

Alteration of skin condition in newborns admitted to neonatal intensive care: a concept analysis

Alteração da condição de pele em recém-nascidos internados em terapia intensiva neonatal: análise de conceito
Alteración de la condición de piel en recién nacidos internados en cuidado intensivo neonatal: análisis de concepto

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How to cite this article:

Araújo DAS, Araújo JNM, Silva AB, Lopes JV, Dantas AC, Martins QCS. Alteration of skin condition in newborns admitted to neonatal intensive care: a concept analysis. Rev Bras Enferm. 2022;75(4):e20210473. <https://doi.org/10.1590/0034-7167-2021-0473>

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EDITOR IN CHIEF: Antonio José de Almeida Filho
ASSOCIATE EDITOR: Maria Itayra Padilha

Submissão: 06-24-2021 **Approval:** 12-04-2021

ABSTRACT

Objectives: to analyze the concept of alteration of skin condition in newborns admitted to the Neonatal Intensive Care Unit. **Methods:** this is a concept analysis operationalized by scoping review. The search was conducted in three parts: the first, in sources like *Scopus* and *Web of Science*; the second, in Google Scholar; and the third, through a parallel list of references. **Results:** according to the types of skin, the most frequent alterations were erythema/redness and pressure injuries. The concept analysis was more evident in the attribute "skin lesions or alterations" than the others. The most frequent antecedents were gestational age, birth weight, and factors related to hospitalization. Among the consequences stood out infection/sepsis. **Conclusions:** this study allows improving the vision of health professionals regarding alterations in skin condition of neonates and, therefore, may contribute to a safe and systematized nursing practice.

Descriptors: Skin; Newborn; Patient Safety; Nursing Care; Intensive Care Units, Neonatal.

RESUMO

Objetivos: analisar o conceito de alteração da condição de pele em recém-nascidos internados na Unidade de Terapia Intensiva Neonatal. **Métodos:** trata-se de uma análise de conceito operacionalizada mediante *scoping review*. A busca foi realizada em três partes: a primeira, nas fontes *Scopus* e *Web of Science*; a segunda, no Google Acadêmico; e a terceira, mediante lista paralela de referências. **Resultados:** de acordo com os tipos de alterações de pele, as mais frequentes foram eritema/vermelhidão e lesões por pressão. Para a análise de conceito, o atributo "lesões ou alterações na pele" apresentou maior evidência. Os antecedentes mais frequentes foram idade gestacional, peso ao nascer e fatores relacionados à internação hospitalar. Dentre os consequentes, infecção/sepsis apresentou destaque. **Conclusões:** este estudo permite o aprimoramento da visão dos profissionais de saúde em relação às alterações na condição de pele dos neonatos e, portanto, pode contribuir para uma prática de enfermagem segura e sistematizada.

Descritores: Pele; Recém-Nascido; Segurança do Paciente; Cuidados de Enfermagem; Unidade de Terapia Intensiva Neonatal.

RESUMEN

Objetivos: analizar concepto de alteración de la condición de piel en neonatos internados en Unidades de Cuidado Intensivo Neonatal. **Métodos:** análisis de operacionalización de concepto mediante *scoping review*. Búsqueda realizada en tres partes: la primera, en las fuentes *Scopus* y *Web of Science*; la segunda, en el Google Académico; y la tercera, mediante lista paralela de referencias. **Resultados:** conforme los tipos de alteraciones de piel, las más frecuentes fueron eritema/enrojecimiento y lesiones por presión. Para el análisis de concepto, el atributo "lesiones o alteraciones en la piel" presentó mayor evidencia. Los antecedentes más frecuentes fueron edad gestacional, peso al nacer y factores relacionados a la internación. Entre los consecuentes, infección/sepsis presentó destaque. **Conclusiones:** este estudio permite el perfeccionamiento de la visión de profesionales de salud en relación a las alteraciones en la condición de piel de los neonatos y, así, puede contribuir para una práctica de enfermería segura y sistematizada.

Descriptores: Piel; Recién Nacido; Seguridad del Paciente; Cuidados de Enfermería; Unidades de Cuidado Intensivo Neonatal.

