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Escola de Enfermagem Alfredo Pinto – UNIRIO

SYSTEMATIC REVIEW OF THE LITERATURE

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## THE NEWBORN HOSPITALIZED IN A NEONATAL INTENSIVE CARE UNIT AND BED POSITIONING: SYSTEMATIC REVIEW

*O recém-nascido hospitalizado em unidade de terapia intensiva neonatal e o posicionamento no leito: revisão sistemática*

*El recién nacido hospitalizado en la unidad de cuidados intensivos neonatales y el posicionamiento en la cama: revisión sistemática*

Tcheice Laís Zwirtes<sup>1</sup> 

Jacinta Sidegum Renner<sup>1</sup> 

Christian Caldeira Santos<sup>2</sup> 

### ABSTRACT

**Objective:** to identify which are the most suitable positioning and auxiliary products for the newborn hospitalized in Neonatal Intensive Care Units. **Method:** this is characterized as basic, exploratory, and as to the technical procedures, it is a systematic literature review. The search was based on the Biblioteca Virtual em Saúde, Plataforma Capes and Unique, limiting publications between 2011 and 2021. A total of 85 results were obtained, and the analysis and discussion of the data was carried out with 7 studies. **Results:** it was found that there are several positions that can be used in these patients, such as dorsal, ventral, and lateral decubitus, with the ventral position being the most indicated. Furthermore, several products were identified that can be used to assist in positioning the newborns and that can facilitate nursing care. **Final considerations:** it was observed that few studies brought a standard and/or a positioning method linked to the auxiliary products.

**DESCRIPTORS:** Infant, newborn; Intensive care units, neonatal; Patient positioning; Child development; Posture.

<sup>1</sup> Universidade Feevale, Novo Hamburgo, Rio Grande do Sul, Brazil

<sup>2</sup> Universidade Federal do Pampa, Uruguaiana, Rio Grande do Sul, Brazil

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**Corresponding Author:** Tcheice Laís Zwirtes, E-mail: tcheice.zwirtes@feevale.br

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## RESUMO

**Objetivo:** identificar quais os posicionamentos e produtos auxiliares mais indicados para o recém-nascido hospitalizado em Unidade de Terapia Intensiva Neonatal. **Método:** caracteriza-se como básica, de caráter exploratório e quanto aos procedimentos técnicos é uma revisão sistemática da literatura. A busca teve como bases a Biblioteca Virtual em Saúde, Plataforma Capes e Unique, limitando as publicações realizadas entre 2011 e 2021. Obteve-se 85 resultados, sendo a análise e discussão dos dados realizada com 7 estudos. **Resultados:** verificou-se que existem diversos posicionamentos que podem ser utilizados nesses pacientes, como os decúbitos dorsal, ventral e lateral, sendo o ventral o mais indicado. Ademais, identificaram-se diversos produtos que podem ser utilizados para auxiliar no posicionamento dos recém-nascidos e que podem facilitar os cuidados de enfermagem. **Considerações finais:** observou-se que poucos estudos trouxeram um padrão e/ou um método de posicionamento vinculado com os produtos auxiliares.

**DESCRITORES:** Recém-nascido; Unidade de terapia intensiva neonatal; Posicionamento do paciente; Desenvolvimento infantil; Postura.

## RESUMEN

**Objetivo:** identificar cuáles son los posicionamientos y productos auxiliares más adecuados para los recién nacidos hospitalizados en una Unidad de Cuidados Intensivos Neonatales. **Método:** se caracteriza como básico, de carácter exploratorio y en cuanto a los procedimientos técnicos es una revisión sistemática de la literatura. La búsqueda se basó en la Biblioteca Virtual em Saúde, Plataforma Capes y Unique, limitando las publicaciones entre 2011 y 2021. Se obtuvieron 85 resultados, siendo el análisis y la discusión de los datos realizados con 7 estudios. **Resultados:** Se ha comprobado que hay varias posiciones que pueden utilizarse en estos pacientes, como el decúbito dorsal, ventral y lateral, siendo la ventral la más adecuada. Además, se identificaron varios productos que pueden utilizarse para ayudar a colocar a los recién nacidos y que pueden facilitar los cuidados de enfermería. **Consideraciones finales:** se observó que pocos estudios trajeron un patrón y/o un método de posicionamiento vinculado a los productos auxiliares.

**DESCRIPTORES:** Recién nacido; Unidades de cuidado intensivo neonatal; Posicionamiento del paciente; Desarrollo infantil; Postura.

