

Nursing care for prevention of skin injury in pre-term newborn: Integrative review

RESUMO | Objetivo: descrever os cuidados de enfermagem para prevenção de lesão de pele em recém-nascido pré-termo na Unidade de Terapia Intensiva Neonatal. Método: revisão integrativa realizada nas bases de dados CINAHL, MEDLINE, LILACS e BDNF em julho de 2021, sendo selecionados 16 artigos, publicados entre os anos de 2015 e 2020. Resultados: Nos estudos foram observados que existem inúmeros cuidados e produtos utilizados na manutenção e prevenção da integridade da pele, como: termorregulação, troca de fraldas, uso de emolientes, avaliação diária da pele, banho, uso de antissépticos. Conclusão: Observa-se que há uma carência em estudos com evidências de alto nível, que ajudam na formação do cuidado na prática com segurança aos recém-nascidos, sendo fundamentais mais estudos relacionados ao tema.

Descritores: Recém-nascido; Pré-termo; Pele; Cuidados de enfermagem.

ABSTRACT | Objective: to describe nursing care to prevent skin lesions in preterm newborns in the Neonatal Intensive Care Unit. Method: integrative review carried out in the CINAHL, MEDLINE, LILACS and BDNF databases, in July 2021, with 16 articles being selected, published between 2015 to 2020. Results: In the studies, it was observed that there are numerous care and products used to maintenance and prevention skin integrity, such as: thermoregulation, changing diapers, use of emollients, daily skin assessment, bathing, use of antiseptics. Conclusion: It is observed that there is a lack of studies with high-level evidence, which help in the formation of care in practice with safety for newborns, and more studies related to the subject are essential.

Keywords: Newborn; Preterm; Skin; Nursing care.

RESUMEN | Objetivo: describir los cuidados de enfermería para la prevención de lesiones cutáneas en recién nacidos prematuros en la Unidad de Cuidados Intensivos Neonatales. Método: revisión integradora realizada en las bases de datos CINAHL, MEDLINE, LILACS y BDNF, en julio de 2021, siendo seleccionados 16 artículos, publicados entre 2015 y 2020. Resultados: En los estudios se observó que existen numerosos cuidados y productos utilizados en mantenimiento y prevención de la integridad de la piel, tales como: termorregulación, cambio de pañales, uso de emolientes, evaluación diaria de la piel, baño, uso de antisépticos. Conclusión: Se observa que faltan estudios con alto nivel de evidencia, que ayuden en la formación del cuidado en la práctica con seguridad para los recién nacidos, siendo imprescindible más estudios relacionados con el tema.

Palabras claves: Recién nacido; Prematuro; Piel; Cuidado de enfermera.

Rita de Cássia Silva

Nurse at the Neonatal Intensive Care Unit Professional training: Nurse specialist in neonatology and dermatological nursing, Master's student at the Professional Master's in Nursing at the Fluminense Federal University (MPEA).
ORCID: 0000-0002-1689-7110

Eny Dórea Paiva

Associate Professor I of the Department of Maternal-Child and Psychiatric Nursing at the Aurora de Afonso Costa Nursing School (EEAAC); permanent professor of the professional master's degree in care nursing (MPEA) Professional training: Master's degree in nursing from the University of São Paulo (USP), doctorate in Health Sciences from USP; Post Doctorate in Nursing at Ryerson University in Toronto - Canada.
ORCID: 0000-0002-4338-5516

Recebido em: 30/03/2022

Aprovado em: 09/08/2022

INTRODUCTION

According to the World Health Organization, preterm newborns (PTNBs) are those with a gestational age of less than 37 weeks, being divided into subcategories according to gestational age, being extremely premature (less than 28 weeks), very premature (28 to 32 weeks), and moderate to late preterm (32 to <37) ⁽¹⁾ Currently, the prematurity rate in Brazil is 11.5%, one of the highest in the world, and one of the main factors of infant mortality. ⁽²⁾

Newborn skin comprises approximately 13% of the body surface and one of its main functions is to act as a protective barrier. In addition to this extremely important function, the skin assists in thermoregulation, minimizes transepidermal water loss, prevents the absorption of chemical agents, protects against infectious agents and immunosurveillance. ⁽³⁾