INTRODUCTION

The skin is vitally important and is responsible for developing several functions, such as thermoregulation, infection control, immune vigilance, hydro electrolytic homeostasis maintenance, endocrine secretion, and tactile sensation. Therefore, it directly interferes with the metabolism, especially in the newborn (NB). It is composed of the dermis, formed essentially by collagen and elastin; and the epidermis, composed of four sub-layers, including the stratum corneum, which is relevant because it is the outermost portion of the skin⁽¹⁾.

The integrity of the stratum corneum, which is the most superficial layer of the skin, is related to gestational age at birth. Up to 23 weeks, the skin may be translucent, gelatinous, and highly fragile, presenting a significant compromised skin barrier. Preterm newborn's skin (PTNS) with ≤ 37 weeks has structural differences compared to the pediatric and adult population; consequently, the case of a lesion is potentially high⁽²⁻³⁾.

Given these structural specificities of the newborn's skin, the lower the gestational age, the higher the risk. So, the chances of infection may increase, which is the leading cause of neonatal morbidity and mortality, besides causing definitive scars and functional alterations⁽⁴⁾. Lesions tend to prolong hospitalization time and increase treatment costs. Thus, more than dealing with the principal diagnosis, managing the skin of the preterm newborn is fundamental while providing care⁽⁴⁾.

NANDA-International (NANDA-I) presents risk factors that act directly on skin integrity, such as radiation, excretions, hydration, hyperthermia, hypothermia, pressure on bony prominence, and humidity. It also presents internal factors, such as alteration in the volume of liquids and inadequate nutrition. The damage to the integrity may also be associated with pharmaceutical agents, altered sensitivity, altered skin turgor, the use of adhesives, and arterial puncture. Moreover, one of its risk populations is the age extremes⁽⁵⁾.

The maintenance of skin integrity is essential, especially in the critical period, since factors such as dermatitis, burns, ulcers, trauma, injuries due pressure, and shear can harm the protective function. Thus, integrity maintenance becomes an essential factor in building preventing strategies and then directing the continuation of interventions by the multi-professional team. For that, caring for neonates' skin has become a concern, especially in Neonatal Admission Units⁽⁶⁾.

In the Neonatal Intensive Care Units (NICU), several types of caring and practices on the NBs involve the skin, such as bathing, using skin solutions for antiseptics, and caring with transepidermal loss, which may predispose or enhance the appearance of lesions. Several procedures are also carried out, like dressings and venous and arterial punctures. The use of adhesives on catheters for oxygen therapy also irritates the skin of those NBs⁽⁷⁾.

Another issue is the monitoring technologies in the NICUs, like cardiorespiratory (pulse oximetry using photoplethysmography, electrocardiography [ECG], and impedance pneumography) based on electrical potential differences through skin patches. They have disadvantages over the use of adhesive sensors because they have potential to cause lesions in neonates' skin. There is also the management of daily assessment of the NB by professionals, which may increase the risk of hypothermia and circulatory disturbances during the examination⁽⁸⁾.

The daily life at NICUs subjects the NB to several moments of risk for alterations in skin condition. According to a survey that identified the frequency of adherence of the nursing staff to patient safety actions at the NICU, by using a previously validated instrument, the technologies that increase the survival of NBs requiring intensive care can cause cutaneous lesions when misused. To avoid complications, adverse events, and worsening of clinical status, the multi-professional team must be oriented about the conditions of the NB, emphasizing that adverse events can prolong hospitalization and even lead to death⁽⁹⁾.

Another study analyzed notifications of adverse events on the Health Surveillance Notification System (*Sistema de Notificação de Vigilância Sanitária*) and found out that 65.6% were related to medications and that skin lesions, phlebitis, and hematomas were frequent in NICUs⁽¹⁰⁾. To reduce damage and adverse events related to health care, the Brazilian Network of Nursing and Patient Safety (*Rede Brasileira de Enfermagem e Segurança do Paciente*) seeks to promote and protect human health and maintain the permanent improvement of services with quality. In 2013, patient safety protocols were instituted to prevent pressure injuries, which aims to prevent the occurrence of skin lesions^(7,11).

It is known that excessive NB handling can cause physical and physiological stress, such as changes in respiratory pattern and heart rate, pain, and alterations in skin integrity. For this reason, the professional needs to identify such patterns to prevent and reduce the damages to health resulting from the assistance⁽¹²⁾.

