

# Knowledge of the neonatal intensive care unit nursing team about newborn pain

*Conhecimento da equipe de enfermagem de unidade de terapia intensiva neonatal sobre a dor do recém-nascido*

Dayana Mourato Moura<sup>1</sup>, Talita Pavarini Borges de Souza<sup>2</sup>

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** The absence or failure to identify and correctly manage pain impairs the recovery of the newborn admitted to the Neonatal Intensive Care Unit (NICU), with long-term consequences. The objective was to describe the knowledge of the nursing team on pain evaluation and management of term and preterm newborns in the NICU, as well as the daily challenges.

**METHODS:** Descriptive, cross-sectional study with a quantitative approach, developed in a public general hospital in São Paulo.

**RESULTS:** 44 professionals participated; the melody of crying (100%), heart rate (99%) and trembling of hands and feet (90%) were the most pointed changes in the face of pain. Attention deficit in school (95%), less tolerance to pain in adulthood (77%), propensity to develop depression and anxiety in adulthood (73%) were the most reported long-term consequences. Non-nutritive sucking (92%), breastfeeding (88%) and the kangaroo method (79%) were the most widely used non-pharmacological methods. The most prevalent challenges were the absence of medical conduct (23%) and difficulty in assessing specific signs of pain (16%), in addition to an absence of pain notification of 22%.

**CONCLUSION:** The knowledge of the nursing team about pain in patients in the NICU demonstrated clarity of hemodynamic changes, consequences of long-term pain exposure and mastery of non-pharmacological strategies. There is underreporting of the presence of pain and the most reported challenges were the absence of medical conduct after communicating the pain and evaluation of specific signs, directing actions to improve care such as training.

**Keywords:** Infant, Neonatal intensive care unit, Neonatal nursing, Newborn, Pain management, Pain measurement.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A ausência ou falhas na identificação e manejo correto da dor prejudica a recuperação do recém-nascido internado na unidade de terapia intensiva neonatal (UTIN), com consequências a longo prazo. O objetivo foi descrever o conhecimento da equipe de enfermagem sobre avaliação e manejo da dor do recém-nascido termo e pré-termo em unidade de UTIN, assim como os desafios cotidianos.

**MÉTODOS:** Estudo descritivo, transversal, quantitativo, desenvolvido em um hospital geral público de São Paulo.

**RESULTADOS:** Foram incluídos 44 profissionais. As alterações mais apontadas frente à dor foram melodia do choro (100%), frequência cardíaca (99%) e tremores nas mãos e pés (90%). As consequências de longo prazo mais relatadas foram: déficit de atenção na fase escolar (95%), menor tolerância a dor na vida adulta (77%), propensão a desenvolver depressão e ansiedade na vida adulta (73%). Sucção não nutritiva (92%), aleitamento materno (88%) e método canguru (79%) foram os métodos não farmacológicos mais utilizados. Os desafios mais prevalentes foram ausência de conduta médica (23%) e dificuldade na avaliação de sinais específicos de dor (16%), soma-se uma ausência de notificação da dor de 22%.

**CONCLUSÃO:** A equipe de enfermagem acerca da dor em pacientes em UTIN demonstrou clareza das modificações hemodinâmicas, consequências da exposição da dor a longo prazo e domínio de estratégias não farmacológicas. Evidenciou-se subnotificação da presença de dor e os desafios mais relatados foram a ausência de conduta médica pós comunicação da dor e avaliação de sinais específicos, direcionando ações para melhoria da assistência como a realização de treinamentos.

**Descritores:** Enfermagem neonatal, Manejo da dor, Medição da dor, Recém-nascido, Unidades de terapia intensiva neonatal.

## INTRODUCTION

The lack of identification and correct treatment of pain impairs the recovery of the newborn (NB) admitted to the neonatal intensive care unit (NICU)<sup>1</sup>. During their stay at the NICU, the NB is submitted to a completely different environment from the mother's womb, with the presence of loud noises, intense and continuous lighting, unpredictable manipulations, in addition to often inadequate care by health professionals regarding the reduction of stressors and pain<sup>2,3</sup>. Healthcare professionals who care for NB are responsible for ethics, promoting of safety, and ensuring effective treatment for

Dayana Mourato Moura – <https://orcid.org/0000-0001-5826-623X>;  
Talita Pavarini Borges de Souza – <https://orcid.org/0000-0002-0914-118X>.

1. University of Santo Amaro, Multiprofessional Residency, São Paulo, SP, Brazil.  
2. Medical Sciences School of Santa Casa de São Paulo, Teacher, São Paulo, SP, Brazil.