Technological advances have allowed the survival and reduction of infant mortality of PTNBs in the Neonatal Intensive Care Unit (NICU), despite being an environment in which newborns are exposed by manipulations and various procedures such as venipuncture, blood collection, use of dressings, it is extremely important to take care of the skin of the PTNB, which has an ineffective skin barrier function, because the stratum corneum is not fully formed, considerably increasing the risk of injury. Consequently, it can significantly contribute to the increase in sepsis. ⁽⁴⁻⁵⁾

The skin lesion in the PTNB is one of the factors that contributes to a longer hospital stay, being important for public health, impacting the life of the PTNB, systematic actions by the nursing team in the care of the PTNB are necessary, which must be developed in an integral way and a routine evaluation of the skin, identifying

and eliminating the risk factors that cause injuries.⁽⁶⁾

It is important to highlight that 80% of newborns develop a skin lesion within the first month of life, especially PTNBs, and may acquire an incident related to sepsis, with the skin being the main gateway.⁽⁷⁾

In this scenario, maintaining the integrity of the PTNB's skin is a constant challenge in the nurse's work activity and one of the primary care in nursing. The nursing team has a fundamental role in the care and maintenance of the PTNB's skin integrity, which indicates the need for scientific knowledge with the use of evidence-based clinic, in order to minimize complications caused by hospitalization and the characteristics of your skin for safe care.⁽⁸⁻⁹⁾

Faced with the problem, the guiding question of the study arises: What are the nursing care to prevent skin lesions in pre-term newborns? Thus, this study aimed to describe the care to prevent skin lesions in PTNBs in the NICU.

METHOD

This is an integrative review, following the following steps: elaboration of the guiding question; definition of inclusion/exclusion criteria for articles; literature search of selected databases; definition of analytical axes; evaluation of included studies; interpretation of results and presentation of the review.⁽¹⁰⁾

The formulation of the guiding question was inspired by the PICO strategy (population/intervention/comparison/result), where P: preterm newborn, I: nursing care to prevent skin lesions, CO: maintenance of skin integrity. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) checklist was used.

The selected databases were: BDENF (Nursing Database), CINAHL (Cumulative Index to Nursing and Allied Health Literature), LILACS (Latin American and Caribbean Literature in Health Sciences), MEDLINE (Online Search and Analysis System of Medical Literature). For the LI-

LACS and BDENF databases, the Health Sciences Descriptors (DeSC) were used: pele, pré-termo, recém-nascido and cuidados de enfermagem, being used for the search the Boolean operators AND and OR (pele AND pré-termo OR recém-nas-



It is important to highlight that 80% of newborns develop a skin lesion within the first month of life, especially PTNBs, and may acquire an incident related to sepsis, with the skin being the main gateway.



cido AND cuidados de enfermagem). For the CINAHL and MEDLINE databases, the MeSH (Medical Subject Headings) descriptors were used: skin, newborn, pre-term, nursing care, with the help of the Bo-

olean operators AND and OR (skin AND preterm OR newborn AND nursing care).

The selection of articles was carried out in July 2021, published between 2015 and 2020. Inclusion criteria were: full texts, published in Portuguese, Spanish and English. For exclusion, the criteria were: those that did not have full text, abstract, repeated in the databases or that were outside the theme, or that were paid.

For data analysis, the level of evidence of the study was used, where the data were structured and synthesized, reinforcing the development of the theme, using the model based on the categorization of the Agency for Healthcare Research and Quality (AHRQ)⁽¹¹⁾ The following flowchart shows the drill down. (figure 1).

RESULTS

The final sample consisted of 16 articles, as shown in the table below. It was observed that 4 articles were published in 2015, 1 in 2016, 2 in 2017, 1 in 2018, 5 in 2019 and 3 in 2020, and it was found that the topic is relevant. It was possible to observe that most studies had level VI evidence.

According to the reading of the studies, several precautions for injury prevention were identified. Among them, the following stand out: use of emollients, use of antiseptics, change of position, transepidermal loss, actions to promote thermoregulation, skin assessment, use of adhesives, hygiene and bathing. The following were extracted from the articles: Article enumeration (EA) according to chronology and Level of Evidence, Title, Author, Year, Country, Method, nursing care, presented in table 1.

