

# Pain management in the use of the peripherally inserted central catheter in newborns

*Manejo da dor na utilização do cateter central de inserção periférica em neonatos*  
*El manejo del dolor en el uso del catéter central de inserción periférica en recién nacidos*

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## ABSTRACT

**Objective:** To describe nursing team practices in pain management for newborns submitted to peripherally inserted central catheter (PICC) in neonatal intensive care units (NICU). **Methods:** A descriptive exploratory study with a qualitative approach was performed using semi-structured interviews with nurses and nursing technicians of a NICU of the central region of the state of Rio Grande do Sul, in Southern Brazil. Interviews were transcribed and submitted to thematic content analysis. **Results:** The nursing team considers the PICC insertion to be a painful procedure and uses pharmacological practices such as oral solutions of paracetamol, dipyron and morphine; and non-pharmacological practices such as non-nutritive sucking, 25% glucose and swaddling. **Conclusion:** The practices used are considered to be efficient in the management of neonatal pain during the PICC insertion and they contribute to the qualification of newborn care in intensive care.

**Keywords:** Central Venous Catheter; Neonatal Nursing; Pain Management; Neonatal Intensive Care Units.

## RESUMO

**Objetivo:** Descrever as práticas da equipe de enfermagem no manejo da dor em recém-nascidos submetidos à inserção do cateter central de inserção periférica (PICC) em Unidade de Terapia Intensiva Neonatal (UTIN). **Métodos:** Estudo descritivo, exploratório com abordagem qualitativa, desenvolvido a partir de entrevistas semiestruturadas com enfermeiros e técnicos de enfermagem de uma UTIN da região central do Rio Grande do Sul. As entrevistas foram transcritas e submetidas à análise de conteúdo temática. **Resultados:** A equipe de enfermagem considera a inserção do PICC um procedimento doloroso e utiliza práticas farmacológicas, tais como morfina, dipirona e paracetamol solução oral; e não farmacológicas, como sucção não nutritiva, glicose 25% e *swaddling*. **Conclusão:** As práticas utilizadas são consideradas eficazes no manejo da dor neonatal na inserção do PICC e contribuem para a qualificação do cuidado ao recém-nascido na terapia intensiva.

**Palavras-chave:** Cateteres Venosos Centrais; Enfermagem Neonatal; Manejo da Dor; Unidades de Terapia Intensiva Neonatal.

## RESUMEN

**Objetivo:** Describir las prácticas del equipo de enfermería en el manejo del dolor en recién nacidos sometidos a la inserción del catéter central de inserción periférica (PICC) en una unidad de cuidados intensivos neonatales (UCIN). **Métodos:** Estudio descriptivo, exploratorio con abordaje cualitativo, desarrollado a partir de entrevistas semiestruturadas con enfermeros y técnicos de enfermería de la UCIN de la región central de Rio Grande do Sul. Las entrevistas fueron transcritas y sometidas al análisis de contenido temático. **Resultados:** El equipo de enfermería considera la inserción de PICC un procedimiento doloroso y utiliza prácticas farmacológicas, tales como la morfina, dipirona y solución oral acetaminofeno; y no farmacológicas, como la succión no nutritiva, 25% de glucosa y *swaddling*. **Conclusión:** Las prácticas utilizadas son consideradas eficaces en el tratamiento del dolor neonatal en la inserción del PICC y contribuyen para la calificación de la atención a los recién nacidos en cuidados intensivos neonatales.

**Palabras clave:** Catéteres Venosos Centrales; Enfermería Neonatal; Manejo del Dolor; Unidades de Cuidado Intensivo Neonatal.

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## INTRODUCTION

The advancement of knowledge and technological development in the area of neonatal intensive care, combined with the sophistication of therapeutic resources, has enabled the increase in survival rate of newborns (NBs), especially premature babies. However, a higher number of manipulations, exams and painful procedures are required to guarantee their survival<sup>1</sup>. During hospitalization in the Neonatal Intensive Care Unit (NICU), it is estimated that premature NBs are submitted to 100 painful procedures on average<sup>2</sup>.

