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BENEFITS OF THE CANGUROU METHOD FOR THE PREMATURED NEWBORN IN THE NEONATAL CARE UNIT

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ABSTRACT

Introduction: The kangaroo method aims to promote humanized care and increase the mother-child bond. With its implementation, Brazil has been standing out for adopting the method as a National Public Policy for the humanization and qualification of neonatal care, favoring the family bond. **Objective:** To describe the benefits of the Kangaroo Method for premature newborns in NICUs. **Methodology:** Integrative Literature Review conducted from January to March 2020 using the databases BVS, LILACS, MEDLINE, SciELO digital library. Available articles published between the years 2015 and 2020, in Portuguese and English languages were included. 164 studies were found, in which 117 of the papers were about Kangaroo Method and 47 about Nursing Care for newborns. **Results:** The benefits of the Kangaroo Method are the reduction of the risk of death (up to 23%) for babies who received the treatment, decreased hospital length of stay, prevents aggravations, promotes the babies' health, decreases neonatal sepsis, contributes to cognitive, motor, psychomotor, neurobehavioral and psychoaffective development. **Conclusion:** The Kangaroo Method is a tool with a strong role in reducing morbidity and mortality and promoting humanized care, providing numerous benefits that contribute to the healthy growth and development of premature newborns throughout their lives.

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INTRODUCTION

In the 1970s, the Kangaroo Method was implemented, which is a strategy in the perinatal field of treatment of premature and low-birth-weight newborns with the goal of removing babies from incubators, keeping them in skin-to-skin contact with their mother, in order to keep them at the ideal body temperature, on her chest, in the upright position and in ventral decubitus (SALES *et al.*, 2018, GESTEIRA, 2016, CALLISTER, 2015). The World Health Organization (WHO) recommends the method, according to a recent guideline, as standard for routine care for newborns weighing less than two kilograms (Lydon *et al.*, 2018, Smith *et al.*, 2017) in order to prevent hypothermia (KRISTOFFERSEN *et al.*, 2016).

It is recommended that the method be included in routine care in the NICU, as well as the participation, for long periods, of the newborns' parents. The method, implemented in Brazil in 2000, aims to promote humanized care and increase the mother-child bond. With its implementation, the country has been standing out for adopting the method as a National Public Policy for the humanization and qualification of neonatal care, favoring the family bond. Federal Law No. 8,069 of the Statute of Children and Adolescents (ECA) guarantees free access of parents in Brazilian neonatal units during the hospitalization period, as a way to provide the affective bond between mother and baby (SALES *et al.*, 2018), thus contributing to the psycho-affective aspects between the family and the newborn being considered (GESTEIRA, 2016).

Establishing a strong and healthy relationship facilitates early attachment and promotes breastfeeding, helps protect the newborn's brain development, and organizes motor and sleep activity (CHARPAK, RUIZ, 2016). The Kangaroo Method is composed of three stages: the first, corresponds to the hospitalization in NICU or Conventional Neonatal Intermediate Care Unit and occurs until the discharge of the Newborn from the NICU/UCINCo. In the second, a pre-hospital discharge stage, the mother returns to the hospital in joint accommodation in the Kangaroo Neonatal Intermediate Care Unit and performs the care, skin to skin contact, supervised and guided by a team until the newborn reaches the ideal weight for hospital discharge and the third stage corresponds to the outpatient monitoring of the baby until it reaches the weight of 2500 kilograms (GESTEIRA, 2016). With the Kangaroo Method it is possible that the care and handling of the baby have the participation and welcoming of parents inserting them in the care, promoting breastfeeding, reducing pain, stabilizing the physiological patterns, accelerating the development and reducing the mother-baby separation (CHARPAK, RUIZ, 2016). Maternal attachment allows the child to grow and develop healthily (physically, psychologically, and intellectually) throughout life. Mother-baby interaction should start immediately after birth and according to studies, premature babies who saw their mothers 2-3 hours after birth had healthier maternal attachment. Attachment or bonding extends to fathers as well, as parenting is an essential element for the health, well-being, and physical and psychosocial development of children (KURT *et al.*, 2020). Prematurity can incur in serious problems for the baby, being necessary the implementation and execution of specific treatments and care to ensure them a healthy development and free of complications. The present study aimed to describe the benefits of the Kangaroo Method for premature newborns in Neonatal Intensive Care Units.

