

Nutritional profile of patients with pressure injuries in a university hospital**

Carla Ferreira Rodrigues Dias Barros^{1*} ,
Izabel Cristina Oliveira da Silva Joia¹ , Alessandra da Silva Pereira¹ 

ABSTRACT

Objective: To assess the nutritional profile of patients with pressure injuries admitted to a university hospital. **Method:** Quantitative, cross-sectional, observational, descriptive, field, and analytical study conducted from January to October 2024 with patients admitted to a university hospital in Rio de Janeiro. To assess nutritional status, data were collected from the medical records of adult and older patients admitted to the intensive care unit and inpatient units of a university hospital in Rio de Janeiro. The inclusion criteria were: patients with pressure injuries, admission to the intensive care unit or an adult inpatient unit, and age ≥ 20 years. Exclusion criteria were pediatric patients and patients with chronic wounds of other etiologies. **Results:** The study included 32 patients with pressure injuries, of whom 56% were female and 74% were older adults (≥ 60 years). According to body mass index classification, 22% were underweight, 19% had normal weight, and 19% had obesity; however, when the nutritional risk assessment instrument was applied, 81.8% were found to be at nutritional risk. Among the patients analyzed, 46.9% had a stage II sacral pressure injury, and 81.8% were at nutritional risk according to Nutritional Risk Screening (2002). Median C-reactive protein and hemoglobin levels were 85.30 mg/dL and 9.25 g/dL, respectively, indicating inflammation and anemia in the study group. **Conclusion:** The present study demonstrated a high nutritional risk and a high potential for inflammation and anemia among patients with pressure injuries admitted to a university hospital, which may worsen the pressure injury, prolong hospitalization, and/or adversely affect other patient outcomes.

DESCRIPTORS: Pressure injury. Nutritional status. Risk factors. Enterostomal therapy.

Perfil nutricional de pacientes com lesão por pressão em hospital universitário**

RESUMO

Objetivo: Avaliar o perfil nutricional de pacientes com lesão por pressão internados em um hospital universitário. **Método:** Estudo quantitativo, transversal, observacional, descritivo, de campo e analítico realizado de janeiro a maio de 2024, com pacientes internados em um hospital universitário do Rio de Janeiro. Para avaliar o estado nutricional, foram coletados dados dos prontuários de pacientes adultos e idosos internados na unidade de terapia intensiva e unidades de internação de um hospital universitário no Rio de Janeiro, de janeiro a outubro de 2024. Consideraram-se critérios de inclusão: portadores de lesão por pressão, internados na unidade de

¹Universidade Federal do Estado do Rio de Janeiro  – Rio de Janeiro (RJ), Brazil.

* Corresponding author: carla_belfort@hotmail.com

Section Editor: Renan Alves Silva 

Received: May 8, 2025 | Accepted: June 29, 2026

How to cite: Barros CFRD, Joia ICOS, Pereira AS. Nutritional profile of patients with pressure injuries in a university hospital. ESTIMA, Braz J Enterostomal Ther. 2026;24:1793. https://doi.org/10.30886/estima.v24.1793_IN

** Article origin: Extracted from the dissertation "Nutritional profile and perception of care provided by the multidisciplinary team in the treatment and prevention of pressure injuries in hospitalized patients", submitted to the Graduate Program in Nursing (Master's degree) at the Federal University of the State of Rio de Janeiro (UNIRIO), in 2025.

terapia intensiva e unidade de internação de adulto e idade ≥ 20 anos. Fatores de exclusão: pacientes pediátricos e com feridas crônicas de outras etiologias. **Resultados:** Participaram do estudo 32 pacientes com lesão por pressão, sendo 56% do sexo feminino e 74% idosos (≥ 60 anos). Segundo classificação do índice de massa corporal, 33% apresentaram baixo peso, 19,1% eutrofia e 47,9% obesidade, contudo, ao aplicar o instrumento para avaliar o risco nutricional, 81,8% encontraram-se em tal condição. Dos pacientes analisados, 46,9% apresentaram lesão sacra estágio II e 81,8% estavam em risco nutricional, segundo o *Nutritional Risk Screening* (2002). As medianas de proteína C-reativa foram 85,30 mg/dL e de hemoglobina 9,25 g/dL, indicando inflamação e anemia no grupo estudado. **Conclusão:** O presente estudo evidenciou elevado risco nutricional, alto potencial inflamatório e de anemia em pacientes com lesão por pressão internados em um hospital universitário, o que pode agravar o estado da lesão por pressão, aumentando o tempo de internação e/ou outros desfechos dos pacientes.