## INTRODUCTION

Hospitalization in early life can be configured as an event marked by many adversities for the hospitalized newborn (NB). Accustomed to the intrauterine environment, the NB needs to adapt to life outside the mother's womb and, when hospitalized, to become stronger in order to overcome this moment, to enter the family and social life.

The maternal womb is characterized as the ideal environment for the healthy development of the fetus, since it has important characteristics such as maintenance of temperature, softness, warmth, and reduction of external noise.<sup>1</sup> These characteristics have, over time, been trying to be implemented in Neonatal Intensive Care Units (NICUs). However, these environments cannot be compared to the mother's womb, being represented by temperature changes, bright lights, noise, sleep interruptions, etc., which affect the NB's health and development.<sup>1</sup> These factors reveal the importance of humanized care for these individuals who, at birth, already experience many changes and painful and invasive procedures.

The main risk factors for hospitalization of the NB are low birth weight and prematurity, which makes them very fragile individuals.<sup>2</sup> In addition, the NB who needs to be hospitalized may present neurobehavioral impairments, hypotonia, decreased reflexes, etc.<sup>3</sup> Corroborating this, another study states that "the morphological and functional immaturity of infants predisposes greater susceptibility to delayed motor development."<sup>4:148</sup> This is of vital importance for hospitalized NBs, since movement deficits can impact their overall development.

During the child's first year of life, it undergoes an accelerated brain growth and maturation of the nervous system, which provides a great affective, social, cognitive, and motor evolution.<sup>5</sup> In this sense, positioning in bed is configured as one of the main factors that can impact the motor development of the hospitalized NB, leading to permanent sequelae. This factor is mentioned by other authors, who corroborate by stating that the positioning of the NB interferes directly in their motor and respiratory development.<sup>6</sup> Thus, it is evident the indispensability of a greater attention, by health professionals, with the care in positioning the NB in bed.

In this context, functional positioning and constant posture variation may reduce the irregularities and asymmetries related to prematurity and admission to the NICU.<sup>7</sup> Moreover, the postural change may help prevent pressure injuries, which, if left untreated, may lead to death. By being placed in different positions, NBs experience divergent pressures on muscles and joints, which positively aids in motor development and coordination.<sup>7</sup> Thus, encouraging postural alternation in hospitalized NBs can have important benefits for life after hospitalization.

In addition to postural alternation, there are several products that can be used in the care of hospitalized NBs. These products can help in the motor development of these individuals through a more appropriate and functional positioning, considering the motor development in this phase of life. In this sense, it is important to mention that the study on the impact of bed positioning for hospitalized NB is widespread in the United States, England and Canada; however, in Brazil there are few studies on this subject.<sup>7</sup>

In this context, this study presents the following problem: what are the most suitable positioning and products considering the motor development of the NB at the NICU? Therefore, the objective is to identify which are the most suitable positioning and auxiliary products for the NB hospitalized at the NICU.

## METHOD

The present study, under the point of view of its nature, is characterized as a basic research. As to the objectives, it is an exploratory research, and as to the technical procedures, it consists of a systematic literature review. This type of research procedure seeks, through the use of specific protocols, to understand and give coherence to a bibliographic context.<sup>8</sup> The systematic literature review differs from others in that it can be reproduced by other researchers, as it informs the reader of all the steps in its development. In this context, the methodological steps adopted in this study follow, based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology.<sup>9</sup>

The search was conducted during the month of November 2021, using the databases of the Virtual Health Library (VHL), Capes Platform, and Unique, limiting it to the last 10 years, i.e., between 2011 and 2021. As for the use of descriptors, it was decided to search the three databases with two sets of words, the first set formed by the descriptors: newborn AND motor development AND Neonatal Intensive Care Unit AND positioning in bed. The second set of words was composed of the descriptors: newborn AND motor development AND Neonatal

