Original Article
doi: https://doi.org/10.1590/1983-1447.2024.20230086.en

Association between clinical characteristics of patients with pressure ulcer in the COVID-19 pandemic

Associação entre as características clínicas de pacientes com lesão por pressão na pandemia por COVID-19

Asociación entre características clínicas de pacientes con úlcera por presión en la pandemia de COVID-19

Taline Bavaresco[a]
Dóris Baratz Menegon[b]
Andréia Barcellos Teixeira Macedo[b]
Raquel Yurika Tanaka[b]
Angela Enderle Candaten[b]

How to cite this article:
Bavaresco T, Menegon DB, Macedo ABT, Tanaka RY, Candaten AE. Association between clinical characteristics of patients with pressure ulcer in the COVID-19 pandemic. Rev Gaúcha Enferm. 2024;45:e20230086. doi: https://doi.org/10.1590/1983-1447.2024.20230086.en

ABSTRACT

Objective: To analyze the associations between the clinical characteristics of patients hospitalized with pressure injuries (PI) during the COVID-19 pandemic.

Method: Cross-sectional study of 237 PI notifications in a hospital in southern Brazil. Collection took place in 2021 in an institutional management program, with interlocution to the patient's medical record. Analysis using descriptive statistics, Student's t-test, Pearson's chi-square and Wilcoxon.

Results: The mean age was 59.4±14.4 years, with 59.7% male, 74.7% diagnosed with COVID-19. High risk (57.8%), stage 2 (80.2%), sacral region, intergluteal/gluteal region (73.0%) were predominant and death was the prevalent outcome (51.1%), with a median of 9.5 (0-217) days after notification. There was no association of death with diabetes, systemic arterial hypertension, smoking and reason for hospitalization.

Conclusion: The association between the clinical characteristics of hospitalized patients with pressure injuries reflects the systemic inflammation of patients affected by COVID-19.

Descriptors: Pressure ulcer. COVID-19. Nursing. Nursing care. Serial cross-sectional studies.

RESUMO

Objetivo: Analisar as associações entre as características clínicas de pacientes hospitalizados com lesão por pressão durante a pandemia por COVID-19.

Método: Estudo transversal realizado com 237 notificações de lesão em um hospital no sul do Brasil. A coleta ocorreu em 2021 em um programa de gerenciamento institucional, com interlocução ao prontuário. Análise descritiva, teste T de Student, qui-quadrado de Pearson e Wilcoxon.

Resultados: A idade média foi de 59,4±14,4 anos, com 59,7% do sexo masculino, 74,7% com diagnóstico de COVID-19. O alto risco (57,8%), estágio 2 (80,2%), região sacral, interglúteos/glúteos (73,0%) foram predominantes e o óbito foi o desfecho prevalente (51,1%), com mediana de 9,5 (0-217) dias, após a notificação. Não houve associação de óbito com diabetes, hipertensão arterial sistêmica, tabagismo e motivo de internação.

Conclusão: As características clínicas de pacientes hospitalizados com lesão por pressão refletem a inflamação sistêmica do paciente acometido por COVID-19.

Descritores: Lesão por pressão. COVID-19. Enfermagem. Cuidados de enfermagem. Estudos transversais seriados.

RESUMEN

Objetivo: Analizar las asociaciones entre las características clínicas de los pacientes hospitalizados con lesiones por presión (IP) durante la pandemia de COVID-19.

Método: Estudio transversal de 237 notificaciones de IP en un hospital del sur de Brasil. La colecta se realizó en 2021 en un programa de gestión institucional, con interlocución a la historia clínica del paciente. Análisis con estadística descriptiva, test t de Student, chi-cuadrado de Pearson y Wilcoxon.

Resultados: La edad media fue de 59,4±14,4 años, con 59,7% de varones, 74,7% diagnosticados de COVID-19. Predominaron el riesgo alto (57,8%), estadio 2 (80,2%), región sacra, región interglútea/glútea (73,0%) y la muerte fue el resultado prevalente (51,1%), con una mediana de 9,5 (0-217) días después notificación. No hubo asociación de muerte con diabetes, hipertensión arterial sistémica, tabaquismo y motivo de hospitalización.