METHODOLOGY

This is an Integrative Literature Review, which aims to synthesize results on a theme or issue, involving the definition of the clinical problem, the identification of the necessary information, the search for studies in the literature and their critical appraisal, the identification of the applicability of data from publications and the determination of their use in a systematic, orderly and comprehensive manner (SOUZA, SILVA, CARVALHO, 2010). This research was guided by the following question: What are the benefits of the Kangaroo Method for premature newborns in Neonatal Intensive Care Units?. The selection of articles occurred from January to March 2020. The consultation, carried out in two stages in the Virtual Health Libraries (VHL), BDNF - Nursing, MEDLINE and LILACS, used the following descriptors: Nursing Care, newborns and the Kangaroo Method. Available articles published between the years 2015 and 2020 in Portuguese and English were included, and abstracts that did not contemplate the objective proposed by the study were excluded. We found 164 articles of which 117 were about the Kangaroo Method and 47 about Nursing Care of newborns). After reading the articles in full, the inclusion and exclusion criteria were applied, and only 20 articles were part of the study. The selected articles were organized in a table containing author, journal, year, methodology and database in five analytical categories. Data analysis is responsible for identifying, interpreting, and reporting patterns from qualitative data by organizing and describing the data in detail. This method collaborates to generate an interpretive analysis on the data (DE SOUSA, 2019).

RESULTS AND DISCUSSION

This review is composed of 20 articles, organized in a table and discussed in two analytical categories: Neonatal Intensive Care Unit admissions and The benefits of the Kangaroo Method for premature newborns. A presente revisão é composta de 20 artigos, organizada em um quadro e discutida em duas categorias analíticas: Internações em Unidades de Terapia Intensiva Neonatal e Os benefícios do Método Canguru para recém nascidos prematuros. The Chart 1 above shows the characteristics of the articles. It was verified that of the 20, 12 belonged to the MEDLINE database, six to BDNF - Nursing and

three to LILACS. The articles were published in different journals, with Early Human Development, Revista de Enfermagem da UFPE on line and Journal of Pediatric Surgery accounting for two publications each, and the others with one publication. As for the year of publication, three articles were published in 2015, two in 2016, four in 2017, eight in 2018, and three in 2019. With regard to research methodology, the articles used varied methods, with the randomized controlled trial predominating with six.

Neonatal Intensive Care Unit Admissions: Approximately 15 million low birth weight or extremely low birth weight (<1,000g) premature neonates are born every day in the world. This data relates to the second leading cause of deaths among children under five years of age and the highest cause of infant mortality (SILVA *et al.*, 2018, STELMAK, MAZZA, FREIRE, 2017). Socioeconomic and racial conditions increase the risk of preterm birth. In Brazil, the average rate of premature live births has been stable since 2000 (6.6%) (LEWIS *et al.*, 2019, SILVA, *et al.*, 2018). Prematurity is the main reason for hospitalization in NICUs. And this unit must guarantee the aspects related to the humanization of care, the free access and/or permanence of parents and be constituted by trained multidisciplinary team that promotes the necessary support for the neonate with safe hospital discharge (NODA *et al.*, 2018, ROCHA, 2016, STELMAK, MAZZA, FREIRE, 2017, ESTEVAM and SILVA, 2016). The concern with the development of premature infants has been growing and technological advances have been contributing to a better prognosis. However, the environment in NICUs, with ample technological apparatus for high-complexity care, may prove harmful and antagonistic to a healthy development of infants, putting them at risk of vulnerability and fragility (STELMAK, MAZZA, FREIRE, 2017, ESTEVAM, SILVA, 2016, SILVA *et al.*, 2016, DENG *et al.*, 2018). The unplanned environment tends to increase stress in neonates, interfering with recovery and prolonging the hospitalization period (SILVEIRA FILHO *et al.*, 2019). Increased noise and light levels beyond what is allowed, for example, can interfere with the organ maturation process, lead to physiological and behavioral changes, reflecting on weight gain and development in general (Fialho *et al.*, 2015). Exposure can cause altered sleep patterns, apnea, irritability, crying spells, cognitive, motor and affective deficits, and circadian rhythm, interfering with the cyclic production of hormones (cortisol, melatonin and gonadotrophin) and neurological development (SILVEIRA FILHO *et al.*, 2019, FIALHO *et al.*, 2015, SILVA *et al.*, 2016).

