



## REVISIONES

### The philosophy of the developmental centred care of the premature infant (NIDCAP): a literature review

La filosofía de los cuidados centrados en el desarrollo del recién nacido prematuro (NIDCAP): una revisión de la literatura

David Harillo Acevedo <sup>1</sup>  
Juan Ignacio Rico Becerra <sup>2</sup>  
Ángel López Martínez <sup>3</sup>

<sup>1</sup> Nurse. Specialist in Pediatrics, and Obstetrics and Gynecology. Academic associate professor of the Faculty of Sociosanitary Sciences of the Campus of Lorca, University of Murcia. Spain.

<sup>2</sup> Nurse. Doctor of Anthropology. Professor of the Faculty of Sociosanitary Sciences of the Campus of Lorca, University of Murcia. Spain.

<sup>3</sup> Nurse.

E-mail: [dharilloa@hotmail.com](mailto:dharilloa@hotmail.com)

<http://dx.doi.org/10.6018/eglobal.16.4.263721>

Received: 17/07/2016

Accepted: 16/09/2016

#### ABSTRACT:

**Objective:** The purpose of this bibliographic revision is to have a better understanding of the philosophy of developmental centered care of the premature infant: NIDCAP. These interventions are aimed at optimising the macroenvironment and microenvironment, together with actions aimed at the family in order to promote stability and the organisation of the development and behaviour of the premature newborn; and from here, to evaluate the effectiveness of its application.

**Methodology:** The methodology stems from a bibliographic research (using inclusion and exclusion criteria) in Spanish and English language, during the period between 2010 and 2015. The data bases used are the following: PUBMED, THE COCHRANE LIBRARY, SCOPUS, CUIDEN, DIALNET, LILACS, TDR y GOOGLE ACADÉMICO (certain official web pages have also been used).

**Results:** They have been focused on the revision of macroenvironment (light, noise), microenvironment (posture, manipulation, pain), the family (parents as main caretakers of the premature infant, Kangaroo Method, breastfeeding) and the evaluation of the effectiveness of NIDCAP implementation.

**Discussion:** It is basically aimed at the consideration of NIDCAP from the perspective of reality (prematurity as the main cause of neonatal and infant morbidity and mortality), the literature evidence, quality/warmth of the cares, economic cost, and the professional roles.

**Conclusions:** There is no evidence that NIDCAP programme improves the neurologic development in the long term or the medical results in the short term, therefore, NIDCAP implementation in its current form as standard care in premature infants cannot be recommended. However, when we analyze the interventions that take part of the CCD or NIDCAP in isolation, most of them are justified in terms of common sense, sensitivity in cares and respect to the family and child.

**Keywords:** Developmental centered care of the premature infant (NIDCAP); macro environment; micro environment; family care; effectiveness.

## RESUMEN:

**Objetivo.** Conocer las intervenciones de la filosofía de los cuidados centrados en el desarrollo del recién nacido prematuro (NIDCAP) dirigidas a optimizar el macroambiente y el microambiente, junto a las actuaciones orientadas a la familia a fin de favorecer la estabilidad y la organización del desarrollo y la conducta del recién nacido prematuro; y a partir de aquí, evaluar la eficacia de su aplicación.

**Metodología.** Se lleva a cabo una búsqueda bibliográfica (a partir de una serie de criterios de inclusión y exclusión específicos) en castellano y en inglés, durante el periodo 2010 a 2015, en las siguientes bases de datos: PUBMED, THE COCHRANE LIBRARY, SCOPUS, CUIDEN, DIALNET, LILACS, TDR y GOOGLE ACADÉMICO (se recurrió también a determinadas páginas web oficiales).

**Resultados.** Se han centrado en la revisión del Macroambiente (luces, ruidos), el Microambiente (postura, manipulaciones, dolor), la Familia (padres principales cuidadores, método canguro, lactancia materna), y de la Evaluación de la eficacia de la aplicación del NIDCAP.

**Discusión.** Se orienta, fundamentalmente, en la consideración del NIDCAP desde la perspectiva de la realidad (la prematuridad como primera causa de morbilidad neonatal e infantil), de la evidencia de la literatura, de la calidad/calidez de los cuidados, del coste económico, y del papel de los profesionales.

**Conclusiones.** No hay evidencia de que el programa NIDCAP mejore el desarrollo neurológico a largo plazo o los resultados médicos a corto plazo, por lo que no se puede recomendar la aplicación del NIDCAP en su forma actual como atención estándar en recién nacidos prematuros. Si bien, al analizar las intervenciones que forman parte de los CCD o del NIDCAP de forma aislada, la mayoría de ellas se justifican desde el sentido común, la sensibilidad en los cuidados y el respeto a la familia y al niño.

**Palabras clave:** Cuidados en el desarrollo del prematuro (NIDCAP); macroambiente; microambiente; cuidado familiar; eficacia.

