SCALE OF INJURIES RISK DUE TO XEROSIS IN HOSPITALIZED ELDERLY PEOPLE: DEVELOPMENT AND EVIDENCE VALIDITY

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ABSTRACT

Objective: To describe the construction process and validation evidence of the risk assessment scale for the development of lesions associated with cutaneous xerosis in hospitalized elderly people. **Method:** Methodological study based on Pasquali's psychometric validation through theoretical, empirical, and analytical analysis. Operationalization occurred in three stages: scope review, scale construction, and content validation by expertises. **Results:** The instrument is structured in 14 items, with an overall score ranging between 15 (low risk) and 53 (high risk), and presented a content validity coefficient of 0.926 based on the aspects theoretical relevance, theoretical dimension, clarity of language, and practical relevance. It also presented a general Cronbach's alpha of 0.815, as well as a McDonald's omega of 0.942, which reveals excellent internal consistency. **Conclusion:** The instrument showed evidence of validity and could contribute to nurses' practice when integrating the skin care process for elderly people.

DESCRIPTORS: Nursing. Validation studies. Skin aging. Health of the elderly.

ESCALA DO RISCO DE LESÕES POR XEROSE EM PESSOAS IDOSAS HOSPITALIZADAS: DESENVOLVIMENTO E EVIDÊNCIAS DE VALIDADE

RESUMO

Objetivo: Descrever o processo de construção e de evidências de validação da escala de avaliação do risco para o desenvolvimento de lesões associadas à xerose cutânea em pessoas idosas hospitalizadas. **Método:** Estudo metodológico fundamentado na validação psicométrica de Pasquali por meio de análise teórica, empírica e analítica. A operacionalização ocorreu em três etapas: revisão de escopo, construção da escala e validação de conteúdo por *expertises*. **Resultados:** O instrumento encontra-se estruturado em 14 itens, com pontuação geral que varia entre 15 (baixo risco) e 53 (alto risco), e apresentou coeficiente de validade de conteúdo de 0,926 conforme os aspectos relevância teórica, dimensão teórica, clareza da linguagem e pertinência prática. Apresentou também alfa de Cronbach geral igual a 0,815, bem como ômega de McDonald de 0,942, o que revela excelente consistência interna. **Conclusão:** O instrumento mostrou evidências de validade e poderá contribuir para a práxis dos enfermeiros ao integrar o processo de cuidado da pele de pessoas idosas.

DESCRITORES: Enfermagem. Estudos de validação. Envelhecimento da pele. Saúde do idoso.

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ESCALA DE RIESGO DE LESIONES POR XEROSIS EN ANCIANOS HOSPITALIZADOS: EVOLUCIÓN Y VALIDEZ DE LA EVIDENCIA

RESUMEN

Objetivo: Describir el proceso de construcción y evidencia de validación de la escala de evaluación de riesgo para el desarrollo de lesiones asociadas a xerosis cutánea en ancianos hospitalizados. **Método:** Estudio metodológico basado en la validación psicométrica de Pasquali mediante análisis teórico, empírico y analítico. La operacionalización ocurrió en tres etapas: revisión del alcance, construcción de escala y validación de contenido por experiencia. **Resultados:** El instrumento se estructura en 14 ítems, con una puntuación global que oscila entre 15 (bajo riesgo) y 53 (alto riesgo), y presentó un coeficiente de validez de contenido de 0,926 basado en los aspectos relevancia teórica, dimensión teórica, claridad del lenguaje y relevancia práctica. También presentó un alfa de Cronbach general de 0,815, así como un omega de McDonald's resultante de 0,942, lo que revela una excelente consistencia interna. **Conclusión:** El instrumento mostró evidencias de validez y podría contribuir para la práctica del enfermero al integrar el proceso de cuidado de la piel del anciano.

DESCRIPTORES: Enfermería. Estudios de validación. Envejecimiento de la piel. Salud del anciano.

INTRODUCTION

In Brazil, the population of elderly people has been growing globally; it is projected that there will be 1.4 billion elderly people in 2030 and 2.1 billion in 2050. It is estimated that by then, all regions of the world, except Africa, will have 1/4 or more of their population aged 60 years or older[1].

