

Relation between the diagnosis of pressure injury risk and the Braden scale

Relação entre o diagnóstico Risco de lesão por pressão e a escala de Braden

Relación entre el diagnóstico Riesgo de lesión por presión y la escala de Braden

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ABSTRACT

Objective: to determine the frequency of the components of the nursing diagnosis of risk of pressure injury and their relation with the Braden scale. **Method:** in 2020 and 2021 this cross-sectional study performed a descriptive and analytical investigation of 105 patients in an intensive care unit who were at risk of developing pressure injury. The study was approved by the research ethics committee. **Results:** the risk factor, population at risk and associated condition with the highest frequencies were, respectively, reduced mobility (99.0%), extremes of age (39.0%) and anemia (46.7%). Patients who presented shear forces, history of stroke, physical immobility, impaired cognitive function, and sensory impairment scored lower on the Braden scale. **Conclusion:** use of a validated measurement scale and nursing diagnoses expands critical thinking in nursing about the reasons that heighten the risk of developing pressure injuries.

Descriptors: Intensive Care Units; Nursing Diagnosis; Pressure Ulcer; Risk Factors.

RESUMO

Objetivo: determinar a frequência dos componentes do diagnóstico de enfermagem Risco de lesão por pressão e sua relação com a escala de Braden. **Método:** estudo transversal desenvolvido entre 2020 e 2021 com 105 pacientes de uma unidade de terapia intensiva que estavam em risco de desenvolver lesão por pressão. Foi realizada análise descritiva e analítica. A pesquisa foi aprovada pelo Comitê de Ética em Pesquisa. **Resultados:** o fator de risco, população em risco e condições associadas mais frequentes foram redução da mobilidade (99,0%), extremo de idade (39,0%) e anemia (46,7%) respectivamente. Pacientes que apresentaram forças de cisalhamento, história de acidente vascular encefálico, imobilização física, alteração na função cognitiva e alteração na sensibilidade apresentaram menores pontuações na escala de Braden. **Conclusão:** a utilização de escalas validadas e diagnósticos de enfermagem ampliam o julgamento crítico do enfermeiro sobre os motivos que elevam o risco de desenvolvimento de lesão por pressão.

Descritores: Unidades de Terapia Intensiva; Diagnóstico de Enfermagem; Lesão por Pressão; Fatores de Risco.

RESUMEN

Objetivo: determinar la frecuencia de los componentes del diagnóstico de enfermería, Riesgo de lesión por presión y su relación con la Escala Braden. **Método:** estudio transversal llevado a cabo entre 2020 y 2021 junto a 105 pacientes de una Unidad de Cuidados Intensivos que estaban en riesgo de desarrollar lesión por presión. Se realizaron análisis descriptivo y analítico. El Comité de Ética en Investigación aprobó la investigación. **Resultados:** el factor de riesgo, población en riesgo y condiciones asociadas más frecuentes fueron reducción de la movilidad (99,0%), extremo de edad (39,0%) y anemia (46,7%). Pacientes que presentaron Fuerzas de cizallamiento, Historia de accidente vascular encefálico, Inmovilización física, alteración en la función cognitiva y alteración en la sensibilidad presentaron puntajes más bajos en la Escala de Braden. **Conclusión:** el uso de escalas validadas y diagnósticos de enfermería amplía el juicio crítico del enfermero en cuanto a los motivos que aumentan el riesgo de desarrollo de lesión por presión.

Descritores: Unidades de Cuidados Intensivos; Diagnóstico de Enfermería; Úlcera por Presión; Factores de Riesgo.

INTRODUCTION

Pressure Ulcer (PU) prevention is an important action to be taken in the health services, as its occurrence shows the quality of the assistance provided to the patients under their care. However, despite the scientific and technological advances, preventing the development of PUs is still a challenge for health institutions and professionals, especially for the Nursing team¹.

Health care quality is the foremost priority of any National Health Service. Data collection and interpretation are crucial for evaluating health procedures and processes, aiming to reduce morbidity among hospitalized patients and to assist in the process of continuous improvement of care and decision-making about the assistance-related actions². In Brazil, according to the National Report of Healthcare-related Incidents, in the period between January 2014 and July 2017,

Acknowledgements to the *Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão* (FAPEMA) and to the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES, Brazil).