However, to define the alterations of skin conditions that affect NBs admitted to NICUs, it is necessary to know the concept that defines them. Also, the elements that make up this concept so that the assistance provided by the multidisciplinary team can be targeted and have quality. It is noteworthy that the concept is an idea about a phenomenon, essential for developing scientific evidence and contributing to clinical practice and the construction of nursing science⁽¹³⁾.

OBJECTIVES

To analyze the concept of alteration of skin condition in newborns admitted to the Neonatal Intensive Care Unit.

METHODS

Ethical aspects

Since this is a review study, no human beings were involved, which exempts approval by the Research Ethics Committee.

Design of study

This study is a concept analysis based on Walker and Avant's model⁽¹⁴⁾, operationalized through a *scoping review*⁽¹⁵⁾ and carried out between September and December 2020.

Concept analysis is a method capable of synthesizing and understanding a concept already introduced in the literature. It aims to standardize the description of a phenomenon and allow effective communication about it, reducing vague, ambiguous, and incoherent terminology, to make it more functional in theory, research, and practice. In that sense, the concept analysis is in the literature in various methods and strategies. We used in this study the model of Walker and Avant⁽¹³⁻¹⁴⁾.

The method proposed by Walker and Avant (2019) is traditional and easy to apply, is based on Wilson's proposal, and includes the execution of eight steps: (1) Select a concept; (2) Determine the objectives or purposes of analysis; (3) Identify all possible uses of the concept; (4) Determine the defining attributes; (5) Construct a model case; (6) Identify other cases: borderline, related, and contrary; (7) Identify antecedents and consequents of the concept; (8) Define empirical referents. In this study, we carried out the eight recommended steps⁽¹⁴⁻¹⁶⁾.

Given this, the concept "alteration of skin condition in newborns" was chosen to be analyzed from the perspective of NBs admitted to the NICU regarding the handling of NBs, invasive procedures, devices, among others. In the literature, diffuse definitions appear for "skin alterations in newborns; therefore, defining a concept for that ensures more patient safety, quality of service, and nursing care directed to the user's needs.

In this line of thought, to support the conceptual analysis, a scoping review was used according to the recommendations of the Joana Briggs Institute⁽¹⁵⁾, based on the PRISMA extension for scoping reviews (PRISMA-ScR)⁽¹⁷⁾. The study was registered in the Open Science Framework study platform and assigned the following URL: <https://osf.io/hvcn6/>⁽¹⁸⁾.

Study protocol; criteria of inclusion and exclusion

The scoping review was selected because it allows the inclusion of studies of various natures. To carry it out, we initially used a research protocol composed of the following steps: objectives; research question; identification of relevant studies by searching the literature through electronic databases; selection of studies, with the establishment of eligibility criteria; mapping and extraction of data; and presentation of the results⁽¹⁵⁾.

This study structured the guiding question using the PCC strategy - P (population), C (concept), and C (context)⁽¹⁵⁾. So, the population was the newborns, the concept was Alteration of skin condition, and the context involved the Neonatal Intensive Care Unit. Thus, we formulated the following central question: What is the concept of alteration of skin condition in newborns admitted to the Neonatal Intensive Care Unit? The subsequent questions of the study were: What is the alteration of skin condition in newborns at the Neonatal Intensive Care Unit? What are the attributes, antecedents, and consequents of the concept "Alteration of skin condition in newborns" admitted to the Neonatal Intensive Care Unit?

As recommended by the method, the search was performed in three parts: in the first part, the data sources *Scopus* (Elsevier) and *Web of Science* (Elsevier) were used. The second part was carried out in Google Scholar[®] using keywords identified in the first part of the search, and the third part was performed through a parallel list of references⁽¹⁵⁾.

For the data sources, an advanced search was made using the indexed descriptors (*Medical Subject Headings - MeSH*): *Skin; Newborn; Patient Safety; Intensive Care Units, Neonatal; Nursing Care*. We used the Boolean operator AND for the following cross-references: 1# "Skin" AND "Patient Safety" AND "Newborn"; 2# "Skin" AND "Newborn" AND "Intensive Care Units, Neonatal"; 3# "Skin" AND "Newborn" AND "Nursing Care"; 4# "Skin" AND "Intensive Care Units, Neonatal" AND "Nursing Care."

The search conducted in each data source occurred through the content accessed by the Federal University of Rio Grande do Norte, via Federated Academic Community (CAFe), through the Coordination for the Improvement of Higher Education Personnel (CAPES) gateway.