During this period, in addition to demographic changes, a high incidence of chronic non-communicable diseases in the population is projected to persist, mainly associated with bad lifestyle habits, a sedentary lifestyle and a lack of preventive education, as well as an increase in obesity diagnoses. , hypertension and diabetes. Furthermore, the senescence process, which brings significant cellular and physiological changes in elderly people, implements health promotion actions as crucial strategies for coping with these conditions even more pressing[2].

In elderly people, compromised proliferation and differentiation of keratinocytes, linked to changes in pH, sebum production, lipid content and hydration, lead to modification of the stratum corneum, and, as a result of these physical and structural changes, dryness occurs, often accompanied by itching. This phenomenon results from intrinsic (chronological) and extrinsic (photoaging) aging, both related to factors such as radiation, free radicals, temperature, smoking, pollution and genetics. With the flattening of the dermo-epidermal junction and disruption of the dermis, the skin becomes thin, with reduced renewal capacity[3].

It should be noted that skin diseases affect up to 70% of the senile population. Dry skin further increases the vulnerability to the appearance of additional lesions and itching due to the presence of xerosis, currently identified as the most common disorder in skin aging, with an incidence that can vary from 11 to 78%[4]. A multicenter study carried out in China with 11,602 elderly people from 50 hospitals and two nursing homes found a prevalence of xerosis of 34.4%, mainly located in the upper and lower limbs, whose dryness was very intense; 21.2% of participants mentioned the presence of itching; and 12.5% stated that this symptom affected their sleep[5].

In this context, nurses play an essential role in evaluating the skin, defining prevention strategies and treating issues inherent to maintaining skin integrity, mainly when aimed at the elderly. Therefore, it is necessary to expand knowledge and develop, among these professionals, skills and attitudes about anatomy, physiology and risk factors for this condition, as well as the stages of the skin healing process[6].

Therefore, instruments that allow skin assessment based on nursing theories must be present in the systematization of nursing care and the nursing process to support nurses' practice in caring for older adults. Through the nursing process, it is possible to provide guidance, direction and organization of professional care by aligning theoretical support and using standardized language systems for nursing diagnoses, results and interventions. In this sense, Horta's theory of basic human

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needs has been Brazil's most used theoretical model for this purpose, as its applicability allows the promotion of nursing care in its psychobiological, psychosocial and psychospiritual dimensions[7].

It is important to highlight that valid and reliable instruments have contributed to improvements in the management and systematization of care. Therefore, we are aware of the importance and discernment of carefully choosing an instrument so that it can be adequate and precise and offer evidence of validity to guarantee the quality of the results. To this end, an accurate assessment of the measurement properties with regard to its items, domains and forms of evaluation is necessary before use[8].

Given the above, this study is justified by the lack of instruments capable of measuring the risk of injuries in the presence of cutaneous xerosis in elderly people in the hospital environment. The risk score analysis may be helpful in decision-making and managing prevention and treatment care, including choosing appropriate dermoprotectors for each situation.

To this end, the objective was to describe the construction process and validation evidence of the risk assessment scale for developing lesions associated with cutaneous xerosis in elderly people.

METHODS

This methodological study followed the guidelines of the Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) instrument to guide this report. It occurred through the following steps: scope review, scale construction and content validation by a panel of experts. The study phases were operationalized from October 2020 to October 2022.

A scoping review was carried out, guided by a specific manual and systematized by the PRISMA tool (PRISMA-ScR), which has control items that provide methodological rigor to the research. To define the question, the Population, Concept and Context9 strategy was adopted, in which the following were defined:

- Population: elderly people with xerosis cutis;
- Concept: conditions related to the risk of lesions in elderly people with cutaneous xerosis;
- Contexto: assistência hospitalar.

The objective was to map the conditions related to this risk in a hospital environment, and three researchers carried out the search independently. Subsequently, the results were compared to eliminate biases and overcome possible inconsistencies in the process[10].

Based on the results, the scale was constructed by grouping its variables with their respective parameters and scores. It also presented minimum and maximum scores with their respective stratification intervals, which represented low, medium and high risks. It should be noted that this construction was based on the premises of Wanda Aguiar Horta's conceptual theoretical framework regarding psychophysiological needs and, for psychometric verification, on the methodological framework of Pasquali[11], based on three procedures (theoretical, empirical and analytical), in which the instrument construction stages, judges' opinion and application of statistical procedures for content validation are enforced.

