PAIN RELIEF TECHNOLOGIES IN NEONATAL CARE UNITS: AN INTEGRATIVE REVIEW OF LITERATURE

ABSTRACT
Objective: to analyze the pain relief technologies for neonates (NB) undergoing painful procedures in Neonatal Care Units. Methodology: this is an integrative review of literature comprised of research in the BDENF, LILACS, SciELO, MEDLINE and the Cochrane Library using controlled keywords “Neonatal ICU” , “pain”, “care” and “analgesia”. The study took place from the questioning, what and how technologies are used for pain relief in neonates in the ICU. Delimited as inclusion criteria, full text, which deal with the subject and published in the period 2002-2011, and exclusion, studies not consistent with the research proposal and duplicate articles. Was employed for analysis, lifting bibliographic, reading exploratory, selective reading, analytical reading, interpretive reading and preparation of text summarizing the results. Results: there were 15 (fifteen) scientific productions analyzed, which were grouped on charts and tables systematically describing studies’ properties, emphasizing the key technologies (pharmacological and non-pharmacological therapies) in neonborn pain relief care, clinical applicability and indication methods. Conclusion: safety and effectiveness in pharmaceutical therapies is a relevant fact to be considered by the healthcare professionals upon facing the clinical implication in favor of the newborn, therefore, such actions should be incorporated in daily professional nursing, together with the humanized care.

RESUMO
Objetivo: analisar as tecnologias do alívio à dor em recém-nascidos submetidos a procedimentos dolorosos em Unidade de Terapia Neonatal. Metodologia: estudo de revisão integrativa de literatura consolidada a partir da pesquisa nos bancos de dados BDENF, LILACS, SciELO, MEDLINE e Biblioteca Cochrane utilizando descritores controlados “UTI neonatal”, “dor”, “cuidado” e “analgesia”. A pesquisa se deu a partir dos questionamentos: quais as tecnologias de alívio à dor são utilizadas em neonatos em UTI? Como são utilizadas as tecnologias de alívio à dor em neonatos em UTI? Delimitou-se como critérios inclusão texto no intargo, que versem sobre a temática e publicado no período de 2002-2011; e exclusão, estudos não condizentes com a proposta de pesquisa e artigos duplicados. Empregou-se para análise, levantamento bibliográfico, leitura exploratória, leitura seletiva, leitura analítica, leitura interpretativa e elaboração do texto sintetizando os resultados os quais foram agrupados em figuras. Resultados: analisaram-se 15 produções científicas, que se agruparam em tabelas e ainda sistematicamente descrevem as propriedades dos estudos enquavitando as principais tecnologias do cuidado do alívio da dor no recém-nascido, os métodos de aplicabilidade e indicações clínicas, considerando os marcadores fisiológicos, sensitivos e comportamentais do neonato. Conclusão: segurança e eficácia nas terapias farmacológicas é um fato relevante a ser considerado pelos profissionais perante os cuidados prestados frente à implicância clínica em favor do recém-nascido, portanto, ações dessa natureza devem estar no cotidiano do profissional da enfermagem, juntamente ao cuidado humanizado.

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Pain relief technologies in neonatal care units...

Therefore, on behalf of health care providers raised the inquiry about the issue derived from the following question: What pain relief technologies are currently used with newborns in Neonatal therapy Units and how?

Therefore, this article aims to analyze pain relief technologies in NBs through an integrated literature review.

METHOD

This is an integrated literature review because it presents the condition, finding strong evidence to review existing research related to a broad methodological approach, allowing the inclusion of non-experimental and experimental studies for the understanding of the analyzed phenomenon.

The research from studies is conducted in the following databases: BDENF (Data Bank on nursing), LILACS (Latin American and Caribbean System on Health Sciences Information), MEDLINE (Medical Literature Analysis and Retrieval System Online), ScIELO (Scientific Electronic Library Online) and in the Cochrane library.

For the location of the studies, controlled keywords were used: “Neonatal ICU”, “pain”, “care” and “analgesia” in the Portuguese language and/or in its derivations in the English language.

Later research using these keywords, the review from studies, excluding those not consistent with the criteria and the proposed research and duplicated productions were conducted.

The inclusion criteria were studies that have addressed the: articles with full text, articles that touch on the proposed theme and published in the last ten years (2002-2011).

Following established criteria, by systematic stage analysis of the research literature was employed, considering: the primary literature in the databases mentioned above, the reading of exploratory studies, verifying the feasibility of the studies found for the literature review, the selective reading, analyzing, specifically, the relevance of the studies, the analytical reading, summarizing the information found in a critical way, interpretative reading, articulating the knowledge learned in all the studies reviewed, and preparation of the final text summarizing the results of the literary research.