## INTRODUCTION

According to the World Health Organisation (WHO), those who are born before the 37 weeks of gestation are premature newborns (NB). In addition, the WHO considers that prematurity is the leading cause of mortality among newborns and the second leading cause of death in children under 5 years of age, and adds that 15 million babies are born every year in the world before reaching full term, that is, more than 1 in 10 births. In most countries with reliable data, preterm births have increased in recent years <sup>(1)</sup>.

Browne and Pallás believe that, in the last decades, the survival of preterm infants has improved essentially due to intrauterine transport, prenatal corticosteroids, surfactant and better technological resources. However, this has not been accompanied by such a significant decline in long-term sequelae, since preterm birth disrupts the development of the central nervous system at a time of rapid and vulnerable growth <sup>(2, 3)</sup>.

In turn, Als et al. observed a high frequency of morbidity in very immature children, which could cause serious disabilities. There is increasing conviction that some of these alterations relate, among many other factors, to the care provided after birth <sup>(4)</sup>.

According to Symington et al., in premature infants, the brain is in a critical period of growth, maturation, and sensory development. Premature infants change from an "ideal" intrauterine environment to a surrounding with multiple unexpected environmental (light, noise, proprioceptive stimuli...) and / or harmful (stress, pain...) stimuli. The large differences between the two surroundings can have a negative effect on the neurodevelopment of these patients, so that their follow-up has become a marker of the effectiveness of neonatal care <sup>(5)</sup>.

There is currently a trend in preterm newborn care, called Development and Family - centred Care (DCC). These are based on a philosophy that embraces the concepts of dynamic interaction between newborns, family and surrounding, applied to the

neonatal period, in an attempt to optimize both the macroenvironment (noises, lights...) and the microenvironment (posture, manipulations, pain...) where the infant grows, and of course, involving the family to enhance its role as the primary caregiver of the preterm infant, in an active and continuous way <sup>(6)</sup>.

The implementation of this care involves a major change in work routines. The processes are adapted to the characteristics of the child and their family, and not the other way around. DCCs represent a change in attitudes that professionals must adopt in relation to patients <sup>(3)</sup>.

This type of care has been carried out more or less routinely in many European countries for some decades. One of the most widespread models, in relation to the DCC, is the NIDCAP (*Neonatal Individualized Developmental Care and Assessment Program*) <sup>(7, 8)</sup>. The NIDCAP is an assessment and intervention programme conducted by professionals trained in neurodevelopment, which is based on formal behavioral observations of the child before, during and after procedures to individualise care.

Due to the above, it is considered of great importance to develop a deeper understanding of the interventions of the philosophy of care focused on the development of the premature newborn (NIDCAP) aimed at optimizing the macroenvironment and microenvironment, together with actions aimed at the family in order to promote stability and the organisation of the development and behaviour of the premature newborn; and from here, to evaluate the effectiveness of its application.

## METHODOLOGY

Bibliographical review of the scientific production related to the object of study, according to the following Inclusion Criteria (IC): 1-Date of publication between 2000 and 2015, 2-Studies in Spanish and English; and Exclusion Criteria (EC): 1-That they do not meet the criteria mentioned above, 2-Research studies not related to the neurodevelopment of the newborn, 3-Research studies not focused on the care of preterm infants admitted to neonatal units.

The keywords and descriptors to generate the bibliographic search, in Spanish and English, were:

- Four roots: "Development-centred care", "Premature", "NIDCAP" and "Nursing".
- Six secondary descriptors: "Neurodevelopment", "Macroenvironment", "Microenvironment", "Family", "Effectiveness" and "Systematic review".

The databases consulted have been MEDLINE through PUBMED, THE COCHRANE LIBRARY, SCOPUS, CUIDEN, DIALNET, LILACS, TDR and GOOGLE SCHOLAR. In addition, official websites such as the following were also consulted: NIDCAP International Federation ([www.nidcap.org](http://www.nidcap.org)), University Hospital 12 de Octubre ([www.madrid.org/hospital12octubre](http://www.madrid.org/hospital12octubre)), Spanish Association of Paediatrics ([www.aeped.es](http://www.aeped.es)), Spanish Society of Neonatology ([www.se-neonatal.es](http://www.se-neonatal.es)), Spanish Association of Primary Care Paediatrics ([www.aepap.org](http://www.aepap.org)), Ministry of Health, Social and Equality Services ([www.msssi.gob.es](http://www.msssi.gob.es)), World Health Organisation ([www.who.int/en](http://www.who.int/en)).

## RESULTS

A total of 575 articles were obtained. Once the inclusion and exclusion criteria were applied, 33 articles resulted for bibliographic review, of which 11 are narrative reviews, 8 are epidemiological studies (of different types: transversal type, transversal, observational and descriptive; multicentric and longitudinal; randomised clinical trial; controlled clinical trial), 4 systematic review (2 with meta-analysis), 4 protocols, 3 doctoral theses, 2 reflective articles and 1 clinical practice guide.