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### Correspondence to:

Rua das Perobeiras, nº 624, Casa 4 – Chácara Santa Maria  
05879-470 São Paulo, SP, Brasil.  
E-mail: dayana\_mourato@hotmail.com

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pain control, as provided by the *Conselho Nacional dos Direitos da Criança e do Adolescente* (CONANDA - National Council for the Rights of Children and Adolescents), Resolution 41, from October 13, 1995, which, in item 7 of the *Direitos da Criança e do Adolescente Hospitalizados* (Rights of Hospitalized Children and Adolescents), lists the “Right to be free from pain when there are means to avoid it”<sup>4,6</sup>; however, recent studies have shown that these professionals still have difficulties in analyzing and understanding NB pain<sup>4,7-10</sup>.

In the field of action in question, the nursing team plays a fundamental role in pain control and in reducing the NB’s suffering, because they stay with the patient during hospitalization, perform most of the invasive procedures, and are responsible for prescribing non-pharmacological methods to provide comfort and pain management for the patient<sup>2</sup>.

The birth of premature children is a factor directly proportional to NICU hospitalization, in which NB are subjected to a daily average of 12 painful procedures with diagnostic or treatment purposes and 16 procedures considered to be stressful. Around 80% of preterm and term NB exposed to these procedures have their pain undertreated, either by erroneous assessments or insufficient use of analgesics<sup>3</sup>. In the year 2018, 450 NB were admitted to the NICU at *Hospital Geral do Grajaú* with an average length of stay of 8 days (HGG, 2019).

For decades NB pain was treated as a factor of minimal priority, due to the belief that neonates didn’t feel pain due to the immaturity of their nervous system. However, recent research has shown to the scientific community that the neonate has all the anatomical-functional and neurochemical components necessary for the reception and transmission of painful stimuli<sup>2,9-12</sup>, since neurons are developed in the 7<sup>th</sup> week of gestation and their skin receptors around the 20<sup>th</sup> week. Despite this, their pain modulation and inhibition mechanisms do not mature at the same time as the pain transmitters, thus, painful stimuli occur, but there is no immediate endogenous inhibition response, making the sensation more intense<sup>13</sup>.

The complications caused by prolonged painful stimulus affect the various organic systems, with behavioral and physiological changes such as: decrease and change in sleep pattern, irritability, and decrease in eating pattern, along with emotional and cognitive changes<sup>9,11,14</sup>.

For premature NB, exposure to multiple painful and invasive procedures causes excessive stimulation of nociceptive pathways because the still immature pathways promote a chronic state of nociceptive stimulation and psychological stress, exposing them to the deleterious clinical effects of pain<sup>14,15</sup>. The prolonged effect of these physiological aggression contribute to the appearance of cognition problems and attention deficits during school life, also leaving the premature neonate vulnerable to neurological lesions<sup>11,14,15</sup>.

The NB undergoing painful procedures without adequate analgesia or sedation present a generalized stress response leading to important hormone release, mobilizing substrates and catabolism. These neonates present, after exposure to pain, high levels of adrenaline, corticoids, aldosterone, glucagon, in addition to insulin interruption and metabolic changes with mobilization and consumption of protein and energy sources, providing a state of hypermetabolism with hyperglycemia and lactic acidosis<sup>7,13,16</sup>.

Cardiac arrhythmias, hypertension, and tachycardia often occur in the cardiovascular system, altering energy consumption, impacting on weight balance, contributing to increase the length of hospitalization of the NB<sup>7,17</sup>, plus increased respiratory rate, reduced oxygen saturation, cyanosis, sweating, pupil dilation and apnea, peripheral vasoconstriction, and changes in blood coagulation<sup>17,18</sup>. The lesions caused to brain development by prolonged exposure to pain generate permanent alterations in the organization of the nociceptive system<sup>8,9</sup>.

Regardless or not of the NB’s range of prematurity, pain relief and management must be prioritized, with the use of scales intended for pain evaluation, in order to better understand the NB’s pain levels, making it possible to execute an intervention and thus promote the patient’s stability, so that hospitalization doesn’t become a traumatic experience liable to cause future damage<sup>13,17,18</sup>. An example of a scale designed for these patients and validated in Brazil is the Neonatal Infant Pain Scale (NIPS), which evaluates six parameters, five of which are behavioral (facial expression, crying, arms, legs, alertness) and one physiological (breathing pattern)<sup>17</sup>. The NB’s pain evaluation by the NIPS reveals the need for pharmacological intervention for pain with a score of  $\geq 3$ , and severe pain at  $\geq 6$ <sup>19,20</sup>.

