J Pediatr (Rio J). 2014;90(3):308–315

Jornal de Pediatria
www.jped.com.br

ORIGINAL ARTICLE

Pain assessment and management in the NICU: analysis of an educational intervention for health professionals☆,☆☆

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Received 8 July 2013; accepted 17 September 2013
Available online 22 February 2014

KEYWORDS
Pain;
Analgesia;
Neonatal Intensive Care Units;
Health education;
Professional practice

Abstract
Objective: to study the perception of a Neonatal Intensive Care team on pain assessment and management before and after an educational intervention created and implemented in the unit.
Methods: intervention study developed as action research, in three phases. In Phase 1, a quantitative study was performed to identify how professionals perceive pain management in the unit. In Phase 2, an educational intervention was carried out, using the Operational Group (OG), which defined strategies to be adopted to seek improvements in pain assessment and management. In Phase 3, the initial questionnaire was reapplied to assess professionals' perceptions about the subject after the intervention. All professionals directly working in newborn care were included.
Results: the perception of professionals about pain management and assessment in the unit showed a statistically significant difference between the two phases of research, highlighting the increase in frequency of reference for evaluation and use of some method of pain relief procedures for most analyzed procedures. Participation in training (one of the strategies defined by the operational group) was reported by 86.4% of the professionals. They reported the use of scales for pain assessment, established by the protocol adopted in the service after the intervention, with a frequency of 94.4%. Changes in pain assessment and management were perceived by 79.6% of the participants.
Conclusion: the professionals involved in the educational intervention observed changes in pain management in the unit and related them to the strategies defined and implemented by the OG.

☆ Please cite this article as: de Aymar CL, de Lima LS, dos Santos CM, Moreno EA, Coutinho SB. Pain assessment and management in the NICU: analysis of an educational intervention for health professionals. J Pediatr (Rio J). 2014;90:308–15.
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http://dx.doi.org/10.1016/j.jped.2013.09.008

PALAVRAS-CHAVE
Dor;
Analgesia;
Unidade de Terapia Intensiva Neonatal;
Educação em saúde;
Prática profissional

Avaliação e manejo da dor na UTI neonatal: análise de uma intervenção educativa para os profissionais de saúde

Resumo

Objetivo: conhecer a percepção de uma equipe de terapia intensiva neonatal sobre a avaliação e manejo dor antes e após uma intervenção educativa construída e implementada na unidade.
Métodos: estudo de intervenção desenvolvido na modalidade de pesquisa-ação, desenvolvido em três fases. Na 1ª fase, foi realizado um estudo quantitativo, para identificar como os profissionais percebiam o manejo da dor na unidade. Na 2ª fase, foi realizada uma intervenção educativa, utilizando o Grupo Operativo, que definiu estratégias a serem adotadas buscando melhorias na avaliação e manejo da dor. Na 3ª fase foi reaplicado o questionário inicial, para avaliar a percepção dos profissionais acerca do tema, após a intervenção. Foram incluídos todos os profissionais que atuam nos cuidados diretos aos recém-nascidos.
Resultados: a percepção dos profissionais acerca do manejo e da avaliação da dor na unidade mostrou diferença estatisticamente significante entre as duas fases da pesquisa, destacando-se o aumento na referência de frequência de avaliação e de utilização de algum método de alívio da dor em procedimentos, para a maioria dos procedimentos pesquisados. A participação na capacitação (uma das estratégias definidas pelo grupo operativo) foi referida por 86,4% dos profissionais. Estes referiram a utilização das escalas para avaliação da dor, estabelecidas no protocolo adotado no serviço após a intervenção, com frequência de 94,4%. Mudanças na avaliação e manejo da dor foram percebidas por 79,6% dos participantes.
Conclusão: os profissionais envolvidos na intervenção educativa perceberam mudanças no manejo da dor na unidade e as relacionaram às estratégias definidas e implementadas pelo GO.

Introduction

The results of some studies demonstrate that there is still a gap between scientific knowledge on neonatal pain, as well as its consequences, and the use of methods for pain assessment and management.[1,2] This condition has been related to the lack of protocols for pain assessment and management in health services and lack of theoretical knowledge about its physiopathology, as well as of methods of assessment and therapeutic alternatives for providing care to newborns at risk.[3,4]

However, access to scientific knowledge and the existence of guidelines and routines are not enough to clearly disclose changes in daily practice. Reflective practice is needed. Thus, according to Vázquez, the more a person is able to reflect on his/her reality and feel he/she belongs in it, the better he/she will be able to act, striving to change it.[5]

The National Policy on Continuing Education in Health (Política Nacional de Educação Permanente em Saúde - PNEPS)[6] refers to reflective practice in the workplace in order to to change assistance practices through the problematization of the work process. It involves the participation of a multidisciplinary team, including all service employees. It is observed that the actions of PNEPS are widely used in primary care, highlighting the need for greater investment in this type of initiative in tertiary care.