DESCRITORES: Lesão por pressão. Estado nutricional. Fatores de risco. Estomaterapia.

Perfil nutricional de pacientes con lesiones por presión en un hospital universitario **

RESUMEN

Objetivo: Evaluar el perfil nutricional de pacientes con lesiones por presión hospitalizados en un hospital universitario. **Método:** Estudio cuantitativo, transversal, observacional, descriptivo, de campo y analítico realizado de enero a octubre de 2024 con pacientes hospitalizados en un hospital universitario de Río de Janeiro. Para evaluar el estado nutricional, se recopilaron datos de las historias clínicas de pacientes adultos y personas mayores hospitalizados en la unidad de cuidados intensivos y en las unidades de hospitalización de un hospital universitario de Río de Janeiro. Se consideraron criterios de inclusión: pacientes con lesiones por presión, hospitalizados en la unidad de cuidados intensivos y en la unidad de hospitalización de adultos, y edad ≥ 20 años. Los criterios de exclusión fueron: pacientes pediátricos y pacientes con heridas crónicas de otras etiologías. **Resultados:** Participaron en el estudio 32 pacientes con lesiones por presión, de los cuales el 56% eran mujeres y el 74% personas mayores (≥ 60 años). Según la clasificación del índice de masa corporal, el 33% presentó bajo peso, el 19,1% peso normal y el 47,9% obesidad; sin embargo, al aplicar el instrumento para evaluar el riesgo nutricional, el 81,8% se encontraba en esta condición. De los pacientes analizados, el 46,9% presentó lesión sacra en estadio II y el 81,8% se encontraba en riesgo nutricional, según el *Nutritional Risk Screening* (2002). Las medianas de proteína C-reativa y hemoglobina fueron de 85,30 mg/dL y 9,25 g/dL, respectivamente, lo que indicó inflamación y anemia en el grupo estudiado. **Conclusión:** El presente estudio evidenció un elevado riesgo nutricional y un alto potencial inflamatorio y de anemia en pacientes con lesiones por presión hospitalizados en un hospital universitario, lo que puede agravar el estado de la lesión por presión, aumentar el tiempo de hospitalización y/o afectar otros desenlaces de los pacientes.

DESCRIPTORES: Lesión por presión. Estado nutricional. Factores de riesgo. Estomaterapia.

INTRODUCTION

The development of pressure injuries (PIs) has been considered an indicator of the quality of care provided to hospitalized patients with regard to the preservation of skin integrity, as well as an indicator of compromised patient safety. PIs represent an important challenge in patient care for healthcare professionals and health service managers¹. This public health problem is a concern for healthcare professionals and managers because of both its consequences for patients (pain, suffering, risk of infection, and prolonged hospital stay) and its implications for hospital management (increased length of stay and hospital costs)². In this context, the importance of multidisciplinary teams assessing, monitoring, and implementing early interventions should be emphasized³.

The current guideline for the prevention and treatment of PIs issued by the National Pressure Injury Advisory Panel (NPIAP, 2025)⁴ defines a pressure injury as “damage to the skin and/or underlying tissue resulting from pressure, which may be combined with shear, causing mechanical deformation of the soft tissues of the skin, including epithelial, dermal, and subcutaneous tissues and muscle”. The injury results from prolonged mechanical deformation between these soft tissues and rigid anatomical structures of bony prominences and support surfaces, such as mattresses, or from contact with medical devices. These factors are particularly exacerbated in patients with severe illnesses, advanced age, nutritional risk, and dependence on care^{5,6}.