The search for the population of judges was carried out through research on the Lattes Platform of the National Council for Scientific and Technological Development, using an advanced search by subject. The following descriptors were crossed: nursing, skin aging and elderly health, combined using the Boolean operator AND.

The sample was selected by applying, according to the Fehring model, the following criteria:

- Participate in research groups, projects and events that address the topic;
- Be studious and have experience in the area;
- Have carried out studies on the subject;
- Have knowledge about the physical and psychosocial aspects that encompass the population.

An adaptation was made to meet the research objectives and ensure accuracy in the assessment[12]. Each criterion presented a score, in which the judge who obtained a minimum of 8 points was considered a judge, as shown in Table 1.

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Table 1. Adaptation according to Fehring's model criteria, João Pessoa (PB), Brazil, 2021.

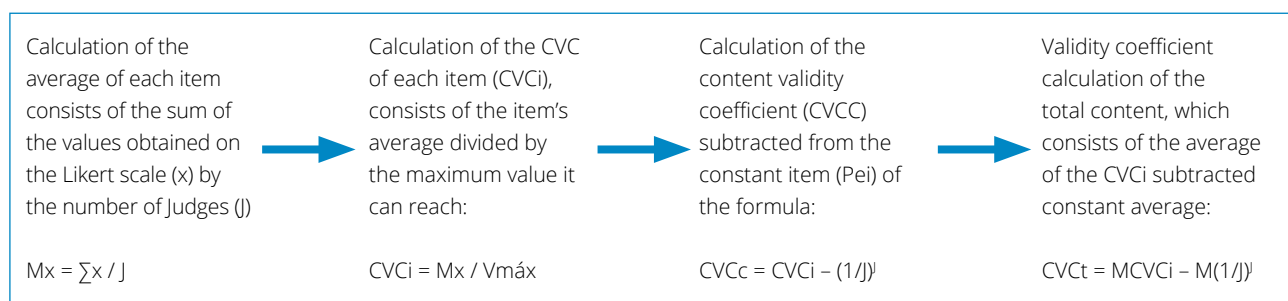|	
Doctorate in Nursing	4
Master's degree in Nursing	3
Participation in a research group in the area under study	2
Article published on skin lesions in reference journals (Qualis A1-A2-B1)	2
Article published on skin lesions in reference journals (Qualis B2–B5)	1
Have clinical practice of at least one year in the area under study	2
Have specialization in the area of study	2

The literature does not indicate consensus regarding the number of judges. However, in this study, it was considered to maintain a minimum of six and a maximum of 20[11]. These judges evaluated the instrument's suitability concerning variables, parameters and scores in the question's theoretical relevance, theoretical dimension, clarity of language and practical relevance. It was decided to maintain the theoretical dimension within the scope of psychobiological needs under the theory of basic human needs. Contact with the judges was made via email via invitation letter, along with the instrument and guidance on the validation procedure and the Free and Informed Consent Form (ICF).

The online questionnaire used to collect data via Google Forms was constructed in two parts. The first refers to sociodemographic and professional data (age, sex, length of professional practice, degree, length of experience in teaching, research or extension on the prevention and treatment of skin lesions), and the second refers to the scale. At the end of each item, there was space for the judges to express comments and suggestions.

To optimize the level of consensus among judges, the Delphi technique was used to obtain maximum agreement among a group of experts on a given topic in cases of lack of unanimity of opinion due to lack of scientific evidence or presence of contradictory information[13].

The instrument was initially organized with 14 variables. For the answers, a 5-point Likert scale was used, where 1 means very little agreement, 2 means little, 3 means medium, 4 means a lot and 5 is very much agreement for the items clarity of language, practical relevance, theoretical relevance and theoretical dimension. Filling occurred in two rounds. Initially, the judges were asked to provide suggestions based on each one's expertise, and these suggestions were analyzed, revised and grouped into a second version. In the second round, the judges analyzed the results of the first round and were invited to evaluate the adjustments or request new corrections if they considered them relevant.

