sucking, and kangaroo position also do not require a medical prescription and are easy to perform. Local clinical protocols for pain management should include these practices, as health professionals believe they are effective.

A potential limitation of the study refers to the single-center design, which makes it difficult to generalize the results to the entire population. Strengths of our study include the prospective design without missing data and the results of the factor analysis to identify the health professionals' construct. Nonetheless, this study adds to the body of evidence of effective practices for pain management in NB.

CONCLUSION

The construct observed in this rooming-in identified three factors and suggests that breastfeeding is the preferred intervention to implement for non-pharmacological pain management in the NB.

AUTHORS' CONTRIBUTIONS

Cristina Ortiz Sobrinho Valete
Statistical analysis, Acquisition of funding, Data Collection, Conceptualization, Resource Management, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Software, Supervision, Validation, Visualization

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