Recent systematic reviews and meta-analyses have demonstrated a strong association between nutritional status and the incidence of PIs. Therefore, specific nutritional interventions may be strategic for the prevention or recovery of PIs. In this regard, assessing patients’ nutritional status upon hospital admission, as well as monitoring and implementing early interventions when necessary during hospitalization, is essential^{6,7}.

Protein deficiency and anemia are common in malnutrition and are associated with the development of PIs. In addition, protein-energy malnutrition causes several alterations in this process, including reduced T-cell function, phagocytic activity, antibody levels, scar tensile strength, and the body’s ability to protect the wound against infection, as well as changes in collagen synthesis. During the development of PIs, a highly catabolic response also occurs, in which all the aforementioned factors may contribute to their chronicity⁶.

Assessment of nutritional status is extremely important for preventing the development of injuries, since unintentional weight loss may occur, resulting in an increased risk of tissue breakdown and rendering the healing process ineffective. Thus, malnutrition is a relevant risk factor for the development of pressure injuries^{6,7}.

Nutritional care for hospitalized patients with PIs is of paramount importance to prevent nutritional deficiencies that may worsen the patient’s clinical condition, as well as to prevent several complications associated with hospital malnutrition. Few studies have assessed the nutritional status of hospitalized patients with PIs in university hospitals, which makes the present study relevant, considering the importance of these hospitals in the training of healthcare professionals.

OBJECTIVES

To assess the nutritional profile of patients with pressure injuries admitted to a university hospital.

METHODS

This was a quantitative, cross-sectional, observational, and descriptive study based on secondary data, conducted from January to October 2024 with patients admitted to a university hospital in the municipality of Rio de Janeiro. The university hospital provides care to adults and older adults and comprises five inpatient wards (two medical and three surgical wards), with a capacity of 82 beds, and an adult intensive care unit (ICU) with 10 beds, totaling 92 inpatient beds.

A convenience, non-probability, purposive sample was used and included patients with PIs who were hospitalized during the study period. The inclusion criteria were: having a PI, being admitted to the ICU or an adult inpatient unit, being 20 years of age or older, and presenting a PI at any stage. Exclusion criteria were pediatric patients and patients with chronic wounds of other etiologies.

Data were collected from patients’ electronic medical records with the support of a data collection instrument developed by the authors to systematize patient information, including age (years), sex (female, male), weight (kg), height (m), diagnosis, and clinical outcome.

Nutritional status assessment, performed by the nutrition service upon patient admission, was based on body mass index (BMI) (weight/height^2), classified according to the criteria established by the World Health Organization and considering the age group, as shown in Charts 1 and 2^{8,9}.

Chart 1. Body mass index classification for adults (18 to 65 years).

Classification	BMI range
Underweight	<18.5
Normal weight	18.5–24.9
Overweight	25–29.9
Obesity	≥30

BMI: body mass index.
Source: World Health Organization⁸.

Chart 2. Body mass index classification for older adults (over 65 years).

BMI range
BMI<22
22–27
BMI>27

BMI: body mass index.
Source: Lipschitz⁹.

Regarding nutritional status, nutritional risk assessment tools are also used during hospitalization to enable early intervention. At the hospital where the study was conducted, the Nutritional Risk Screening 2002 (NRS 2002)¹⁰ is used to identify malnutrition or the risk of malnutrition during hospitalization. NRS 2002 data were collected in the present study and classified as described in Chart 3¹⁰.

Chart 3. Nutritional risk classification according to Nutritional Risk Screening, 2002.

Nutritional risk	18	(56)
No nutritional risk	3	(9)
Malnutrition	1	(3)
No record	10	(32)

Source: Kondrup et al.¹⁰

The research protocol for this study was approved by the Research Ethics Committee under Opinion No. 6,579,055.

PIs were characterized according to their location and stage and classified as stages I to IV or unstageable, based on the European Pressure Ulcer Advisory Panel (EPUAP)¹¹.

