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Skin lesions in newborns: integrative review

Lesões de pele em recém-nascido: revisão integrativa

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ABSTRACT

The objective is to describe and analyze the scientific evidence about skin lesions in newborns. It was searched for scientific productions having as criteria of inclusion publications period from 2012 to 2017, that correlated the descriptors "skin", "injuries and lesions" and "newborn". The searched databases were PUBMED, WEB OF SCIENCE, LILACS, CINAHL and SCIELO. When analyzing the 10 selected studies, it was agreed among the authors that the production of scientific knowledge regarding the theme of skin lesions in NB, represents a guiding axis for the care. The integrity of the skin is of great importance for the survival of the newborn. Due to its action between the internal organs and the external environment, the skin acts as a barrier against infection. Risk factors for skin lesions in newborns are associated with procedures performed in hospital care. It is concluded that in the researched literature, studies that address the skin care of the newborn with lesions are still scarce, therefore, it is necessary to develop new studies in this sense.

Keywords: Skin; Wounds and injuries; Newborn; Nursing.

RESUMO

O objetivo é descrever e analisar as evidências cientificas acerca de lesões de pele em recém-nascido. Buscou-se produções científicas tendo como critérios de inclusão publicações período de 2012 a 2017, que correlacionassem os descritores “pele”, “ferimentos e lesões” e “recém-nascido”. As bases de dados pesquisadas foram PUBMED, *WEB OF SCIENCE*, LILACS, CINAHL e SCIELO. Ao analisarem-se os 10 estudos selecionados, foi consenso entre os autores que a produção de conhecimento científico referente à temática de lesões de pele em RN representa um eixo norteador para a assistência. A integridade da pele é de grande importância para a sobrevida do RN. Em virtude da sua atuação entre os órgãos internos e o meio externo, a pele atua como barreira contra infecção. Os fatores de risco para lesões de pele em RN estão associados aos procedimentos realizados no atendimento hospitalar. Conclui se que na literatura pesquisada, estudos que abordem os cuidados com a pele do RN diante de lesões ainda são escassos, portanto, faz-se necessário desenvolver novos estudos nesse sentido.

Palavras-chave: Pele; Ferimentos e lesões; Recém-nascido; Enfermagem.

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INTRODUCTION

The skin is considered the largest organ of the human body and isolates the organic components from the external environment and presents distinct characteristics in the different phases of the life cycle of an individual. It consists of three distinct layers: epidermis, dermis and hypodermis or subcutaneous tissue, which exert a series of functionalities, among them: protection, thermoregulation, infection control, immunovigilance and tactile sensation [1].

In the neonate the skin is characterized as delicate, thin and fragile, where the physiological and pathological reactions are often complex, therefore, its alterations are common in this period. These characteristics, combined with the immaturity of the systems and the use of medical devices, essential for their survival, increase the risk of skin damage[2].

Any unusual finding on the surface of the skin is considered as a skin lesion. The lesions may be primary, when they represent an initial sign of pathological process, or secondary, when they correspond to the result of a late formation or trauma of a primary lesion[3].

The North American Nursing Diagnosis Association presents risk factors for the development of skin lesions, such as: radiation, physical immobilization, use of adhesives that remove hair, pressure, containment, dysthermia, moisture, chemicals, excretions, secretions, medications and end of age [4]. A review study also identified two other causes for the development of skin lesions in newborns, which were injuries related to inadequate manipulation of the newborn and skin dryness[5].

Skin lesions in newborns are important for public health, especially in the hospital context. It is estimated that the incidence of skin lesions in newborns is 16%, with a high prevalence of 58%. It is known that skin lesions are one of the main causes of prolongation of hospitalizations of neonates, with an average of 37.2 days in hospitalizations [6].

In this context, the qualification of the assistance provided by the multiprofessional team and the reduction of neonatal morbidity and mortality demand specific actions in the provision of care peculiar to the newborn (NB), which must be fully developed. This is a basic element for greater rationality and effectiveness in the process of perinatal care organization[7].

