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ARTIGO DE INVESTIGAÇÃO (ORIGINAL)
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Observation Neonatal Skin Risk Assessment Scale: statistical validation with newborns

Escala de Observação do Risco de Lesão da Pele em Neonatos: validação estatística com recém-nascidos

Escala de Observación del Riesgo de Lesión de la Piel en Neonatos: validación estadística con recién nacidos

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Abstract

Background: A newborn's skin is delicate, thin, and fragile. These characteristics, when combined with system immaturity and the use of medical devices that are essential for survival, increase the risk of skin injury. This predisposition to injury requires health professionals to perform a close observation and assessment of the risk, using instruments specifically validated for this population.
Objectives: To perform the cultural and linguistic adaptation of the Neonatal Skin Risk Assessment Scale (NSRAS) and assess its psychometric properties.
Methodology: Quantitative study with a sample of 131 preterm infants. Confirmatory factor analysis and Cronbach's alpha were used to estimate the sensitivity, validity, and reliability of the Portuguese version of the NSRAS.
Results: The goodness-of-fit indexes indicate a good fit ($\chi^2(8)=28.415$; $p<0.001$; $\chi^2/df=3,55$; CFI=0.959; GFI=0.965; TLI=0.923; and RMSEA=0.099; P(RMSEA ≤0.05)<0.001; n=131).
Conclusion: The analysis of the psychometric properties of the Portuguese version of the NSRAS shows an adequate factorial structure for assessing the risk of pressure injuries in preterm infants; therefore, it is a good tool for research.

Keywords: infant, newborn; skin; scale; validation studies

Resumo

Enquadramento: A pele do recém-nascido **é caracterizada como delicada,** fina e frágil. Estas características, associadas à imaturidade dos sistemas e à utilização de dispositivos médicos, imprescindíveis à sua sobrevivência, aumentam o risco de lesão da pele. Esta predisposição para o aparecimento de lesões exige dos profissionais de saúde uma rigorosa observação e avaliação do risco, com instrumentos validados especificamente para esta população.
Objetivos: Fazer a adaptação cultural e linguística e avaliação das qualidades psicométricas da *Neonatal Skin Risk Assessment Scale (NSRAS)*.
Metodologia: Estudo quantitativo, numa amostra de 131 recém-nascidos. Na estimação da sensibilidade, validade e fiabilidade da NSRAS recorreu-se à análise fatorial confirmatória e alfa de Cronbach.
Resultados: Os índices de qualidade de ajustamento são indicadores de um bom ajustamento ($\chi^2(8)=28,415$; $p<0,001$; $\chi^2/df=3,55$; CFI=0,959; GFI=0,965; TLI=0,923 e RMSEA=0,099; P(RMSEA ≤0,05)<0,001; n=131).
Conclusão: O estudo das qualidades psicométricas da NSRAS revela adequada estrutura fatorial na avaliação do risco de lesões por pressão nos recém-nascidos pré-termo e, consequentemente, um bom instrumento para investigação.

Palavras-chave: recém-nascido; pele; escala; estudos de validação

Resumen

Marco contextual: La piel del recién nacido se caracteriza por ser delicada, fina y frágil. Estas características, asociadas a la inmadurez de los sistemas y a la utilización de dispositivos médicos, imprescindibles para que sobreviva, aumentan el riesgo de lesión de la piel. Esta predisposición para que aparezcan lesiones importantes exige que los profesionales sanitarios realicen una rigurosa observación y evaluación del riesgo, con instrumentos validados específicamente para esta población.
Objetivos: Realizar la adaptación cultural y lingüística, así como la evaluación de las cualidades psicométricas de la *Neonatal Skin Risk Assessment Scale* (NSRAS).
Metodología: Estudio cuantitativo, en una muestra de 131 recién nacidos. En la estimación de la sensibilidad, validez y fiabilidad de la NSRAS se recurrió al análisis factorial confirmatorio y al alfa de Cronbach.
Resultados: Los índices de calidad del ajuste indican un buen ajuste ($\chi^2(8)=28,415$; $p<0,001$; $\chi^2/df=3,55$; CFI=0,959; GFI=0,965; TLI=0,923 y RMSEA=0,099; P(RMSEA ≤0,05)<0,001; n=131).
Conclusión: El estudio de las cualidades psicométricas de la NSRAS revela una estructura factorial adecuada en la evaluación del riesgo de lesiones por presión en los recién nacidos prematuros y, consecuentemente, resulta un buen instrumento de investigación.