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Scientific Editor: Cristiane Helena Gallasch

134,501 incidents were identified by the Patient Safety Centers and, of these, 23,722 (17.6%) were PU notifications, which, in this period, corresponded to the third most frequent type of event in the Brazilian health services³.

PU is defined as punctual damage in the skin and/or underlying tissue as a result of pressure or of pressure together with shearing forces. It involves harms to the skin soft tissues, including epithelial, dermal and subcutaneous tissues, such as fat or muscles. PU prevalence is especially high in long-term intensive care environments⁴.

Most of the times, patients that need to be admitted to an Intensive Care Unit (ICU) are in a highly complex clinical condition, which is aggravated by the need for technologically sophisticated equipment to manage a critical disease, predisposing them to the development of PUs⁵. Currently, the PU prevalence and incidence percentages in ICUs are from 10% to 25.9% and from 16.9% to 23.8%, respectively⁶. Age, prolonged hospitalization time, diabetes mellitus, cardiovascular diseases, hypotension, prolonged ventilatory mechanics and administration of vasoactive drugs are independent risk factors for the development of PU commonly found in ICUs⁷.

PU risk management is frequently performed with scales that track the most vulnerable patients and assist in identification and in nurses' decision-making. Quantifying the risk for PU through a formalized evaluation is considered an important stage in any PU prevention protocol, and its conduction is recommended in clinical practice guidelines⁴. In the United States, the scale commonly used for PU risk assessment is the Braden scale, which can be employed in all care settings, including ICUs⁵. In Brazil, this scale is also used and it strikes a balance between sensitivity and specificity, configuring itself as an excellent predictive instrument in the population in need of intensive care⁸.

Using scales that identify risks is a relevant care measure inherent to the Nursing team, representing an effective mechanism in the reduction of PU incidence⁸. However, the approach to patients at risk of developing a lesion should not be limited only to identification based on scales, but it must also involve planning for a reduction of the risk factors on an individual basis. The actual determination of the risk for PU is complex and, although it is possible to identify the most vulnerable patients for its occurrence, the empirical literature points out additional factors that increase the risk, not quantified in the current measuring instruments⁵.

Given this fact, it is important that nurses are attentive to the risk factors that can interfere in due maintenance of the skin's physiology. During care implementation, these professionals are able to distinguish which human response to health conditions/life processes, or certain vulnerability to such response, manifests itself in a given individual. The result is called Nursing Diagnosis (ND)⁹.

Among the existing diagnoses, Risk for pressure ulcer stands out, which was elaborated by Nursing researchers to cover the specificity of the risk factors for changes not only in the skin, but also in adipose, muscle and bone tissues that are frequently affected in PU cases¹⁰. Regarding this, a content validation study showed that, of the 19 risk factors present in the Risk for pressure ulcer ND, 18 were considered important causes for the development of lesions according to specialist nurses¹¹. It is believed that a more accurate diagnosis for this event exerts a direct influence on the choice of the most appropriate Nursing interventions to prevent PU occurrence¹⁰.

Given the above, it is verified that the use of different measuring instruments for the early detection of the risk for PU offers the possibility of improving prevention strategies. The use of risk prediction scales by nurses must be accompanied by clinical judgment of the responses presented by the patient, with the aid of the NDs, which will direct an individualized care plan in order to alleviate each factor that threatens skin's integrity, both systematically and supported by scientific evidence. Therefore, this study aimed at determining the frequency of the Risk for pressure ulcer Nursing diagnosis components and their relationship with the Braden scale.

METHOD

This is a cross-sectional study developed from February 2020 to January 2021, with patients at risk of developing PUs who were hospitalized in the intensive care units of a high-complexity hospital located in northeastern Brazil.

The following inclusion criteria were defined: being 18 years of age or older; being hospitalized in an ICU for adults, specifically, in the Surgical, Cardiology, General 01 or General 02 ICUs; within 48 hours of admission to the sector; and having a PU risk assessment with a score equal to or less than 16 in the Braden scale. According to the literature, this is the score in which adult patients already have a minimum risk for PU development¹². The following exclusion criteria were established: hemodynamically unstable patients, in whom the physical examination could aggravate their health status; having a medical diagnosis of brain death; or having PUs on admission to the sector.