With regard to specific nursing care, the goal of care is to lead the neonate to recovery, adaptation and well-being, so they must be based on scientific knowledge and the autonomy of the nursing professional[8]. For the nurse to provide the appropriate

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assistance, it is necessary to provide scientific evidence to help him choose the best products, techniques, materials and procedures. However, despite advances in research in the area, it is necessary to develop research, especially with emphasis on premature neonates, which presents specificities due to physiological immaturity[9].

From the above, the following research question emerges: what has been studied recently about skin lesions in newborns? The exercise of nursing care in intensive care settings for newborns, both preterm and term, and the challenge of qualifying care, were the stimulators for the production of the present research.

In order to answer the question, it is observed that a better understanding of this event is necessary, as well as the identification of gaps in the knowledge, and of favoring the improvement of the assistance given to the neonates by the health and nursing team in order to prevent the skin lesions or even reduce their impact on the health of the newborn. The review aims to describe and analyze the scientific evidence that addresses skin lesions in newborns.

METHOD

It is an integrative review of literature aiming to synthesize the published knowledge of a certain subject or issue, and to point out gaps that must be filled with new studies in complementarity with the review. It follows the same methodological rigor of original research, allowing readers subsidies for the advancement of health practices [10]. The present integrative review was developed in six stages: 1) formulation of the guiding question; 2) search in databases 3) selection and categorization of studies; 4) evaluation of the selected studies; 5) discussion and interpretation of results; and 6) synthesis of knowledge with recommendations for practice [11].

The guiding question for this review was: what is the scientific evidence about skin lesions in newborns? Inclusion criteria were: studies published in the period from 2012 to 2017, which analyzed skin lesions in newborns in the areas of prevention and post-injury care; (level I), experimental study or clinical trial (level II), quasi-experimental study (level III) and non-experimental study were considered, such as case study, integrative review, descriptive research and qualitative study (level IV); which had title and abstract indexed in databases. Reflective articles and methodological studies were excluded, or they did not directly address skin lesions, which were repeated in the same databases and were not available online in full.

The search for articles was carried out in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS), *American National Library of*

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Medicine (PubMed), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Thomson Reuters Scientific (Web of Science) and Scientific Electronic Library Online (SciELO). For the search in the LILACS and SciELO databases, the Descriptors in Health Sciences (DeCS) "*skin*", "*injuries and lesions*" and "*newborn*" were used. In the PubMed, CINAHL and Web of Science databases, the descriptors indexed in the MeSH Terms were used: "*Skin*", "*Wounds and Injuries*" and "*Infant, Newborn*" using the Boolean operator AND.

205 articles were found from the junction of all the searches. All abstracts were accessed through the Internet, resulting in 26 articles of this research that met the inclusion criteria, remaining 10 at the end, considering the exclusion criteria. The information to be extracted from the 10 selected studies was defined and cataloged in a bibliographic sheet organized in a spreadsheet with the following items: authors and their titles, language in which they were published, country of research, title, year of publication, keywords or descriptors, method, goals, periodic and database. It was also sought to identify and discuss the main results, conclusions and recommendations for the Nursing practice, the suggestions for new research and, finally, the difficulties presented.

Filling and critical analysis of the selected studies occurred, observing the methodological aspects, the consensus among the different researchers and their divergences. It is important to highlight the following categories: [1] risks for the development of skin lesions and [2] mechanisms of treatment of skin lesions in newborns. It consisted in the discussion and interpretation of the results, and recommendations were made based on the conclusions found in this review.

RESULTS

When the ten selected studies were analyzed, four of them used the quantitative approach and three, the qualitative one. The others are literature reviews. Of the four quantitative variables, three were used for retrospective analysis in an inpatient setting. Other research environments included a pediatric medical outpatient clinic and follow-up of patients with spina bifida. The descriptor "infant newborn" was the one that was most repeated, starring in three of the studies, followed by "skin" and "wounds and injuries", which appeared in two studies each.