Thus, the present study is the first to be conducted in Brazil in the field of neonatal intensive care, using action research as the methodology for effective intervention in pain management improvement, aiming to better understand the perception of a neonatal intensive care team on the pain assessment and management before and after an educational intervention was designed and implemented in the unit.

Methods

The study was conducted in the Neonatal Intensive Care Unit (NICU) of the Hospital Agamemnon Magalhães (HAM). The hospital is located in Recife, state of Pernambuco, Northeastern Brazil, and it is a reference public hospital for the care of high-risk pregnant women.

An intervention study was developed as an action research modality, through an operational group (OG). The main goal of action research is to change a specific situation in which the relationship between the researcher and the participant is very close.[7]

The study was performed from September of 2011 to February of 2013. All professionals directly working with newborn care were invited to participate in the study: neonatologists, physical therapists, nurses, and nursing assistants who work as day workers and/or on duty in the participating neonatal intensive care service, after signing the free and informed consent for each phase of the research. The researcher did not answer the questionnaires.

The study was conducted in three phases: In Phase 1, a quantitative cross-sectional study was performed to identify how professionals perceived pain management in the chosen unit, through the application of a questionnaire to college/university and technical-level professionals who work directly with newborns. This phase (September to November of 2011) included 70 participants, of whom 41 were college/university-level and 29 were

technical-level professionals, corresponding to 80.3% and 90.6%, respectively, of the professionals in the service during the data collection period. There were no refusals to participate and non-participation was due to vacation and/or medical leaves.

To record the collected information, specific forms were prepared, containing questions according to the study variables. Personal data: Age; gender; number of children; history of hospitalization in the intensive care unit (ICU) – related to the professional and/or first-degree relative; history of chronic pain – related to the professional and/or first-degree relative; religious practice. Professional data: Occupation and time since graduation; level of specialization/post-graduation; teaching activity, duration of activity; working hours and employment scheme in NICUs); pediatric intensive care units (PICU), and at the NICU/HAM. Pain-related data: perceptions of professionals about pain management in the NICU, considering knowledge and use of pain assessment and relief methods during frequent procedures in the NICU (pharmacological and non-pharmacological methods) and the need for changes in practice.

At Phase 2 (March to September of 2012), an educational intervention was performed, using the OG, which consisted of a mediator (researcher), the narrator (member of the group chosen), an external observer (not a member of the NICU team, with previous experience in OGs), and other participants.

Sixteen meetings were held between April and August of 2012, with a mean duration of one hour, every ten days (approximately), with the participation of all professional categories of the Neonatal Unit (NU) - four physicians, two nurses, two physical therapists, and five nurse technicians - with an average of ten participants per meeting, as there were occasional absences. It is noteworthy that the group maintained its structure, and that representation of all occupational categories was ensured in all meetings.

The problematization methodology, conducted in accordance with the five steps of Maguerez's Arch,[8] was used to guide the work during the OG. According to this methodology, the issue of pain was initially problematized based on the experience of one of the group participants. Then, the discussion was brought into the context of the NICU and the current situation of pain management was discussed (observation of reality). A discussion was then initiated to identify factors that could contribute positively or negatively to the appropriate professional practice in relation to pain management.

Thus, the following were listed as key points: empathy (capacity to put oneself in someone else's place), knowledge (training), specific protocol, appreciation of teamwork, work overload, recalling/sensitivity regarding the issue, and the mechanical work (non-reflective practice).

The next step (theorization) was developed by seeking scientific material regarding the topics listed as key points. Thus, at the phase of creating solution hypotheses, it was concluded that the practice needed to be modified and that some actions might encourage the necessary changes.

The following were considered as urgent measures: care humanization; development and implementation of a neonatal pain management protocol at HAM (appropriate to the needs and reality of the service, which addresses assessment, pharmacological, and non-pharmacological measures for pain relief and care humanization); creation of a new printed nursing care form, including the use of the Neonatal Infant Pain Scale (NIPS) as the fifth vital sign (every three hours); and training of all professionals of the NU, not only the NICU.

The group also identified the need to remind health professionals of the infant's pain, creating the ''pain manager'', who would be present at every shift (professional who would have the responsibility to remind all the staff to comply with the protocol).