Data were collected from the following laboratory tests routinely assessed at the institution: hemoglobin (g/dL), hematocrit (%), C-reactive protein (mg/dL), and albumin (g/dL). In addition, admission diagnosis, length of hospital stay (days), age (years), sex (male/female), type and route of nutritional support, nutritional supplementation (yes/no), bed confinement, and outcomes related to hospital discharge, palliative care, and death were investigated.

Data analysis: The collected data were organized in a Microsoft Excel Office 2019[®] spreadsheet and analyzed using Stata 13.1[®] statistical software. Variables were tested for normality using the Kolmogorov-Smirnov test. Descriptive analyses were performed, with measures of central tendency and dispersion, including mean, median, standard deviation, and interquartile range, according to data distribution, for continuous variables. Absolute and relative frequencies were presented for categorical variables.

RESULTS

Of the 92 patients admitted to critical and non-critical care units (ICU/IU), 32 were included in the study. Of these, 56% were female, and the largest proportion were older adults aged 61 to 80 years (47%). Patients with PIs

were predominantly admitted for oncological treatment (63%). The characteristics of the study participants are presented in Table 1.

Table 1. Characteristics of patients with pressure injuries admitted to a university hospital. Rio de Janeiro (RJ), Brazil, 2024.

Characteristics	n	(%)
Sex		
Male	14	(44)
Female	18	(56)
Age (years)		
20–40	4	(13)
41–60	4	(13)
61–80	15	(47)
81–100	9	(27)
PI location		
Sacral stage I	2	(6)
Sacral stage II	15	(47)
Sacral stage III	2	(6)
Unstageable	3	(9)
Sacral/heel	1	(3)
Sacral/malleolus	2	(6)
Sacral/skin tears	3	(9)
Intergluteal	3	(9)
Ischial	1	(3)
NRS 2002 score		
Nutritional risk	18	(56)
No nutritional risk	3	(9)
Malnutrition	1	(3)
No record	10	(32)
BMI classification		
Underweight	7	(22)
Overweight	4	(13)
Normal weight	6	(19)
Class 1 obesity	1	(3)
Class 2 obesity	1	(3)
Malnutrition	3	(9)
No record	10	(31)
Reasons for hospitalization (disease)		
Oncological	20	(63)
Pulmonary	6	(19)
Renal	1	(3)
Hepatic	1	(3)
Muscular	2	(6)
Neurovegetative	2	(6)
Patient outcome		
Hospitalized	21	(66)
Discharged	1	(3)
Palliative care	4	(12)
Death	6	(19)

PI: pressure injury; NRS: Nutritional Risk Screening; BMI: body mass index.
Source: Authors, 2024.

Stage 2 injuries predominated, particularly in the sacral region, resulting from lack of repositioning in bed, in 15 (47%) cases, indicating superficial tissue damage with partial-thickness skin loss involving the epidermis and dermis.

Nutritional risk screening using the NRS 2002 tool identified 18 patients (56%) as being at nutritional risk. However, it should be noted that nutritional risk data were unavailable for 10 patients, demonstrating weaknesses in the nutritional care of hospitalized patients with PIs. According to BMI classification, 7 patients were underweight (33%), 6 were classified as having normal weight (19%), and 4 as overweight (13%).

Regarding the outcomes observed among these patients, 21 (66%) remained hospitalized for treatment of their underlying conditions and complications, 6 (19%) died, and 4 (12%) were transitioned to palliative care, whereas only 1 (3%) was discharged from the hospital with improvement in both the health condition and the skin injury.

Regarding the data measured during hospitalization, the median patient weight was 57.50 kg (quartile 1=50; quartile 3=78), with a mean height of 1.66 m (quartile 1=1.56; quartile 3=1.73). Regarding BMI classification, which contributes to the identification of obesity and malnutrition, the median was 22.58 (quartile 1=16.76; quartile 2=29), indicating normal weight.

Nutritional assessment based on biochemical tests showed low values for all parameters: median hemoglobin remained around 9.25 ± 2.13 g/dL, hematocrit around 27.20 ± 6.75 g/dL, and serum albumin around 2.85 ± 0.56 g/dL.