Of the data collection instruments used, observation and recording of the stages of treatment of skin lesions in newborns were present in half of the studies, while semi-structured interviews were in two studies. The total number of participants in the studies that presented skin lesions was 771. Nursing professionals from a Neonatal Intensive Care

Unit (NICU) were part of a study as participants. It was noticed in the year of publication that half of the selected studies were published in 2013. Table I presents the characterization of the sample studies.

Table 1. Characterization of selected studies according to identification, objectives, design, subjects and instruments of data collection. Fortaleza, CE, Brazil, 2018.

Reference	Goal	Designing	Subjects	Collection Instruments
Beall et al. (2013) [12]	To analyze aspects of skin lesion related to infiltration and extravasation.	Literature review	This is a review	Not reported
Boyar et al. (2014) [13]	To present a series of cases describing the use of medical grade Honey - Leptospermum Honey (Medihoney), for successful treatment of slow healing neonatal wounds, specifically stage 3 pressure ulcer, dehiscent and infected sternal wound and thick wound of an extravasation lesion.	Qualitative / Case Series	3 hospitalized neonates undergoing treatment.	Observation and recording of the treatment steps of the lesions using Medihoney
Ferreira et al. (2013) [14]	To analyze the factors associated with skin lesions in newborns and infants attended at the child care clinic of a university hospital in Recife/PE.	Quantitative / Cross-sectional, descriptive study	105 children under two months.	Structured interviews and physical examination directed to the inspection of the skin.
Gonzalez (2013) [15]	To discuss the four major subtypes of epidermolysis bullosa and its association with extra-cutaneous features.	Literature review	This is a review	Not reported
Lund (2014) [16]	Explore differences in neonatal skin in patient	Literature review	This is a review	Not reported

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	s in the ICU and the risk of developing skin lesions related to the adhesive and select products more suitable for the desired results.			
Nandiolo-Anelone et al. (2014) (17)	Reporting experience in management of extravasation by iatrogenic therapeutic vision, occurred among newborns.	Quantitative / Descriptive and Retrospective	15 hospitalized neonates.	Records of consultations and hospitalizations and patient records.
Ottolini et al. (2013) (18)	Document the incidence of wounds to inform patients and parents about how the risk of injury varies throughout life and in relation to the functional neurological level.	Quantitative / Cohort Study	376 patients with spina bifida	Observation and registration of the main sites affected with skin lesions in patients with spina bifida and treatment.
Rentea et al. (2013) (19)	Addressing negative pressure wound therapy in infants and children.	Quantitative / Retrospective	270 neonates and pediatric patients.	Observation and recording of the stages of the treatment of the lesions.
Santos et al (2014) (20)	To know, together with the nursing team, the necessary care for the treatment of skin lesions in neonates hospitalized in a Neonatal Unit.	Qualitative / Convergent Care	4 nursing assistants, 6 nursing technicians and 4 nurses.	Semi-structured interviews
Slavin et al (2012) (21)	To present 2 cases of Tumoral Calcinosis (CT) from one hospital and 53 specimens resected from 7 patients with CT.	Qualitative / Case Series	1 child and 1 teenager	Observation and histological and chemical records.

Source: research data.

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Regarding the objectives presented by the researchers, four were based on the concern to respond, with scientific evidence, problems of higher incidence and prevalence in skin care inherent to the health service in which they are inserted. Two studies address different means of treatment of existing skin lesions. Four were specific reviews for certain lesions, such as Epidermolysis bullosa, Tumoral Calcinosis and Spina Bifida, as well as different lesions due to infiltration and extravasation.

For the discussion of the results, it was possible to construct two categories, the first one being [1] risks for the development of skin lesions, in which aspects that lead to the formation of skin lesions and their specificities, as derived from infiltration and extravasation; epidermolysis bullosa and its association with extra-cutaneous characteristics; lesions related to the use of adhesive in dressings in NICU and; evaluates the risk of life-long wound formation in relation to newborns with compromised functional neurological level.