Therefore, recognizing the need to approach pain in full-term and preterm NB based on their singularity, the repercussions on their development caused in the short and long term by pain, the role of the nursing team in neonatal care and the challenges on the issue of pain in NICUs, the present research’s objective was to identify the level of knowledge of the nursing team and the challenges of pain assessment and management of NB in NICUs.

## METHODS

A descriptive, cross-sectional study developed in a NICU of a public general hospital in São Paulo. Inclusion criteria were nursing professionals directly involved with patient care. Participants on vacation, on sick notice or maternity leave were excluded. The data collection occurred in June 2020.

The 47 professionals working at the NICU during the research period were invited to participate, considering day and night shifts. The staff was composed of eight nurses, 16 nursing technicians and 23 nursing assistants.

The objectives of the study were presented to the staff, nursing supervision and continuing education. After acceptance and signing of the Free and Informed Consent Term (FICT), the application of the questionnaires was scheduled.

Two questionnaires were applied, one for sociodemographic characterization and the other with multiple choice questions on institutional issues regarding pain assessment and management and its short- and long-term consequences, as well as two open questions on daily assessment difficulties. The open-ended questions were: (1) Do you think it’s important to evaluate NB’s pain? Why so? (2) What are the main difficulties you encounter in your work routine to perform the evaluation and relief of NB’s pain?

The development of the study complied with national and international standards of ethics in research involving human beings, in accordance with resolution MS/CNS 466/2012,

through the signing of the FICT, in two copies, after approval by the Research Ethics Committee of UNISA according to CAAE: 30074720.0.0000.0081 and opinion no. 3.931.829, as well as by the coparticipating institution by CAAE: 30074720.0.3001.5447 and opinion no. 3.939.368. Data was organized in Microsoft Excel® 2016 spreadsheets and a descriptive analysis was performed describing frequencies for closed questions (multiple choice) and, for open questions, a categorization of the speeches was performed.

**RESULTS**

The sample comprised 44 professionals (93.6% of the population), being 8 nurses, 14 nursing technicians and 22 nursing assistants, all female, with a mean professional experience of 8.2 years. The most experienced professional had 26 years of experience and the least experienced one year of experience in the NICU. 50% work during the day and 50% during the night. Among the nurses, 6 (75%) had a graduation in neonatology and 2 (25%) in neonatology and pediatrics.

The majority of professionals (81.8%) reported the existence of protocols/recommendations on the evaluation of NB pain. The presence of a pain scale directed to this type of patient is known by 100% of nurses, 85.7% of technicians and 72.7% of nursing assistants. Most of them (52.3%) reported that there is no training about pain in NB in this institution. The documentation of the pain score and its evaluation occurs in the nursing notes (56.8%), however, there is a proper place for its documentation in the electronic medical record system and 100% of the sample stated that the evaluation of the NB's pain must be part of the nursing prescription. The routine pain evaluation is done together mostly with vital signs (61.4%) by the nursing assistant and technician.

As for the question referring to which professionals could perform the identification of NB's pain, the participants were allowed to choose more than one option, thus, 63,6% of the team chose the nurse, and 40,9% informed that all professionals of the multiprofessional team were suitable to perform the evaluation. Table 1 presents the frequency of answers for each professional category of nursing of multiple choice questions related to the evaluation of NB's pain. The participants were allowed to choose more than one option.

Table 2 presents the procedures performed by the nursing team when pain is identified, with the possibility of choosing more than one option.

Table 3 shows which are the non-pharmacological strategies most used by the institution's nursing staff for pain management, with the possibility of choosing more than one option.

The nursing team has a list of non-pharmacological interventions for pain relief; however, the record is impaired.

There was categorization of answers in the open questions. Regarding the question about the importance of evaluating the NB's pain, 88.63% of the employees said it was important, and 11.36% did not answer the question. 34.09% pointed out that the most important factor for this evaluation was to avoid long-term consequences, followed by providing humanized care providing comfort; however, only 13.63% of the participants

**Table 1.** Evaluation and consequences of pain in neonatal patients

Questions	Nurse	Nursing technician	Nursing assistant
What alterations result from pain in the NB?			
Heart rate	100%	100%	95.5%
Temperature	62.5%	85.7%	86.4%
Melody of crying	100%	100%	100%
Saturation	50%	21.4%	40.9%
Facial expression	87.5%	64.3%	72.7%
Trembling of hands and feet	87.5%	92.9%	90.9%
What are the consequences of exposure to pain for the future life of the NB?			
Attention deficit in the school phase	100%	92.9%	90.9%
Weight gain	37.5%	50%	22.7%
Lower pain tolerance in adulthood	87.5%	71.4%	72.7%
Propensity to develop depression and anxiety in adulthood	75%	71.4%	72.7%
Changes the mother and son bond	50%	64.3%	90.9%
Increase in hours of sleep	-	14.3%	36.4%
Has no consequences because it's sporadic	-	-	-
None of the above	-	-	-
Can a premature NB have pain?			
Yes	100%	71.4%	100%
No	-	28.6%	-
I don't know	-	-	-