C-reactive protein (CRP) showed elevated mean values according to criteria for inflammation and infection, at approximately 85.3 ± 119.11 mg/dL. The anthropometric criteria and laboratory findings for these patients are presented in Table 2.

Table 2. Anthropometric and biochemical profile of hospitalized patients with pressure injuries. Rio de Janeiro (RJ), Brazil, 2024.

Variables	Median	IQR	Minimum	Maximum
Weight (kg)	57.50	28.00	40	105
Height (m)	1.66	0.17	1.42	1.80
BMI (kg/m ²)	22.58	12.24	14.50	37.20
HB (g/dL)	9.25	2.80	6.10	15.01
HCT (%)	27.20	6.80	17.90	44.90
CRP (mg/dL)	85.30	177.60	5.00	427.00
Albumin (g/dL)	2.85	1.00	2.20	4.00

BMI: body mass index; HB: hemoglobin; HCT: hematocrit; CRP: C-reactive protein; IQR: interquartile range.

Source: Authors, 2024.

DISCUSSION

As shown in the present study, patients with PIs were predominantly oncology patients, had inflammatory conditions and anemia, and were at increased risk of malnutrition. Missing data were also identified in the medical records, particularly regarding nutritional status, which may have contributed to poorer patient outcomes.

Among the patients in this study, 6 (19%) died and 4 (12%) remained under palliative care, alongside catabolic progression, nutritional risk, and a severe risk of PIs. Regarding lesion location, stage 2 injuries in the sacral region were the most frequent, occurring in 15 (47%) patients, while 6 (19%) had multiple lesions, including medical device-related injuries to the earlobe and skin tears. According to the National Pressure Ulcer Advisory Panel (NPUAP®) classification, stage II predominated among all injuries, accounting for 15 (47%) cases, with partial-thickness skin loss and exposed dermis. Skin tears were classified according to the Skin Tear Audit Research (STAR®) classification system as type 2, with partial flap loss, and type 2b, in which a friction-related injury developed and the flap could not be realigned to its normal anatomical position^{12,13}.

Other studies conducted in Brazil have reported findings that corroborate the epidemiological profile of skin injuries identified among hospitalized patients in the present study, with the sacral region being the most frequently affected site. This region is highly susceptible to PIs because patients commonly remain in the supine position while in bed¹⁴.

The oncological profile predominated among patients with PIs (63%), precisely among those more frequently undergoing surgical procedures, prolonged hospital stays, and palliative care and, therefore, more susceptible to risk factors associated with the development of these injuries. These patients require comprehensive care from an interdisciplinary team. Moreover, patients with advanced cancer are particularly prone to developing PIs because of impaired mobility and the loss of nutrients and proteins caused by hypermetabolism and cancer cachexia.

Another aggravating factor was advanced age, which is associated with typical physiological changes, such as delayed granulation, collagen fiber cross-linking, and poor vascularization, thereby reducing skin resistance^{14,15}.

Some studies have reported different findings; however, over the past decade, a shift has been observed in the population profile of patients affected by PIs, from those with cardiopulmonary diseases to oncology patients, in agreement with the findings of the present study¹⁴⁻¹⁶.

Malnutrition is a phenomenon that affects people with cancer, highlighting the importance of prevention, early identification of patients at nutritional risk, and nutritional diagnosis to guide intervention, monitoring, and follow-up aimed at reducing the occurrence of malnutrition and its consequences. Patients should be assessed continuously and concurrently by the nutritional care team, always in a timely, proactive, and responsive manner¹⁷.

Alhaug et al.¹⁸, who also used the Nutrition Risk Screening 2002 (NRS 2002 tool), evaluated 32 hospitalized patients and found that those at risk of malnutrition had a 3% greater likelihood of developing pressure injuries. It should be emphasized that PI severity is directly associated with malnutrition, particularly among bedridden older adults with cancer, as observed in the present study.