The judges were characterized in terms of social and professional data. Regarding the validation process, the content validity coefficient (CVC) was calculated, based on the average scores above 3, scores achieved in the return of the first round. Then, the data were tabulated and stored in the Windows Excel program and transported to the Statistical Package for the Social Sciences software, version 27. The CVC calculation made it possible to verify the level of agreement according to the flowchart presented in Fig. 1, in which items that obtained CVC values ≥ 0.8[11] were considered acceptable.

Calculation of the average of each item consists of the sum of the values obtained on the Likert scale (x) by the number of Judges (J)	→	Calculation of the CVC of each item (CVCi), consists of the item's average divided by the maximum value it can reach:	→	Calculation of the content validity coefficient (CVCC) subtracted from the constant item (Pei) of the formula:	→	Validity coefficient calculation of the total content, which consists of the average of the CVCi subtracted constant average:
$Mx = \sum x / J$		$CVCi = Mx / Vmáx$		$CVCc = CVCi - (1/J)^J$		$CVCt = MCVCi - M(1/J)^J$

Figure 1. Flowchart of the steps for calculating the content validity coefficient (CVC), João Pessoa (PB), Brazil, 2022.

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To assess reliability through internal consistency, Cronbach's alpha coefficient was used, which must be positive, ranging from 0 to 1, and is categorized as follows:

• Above 0.8 = excellent;
• Greater than 0.7 = considered good;
• Below 0.4 = bad[14].

In addition to this coefficient, the McDonald's omega value was also calculated, which varies between 0 and 1 – the closer to 1, the greater the instrument's internal consistency. A value between 0.70 and 0.90[15] is considered acceptable.

The Research Ethics Committee approved the study and complied with Resolution No. 466/2012 of the [Brazilian] National Health Council for research involving human beings. Participants were provided with information about the investigation and a guarantee of anonymity. The ICF was then signed.

RESULTS

Validation took place with nine judges, all nurses, with an average age of 45.5 years, professional experience of 23 years and expertise in the prevention and treatment of skin lesions of 14.5 years. Seven professionals are from the Northeast, one from the Southeast and one from the South. Two had masters, six had doctorates, and one had a postdoctoral degree. All scored above 8 on the Fehring criteria.

In the first round of evaluation, the instrument, initially with 14 variables, now presents 15, as there was a recommendation to add the water temperature variable for bathing, as well as age stratification every ten years from 60 onwards. Regarding the variable comorbidities, there was no consensus, given the diversity of diseases that affect the elderly and interfere with the conditions of the skin. Adopting the parameters present or absent is recommended, as shown in Table 2.

Table 2. Distribution of content validity coefficient (CVC) values of the risk assessment scale for the development of lesions associated with cutaneous xerosis in elderly people (ERLAX-53), João Pessoa (PB), Brazil, 2022.

Variables	Parameters	Scores	CVC
Patient age (years)	> 80	3	0.985
	70–79	2	
	60–69	1	
Level of consciousness	Intense sedation/comatose	5	0.956
	Moderate sedation/drowsiness	4	
	Mild sedation/drowsiness	3	
	Disoriented	2	
	Conscious/oriented	1	
Mobility	Property (bed-bound/restricted to bed)	4	0.926
	Very limited (performs activities in bed)	3	
	Slightly limited (transfers to chair or armchair)	2	
	No limitation (walks freely)	1	
Friction and shear	Present	2	1.000
	Absent	1	
Comorbidities	Present	2	0.844
	Absent	1	
Turgor and elasticity	Decreased	2	0.978
	Preserved	1	
Tactile sensitivity	Absent	3	0.948
	Decreased	2	
	Preserved	1	

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Table 2. Continuation...