Among the painful procedures frequently performed in the NICU, the following stand out: heel puncture, puncture for laboratory exams and endotracheal tube (ETT) suction<sup>1</sup>. Moreover, the insertion of the Peripherally Inserted Central Catheter (PICC) is considered to be a frequent and painful procedure in the care routine<sup>1</sup>.

The PICC consists of a central venous catheter, inserted through a peripheral vein, which enables to infuse drugs, hypertonic solutions and total parenteral nutrition (TPN) into central veins in a safe way and for a long period of time<sup>3</sup>. Among the advantages of the use of this device, the following stand out: preservation of the peripheral vascular network; lower risk of infection when compared to other central venous devices; reduction in pain and stress caused by multiple venous punctures; lower risk of occurrence of chemical phlebitis and fluid extravasation; longer length of catheter use; and reduction of costs<sup>3</sup>. For this reason, such device has been increasingly used in critically ill NB care, especially preterm low-weight ones.

The insertion of the PICC is a painful event, as observed in a study performed in the city of São Paulo, Southeastern Brazil, with a sample of 28 NBs hospitalized in a NICU<sup>4</sup>. The results showed that 71.4% of NBs had scores in the pain assessment scale of the Premature Infant Pain Profile (PIPP) indicating from moderate to severe pain<sup>4</sup>. Additionally, authors observed that, among the 28 newborns submitted to insertion, only six received a certain type of analgesic, thus suggesting the importance of discussing the analgesic practice in the neonatal care routine<sup>4</sup>.

When not cared for, pain can be associated with an increase in morbi-mortality and difficulty to recover from clinical or surgical morbid processes, apart from causing permanent structural and functional reorganization of the nociceptive pathways, which may cause hypersensitivity to painful and painless stimuli and a decrease in pain threshold<sup>5</sup>. Additionally, recurrent pain can promote the onset of cognitive problems and a concentration and attention deficit in school life<sup>5</sup>.

Thus, pain prevention and/or reduction are essential to guarantee both the survival of newborns in a NICU and its quality, in addition to being an important measure of humanized care<sup>6</sup>. Neonatal pain management includes the use of pharmacological measures, such as opioid and non-opioid analgesics, and non-pharmacological measures, such as the administration of glucose or sucrose, non-nutritive sucking, breastfeeding, skin-to-skin contact or Kangaroo Mother Care and reduction in tactile stimulation<sup>7</sup>. A nurse is one of the main professionals responsible

for the insertion, maintenance and removal of the PICC, as well as for the pain prevention, assessment and management resulting from the use of such device.

Considering the fact that the PICC insertion is a painful procedure and that repeated pain can slow down NB recovery, apart from the lack of studies<sup>8</sup> that deal with the practice of pain management associated with the use of such device, the following question arose: What are the pain management practices for NBs submitted to the PICC in the NICU?

Based on this question, pain management during the PICC insertion in newborns was selected as object of study. The present study aimed to describe the practices of the nursing team in pain management in newborns submitted to the insertion of the peripherally inserted central catheter in a neonatal intensive care unit.

## METHODS

A descriptive exploratory study with a qualitative approach was performed from the database of a research project entitled "Nursing Knowledge and Practices in the Use of Peripherally Inserted Central Catheter in Neonatology" and from complementary semi-structured interviews. The production of data for the database was performed between July and August 2014 and the selection criteria of participants (even for complementary interviews) were as follows: nurses who insert the PICC and handle catheters routinely and nursing technicians who help to insert this catheter - permanent workers who were not on a leave during data collection. The place of study was a NICU of a medium - sized public hospital, a reference point in health for the central region of the state of Rio Grande do Sul, in Southern Brazil. The database is comprised of 11 semi-structured interviews, with a mean duration of 24 minutes and including five nurses and six nursing technicians.

Aiming to have access to the database and to complement this study with new interviews, an amendment was submitted to the Research Ethics Committee and approved under CAAE number: 26973914.4.0000.5346. The present research project followed the recommendations of Resolution 466/12 of the National Health Council.

First, a thorough reading of the constant transcriptions in the database was performed. After this pre-analysis, researchers felt the need to obtain further details from participants about the information included in the first interview. Thus, new interviews were conducted with six (two nurses and four nursing technicians) out of the 11 participants, totaling 17 interviews with 11 professionals between February and April 2015.