The second phase of the search occurred in Google Scholar[®], using the following keywords, identified based on the first part of the search: "Newborn Skin Condition Scale"; "Neonatal Intensive Care Unit"; "Nursing Care"; "Newborn Skin Condition"; "Neonatal Skin Condition Score"; "Intensive Care Units, Neonatal"; "Nursing Care" with the following combinations: "Newborn Skin Condition Score" AND "Neonatal Intensive Care Unit"; "Newborn Skin Condition Score" AND "Nursing Care"; "Newborn Skin Condition" and "Neonatal Intensive Care Unit"; "Neonatal Skin Condition Score" AND "Intensive Care Unit, Neonatal"; "Neonatal Skin Condition Score" AND "Nursing Care."

For the selection of studies, the following inclusion criteria were adopted: complete studies available in the data sources addressing newborn skin condition, in Portuguese, Spanish, and English. Abstracts, editorials, correspondence, and expert opinion were excluded.

Organization of data/Data analysis

The initial screening was done by dynamically reading the studies' titles and abstracts, followed by a complete reading of the selected studies. Repeated studies were counted only once, and those that did not fit the eligibility criteria and were not available for access were excluded.

A protocol was prepared to extract the data with the study's methodological information (study title, indexed data source, authors, language, continent and year of publication, methodology used, type of approach, and level of evidence) and items related to the concept analysis (types of skin alterations, possible definitions for the concept, attributes of the alteration of skin condition, antecedents, and consequents of the alteration of skin condition, and empirical references).

As for the level of evidence was adopted the Joanna Briggs Collaborating Center classification⁽¹⁸⁾. The studies were evaluated as follows: Level I - Evidence obtained from a systematic review of randomized controlled trials; Level II - Evidence achieved in the randomized controlled trial; Level III.1 - Evidence obtained from well-designed controlled trials without randomization; Level III.2 - Evidence acquired from well-designed cohort or case-control studies; Level III.3 - Level IV - Opinions of respected authorities based on clinical criteria and experience, descriptive studies, or expert committee reports. Finally, tables and charts were used to present the results⁽¹⁸⁾.

RESULTS

After searching the databases, 2,828 studies were found in *Scopus* (Elsevier) and 33 studies in the *Web of Science*. In Google Scholar[®], 1,000 studies were found, totaling 3,861. From these, 173 were unavailable electronically. After analysis of titles and abstracts, 3,582 were excluded for not meeting the eligibility criteria, and 40 counted only once since they were duplicates, leaving a total of 66 studies.

After reading those complete texts, all were eligible and included in the final sample. Then, one study was also included in the reverse search of the parallel references list, totaling a final

sample of 67 studies. Figure 1 shows the flowchart of studies selected from the data sources and Google Scholar[®].

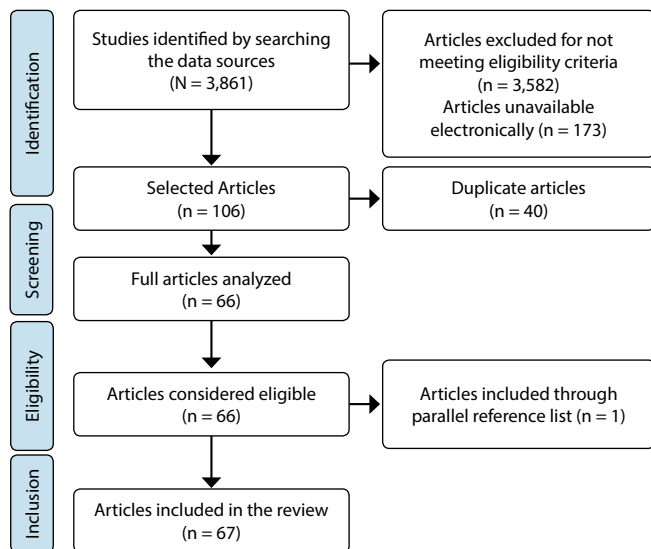


Figure 1 – Flowchart of literature search and inclusion of articles, according to PRISMA-ScR guidelines⁽¹⁷⁾ (adapted), Santa Cruz, Rio Grande do Norte, Brazil, 2020

In terms of the selected studies characterization, the years of publication date from 1999 to 2020, most of them published in the last five years (55.22%). According to the location, South America appeared most frequently (47.76%), and the language that prevailed was English (62.69%). Regarding the method used, literature reviews prevailed with 17.91%, followed by descriptive studies in 16.42% of the sample.