Data collection was divided into two stages: initially, the patients were screened to identify which ones had a score equal to or less than 16 in the Braden scale, that is, risk of developing PUs. Afterwards, the patients and/or family members were invited to participate in the research and, after agreeing, they signed the free and informed consent form. Subsequently, the second moment was initiated, which consisted in conducting anamnesis and physical examination with the aid of a form created for this purpose. The evaluations were carried out preferably in the morning and during the bed bath, a time that provided an opportunity for evaluating the patient's skin and investigating possible installed PUs.

The statistical analysis was performed with the aid of the SPSS package, version 24.0 for Mac OS®. The data were organized in Microsoft Excel 2010. Relative and absolute frequency measures were presented in the univariate descriptive analysis. Mann-Whitney's U test was applied to assess the relationship between the Risk for pressure ulcer ND components and the Braden scale. A 5% ($p < 0.05$) level was adopted for statistical significance. In compliance with the recommendations set forth in Resolution 466/12 regarding research with human beings¹³, data collection was initiated after approval by the Research Ethics Committee of the Federal University of Maranhão.

RESULTS

A total of 105 participants were evaluated in this study, with their characterization presented in Table 1.

TABLE 1: Characterization of the patients at risk of PU in the Intensive Care Unit according to the sociodemographic data. São Luís, MA, Brazil, 2021.

Variables	N	%
Gender		
Male	64	61.0
Female	41	39.0
Age		
< 60 years old	33	31.4
≥ 60 years old	72	68.6
Race		
White	22	21.9
Black	15	14.3
Brown	40	38.1
Other	28	26.7
Smoking habit		
Never smoked	57	54.3
Smoking history	43	41.0
Current smoker	5	4.8
Alcoholism		
Social/Occasional drinker	66	62.9
Never drank	36	34.3
Drinks more than 3 times a week	3	2.9
Physical activity		
Does not practice physical activity	56	53.3
Practices less than 3 times a week	27	25.7
Practices at least 3 times a week	22	21.0
Previous treatment for Pressure Ulcer		
No	101	96.2
Yes	4	3.8
Reason for ICU admission		
Cardiovascular	53	50.5
Cerebrovascular/Neurological	18	17.1
Gastrointestinal	14	13.3
Other	12	11.5
Pulmonary	4	3.8
Genitourinary	3	2.9
Trauma (accidents and falls)	1	1.0

Source: The authors (2021)

There was predominance of male patients (61.0%), aged at least 60 years old (68.6%), brown-skinned (38.1%), who never smoked (54.3%), drank socially/occasionally (62.9%), did not practice physical activity (53.3%), had never being treated due to PUs (96.2%), and were hospitalized mainly for cardiovascular reasons (50.3%).

Table 2 shows the Risk for pressure ulcer Nursing Diagnosis components found in the sample evaluated.

TABLE 2: Distribution of the Risk factors, At-risk population and Associated conditions of the Risk for pressure ulcer diagnosis in patients hospitalized in the Intensive Care Unit. São Luís, MA, Brazil, 2021.

Risk for pressure ulcer Nursing diagnosis	N	%
Risk factors		
Decrease in mobility	104	99.0
Use of linen with insufficient moisture wicking property	80	76.2
Extended period of immobility on hard surface	47	44.8
Pressure over bony prominence	47	44.8
Inadequate nutrition	38	36.1
Dry skin	27	25.7
Overweight	26	24.8
Surface friction	26	24.8
Shearing forces	21	20.0
Smoking	11	10.5
Dehydration	5	4.8
Scaly skin	2	1.9
Hyperthermia	1	1.0
Incontinence	0	0.0
At-risk population		
Adults: Braden scale score < 17	105	100.0
Age extremes	41	39.0
Female gender	41	39.0
Weight extremes	20	19.0
Stroke history	7	6.7
Pressure Ulcer history	4	3.8
Associated conditions		
Anemia*	49	46.7
Impaired circulation	47	44.8
Pharmaceutical agent	37	35.2
Decrease in tissue perfusion	37	35.2
Alteration in cognitive functioning	26	24.8
Alteration in sensation	18	17.1
Edema	14	13.3
Cardiovascular disease	14	13.3
Physical immobilization	7	6.7
Decrease in serum albumin level*	7	6.7
Decrease in tissue oxygenation	2	1.9
Elevated skin temperature by 1-2°C	1	1.0

Source: The author (2021). *It was not possible to assess these variables in the entire sample because not all the subjects had laboratory tests at the time of collection.