Finally, the fifth stage of the Maguerez's Arch (application to reality) was developed through the implementation of the strategies identified in the previous phase by the OG. These activities occurred during the month of September of 2012. Twenty-eight meetings were held, with a mean duration of one hour each, coordinated by members of the OG, when approximately 90% of the NU professionals were trained, as determined by the OG as the strategy.

During the training, active teaching and learning methodologies were used, maintaining the reasoning of the OG and in agreement with PNEPS,[6] and each professional attended two of these meetings. The protocol developed by the OG and adopted at the service was discussed with the participants at each meeting and practical training was carried out for the use of scales utilized for neonatal pain assessment - the NIPS and the Neonatal Facial Coding System (NFCS).

At Phase 3 (February 2013), the initial questionnaire was reapplied to assess the changes in the professionals' perception about pain management in the unit, as well as questions related to the educational intervention.

Data collection in the third phase was performed four months after the end of training and included 60 participants, 33 college/university-level and 27 technical-level professionals, which represented 71.7% and 81.8%, respectively, of NICU professionals during that period. In the interval between the two samples (15 months), some college/university-level professionals resigned from their jobs. Moreover, the collection period in Phase 1 lasted three months, while in Phase 3 it lasted only one month and the existence of employees on vacation and other leaves of absence contributed to the difference in the number of participants.

For quantitative data analysis, coding and processing was carried out as double entry and validation was performed using Epi Info™ 6.04d software (Atlanta, USA) and for statistical analysis, Stata/SE 12.0 software (USA).

The chi-squared test and Fisher's exact test were applied to verify the existence of an association for categorical variables. All tests were applied with 95% confidence intervals. The results are disclosed in the tables.

This study was approved by the Ethics Committee on Human Research of HAM/PE, under protocol number 280, CAAE-0173.0.236.000-10.

Results

Phase 1 involved 70 professionals, 41 college/university and 29 technical-level professionals, corresponding to 80.3% and 90.6% of the professionals working in the unit during the collection period. Phase 3 included 60 participants, 33 (71.7%)

Table 1 Profile of neonatal intensive care unit professionals of the Hospital Agamenon Magalhães. Recife, 2013.

Variables	Baseline		Reassessment		p-value
	n	%	n	%	
College/university level					
Age (years)					
< 40	21	51.2	15	45.5	0.795[a]
≥ 40	20	48.8	18	54.5	
Number of children					
0	13	31.7	7	21.2	0.479[b]
1 - 2	23	56.1	23	69.7	
3 or more	5	12.2	3	9.1	
History of ICU admission					
Yes	3	7.3	3	9.1	1.000[b]
No	38	92.7	30	90.9	
Close relative or friend in ICU					
Yes	29	70.7	23	69.7	1.000[a]
No	12	29.3	10	30.3	
History of chronic pain					
Yes	19	46.3	20	60.6	0.323[a]
No	22	53.7	13	39.4	
Time since graduation					
< 15 years	21	51.2	18	54.5	0.775[b]
> 15 years	20	48.8	15	45.5	
Time working in neonatology					
< 15 years	24	61.5	19	59.4	0.852[b]
> 15 years	15	38.5	13	40.6	
Technical level					
Age (years)					
< 40	14	51.9	9	34.6	0.323[a]
≥ 40	13	48.1	17	65.4	
Number of children					
0	11	37.9	8	30.8	0.802[a]
1 - 2	13	44.9	12	46.1	
3 or more	5	17.2	6	23.1	
History of ICU admission					
Yes	3	10.3	3	11.1	1.000[b]
No	26	89.7	24	88.9	
Close relative or friend in ICU					
Yes	9	34.6	12	44.4	0.652[a]
No	17	65.4	15	55.6	
History of chronic pain					
Yes	15	53.6	15	57.7	0.976[a]
No	13	46.4	11	42.3	
Time since graduation					
< 15 years	17	60.7	13	48.1	0.349[b]
> 15 years	11	39.3	14	51.9	
Time working in neonatology					
< 15 years	23	82.1	22	84.6	0.807[b]
> 15 years	5	17.9	4	15.4	

ICU, intensive care unit.
[a] Chi-Squared test.
[b] Fisher's exact test.

College/University and 27 (81.8%) technical-level professionals, which represented 71.7% and 81.8%, respectively, of professionals working at the unit during that period.

The first phase included 23 physicians, 13 nurses, five physical therapists, and 29 nurse technicians/assistants. The third phase included 18, 11, four, and 27 professionals, respectively.