Palabras clave: recién nacido; piel; escala; estudos de validación

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Introduction

A newborn's skin is delicate, thin, and fragile. These characteristics, when combined with system immaturity and the use of medical devices that are essential for survival, increase the risk of skin injury.

The European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) consider that a pressure injury is usually localized over a bony prominence, as a result of pressure, shear, and/or pressure in combination with shear (European Pressure Ulcer Advisory Panel, National Pressure Ulcer Advisory Panel, 2013). Its complexity is related to the location, size, and depth of the injury, but also to the consequences of its side effects (e.g., infection, pain, suffering, changes in body image, increased hospital length-of-stay, increased treatment costs; Direção-Geral da Saúde, 2011).

The World Health Organization (2007) believes that the prevention of pressure injuries is a fundamental human right and, as such, a children's right that must be preserved through an evidence-based clinical practice. If health professionals acquire knowledge about the etiology of pressure ulcers and the risk factors associated with its development and use instruments specifically validated for risk detection, they can easily make the clinical judgment, apply preventive measures (Ferreira, Miguéns, Gouveia, & Furtado, 2007), and promote skin integrity.

With regard to health care, the use of risk assessment instruments that are suitable to the characteristics of specific populations, such as neonates, provide data for evaluation, confer objectivity to prevention and treatment plans, optimize the use of preventive measures, and allow measuring nursing-sensitive outcomes.

The Portuguese Directorate-General for Health has validated and approved two scales for the observation of pressure injury risk: the Braden scale for the adult population and the Braden Q scale for the pediatric population (applied to children aged between 21 days and 18 years; Ferreira et al., 2007). Therefore, there is no instrument for assessing the risk of pressure injury in the neonatal population (between 0 and 21 days). The objective of this study was to perform the cultural and linguistic adaptation of the NSRAS (Neonatal Skin Risk Assessment Scale - *Escala de Observação do Risco de Lesão da Pele em Neonatos* [EORLPN]; Huffines & Lodgson, 1997).

Background

The skin is the largest organ in the human body, accounting for 16% of the body weight. It is anatomically stratified into three interdependent and distinct layers (epidermis, dermis, and hypodermis or subcutaneous tissue), which are closely related in terms of functioning. The first layer is composed of stratified squamous epithelium, the second layer consists of dense connective tissue, and the third layer is largely composed of subcutaneous tissue - the hypodermis - which is rich in adipose tissue formed during the last trimester of pregnancy. The skin develops in the womb during the first trimester of gestation and the epidermis is formed from the 4th and 6th week until the end of pregnancy. Between the 22nd and 24th week of gestational age, keratinocytes become differentiated in the *stratum corneum*, reaching two to three cell layers by the 28th week of gestation and evolving to 15 layers around the 32nd week (Barel, Paye, & Maibach, 2009). The skin acts as a protective barrier against environmental agents such as bacteria or viruses and is also responsible for vital functions such as thermoregulation or sensory functions (e.g., touch, pressure, cold, heat, pain…). The skin also has an excretory function of substances which need to be eliminated by the body (Barel et al., 2009). The functions of the skin reach maturity between the 2nd and 4th weeks of life after birth and may extend until the 8th week in the case of extremely preterm infants, i.e. with a gestational age of less than 30 weeks (Martins & Tapia, 2009). In recent decades, technological advances in neonatal care have allowed many neonates previously considered unviable to grow outside the mother's womb; however, these infants are constantly at high risk for regulatory problems and infection.