The most frequent risk factors were Decrease in mobility (99.0%), Use of linen with insufficient moisture wicking property (76.2%) and Extended period of immobility on hard surface (44.8%). In relation to the at-risk populations, individuals with Age extremes (39.0%) and Female gender (39.0%) stood out. For having been established as an inclusion criterion, the Adults: Braden scale score < 17 variable was present in 100.0% of the sample. Regarding the conditions associated with the diagnosis, the most frequent were Anemia (46.7%), Impaired circulation (44.8%), Pharmaceutical agent (35.2%) and Decrease in tissue perfusion (35.2%).

The data presented in Table 3 show the relationship between the Risk factors, At-risk population and Associated conditions of the Risk for pressure ulcer diagnosis and the Braden scale.

TABLE 3: Relationship between Risk factors, At-risk population and Associated conditions of the Risk for pressure ulcer diagnosis and the Braden scale in patients hospitalized in the Intensive Care Unit. São Luís, MA, Brazil, 2021.

Clinical Indicators Risk for pressure ulcer	Braden scale		p-value*
	Present	Absent	
	Mean		
Risk factors			
Surface friction	12.69	13.77	0.209
Dehydration	13.60	13.50	0.575
Shearing forces	9.05	14.62	<0.001
Hyperthermia	8.00	13.56	0.133
Incontinence*	-	-	-
Inadequate nutrition	12.86	14.59	0.001
Scaly skin	15.00	13.48	0.543
Dry skin	12.41	13.88	0.050
Extended period of immobility on hard surface	12.85	14.03	0.042
Pressure over bony prominence	12.85	14.03	0.042
Decrease in mobility	13.49	15.00	0.743
Overweight	14.00	13.36	0.389
Smoking	14.55	13.38	0.067
Use of linen with insufficient moisture wicking property	13.43	13.76	0.385
At-risk population			
Age extremes	13.24	13.67	0.522
Weight extremes	13.00	13.62	0.521
Stroke history	9.57	13.79	0.001
Pressure Ulcer history	12.50	13.54	0.436
Female gender	13.24	13.67	0.195
Associated conditions			
Pharmaceutical agent	12.57	14.01	0.002
Alteration in cognitive functioning	9.00	14.67	<0.001
Alteration in sensation	9.56	14.32	<0.001
Anemia	13.67	13.75	0.866
Impaired circulation	13.28	13.69	0.489
Cardiovascular disease	13.64	13.48	0.679
Edema	11.79	13.77	0.037
Physical immobilization	8.57	13.86	<0.001
Decrease in tissue oxygenation	14.00	13.50	0.844
Decrease in tissue perfusion	12.97	13.79	0.135
Decrease in serum albumin level*	-	-	-
Elevated skin temperature by 1-2°C	8.00	13.56	0.133

Source: The author (2021).

*It was not possible to perform the analysis because no patient presented this variable.

The patients who presented Shearing forces ($p < 0.001$), Inadequate nutrition ($p = 0.001$), Prolonged period of immobility on hard surface ($p = 0.042$), Pressure on bony prominence ($p = 0.042$), Stroke history ($p = 0.001$), Pharmaceutical agent ($p = 0.002$), Alteration in cognitive functioning ($p < 0.001$), Alteration in sensation ($p < 0.001$), Edema ($p = 0.037$) and Physical immobilization ($p < 0.001$) obtained lower scores in the Braden scale when compared to those who did not present these variables.

DISCUSSION

In this study, most of the patients hospitalized in the Intensive Care Unit with some risk of developing PUs were men and aged 60 years old or more. In Brazil, a study conducted in Intensive Care Units identified higher occurrence of PUs in aged men⁸. Aged patients are more likely to present the Risk for pressure ulcer and Risk for impaired skin integrity NDs due to their level of dependence on care. The influence of factors such as decrease in mobility, mental confusion and use of diapers to contain incontinence deserves attention from the multiprofessional health team in terms of minimizing these risks¹⁴.