Variables	Parameters	Scores	CVC
Skin texture	Dry	4	0.867
	Mixed	3	
	Oily	2	
	Hydrated	1	
Pruritus	Present	2	1.000
	Absent	1	
Pre-existing alteration	Cracks	5	0.889
	Peeling	4	
	Deep wrinkles	3	
	Photodermatoses	2	
	Absent	1	
Products for hydrating and/or lubricating the skin	Don't use anything	3	0.815
	Use any moisturizer available	2	
	Use when indicated (humectants, emollients or occlusives)	1	
Skin hydration routine	None	4	0.874
	Hydration without an established routine	3	
	1 time a day	2	
	2 times a day	1	
Water temperature for bathing	Greater than 36°	3	0.952
	Between 34° and 36°	2	
	Less than 34°	1	
Body mass index	< 18.5 or > 40 (underweight or class III obesity)	5	0.956
	Between 35 and 39.9 (class II obesity)	4	
	Between 30 and 34.9 (class I obesity)	3	
	Between 25 and 29.9 (overweight)	2	
	Between 18.5 and 24.9 (normal or eutrophic)	1	
Phototype	Extremely white	6	0.933
	White	5	
	Light brunette	4	
	Moderate brunette	3	
	Dark brunette	2	
	black	1	
CVC total			**0.926**

There was a change in skin texture from soft to hydrated. Regarding pre-existing changes, the consensus was that only those effectively related to dry skin would remain in the item. Regarding products used for hydration, the term lubrication was introduced since hydration and lubrication are distinct actions, as well as information regarding their usefulness, to differentiate the use of any available moisturizer from those indicated based on the specific action of each type. Regarding the hydration routine, adding a frequency of twice a day was suggested.

Risk stratification was defined from a minimum of 15 to a maximum of 53 points, with 15 to 27 considered low risk, 28 to 40 medium risk and 41 to 53 high risk. The total CVC of the instrument was 0.926, and calculations to assess reliability through internal consistency revealed high reliability, as shown in Table 3.

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Table 3. Distribution of Cronbach's alpha and McDonald's omega values of the risk assessment scale instrument for developing lesions associated with cutaneous xerosis in elderly people (ERLAX-53), João Pessoa (PB), Brazil, 2022.

	Cronbach's alpha	McDonald's Omega
Clarity of language	0,831	0,868
Practical relevance	0,758	0,774
Theoretical relevance	0,823	0,847
Theoretical dimension	0,938	0,952
Total	0,815	0,942

The version of the risk assessment scale for developing lesions associated with cutaneous xerosis in elderly people was called ERLAX-53.

DISCUSSION

After validating the instrument, it presented a final agreement percentage above 0.90, meaning that the items are clear and representative of the context evaluation. The judges were carefully selected and presented excellent knowledge and skills based on studies and clinical experience.

Hydration, considered an essential condition for skin integrity and homeostasis, is part of the context of psychobiological needs. The theory of basic human needs, which has as its principles the law of balance (homeostasis), assumes that the entire universe maintains itself through a dynamic balance between its beings, while the law of adaptation defends that all beings in the universe maintain themselves in balance through adjustments, and the law of holism, that the universe is a whole, the human being is a whole, and this whole is not merely the sum of the parts of each being[16].

Over the years, in the aging process, the xerotic condition commonly worsens, especially in the absence of preventive care. Despite being associated with some chronic non-communicable diseases, such as diabetes, senile xerosis was adopted as a focus in this study, as dry skin in people with diabetes is described explicitly as diabetic xerosis, which can be considered a particular form of cutaneous xerosis[17].

In the present study, mobility assessment was carried out by adapting the Johns Hopkins highest level of mobility scale, used in intensive care units, recovery units and medical clinic sectors, to document mobility and establish goals[18]. It is essential to consider that cognitive impairment, sedation or mechanical restraint are directly related to restricted mobility and, consequently, to an increased risk of injuries when the skin is dry.

Reduced turgor and elasticity contribute to the appearance of friction and shear injuries, commonly called skin tears. Some areas present greater involvement, as reported in the study by Pinheiro et al.[19], in which 42% of these injuries were located on the elbows, 22% on the legs and 13% on the hands, areas considered at risk due to the tension present during retraction, friction or in the impact between the skin and the surface of the bed or surrounding objects that can cause partial or complete thickness injuries.

Senile pruritus is present in several disorders, such as cholestasis, systemic infections, diabetes, liver failure and some hematological disorders. Furthermore, it can occur as a side effect of many medications used by elderly people, it affects quality of life, and, in untreated cases and with the progression of permanent impairment of the barrier function, it can favor the emergence of eczema and local infections or even systemic[4].

Intrinsic aging causes an increase in musculoskeletal rigidity and a reduction in muscle spasticity, which decreases sensory sensitivity in addition to compromising mobility and increasing the risk of falls. Due to the frequent presence of xerosis in the foot area, as well as in people with diabetic feet, the judges recommended carrying out tactile sensitivity testing on the feet or hands when considering the prevalence of amputation[20].