After consulting the bibliography, the four themes developed below were analysed:

1. Macroenvironment (lights, noises).
2. Microenvironment (posture, manipulations, pain).
3. Family (parents, caregivers, kangaroo method, breastfeeding).
4. Evaluation of the effectiveness of NIDCAP implementation.

### 1. Interventions aimed at optimising the macroenvironment:

According to Gallegos et al., the Neonatal Unit (NU) is an area where great stimulation is generated. This situation has an impact on the growth and development of the newborn, particularly preterm newborns, since they are especially stimulated <sup>(6, 8, 9, 10)</sup>.

As indicated by Pallás and García et al., the sense of sight is the last to mature, and therefore, premature infants are especially sensitive to light stimuli. The NUs must adapt to the capacities of preterm infants, and this must be compatible with places with intense light to prepare medication or to perform other procedures <sup>(3, 11, 12)</sup>. In fact, various studies have shown that when light intensity is reduced, there is a decrease in heart rate, a decrease in vital activity, an improvement in sleep patterns, stress is reduced, and food intake is improved and so is the rhythm of weight gain <sup>(6, 8, 10)</sup>. In addition, abrupt changes in light intensity may result in a decrease in oxygen saturation <sup>(6, 8, 10, 13)</sup>.

The Spanish Society of Neonatology recommends luminous intensity to be adjusted between 10 and 600 luxes and noise level not to exceed 40 dB. Try to use natural, gradual light, with a smooth transition in light-dark cycles, use blankets on the incubators, progressive lights with adjustable intensity, screens to separate children, a lower light level favours the reduction of noise. It is advisable to have sound level meters that measure noise continuously, to reduce the intensity of alarms, and to limit conversations near newborn, as well as information posters <sup>(3, 5, 6, 8, 11, 13)</sup>.

According to Fernández and Schapira et al., sound (noise) stimuli cause hypoxaemia, bradycardia, increased intracranial pressure, arterial hypertension, apnoea, stress, disorganized, ineffective and non-adaptive behaviour, metabolic instability..., as caloric requirements increase from glucose. In addition, sleep disturbances, irritability, fatigue, vomiting and loss of appetite occur in the newborn, especially in premature infants <sup>(1, 14, 15)</sup>. Similarly, Gallegos et al. indicate that in the long term there are alterations in hearing with the risk of hearing loss, sometimes irreversible, and with language impairment. This, in turn, causes a delay in social, cognitive, educational and socio-emotional development, and social difficulties related to interaction, which results in isolation <sup>(9)</sup>.

## 2. Interventions aimed at optimising the microenvironment:

The musculoskeletal system of newborns has a high plasticity, so that they are easily adapted to the positions in which they are placed upon admission <sup>(3)</sup>, which can produce postural deformities and affect their psychomotor development, the relationship of attachment to their parents and to their own self-esteem, when mature, in the event of adopting an inappropriate postural pattern <sup>(8, 16, 17, 18)</sup>. Als H. proposes containment of the NB in order to promote stability and organisation of development and behaviour (Synactive Theory of Behavioural Development) <sup>(15)</sup>.

According to Ginovart, the goals of premature baby postural care are: to receive it in flexion and stimulate the active flexing of the trunk and limbs, so as to facilitate hand-to-mouth activity. It is also advisable to maintain this level of flexion, using nests that provide limits (containment) and allow for greater self-regulation and calming ability. This in turn helps in the organisation of behaviour. We will also have to favour the alternation of both sides <sup>(6, 13, 16, 17, 19)</sup>. It is clear that premature NBs experience excessive manipulation <sup>(14, 16, 19)</sup>.

In turn Sánchez et al. show different studies where newborns react immediately to touch, and often the response is hypoxia. In addition, constant manipulation of the NB has been associated with fluctuations in blood pressure and central venous pressure with potential risk of intraventricular haemorrhage <sup>(3, 18)</sup>.

According to Rodríguez et al. minimal manipulation techniques are a way of minimising the impact of admission to a Neonatal Intensive Care Unit (NICU), especially for very premature infants <sup>(1, 20)</sup>. Manipulations will be more frequent during the day and more spaced at night. The rest of the time, observation is carried out through non-invasive methods <sup>(18)</sup>.

Preterm infants, even the most immature, are sensitive to painful stimuli, and given their characteristics, they present a more intense, more generalised and lasting pain than the full-term newborns. Thus, repeated painful stimuli can lead to important haemodynamic, respiratory and brain changes and alterations <sup>(6, 13)</sup>. Untreated pain in the NB contributes to its morbidity and mortality <sup>(3, 6, 17)</sup>. Pain management in NBs is still far from optimal <sup>(3, 6)</sup>.