The studies on this research were based on data collected gathered in tables so that their
The systematic analysis of 15 productions relevant to the research which will be described in two axes. The first will be submitted to the characterization of the studies in synoptic tables (Tables 1, 2 and 3) highlighting the name of the article, country of production and year of publication, methodology and the technology used, as well as systematically describing the properties of the literary review studies (2011), emphasizing that the technologies employed are consistent with the similarity between them; and then put into relevant the reports brought about by theoretical studies emphasizing the methods of using the care technologies in relief, reduction or cessation of pain in newborns hospitalized in the Neonatal Intensive Care Units.

There were 171 articles selected for research methodology, of which 156 were excluded because temporal dimension, not available in its entirety, as well as studies with discordant themes. There were also accounts of duplicate articles that by reason of consistency variables were placed in exclusion, totaling only 1 study. At the end of the research, the remaining 15 studies are to be discussed.

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The 15 studies included in the review, most of them were published in the last five years, of which 12 are international (80%) and three national (20%). They have the virtue of evidence, as they are studies with methodological designs and high clinical examination accuracy, a fact considered positive for this study.

<table>
<thead>
<tr>
<th>Title</th>
<th>Country and Year</th>
<th>Methodology:</th>
<th>Technology used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain assessment in preterm infants during respiratory physiotherapy</td>
<td>Brazil, 2008</td>
<td>Longitudinal Prospective</td>
<td>Sweet solutions, positioning, tactile stimulation and respiratory therapy</td>
</tr>
<tr>
<td>Oral sucrose and a pacifier for pain relief during simple procedures in newborn preterm infants: a randomized controlled study</td>
<td>Saudi Arabia, 2009</td>
<td>Double-blind, randomized and controlled</td>
<td>Sucrose solution to 24% combined with pacifier</td>
</tr>
<tr>
<td>Kangaroo mother care diminishes pain from heel lance in very preterm neonates: A crossover trial</td>
<td>Canada, 2008</td>
<td>Crossover Study, randomized single-blind</td>
<td>Kangaroo Mother Method</td>
</tr>
<tr>
<td>Sucrose for analgesia in newborn infants undergoing painful procedures</td>
<td>Canada, 2004</td>
<td>Systematic Review</td>
<td>Sucrose solution at 24%</td>
</tr>
<tr>
<td>Skin-to-skin care is procedural pain in neonates [protocol]</td>
<td>Canada, 2011</td>
<td>Review Protocol</td>
<td>Skin-to-skin contact of the baby with another person (mother, father, professional)</td>
</tr>
</tbody>
</table>

Figure 2. Technologies for non-pharmacological pain relief in neonates.

Health Technology must not be identified by only products, but also by knowledge and tools that can be used in various areas of health care. In this respect the non-pharmacological therapies have an important role in relieving pain in newborns.

The sugary solutions (sucrose 24%) are widely used in some Neonatal Care Unit services. Generally, they use a method quite conventional and easy to administer. The professional administers the volume of 0.5 ml or 0.12 g of solution combined with a pacifier or syringe, orally offered for 30 seconds to 2 minutes before the painful procedure. This method is employed to relieve tracheal
cannula pain from mechanical ventilation; vein, arterial and calcaneal punctures. It is believed that the time interval coincides with the release of endogenous opioids through the bloodstream.\textsuperscript{8,9,11}

Another non-pharmacological therapy which also deserves mention, which the affection between mother and child, and the Kangaroo Mother Method (KMM). The baby wears diapers while in the vertical position with an angle of approximately 60°, between the mother’s breasts, giving maximum contact between the baby’s skin and the mother’s. Clothes and a blanket are placed on the child’s back and bent on both sides of the mother. The baby remains in this position for at least 15 minutes before the painful procedure.\textsuperscript{10,12}

The KMM is strongly recommended for premature newborns of 28-36 weeks, the mothers are allowed to speak to their child, reducing the pain response, the sucrose can also use as an adjuvant.

\begin{table}
\centering
\begin{tabular}{|l|l|l|l|}
\hline
Title & Country and Year & Methodology: & Technology used \\
\hline
Factors related to use of systemic analgesia in neonatology\textsuperscript{13} & Brazil, 2008 & Literature review & Morphine, Fentanyl, Remifentanil; Non-opioids: Paracetamol \\
\hline
Frequency of analgesics usage in university neonatal intensive care units \textsuperscript{14} & Brazil, 2005 & Prospective cohort study, observational and multicentric & Fentanyl, Lidocaine and Morphine \\
\hline
Feasibility of sedation and analgesia interruption following cannulation in neonates on extracorporeal membrane oxygenation\textsuperscript{15} & USA, 2010 & Observational Prospective & Morphine, Fentanyl and Midazolam and Phenobarbital \\
\hline
Intravenous midazolam infusion for sedation of infants in the intensive care unit neonatales \textsuperscript{16} & Canada, 2002 & Systematic Review & Midazolam \\
\hline
Opioids for neonates receiving ventilation\textsuperscript{17} & Italy, 2007 & Systematic Review & Morphine, Fentanyl, Alfentanil, Sufentanil \\
\hline
Drugs of Choice for Sedation and Analgesia in the NICU\textsuperscript{18} & USA, 2009 & Literary Review & Opioids: Morphine, Fentanyl, Benzodiazepines, Barbiturates; Non-opioids: NSAIDS. \\
\hline
\end{tabular}
\caption{Pharmacological Technologies (opioids) for the relief of pain in neonates.}
\end{table}