The most used approach was quantitative (76.13%), presenting only one study with mixed methods (1.49%). The level IV of scientific evidence was presented in 47.76% of the studies, followed by level III.3 in 25.37%. In Table 1 are listed the types of lesions presented in the studies.

The prevailing skin alteration was erythema, with 38.80%, also described as “redness” in some studies. Pressure injury was also evidenced in 20.90% of the studies, followed by abrasion, stripping, and dermatitis, with 19.40%.

Table 1 – Types of skin alterations in newborns admitted to the Neonatal Intensive Care Unit, Santa Cruz, Rio Grande do Norte, Brazil, 2020

Types of alterations*	n	%
Erythema/Redness	26	38.80%
Pressure Injuries	14	20.90%
Abrasion	13	19.40%
Stripping	13	19.40%
Dermatitis	13	19.40%
Skin Rupture	10	14.92%
Edema	9	13.43%
Necrosis	9	13.43%
Dryness	9	13.43%
Burns	9	13.43%
Hematoma/Eczema	9	13.43%
Blister	5	7.46%
Eruptions	3	4.47%
Folliculitis	2	2.98%
Maceration	1	1.49%

*Variable that accepts more than one option.

Identifying the use of the concept

The concept “Alteration of skin condition in newborns” was selected to perform the concept analysis.

According to the studies, the possible usages of the concept identified in the sample were: the altered epidermis and/or dermis⁽⁵⁾; change in skin color⁽¹⁹⁾; partial loss of dermal thickness, evidenced as a superficial wound⁽²⁰⁾; and lesion, which is suggestive of an end or advanced point of damage to the skin by pressure (a mechanical force)⁽³⁾.

Essential Attributes

The attributes are associated with the concept because they describe characteristics, allowing a comprehensive analysis, which can improve the understanding of this concept. After reading the studies, five essential attributes were identified and appear in Table 2.

Table 2 – Essential attributes of the concept “Alteration of skin condition in newborns” in Neonatal Intensive Care Unit, Santa Cruz, Rio Grande do Norte, Brazil, 2020

Attributes*	n	%
Lesions or skin alterations	35	52.23%
Skin lesions	15	22.38%
Skin alteration	6	8.95%
Skin Inflammation	1	1.49%
Lesions to the skin, nerves, or tendons	1	1.49%

*Variable that accepts more than one option.

Thus, the most frequent attributes were injuries or skin alterations (52.23% of the studies). It is worth noting that not all studies in the sample presented requirements for concept attributes.

Identifying a model case and a contrary case

In addition, we built a model case and a contrary case for alteration of skin condition in newborns admitted to the NICU.

Model case for “Alteration of skin condition in a newborn”

Full-term newborn admitted to the NICU due to perinatal asphyxia during delivery. Severe general condition, hypocoric, anicteric, acyanotic, afebrile, normotensive lambdoid and bregmatic fontanelles. Under residual sedation from fentanyl and doronid, she presents isochoric and mydriatic pupils, without pupillary photoreaction, absence of muscle tone, and primitive reflexes. Hemodynamically unstable, under the use of dopamine through infusion pump, presents decreased tissue perfusion. On invasive mechanical ventilation, presents Ronchi sounds during pulmonary auscultation, but with little secretion in the airways. The newborn presents a flaccid abdomen with fluid-air noises, an umbilical stump in mummification process, and without phlogistic signs. With an orogastric tube, she accepted breast milk. Diuresis by indwelling urinary catheter, urine with a light-yellow aspect and without sediments. No edema in the limbs, but they are stiff. Skin evaluation: dry and broken skin all over the body, mainly in the lower limbs, evaluated by the Newborn Skin Condition Scale (NSCS). In addition, in the areas of alterations/lesions, she presents phlogistic signs and possible tendon impairment.

This case model, adapted from the researcher's clinical practices, was developed in a university hospital in Rio Grande do Norte in 2019. In this case, it is noteworthy that the author identified the most frequent attributes highlighted by the studies: skin lesions, skin changes, skin inflammation, nerve, or tendon lesions.