Within the concept of non-pharmacological analgesia, a series of prophylactic and complementary measures are included for the control of low-medium intensity pain, and to complement pharmacological measures in the control of intense pain, namely: use of oral sucrose 0,2 cc, non-nutritive suckling, breastfeeding, Kangaroo Mother Care, restraint, and manipulations of two people <sup>(3, 6, 21)</sup>. Following this, Ruiz et al. indicate that pharmacological measures of pain control should be reserved for moderate-severe pain or as adjuncts to more intense pain <sup>(16)</sup>.

## 3. Interventions aimed at the family:

Pallás states that the participation of parents in caring for their admitted NB children is one of the basic axes of the NIDCAP methodology <sup>(3)</sup>. Similarly, Ginovart argues that parents are the essential pillar of children's development, especially during their first years of life, and their early involvement in the care of NBs improves their prognosis. Achieving the full participation of parents implies changes in the structure of the Units, in the schedules, and above all, in the attitudes of the caregivers, who must realise

that they are caring for families and not only NBs, so this requires NUs to be open to parents 24 hours a day, thus facilitating breastfeeding and kangaroo care, as well as the role of parents as caretakers of their children <sup>(17)</sup>.

Other works have shown that the early relationship established between parents and their child is the cornerstone in children's development. These interactions give the child confidence and security, enabling them to develop healthy emotional bonds, which are important for the attachment process <sup>(14, 22)</sup>.

Probably the entry of parents into the NU and their recovery of the role of caretakers, should not be justified from scientific evidence, but from a perspective of citizen rights and what has been natural in the human species <sup>(6)</sup>.

Perapoch et al. point out that the practice of the Kangaroo Method is one of the most valuable instruments available to increase the positive stimuli that an immature NB can receive in improving its development. In addition, and not least, it favours the bond of parents with their children and mutual knowledge, and increases the confidence and the competence level of parents. The ease in its application and the practical absence of undesirable effects support its application in practically all Spanish Units <sup>(23)</sup>. But also, leaving the incubator to perform kangaroo care represents some stress for the NB. Therefore, it is advisable to remain in kangaroo care at least 90 to 120 minutes, since less skin-to-skin contact does not seem to offer advantages <sup>(16)</sup>. However, nowadays, kangaroo care is considered an essential part of DCC and the NIDCAP method <sup>(6)</sup>.

Another essential aspect linked to the family is breastfeeding. Breast milk is the best food for the NB, breastfeeding itself is an intimate act between mother and child, and contributes, in a substantive way, to the creation of the bond between both, which in turn is very important for development of the child <sup>(16, 17)</sup>.

#### **4. Evaluation of the effectiveness of NIDCAP implementation:**

The evaluation of the effectiveness of NIDCAP (*Newborn Individualized Developmental Care and Assessment Program*) care implementation presents ambivalent results. So, advantages and disadvantages must be considered. The former has already been dealt with in previous sections, so from now on we will focus on a more critical perspective.

Thus, among its disadvantages, we find that starting to work with a DCC philosophy in a Neonatal Unit, where parents and families must be included into care, usually generates resistance and barriers that are often difficult to overcome <sup>(24)</sup>.

Another difficulty of the NIDCAP is that, in order to accomplish it, a multidisciplinary team should be created with all staff involved in neonatal care, a challenge because of the high cost of training in this unique approach to care. Undoubtedly, this is an obstacle to the dissemination of this evaluation and intervention programme, but also, and this is not trivial, it makes the person who receives the training value it especially <sup>(7)</sup>.

It is clear that in order to be able to introduce this peculiar care, a substantial amount of economic investment is needed, both to train professionals and to adapt the

facilities with the necessary equipment and thus make the implementation of the NIDCAP a reality. That is why it makes sense to consider its effectiveness.

Finally, following our focus on the disadvantages of NIDCAP care, it is important to highlight the systematic review (SR) recently published in *Paediatrics* and performed by Ohlsson and Jacobs (25). Its main objective was to evaluate the efficacy of NIDCAP in preterm infants to improve short-term medical variables and long-term neurodevelopmental variables. The authors of the study conclude that this Systematic Review does not identify any clinically important benefits in terms of NIDCAP improving long-term neurodevelopmental or other short-term medical variables. Thus, it can be affirmed that care focused on the development of the preterm newborn does not prove significant clinical improvements that are important, consistent and maintained in premature infants. The authors of this study justify the updating of their three previous Systematic Reviews <sup>(26, 27, 28)</sup> with the appearance of important randomised trials on this subject, specifically between 2009 and 2012. It should be pointed out in this regard, that this is a scientifically rigorous study, where the quality of the individual studies was evaluated using the Cochrane Collaboration tool, although only two of them were of high quality <sup>(29, 30)</sup>.