Cardiovascular problems were the main responsible for the ICU admission of the patients in this study, which corroborates another study in which 75% of the patients that developed PUs were also hospitalized due to

cardiovascular impairment⁸. A number of systematic review studies indicate that cardiovascular diseases and diagnoses related to oxygenation and/or perfusion are risk factors for the occurrence of PUs^{15,16}.

The Risk factors, At-risk population and Associated Conditions of the Risk for pressure ulcer ND that stood out in this research were Decrease in mobility, Age extremes and Anemia, respectively. Another study, which also evaluated the Risk for pressure ulcer ND, obtained 100% of Decrease in mobility and 86.6% of Age extremes in its sample. Reduced mobility in critically-ill patients can be associated with hemodynamic instability conditions, fractures, use of sedation, and use of monitoring and treatment devices⁵.

As for the Age extremes variable, it is common for PUs to be associated with advanced age, although it is important to emphasize that they can also affect young children and neonates⁹. In general, this population has impaired mobility and sensation and need help for changing body positions. In the case of older adults, the changes in the skin resulting from age represent an additional risk factor¹⁷.

Anemia is an associated condition that can favor changes in the oxygen dissociation curve, which increases the risk for tissue ischemia and contributes to the development of PUs. Therefore, patients with low hemoglobin levels are more susceptible to the occurrence of the lesion and may benefit from blood transfusions and supplements¹⁶.

When evaluating the relationship between the Risk for pressure ulcer ND risk factors and the values obtained in the Braden scale, statistically significant results were identified for Shearing forces, Inadequate nutrition, Prolonged period of immobility on hard surface and Pressure on bony prominence. According to the data obtained, the patients who presented the Shearing forces risk factor obtained lower values in the scale than those who did not have this factor, and the mean score obtained corresponds to the "very high risk" classification for the occurrence of PUs. Regarding this, a study carried out in Ethiopia, which evaluated PU prevalence in hospitalized patients, evidenced that those who presented impairment in the friction/shearing item in the Braden scale had 16.4 times more risk of developing PUs¹⁸.

To minimize the effect of the Shearing forces, the Nursing team performance is important in relation to the patient's correct positioning. Regarding this, a study pointed out that maintaining the bed headboard elevated at an angle of 30 degrees is an effective intervention for PU prevention. However, it was only prescribed by 9.6% of the nurses¹⁹.

In relation to the Inadequate nutrition risk factor, it was verified that the patients who presented this variable had a mean score in the Braden scale corresponding to the "high risk" classification. Diverse evidence in the literature point to the influence of nutrition on skin maintenance, PU occurrence and wound healing^{15,16,20}. A study carried out in a university hospital showed that caloric and protein intake was identified as an independent factor for the development of PUs and that the time for their occurrence in the group of patients who did not attain the nutritional goals was shorter when compared to those who did²¹. In these cases, performance of the multidisciplinary team, with collaboration between a nutritionist and a nurse, is important for the patient to achieve an adequate BMI, which contributes to the prevention of metabolic disorders and, consequently, to the onset of PUs²².

The patients in the current study who had the Prolonged period of immobility on hard surface risk factor tended to obtain lower values in the Braden scale, whose mean score corresponds to the classification of "high risk" for developing PUs. According to a systematic review study, immobility is a direct cause factor for PUs¹⁵. Another research study carried out in a medical clinic unit identified a statistical association between PU incidence and the "impaired physical mobility" and "decubitus change" variables²³.

It is important that the Nursing team repositions the patient periodically in intensive care units and records the action taken as a guarantee of support and care provided. Regarding this, a study carried out in an intensive care center verified that decubitus change was among the main prescriptions for Nursing actions that presented statistically significant results for the prevention of PUs. These actions promote pressure redistribution, mainly in areas with bony prominences¹⁹.

Another prevention measure found in the literature consists in using pneumatic mattresses and comfort cushions and in preventing the patients from staying on hard surfaces for long periods of time^{19,24}. Sustained pressure on bony prominences leads to tissue ischemia and to necrosis¹⁷. Therefore, it is believed that the data presented may explain the relationship between the Pressure over bony prominence risk factor and the mean score of "high risk" in the Braden scale for the development of PUs obtained in the current research.