As a protective organ, the skin of a newborn is morphologically and functionally different from the skin of an adult. During the first days of life, the newborn's skin is subjected to various adaptation processes which are necessary for the transfer from the wet intrauterine environment to the dry outside environment (Blume-Peytavi, Hauser, Stamatas, Pathirana, & Garcia, 2012; Fujii, Sugama, Okuwa, Sanada, & Mizokami, 2010). This may increase the risk level and may lead to limitations in the adaptation process in case of preterm or low-weight infants (Martins & Tapia, 2009). The most important skin function is to protect against water loss, absorption of harmful substances, invasion of microorganisms, and physical trauma (Blume-Peytavi et al., 2012). Therefore, skin integrity is essential for newborn's homeostasis, namely in preterm infants and infants whose skin development is not yet completed (Martins & Tapia, 2009).

Skin care should start in the delivery room, where the baby should be placed in a pre-heated crib, and the temperature in the unit should be at 25ºC. When transferred to the neonatal unit, the infant should be placed in an incubator using positioning devices, maintaining the infant in the fetal position with minimal handling, limiting the number invasive procedures and adhesives for medical device fixation. These interventions reduce the loss of heat to the environment (Martins & Tapia, 2009), the risk of injury, and, consequently, the risk of infection, pain, and suffering.

Preterm infants are a risk population for pressure injuries. Studies on the prevalence and incidence of these injuries are often performed to assess and characterize the magnitude of this problem; however, in Portugal, studies of this nature are almost non-existent. Some international results point to a prevalence of 0.47% to 27% of pressure injuries in the pediatric population (Sanada et al., 2008). The lack of evidence on this issue in the neonatal period requires the use of prevention and treatment protocols, as well as of evidence-based nursing diagnoses as alternatives to guarantee optimal care delivery to patients with or at risk for pressure injuries (Fernandes & Caliri, 2008).

The complexity of skin care in neonatology requires well-prepared professionals for the timely identification of problems and the effective implementation of nursing interventions regarding skin observation, assessment of injury risk, and identification of toxic products. These products, when used directly on the newborn's skin, especially in preterm infants, may be absorbed, causing skin flaking and/or burns (Association of Women's Health, Obstetric and Neonatal Nurses, 2007). The application of adhesives directly on the skin for securing medical devices should be done with caution because it contributes to the emergence of micro and macro skin injuries. As previously described, the frailties and peculiarities of newborn's skin are predisposing factors for the risk of skin injuries, namely pressure injuries, which may be considered high risk when the infant has a gestational age of less than 37 weeks.

The Infants' immaturity, associated with their unstable health status, decreases skin tolerance and the supporting structures to risk factors, and, therefore, promotes the development of pressure injuries (Fujii et al., 2010). Neonates' most common risk factors are immobilization, friction and shear, malnutrition, tissue perfusion, oxygenation impairment, and the use of medical devices that are essential to their survival (Sanada et al., 2008).

It is estimated that approximately 95% of pressure injuries are avoidable through early identification of the risk level. The knowledge of the etiology and risk factors associated with the development of injuries is the key to successful prevention strategies (European Pressure Ulcer Advisory Panel, the National Pressure Ulcer Advisory Panel, 2013).

Research Question

Are the psychometric qualities of the *Escala de Observação do Risco de Lesão da Pele em Neonatos* (EORLPN) adequate for the assessment of the risk of skin injury in neonates?

Methodology

The NSRAS was developed in 1997 by Barbara Huffines and Cynthia Logsdon in the United States. It is based on the Braden scale for the adult population but uses specific risk factors for the development of pressure injuries in neonates (Huffines & Logsdon, 1997).

The translation and validation of the scale for Portuguese newborns were authorized by the original authors. The English original version was translated into Portuguese by two translators: A (bilingual Portuguese-native official translator, specialized in the study area) and B (bilingual Portuguese-native translator, familiar with the study, as well as with the health area and psychometrics), resulting in two versions of the scale. Both versions were analyzed and back-translated, followed by the adjustment of the instrument. Afterward, it was returned to the authors for validation of the meanings of each item (semantic equivalence). We analyzed the deviations, made the necessary adjustments and submitted the instrument to an expert committee for validation. After this validation, the instrument was applied to a group of children with similar characteristics to those of the study population.