The second category (2) mechanisms of treatment of skin lesions in newborns, addresses aspects that are related to means of treatment of existing lesions, with the suggestion of the use of Medihoney in wounds of slow cicatrization; analyzes iatrogenic extravasation in the therapeutic view; addresses negative pressure wound therapy; Nursing care in front of skin lesions and; histological treatment in cases of presence of cells *Tumoral Calcinosis.*

DISCUSSION

The scientific evidence that addresses skin lesions in newborns shows that it is necessary to develop new prevention and treatment technologies in both hospital and community settings. The integrity of the skin is of great importance for the survival of the newborn. Due to its action between the internal organs and the external environment, the skin acts as a barrier against infection. However, in the RN, the skin has a continuous, thin, delicate and fragile surface, being extremely susceptible to lesions by different means.

Risk factors for skin lesions in newborns are associated with procedures performed in hospital care that lead to risks of skin lesions and their specificities. There are other associated factors, such as excessive use of chemicals and cosmetics in body hygiene and washing of children's clothing, which can induce irritation to the skin, as well as insect bites that can cause pruritus and local irritation, which can progress to papule and vesicle lesions[14].

In the occurrence of cutaneous lesions, it is necessary to evaluate the degree of complexity of these, to distinguish cases of benign course and pathological cases. Thus,

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the causative agent, the period of injury, the depth, the body zone in which it is located, the extent and the characteristics present must be observed, so that it can establish orientations and conduct of professionals and parents for optimal treatment of the lesion[20].

It should be emphasized that all selected studies presented recommendations for clinical practice. Within the category risks for the development of skin lesions, risk factors are vesicant factors: pH <5 or pH> 9; increased osmolarity; direct drug effect and solubility. These factors lead to cellular vascular damage, releasing radicals that act directly on inflammatory processes, damaging cell membranes and blood cells, leading to loss of cellular integrity, thromboses, fluid leakage and cellular necrosis, with tissue damage. Associated with these factors are the fragile conditions of the newborn's skin, such as venous fragility, multiple punctures and limitation of venous visibility, as well as the pathologies inherent to the skin[12].

Epidermolysis Bullosa (EB), a connective tissue disease that causes blisters on the skin, provoking friction and fragility, has shown that its severity ranges from mild to fatal, without cure. In this review study, the four main types of EB are addressed: Simple EB, EB Junctional, Dystrophic EB and Kindler's Syndrome are discussed, focusing on the associated extracutaneous characteristics. The evaluation of an RN suspected to have EB, including diagnosis and management, is also reviewed[20].

It is worth mentioning that the majority of the procedures performed in the RN with EB can traumatize the skin and must be adapted in a way that reduces this risk. It is also considered that many newborns are premature, which increases even more the cutaneous fragility. Skin and mucosal lesions at this stage of life may predispose to serious and life-threatening infections and cause dehydration. The involvement of the skin and mucosa varies according to the type of EB, but in general, care should be taken for every newborn with suspected disease and the diagnosis made as soon as possible (22). Regarding the care of the skin of those affected by EB, the best clinical practices indicate, for all ages, non-adhesive dressings with silicone based products, as they are useful in reducing pain caused by cutaneous trauma[23].

Another risk for the presence of cutaneous lesions is caused by medicinal adhesives and is a known problem for patients in neonatal intensive care units. Adhesive-related skin lesion for all patient populations includes mechanical problems, such as skin peeling and blistering; dermatitis reactions such as irritative contact dermatitis and allergic dermatitis; and other complications such as skin maceration and folliculitis. The

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most observed in neonatal patients is skin peeling[16].

The adhesive products are selected based on the intended purpose as well as in the anatomical location that the adhesive will be attached. An important consideration for each patient is the type of device being protected by the adhesive. Different products may be more suitable for attaching critical devices such as endotracheal tubes, vascular access devices, thoracic tubes and, in some cases, nasogastric probes compared to a monitoring sensor which has to be replaced several times a day. The prevention of adhesive injuries should be done using smaller adhesive products. The difficulty of the therapeutic management of these lesions requires prevention through the development of protocols of monitoring and permanent education of the employees in favor of efficient practical infusions[16].