Babies in NICUs have difficulties in reaching the state of deep sleep and silent wakefulness. Exposure to this environment, while the premature brain is not yet ready to process various stimuli, brings negative consequences for the newborn, because sleep and wakefulness are directly related to the maturation of the central nervous system (BASTANI *et al.*, 2017, DENG *et al.*, 2018). Premature infants tend to develop ocular disorders (retinopathy, strabismus, and refractive errors) due to light toxicity in the period from the 28th to 40th weeks (the period of visual system development) and difficulties in thinking, speaking, reading, writing, or calculating as a result of noise levels (Stelmak, Freire, 2017). Delays in development and learning (a consequence of excessive levels of the stress hormone cortisol acting on the prefrontal cortex and hippocampus region of the brain), cerebral palsy, respiratory diseases, feeding difficulties, and vision problems can occur (PUTHUSSEY *et al.*, 2018, ANGELHOFF *et al.*, 2018). The technical-scientific advances undoubtedly provide greater survival for newborns, but, by itself, it does not guarantee a comprehensive and effective treatment. Therefore, continuing education in the search for specialized and qualified knowledge in neonatal care is of utmost importance (Estevam, Silva, 2016, Sales *et al.*, 2018). Thus, management depends, first, on the completeness of care, considering workers, managers, newborns, and family members as the protagonists of health production, and, second, on the cognitive, integrative, and relational ability to apply knowledge in the face of challenges and problems (SILVA *et al.*, 2015, FIALHO *et al.*, 2015). Therefore, the modification and improvement of the NICU environment is necessary to promote better outcomes for babies and

Chart 1. Description of the articles included in the integrative review according to title, author, authors, journal, year, methodology, and database