Conclusión: La asociación entre las características clínicas de los pacientes hospitalizados con lesiones por presión refleja la inflamación sistémica de los pacientes afectados por COVID-19.

Descriptores: Úlcera por presión. COVID-19. Enfermería. Cuidados de enfermería. Estudios transversales seriados.

[a] Universidade Federal do Rio Grande do Sul. Escola de Enfermagem. Departamento de Enfermagem Médico-Cirúrgica. Porto Alegre, Rio Grande do Sul, Brasil.

[b] Hospital de Clínicas de Porto Alegre. Comissão de Prevenção e Tratamento de Feridas. Porto Alegre, Rio Grande do Sul, Brasil.

INTRODUCTION

Pressure ulcer (PU) is an adverse event to which hospitalized patients are more susceptible and which can lead to partial or total tissue destruction[1]. It is localized damage to the skin or underlying soft tissue, often over a bony prominence, which may also be related to medical equipment and other devices and which occurs after intense or prolonged pressure, or due to the sum of other factors such as shear, humidity, nutrition and mobility[2].

In the literature, there are variations in the incidence and prevalence rates due to the sociodemographic and clinical profile of patients and the quality of care provided. The mortality rate is 2 to 6 times higher in patients with PU compared to deaths caused by other complications in the pre-pandemic period[3]. In Brazil, the National Health Surveillance Agency (ANVISA) reveals that PUs represented 20% of the total notifications of health-related incidents in the 2014-2022 period[4], that is, they were the second most reported event, in contrast to countries such as the United States, Australia and New Zealand, where the incidence was less than 10% in the pre-pandemic period[5,6].

However, with the emergence of the COVID-19 pandemic, there was a rapid increase in the number of critically ill patients in the Intensive Care Unit (ICU). Many of these patients spent more time on mechanical ventilation, under sedoanalgesia and prolonged neuromuscular blockade, which led to a longer period of physical immobility and vascular impairment, need for prone positioning and the use of multiple health care devices[7]. Hence, these changes make patients unstable, with reduced level of tissue oxygenation, longer hospital stay and difficulties in repositioning, leading to more susceptibility to the development of pressure ulcers. In this context, there is evidence of an increase in the incidence of PU, ranging from 42% to 77%[8-10], which demands from health professionals, evaluation, follow-up and monitoring of indicators that involve patient safety and that impact the quality of institutional care for the prevention and treatment of PU[4].

Consequently, nurses are supposed to classify the stage of PUs, recognize their characteristics and causal factors to implement appropriate treatment, especially because of the pandemic situation. Given this recent scenario and because PUs worsen rapidly, presumably due to microvascular thrombosis caused by the SARS-CoV-2 virus[11], the National Pressure Injury Advisory Panel (NPIAP)[2]reported that patients with COVID-19 have a different profile, and this is a risk factor for the development of PU[12].

Nurses must have a deeper understanding of this new profile. Also, many professionals were allocated to critical areas during this period, with inconsistencies in the implementation of continuing health education. This scenario may also have impacted care management, both in the prevention and treatment of PU in the midst of the pandemic[7]. In view of this, there was greater demand and strengthening of multidisciplinary wound prevention and treatment committees, to minimize the impact of PU on patients and the care team, especially nursing, by updating institutional protocols, developing research, optimizing resources and technologies, training on new materials and inputs acquired by institutions, on a large scale and without prior evaluation, and by professionals aiming to offer qualified assistance[13,14].

In view of the above, understanding the profile of patients at risk of developing PU demands clinical reasoning from nurses in the management of care, especially in the recent pandemic context, aiming to better understand how this event occurs and what are its determining risk factors and its associations. As a result, nursing professionals will be better prepared to provide the necessary care to face this adverse event, contributing to a more in-depth discussion in the scientific community with more assertive protocols for both patients diagnosed and not diagnosed with COVID-19.

The following research question was formulated for this study: "Is there an association between the clinical characteristics of patients hospitalized with PU during the COVID-19 pandemic"? To answer this question, the study aimed to analyze the associations between the clinical characteristics of hospitalized patients with pressure injuries during the COVID-19 pandemic.