Among patients with PIs, those older than 60 years predominated (75%). In these patients, skin aging involves changes in the stratum corneum related to keratinocytes, lipid content, hydration, pH, and sebum production, leading to skin dryness, a phenomenon known as xerosis. In addition, reduced cellular synthesis and functional capacity occur, resulting in skin atrophy and disruption of the dermal structure, ultimately producing thinner skin with a reduced capacity for renewal^{18,19}.

A study conducted by Bernardes et al.²⁰ corroborates these findings, demonstrating the need to assess nutritional status and hydration when evaluating the risk of patients with PIs.

The nutritional screening tool used for the early identification of patients at nutritional risk (NRS 2002) was not fully implemented, as 10 (32%) patients with PIs had no corresponding record in their electronic medical records, indicating shortcomings in nutritional diagnosis and treatment. Of the total sample, 18 (56%) were already at nutritional risk and 3 (9%) were malnourished, indicating deterioration in nutritional status. Outcomes related to complications of the underlying diseases were unfavorable, with associated skin injuries.

A malnourished patient is not defined solely by a low BMI, as demonstrated by the median BMI of 22.58 kg/m², which was within the normal range. Alongside the underlying disease, laboratory abnormalities were observed, with low levels of all nutritional markers and elevated CRP. Hypoalbuminemia is associated with tissue edema and reduced resistance to infection, favoring the chronicity of injuries. Therefore, consideration of these factors is essential for nutritional intervention.

Study limitations

The limitations of the study include missing data in the medical records, particularly because this study was based on secondary data.

Recommendations

The present study highlighted the need to improve adherence to hospital protocols, as well as the proper completion of medical records, allowing for more robust data on hospitalized patients, particularly in university hospitals. Nutritional risk screening is also recommended as a routine practice for patients with PIs in order to prevent complications and outcomes such as prolonged hospital stay, clinical deterioration, and even death.

CONCLUSION

The present study showed that patients with PIs are affected by nutritional risk, demonstrating the importance of assessing the nutritional status of these patients, particularly in a university hospital whose mission includes the training of new healthcare professionals. Further studies are needed, particularly those using primary data and longitudinal designs.

Acknowledgments: Not applicable.

Author contributions: CFRDB: conceptualization, data curation, writing, original draft, investigation, methodology, resources, software, visualization. ASP: project administration, writing, review and editing, funding acquisition, supervision. ICOSJ: formal analysis, writing, review and editing, validation.

Research data availability: All data were generated or analyzed in the present study.

Funding: This article received funding from the Coordination for the Improvement of Higher Education Personnel (CAPES), Brazil, Finance Code 001, in accordance with Ordinance No. 206 of September 4, 2018. Process No. 88887.809275/2023-00.

Conflict of interest: None declared.

Research ethics committee approval: Approved by the Research Ethics Committee of the Gaffree and Guinle University Hospital/Federal University of the State of Rio de Janeiro (HUGG/UNIRIO), under Opinion No. 6,579,055 and Certificate of Presentation for Ethical Consideration No. 75848223.6.0000.5258.