In referring to pharmacological therapies, opioids are found in all neonatal care services. It is noted that the frequency of analgesic use in neonates is a substantial practice, however, it is known that the effects of these drugs are harmful to the newborn, respiratory depression may occur, chest wall rigidity, tolerance, withdrawal and dependence.\textsuperscript{13-14}

On the other hand, it is also known that opioid analgesics are extremely important in various and numerous achievements of painful procedures such as arterial, lumbar, capillary and venous punctures. The use of opioids is widely accepted in the Neonatal Therapy Unit during more invasive procedures by means of “protocoles” established in the intervention of pain, especially when the intensive care not objectively describes the pain felt (without correct measurement) by the newborn infant, such as insertions of central catheter, necrotizing enterocolitis, insertion of drains, tracheal cannula insertions for Extra Corporeal Oxygenation and also Mechanical Ventilation (MV), in which the opioid is administered for the reduction of pain and stress and to avoid further complications.\textsuperscript{14-18}

With this understanding, the main opioids are morphine infused intermittently from 0.05 to 0.2 mg / kg / dose and continuous administration in newborns accordance 5-20 mcg / kg / hour and premature 2 10 mg / kg / hour; fentanyl have rapid action hemodynamic stability being intermittently administered 1-4 mg / kg 2-4 hours for continuous administration in the newborn at term from 0.5 to 3 mg / kg / hour and premature 0.5 to 2 mg / kg / hour.\textsuperscript{13-15}

Remifentanil is also a commonly used synthetic opioid; the doses vary according to the objective, bolus infusion for 1 to 3μg/kg intubation and for continuous infusion of 0.1 to 5μg/kg/minute.\textsuperscript{13}

Other opioids are cited for analgesia, namely: Phenobarbital, Midazolam, alfentanil, sufentanil, pethidine, meperidine, codeine, but the use selective is indicated based on the clinical evaluation of pain indicators.\textsuperscript{15-18}
The non-opioid pharmacological technologies are highlighted in different intensive non-intensive therapeutic events, analgesics are administered during pre-medication for pain relief and to sedate the newborn.

The tetracaine gel 4% was assessed at a hospital in Ottawa, Canada, before the dosage: 1.1g of tetracaine on the skin 30 minutes prior to venipuncture, the gel must be removed before this procedure. It is valid to point out that this method was not seen in neonates with immature skin, with suspicion or evidence of abnormalities in the Central Nervous System (CNS), those who receive opioids or sedatives and those with facial abnormalities, thus making the interpretation of pain through facial expression. In this aspect, physiological indicators of pain were recorded (heart rate, blood pressure, respiratory rate and oxygen saturation).19

Under the statistical power, topical tetracaine is safe, but does not significantly decrease pain in venipuncture procedures. 19

Proparacaine, a topical anesthetic eye was studied in infants undergoing screening for Retinopathy of Prematurity (ROP). Proximetacaine was instilled in the eye at least 30 seconds before the examination. The anesthetic action is one to five minutes it was identified due to the pain assessment findings - in the fifth minute the expressions of pain are lower than in the first minute, therefore the pain was not eliminated.20

Propofol is already a parenteral anesthetic, and feasible in newborns for intubation, significantly reducing the duration of preparation, procedure time and post-procedure recovery. There is no increase in the incidence of side effects attributable to Propofol, however, more recent studies indicate that this drug has an impact on the heart rate, oxygen saturation and blood pressure.21

Regarding the anesthetic drugs, anxiolytics and anticholinergics, in the same way as some opioids, the administration protocols are “accountable” for the use in neonatal units, because the safety of this is not yet defined.21-2

CONCLUSION

This review disposed knowledge how the care technologies in Neonatal Care Units are used and what their purposes are. In this same aspect, the use of the main drugs and non-drugs was highlighted, in order to update, the caregiver subjects, in particular the intensivists, the most effective means for the relief and/or cessation of pain and avoiding the consequences in the care process.

The non-pharmacological therapies deserve mentioning by way of medical care as they are knowledge developed so that newborns will be subjected to less aggravating procedures, thus promoting recovery.

With respect to pharmacological therapies, in turn, providers should evaluate the efficacy and safety of the newborn to indicate the administration of certain therapies in these conditions; one needs a more thorough analytical judgment and a careful approach to have practical clinical implications in favor of the newborn.

Evidently, the results of this research are limited, a fact that implies other questions. Therefore, the contributions of this study sought provide reflections from clinical practice and their controversies, as well as the professional posture facing pain in the newborn.

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