Through these interviews, professionals were asked about whether they consider the PICC insertion as a painful procedure; whether they use pain management practices in NBs submitted to the PICC insertion; what the practices used in pain management are; and what contributions they bring.

These interviews were performed by a researcher other than the one who conducted the interviews included in the database - after the initial invitation and presentation of the

approved amendment. These interviews were conducted in a NICU room that provided a suitable private atmosphere and they lasted seven minutes on average. Interviews were recorded on audio using an electronic voice recorder and subsequently transcribed for analysis. The data saturation criterion was used to end this stage<sup>9</sup>.

Participants were identified by an alphanumeric code, i.e. P referred to participant, followed by the random numbers established by the database, without distinctions among professional categories.

Thematic content analysis was used<sup>10</sup>, following the stages of pre-analysis, material exploration and treatment of results. Pre-analysis involved material organization and fluctuating reading. During material exploration, coding (identification of units of registration) and categorization (approximation of related units of registration to comprise the thematic categories). Finally, the treatment of results was developed through the interpretation based on the production of national and international knowledge about this theme.

## RESULTS AND DISCUSSION

From the analysis of results, the following three thematic categories arose: Recognizing the PICC insertion as a painful procedure; Pharmacological practices in pain management during the PICC insertion; and Non-pharmacological practices in pain management during the PICC insertion.

### Recognizing the PICC insertion as a painful procedure

The team associates the PICC procedure with the insertion of the peripheral catheter, thus considering it to be painful, as reported below:

*It's a painful puncture, just like the Abocath [peripheral venous catheter], [...] a puncture in your hand, in the arm where the Abocath is [peripheral venous catheter], you see that it tears the skin as it goes in [...], and the PICC puncture is the same thing [...] (P1).*

*[...] Babies actually feel pain! [...] (P2).*

*Because, in fact, it [the PICC insertion] is a puncture in the vein, [...] you insert the needle there, [...], this makes babies cry and feel pain (P4).*

*[...] it's painful indeed, any puncture is painful [...] (P11).*

The team recognizes that the PICC insertion is a painful procedure due to the need for the venous puncture. The painful perception is understood when the NB cries at the moment of the puncture, as well as from the previous experience of participants with the insertion of the peripheral catheter. The team members put themselves in the NB's place, reporting their own experience of pain when punctured.

The remaining aspects, such as handling, tourniquet and skin antiseptics were not identified as painful. Participants are not aware that handling NBs can be understood as a painful practice, associating pain with the exclusive performance of invasive procedures. Considering the PICC as a venous puncture and, as a result, an invasive and painful procedure, justifies the use of analgesic practices.

Neonatal pain only began to be a reason for concern among health professionals and researchers in the 1970s, because newborns were believed to be incapable of feeling pain before that time<sup>6</sup>. During that period, the anatomical pathways responsible for pain were found to be developed in the seventh week of pregnancy and fully spread throughout the body surface in the 20<sup>th</sup> week approximately. Moreover, NBs, especially premature ones, perceive pain more intensely than children and adults, as their inhibitory control mechanisms are immature, limiting their ability to regulate the painful sensation<sup>11</sup>.

Crying was pointed out by participants as an indication of pain in NBs. This finding corroborates a study that showed how nursing professionals value crying when assessing neonatal pain<sup>12</sup>. In addition to crying, motor activity and facial expressions are also behavioral parameters that can undergo changes when there is a painful stimulus, apart from physiological indicators such as heart rate, respiratory frequency, arterial pressure and oxygen saturation. The concomitant assessment of physiological and behavioral parameters provides more accurate information, enabling a valid and reliable evaluation of pain in NBs<sup>7</sup>.

In addition to the commitment to quality of life of NBs in the NICU, analgesia contributes to certain factors associated with the PICC insertion and their clinical condition.