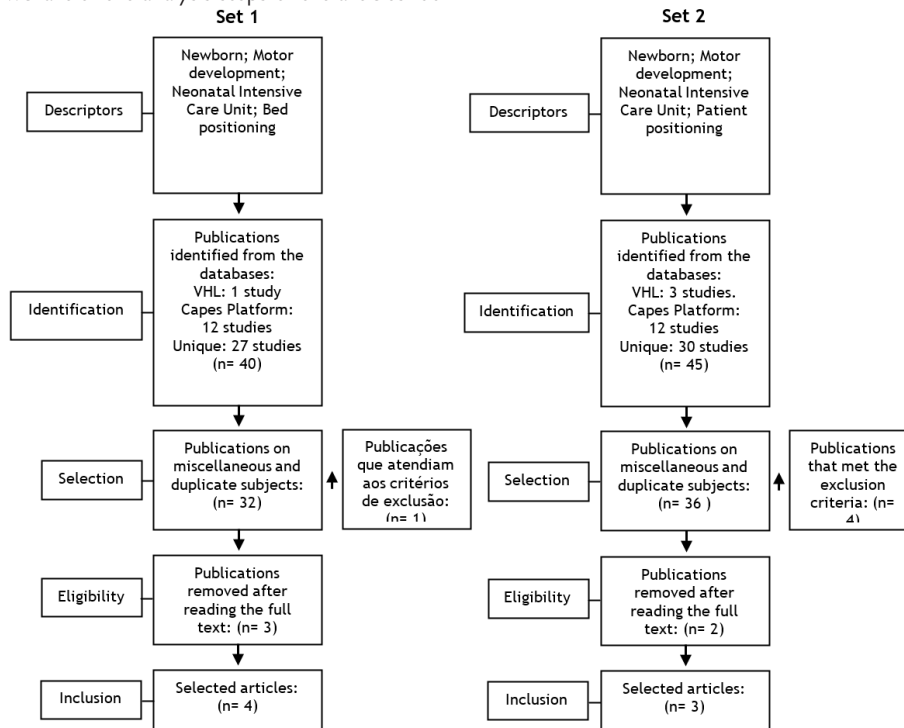
Intensive Care Unit AND patient positioning. It was decided to use Boolean operators in the search, in order to make it more objective. The operator AND means "and" in Portuguese, and is used when the objective is to find all the descriptors included in the same study.<sup>10</sup> Through these searches, 85 results were obtained, which were analyzed as shown in Figure 1.

In the first stage of the two analyses, studies on different subjects that had no direct relation to the theme, duplicate studies and those that met the exclusion criteria were excluded. After reading the articles, those that addressed specific aspects of physiotherapy or that dealt with general care, not addressing the positioning of the patient in bed, were removed.

Thus, the exclusion criteria for this study were: a) studies that did not fit the article category; b) literature reviews; c) articles outside the stipulated time period; d) articles that did not cover hospitalized NBs; e) articles that did not focus on patient positioning in bed. Inclusion criteria were: a) articles about patient positioning in bed; b) articles carried out at NICU; c) articles in all languages and d) full articles.

After the previous analysis of the studies, seven articles were selected. Data analysis and discussion was performed by data categorization and triangulation. Data categorization occurred through exhaustive reading of the results, which were subsequently grouped into categories by subjects.<sup>11</sup> Data triangulation, in turn, aims to arrange the results and discussion through a triad, formed by information from collaborators (in this case being the articles found in the databases), the authors specialized in the theme and the author of the study.<sup>12</sup>

**Figure 1** – PRISMA flowchart of the analysis steps of the articles found



## RESULTS AND DISCUSSION

Based on the results found, seven studies were selected that addressed aids and positioning in bed at the NICU. Table 1 shows the objectives of the studies.

Given the data in Table 1, we note that, as to the objective, two studies aimed to compare the development of the NB in different positions, two had as their central point a SOP, one aimed to develop a SOP and another aimed to show the benefits of a SOP. Moreover, one study aimed to evaluate the multidisciplinary care, another to identify different care technologies used with NBs in NICU and, finally, one study aimed to analyze the Developmental Care. Regarding the sample of collaborators, four studies were carried out with nurses who work at NICU and three were carried out with hospitalized premature babies.

In analyzing the studies, two categories of discussion were formulated: a) recommended positioning for the NB at the NICU and b) products that help in the motor development of the NB at the NICU.

### Indicated positions for the newborn in the Neonatal Intensive Care Unit

Healthcare professionals may use different positions in the NB hospitalized at the NICU. The choice will depend on the protocols used in the institution, the experience of professionals, the health status of the NB, among others. However, it is essential that they are performed so as not to intensify the newborn's pain and favor its neurological and motor development and, consequently, result in reflexes for his adult life.<sup>15</sup> Table 2 describes the indicated positioning and the main characteristics that professionals should consider regarding the positioning.