Nº	Title	Authors	Journal	Year	Methodology	Database
1	Technologies applied by Nursing in neonatal care	FIALHO, DIAS, SILVA, SANTOS, SALVADOR	Revista Baiana de Enfermagem	2015	Qualitative Research	BDENF - Enfermagem
2	Kangaroo care by fathers and mothers: comparison of physiological and stress responses in premature infants	SRINATH, SHAH, KUMAR, SHAH.	Journal of Perinatology	2015	Prospective study	MEDLINE
3	Effect of maternal skin-to-skin contact on decolonization of methicillin-oxacillin-resistant staphylococcus in neonatal intensive care units: a randomized controlled trial	LAMY FILHO, DE SOUSA, FREITAS, LAMY, SIMÕES, DA SILVA, BARBIERI.	BMC Pregnancy and Childbirth	2015	Randomized controlled trial	MEDLINE
4	Kangaroo - mother care method and neurobehavioral behavior of preterm infants	SILVA, BARROS, PESSOA, GUINSBURG.	Early Human Development	2016	Prospective cohort	MEDLINE
5	Mothers' view on newborn care after discharge from the neonatal ICU	ESTEVAM E SILVA	Saúde e Pesquisa	2016	Descriptive and exploratory research with qualitative approach	LILACS
6	Humanization of newborn care in the kangaroo method: an experience report	LOPES, OLIVEIRA, PEREIRA, ROMEIRO, CARVALHO.	Revista de enfermagem UFPE on line	2017	Qualitative, descriptive study, experience report type	BDENF - Enfermagem
7	The effects of kangaroo care on the sleep and wakefulness of premature babies	BASTANI, RAJAI, FARSI, ALS.	The Journal of Nursing Research	2017	Randomized controlled study	MEDLINE
8	The value assigned by nursing professionals to the care recommended by the Kangaroo Method	STELMAK, MAZZA, FREIRE	Rev enferm UFPE on line	2017	Descriptive study, qualitative approach	BDENF - Enfermagem
9	Applicability of the actions recommended by the Kangaroo Method	STELMAK, FREIRE	Revista UFRJ On line	2017	Quantitative descriptive research	LILACS
10	Unlike kangaroo care, mechanically simulated kangaroo care does not alter heart rate variability in premature newborns	KOMMERS, JOSHI, VAN PUL, FEIJS, OEI, OETOMO, ANDRIESEN.	Early Human Development	2018	Randomized controlled study	MEDLINE
11	Experience and needs of parents of preterm infants admitted to a neonatal intensive care unit	SILVA PLN, BARBOSA, ROCHA, FERREIRA.	Revista de Enfermagem UFPI	2018	Descriptive, exploratory, qualitative study	BDENF - Enfermagem
12	Positive association between duration of skin-to-skin contact and blood glucose level in full-term infants	TAKAHASHI, TAMAKOSHI	The Journal of Perinatal e Neonatal Nursing	2018	Cross-sectional, descriptive study	MEDLINE
13	Effectiveness of early intervention programs for parents of preterm infants: a meta-review of systematic reviews	PUTHUSSEY, CHUTYAMI, TSENG, KILBY, KAPADIA.	BMC Pediatrics	2018	Systematic Review	MEDLINE
14	Humanization in Neonatal Intensive Care Unit from the perspective of parents.	NODA, ALVES, GONÇALVES, DA SILVA, FUSCO, AVILA.	Rev Mineira de Enfermagem	2018	Descriptive, exploratory, qualitative study	BDENF - Enfermagem
15	Effect of skin-to-skin contact on parents' sleep quality, mood, parent-infant interaction, and cortisol concentrations in neonatal units: study protocol of a randomized clinical trial	ANGELHOFF, BLOMQUIST, HELMER, OLSSON, SHOREY, FROSTELL, MORELIUS.	British Medical Journal Open	2018	Randomized controlled study	MEDLINE
16	Early parent-infant skin-to-skin contact and its effect on neurodevelopmental outcomes in moderately preterm infants in China: study protocol for a randomized controlled trial	DENG, LI, WANG, SUN, XU.	Trials	2018	Randomized controlled study	MEDLINE
17	Parental involvement correlates with oxytocin release from parents and the preterm infant during skin-to-skin contact	VITTNER, BUTLER, SMITH, MAKRIS, BROWNELL, SAMRA, MCGRATH.	Advances in Neonatal Care	2018	Randomized controlled study	MEDLINE
18	Safety and feasibility of skin-to-skin care of surgical infants: a quality improvement project	KELLEY-QUON, KENNEY, BARTMAN, THOMAS, ROBINSON, NWOMEH, BAPAT.	Journal of Pediatric Surgery	2019	Exploratory descriptive and quantitative study	MEDLINE
19	Strategies of the neonatal intensivist nurse facing the humanization of care	SILVEIRA FILHO, SILVEIRA, DA SILVA.	Cuidarte Enfermagem	2019	Integrative review	LILACS, BDENF - Enfermagem
20	The effect of short-term skin-to-skin contact on physiological and behavioral outcomes of preterm infants: a quasi-experimental study	SHATTANAW, AL-ALI	Journal of Pediatric Nursing	2019	Experimental study	MEDLINE

parents, meet the unique demands of the newborn and provide criteria for light levels and sound intensity, for example (PINEDA *et al.*, 2016).