Contrary case for "Alteration of skin condition in a newborn"

Preterm newborn admitted to the NICU. A general stable state, normal color, anicteric, acyanotic, afebrile. Under residual sedation, she shows isochoric and photo reagent pupils, presence of muscle tone, and primitive reflexes. Hemodynamically stable, with good perfusion. In ambient air, presents a wheezing sound during pulmonary auscultation. The newborn has a flaccid abdomen with fluid-air sounds, umbilical stump in mummification process, and no phlogistic signs, accepting breast milk. Spontaneous diuresis, urine with a light-yellow aspect. No edema in the limbs. Skin evaluation: intact skin, using skin hydration, and obeying safe care protocols. The newborn did not present alterations when evaluated by the Newborn Skin Condition Scale (NSCS).

The contrary case is fictitious, contradicting the attributes of this study. For this purpose, according to the possible usages of the concept, with the critical attributes, and the elaboration of the cases, it was built a definition to be addressed for the concept "Alteration of skin condition in newborns," namely: alteration in color, thickness, and skin hydration in newborns, associated or not with the presence of lesions.

Antecedents e consequents

The antecedents and consequents for "Alteration of skin condition in newborns" are shown in Table 3.

Table 3 – Categorization of the antecedents and consequences for "Alteration of skin condition in newborns" in a Neonatal Intensive Care Unit, Santa Cruz, Rio Grande do Norte, Brazil, 2020

Antecedents*	n	%
Gestational age-related		
Immature skin barrier	9	13.43%
Thermoregulation	7	10.44%
Transepidermal water loss	4	5.97%
Impaired immunity	3	4.47%
Increased percutaneous absorption	1	1.49%
Capillarity fragility	1	1.49%
Birth weight related		
Low weight at birth	22	32.83%
Malnutrition	2	2.98%
Lack of subcutaneous tissue	1	1.49%
Dehydration	1	1.49%
Nutrition Source	1	1.49%
Hospitalization-related		
Medical Devices	21	31.34%
Skincare	9	13.43%
Length of hospitalization	5	7.46%
Invasive procedures	4	5.97%
Chemical Agents	3	4.47%
Consequents*	N	%
Infections/sepsis	19	28.35%
Pain	2	2.98%
Dehydration	2	2.98%
Inflammation	1	1.49%
Skin reactions	1	1.49%

*Variable that accepts more than one option.

The antecedents are the events or incidents that anticipate the skin alterations and are directly related to the characteristics of prematurity. In the category "Related to gestational age," the most frequent antecedents were immature skin barrier (13.43%) and thermoregulation (10.44%). In the category "Related to birth weight," low weight was the most evident in 32.83% of the studies. As for the antecedents related to hospitalization, medical devices were highlighted in 31.34%.

The consequences most prevalent in the studies were: infections/sepsis (28.35%), pain (2.98%), and dehydration. Those are the factors that can occur due to the alteration of skin condition in newborns. It is noteworthy that not all studies in the sample presented requirements for consequences of the concept.

Identifying the empirical references

Furthermore, to support the concept analysis, some empirical references were found in the studies that allow measuring the "alteration of skin condition in newborns" (Table 4). Based on them, we can classify the risk of having the lesion. They also help standardize and direct care to the patients' needs, decreasing the risk of complications.

Table 4 – Empirical references for "Alteration of skin condition in newborns" identified in the studies, Santa Cruz, Rio Grande do Norte, Brazil, 2020

Empirical references*	n	%
Newborn Skin Condition Scale	4	5.97%
Braden Q scale	4	5.97%
Braden QD scale	2	2.98%
Neonatal Skin Risk Assessment Scale	1	1.49%
Dubowitz Neonatal Maturity Rating Scale	1	1.49%
Skin Condition Score (Lane e Drost)	1	1.49%
Glamorgan Scale	1	1.49%

*Variable that accepts more than one option.

According to Table 4, the most frequent empirical references in the sample were the Newborn Skin Condition Scale and the Braden Q Scale (5.97% of the studies), followed by the Braden QD Scale (2.98%). We reiterate that not all studies in the sample presented elements for for the concept's empirical references.

DISCUSSION

While examining the studies used to back up the concept analysis on the alterations of the skin condition in NBs admitted to the NICU, it was observed that most of them were published in the last five years, showing a recent production on the subject.

The neonate's skin is complex and fragile, making it more susceptible to the appearance of lesions of various etiologies. According to the most frequent alterations, the use of topical antiseptics is the leading cause of erythema and may be the primary cause for the development of other types of lesions, such as dermatitis^(11,21-22).