METHOD

This is a cross-sectional, retrospective study with a quantitative approach, following the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

The study was carried out at the Wound Prevention and Treatment Committee (CPTF) of a large, public teaching hospital in southern Brazil. During the COVID-19 pandemic, due to the exponential increase in the number of critically ill patients, an emergency and temporary expansion from 39 to 105 new ICU beds was necessary in the Institution.

In such a scenario, the risk for developing PU is stratified with the use of the Braden Scale. This scale is composed of six subscales: sensory perception, humidity, activity, mobility, nutrition, friction and shear. Regarding the risk for patients,

the score is as follows: no risk from 19 to 23 points; low risk, 15 to 18 points; moderate risk, 13 to 14 points; high risk, from 10 to 12 points and very high risk < 9 points)[2]. Based on this, nurses in each sector can perform a clinical assessment of the patients and record this risk prediction routinely, following the institutional protocol, and reporting the occurrence of PU.

Thus, in the study population there were 778 notifications of PU registered in the institution's computerized system and managed by the CPTF of adult patients admitted to the ICU, in the inpatient and emergency units, in 2021. To constitute the sample, a calculation was made using Programs for Epidemiologists for Windows (WinPEPI), version 11.65, considering a confidence level of 95%, margin of error of 5% and which was based on the number (632) of notifications in 2020. Convenience sampling was used, with analysis of records from January to April 2021, totaling 237 PU notifications. For the calculation, the percentage of losses was not considered and incomplete medical records were also analyzed, using the available information, with relevant statistical adjustments for the use of the data.

Reports of PU from patients aged 18 years or over, with PU of hospital origin, classified as stages 2, 3, 4, deep tissue and unclassifiable, were included. Notifications of community-based PUs, of stage 1 and hospital origin were excluded, as it is not considered a care indicator.

Data collection was carried out with the use of an institutional PU notification management program, which is linked to the patient's medical records and organized in the Excel program (Microsoft Office 2013), version 15.0. The instrument was created by the researchers and is composed of the patient's sociodemographic characteristics (age, gender), hospitalization details (time, sector, reason and outcome), clinical variables (nutritional status, comorbidities, biochemical tests and inflammatory markers and risk classification for PU, according to the Braden Scale) and description of the PU (location, stage and evolution). The data was collected by the research team, after a training meeting and alignment of the electronic medical record collection, between January and May 2022, in the room designated for the CPTF.

Statistical analysis was carried out using the Statistical Package for Social Science for Windows (SPSS), version 27.0, in a descriptive way of continuous variables (in the case of normal distribution) such as mean and standard deviation and asymmetric variables, such as median and range interquartile. The association of variables was verified using Student's t test for independent samples and paired t test for before and after comparisons of variables, according to their distribution. Pearson chi-square test was used for categorical data, and Wilcoxon test was used for asymmetric variables, considering a significance level of 5% ($p< 0.005$). and the Wilcoxon test was used for asymmetric variables, considering a significance level of 5% ($p < 0.005$).

The study was carried out in accordance with Resolution 466/2012 of the National Health Council[15] and approved by the institution's Ethics and Research Committee under Protocol No 5,140,116. The Consent Form was signed by the patients, in accordance with the General Data Protection Law for participation in research.

RESULTS

The study included 237 PU notifications from patients admitted in 2021, during the COVID-19 pandemic, based on an institutional management program for PU notifications.

Patients were on average 59.4±14.4 years old, and most were male (59.7%).The median for length of hospital stay was 30(4-337) days, and the time elapsed from hospital admission to notification of PU was 15 (1-53) days.

Most patients were admitted to the ICU (78.5%) and the reason for hospitalization was COVID-19 in 74.7% of the cases. Regarding clinical characteristics, obesity was present in 41.4% of the sample, followed by overweight in 34.6% and systemic arterial hypertension in 57.4%. Regarding clinical characteristics, obesity was present in 41.4% of the sample, followed by overweight in 34.6% and systemic arterial hypertension in 57.4%. Death was the prevalent outcome, following PU notification, in 51.1% of the patients (Table 1). The patients who died had a median lifespan after PU notification of 9.5 (0-217) days.