The instrument was applied by two professionals working in each neonatology unit, who had previously received training in workshops for the preparation of observers. Based on the analysis of both observers' results, we obtained a concordance greater than 80%, i.e. a good interrater reliability, which represents the stability of the EORLPN for the assessment of the risk of skin injuries in the same newborn and by different observers.

Data analysis and the factorial validity of the EORLPN were performed using the software IBM® SPSS® Statistics and AMOS® (v. 22, SPSS, An IBM Company, Chicago, IL). Sensitivity, validity, and reliability were estimated to assess the psychometric qualities of the scale. The assumptions of the confirmatory factor model, namely item sensitivity, were assessed using the skewness (g1) and kurtosis (g2) coefficients and their critical ratios. We considered that the items had psychometric sensitivity when the absolute values of skewness (g1) and kurtosis (g2) were below |3| and |7|, respectively (Marôco, 2010b).

Convergent validity was assessed through the average variance extracted by a factor considering that the factor model had validity when the six EORLPN items had factor loadings greater than 0.40.

Construct validity was assessed using factorial validity, with convergent validity (estimated by the average variance extracted - AVE) being considered suitable if AVE ≥ 0.50. The factorial validity of the model was assessed using confirmatory factor analysis, with maximum likelihood estimation, using the following empirical indexes of the quality of adjustment of the model: the chi-square divided by degrees of freedom ($\chi 2/df$) less than five, Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), Tucker-Lewis Index (TLI) greater than 0.90, and Root Mean Square Error of Approximation (RMSEA) less than 0.05 with P(RMSEA ≤ 0.05) greater than .05 (Marôco, 2010b).

The reliability of the EORLPN factor was estimated from the internal consistency of factor items using Cronbach's alpha coefficient. This estimate was based on the mean inter-item correlations, weighted by their variances, considering 0.70 as the acceptable reference value. We also considered that a composite reliability ≥ 0.70 and an average variance extracted (AVE) ≥ 0.50 were indicators of a reliable and valid construct (Marôco, 2010a; 2010b).

Data collection was authorized by the boards of directors, the ethics committees, and the legal guardians of children who participated in the study.

Taking into account that some authors believe that the ideal number is 10 to 20 observations per item (Sanada, Teles, & Marôco, 2014), the validation sample consisted of 131 observations, ensuring variability to estimate parameters, which is related to the number of observations per item.

The pre-validation study of the scale began with a pre-test of validity and reproducibility, which was conducted at a neonatology unit of a hospital in Lisbon. For the valida-

tion study of the scale, 13 neonatology units participated in data collection (10 to 11 observations per unit).

The EORLPN was applied as an observation scale between July 2014 and February 2015. Study participants were selected by a casual or convenience non-random sampling technique (Marôco, 2010a). The study included all infants who were hospitalized in neonatology units, aged 24 to 36 weeks of gestation, with a mean age of 31 weeks and a standard deviation (*SD*) of 3 weeks. Observed infants weighted between 510 and 3.490 grams; 59% were boys and 41% were girls. Infants who, at the time of admission, had some skin injury or any genetic skin disease were excluded from the study.

The EORLPN consists of six items: *general physical condition* (gestational age), *mental status*, *mobility*, *activity*, *nutrition,* and *moisture* (Table 1). Each item is measured on a 4-point ordinal scale (1 to 4). Item scores range from 6 to 24 points, with the lowest score representing a low risk of skin injury, and the highest score a high risk of skin injury.