Pressure injuries may be related to immobility; however, the use of medical devices in neonates stood out as a significant factor in triggering this type of lesion since their usage for therapy and recovery of newborns is essential. Thus, it is crucial to protect the skin area where each device is applied. Other factors contributing

to the risk of pressure injury are friction, shear, ineffective nutrition, insufficient tissue perfusion and oxygenation⁽²³⁻²⁴⁾.

When identified the possible uses of the concept, it was verified that the change in skin color could be associated with erythema, hematomas, and cyanosis - the latter indicating poor perfusion, which can lead to tissue necrosis. The partial loss of dermal thickness, evidenced as a superficial wound, is associated with stage 2 pressure injury, abrasion, and even minor lesions caused by adhesive removal — those lesions result from skin exposure to aggressive elements, whether physical, mechanical, or chemical⁽³⁾.

According to the lesions or skin alterations — the most frequent critical or essential attributes — other authors report that the neonate's skin continues to develop after birth, undergoing a process of extrauterine adaptation. In this sense, neonates' safety depends on damage-free care to maintain and restore physiological stability. A condition associated with immature skin in neonates is transepidermal water loss, which contributes to dehydration, thermal instability, electrolyte imbalances, and the possible presence of alterations and other lesions in the newborn's skin^(2,25-26).

A skin lesion is considered any unusual finding on its surface and can be classified as primary when it represents an initial sign of a pathological process or secondary when it corresponds to the result of a late formation or trauma of the primary lesion. In the neonate, these alterations are common due to the complexity of this period. The lesion is aggressive to the skin, which threatens its functionality; thus, noticing the existence of alterations, even before the development of the lesion, is one of the fundamental roles for health prevention⁽²⁷⁻²⁸⁾.

Skin inflammation may be related to atopic dermatitis, which is chronic and genetic, multifactorial, relapsing, and varying severity. It presents intense pruritus, erythematous or vesicular maculopapular lesions, with stripping, accompanied by dryness, crusts, and liquefaction, with higher prevalence in children⁽²⁹⁻³⁰⁾.

The lesions denote distinct complexities and consequences, so full attention becomes essential. The dermis is a thick layer of connective tissue that extends itself to the subcutaneous tissue. The presence of nerves and tendons indicates the need for special treatment for the lesion since the damage has reached other tissues, affecting homeostasis and causing pain⁽³¹⁾.

It was observed in the study that antecedents contribute to skin alterations and lesions in NBs, characterized mainly by gestational age, birth weight, and factors related to hospitalization. The antecedents refer to the possible etiological factors that will result in a gradual and intense response depending on the degree of exposure⁽¹⁴⁾.

As for gestational age, a study conducted in the United States showed that the lower the gestational age at birth, the greater the probability of developing lesions. It is known that transepidermal water loss is also associated with gestational age because, due to more significant immaturity, the skin tends to be drier in the first week of life. Thus, along with impaired skin integrity, there are risks of thermoregulation failure⁽³²⁾.

A study developed in Hungary reports that NBs with low birth weight have an increased risk of adverse events⁽³³⁾. Also associated with low birth weight is malnutrition since the NB admitted to the NICU often do not have adequate nutrition due to their

hospitalization conditions. Breast milk is often supplemented with formula, and this dietary deficiency considerably increases the possibility of developing skin lesions as well as significantly influences the healing process⁽³³⁾.

For the antecedents related to hospitalization, medical devices stood out. In neonatology, these devices are the main etiological and extrinsic factors for developing injuries. Some research reports that these injuries can be avoided with preventive measures, such as choosing the appropriate size of the device, giving preference to less harmful materials, regularly assessing the skin area under the device, protecting, and moisturizing the site in contact, and performing repositioning. Thus, it is recommended the removal of these devices as soon as possible^(24,32,34).

According to the most frequent consequences of the concept, infections of multiple etiologies occur because of colonization of microorganisms, adherence of medical devices developing biofilm, and maternal separation, which generates stress in early life⁽³⁴⁾. An observational study conducted in Canada showed a reduction in central catheter-associated bloodstream infections using 2% chlorhexidine gluconate⁽³⁵⁾.