Regarding the relationship between outcome after PU notification and comorbidities, there was no association of death with diabetes (47.8% vs. 55.4%, p=0.688), systemic arterial hypertension (53.7% vs. 46.6 %, p=0.372), smoking (62.2% vs. 48.4%, p=0.233) and reason for hospitalization (43.0% vs. 57.0%, p=0.961) in the sample.

Regarding the outcome of PUs, it was found that nursing documentation of patients' progress did not include the description of improvement or healing of pressure ulcer in 58.7% of diabetic patients, as well as in 59.7% of hypertensive patients, 55.8% of patients classified as overweight/obese and 53.3% of smokers.

Laboratory tests showed a statistically significant difference in the hemoglobin value (9.7±2.3 vs. 9.4±2.0, p<0.001) compared to pre- and post-PU notification values. In the analysis of arterial blood gas values no statistically significant difference was observed between pre- and post-PU notification values (Table 2).

Table 1 – Sociodemographic and clinical characteristics of patients hospitalized with pressure injuries (n = 237). Porto Alegre, Rio Grande do Sul, Brazil, 2023

Variables		n(%)
Inpatient sector	ICU	186(78.5)
	Medical or surgical unit	42(17.7)
	Emergency	9(3.8)
Reason for admission	COVID-19	177(74.7)
	Infectious diseases	14(5.9)
	Cardiovascular	11(4,6)
	Oncological	9(3.8)
	Renal	7(3.0)
	Neurological	5(2.1)
	Surgical	5(2.1)
	Digestive	2(0.8)
Nutritional status	Underweight	7(2.9)
	Normal weight	50(21.1)
	Overweight	82(34.6)
	Obesity	98(41.4)
Comorbidities	Systemic arterial hypertension	136(57.4)
	Diabetes mellitus	101(42.6)
	Smoking	45(19.0)
Outcome after notification of PU	Discharge	115(48.5)
	Death	121(51.1)
	Hospital transfer	1(0.4)

Source: Research data, 2021.
ICU: Intensive Care Unit; PU: pressure ulcer

Some laboratory tests did not have a normal distribution and, regarding C-Reactive Protein (CRP) and D-dimer tests, a statistically significant difference was observed between pre- and post-PU notification values, respectively p=0.001 and p=0.010 (Table 3).

Regarding risk stratification for developing PU, high risk predominated in the sample in 57.8% of patients. Regarding the characteristics of the PUs, the sacral, intergluteal or gluteal region predominated in 73.0%, followed by the calcaneus and chest/abdomen/back region with 6.8% each. Stage 2 prevailed in 80.2% of PUs and with an unchanged evolution of PU until hospital discharge in 51.9% of cases (Table 4).

Table 2 – Results of laboratory tests collected before and after notification of pressure ulcer in hospitalized patients (n=237). Porto Alegre, Rio Grande do Sul, Brazil, 2023

Tests	Pre PU*	Post PU*	P-Value**
Hemoglobin	9.7±2.3	9.4±2.0	**<0.001**
Arterial blood pH	7.4±0.1	7.3±0.1	0.821
PCO2	50.1±14.2	49.2±13.3	0.290
HCO3	27.1±5.7	27.0±6.2	0.760
PO2	104.0±34.4	103.7±36.4	0.715
Oxygen saturation	96.0±6.6	95.8±5.0	0.136

Source: Research data, 2021.
PCO2 Partial pressure of carbon dioxide within arterial blood; HCO3: calculated concentration of bicarbonate in arterial blood; PO2: Partial pressure of oxygen in arterial blood; *mean ± standard deviation; ** Paired T-Test.