**Table 2.** Management of pain in neonatal patients

Questions	Nurse	Nursing technician	Nursing assistant
What is(are) the conduct(s) performed by you when pain is identified in a NB during a certain procedure?			
Discusses it with the staff	62.5%	35.71%	36.36%
Communicates the head of staff	62.5%	92.85%	100%
Registers it in the medical record	75%	71.42%	86.36%
Doesn't do anything	-	-	-
Uses some type of analgesia for pain relief?			
Yes*	87.5%	21.42%	27.27%
No	12.5%	78.57%	72.72%
When the pain scale used in the institution** suggests that the newborn is in pain, what is the conduct performed by you?			
Discusses it with the staff	62.5%	35.71%	40.90%
Communicates the head of staff	62.5%	100%	100%
Registers it in the medical record	87.5%	85.71%	90.90%
Doesn't do anything	-	-	-
There is no pain scale in this institution	-	-	-

\*Dipyrone, Paracetamol, Fentanyl, Lidocaine, Morphine, Codeine, Midazolam, Ketamine according to the medical prescription. \*\*NIPS = Neonatal Infant Pain Scale.

**Table 3.** Non-pharmacological measures for pain control

Questions	Nurse	Nursing technician	Nursing assistant
What are the non-pharmacological interventions performed in the presence of pain?			
Non-nutritive sucking	100%	85.71%	90.90%
Oral glucose/sucrose	25%	14.28%	18.18%
Breastfeeding	100%	85.71%	77.27%
Therapeutic massage	37.5%	50%	40.90%
Touch	62.5%	57.14%	45.45%
Kangaroo method	87.5%	64.28%	86.36%
Easy containment	87.5%	75.57%	50%
Positioning	87.5%	50%	68.18%
Nest	75%	64.28%	63.63%
Decreased auditory stimuli	75%	78.57%	59.09%
Decreased visual stimuli	75%	57.14%	50%
Music therapy	25%	-	9.09%
Do you register the usage of non-pharmacological methods for NB pain relief in a medical record?			
Never	-	21.42%	18.18%
Rarely	12.5%	28.57%	-
Sometimes	25%	-	18.18%
Most of the time	25%	21.42%	18.18%
Always	37.5%	28.57%	45.45%

**Table 4.** Challenges in work routine when performing newborn pain evaluation and relief

Questions	Nurse	Nursing technician	Nursing assistant
Difficulty in evaluating specific signs of pain	-	14.3%	18.2%
Complexity when identifying the initial pain location	-	-	4.5%
Absence of medical conduct	37.5%	14.3%	18.2%
Flaws in staff communication	-	-	4.5%
Need for training on the subject of pain	25%	14.3%	4.5%
Human resources	-	-	4.5%

attributed the evaluation of neonatal pain as an important factor for appropriate management.

The question related to challenges in pain evaluation and relief was not answered by 25% of the nurses, 43% of the technicians and 27% of the assistants. However, 12.5% of the nurses, 21.4% of the technicians and 18% of the assistants said they had no difficulty with this issue. The other difficulties are presented in table 4.

## DISCUSSION

All the professionals participating in the research consider that premature and full-term NB feel pain and recognize the importance of its evaluation. Similar results on the perception and know-

wledge of the nursing staff regarding pain in neonatal patients were presented in other studies<sup>3,21</sup>, however, a study showed that in nowadays it's possible to find professionals who disbelieve in the NB's capacity to feel pain, this fact can be attributed to the absence of specific content in technical and undergraduate courses on the subject and also to the assistance provided, thus allowing this thought to be perpetuated and the pain condition to remain undertreated<sup>5</sup>.

It was verified that most professionals felt able to verbally report their difficulties on the evaluation and treatment of neonatal pain, as well as on the importance of assessing it in these patients, nevertheless, even with the presentation of the FICT and explanation of the confidentiality term, 31.8% of the professionals did not feel comfortable to answer the questions in writing. The staff presented knowledge consistent with the literature on the physiological changes presented by the NB when exposed to pain, however, when answering about the deleterious effects of pain in the long term, some professionals pointed out that pain could favor weight gain and increased hours of sleep, but the literature indicates that prolonged exposure to pain causes generalized stress response. This scenario induces the release of hormones, harmful when released in large amounts, the mobilization of substrates and catabolism favoring weight loss, in addition to alterations in vital signs, cardiac arrhythmias, and damage to brain development, such as permanent changes in the organization of the nociceptive system<sup>8,9,22</sup>.