*[...] it reduced the pain and babies were more relaxed, it's easier [the insertion] they don't keep pulling their hand back [...] if they're intubated, sometimes stress makes things worse, saturation falls, or if they're in an open environment, saturation falls, everything gets harder! (P1).*

*[...] [it influences] the patients' condition, if they're crying, if they're very active, [...] some babies cry a lot, so when we puncture them, they'll cry, they'll get restless, we won't make it [insertion of the PICC], [...] this makes them decide for analgesia. [...] it helps a lot, [...], even our mental state, because it's awful to do a procedure while a child keeps crying [...]. Both for the success of the PICC insertion [...] and for the baby too, who stays calm, [...], it reduces their pain (P4).*

*Even to help nurses who are puncturing a vein, with restless babies under the surgical drapes, it's impossible [...] (P11).*

Among the justifications for the use of analgesic practices, the nursing team associates the need to soothe NBs to successfully install the PICC. Participants acknowledge that NBs become

restless and cry during painful practices, a reaction described as a factor that causes difficulties and failures in the procedure. They state that the adoption of analgesic practices helps to alleviate pain in NBs and, consequently, reduces clinical repercussions, apart from decreasing the stress of professionals who experience failures in the procedure and/or witness the NB's painful sensation.

Studies do not reveal that conditions of restlessness are associated with a higher number of attempts of venous punctures, a longer time of installation of the PICC, and a non-central position of the tip of the catheter. In this sense, how easy it is to insert the PICC and how long it takes to perform this procedure are probably associated with other factors such as venous network conditions and professional experience, not only limb movement and restlessness of NBs<sup>9</sup>.

The reports reveal an ethical commitment of the nursing team to the promotion of analgesia in NBs submitted to the PICC insertion. The experience of inserting a PICC in a newborn who shows painful expressions is a factor that causes suffering in professionals. This feeling can be perceived from experiences which reveal that health care provided to NBs experiencing pain requires responsibility and respect<sup>13</sup>.

### **Pharmacological practices in pain management during the PICC insertion**

The administration of pharmacological agents is used when one aims to handle analgesia, as painful invasive procedures causing severe and intense pain are present<sup>12</sup>.

With regard to pharmacological practices, participants described that the most frequently used were: *morphine* (P1; P2; P4; P6; P7; P8; P9; P10; P11), *dipyrone* (P7; P8) and *paracetamol* drops (P1; P6), administered according to medical prescription.

Opioid analgesics are the most important form of pain treatment in critically ill NBs. Morphine stands out among them, a powerful analgesic and sedative, which begins to act one minute after administration and whose analgesic effect lasts between six and seven hours, while its sedative effect lasts between one and three hours. Its mechanism of action involves the activation of opioid receptors spread throughout the central nervous system, which inhibit the transmission of nociceptive stimulus to upper centers, in addition to activating descending cortical pathways that inhibit pain, thus leading to analgesia<sup>7</sup>.

Non-steroidal anti-inflammatory drugs (NSAIDs) stand out in the group of non-opioid analgesics, which are recommended in cases of mild pain and as an adjunct in the treatment of moderate to severe pain and when pain is associated with an inflammatory process<sup>12</sup>. Among the drugs found in this group, paracetamol is the only safe analgesic to be used in NBs. However, in Brazil, the presentation of its parenteral use does not exist, restricting its utilization, depending on the clinical condition of NBs hospitalized in the NICU<sup>7</sup>.

Next, some excerpts from participants' reports on pharmacological practices are highlighted:

*[...] If the baby is intubated, a Dimorf® [morphine] can be done [...] (P1).*

*[...] it's used more often when babies are restless and on mechanical ventilation [...] (P7).*

*[...] if the baby is restless and intubated, a Dimorf® [morphine], but only if it's intubated [...] (P8).*

Thus, participants point out some recommended uses of morphine, among which are the use of mechanical ventilation and restlessness. Corroborating data from this study, which concluded that NBs breathing spontaneously are 28% less likely to receive opioids than newborns those on mechanical ventilation<sup>14</sup>. Although such analgesic practice is frequent in this unit, some participants mentioned that morphine should be used with caution, due to possible side effects caused by this drug, as described below:

*[...] there are those [physicians] who don't even like to give Dimorf® [morphine], [...] because they say it [morphine] causes apnea (P4).*

*[...] they're at risk later on, I've already done the Dimorf® [morphine] and it caused apnea [...] (P10).*