Regarding the profile (Table 1), there was no statistically significant differences between the two assessment phases, despite the variation in the number of participants,

Table 2 Perception of professionals regarding pain assessment and management in the neonatal intensive care unit of the Hospital Agamenon Magalhães. Recife, 2013.

	Phase 1		Phase 3		p-value
	n	%	n	%	
College/university level					
Recollection of pain occurrence in the neonate					
Always/frequently	21	51.2	26	81.2	0.016[a]
Never/rarely	20	48.8	6	18.8	
Pain assessment in the neonate (scales or other methods)					
Always/frequently	9	22.5	21	65.6	0.001[b]
Never/rarely	26	65.0	9	28.1	
Does not know	5	12.5	2	6.3	
Use of methods for pain relief					
Always/frequently	12	30.8	25	75.7	< 0.001[b]
Never/rarely	22	56.4	6	18.2	
Does not know	5	12.8	2	6.1	
Existence of standards and routines for pain assessment and management					
Yes	3	7.3	25	78.1	< 0.001[b]
No	35	85.4	5	15.6	
Does not know	3	7.3	2	6.3	
Technical level					
Recollection of pain occurrence in the neonate					
Always/frequently	16	57.1	18	75.0	0.291[a]
Never/rarely	12	42.9	6	25.0	
Pain assessment in the neonate (scales or other methods)					
Always/frequently	10	35.7	19	76.0	0.008[a]
Never/rarely	18	64.3	6	24.0	
Use of methods for pain relief					
Always/frequently	9	36.0	15	65.3	0.091[b]
Never/rarely	15	60.0	7	30.4	
Does not know	1	4.0	1	4.3	
Existence of standards and routines for pain assessment and management					
Yes	5	22.7	23	92.0	< 0.001[a]
No	17	77.3	2	8.0	

[a] Chi-squared test.
[b] Fisher's exact test.

especially of college/university level professionals. Among the latter, more than 90% had residency/specialization and more than 50% performed teaching activities in both study phases.

Regarding the perception of college/university level professionals about pain management in the NICU-HAM (Table 2), a statistically significant difference was observed between the two phases, for all questions asked. It is noteworthy that there was an increase in referral for assessment and use of some pain relief methods. As for the technical level, there was significant acknowledgment of the existence of guidelines and routines after the educational intervention, as well as an increase in the perception that pain is assessed through scales or crying, facial expressions, body movements, and physiological parameters.

When observing data related to the use of some method of pain relief (pharmacological and/or non-pharmacological), in the opinion of college/university level participants (Table 3), there was a change for all studied procedures, except for the postoperative period, elective tracheal intubation, and mechanical ventilation (data not shown in table).

Among the technical level participants, there was a significant improvement in the reporting of use of some method of pain relief for all procedures assessed after the educational intervention (Table 3), except for heel puncture (data not shown in table).

Participation in training (one of the strategies defined by the OG) was reported by 86.4% of the professionals who answered the questionnaire in the third phase of the research. They reported the use of scales for pain assessment established in the protocol adopted at the unit after the intervention (NFCS and NIPS), at a frequency of 94.4%. The change in pain assessment and management in the unit was perceived by 79.6% of the participants (Table 4).

Discussion

The present was a pioneering Brazilian study in the neonatal intensive care area, using action research as a methodology for intervention in pain management improvement, which may serve as a benchmark for other services in similar institutional settings.

Table 3 Professionals' perception on the use of pain relief methods (pharmacological and/or nonpharmacological) in the neonatal intensive care unit of the Hospital Agamenon Magalhães. Recife, 2013.