The use of adhesives or topcoats with soft silicone are considered less aggressive to the skin of newborns. Its silicon structure favors a lower risk because it adheres gently to both whole skin and peri-lesional skin, improves adaptability and promotes comfort, contributing to decrease with the damages caused by the skin care of the newborn. In all cases, however, it is important to emphasize the need to observe the cutaneous maturity of the neonate according to the weeks of life; the maturation of the skin barrier after preterm birth, which requires on average 2 to 4 weeks, and are factors that determine the practice of care[24].

Studies indicate that some nursing care may contribute to the maintenance of the integrity of the skin of the newborn, such as: change of decubitus, maintenance of clean and dry skin, use of hydrocolloids in osseous prominences, optimization of collection of exams, thus avoiding repeated punctures, prevention and treatment of extravasation and infiltration of intravenous solutions, as well as the identification of common skin lesions such as erythema, diaper dermatitis, milium and sebaceous gland hyperplasia[26].

Research carried out in a Neonatal Unit in Southern Brazil revealed that there are difficulties on the part of professionals, mainly nurses, in the decision making of the conduct for the treatment and continuity of skin care in NB. They point out that the absence of standardization for procedures and proper use of products in the care of the injuries, the physiological peculiarities pertinent to the NB, as well as insufficient studies on the subject, add up as obstacles to the implementation of quality assistance [20]. Thus, it is imminent to construct a protocol for the standardization of ducts and the provision of care, based on scientific knowledge for individualized care, aiming to establish guidelines to reduce the risk of changes in the ducts, providing qualified and safe care to new-born.

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Regarding the findings regarding the mechanisms of treatment of skin lesions in neonates using negative pressure therapy as a method of care of complex wounds, its efficacy was proven in a study with 270 neonatal and pediatric patients. The vacuum closure system applies negative suction pressure to the base of the wound through a porous sponge sealed by an adherent cover, respecting the optimal amount of pressure for each age group. If negative pressure therapy was placed on the hollow viscera, a non-adherent oil-coated gauze was placed before applying the sponge in adhesive bonding [19].

Fluid repositions were performed in cases of significant loss of wound fluid. Characteristics such as gender, age, associated comorbidities and nutrition were analyzed. Wounds were classified according to etiology (ie trauma, surgically created, congenital, burns, pressure ulcers and grafts), age (acute versus chronic), and anatomical location. Any single characteristics of the treated site, such as the presence of bone, bowel, tendon or nerve, were also observed. We also analyzed treatment details regarding the duration and frequency of changes[16].

The use of negative pressure therapy promotes healing by secondary or tertiary intention. It has been shown to reduce edema from wounds, favoring granulation of the forming tissue, increasing perfusion and removing exudates and infectious material. Although Pediatric Medical Device Safety recognizes that surgical devices are sometimes not readily available to the population, and with the aforementioned advantages of using negative pressure therapy, use in neonates and infants has more intensive monitoring recommendations because they occurred complications in five patients of the study, with formation of enteroatmospheric fistula, disintegration of the skin of the adhesive, a sponge retained and infection of recent onset in the wound[19].

Regarding the research on the injuries caused to the skin of newborn infants due to iatrogenic perfusion, in 15 cases of newborns between January 2010 and December 2012, it was evidenced that accidents of this nature are serious frequent complications that occur during an infusion into the bloodstream for diagnostic or therapeutic purposes in peripheral or central venous lines. If viewed late, they are sources of functional sequelae[17].

Serum calcium chloride 10% and glucose were found in all cases. The upper limbs were the most affected, with nine lesions and six in the lower limbs. The dorsal surfaces of the feet and hands were found respectively in six and five cases. Two lesions were located in the posterior region of the forearm and elbow. The treatment consisted of six alcoholic dressings. The surgery was

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secondary treatment in four cases, combined with skin graft excision [17].