As shown in Table 2, it can be seen that some authors brought standard positions, also applied to the adult audience, while others addressed only some characteristics of the positions, which they consider effective for the motor development of the hospitalized NB. The positions considered standard are: DD, PD and LD.

The DD in hospitalized NB should be performed with the patient lying on his/her back, with the lower and upper limbs in flexion and adduction and head positioned in midline.<sup>16</sup> In addition, the authors also indicate chest exposure in order to facilitate respiratory assessment.

The LD is characterized by positioning the patient lying on the side, which can be either the right or left side. In the LD, the patient should slightly flex the trunk, always keeping the head in midline.<sup>16</sup> Furthermore, the healthcare professional should place a support between the legs of the NB, so that a neutral posture is maintained and there is not too much pressure on the bony prominences. Furthermore, the professional must keep the upper limbs of the NB free, so that it can explore the movements of consolation and the facial region.<sup>16</sup>

Finally, in PD the patient remains lying face down. In this position, it is suggested that a support that helps maintain hip and pelvis inclination be used.<sup>16</sup> In addition, the authors suggest bending the knees and using a support for legs and feet. This is considered the ideal position for the promotion of physiological stability, since even babies with the weakest health can be placed in this position.<sup>7</sup>

Regarding the specifics of each position, most authors recommend flexion of the lower and/or upper limbs of newborns. This characteristic can be observed in the DD and PD, as previously described. The flexor position can help promote stability, posture alignment, containment, and reduction of energy expenditure, providing comfort and reducing the physiological and behavioral stress of the NB.<sup>17</sup>

However, other authors also indicate adduction of the upper and lower limbs, as pointed out in the description of the dorsal posture.<sup>4,16</sup> While others recommend, in addition to flexion, extension of the lower and upper limbs.<sup>13</sup> Extension is the standard position used mainly by premature babies, since they have not fully developed in the womb. However, this should not be the only position used by the NB. This is due to the fact that if the extensor posture is maintained for long periods of time, the NB may progress with serious alterations in motor development.<sup>18</sup>

Another point that should be observed in the positioning of the hospitalized NB is the orientation of the body in midline.<sup>4,7,14,16</sup> This care should also be taken in order to prevent later problems in development, such as difficulty in walking, crawling, sucking, etc., and increased intracranial pressure and/or obstructive apnea.<sup>19</sup> Furthermore, orientation by the midline helps in maintaining the symmetry of movements.<sup>14</sup> This characteristic was mentioned in the DD and LD, but should also be adopted in the PD.

**Table 1** – Objectives of the studies

Reference	Goal
Arakaki, Oliveira, Bogossian, Almeida, Silva e Ferreira <sup>6</sup>	To verify the impact of physiotherapy/nursing integration in the update on positioning of the NB in the NICU bed.
Calazans, Amaral, Pinheiro e Gardenghi <sup>4</sup>	To see if extreme preterm infants, who have undergone functional positioning, are able to acquire integration of primitive reflexes when compared to premature infants.
Fialho, Dias, Silva, Santos e Salvador <sup>13</sup>	To identify the care technologies used in NICUs in Federal University Hospitals in the Southeast region of Brazil.
Madlinger-Lewis, Reynolds, Zarem, Crapnell, Inder e Pineda <sup>14</sup>	Compare the neurobehavioral and medical outcomes of preterm infants in the NICU positioned with the alternative positioning device compared to preterm infants positioned using traditional methods.
Marski, Facio, Ichisato, Barba e Wernet <sup>15</sup>	To analyze the Developmental Care in the care provided by nurses to critically ill NBs in NICUs.
Santos, Viera, Toso, Barreto e Souza <sup>16</sup>	Show the positioning that Standard Operating Procedure (SOP) benefits over routine positioning in a NICU.
Toso, Viera, Valter, Delatore e Barreto <sup>7</sup>	Develop a SOP regarding the positioning of the premature NB in an incubator and/or a heated crib, to be validated by experts in the field, with a view to its application in the NICU.