The tools for pain evaluation in the neonatal period are facilitators based on changes in physiological and behavioral parameters which can be observed before or after the application of a painful stimulus, therefore, behavior is the main source of information that the duly trained professionals<sup>2</sup> have on the neonates and their evaluation must be precise<sup>1,24</sup>. All the nurses know this assessment scale and its use is recommended to them; however, the professionals who most evaluate pain are the nursing technicians and assistants when performing vital signs, added to the fact that on average 52.3% mentioned never having participated in training on the subject.

Registering pain is also important and is part of the staff's attributions since the medical record is a legal document. However, the record of the activities performed is still insufficient and inadequate, both for issues related to habits and staff dimensioning<sup>22,23</sup>. In that regard, 20.5% of the participants on average said that the annotation was placed next to the vital signs record, signaling an inconsistency, because this field is formatted for numerical evaluation of the pain score in patients able to communicate verbally and 2.3% of the participants reported not recording the NB's pain assessment anywhere, neglecting it. This lack of adherence to pain evaluation reinforces the underreporting already pointed out by the studies<sup>13,25</sup>.

When the questions related to the difficulties found in the evaluation and management of neonatal pain were analyzed, there was an emphasis on the absence of medical procedures after the assessment, pointing out to the importance of pharmacological methods in this NICU context, added to the debility in the interprofessional work, providing a longer period of unnecessary exposure to pain and its deleterious effects. Research indicates



that this debility generates a destabilization in the staff, feeling unappreciated and unwelcomed<sup>22,25</sup>.

Still regarding the obstacles experienced by the staff, another emphasis point was the lack of training on the institutional protocols directed to the subject, corroborating the results present in the literature, in which there is an emphasis in the existing gaps between the team's knowledge regarding the evaluation and management of neonatal pain and the absence of training and protocols that are fundamental actions<sup>22,24,25</sup>, constituting a major institutional problem.

The process of pharmacological handling is an interprofessional endeavor counting on the choosing of the drug by the medical professional with the support of the clinical pharmacy staff due to the metabolization, excretion vias and even unknown effects<sup>26</sup>, being finalized by its administration by the nursing team. Among the main drugs mentioned in the survey, there are reservations about the use of dipyrone in the neonatal period due to the lack of pharmacological and clinical studies that exclude risks<sup>8,26</sup> to the NB's health, thus, the non-opioid analgesic of best choice is paracetamol, because of its proven efficacy and safety. Fentanyl has been widely used due to its low side effect rates, making it one of the main drugs of choice, midazolam is also widely used in small doses during short duration procedures and recent studies have reported its option as a sedative, but warn about the increase in adverse neurological events at 28 days of life<sup>8</sup>.

Currently, non-pharmacological measures are an important pillar in the management and treatment of mild pain, in addition to not increasing institutional costs, it's an ally for the nursing staff working in neonatal units<sup>16,21</sup>. The methods most used in this research, such as non-nutritive sucking, breastfeeding and the kangaroo method are in line with the methods widely recommended in the literature, either because they compete positively with the painful stimulus or because they facilitate the NB's reorganization process. However, less mentioned methods, such as the reduction of sound and visual stimuli, are also effective in the reorganization of the NB, in addition to providing neurological protection, especially in the premature<sup>9,11</sup>.

Although the nursing staff has technical knowledge about neonatal pain management, the practice of this care is not widely implemented in NICU services, impacting the quality of care provided. This scenario points to the need of investment in educational strategies<sup>3,25,27</sup>. A continued, and permanent education based on scientific evidence helps professionals to adopt effective and safe control measures for pain prevention and management.

## CONCLUSION

The nursing team showed clarity of hemodynamic changes, consequences of long-term exposure to pain and mastery of non-pharmacological strategies regarding pain in full-term and preterm patients in NICU. There is underreporting of both the presence of pain and its management and the challenges reported are related to the absence of medical conducts after communication of pain, difficulty in assessing specific signs of pain among nursing assistants and technicians and lack of specific training, calling for effective actions for institutional training focused on

the practical part, and in actions that contribute to a truly inter-professional care.

## AUTHORS' CONTRIBUTIONS

### Dayana Mourato Moura

Statistical Analysis, Data collection, Conceptualization, Resource management, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Validation, Visualization

### Talita Pavarini Borges de-Souza

Conceptualization, Project Management, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Supervision, Validation, Visualization

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