DISCUSSION

Nursing care related to the skin of PTNB requires scientific knowledge from professionals to play an important role in the quality of care, acting in the prevention and maintenance of skin integrity. The selected studies made it possible to com-

pile recommendations regarding the care of the skin of the PTNB.

After the birth of the newborn, maintaining thermoregulation is one of the main precautions in skin care, as hypothermia can lead to hypoglycemia, metabolic acidosis and hypoxia. Therefore, health professionals need to adopt measures such as placing a cotton cap on the head to reduce heat loss, use of polyurethane film.⁽¹⁴⁾

According to the WHO, the normal temperature of newborns is between 36.50C and 370C, and thermoregulation is an important factor after birth, as the risk of hypothermia is greater, due to the adequacy of the extrauterine environment, increasing the risk of mortality.⁽²⁶⁾ That said, the importance of the nurse's role for a better transition of the NB to the extrauterine environment is observed.

Article 7 describes humidified incubators and heated cribs as resources used to avoid hypothermia and assist in maintaining thermoregulation, as there is a decrease in evaporative loss, a decrease in transepidermal water loss, electrolytes, thus avoiding thermal instability. Since the PTNB's skin has the absence or reduction of varnish, making the skin more vulnerable.⁽¹⁶⁾

The maintenance of humidification in the incubator should be maintained at 85% during the first week of life, and after that it should remain at 70% until the third week and gradually reduce to 60% and

after maintaining 60% until the neonate reaches 1500g, being indicated for PTNB below 1000g and gestational age below 30 weeks.⁽¹⁶⁾

One of the strategies adopted for the prevention of skin lesions is the use of a polyethylene bag, reported in a randomized study, which shows the effectiveness in thermoregulation of preterm neonates, below 34 weeks, reducing heat loss by convection and evaporation. It was observed that covering the PTNB with a polyethylene bag for one hour is more effective than covering the newborn with a cloth, reducing the incidence of hypothermia and keeping the NB warmer.⁽¹⁹⁾

Another important care related to skin maintenance is bathing, which is recommended not daily, as they can increase the pH of the skin, damage the maturation of the acid mantle, increase oxygen consumption, and, consequently, cause respiratory discomfort. It is recommended to alternate bathing with neutral soaps and bathing only with water since the pH of the newborn's skin at birth is neutral, however, in a few days, it becomes acidic. In PTNBs younger than 26 weeks, it is recommended to use only sterile water for bathing and in PTNBs younger than 32 weeks, it is recommended to use sterile warm water. Daily cleaning is not recommended in premature infants, and this procedure must take into account the level of consciousness, behavioral response and

clinical status of the baby.^(4, 15, 21)

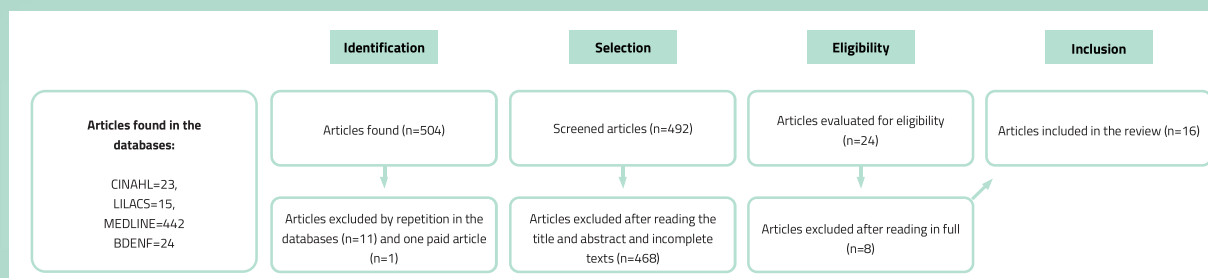
According to article 14, reducing the bath interval from two to four days reduces the risk of hypothermia, promoting an environment for development and growth, consequently decreasing the risks of physiological instability, not increasing the incidence of axillary colonization or skin problems, being a safe, evidence-based nursing intervention.⁽²³⁾