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Other aspects of senile skin are wrinkles, photodermatoses and fissures. Wrinkles are changes that form mainly in regions most exposed to the sun and are clinically classified as superficial and deep, as well as static, dynamic and gravitational. Photodermatoses are primarily caused by exposure to ultraviolet radiation, which can result in chronic inflammation due to phototoxicity, photoallergy, and elastosis. With the decrease in the activity of the sebaceous and sweat glands, moisture depletion increases, leading to ruptures in the stratum corneum, revealing fissures that can be deep enough to affect the dermal capillaries and cause bleeding[21].

The Brazilian Society of Dermatology[22] classifies skin texture as normal, hydrated, dry, oily, or combination. Normal or hydrated skin has a healthy, velvety texture without excess shine or dryness. Dry skin has few visible pores little luminosity, is more prone to flaking and redness and may be more prone to the appearance of small lines and cracks. Oily skin appears brighter and thicker due to more outstanding sebum production than normal and has enlarged pores. Combination is the most common type and has an oily appearance and enlarged pores in the T-zone (forehead, nose and chin).

In a literature review carried out in Indonesia, it was observed that the use of moisturizers reduces dryness by improving the water maintenance condition in the stratum corneum and that these products are capable of minimizing skin friction, softening and filling cracks, which makes them the first line in the treatment of xerosis in elderly people. In addition to these properties, they may have antiseptic and antioxidant effects[23]. Careful assessment will determine the hydration routine, but benefits have been attributed to use twice a day[24].

Moisturizers are presented as emollient, humectant or occlusive compounds. Emollients fill the spaces between the corneocytes and work by absorbing moisture and reducing water loss through evaporation. Humectants increase the hydration of the stratum corneum, preserving the structure and actively attracting water from the dermis to the epidermis to compensate for reduced levels of natural moisturizers. Occlusives, in turn, form a hydrophobic film on the epidermis, which delays water evaporation and penetration of irritating agents, such as allergens and toxins[25].

Regarding water temperature, a construct validation study with 101 nurses from a northeastern Brazilian state found the importance of guiding the nursing team about the appropriate water temperature, which, when heated, should be between 34 and 36°C, as water at high temperatures dries out and removes natural oil[6].

Another study on friction injuries in elderly people concluded that the use of heated water is pertinent but should be reduced in both the frequency and duration of bathing to reduce the rate of change in the skin's physiological characteristics of the skin[26].

The nutritional status evidenced by changes in body mass index can favor the appearance of injuries, especially pressure injuries, as conditions such as low weight and obesity compromise vascularization and albumin levels and reduce collagen synthesis[27].

Regarding skin phototype, a systematic review carried out from 1990 to 2020 did not identify a clear association between skin color and aging. The issues surrounding skin color and corresponding associations with xerosis differed between studies. Furthermore, interaction with sun exposure is a conditioning factor for greater severity. Each skin type has particularities in terms of pigmentation and sensitivity to sun exposure, and people with fair skin are more sensitive to photoaging, which is directly related to xerosis[28,29].

Some limitations of the study can be highlighted: the selection of judges, which restricted the geographical distribution due to the lack of return after contact attempts, and the incipience of studies, especially Brazilian ones, that specifically address issues pertinent to nursing care for elderly people with dehydrated skin.

It is recommended to carry out the subsequent steps with the ERLAX-53 construct and clinical validation processes to find indicators that indicate the robustness and precision necessary to deliver a reliable instrument.

CONCLUSIONS

After the construction of the ERLAX-53 instrument, with a theoretical-conceptual foundation in the theory of basic human needs, from Horta, a dimension that includes the need for hydration and the set of psychobiological needs, it was possible to find evidence of validation through the analysis of expert judges. Thus, the relevant contribution of this instrument

to the practice of nurses can be inferred, as risk assessment can assist in the management of skin care for elderly people, as its applicability guides decision-making and the adoption of Preventive measures.

AUTHOR'S CONTRIBUTION

DATA AVAILABILITY STATEMENT

All dataset were generated or analyzed in the current study.

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