The benefits of the Kangaroo Method for premature newborns:

Among the benefits of the Kangaroo Method, the most important is the reduction in the risk of death (up to 23%) for babies who received the treatment and the reduction in the length of hospital stay that can reach up to 4.6 days (LANGLEY, 2017, SILVA *et al.*, 2016). The method prevents aggravations, promotes babies' health, decreases neonatal sepsis, contributes to cognitive, motor, psychomotor, neurobehavioral, and psychoaffective development as well as improves temperament, promotes sensory stimulation, provides for the maintenance of the baby's vital signs, reduces hospital readmissions, improves the quality of movements, attention and orientation to external stimuli, and reduces reflexes with asymmetric responses (Sales *et al.*, 2018, Stelmak, Mazza, Freire, 2017, Gesteira, 2016, Cattaneo *et al.*, 2018, Puthussery *et al.*, 2018, Silva *et al.*, 2016). For intubated infants it may facilitate earlier extubation (KELLEY-QUON *et al.*, 2019). With breastfeeding performed by the mother in the Kangaroo Method favors weight gain, gain of cephalic circumference, immunizes and stimulates the newborn, because the colostrum is rich in nutritional and immunological aspects (Lopes *et al.*, 2017, Cattaneo *et al.*, 2018), and, in the long term, to better brain maturation in ex-premature adolescents submitted by the method (Charpak, Ruiz, 2016). Another positive point of breastfeeding is the act of sucking that enables the improvement of oral motor skills (FIALHO *et al.*, 2015).

Kangaroo Care has a positive impact on the quality of the mother-baby relationship: symmetric co-regulation, asymmetric co-regulation, attachment, and mother-baby interaction (Puthussery *et al.*, 2018). Mothers express enhanced attachment behaviors and increased feelings of satisfaction (Srinath *et al.*, 2015). However, this impact is not just limited to the mother-baby dyad. Paternal Kangaroo care has also been shown to maintain higher skin temperature, enabling better behavioral responses, reducing negative effects on metabolic rate, and decreasing pain response in preemies (DENG *et al.*, 2018). The method decreases beat variability and magnitude by reducing transient heart rate decelerations, episodes of bradycardia and oxygen denaturation consequently stabilizing the infant's cardiopulmonary parameters, especially in infants with complex congenital heart disease (BASTANI *et al.*, 2017, ALDRETE-CORTEZ *et al.*, 2015, JONES, SANTAMARIA, 2018, TAKAHASHI, TAMAKOSHI, 2018, SRINATH *et al.*, 2015, KELLEY-QUON *et al.*, 2019). Respiratory rates in infants after Kangaroo care are significantly altered - blood oxygen saturation, decrease in the incidence of apnea - contributing to the reduction of morbidity and mortality in premature infants due to lack of brain oxygenation (PARSA *et al.*, 2018, SHATTNAWI, AL-ALI, 2019, LORENZ *et al.*, 2016). Another advantage is the reduction of stress, the warmth and smell of the mother's body and breasts, the soothing sound of the mother's heartbeat that reassures, calms and stimulates the baby to deep sleep during Kangaroo care (Gesteira, 2016, Bastani *et al.*, 2017). According to findings, there is significantly lower cortisol reactivity in premature babies who have received almost continuous Kangaroo care since birth (KRISTOFFERSEN *et al.*, 2016). The method establishes more organized sleep patterns (less rapid eye movements, quieter sleep, and less arousal) and accelerates brain maturation since deep sleep is important for promoting brain development by increasing synaptogenesis (DENG *et al.*, 2018, BASTANI *et al.*, 2017). Infants in the Kangaroo Care group, averaging 1 hour per week, had shorter light sleep times, less sleepiness, and a more organized long-term sleep-wake cycle (Bastani *et al.*, 2017). Babies were less likely to cry continuously (36% reduction in average cry duration) (SHATTNAWI, AL-ALI, 2019). The Kangaroo Method has been used as a treatment in modulating pain responses (Castral *et al.*, 2015, Deng *et al.*, 2018). Pain can cause negative impacts to the child's future life (withdrawal irritability, altered pain sensitivity, decreased ability to learn, and increased alcohol preference later on) (CHOUDHARY *et al.*, 2015).