The use of antiseptics is essential for the performance of invasive procedures, as newborns hospitalized in NICUs are susceptible to the appearance of infections related to health care, so it is essential to choose the best product without causing harm to the NB.⁽²⁶⁾

The use of antiseptic can cause burns, especially if alcohol or alcohol-based chlorhexidine is used. Thus, according to the article, the use of 0.2% chlorhexidine as a skin disinfectant for extremely preterm infants resulted in a reduction in lesions, without increasing bloodstream infection compared to 0.5% chlorhexidine, with alcohol, being indicated for extreme preterm infants less than 26 weeks of gestation.⁽²⁴⁾

A study in a maternity hospital analyzed the care of the skin of the preterm newborn by the nursing team, the most mentioned care were bathing and body hygiene, changing the position and hydration of the skin, one of the main precautions described is the use of emollients

Figure 1- Flowchart of the process of identification, selection, eligibility and inclusion of studies in the research using the PRISMA method (ScR).



Source: Prepared by the author, 2021.

Tabela 1. Características dos estudos eleitos na revisão, Niterói, 2021.

Level of Evidence/EA	Author and Title	Country and Year	Method	Care to prevent skin injury in newborns
Level VI A1	Simone VS, et al. Quality assessment of a software for the prevention of skin lesions in newborns (Avaliação da qualidade de um software para prevenção de lesões de pele em recém-nascidos.) (12)	Brazil, 2020	Methodological study	Software, to guide nurses on the assessment and care plans for the prevention of skin lesions.
Level VI A2	Natália DAA, et al. Premature newborn skin care: an integrative review. (Cuidados com a pele do recém-nascido prematuro: revisão integrativa.) (8)	Brazil, 2017	Integrative review	Use of hydrophilic gel dressings; use of mineral oil to remove stickers; the use of emollients; use of 0.5% aqueous chlorhexidine in extremely preterm infants; humidification of incubators; positioning; sensor caster; avoid daily baths.
Level VI A3	Schaefer TIM, et al. Skin care of the newborn hospitalized in a neonatal intensive care unit: an integrative review. (Cuidados com a pele do recém-nascido internado em unidade de terapia intensiva neonatal: revisão integrativa.) (4)	Brazil, 2016	Exploratory, descriptive and qualitative study.	Use of antiseptics solutions, keep the skin dry, systematic evaluation of the skin, lubrication with emollient oils, avoid daily bathing with soap, use of egg crate mattress, use of semipermeable membrane.
Level VI A4	Leylane NS, et al. Nursing care for the skin of the preterm newborn. (Cuidados de enfermagem com a pele do recém-nascido pré-termo.) (13)	Brazil, 2015	Descriptive and quantitative study.	Physical examination of the skin; use of emollients; change of position, use of adhesives in small amounts, care in cleaning the skin.
Level VI A5	Simone VS, Roberta C. Prevention of skin lesions in newborns: the knowledge of the Nursing team. (Prevenção de lesões de pele em recém-nascidos: o conhecimento da equipe de Enfermagem.) (14)	Brazil, 2015	Convergent Care Research.	Use of thermal cribs and heated and humidified incubators, diaper change every 3 hours, daily skin inspection; use of special mattresses, use of silicone dressing, use of hydrocolloids, use of polyurethane bag.
Level VI A6	Ingrid VRT, et al. Patient safety in the prevention and care of skin lesions in newborns: an integrative review. (Segurança do paciente na prevenção e cuidados às lesões de pele em recém-nascidos: revisão integrativa.) (15)	Brazil, 2020	Integrative literature review.	Cotton hood on the newborn's head, diaper change every 3 hours or when dirty, hydrocolloid dressings, use of incubators and heated and humidified cribs for those under 30 weeks and weighing less than 1000g.
Level VI A7	Simone VS, Roberta C. Newborn skin care: the state of the art. (Cuidados com a pele do recém-nascido: o estado da arte.) (16)	Brazil, 2015	Integrative literature review.	Nest the newborn in bed; use of a double-walled incubator; use of polyurethane film for premature infants, use of antiseptic before invasive procedures.
Level II A8	Mithum CK, et al. Effect of virgin coconut oil application on the skin of preterm newborns: A randomized controlled trial. (17)	India, 2020	Randomized clinical trial.	Application of an emollient, such as coconut oil.
Level I A9	Sameer SP, et al. Topical application of coconut oil the skin of preterm infants: a systematic review. (18)	Australia, 2019	Systematic review	Topical application of coconut oil.
Level II A10	Somashekhar MN, et al. Efficacy of polyethylene skin wrapping in preventing hypothermia in preterm neonates (<34 weeks): A parallel group non-blinded randomized control trial. (19)	India, 2019	Randomized control study.	Use of polyethylene wrap in preterm infants below 34 weeks.
Level II A11	Aimee S, et al. Impact of sunflower seed oil versus mustard seed oil on skin barrier function in newborns: a Community-based, cluster-randomized trial. (20)	United States of America, 2019	Controlled clinical trial, randomized by cluster	Application of sunflower oil or mustard oil, through massage.