Table 3 – Median of laboratory tests collected before and after notification of pressure ulcers in hospitalized patients (n=237). Porto Alegre, Rio Grande do Sul, Brazil, 2023

Tests	Pre PU			Post PU			P-Value*
	Median	Min	Max	Median	Min	Max	
Base Excess	1.1	-15.3	19.4	1.8	-28.8	17.4	0.461
Urea	101.5	11	447.0	99.0	16.0	466	0.198
Creatinine	1.2	0.4	9.7	1.1	0.40	18.91	0.052
PCR	100.7	1.4	605.0	82.5	1.6	428.8	**0.001**
D-dimer	4.1	0.6	20	3.0	0.61	20.0	**0.010**

Source: research data, 2021.
PU: pressure ulcer; PCR: C-reactive protein; *Wilcoxon

Table 4 – Characteristics of pressure ulcers in hospitalized adults (n = 237). Porto Alegre, Rio Grande do Sul, Brazil, 2023

Variables		n(%)
Risk for PU	No risk	1(0.4)
	Low	15(6.3)
	Moderate	21(8.9)
	High	137(57.8)
	Very high	63(26.6)
Site of PU	Sacrum, intergluteal or gluteal muscles	173(73.0)
	Thorax/Abdomen/back	16(6.6)
	Calcaneous	16(6.8)
	Face	12(5.1)
	Limbs	9(3.8)
	Trochanter	4(1.7)
	Shoulder blade	4(1.7)
	Occipital	3(1.3)
Stage of PU	Stage 2	190(80.2)
	Stage 3	24(10.1)
	Stage 4	1(0.4)
	Unstageable	6(2.5)
	Tissue injury/deep injury	16(6.8)
Progression of pressure ulcer	Complete healing	31(13.1)
	Improvement	27(11.4)
	Unchanged	123(51.9)
	Worsened	33(13.9)
	Not informed	23(9.7)

Source: Research data, 2021
PÚ: pressure ulcer

DISCUSSION

Consistent with the literature, the results obtained in the characterization of the sample of PU notifications in this study showed that during the COVID-19 pandemic there was an increase in PU cases during the hospitalization of patients, aged on average 58 years old and predominantly male[16]. Age is the risk factor considered a significant predictor for the development of PU and associated with factors such as frailty, disability and multimorbidity, which are more prevalent at an older age and increase the risk of adverse outcomes[17].

Another aspect corroborated by the literature is related to the fact that the majority of these patients were admitted to the ICU. Epidemiological data from a large health center indicate that patients admitted to ICU with COVID-19 had a prevalence of PU three times higher than those not affected by COVID-19[18]. This data can be justified by the relationship between critical illness, comorbidities and factors related to treatment that are essential for the management and maintenance of life support, being considered multi-etiological[17].

These data reflect the most critical period of the COVID-19 pandemic, during which there was a considerable increase in unstable and seriously ill patients in health services with acute respiratory distress syndrome (ARDS), shock and multiple organ failure[17,18]. For patients with this profile, notifications of PU occurred on average 15 days after hospitalization and the average length of life of the patients after notification of PU was 9.5 days, demonstrating a progressive worsening during hospitalization, due to the need for advanced supportive therapies, and which have impact on the incidence of PU[19,20].

In addition to the pathophysiology of COVID-19, the presence of comorbidities, such as systemic arterial hypertension and diabetes mellitus, were also common and impacted the development of PU and its healing process. It is known that they are considered health problems that increase the risk of hospitalizations and increase mortality[17]. Studies carried out in Brazil and the United States also highlighted these comorbidities as the most prevalent, followed by obesity[21,22].

Obesity causes hypoperfusion and ischemia of subcutaneous adipose tissue, conditions that favor the onset of PU and also affect healing[23]. These individuals are more exposed to humidity, which makes it difficult to implement effective skin care measures. Furthermore, the difficulty in mobilization and positioning, associated with the severity of the patients, also end up contributing to the development of PU in obese people.

Still on the clinical profile of the sample, in the analysis of laboratory tests (pre and post PU notification), a statistically significant difference was observed in hemoglobin, CRP and D-dimers levels. A more in-depth study could correlate the laboratory profile with other variables, e.g. organic dysfunction scores such as the Simplified Acute Physiology Score (SAPS) and the Sequential Organ Failure Assessment (SOFA), in addition to mortality predictors such as the Acute Physiology and Chronic Health Evaluation (APACHE II) and therapies used that impact tissue perfusion[24].