When evaluating the At-risk population, it was observed that the patients with a Stroke history tended to present lower scores in the Braden scale, whose mean value corresponds to the "very high risk" classification. A study carried out in an ICU identified that, among the individuals that developed PUs, 58.3% had a diagnosis of Ischemic stroke and 8.3% had a diagnosis of Hemorrhagic stroke⁸. Generally, stroke results from the atherosclerotic cerebrovascular disease,

which causes poor perfusion that, together with the mobilization difficulty and side effects of medications, contribute to the occurrence of PUs, especially during the hospitalization period¹⁶.

With regard to the Associated conditions, the patients that used Pharmaceutical agents obtained lower values in the Braden scale than those who did not, and the mean score is equivalent to the “very high risk” classification for the occurrence of PUs. The use of certain medications can exert an influence on PU development, and the ones frequently listed in the literature are vasoactive and sedative drugs^{15,16}. Regarding this, a research study verified that the patients on deep sedation were the ones who most developed PUs²⁵. In addition, a number of researchers from Lebanon identified an association between administration of vasopressors/dopamine and PU occurrence²⁶. Vasoactive drugs are generally used in critically-ill patients with severe hemodynamic instability, and one of the main side effects is hypoperfusion caused in tissues due to vasoconstriction^{5,16}.

The patients that presented the Altered cognitive functioning and Altered sensation associated conditions had lower values in the Braden scale, and the mean score corresponds to the “very high risk” classification for the occurrence of PUs. Cognition is frequently impaired during the critical phase of a disease. Many critically-ill patients are comatose or delusional when admitted to the ICU, and those who are not present a high risk of developing cognitive impairment²⁷. Both mental/neurological status and sensory perception are considered predictors for PU occurrence¹⁵. In those cases in which one of these factors is impaired, the patient may need help for changing body positions.

The presence of edema is another variable that has been associated with the occurrence of PUs in patients hospitalized in an intensive care unit¹⁹; and the patients in this study who presented this variable had lower values in the Braden scale and were classified as at high risk for developing PUs. The occurrence of edema can be related to cardiac dysfunctions that might cause structural changes in the skin layers and promote PU development¹⁶. It is believed that this finding can also be justified by impaired mobility, infusion of large volumes of fluids and multiple organ dysfunctions, situations common in patients admitted to ICUs¹⁹.

In relation to Physical immobilization, the patients with this condition presented lower values in the Braden scale and the “very high risk” classification for the occurrence of PUs according to the mean score obtained. In the ICU, several phenomena are considered barriers to patient mobilization, ranging from clinical status, hemodynamic instability and fractures, to organizational and structural barriers, such as human and technological resources, as well as institutional habits and attitudes. Strategies that address the perceived barriers to mobilization, along with an interdisciplinary approach, are important components in prioritizing early mobilization²⁸.

This study was limited by the COVID-19 pandemic, as the study setting became one of the reference hospitals for the treatment of acute patients affected by COVID-19 in the state of Maranhão and, at the time, research activities were suspended between April and September 2020. As a difficulty, the scarcity of analytical studies in the literature that assess the association between the Nursing diagnoses related to PUs and other clinical components is highlighted, which hindered comparison of results in this context.

It is believed that this research can contribute to a better understanding of the causes that are related to PU occurrence, as well as it supports the nurses' best practices during the care provided to patients at risk of developing PUs. Research studies like these show the importance of the role of Nursing for patient safety through risk prevention, as well as they reinforce the nurses' perspective for the development of a care plan based on scientific evidence.

CONCLUSION

This study evidences that the use of validated scales for PU in consonance with Nursing diagnoses, especially Risk for pressure ulcer, enhances the nurses' critical judgment regarding the reasons that increase the risk of patients developing PUs. These findings shows the need for a systematized and individualized care plan focused on attenuating the agents responsible for the lower scores in the Braden scale.

By identifying which Risk Factors, At-risk population and Associated Conditions of the Risk for pressure ulcer ND are more frequent in patients admitted to intensive care units, there is a better understanding of which aspects can be modified by the Nursing team independently and which ones require the joint collaboration between nurses and the multidisciplinary team. Consequently, Nursing professionals can develop better practices and seek new ways of assertively ensuring care.

Therefore, it is worth emphasizing the importance of the Nursing perspective as an active member of the multidisciplinary team in managing a care plan that prevents PU occurrence and promotes the most appropriate care for each patient's needs, in addition to the use of its own terminology, such as Nursing diagnoses, which show evidence-based care.

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