Table 1
Descriptors of the Escala de Observação do Risco de Lesão da Pele em Neonatos

Itens	Opções de resposta			
Condição física geral	4. Idade Gestacional < 28 semanas	3. Idade gestacional > 28 semanas, mas < 33 semanas	2. Idade gestacional > 33 semanas, mas < 38 semanas	1. Idade gestacional > 38 semanas
Estado mental	4. *Completamente limitado*. Não responde a estímulos dolorosos, devido à redução do nível de consciência ou sedação ou ao desenvolvimento motor esperado para a idade gestacional (não se estremece, agarra ou geme, não há aumento da pressão arterial ou da frequência cardíaca).	3. *Muito limitado*. Responde apenas a estímulos dolorosos (estremece, agarra, geme, aumento da pressão arterial e frequência cardíaca).	2. *Ligeiramente limitado*. Letárgico/Hipotónico.	1. *Nenhuma limitação*. Desperto e Ativo.
Mobilidade	4. *Completamente imóvel*. Não faz qualquer alteração ligeira de posição do corpo ou das extremidades sem ajuda (com ou sem sedação).	3. *Muito limitada*. Capaz de fazer ligeiras alterações ocasionais do corpo ou das extremidades, mas incapaz de fazer alterações frequentes de forma independente.	2. *Ligeiramente limitada*. Capaz de fazer alterações frequentes, embora ligeiras, de posição do corpo ou extremidades de forma independente.	1. *Nenhuma limitação*. Capaz de fazer alterações frequentes e significativas de posição sem ajuda (por exemplo, virar a cabeça).
Atividade	4. *Completamente limitado à incubadora*. Está confinado à incubadora aquecida com humidade sem poder sair dela.	3. *Limitado à incubadora*. Está confinado à incubadora só saindo dela excecionalmente.	2. Ligeiramente limitada. Numa incubadora, mas pode ir ao colo, canguru, etc.	1. *Nenhuma limitação*. Num berço aberto.

Nutrição	4. *Muito pobre*. Nada "Per os" (fluidos endovenosos exclusivos).	3. *Inadequada*. Não recebe a quantidade ideal de dieta líquida para as necessidades (fórmula / leite materno) tendo de ser suplementada com fluidos endovenosos.	2. *Adequada*. Alimentação por sonda gástrica que permite satisfazer as necessidades nutricionais para o crescimento.	1. *Excelente*. Biberão/Amamentação em todas as refeições que satisfazem as necessidades nutricionais para o crescimento.
Humidade	4. *Constantemente húmida*. A pele está húmida sempre que a criança é manipulada ou posicionada.	3. *Húmida*. A pele está frequentemente húmida. Os lençóis têm que ser trocados pelo menos uma vez de 8/8 horas, devido a frequentes dejeções semilíquidas e/ou vómitos, bolsados.	2. *Ocasionalmente húmida*. A pele está ocasionalmente húmida. Requer uma troca de lençóis extra aproximadamente uma vez por dia, devido a algumas dejeções e/ou vómitos, bolsados.	1. *Raramente húmida*. A pele está geralmente seca, os lençóis apenas requerem ser mudados a cada 24 horas.

The item General physical condition characterizes the newborn according to gestational age. The more premature the child, the higher is the score (4. Gestational age < 28 weeks; 3. Gestational age > 28 weeks and < 33 weeks, 2. Gestational age > 33 weeks and < 38 weeks; 1. Gestational age > 38 weeks), reinforcing the fact that skin immaturity is a risk factor for skin injuries. The item Mental status rates the way in which the newborn responds to painful stimuli and discomfort, and it ranges from an inability to respond (in the case of sedation or any sensory dysfunction that limits the ability to feel and express pain; 4 points) to normal sensory perception (1 point). The decreased level of consciousness is directly or indirectly associated with sensory perception, mobility, and activity. Impaired perception of pressure-related discomfort caused by the state of alert that enables spontaneous movements, the use of physical restraints for safety reasons, or the use of sedatives, prevents pressure relief on the tissues in bony prominences, which poses a significantly increased risk of injury. The item Mobility assesses the newborn's ability to change body position, and the score may vary depending on the type of changes, ranging no changes to major and frequent changes in position without assistance. Mobility contributes to the physical/mental well-being and facilitates the pressure relief in bony prominences. The item Activity measures the infant's level of movement or physical activity, that is, whether the infant remains bound to the incubator or alternates periods in bed with periods being held/kangaroo, facilitating pressure relief in bony prominences. The item Nutrition is rated according to the infant's diet and feeding method. In this item, newborns whose oral skills are fully developed and who are exclusively bottle-fed are considered to be out of risk, and newborns whose nutritional needs are met through intravenous feeding are considered to be at high risk. Scores 3 and 4 apply to newborns who require mixed feeding methods and the use of medical devices for their daily calorie needs, which are associated with increased risk of injury. The item Moisture rates skin exposure to perspiration, urine or other fluids that may cause