## DISCUSSION

There is currently sufficient clinical evidence on the importance of caring for the newborn from a sensorineural and emotional development. It is not only a question of addressing the illnesses of the newborn, but also taking advantage of this unique period of life because of the biological and emotional characteristics that surround it, to favour the normalisation of certain aspects that suffer great distortion due to hospitalisation <sup>(17)</sup>. This, accompanied with an increasing opening to the intervention of parents in the care of their child <sup>(31)</sup>.

If we pause to reflect on the reason for this new Development-Centred Care philosophy, we must consider at least the following perspectives:

- Reality. Prematurity is the leading cause of neonatal and infant morbidity and mortality, and is one of the most important health problems in society, especially in the most industrialised ones <sup>(32)</sup>.

- Studies. Reduction in days of mechanical ventilation. Better evolution of neurodevelopment at 18 months. Kangaroo Mother Care is effective in all women to increase the amount of milk produced, regardless of their previous intention to breastfeed (level of evidence 1 <sup>(8)</sup>).

- Quality / warmth of care. The prevention and treatment of pain should be considered as an essential human right of the newborn, regardless of its consequences, short or long term <sup>(8)</sup>.

- Economic cost. Decrease in days of admission <sup>(8)</sup>.

- Professionals. Greater motivation, more sense of control, more job satisfaction, ability to take on challenges... <sup>(8)</sup>.

To achieve excellence in this new philosophy of care, we must approach it as a common project for all professionals, who are in some way involved in neonatal care:

neonatologists, nurses, nursing assistants, specialists, technicians, administrative staff... thus offering a continuity between care for the family, before birth; and attention to the child and family after birth <sup>(17)</sup>.

DCCs encompass dynamic interaction concepts between the newborn, the family and the environment, and apply them to the neonatal period. This includes interventions aimed at optimising the macroenvironment of lights and noises, such as the microenvironment in which the child develops (posture, manipulations, pain). In addition, there is interaction with the family to maximise its role as the child's primary caretaker <sup>(32)</sup>.

Regardless of what has already been said about the disadvantages of NIDCAP care, undoubtedly, its qualitative value plays a fundamental role in the humanisation of care focused on development and the family. In fact, in a study on NIDCAP reflections <sup>(33)</sup>, the authors argue that the systematic review <sup>(25)</sup> discussed above (which showed that there is no clinically important benefit of NIDCAP in improving neurodevelopment in the long term, or another short-term medical variable) does not assess everything involved in NIDCAP, but it does raise questions that should be answered, such as: Should NIDCAP be implemented as a standard form of care for prematurity, or would other developmental care measures be sufficient? And, above all, is the current cost of training acquisition justified in NIDCAP? To answer these questions, González de Dios et al. <sup>(33)</sup>, propose two types of studies (insufficient at present) that would allow us to decide if the implementation of NIDCAP in the neonatal units is justified, these are: qualitative evaluation and economic evaluation studies.

However, referring to the comments made in the study by Pallas Alonso et al. <sup>(7)</sup>, we should reflect on each of the interventions that are part of the DCC or the NIDCAP. Because as their authors point out, when analysed in isolation, most of them are justified from common sense, sensitivity in care, and respect for the family and the child. Since care of the macroenvironment, microenvironment and family-centred care is nothing more than what we all want when we feel ill. So, a meta-analysis, even well designed, does not seem to illuminate as much as desired in these questions, or if we may say, not as human. What the NIDCAP seeks to provide is comfort for the child, the mother, the father, the siblings, and for the professionals themselves, who feel more capable and satisfied working from this approach to care <sup>(24)</sup>.

## CONCLUSIONS

When analysing interventions that are part of DCC or NIDCAP in isolation, most of them are justified from common sense, sensitivity in care and respect for the family and the child.

The control of light, the avoidance of excessively luminous environments, more when the sense of sight is poorly developed in preterm infants, is what we all desire when we feel ill.

To speak in a low voice close to the sick, close to those who suffer is something that has only been lost with the arrival of the NICU (Neonatal Intensive Care Unit) technification, where machines and their alarms began the raising of tones, and high voices were established where there must naturally be whispers.



Being able to be close to those who love us when we are ill, a mother or father accompanying their child, taking care of them and helping them to overcome the problems binding them to the hospital... are almost universal feelings. This is the claim of the NIDCAP, which seeks to provide well-being to the whole family, in addition to empowering professionals to feel more capable and more satisfied at work.

The NIDCAP interprets each child as a unique individual, with his or her skills and threshold when faced with stress and disorganisation. DCCs are a model of care for children, consisting of a series of interventions designed to reduce stress in the NICU, to reduce pain associated with diagnostic tests and invasive treatments, through the application of non-pharmacological methods, such as oral administration of 0.2 cc sucrose, nutritive suckling (breast) and non-nutritive (pacifier), and to facilitate the participation of parents in the care of their child.