Some maternal stimuli (voice, perfume) can coordinate the release of oxytocin, central and peripheral, (Kommers, 2016), involved in the control of stress, anxiety, and autonomic functions. Oxytocin levels are inversely proportional to cortisol levels, increased oxytocin implies decreased stress. Oxytocin facilitates social sensitivity and is the necessary attunement for developing relationships and nourishment for emotional and physical health (VITTNER *et al.*, 2018). The physiological and biological response to stress is necessary for the maintenance of homeostasis. The method has a neuroendocrine effect by co-regulating cortisol. Twenty minutes of care provides a significant reduction in salivary cortisol levels and consequently reduces stress (Aldrete-cortez *et al.*, 2015, Srinath *et al.*, 2015, Angelhoff *et al.*, 2018). Reduced stress implies lower energy consumption and prevention of hypoglycemia (TAKAHASHI, TAMAKOSHI, 2018). Kangaroo Care increases the baby's blood glucose levels by preserving glycogen (CHARPAK, RUIZ, 2016, KRISTOFFERSEN *et al.*, 2016). However, when the baby fails to maintain temperature and peripheral blood flow decreases, the cardiovascular and respiratory systems work harder to obtain oxygen in the blood consequently increasing energy consumption, causing blood glucose to decrease due to depletion of glycogen stores (TAKAHASHI, TAMAKOSHI, 2018). A severe hypoglycemic condition can cause various neurological damage such as mental retardation, developmental delay, personality disorders, and recurrent seizure activity, however, infants under Kangaroo Care showed better neurobehavioral performance due to accelerated neurological maturation (TAKAHASHI, TAMAKOSHI, 2018, SILVA *et al.*, 2016).

The method improves regulation (homeostasis) (Kommers *et al.*, 2018), provides better maturation of the prefrontal cortex (by decreasing cortisol levels acting in this region) (Bastani *et al.*, 2017, Angelhoff, *et al.*, 2018), increases vagal tone (Butruille *et al.*, 2017) and parasympathetic activity, and in the long term improves motor and cognitive performance and family interaction (SILVA *et al.*, 2016). In the literature, there is much evidence that the Kangaroo Method decreases hospital infection rates, including reducing the incidence of necrotizing enterocolitis (NEC) (DENG *et al.*, 2018). Methicillin-oxacillin-resistant staphylococcus (MRSA) is frequent in newborns admitted to NICUs, and are the main culprits in hospital infection outbreaks. Non-pathogenic, non-methicillin-resistant bacteria (*Streptococcus viridans* group) can inhibit the growth of MRSA in the oral cavity of newborns through a competitive mechanism called bacterial interference. This mechanism of competition for nutrients, may account for the ability of Kangaroo Care to reduce infection rates in newborns. Kangaroo Care infants showed positive results for decolonization, twice as high as control groups, after seven days of treatment (LAMY FILHO *et al.*, 2015). In the long term, in the child development process, the Kangaroo Method provides numerous benefits, such as: quieter waking periods, more awake and alert periods (BASTANI *et al.*, 2017), better performance in physical tests (during early childhood) (PARSA *et al.*, 2018), better mental development at 6, 12 and 24 months, and better cognitive development at 5 and 10 years (PINEDA *et al.*, 2016, VITTNER *et al.*, 2018). For best outcomes, there should be comprehensive longitudinal follow-up after hospital discharge with adequate information for mothers and family members, and assistive support for the infant's primary health care (CATTANEO *et al.*, 2018).

CONCLUSION

It can be concluded that the Kangaroo Method is a tool with a strong role in reducing morbidity and mortality and promoting humanized care. The method provides countless benefits that contribute to the healthy growth and development of premature newborns throughout their lives. The main benefits identified refer to cognitive, motor, psychomotor, neurobehavioral, and psychoaffective development, reduced hospital infection rates, better brain maturation, improved heart rate, improved respiratory rates, and cardiorespiratory stability, reduced stress, more organized sleep patterns, modulates pain responses, and increases glucose levels.

The study is relevant because it presents numerous benefits of the Kangaroo Method in the treatment of premature newborns and highlights the importance of the implementation and execution of care in Neonatal ICU as a tool for humanization of the health of the newborn and, consequently, the reduction of hospital stay and the reduction of mortality rates.

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