skin damage. It is measured by the number of times that sheets and diapers are changed. Skin maceration and injury due to excessive moisture destroy the natural barrier of the epidermis, so urinary and fecal incontinence increase the risk of injury (Butler, 2007). Skin maceration caused by moisture may become worse in pressure zones, mainly related to the presence of tapes, beads and/or support devices.

Results

The sensitivity of NSRAS items was assessed using the measures of skewness (g_1) and kurtosis (g_2), and sensitivity was not compromised (values below |3| and |7|, respectively; Marôco, 2010a). Table 2 shows the values of descriptive statistics, median, minimum, maximum, measures of shape and corresponding critical ratios.

Table 2
Median (Me), Maximum (Max), Minimum (Min), measures of skewness (g_1) and kurtosis (g_2) and corresponding critical ratios (g_1/SEg_1; g_2/SEg_2), SE_{g1}=0.209; SEg_2=0.416; for the 6 NSRAS items (n = 131)

NSRAS Items	Me	g_1	g_1/SE_{g1}	g_2	g_2/SE_{g2}	*Min*	*Max*
Physical Condition	3.00	0.326	1.559	-0.801	1.925	2	4
Mental Status	1.00	1.040	4.976	-0.181	0.435	1	4
Mobility	2.00	0.113	0.540	-0.703	1.689	1	4
Activity	3.00	-0.773	3.698	-0.257	0.617	1	4
Nutrition	4.00	-0.888	4.248	-0.489	1.175	1	4
Moisture	2.00	0.296	1.416	-1.640	3.942	1	4

The Portuguese version of the NSRAS model has factor validity. The analysis of the standardized item estimate showed that factor loadings are close to or are higher than the reference value (0.4), with the Mobility item showing the lowest factor loading, 0.40 (β = 0.396; Table 3).

Table 3
Standardized factor loadings (β) of the NSRAS items obtained through confirmatory factor analysis

Items	Factor loadings (β)
Mental Status	0.670
Mobility	0.396
Activity	0.716
Nutrition	0.719
Physical Condition	0.630
Moisture	0.646

The goodness-of-fit indexes of the single-factor structure of the NSRAS support the model proposed by Huffines and Logsdon (1997). The model has a good quality of fit (χ^2 (8)b = 28.415; $p < 0.001$; $\chi^2/df = 3{,}55$; CFI = 0.959; GFI = 0.965; TLI = 0.923 and RMSEA = 0.099; P(RMSEA ≤ 0.05) < 0.001; n = 131; Figure 1).

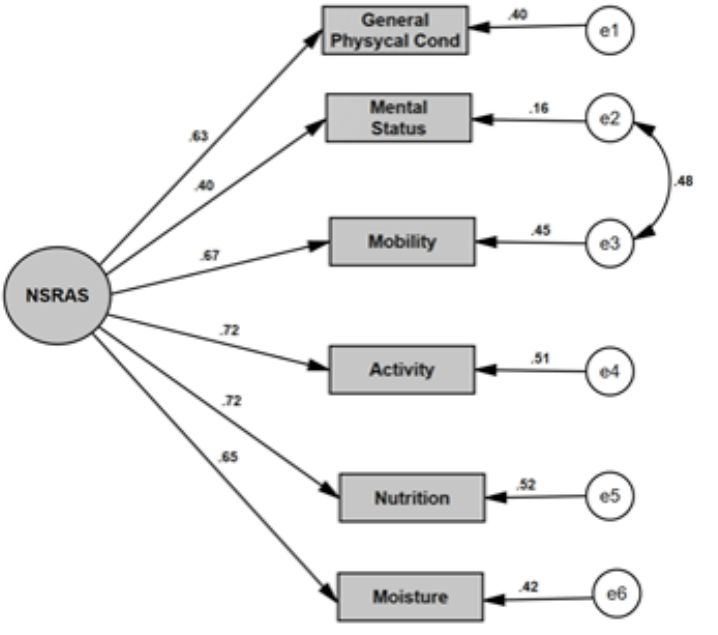

Figure 1. Single-Factor Confirmatory Model of the NSRAS adjusted to the sample of the validation study.