A systematic review[25] showed that the Braden scale is an effective instrument for evaluating and stratifying the risk score for PU, allowing the implementation of care and prevention strategies. In the sample of this study, most patients with PU notification had obtained a Braden scale score of high risk indicating a greater probability of developing PU, due to the previously mentioned clinical characteristics of these patients, which was corroborated by the literature[26].

Regarding the regions, the sacral, intergluteal or gluteal region had the highest incidence of PUs followed by the calcaneous. Similar data were found in the literature[27,28], which evaluated the international and national prevalence of injuries and found that the sacral region was the most affected (37%), followed by the calcaneous (19.5%). However, due to the treatment of COVID-19 and the need for a prone position, a maneuver widely used in the management of ARDS, other areas with PU were identified, including regions of the chest, abdomen and face in the study population[29].

Still regarding PU, stage 2 also predominated (80.2%) in the notifications evaluated, following the same behavior prior to the COVID-19 pandemic[24,28]. The institutions recommend notification of PU from the initial stages, so that disease prevention and treatment protocols can be implemented early, with constant surveillance[24]. However, 6.8% of patients were reported with deep tissue injury.

According to the literature[28], PUs had a favorable outcome, with a remarkable reduction from the 6th assessment and after 35 days of hospitalization ($p< 0.001$), while in this study most injuries remained. This probably occurred due to the disease severity in the patients, a fact explained by the significant number of unfavorable outcomes.

The limitations of the study may be related to the fact that data collection was based on the electronic medical records, depending exclusively on the records made by professionals, which may present weaknesses. It is worth noting that during the pandemic period there was an overload of work in health institutions and records may have been compromised and, therefore, would be incomplete.

CONCLUSION

The association between the clinical characteristics of patients admitted with pressure ulcers reflects the new clinical profile of patients affected by COVID-19, due to their systemic involvement, favoring the development of PU and affecting the tissue repair process.

The findings of the present study will serve as a basis for care management, aiming to carry out a more detailed investigation of the clinical predictors that impact work processes, workload and PU care indicators. Therefore, further research is needed to build robust body of evidence, using comparative databases, a broader time frame, in the pre and post pandemic periods, as well as to identify the prediction of mortality risk and the degree of organic dysfunction in patients with PU in different scenarios. This is necessary to improve nursing care and the communication with the interdisciplinary team, in order to increase the quality of care and patient safety.