Reports show the team's fear of using morphine, due to the risk of apnea. It is known that, among the side effects of morphine, the most serious one in NBs is respiratory depression<sup>7</sup>. Thus, they emphasize the importance of specific care when morphine is the drug of choice for pain management in newborns submitted to the PICC insertion, as described below:

*[...] we have to care for the newborn to see if it's breathing well, especially if the monitor is on, because it stays under all those cloths (P5).*

*[...] you got to keep controlling, monitoring and caring for them [NBs] (P6).*

Placing surgical drapes during the PICC insertion prevents professionals from observing NBs. Therefore, participants pointed out the need to continuously monitor the vital signs in such situation.

Moreover, the results indicated that pharmacological practices can be associated with non-pharmacological ones, as observed in the following report:

*[...] we use a pacifier [non-nutritive sucking] just like Dimorf® [morphine], because they don't get to sleep with the Dimorf® dose [morphine], it's just to relax them (P11).*

The association between analgesic practices, non-nutritive sucking with morphine, optimizes the analgesic action, promoting

comfort to NBs. Thus, when pharmacological strategies are associated with non-pharmacological ones, the analgesic effects become more powerful<sup>15</sup>.

To achieve this, pharmacological practices are frequent in the routine of nursing professionals in neonatal intensive care. Additionally, morphine is the one most often used and it is considered to be efficient to promote an analgesic effect during the installation of the PICC.

### Non-pharmacological practices in pain management during the PICC insertion

Non-pharmacological interventions aim to reduce aggressive stimuli from the environment and stress and to prevent physiological and behavioral changes in NBs. Among the advantages of these interventions, the following stand out: low cost, easy administration and almost immediate analgesic effect<sup>6,8</sup>. In the case of mild pain, they can be used individually and pharmacological analgesia should be included in the presence of moderate to severe pain<sup>12</sup>.

The non-pharmacological practices used by participants in this study in the pain management of NBs submitted to the PICC insertion are described as follows:

*[...] 25% glucose, [...] to keep them swaddled up [...] and, [...] with our finger in their mouth [...] (P4).*

*[...] to put our gloved finger, [...], put some glucose for them to suck and soothe them, [...] to leave them swaddled up [...] (P6).*

*[...] someone holds them all swaddled up, those who put a pacifier in their mouth and 25% glucose [...] it works for puncture [sucking associated with glucose]. They feel calmer, because babies without a pacifier like this, without sucking, if you have to puncture a vein, they'll cry, it takes a long time to calm them down, but with the pacifier, [...], they complain just a little and continue to suck it quietly, as if you were doing nothing. It makes a good difference (P11).*

The non-pharmacological practices most frequently used in the NICU are non-nutritive sucking with a gloved finger or pacifier, 25% glucose and swaddling. Moreover, P11 emphasized the efficacy of sucking associated with glucose, stating that NBs sucking a pacifier with glucose show a reduced response to pain, compared to those who are not making use of this analgesic practice.

Sweetened solutions release endogenous opioids as they act in the taste buds, located in the anterior part of the tongue and responsible for the identification of the sweet taste<sup>15,16</sup>. This justifies the reason for which such solutions should not be administered through nasogastric tubes, as the effect does not depend on the intake of substances, but rather the taste perception produced by them. Among the solutions most frequently studied, sucrose and glucose show the best analgesic effect<sup>15</sup>.

With regard to the administration of 25% glucose to promote analgesia, the use of 1 ml of glucose solution at 25% by oral route is recommended, approximately one to two minutes before the painful procedure. In premature NBs, the recommended volume varies from 0.3 to 0.4 ml<sup>5</sup>. The literature shows that 25% glucose is capable of reducing scores in the PIPP (Premature Infant Pain Profile) scale, apart from the incidence and duration of crying during heel puncture, when compared to breast milk<sup>16</sup>.

Glucose can be added to the sucking, thus contributing to the efficacy of the analgesic practice and being considered as the most frequently used non-pharmacological intervention in pain management, in addition to being efficient and safe<sup>5</sup>.