Parents who take care of their children under the Kangaroo Mother Method during admission to intensive care units show lower levels of anxiety, and subsequently develop greater confidence in their child care and greater attention to their needs.

Breast milk is the food of choice for preterm infants, because its composition is unique, due to the greater bioavailability of its components, its immunological properties and the presence of enzymes, hormones and growth factors. In addition to all this, it is a protective factor against necrotising enterocolitis, nosocomial infections, atopy and allergy.

There is no evidence that the NIDCAP programme improves long-term neurodevelopmental or short-term medical outcomes, so applying the NIDCAP in its current form as standard care in preterm infants cannot be recommended. Although, as some studies argue, meta-analyses, systematic reviews, clinical trials... cannot be the sole measure of Care, as other evaluative formats are also required.

Beyond technical scientific and physical care experience, our labour also extends to spiritual and emotional needs (such as being holistic), contributing to the emotional development of the family, humanising care and verifying the implementation of care centred on development and the family.

## REFERENCES

1. Álvarez A. Sensibilidad y valor predictivo de la Pauta de Observación del Newborn Individualized Developmental Care and Assessment Program para la detección de alteraciones en el neurodesarrollo del neonato prematuro [tesis doctoral]. Barcelona: Universitat Autònoma de Barcelona, Facultat de Psicologia; 2014 [acceso 16 de noviembre de 2014]. Disponible en: <http://www.tdx.cat/bitstream/handle/10803/284316/aag1de1.pdf?sequence=1>
2. Browne JV. Developmental care for high-risk newborns: emerging science, clinical application, and continuity from newborn intensive care unit to community. Clin Perinatol [revista en Internet]. 2011 [acceso 19 de noviembre de 2014]; 38: 719-29. Disponible en: [http://wordpress.sph.harvard.edu/mhtf-2/wp-content/uploads/sites/32/2014/11/DevelopmentalCare\\_Browne\\_ResArt\\_2011.pdf](http://wordpress.sph.harvard.edu/mhtf-2/wp-content/uploads/sites/32/2014/11/DevelopmentalCare_Browne_ResArt_2011.pdf)
3. Pallás Alonso CR. Cuidados centrados en el desarrollo en las unidades neonatales. An Pediatr Contin [revista en Internet]. 2014 [acceso 29 de noviembre de 2014]; 12(2): 62-7. Disponible en: <http://www.sciencedirect.com/science/article/pii/S1696281814701702>

4. Als H, Duffy FH, McAnulty G, Rivkin MJ, Vajapeyam S, Mulkern Rv et al. Early experience alters brain function and structure. *Pediatrics* [revista en Internet]. 2004 [acceso 19 de noviembre de 2014]; 113: (4): 846-57. Disponible en: <https://www.spl.harvard.edu/archive/spl-pre2007/pages/papers/warfield/pediatrics2004.pdf>
5. Symington AJ, Pinelli J. Developmental care for promoting development and preventing morbidity in preterm infants (Cochrane Review). *Cochrane Database of Systematic Reviews* [base de datos en Internet]. 2006 [acceso 19 de noviembre de 2014]; 2. Disponible en: [file:///C:/Users/Usuario/Downloads/CD001814%20\(2\).pdf](file:///C:/Users/Usuario/Downloads/CD001814%20(2).pdf)
6. Ministerio de Sanidad y Política Social. Cuidados desde el nacimiento basados en pruebas y buenas prácticas [monografía en Internet]. Madrid: Ministerio de Sanidad y Política Social; 2010 [acceso 29 de noviembre de 2014]. Disponible en: <http://www.msssi.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/cuidadosDesdeNacimiento.pdf>
7. Pallás Alonso CR, López Maestro M. NIDCAP, práctica clínica y metanálisis. *Evid. Pediatr* [revista en Internet]. 2013 [acceso 5 de diciembre de 2014]; 9:40. Disponible en: <http://evidenciasenpediatria.es/files/41-11979-RUTA/040Editorial.pdf>
8. Servicio de Neonatología, Grupo NIDCAP. Cuidados centrados en el desarrollo: Método NIDCAP [monografía en Internet]. Madrid: Hospital Universitario 12 de Octubre; 2008 [acceso 5 de diciembre de 2014]. Disponible en: <http://www.abap.cat/documentos/Metodo%20Nidcap.pdf>
9. Gallegos-Martínez J, Reyes-Hernández J, Fernández-Hernández VA, González-González LO. Índice de ruido en la unidad neonatal. Su impacto en recién nacidos. *Acta Pediatr Mex* [revista de Internet]. 2011 [acceso 29 de noviembre de 2014]; 32(1): 5-14. Disponible en: <http://new.medigraphic.com/cgi-bin/resumen.cgi?IDREVISTA=74&IDARTICULO=28474&IDPUBLICACION=3039>
10. Melgar Bonis A, Bergón Sendín E. Protocolo de luz y ruido [monografía en Internet]. Madrid: Hospital 12 de Octubre. Servicio de Neonatología; 2011 [acceso 29 de noviembre de 2014]. Disponible en: <http://www.pediatria-12deoctubre.com/servicios/neonatalogia/pdf/14.PROTOCOLO-LUZ-RUIDO-LOGO.pdf>
11. García de Río M, Sánchez Luna M, Doménech Martínez E, Izquierdo Macián I, López Herrera MC, Losada Martínez et al. Revisión de los estándares y recomendaciones para el diseño de una unidad de neonatología. *An Pediatr* [revista de Internet]. 2007 [acceso 5 de diciembre de 2014]; 67(6): 594-602. Disponible en: [http://www.se-neonatal.es/Portals/0/Estandares\\_diseo\\_Neo.PDF](http://www.se-neonatal.es/Portals/0/Estandares_diseo_Neo.PDF)
12. Martínez M. Eficacia de una breve intervención temprana basada en la evaluación del desarrollo del neonato prematuro: efecto sobre el estrés, la depresión y las percepciones maternas [tesis doctoral]. Barcelona: Universitat Autònoma de Barcelona, Facultat de Psicologia; 2010 [acceso 16 de noviembre de 2014]. Disponible en: <http://www.tdx.cat/bitstream/handle/10803/32092/mmg1de1.pdf?sequence=1>
13. Chaure I et al. Desarrollo del niño premature. *Matronas Prof* [revista en Internet]. 2007 [acceso 29 de noviembre de 2014]; 8: 16-18. Disponible en: [www.federacion-matronas.org/rs/219/.../es.../vol8n2pag16-18.pdf](http://www.federacion-matronas.org/rs/219/.../es.../vol8n2pag16-18.pdf)
14. Fernández Dillems MP. Intervención sensorio-motriz en recién nacidos prematuros. *Rev Ped Elec* [revista en Internet]. 2004 [acceso 29 de noviembre de 2014]; 1(11). Disponible en: <http://www.revistapediatria.cl/vol1num1/pdf/intervencion.pdf>
15. Schapira IT, Aspres N. Estrés en recién nacidos internados en una unidad de cuidados intensivos (UCIN): Propuesta para minimizar sus efectos. *Rev Hosp Mat*