**Table 2** – Indicated positioning for hospitalized NBs

Reference	Indicated positions and characteristics
Arakaki, Oliveira, Bogossian, Almeida, Silva e Ferreira <sup>6</sup>	Flexor postures.
Calazans, Amaral, Pinheiro e Gardenghi <sup>4</sup>	Dorsal decubitus (DD); lateral decubitus (LD); prone decubitus (PD); symmetry of the head in the midline; physiological flexion of the trunk and upper and lower limbs in flexion and adduction.
Fialho, Dias, Silva, Santos e Salvador <sup>13</sup>	Moderate restraint; allow voluntary movements and alternate between flexor and extensor postures.
Madlinger-Lewis, Reynolds, Zarem, Crapnell, Inder e Pineda <sup>14</sup>	Symmetrical position, flexed and oriented by the midline.
Marski, Facio, Ichisato, Barba e Wernet <sup>15</sup>	Preferably in flexor posture.
Santos, Viera, Toso, Barreto e Souza <sup>16</sup>	DD; LD; PD; raised headboard; semi-extension of the neck; positioning the head in midline and flexion and adduction of upper and lower limbs.
Toso, Viera, Valter, Delatore e Barreto <sup>7</sup>	Headboard elevated 30° in all positions; DD; LD; PD; flexion of the lower limbs and head oriented by the midline.

Thus, the correct positioning and postural variation can reduce postural asymmetries and other abnormalities related to prematurity and/or NICU stay.<sup>7</sup> Inadequate positioning may be responsible for several postural problems, deficits in the adequacy of muscle tone and strength and torticollis, causing greater discomfort and consequent increased effort and energy expenditure to adapt the functioning of the body.<sup>16</sup>

Moreover, it is important that the health professional keeps the head end elevated, and the angle of 30° is considered the best angle for elevation.<sup>7,16</sup> Elevation of the head end is important because this movement helps the respiratory function, leaving the airways more rectilinear, consequently reducing the resistance to air entry.<sup>16</sup> Thus, it is noted that this management also helps to reduce the effort of the NB, providing greater comfort and lower energy expenditure.

In addition, when positioning the NB, it is also necessary that the health professional performs the correct restraint.<sup>13</sup> Restraint is used in order to maintain proper positioning, limiting the movements of the NB. Various products can be used for restraint, which are discussed with more emphasis in the next category.

Given the indicated positioning and the characteristics addressed by the authors of the studies selected for this literature review, the importance of a standardized approach to the care of hospitalized NB is evident. Thus, the change of decubitus cannot be just another protocol to be used at the NICU.<sup>16</sup> It should be developed considering a specific methodology, which guides professionals and, consequently, avoids the inappropriate positioning and provides a good evolution in motor development.

### Products that assist in the proper positioning of the newborn patient in a Neonatal Intensive Care Unit

Given the different positions in the bed of the NB hospitalized at the NICU and their different characteristics, health professionals can also make use of different products to provide an appropriate positioning, which assists in the motor development and patient comfort. Table 3 shows the products indicated to assist in the positioning of NBs, which were mentioned in the studies of this review.

Given the data presented in Table 3, it appears that many authors suggest the use of nests to assist in the containment of hospitalized NB at the NICU. The use of products such as containment nests helps to conserve energy, reduce physiological and behavioral stress, and promote greater self-control of the NB.<sup>7</sup> Moreover, the positioning with the aid of these nests works as a method of precaution against the risk of aspiration.<sup>7</sup>

There are currently several models of retention nests, which have different characteristics and may be more beneficial for larger or smaller babies or even with different pathologies. However, in many NICUs, rudimentary artifacts continue to be used, such as rolls, sheets, blankets, towels, swaddling cloths, diapers and swaddling clothes mentioned by some authors of this study.<sup>7,14,16</sup>

The use of handmade nests was not strongly censored in any of the studies, however, there are several other products on the market that may be more effective in positioning the NB in bed. One of the studies in this review, for example, indicates the use of cushions, which are pillows produced in order to assist in positioning.<sup>4</sup> This type of cushion is widely used in bedridden

**Table 3** – Products indicated to assist in positioning RNs

Reference	Featured Products
Arakaki, Oliveira, Bogossian, Almeida, Silva e Ferreira <sup>6</sup>	-
Calazans, Amaral, Pinheiro e Gardenghi <sup>4</sup>	Coxins.
Fialho, Dias, Silva, Santos e Salvador <sup>13</sup>	-
Madlinger-Lewis, Reynolds, Zarem, Crapnell, Inder e Pineda <sup>14</sup>	Dandle-ROO; rolos; almofadas de gel; Dandle-WRAP; Snuggle Up; Bendy Bumper; SleepSack e cobertores.
Marski, Facio, Ichisato, Barba e Wernet <sup>15</sup>	Ninhos (não informa de que tipo).
Santos, Viera, Toso, Barreto e Souza <sup>16</sup>	Ninhos (não informa de que tipo) e rolos.
Toso, Viera, Valter, Delatore e Barreto <sup>7</sup>	Ninhos artesanais, feitos com cueiros e fraldas; Snuggle Up; Dandle-ROO; rolos; faixas e sapinho ou polvo.