REFERENCES

1. Moura SRS, Melo DPL, Rocha GMS, Cruz ERC. Prevalência de lesão por pressão em um hospital geral. REAS. 2020;12(10):e4298. doi: https://doi.org/10.25248/reas.e4298.2020
2. National Pressure Injury Advisory Panel. Unavoidable pressure injury during COVID-19 pandemic: a position paper from the National Pressure Injury Advisory Panel [Internet]. Westford, MA: NPIAP; 2020 [cited 2023 Aug 17]. Available from: https://cdn.ymaws.com/npiap.com/resource/resmgr/white_papers/Unavoidable_in_COVID_Pandemi.pdf
3. Dolanová D, Búřilová P, Krupová L, Benešová K, Jarkovský J, Saibertová S, et al. Mortality related to pressure ulcers in Czech Republic – analyses of national health registries. J Tissue Viability. 2023;32(3):365-70. doi: https://doi.org/10.1016/j.jtv.2023.05.002
4. Ministério da Saúde (BR). Agência Nacional de Vigilância Sanitária. Nota Técnica GVIMS/GGTES/ Anvisa nº 05/2023. Práticas de segurança do paciente em serviço de saúde: prevenção de lesão por pressão. Brasília, DF: ANVISA; 2023.
5. Yarad E, O'Connor A, Meyer J, Tinker M, Knowles S, Li Y, et al. Prevalence of pressure injuries and the management of support surfaces (mattresses) in adult intensive care patients: A multicentre point prevalence study in Australia and New Zealand. Aust Crit Care. 2021;34(1):60-6. doi: https://doi.org/10.1016/j.aucc.2020.04.153
6. Sala JJ, Mayampurath A, Solmos S, Vonderheid SC, Banas M, D'Souza A, et al. Predictors of pressure injury development in critically ill adults: a retrospective cohort study. Intensive Crit Care Nurs. 2021;62:102924. doi: https://doi.org/10.1016/j.iccn.2020.102924
7. Lucchini A, Giani M, Elli S, Villa S, Rona R, Foti G. Nursing Activities score is increased in COVID-19 patients. Intensive Crit Care Nurs. 2020;59:e102876. doi: https://doi.org/10.1016/j.iccn.2020.102876
8. Vowden K, Hill L. What is the impact of COVID-19 on tissue viability services and pressure ulceration? J Wound Care. 2021;30(7):522-31. doi: https://doi.org/10.12968/jowc.2021.30.7.522
9. Yu N, Li Z, Long X, Huang J, Cao W, Zhang Y, et al. Pressure injury: a non-negligible comorbidity for critical Covid-19 patients. J Plast Reconstr Aesthet Surg. 2021;74(3):644-710. doi: https://doi.org/10.1016/j.bjps.2020.08.006
10. Guirra PSB, Gomes JS, Billiu KS, Vilanova MedVed I, Almeida VC. Manejo do paciente com COVID-19 em pronação e prevenção de lesão por pressão: pandemia COVID-19. HRJ. 2020;1(2)71-87. doi: https://doi.org/10.51723/hrj.v1i2.30
11. Black J, Cuddigan J. Skin manifestations with COVID-19: the purple skin and toes that you are seeing may not be deep tissue pressure injury. World Council of Enterostomal Therapists Journal. 2020 [cited 2023 Aug 17];40(2):18-21. Avaliable from: https://search.informit.org/doi/abs/10.3316/INFORMIT.216161118192830
12. Ramalho AO, Rosa TS, Santos VLCG, Nogueira PC. Acute skin failure and pressure injury in the patient with COVID-19. Estima. 2021;19:e0521. doi: https://doi.org/10.30886/estima.v19.1007_IN
13. Silva GF Almeida BEM, Schneider EC, Alban LL, Sales MS, Sousa SMS. Experiência dos residentes de enfermagem na reorganização do processo de trabalho para enfrentamento da COVID-19. Var Sci Ci Saúde. 2021;7(2):88-97. doi: https://doi.org/10.48075/vscs.v7i2.27462
14. Silverio R, Gonçalves DC, Andrade MF, Seelaender M. Coronavirus disease 2019 (COVID-19) and nutritional status: the missing link? Adv Nutr. 2021;12(3), 682-92. doi: https://doi.org/10.1093/advances/nmaa125
15. Ministério da Saúde (BR). Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial União. 2013 jun 13 [cited 2023 Aug 17];150(112 Seção 1):59-62. Available from: https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=13/06/2013&jornal=1&pagina=59&totalArquivos=140
16. Polancich S, Hall AG, Miltner R, Poe T, Enogela EM, Montgomery AP, et al. Learning during crisis: the impact of COVID-19 on hospital-acquired pressure injury incidence. J Healthc Qual. 2021;43(3):137-144. doi: https://doi.org/10.1097/JHQ.0000000000000301
17. Cox J, Schallom M. Pressure injuries in critical care patients: a conceptual schema. Adv Skin Wound Care. 2021;34(3):124-31. doi: https://doi.org/10.1097/01.ASW.0000732732.23597.85
18. Lu W, Bloom O, Rathgeber M, Maltser S. Pressure injury prevalence and characteristics in patients with COVID-19 admitted to acute inpatient rehabilitation unit. Front Rehabil Sci. 2023;4:1058982. doi: https://doi.org/10.3389/fresc.2023.1058982
19. Sandhu, J, Miller C, Kapp S. Characteristics of COVID-19 patients who developed pressure injuries: a scoping review. J Wound Care. 2023;32(Sup3):S9-S16. doi: https://doi.org/10.12968/jowc.2023.32.Sup3.S9
20. Bourkas AN, Zaman M, Sibbald RG. COVID-19 and hospital-acquired pressure injuries: a systematic review. Adv Skin Wound Care. 2023:36(8):421-34. doi: https://doi.org/10.1097/01.ASW.0000919408.20614.61
21. Alves SS, Paladini SV, Silva LHF, Rabin EG. O impacto da pandemia de COVID-19 na incidência de lesão por pressão: uma revisão sistemática. Rev Enferm Atual In Derme. 2022;96(40):e-021316. doi: https://doi.org/10.31011/reaid-2022-v.96-n.40-art.1443
22. Arulanandam B, Beladi H, Chakrabarti A. Obesity and COVID-19 mortality are correlated. Sci Rep. 2023;13(1):5895. doi: https://doi.org/10.1038/s41598-023-33093-3
23. Munoz N, Posthauer ME, Cereda E, Schols JMGA, Haesler E. The role of nutrition for pressure injury prevention and healing: the 2019 International Clinical Practice Guideline Recommendations. Adv Skin Wound Care. 2020;33(3):123-36. doi: https://doi.org/10.1097/01.ASW.0000653144.90739.ad