Non-nutritive sucking can reduce hyperactivity and regulate newborns' discomfort, apart from decreasing the pain of term and premature newborns submitted to painful procedures<sup>15</sup>. Its effects are associated with the increase in oxygenation, improvement in respiratory and gastrointestinal functions and reduction in heart rate and energy expenditure. These benefits occur if newborns are performing more than 30 suction per minute, when serotonin is released<sup>5</sup>.

With regard to non-pharmacological practices, swaddling is one of the most frequently used ones in NICUs. In the perspective of the nursing team, its importance is emphasized as follows:

*[...] if you're going to do it [puncture] in the upper right limb, you swaddle the newborn, even the arm is swaddled, so they'll feel safer and won't hit themselves [...] (P3).*

*[...] they [NBs] feel more protected, [...], more comfortable, because if we let them loose, they keep moving their little arms and legs, so this way it seems they are more protected [swaddled] [...] (P4).*

*[...] every baby stays calm when it's swaddled up, they're tight inside their moms, [...], some babies sleep all day if they're swaddled. [...] they feel more protected (P11).*

Participants emphasized that swaddling enables comfort and safety for NBs, attributed to the limited physical space it provides, an analogy with the maternal womb.

Swaddling aims to restrict newborns, allowing for self-regulation and, consequently, reducing the stress caused by motor disorganization associated with stimuli, apart from inducing sleep and enabling thermal control<sup>17</sup>. Swaddling is achieved by wrapping newborns with a sheet or blanket, with their lower limbs flexed; head, shoulders and hips at a neutral position, without rotation; and hands free to explore. This technique, often used with the purpose of achieving newborns' neurofunctional organization, also helps to reduce the pain and stress caused by painful procedures<sup>18</sup>.

When compared to massage, swaddled newborns cried less during painful procedures, showing that swaddling is a non-pharmacological practice which is efficient to relieve their pain<sup>17</sup>.

There are some obstacles to the use of non-pharmacological practices, described by participants as follows:

*[...] we used non-nutritive sucking a lot, we'd give them our finger to suck and so on, but we had nobody to help us [...]* (P2).

*[...] there must be an employee there to help with the glucose and the pacifier too* (P7).

*[...] in situations when you have others helping you, you give them a pacifier [...]* (P9).

*[...] there are professionals [...] who only use glucose, they pick another employee, who puts glucose in the baby's mouth, comforting them [...]* (P10).

The limitation described for the use of non-nutritive sucking associated with 25% glucose or not refers to the fact that only one professional is required for newborn pain management, in addition to those already involved in PICC insertion procedures. Many times, it is not possible for more than one professional to perform this, due to the limited number of professionals in the team.

A study conducted with neonatal and pediatric intensive care showed that the number of nursing professionals is inadequate and, as a result, it affects the effectiveness of pain assessment and management<sup>19</sup>.

Apart from the need for more than one professional to use 25% glucose, P1 describes another limitation with regard to the use of this analgesic practice:

*[...] there are doctors who say we can't use it [25% glucose], [...] because it was increasing the babies' BGT, [...]* (P1).

Through P1's report, it could be observed that physicians of the previously mentioned unit were afraid of using 25% glucose to minimize the pain resulting from the PICC insertion procedure, a fact attributed to the increase in the newborns' capillary glycemia. In highly premature NBs, the main short-term side effects of glucose administration were episodes of bradycardia and oxygen desaturation<sup>20</sup>.

However, the nursing team considers the use of efficient non-pharmacological practices individually or associated with pharmacological practices. Non-nutritive sucking, 25% glucose by oral route and swaddling are considered by this team to be safe and efficient analgesic practices adaptable to NICU services.

One of the limitations of this study was the fact that it was performed in a single NICU of the central region of the state of Rio Grande do Sul. It should be emphasized that new studies are required, especially on analgesia during the PICC insertion.

## CONCLUSION

The nursing team recognizes that the PICC insertion is a painful procedure, thus justifying the use of analgesic practices. Moreover, participants mentioned the following as reasons for the adoption of analgesia: the need to maintain the NBs'

calm during the procedure, alleviation of pain, and reduction of professional stress.

The commitment of nursing professionals with newborn pain prevention and treatment during the PICC insertion is identified at the moment when the suffering resulting from the painful sensation is perceived by these professionals.