Level V A12	Laurent R, et al. Recommendation for hygiene and topical in neonatology from the French Neonatal Society. (21)	France, 2019	Systematic Review of Literature.	Early bathing is not recommended; daily cleaning of premature babies is not recommended; select topical agents for use in the newborn that are not potentially harmful.
Level II A13	Sushama N, et al. Topical Oil Application and Trans-Epidermal Water Loss in Preterm Very Low Birth Weight Infants - Randomized Trial. (22)	India, 2015	Randomized controlled clinical trial.	Application of coconut oil twice a day, in the first week of life, in very low birth weight preterm infants.
Level II A14	Jong CL, Yaelim L, Ho R P. Effects of bathing interval on skin condition and axillary bacterial colonization in preterm infants. (23)	China, 2018	Randomized experimental study.	Bath with a 4-day interval without increasing the incidence of skin problems or colonization of the axillary skin.
Level IV A15	Lisanne MAJ, et al. 0,2% chlorhexidine acetate as skin disinfectant prevents skin lesions in extremely preterm infants: a preliminar report. (24)	United States of America, 2017	Pre and post retrospective comparison cohort study.	Use of 0.2% chlorhexidine for premature newborns.
Level VI A16	Ana CFC, et al. Care and maintenance of the skin integrity of the premature neonate. (Cuidado e manutenção da integridade da pele do neonato prematuro.) (25)	Brazil, 2019	Exploratory, qualitative and descriptive study.	Use of dressings based on hydrocolloid, silicone and polyurethane, topical application of oils, use of epicutaneous catheter when necessary.

Source: Prepared by the author, 2021.

such as sunflower oil for hydration and protection from transepidermal loss.⁽¹³⁾ A study in a maternity hospital analyzed the care of the skin of the preterm newborn by the nursing team, the most mentioned care were bathing and body hygiene, changing the position and hydration of the skin, one of the main precautions described is the use of emollients such as sunflower oil for hydration and protection from transepidermal loss.⁽²²⁾

Another study that aimed to evaluate the effects of topical application of coconut oil on the skin of premature babies, found that it improves weight gain, reduces the risk of infection, improves skin condition, and can prevent hypothermia and apnea. These findings demonstrate that coconut oil can be a beneficial emollient for premature newborns, due to its properties.⁽¹⁷⁻¹⁸⁾

The A 11, tested the impact of sunflower seed oil and mustard seed oil on skin barrier function in newborns, where the resource is scarce. In general, it was observed that pH, transepidermal water loss and skin conditions in the sunflower oil group compared to the mustard seed oil group did not differ in terms of gesta-

tional age.⁽²⁰⁾

According to A16, the care provided by nursing to maintain skin integrity and prevent injury is directed to the skin of premature infants, from admission to discharge. Among these precautions, there are the sensor rotation, the use of tensoplast, the administration of sunflower oil, and the use of hydrocolloid.⁽²⁵⁾

The A5 and 6 describe strategies and the importance of preventing skin lesions in the perianal region, being one of the lesions that most affect the NB in the NICU, such as: changing diapers every 3 hours or when dirty, cleaning with water and cotton without the use of soap, frequent skin assessment, use of diapers with high absorption, and the use of products that establish a barrier function.⁽¹⁴⁻¹⁵⁾