Procedure/clinical situation	Phase 1		Phase 3		p-value
	n	%	n	%	
College/university level					
Chest drainage					
Always/frequently	26	65.0	28	87.4	0.030[a]
Never/rarely	12	30.0	2	6.3	
Does not know	2	5.0	2	6.3	
Necrotizing enterocolitis					
Always/frequently	24	58.5	26	81.2	0.023[a]
Never/rarely	15	36.6	3	9.4	
Does not know	2	4.9	3	9.4	
Arterial puncture					
Always/frequently	1	2.6	15	46.8	< 0.001
Never/rarely	37	94.8	14	43.8	
Does not know	1	2.6	3	9.4	
Peripheral puncture					
Always/frequently	0	0.0	13	50.0	< 0.001
Never/rarely	40	100.0	13	50.0	
Insertion of PICI					
Always/frequently	5	12.8	19	61.3	< 0.001
Never/rarely	20	51.3	5	16.1	
Does not know	14	35.9	7	22.6	
Upper airway aspiration					
Always/frequently	2	5.0	13	40.6	< 0.001
Never/rarely	37	92.5	16	50.0	
Not necessary	1	2.5	3	9.4	
Tracheal tube aspiration					
Always/frequently	4	10.3	14	43.8	0.001[a]
Never/rarely	34	87.1	15	46.8	
Does not know	1	2.6	3	9.4	
CSF sampling					
Always/frequently	6	15.0	21	63.6	< 0.001
Never/rarely	30	75.0	5	15.2	
Does not know	4	10.0	7	21.2	
Technical level					
Blood collection					
Always/frequently	2	7.0	15	60.0	< 0.001[b]
Never/rarely	25	92.6	10	40.0	
Peripheral venous access					
Always/frequently	12	41.4	19	76.0	0.022[b]
Never/rarely	17	58.6	6	24.0	
Upper airway aspiration					
Always/frequently	2	7.1	12	48.0	0.001[a]
Never/rarely	25	89.3	11	44.0	
Not necessary	1	3.6	2	8.0	
Tracheal tube aspiration					
Always/frequently	3	11.1	12	50.0	< 0.002[b]
Never/rarely	24	88.9	9	37.5	

PCPI, percutaneous catheter peripherally inserted, CSF, cerebrospinal fluid.
[a] Fisher's exact test
[b] Chi-squared test

The development of its own protocol as well as awareness and involvement practices for all the staffs in the transition process were some of the strategies defined by the OG and assessed by the participants during revaluation.

The questions on the existence of guidelines and routines related to pain management showed considerable difference between the two phases of research, showing that the Neonatal Pain Management Protocol was

Table 4 Professionals' perception (Technical and college/university level) on pain assessment and management after the educational intervention in the neonatal intensive care unit of the Hospital Agamenon Magalhães. Recife, 2013.

	n	%
Participation in training[a]		
Yes	51	86.4
No	8	13.6
Change perception after educational intervention[a]		
Yes	47	79.6
No	10	16.9
Does not know	2	3.5
Compliance with the protocol used		
Always/frequently	34	56.7
Never/rarely	17	28.3
Does not know	9	15.0
Use of pain assessment scales NIPS/NFCS[b]		
Yes	51	94.4
No	3	5.6

NIPS, Neonatal Infant Pain Scale; NFCS, Neonatal Facial Coding.
[a] Not informed, 1
[b] Not informed, 6

well publicized, and was known by most professionals.

Regarding the use of pain relief methods in procedures, it should be emphasized that all procedures and situations included in the questionnaires are known to be painful and, for most, there are specific recommendations for relief methods.[9,10]

Regarding pain relief in elective intubation and mechanical ventilation, no statistical significance was observed after the intervention. However, it is noteworthy that the protocol developed by the OG and adopted by the service did not include well-defined recommendations for drug use in these specific situations, although the literature mentions several therapeutic options.[11–14]

It is important to emphasize the participants' observations regarding the frequency of use of scales to assess pain. This information is considered relevant, given that the correct assessment of the situation in which a medical professional intends to intervene is a paramount condition for implementing the appropriate conduct.[15,16]

It is clear that, although improvements have been observed, many changes are still needed. The apparent dichotomy between theory and practice is still a challenge for many scholars. The literature states that access to knowledge and the existence of guidelines and routines are not enough to cause changes in daily practice.[2,17,18]

It is worth mentioning the short time interval between intervention and reassessment (four months), which, according to performed studies, could explain some negative results, such as high percentages of reference to lack of knowledge and need for changes after the intervention. As indicated in the literature, it takes considerable time for the acquired knowledge on the subject to result in changes in clinical practice.[3,4]

Another limitation of the study was the lack of verification of the practice at the service, as it aimed to assess the professionals' perceptions about the subject.

Although action research has been used with positive results in health care, particularly in primary care, no studies were retrieved in the literature to allow for comparisons with the results obtained in the present study, which was developed with tertiary care professionals.

It was verified that although pain assessment and management at the selected neonatal service still fall short of current recommendations, according to the professionals' perceptions, a process of change has started, and those involved in the present study demonstrated that it is possible to change the reality when they propose to do so.

The use of the proposed methodology - action research - provided a critical evaluation and reflection on the importance of neonatal pain by professionals involved in neonatal care.

Thus, it can be concluded that the professionals involved in the educational intervention perceived changes in pain management at the unit and correlated them to strategies that were defined and implemented by the OG.

Conflicts of interest

The authors declare no conflicts of interest.

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