patients to prevent the development of pressure injuries. In this same study, hospitalized NBs were submitted to a routine of postural changes performed with the use of cushions, which were intended to ensure containment and provide a sense of security.<sup>4</sup> The change of decubitus occurred three times a day and at the end of the 60th day of life, the babies showed an improvement in the integration of primitive reflexes. This result shows an improvement in the development of the infants who participated in the study, a factor of great relevance.

Another study in this literature review mentions the use of frogs or octopuses to assist in positioning the NB.<sup>7</sup> However, these products are usually used more for therapeutic purposes. In a study carried out in the Federal District, for example, the authors made, with mothers of hospitalized NBs, several crocheted octopuses, which were used to help the babies in their self-knowledge, stimulating them to discover different shapes, textures, and colors.<sup>20</sup>

There are also more structured products that act as nests, promoting the positioning and containment of hospitalized NBs. The Dandle-ROO, is an example of this type of product, which was mentioned in some studies in this review.<sup>7,14</sup> This product consists of a structured and elastic blanket, with flexible straps at the upper ends, in addition to a head restraint.<sup>14</sup> At the bottom, a high-performance fabric is used, which helps promote a flexed posture. In addition, fabric rolls or gel pads may be used, which tend to help relieve the pressure exerted between the surface and the RN's skin.<sup>14</sup> In addition to the Dandle-ROO, the use of the Dandle WRAP was also mentioned, a product similar to the previous one, but used in larger babies.<sup>14</sup>

Another product mentioned in the studies that make up this review is the Snuggle Up.<sup>7,14</sup> This positioning aid has some different characteristics from the previously mentioned products, being characterized as a more open and bulky wrap. Thus, when using the Snuggle Up, the healthcare professional can also use the Bendy Bumper.<sup>14</sup> This product is used as a complement to the Snuggle Up, helping to create a more structured nest. The Snuggle Up and the Bendy Bumper, used together, have characteristics similar to the uterine wall, being resistant, but elastic at the same time, allowing the baby to move its body and, later, return to the flexor position.<sup>21</sup> This characteristic is interesting especially for premature NBs, since in the NICU, the incubator tends to be structured so that it is analogous to the uterine environment.

Finally, the use of SleepSack is mentioned.<sup>14</sup> It can be used to help regulate the body temperature of hospitalized NBs. In addition, SleepSack can also assist in containing the baby, but in a less consistent way than the products mentioned above.

According to one of the studies in this review, the use of these positioning aids is extremely widespread, however, there are few scientific studies on the benefits and/or harms of such use.<sup>14</sup> In contrast, it is important to mention that this study was developed in the United States. This factor is of great relevance since Brazilian authors claim that this type of product is still inexistent in Brazil.<sup>7</sup> Thus, in order to identify the products used on a daily basis for repositioning of NBs in the NICU, it is

important to consider the reality of the country, state or region where the researcher is located, since one must take into account cultural aspects and the resources available.

## CONCLUDING REMARKS

The objective of this study was focused on identifying which are the most suitable positioning and auxiliary products for the NB hospitalized in NICUs. It was found that there are several positions that can be used with hospitalized NBs in NICUs, such as dorsal, ventral and lateral decubitus, being the ventral the most suitable. In addition, it was observed that there are several characteristics that should be considered when using each of the positions, such as care with midline positioning, the use of flexion postures, raising the head end, the use of restraint methods, etc. However, it was also possible to observe that few studies brought a standard and/or a positioning method. Moreover, none of them presented a schedule for changing the decubitus linked to each positioning, as occurs with the adult public. This schedule is important because it helps in the organization of the environment and prevents the patient from being manipulated too much or too little, thus promoting the development of pressure ulcers. Furthermore, several products were identified that can be used to help in positioning the NBs and that can facilitate nursing care. However, many of these products are still incipient in Brazil, which may be related to lack of knowledge and/or resources, both financial and material. In this sense, it is suggested that further studies be conducted on this topic in order to identify the causes of the lack of use of these products as well as the lack of prevention strategies such as positioning schedules in the country, and the possible consequences of this on the motor development of hospitalized NBs in NICUs.

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