As the PTNB in the NICU is predisposed to the appearance of pressure injuries due to skin immaturity, impaired mobility, inappropriate nutrition and medical devices, which are essential for the preservation of life.⁽¹⁴⁾ In order to avoid injuries, it is advisable to use an egg crate mattress, change the position every 3 or more frequently, cradle the baby in the fetal position, simulating the environment of the

uterus, use of silicone and hydrocolloid-based protectors between the device and the skin.^(4,8,14,16)

The application of technology in the health area has helped in the care strategy, especially in the neonatal area. A survey carried out on the evaluation of the quality of the Neonatal Skin Safe software, used in the prevention of skin injury, is a way to contribute to patient safety and better quality, guaranteeing access to evidence-based knowledge, enabling the nurse to make a general assessment of the NB, identify diagnoses and suggest nursing interventions.⁽¹²⁾

CONCLUSION

The need for nurses to provide effective measures and individualized care to PTNBs within the NICU is emphasized, for a better quality of care provided.

In the construction of the study, it was observed that there are numerous care and products used in the maintenance and prevention of skin integrity, such as: sensor change, incubator humidification, diaper change, use of emollients, daily skin assessment, cleaning and bathing, use of anti-

septics, more than the lack of protocols, it makes it difficult to incorporate these practices into care.

It is observed that there is a lack of studies with high-level evidence. In this stu-

dy, few articles with a high level of evidence were identified and most articles were based on expert opinion. It is essential that more studies related to the topic are carried out, aiming to improve the level

of evidence and the development of care protocols for the care in question, contributing to better care.