The results showed that this team uses pharmacological practices such as morphine, dipyrone and paracetamol by oral route and non-pharmacological practices such as non-nutritive sucking, 25% glucose and swaddling. However, some of the analgesic practices that are recognizably efficient and safe were not mentioned in this study.

It is believed that the present study contributed to the identification of the potentialities and vulnerabilities regarding analgesic practices in the PICC insertion procedure. In this sense, we sought to promote a reflection on the need to change health professional practices, an investment in continuing education aimed at neonatal care qualification and humanization in NICU.

## REFERENCES

1. Gaíva MAM, Blanco e Silva F, Azevedo FM, Rubira EA. Procedimentos dolorosos em recém-nascidos prematuros em unidade terapia intensiva neonatal. *Arq. Ciênc. Saúde* [periódico na internet]. 2014 jan/mar;[citado 2015 maio 25];21(1):48-54. Disponível: [http://repositorio-racs.famerp.br/racs\\_ol/vol-21-1/v21-1.htm](http://repositorio-racs.famerp.br/racs_ol/vol-21-1/v21-1.htm)
2. Chen M, Shi X, Chen Y, Cao Z, Cheng R, Xu Y et al. A prospective study of pain experience in a neonatal intensive care unit of China. *Clin. J. Pain* [on line]. 2012 out;[cited 2015 may 19];28(8):700-4. Available: <http://www.ncbi.nlm.nih.gov/pubmed/22156826>
3. Belo MPM, Silva RAMC, Nogueira ILM, Mizoguti DP, Ventura CMU. Conhecimento de enfermeiros de neonatologia acerca do cateter venoso central de inserção periférica. *Rev. bras. enferm.* 2012 jan/fev;[citado 2015 maio 19];65(1):[aprox. 7 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0034-71672012000100006&lng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672012000100006&lng=en). <http://dx.doi.org/10.1590/S0034-71672012000100006>
4. Costa P, Camargo PP, Bueno M, Kimura AF. Dimensionamento da dor durante a instalação do cateter central de inserção periférica em neonatos. *Acta Paul. Enferm* [on line]. 2010;[citado 2015 maio 19];23(1):[aprox. 6 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0103-21002010000100006&lng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002010000100006&lng=en). <http://dx.doi.org/10.1590/S0103-21002010000100006>
5. Oliveira RM, Silva AVS, Silva LMS, Silva APAD, Chaves EMC, Bezerra SC. Implementação de medidas para o alívio da dor em neonatos pela equipe de enfermagem. *Esc Anna Nery* [on line]. 2011 abr/jun;[citado 2015 maio 25];15(2): 277-283. Disponível: [http://www.scielo.br/scielo.php?pid=S1414-81452011000200009&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S1414-81452011000200009&script=sci_arttext)
6. Tassinari RF, Hahn GV. Intervenções de enfermagem para o alívio da dor de recém-nascidos. *Pediatr. Mod.* [periódico na internet]. 2013 jun;[citado 2015 maio 19];49(6):[aprox. 8 telas]. Disponível em: [http://www.moreirajr.com.br/revistas.asp?fase=r003&id\\_materia=5414](http://www.moreirajr.com.br/revistas.asp?fase=r003&id_materia=5414)
7. Capellini VK, Daré MF, Castral TC, Christoffel MM, Leite AM, Scochi CGS. Conhecimento e atitudes de profissionais de saúde sobre avaliação e manejo da dor neonatal. *Revista Eletrônica de Enfermagem* [on line]. 2014 abr/jun;[citado 2015 maio 25];16(2):361-9. Disponível: <http://h200137217135.ufg.br/index.php/fen/article/view/23611>
8. Costa P, Bueno M, Oliva CL, Castro TE, Camargo PP, Kimura AF. Analgesia e sedação durante a instalação do cateter central de inserção periférica em neonatos. *Rev. Esc. Enferm. USP* [periódico na internet]. 2013 ago;[citado 2015 maio 19];47(4):[aprox. 7 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0080-62342013000400801&lng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342013000400801&lng=en). <http://dx.doi.org/10.1590/S0080-62342013000400801>