REFERENCES

1. Kottner J, Cuddigan J, Carville K, Balzer K, Berlowitz D, Law S, et al. Pressure ulcer/injury classification today: an international perspective. *J Tissue Viability*. 2020;29(3):97-203. <https://doi.org/10.1016/j.jtv.2020.04.003>
2. Ferreira EC. Gestão da prevenção de lesões de pele intra hospitalares. São Paulo: Câmara Brasileira do Livro; 2022.
3. Botelho LS, Arboit EL, Freitag VL. Nurses' performance in the care of the prevention and treatment of pressure injuries. *Res Soc Dev*. 2020;9(7):e775974644. <https://doi.org/10.33448/rsd-v9i7.4644>
4. National Pressure Injury Advisory Panel. International Guideline. 4th ed. Schaumburg: NPIAP; 2025.
5. Brasil. Ministério da Saúde. Protocolo de assistência nutricional para cicatrização de feridas. Brasília: Empresa Brasileira de Serviços Hospitalares; 2020.
6. Chen B, Yang Y, Cai F, Zhu C, Lin S, Huang P, et al. Nutritional status as a predictor of the incidence of pressure injury in adults: a systematic review and meta-analysis. *J Tissue Viability*. 2023;32(3):339-48. <https://doi.org/10.1016/j.jtv.2023.04.005>
7. Ortiz S, Dourado CP, Sanches FLZ. Perfil epidemiológico, clínico e nutricional de pacientes com lesão por pressão de um hospital público de Campo Grande-MS. *Fag Journal of Health*. 2020;2(2):231-43. <https://10.35984/fjh.v2i2.207>
8. Estado físico: o uso e a interpretação da antropometria. Relatório de um comitê de especialistas da OMS. Série de Relatórios Técnicos da Organização Mundial da Saúde. 1995;854:1-452. PMID: 8594834.
9. Lipschitz DA. Screening for nutritional status in the elderly. *Prim Care*. 1994;21(1):55-67. PMID: 8197257.
10. Kondrup J, Rasmussen HH, Hamberg O, Stanga Z; Ad Hoc ESPEN Working Group. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. *Clin Nutr*. 2003;22(3):321-36. [https://doi.org/10.1016/s0261-5614\(02\)00214-5](https://doi.org/10.1016/s0261-5614(02)00214-5)
11. European Pressure Ulcer Advisory Panel. National Pressure Injury Advisory Panel. Pan Pacific Pressure Injury Alliance. Prevenção e tratamento de lesões/úlceras por pressão. Guia de consulta rápida. (edição Portuguesa). Australia: Emily Haesler; 2019.
12. Cass AR, Charlton KE. Prevalence of hospital-acquired malnutrition and modifiable determinants of nutritional deterioration during inpatient admissions: a systematic review of the evidence. *J Hum Nutr Diet*. 2022;35(6):1043-58. <https://doi.org/10.1111/jhn.13009>

13. McClave SA, Taylor BE, Martindale RG, Warren MM, Johnson DR, Braunschweig C, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr.* 2016;40(2):159-211. <https://doi.org/10.1177/0148607115621863>
14. Martins AFM, Peres AA, Campos CS, Santos KB. Perfil epidemiológico de lesões cutâneas crônicas de pacientes internados. *Ver Enferm UFPE.* 2021;15:e244519. <https://doi.org/10.5205/1981-8963.2021.244519>
15. Cascão TRV, Rasche AS, Di Piero KC. Incidência e fatores de risco para lesão por pressão em unidade de terapia intensiva. *Rev Enferm Atual In Derme.* 2019;87(25):1-8. <https://doi.org/10.31011/reaid-2019-v.87-n.25-art.204>
16. Lima AR, Palmer CR, Nogueira PC. Fatores de risco e intervenções preventivas para lesão por pressão em pacientes oncológicos. *Estima Braz J Enterostomal Ther.* 2021;19:e1021. https://doi.org/10.30886/estima.v19.1005_IN
17. Pachá HHP, Faria JIL, Oliveira KA, Beccaria LM. Pressure ulcer in intensive care units: a case-control study. *Rev Bras Enferm.* 2018;71(6):3027-34. <https://doi.org/10.1590/0034-7167-2017-0950>
18. Alhaug J, Gay CL, Henriksen C, Lerdal A. Pressure ulcer is associated with malnutrition as assessed by Nutritional Risk Screening (NRS 2002) in a mixed hospital population. *Food Nutr Res.* 2017;61(1):1324230. <https://doi.org/10.1080/16546628.2017.1324230>
19. Gonçalves F, Cabral S, Moreira AP, Cunha J, Magalhães B. Characterization and monitoring of nutritional risk and nutritional status in oncological patients admitted to an oncological surgery unit: a longitudinal study. *Clin Nutr ESPEN.* 2023;57:637-46. <https://doi.org/10.1016/j.clnesp.2023.08.015>
20. Bernardes RM. Construção, validação e implementação de um recurso educacional online para prevenção e manejo da lesão por pressão [tese]. Ribeirão Preto: Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto; 2019.