So, a literature review demonstrates that the topical application of 2% chlorhexidine gluconate is related to infection reduction⁽³⁴⁾. Another study describes economic and clinical benefits with its use, reducing the incidence of morbidity and mortality⁽³⁶⁾. However, the use of chlorhexidine is not recommended for neonatal patients due to concerns about dermatitis and systemic absorption, indicated only for those with gestational age above 27 weeks⁽³⁴⁾.

Still, on the subject under discussion, another review study shows recent reports that the bath with chlorhexidine reduces the incidence of central catheter-associated bloodstream infections, but there is still no evidence related to neonates and premature babies⁽³⁷⁾. In PTNBs less than 32 weeks, the Association of Women's Health Obstetric and Neonatal Nurses (AWHONN) recommends using only warm water with a cotton swab⁽¹⁾.

The empirical references address scales that assess the skin condition and the risk of developing lesions to establish daily, safe, and systematic care. Thus, it is recommended the use of these scales to standardize the assessment performed by professionals and assist in nursing interventions, avoiding the occurrence of discrepancies in assessments due to the subjectivity of each professional⁽⁷⁾.

This study stands out the Newborn Skin Condition Scale, which evaluates the skin condition of neonates in three variables: dryness, erythema, and rupture. On this scale, 3 is the worst score; and 9, the best. In addition, it is an easy-to-understand instrument that can be inserted into the nursing care practice at the NICU, contributing to standardizing the assessment of lesions and improving the quality of care provided^(4,7).

The Braden Q Scale was adapted from the Braden Scale used in adults. Its variables consist of seven risk factors: mobility; activity; sensory perception, humidity; nutrition; friction and shear; tissue perfusion, and oxygenation. The score ranges from 7 to 28 points, with the lowest score referring to a higher risk of developing pressure injuries. The Braden QD Scale is an adaptation of the Braden Q Scale; it assesses the same variables with the addition of two others: the number of medical devices and skin repositioning/protection. The scale score is allowed to range

from 0 to 20 points. When the risk of lesions increases, the score increases too, and a score ≥ 13 indicates that the patient is at risk of developing the lesion. It is noteworthy that the scales can be inserted in the assistance provided by the nursing staff^(25,38). Since the Braden QD scale predicts the risk of immobility and medical device-related pressure injuries in children, it can include from NBPTs to 21-year-old patients⁽²⁵⁾.

Huffines and Logsdon developed the Neonatal Skin Risk Assessment Scale, based on the Braden scale specific to the neonatal population, with six subscales: general physical condition; mental status; mobility; activity; nutrition; and humidity. Each subscale receives 1 point for a total of 6 to 24. The higher the score, the lower the risk of developing a skin lesion⁽²⁵⁾.

Furthermore, it should be noted that the NICU is an environment that welcomes NBs and their families; therefore, it depends on the support of the entire multi-professional team. Nursing professionals play an essential role in maintaining the living conditions of highly complex NBs, by aligning care practices with scientific evidence, acting in the management of the environment and the nursing team. In addition, with the execution and planning of individual and priority care linked to the prevention of alterations of skin condition of the NB, they promote safe and quality care⁽³⁹⁾.

Study limitations

The limitations of this study may be related to the data sources chosen for the methodological approach and the limit of three languages, which may have contributed to obscuring the inclusion of other important surveys on the topic.

Contributions to the Fields of Nursing, Health or Public Policy

This study can contribute to professionals' broader and improved view of the concept "altered skin condition in newborns" since skincare is a predictor of service quality, health care and ensures patient safety. Furthermore, when it comes to nursing, it provides systematized care with human responses, contributing to developing new clinical indicators for nursing diagnoses and supporting the development of preventive intervention strategies against skin condition alterations in newborns admitted to NICUs.

CONCLUSIONS

Given the results obtained and considering the objective of this research, the concept analysis of alteration of skin condition in newborns hospitalized in the Neonatal Intensive Care Unit, operationalized through scoping review, obtained a sample of 67 studies. The concept obtained as essential attributes the skin lesions or alterations, presenting as antecedents the factors related to gestational age, birth weight, and hospitalization. As consequents were highlighted the infections of various etiologies. As a result, the definition constructed in this research to address the concept was as follows: alteration in color, thickness, and hydration of the skin in newborns, associated or not with the presence of lesions.

Therefore, we recommend new studies with other designs about that subject to deepen the knowledge in this field since neonate skincare may not be standardized due to its complexity, and there are still many disagreements in the literature.

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