References

- 1-Organização Mundial da Saúde. Preterm birth. WHO 2018 19 fev [acesso 2021 jun 06]. Disponível em: <https://www.who.int/news-room/fact-sheets/detail/preterm-birth>.
- 2-Fundação Oswaldo Cruz. Taxa de bebês prematuros no país é quase o dobro do que em países da Europa. 2016 dez. Disponível em: <https://portal.fiocruz.br/noticia/taxa-de-bebesprematuros-no-pais-e-quase-o-dobro-do-que-em-paises-da-europa>.
- 3-Tamez RN. Enfermagem na UTI Neonatal: assistência ao recém-nascido de alto risco. 6. ed. Rio de Janeiro: Guanabara Koogan; 2017.
- 4-Schaefer TIM, Naidon AM, Neves ET. Cuidados com a pele do recém-nascido internado em unidade de terapia intensiva neonatal: revisão integrativa. *Rev Fund Care Online*. 2016 out/dez; 8(4):5156-5162.
- 5-Silva SF, Rolim KMC, Albuquerque FHS, Santos MSN, Pinheiro MCD, Frota MA. Intervenções não farmacológicas no controle da dor em recém-nascidos pré-termo: conhecimento da equipe de enfermagem. *Revista Nursing*. 2021;24(278): 5892-5896.
- 6- Teófilo FKS, Silva AVS, Lima KJ, Dantas APF, Silva VA, Teófilo TJS. Lesões de pele em recém-nascido: revisão integrativa. *Revista Enfermagem Atual*. 2018;86.
- 7- Souza MWCR, Silva WCR, Araújo SAN. Quantificação das manipulações em recém-nascidos pré-termo em Unidade de Terapia Intensiva: uma proposta de elaboração de protocolo. *ConSientiae Saúde*. 2008;7(2): 269-274
- 8-Aredes NDA, Santos RCA, Fonseca LMM. Cuidados com a pele do recém-nascido prematuro: revisão integrativa. *Rev Eletr Enf*. 2017; 19-59.
- 9-Feitosa ARS, Fontenele LF, Santiago AKC, Oliveira LAM, Costa GS. Cuidados de enfermagem na prevenção de lesões de pele em recém-nascidos prematuros: revisão integrativa. *Brazilian Journal of Surgery and Clinical Research*. 2018 mar/mai;22 (1):100-106
- 10-Souza MT, Silva, M.D., Carvalho, R. Revisão integrativa: o que é e como fazer. *Einsten (São Paulo)*, vol.8, n1, São Paulo. Jan/Mar. 2010.
- 11-Galvão CM. Níveis de Evidência. Editorial. *Acta Paul Enferm*. 2006 jun; 19(2) <https://doi.org/10.1590/S0103-21002006000200001>
- 12-Santos SV, Ramos FRS, Costa R, Batalha LMC. Avaliação da qualidade de um software para prevenção de lesões de pele em recém-nascidos. *Rev Latino-Am Enferm*. 2020; 28:e3352.
- 13-Silva LN, Moura CMAB. Cuidados de enfermagem com a pele do recém-nascido pré-termo. *Rev Enferm UFPI*. 2015 out/dez; 4(4): 4-7.
- 14-Santos SV, Costa R. Prevenção de lesões cutâneas neonatais: conhecimento da equipe de enfermagem. *Texto e Contexto Enferm*. 2015, jul/set; 24(3):731-739.
- 15-Tavares IVR, Silva DCZ, Silva MR, Fonseca MP, Marcatto JO, Manzo BF. Segurança do paciente na prevenção e cuidado às lesões de pele em recém-nascidos: revisão integrativa. *Rev Bras Enferm*. 2020; 73(4).
- 16-Santos SV, Costa R. Cuidados com a pele do recém-nascido: o estado da arte. *Rev de pesquisa cuidado é fundamental [internet]*. 2015 jul/set; [acesso 2020 nov 27] 7 (3): 2887-2901.
- 17-Konar MC, Islam K, Roy A, Ghosh T. Effect of Virgin Coconut Oil Application on the Skin of Preterm Newborns: A Randomized Controlled Trial. *Journal of Tropical Pediatrics*. 2020; (66):129–135.
- 18-Pupala SS, Rao S, Strunk T, Patole S. Topical application of coconut oil to the skin of preterm infants: a systematic review. *European Journal of Pediatrics*. 2019; 178:1317–1324.
- 19-Nimbalkar SM, Khanna AK, Patel DV, Nimbalkar AS, Phatak AG. Efficacy of Polyethylene Skin Wrapping in Preventing Hypothermia in Preterm Neonates (< 34 Weeks): A Parallel Group Non-blinded Randomized Control Trial. *Journal of Tropical Pediatrics*. 2019; 65:122–129.
- 20-Summers A, Visscher MO, Khatry SK, Sherchand JB, Leclercq SC, Katz J, Tielsch JM, Mullany LC. Impact of sunflower seed oil versus mustard seed oil on skin barrier function in newborns: a community-based, cluster-randomized trial. *BMC Pediatrics*. 2019; 19:512.
- 21- Laurent R, Allen A, Audeoud F, Bouvard C, Brandicourt A, Casper C, et al. Recommendation for hygiene and topical in neonatology from the French Neonatal Society. *European Journal of Pediatrics*. 2019; 178:1545–1558.
- 22-Nangia BS, Paul VK, Deorari AK, Sreenivas V, Agarwal R, Chawla D. Topical Oil Application and Trans-Epidermal Water Loss in Preterm Very Low Birth Weight Infants-A Randomized Trial. *Journal of Tropical Pediatrics*. 2015; 61: 414–420
- 23-Lee JC, Lee Y, Park HR. Effects of bathing interval on skin condition and axillary bacterial colonization in preterm infants. *Applied Nursing Research*. 2018 abril; v.40: 34-38.
- 24-Janssen LMA, Tostmann A, Hopman J, Liem KD. 0.2% chlorhexidine acetate as skin disinfectant prevents skin lesions in extremely preterm infants: a preliminary report. *Arch Dis Child Fetal Neonatal*. 2018; 103:F97–F100.
- 25-Chaves ACF, Santos AP, Ataíde KMN, Cunha KJB. Cuidado e Manutenção da Integridade da Pele do Neonato Prematuro. *Rev. Enferm UFPE online*. 2019; 13(2):378-84.
- 26-Santos SV, Ramos FRS, Costa R, batalha LMC. Evidências sobre prevenção de lesões de pele em recém-nascidos: revisão integrativa. *Estima, Braz. J. Enterostomal Ther*. 2019; 17: e2219.