24. Lima LS, Aragão NRO, Santos GKBB, Santos ES, Palmeira CS. Clinical-epidemiological profile of patients with pressure injuries in the hospital context. Estima. 2020;18:e2720. doi: https://doi.org/10.30886/estima.v18.917_IN
25. Floyd NA, Dominguez-Cancino KA, Butler LG, Rivera-Lozada O, Leyva-Moral JM, Palmieri PA. The effectiveness of care bundles including the braden scale for preventing hospital acquired pressure ulcers in older adults hospitalized in ICUs: a systematic review. Open Nurs J. 2021;15(1):74-84. doi: https://doi.org/10.2174/1874434602115010074
26. Jansen RCS, Silva KBA, Moura MES. Braden Scale in pressure ulcer risk assessment. Rev Bras Enferm. 2020;73(6):e20190413. doi: https://doi.org/10.1590/0034-7167-2019-0413
27. Labeau SO, Afonso E, Benbenishty J, Blackwood B, Boulanger C, Brett SJ, et al. Prevalence, associated factors and outcomes of pressure injuries in adult intensive care unit patients: the DecubICUs study. Intensive Care Med. 2021;47(2):160-9. doi: https://doi.org/10.1007/s00134-020-06234-9
28. Macedo ABT, Mello DB, Graciotto A, Cortelini CLS, Souza E, Picetti N. Lesões por pressão em adultos portadores de germes multirresistentes: um estudo de coorte. Saud Coletiv. 2021;11(69):8347-58. doi: https://doi.org/10.36489/saudecoletiva.2021v11i69p8347-8358
29. Carvalho LD, Rodrigues NKSS. Ocorrência de lesão por pressão em pacientes acometidos pela COVID-19 em decorrência da posição prona. REASE. 2022;8(4):668-81. doi: https://doi.org/10.51891/rease.v8i4.4866

Authorship contribution:

Formal analysis: Taline Bavaresco, Dóris Baratz Menegon, Andréia Barcellos Teixeira Macedo, Raquel Yurika Tanaka, Angela Enderle Candaten.
Conceptualization: Taline Bavaresco, Dóris Baratz Menegon, Andréia Barcellos Teixeira Macedo, Raquel Yurika Tanaka, Angela Enderle Candaten.
Data curation: Taline Bavaresco, Dóris Baratz Menegon, Andréia Barcellos Teixeira Macedo, Raquel Yurika Tanaka, Angela Enderle Candaten.
Writing – original draft: Taline Bavaresco, Dóris Baratz Menegon, Andréia Barcellos Teixeira Macedo, Raquel Yurika Tanaka, Angela Enderle Candaten.
Writing – review and editing: Taline Bavaresco, Dóris Baratz Menegon.
Superviion: Taline Bavaresco, Dóris Baratz Menegon.
Validation: Taline Bavaresco, Dóris Baratz Menegon, Andréia Barcellos Teixeira Macedo, Raquel Yurika Tanaka, Angela Enderle Candaten.

The authors declare that there is no conflict of interest.

Corresponding author:

Taline Bavaresco
E-mail: talinebavaresco1@gmail.com

Associate editor:
Adriana Aparecida Paz

Received: 05.11.2023
Approved: 11.07.2023

Editor-in-chief:
João Lucas Campos de Oliveira