Regarding the use of the intravenous peripheral catheter as the vascular access device most used for the administration of drugs in hospitalized neonates, it was observed that 95% of these catheters are removed due to complications. Infiltration and extravasation are the most destructive complications for the fragile skin of the newborn. There were aspects of lesion by infiltration and extravasation, from the cellular level, where the role of the vesicants in the vascular lesion and its role in inflammation was discussed, followed by a comprehensive review of the vesicants and their lesion mechanism, by pH , osmolality or chemical composition, and an overview of the knowledge and actions of NICU nurses to prevent infiltration [12].

The use of an evidence-based algorithm was developed in a children's hospital to minimize lesions caused by extravasations through directed and immediate treatment. This algorithm traces lesion identification markers, from its formation to the forms of treatment. The use of non-pharmacological approaches to treat injury is a first step in limiting damage. For certain vesicant-induced lesions, pharmacological treatment with hyaluronidase, in particular, has been shown to be efficient in limiting the lesion. If ineffective, or if the injury is extensive, surgical treatment may be necessary and a plastic surgeon may be consulted [12].

Among the selection of products that are most suitable for securing critical devices, a higher level of adhesion product, usually acrylate or hydrocolloid, with a stronger backing, cloth or silk is selected. The vascular access devices are protected with polyurethane covers which contain acrylate adhesion so that the insertion site remains clearly visible. Micropore tape is often used for ease of use as it can be easily torn into small pieces, reducing the amount of tape in contact with the skin. Silicone tapes and adhesive products are becoming more common and have promising qualities, especially for burn management [12-26-27].

Initial studies have indicated a better response to prevention of erythema with the use of silicone adhesive tapes than with other types of tape. In addition, it was observed that the discomfort, removal of keratin and hairs was significantly lower when compared to the silicone tape compared to other tapes (28). Epidermal skin scaling of the neonatal skin can be minimized with the use of dressings with soft silicone based adhesives [29].

Although the general principles of wound healing are similar in children and adults, there are limited clinical guidelines to guide the choice of specific wound care products for wound treatment in children (30). It is pertinent that care that preserves

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the integrity of newborns should be a priority during NICU admission. A care that prevents skin lesions and infections from these lesions, keeping the skin intact and providing comfort. The information generated in this study can be used by professionals as subsidies for professional practice, consolidating their strategies to care for the skin of the newborn.

CONCLUSION

In the international literature, studies that address the skin care of the newborn in both prevention and injury are still scarce. The present integrative review, carried out with the objective of analyzing the scientific publications that addressed skin lesions in newborns, reinforces the need for new studies that can demonstrate, in a emphatic and effective way, more varied mechanisms of prevention and treatment of skin lesions in this population. This need is much more important when considering the most common risk factors found mainly in NICUs, where care is more invasive.

The Nursing team stands out as the main responsible for the handling of the newborns in these units, and specific care of this category with the skin is necessary. This synthesis of knowledge, brought by the studies included in this review, reinforces the importance of research to support nursing practice and to stimulate new studies in understanding the need to care for the newborn's skin, reducing iatrogenesis, and performing appropriate treatment of the lesions developed.

Understanding the importance of prevention is paramount for avoiding injury. It was observed that it is necessary for the multiprofessional team to work taking into account the use of different types of adhesives, dressing coatings, and other treatment technologies, as well as effective technical mechanisms for the prevention and treatment of injuries. It is believed that the main limitation of this review is, therefore, the small quantitative reach of the international scientific production, being necessary the amplification of the searches, and the construction of new studies, especially systematic reviews that address the RN and the risks related to the integrity of its skin care in different health care contexts.

REFERENCES

1. Eming SA, Martin P, Tomic-Canic M. Wound repair and regeneration: Mechanisms, signaling, and translation. Sci Transl Med. [Internet]. 2014 [acesso em 12 dez 2017]. 6(265): 265sr6. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/25473038.