The estimated factor reliability of the NSRAS based on the mean inter-item correlations and weighted by their variances was calculated based on the Cronbach's alpha, whose value was acceptable (α = 0.787; Hill & Hill, 2009). Composite reliability (CR), which estimates the internal consistency of the items reflecting the factor or construct and indicates the extent to which these items consistently express the latent factor, was higher than the reference value (CR_{NSRAS} = 0.865). Based on this result, construct reliability was considered to be adequate. Convergent validity, which is estimated by the average variance extracted (AVE), occurs when items reflect the factor, and, as such, load heavily on this factor, which can be seen in the NSRAS items with AVE = 0.524, which is above the reference value (Marôco, 2010b).

Discussion

When compared to the original NSRAS, the NSRAS scale for Portuguese newborns has proved to be a valid and reliable tool to identify the risk of skin injury. The original NSRAS had a cut-off point of 13; in the group of Portuguese infants, data obtained with the NSRAS show an intermediate point between 16 and 18, with a mean value of 15 points (Mean = 15.36) and a standard deviation of 4 points (*SD* = 3.871), which confirms that the cut-off point for the Portuguese version of the NSRAS is 15.

The confirmatory factor analysis of the single-factor structure of the NSRAS showed good goodness-of-fit indexes which indicate a good fit of the model to data obtained from preterm infants. The factor reliability of the NSRAS was estimated by calculating Cronbach's alpha, and acceptable values were ob-

tained (Marôco & Garcia-Marques, 2006). In view of these results, we believe that this is a sensitive, valid, and reliable instrument for assessing the risk of skin injury in neonates.

The Portuguese Order of Nurses (*Ordem dos Enfermeiros*) identified some indicators to give visibility to the nursing care provided to patients. Three of these indicators are directly related to the scope of this article, namely: incidence and prevalence rates of pressure injuries, healthcare provider's acquisition of knowledge about prevention of pressure injuries, and healthcare providers' acquisition of skills to prevent pressure injuries. These indicators are sensitive outcomes that represent the contributions of nursing care (Ordem dos Enfermeiros, 2007). Through the use of a measuring instrument such as the NSRAS, some of these indicators can be derived and results can be compared to improve the quality standards in care delivery (Ordem dos Enfermeiros, 2001).

The cut-off points between high risk, moderate risk, and low risk were not analyzed, which can be considered as a limitation of the study.

Conclusion

The use of research results and the translation of these results into clinical practice is a reality, particularly in highly specialized areas. However, in caring for preterm infants' skin, health professionals require evidence-based practices focused on skin injury risk observation and monitoring, as well as systematized nursing interventions. The literature provides extensive information about maintaining the integrity of newborn's skin. Although risk assessment should guide care delivery and allow for the development of individualized, objective, and systematic care plan, skin care is not always performed.

In daily practice, skin assessment is merely descriptive, based on greatly subjective judgments depending on the professional assessing it. This causes discrepancies resulting from the observers' knowledge, and experience. So, in their daily practices, health professionals should use measuring instruments based on research results, in order to combine the general observation of the newborn with a more standardized and systematized observation which facilitates record consistency.

The NSRAS has good psychometric qualities and is suitable to be used in research and to facilitate the assessment of skin injury risk in newborns, allowing for a measurable assessment which translates into valuable information for decision-making, planning and implementation of preventive measures and treatment, and, consequently, facilitating the continuous improvement of the quality of care.

Future studies should analyze the cut-off points between high, moderate, and low risk for pressure injuries.

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