- Inf Ramón Sardá [revista en Internet]. 2004 [acceso 5 de diciembre de 2014]; 23(3). Disponible en: <http://www.redalyc.org/pdf/912/91223306.pdf>
16. Ruiz López A, Rodríguez Belmonte R, Miras Baldó MJ, Robles Vizcaino C, Jerez calero A, González Linde A et al. Cuidados neonatales centrados en el desarrollo. Bol.SPAO [revista en Internet]. 2013 [acceso 29 de noviembre de 2014]; 7(2). Disponible en: <http://www.spao.es/documentos/boletines/pdf-boletin-seccion-29-secciones-74597.pdf>
17. Ginovart Galiana G. Cuidados centrados en el desarrollo: un proyecto común. Aloma [revista en Internet]. 2010 [acceso 29 de noviembre de 2014]; 26: 15-27. Disponible en: <http://www.raco.cat/index.php/Aloma/article/viewFile/196127/262943>
18. Sánchez-Rodríguez G, Quintero-Villegas LJ, Rodríguez Camelo G, Nieto-Sanjuanero A, Rodríguez-Balderrama I. Disminución del estrés del prematuro para promover su neurodesarrollo: un nuevo enfoque terapéutico. Medicina Universitaria [revista en Internet]. 2010 [acceso 29 de noviembre de 2014]; 12(48): 176-180. Disponible en: [http://medicinauniversitaria.uanl.mx/48/pdf/8\\_dism\\_del\\_estres.pdf](http://medicinauniversitaria.uanl.mx/48/pdf/8_dism_del_estres.pdf)
19. Cabrejas L, Domínguez M, García L, Martínez MD, Palacios A, Peiro G et al. Protocolo de Posicionamiento [monografía en Internet]. Madrid: Hospital 12 de Octubre; 2011 [acceso 29 de noviembre de 2014]. Disponible en: <http://www.pediatria-12deoctubre.com/servicios/neonatologia/pdf/14.POSICI%C3%93N.pdf>
20. Rodríguez González L, De la Mata Alcoba I. Procedimiento de mínima manipulación en el neonato. Rev.enferm,CyL [revista en Internet]. 2014 [acceso 5 de diciembre de 2014]; 6(2). Disponible en: [file:///C:/Users/Usuario/Downloads/115-384-1-PB%20\(1\).pdf](file:///C:/Users/Usuario/Downloads/115-384-1-PB%20(1).pdf)
21. Moral MT, Herrados E. Protocolo de Analgesia no Farmacológica, Estrategias de reducción de estrés [monografía en Internet]. Madrid: Hospital 12 de Octubre; 2011 [acceso 29 de noviembre de 2014]. Disponible en: <http://www.pediatria-12deoctubre.com/servicios/neonatologia/pdf/12.ANALGESIA%20NO%20FARM.%20LOGO.pdf>
22. López Maestro M, et al. Cuidados centrados en el desarrollo. Situación en las unidades de neonatología de España. An Pediatr [revista en Internet]. 2014 [acceso 19 de noviembre de 2014]. Disponible en: [file:///C:/Users/Usuario/Downloads/S2341287914000763\\_S300\\_en.pdf](file:///C:/Users/Usuario/Downloads/S2341287914000763_S300_en.pdf)
23. Perapoch J, Pallás CR, Linde MA, Moral MT, Benito F, López M et al. Cuidados centrados en el desarrollo. Situación en las unidades de neonatología de España. An Pediatr [revista de Internet]. 2006 [acceso 19 de noviembre de 2014]; 64: 132-9. Disponible en: [https://www.elpartoesnuestro.es/sites/default/files/public/documentos/campanaunicornatos/informe\\_ucis\\_neonatales:2005.pdf](https://www.elpartoesnuestro.es/sites/default/files/public/documentos/campanaunicornatos/informe_ucis_neonatales:2005.pdf)
24. Mosqueda R, Castilla Y, Perapoch J, De la Cruz J, López M, Pallás CR. Staff perception on Newborn Individualized Developmental Care and Assessment Program (NIDCAP) during its implementation in two Spanish neonatal units. Early Hum Dev [revista en Internet]. 2013 [acceso 19 de noviembre de 2014]; 89:27-33. Disponible en: [http://www.earlyhumandev.com/article/S0378-3782\(12\)00175-2/pdf](http://www.earlyhumandev.com/article/S0378-3782(12)00175-2/pdf)
25. Ohlsson A, Jacobs SE. NIDCAP: A Systematic Review and Meta-analyses of Randomized Controlled Trials. Pediatrics [revista en Internet]. 2013 [acceso 19 de noviembre de 2014]; 131:881-93. Disponible en: <http://pediatrics.aappublications.org/content/131/3/e881.full.html>