2. Martins COA; Curado MAS. Scale of Observation of the Risk of Skin Injury in Neonates: statistical validation with newborns. Rev Enferm Referência. [Internet]. 2017 [acesso em 15 ago 2017]; 13 (4): 43-52. Disponível em: http://www.scielo.mec.pt/pdf/ref/vserIVn13/serIVn13a05.pdf.

3. Potter, PA. et al. Fundamentals of Nursing. 8. ed. Rio de Janeiro: Elsevier, 2013.

4. North American Nursing Diagnosis Association. Diagnóstico de enfermagem da NANDA: definições e classificação 2015-2017. 10. ed. Porto Alegre: Artmed, 2015.

5. Nascimento RR, Landim TMA. Nursing care in the prevention of skin lesions in premature newborns. Rev Eletrôn Atual Saúde. [Internet]. 2016 [acesso em 06 ago 2017]; 4(4): 66-73. Disponível em: http://atualizarevista.com.br/article/cuidados-de-enfermagem-na-prevencao-de-lesoes-de-pele-no-recem-nascido-prematuro-v-4-n-4/.

6. Migoto MT, Souza SNDH, Rosetto EG. Skin lesions of newborns in a neonatal unit: descriptive study. Online Braz J Nurs. [Internet] 2013 [acesso em: 14 mai 2017]; 12(2): 377-92. Disponível em: http://www.objnursing.uff.br/index.php/nursing/article/view/4042.

7. Melo RCJ, Souza IEO, Paula CP. Neonatal nursing: the existential sense of care in the Intensive Care Unit. Rev Bras Enferm. [Internet] 2013 [acesso em 12 mai 2017]; 66(5): 656-662. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672013000500003.

8. Moraes-Filho IM, et al. Checklist of the newborn: main nursing diagnoses through intercurrences and susceptibility of the same in the neonatal. Rev Cient Sena Aires. [Internet] 2017 [acesso em 22 de Agosto de 2017]; 6(1): 30-48. Disponível em: http://revistafacesa.senaaires.com.br/index.php/revisa/article/view/276.

9. Elzer HE. Bathing basics: how clean should neonates be? Adv Neonatal Care. [Internet]. 2013 [acesso em: 31 dez 2017]; 13(3):188-9. Disponível em: http://doi.org/10.1097/ANC.0b013e318293d5ee.

10. Soares CB, et al. Integrative review: concepts and methods used in nursing. Rev Esc Enferm USP. [Internet]. 2014 [acesso em 12 jan 2018]; 48(2):335-345. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342014000200335.

11. Ganong LH. Integrative reviews of nursing research. Res Nurs Health. [Internet] 1987 [acesso em 10 dez 2017]; 10(1)1-11. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/3644366.

12. Beall V, et al. Neonatal Extravasation: An Overview and Algorithm for Evidence-based Treatment. Newborn and Infant Nursing Reviews. [Internet] 2013 [acesso em 12 mai 2017]; 13(4):189-195. Disponível em: https://www.sciencedirect.com/science/article/pii/S1527336913000986.

13. Boyar V. et al. Clinical experience with Leptospermum honey use for treatment of hard to heal neonatal wounds: case series. J Perinatol. [Internet] 2014 [acesso em 12 mai 2017]; 34(2):161-3. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/24476663.

14. Ferreira AS, et al. Skin lesions in newborns and infants. Rev Enferm UERJ. [Internet]. 2013 [acesso em 13 mai 2017]; 21(2):208-215. Disponível em: http://www.facenf.uerj.br/v21n2/v21n2a12.pdf.

15. Gonzalez, ME. Evaluation and treatment of the newborn with epidermolysis bullosa. Semin Perinatol. [Internet] 2013 [acesso em 01 jun 2017]; 37(1):32-39. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/23419761.

16. Lund, C. Medical Adhesives in the NICU. Newb Inf Nurs Rev. [Internet]. 2014 [acesso em 12 mai 2017]; 14(4):160-165. Disponível em: https://www.sciencedirect.com/science/article/pii/S1527336914000877.