9. Fontanella BJB, Luchesi BM, Saidel MGB, Ricas J, Turato ER, Melo DG. Amostragem em pesquisas qualitativas: proposta de procedimentos para constatar saturação teórica. *Cad. Saúde Pública* [on line]. 2011 fev;[citado 2015 maio 19];27(2):[aprox. 6 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0102-311X2011000200020&Ing=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2011000200020&Ing=en). <http://dx.doi.org/10.1590/S0102-311X2011000200020>
10. Bardin L. *Análise de conteúdo*. São Paulo: Edições 70; 2011.
11. Veronez M, Corrêa DAM. A dor e o recém-nascido de risco: percepção dos profissionais de enfermagem. *Cogitare enferm.* [on line]. 2010 abr/jun;[citado 2015 maio 25];15(2):263-70. Disponível: <http://ojs.c3sl.ufpr.br/ojs/index.php/cogitare/article/view/17859>
12. Caetano EA, Lemos NRF, Cordeiro SM, Pereira FMV, Moreira DS, Buchhorn SMM. O recém-nascido com dor: atuação da equipe de enfermagem. *Esc Anna Nery* [on line]. 2013 jul/ago;[citado 2015 maio 25];17(3):[aprox. 7 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1414-81452013000300439](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452013000300439)
13. Lélis ALPA, Farias LM, Cipriano MAB, Cardoso MVLML, Galvão MTG, Caetano JA. Cuidado humanístico e percepções de enfermagem diante da dor do recém-nascido. *Esc Anna Nery* [on line]. 2011 out/dez;[citado 2015 maio 25];15(4):[aprox. 6 telas]. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1414-81452011000400006&Ing=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452011000400006&Ing=en). <http://dx.doi.org/10.1590/S1414-81452011000400006>
14. Taddio A, Pulleyblank R, Stephens D, McNair C, Shah V. Canadian neonatologist practices regarding opioid use in ventilated and spontaneously breathing infants undergoing medical procedures. *Clin J Pain* [on line]. 2010 jun;[citado 2015 maio 27];26(5):[aprox. 7 telas]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/20473050>
15. Motta GCP, Cunha MLC. Prevenção e manejo não farmacológico da dor no recém-nascido. *Rev. bras. enferm.* [on line]. 2015 jan/fev;[citado 2015 maio 25];68(1):422-8. Disponível: [http://www.scielo.br/scielo.php?pid=S0034-71672015000100131&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0034-71672015000100131&script=sci_arttext)
16. Bueno M, Stevens B, de Camargo PP, Toma E, Krebs VL, Kimura AF. Breast milk and glucose for pain relief in preterm infants: a noninferiority randomized controlled trial. [on line]. 2012 abr; [citado 2015 maio 25];129(4):664-70. Available: <http://www.ncbi.nlm.nih.gov/pubmed/22392169>
17. Van Sleuwen BE, Engelberts AC, Boere-Boonekamp MM, Kuis W, Schulpen TW, L'Hoir MP. Swaddling: a systematic review. *Pediatrics* [on line]. 2007 out;[citado 2015 maio 25];120(4): 1097-106. Available: <http://www.ncbi.nlm.nih.gov/pubmed/17908730>
18. McNair C, Campbell Yeo M, Johnston C, Taddio A. Nonpharmacological management of pain during common needle puncture procedures in infants: current research evidence and practical considerations. *Clin. perinatol.* [on line]. 2013 set;[citado 2015 maio 25];40(3):[aprox. 16 telas]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/23972753>
19. Santos MZ, Kusahara DM, Pedreira MLG. Vivências de enfermeiros intensivistas na avaliação e intervenção para alívio da dor na criança. *Rev. Esc. Enferm. USP* [on line]. 2012 out;[citado 2015 maio 25];46(5):493-508. Disponível: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0080-62342012000500006](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342012000500006)
20. Bueno M, Yamada J, Harrison D, Khan S, Ohlsson A, Adams-Webber T et al. A systematic review and meta-analyses of nonsucrose sweet solutions for pain relief in neonates. *Pain Res. Manag.* 2013 maio/jun;[citado 2015 maio 31];18(3):153-61. Available: <http://www.ncbi.nlm.nih.gov/pubmed/23748256>