26. Lacy JB, Ohlsson A. Behavioral outcomes of environmental or care-giving hospital-based interventions for preterm infants: a critical overview. *Acta Paediatr.* 1993; 82:408-15.
27. Jacobs SE, Sokol J, Ohlsson A. The Newborn Individualized Developmental care and Assessment Program is not supported by meta-analyses of the data. *J Pediatr.* 2002; 140:699-706.
28. Ohlsson A, Jacobs SE. Meta-regression can indicate if further NIDCAP studies are justified [in Swedish]. *Lakartidningen.* 2007; 104:134-7.
29. Maguire CM, Walther FJ, Sprij AJ, Le Cessie S, Wit JM, Veen S; Leiden Developmental Care Project. Effects of individualized developmental care in a randomized trial of preterm infants < 32 weeks. *Pediatrics.* 2009; 124: 1021-30.
30. Peters KL, Rosychuk RJ, Hendson L, coté JJ, McPherson C, Tyebkhan JM. Improvement of short-and long-term outcomes for very low birth weight infants: Edmonton NIDCAO trial. *Pediatrics.* 2009; 124:1009-20.
31. Cano E. Estrés y ansiedad parental en la unidad de cuidados intensivos neonatal. El papel modulador de una intervención temprana [tesis doctoral]. Murcia: Universidad de Murcia, Departamento de Psicología Evolutiva y de la Educación; 2013 [acceso 16 de noviembre de 2014]. Disponible en: <http://www.tdx.cat/bitstream/handle/10803/131097/TECJ.pdf?sequence=1>
32. Hurtado Suazo JA, García Reymundo M, Calvo Aguilar MJ, Ginovart Galiana G, Jiménez Moya A, Trincado Aguinagalde MJ et al. Recomendaciones para el manejo perinatal y seguimiento del recién nacido tardío. *An Pediatr [revista en Internet].* 2014 [acceso 19 de noviembre de 2014]; 81(5): 327.e1-327.e7. Disponible en: <http://analesdepediatria.org/es/recomendaciones-el-manejo-perinatal-seguimiento/articulo/S1695403314003191/>
33. González de Dios J, Buñuel Álvarez JC. Reflexiones sobre el NIDCAP: de la evaluación cuantitativa a la cualitativa y económica. *Evid Pediatr [revista en Internet].* 2013 [acceso 16 de noviembre de 2014]; 9:44. Disponible en: <http://www.evidenciasenpediatria.es/files/41-11980-RUTA/044AVC.pdf>

ISSN 1695-6141

© [COPYRIGHT](#) Servicio de Publicaciones - Universidad de Murcia