17. Nandiolo-Anelone KR, et al. Les accidents d'extravasation perfusionnelle chez le nouveau-né: une expérience de 15 cas. Chirurgie de la main. [Internet] 2014 [acesso em 01 jun 2017]; 33(1):44-50. Disponível em: https://www.sciencedirect.com/science/article/pii/S1297320313003880.

18. Ottolini K. et al. Wound care challenges in children and adults with spina bifida: an open-cohort study. J Pediatr Rehabil Med. [Internet] 2013 [acesso em 14 mai 2017]; 6(1):1-10. Disponível em: https://hsrc.himmelfarb.gwu.edu/cgi/viewcontent.cgi?article=1100&context=smhs_peds_facpubs.

19. Rentea RM. Negative pressure wound therapy in infants and children: a single-institution experience. J Surg Res. [Internet] 2013 [acesso em 02 jun 2017]; 184(1):658-64. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/23768766.

20. Santos SV, Costa R. Prevention of skin lesions in newborns: nursing team knowledge. Texto Contexto Enferm. [Internet]. 2015 [acesso em 06 ago 2017]; 24 (1): 731-39. Disponível em: http://www.scielo.br/pdf/tce/v24n3/pt_0104-0707-tce-24-03-00731.pdf.

21. Slavin RE, Wen J, Barmada A. Tumoral calcinosis-a pathogenetic overview: a histological and ultrastructural study with a report of two new cases, one in infancy. Int J Surg Pathol. [Internet] 2012. [acesso em 06 jun 2017]; 20(5) 462–473. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/22614164.

22. Pitta AL, Magalhães RP, Silva JC. Epidermóclise bolhosa congénita: importancia do cuidado de enfermagem. Rev Cuid [Internet] 2016 [acesso em 20 jan 2018]; 10(2):201-208. Disponível em: http://www.webfipa.net/facfipa/ner/sumarios/cuidarte/2016v2/201-208.pdf.

23. Goldschneider KR, et al. Pain care for patients with epidermolysis bullosa: best care practice guidelines. BMC Medicine [Internet]. 2014 [acesso em 12 mar 2018]; 12:178. Disponível em: https://bmcmedicine.biomedcentral.com/articles/10.1186/s12916-014-0178-2.

24. Mendes, L, Telles R, Ettinge S, Barbosa T. The use of soft silicone in the skin of the newborn. Current Illness. [Internet] 2012 [acesso em 15 mar 2018]; 1(4). Disponível em: http://revistaenfermagematual.com.br/01-01.php.

25. Schaefer TIM; Naidom AM; Neves ET. Care of the skin of neonates hospitalized in a neonatal intensive care unit: integrative review. Rev On Pesq. [Internet] 2016. [acesso em 20 nov 2017]; 8(4): 5156-5162. Disponível em: http://www.seer.unirio.br/index.php/cuidadofundamental/article/view/3791.

26. Mir M, et al. Synthetic polymeric biomaterials for wound healing: a review. Prog Biomater. [Internet]. 2018 [acesso em 01 mar 2018]; 7: 1–21. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/29446015.

27. Dreifke MB, Jayasuriya AA, Jayasuriya AC. Current wound healing procedures and potential care. Mater Sci Eng C Mater Biol Appl. [Internet]. 2015 [acesso em 20 mar 2018]; 48: 651–662. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4443476/.

28. Grove GL, et al. Randomized Comparison of a Silicone Tape and a Paper Tape for Gentleness in Healthy Children. J Wound Ostomy Continence Nurs. [Internet]. 2014 [acesso em 20 mar 2018]; (1):40-8. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/24240641.

29. King A, et al. Dressings and Products in Pediatric Wound Care. Adv Wound Care. [Internet]. 2014 [acesso em 31 mar 2018]; 3(4): 324–334. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3985526/.

30. Sood A, Granick MS, Tomaselli NL. Wound Dressings and Comparative Effectiveness Data. Adv Wound Care. [Internet]. 2014 [acesso em 01 abr 2018]; 3(8): 511–529. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/25126472.