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Profile analysis and hospitalization outcomes in critically ill patients with pressure ulcers

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ABSTRACT

Objective: To describe the clinical profile of patients who developed pressure ulcers (PU) during intensive care in a cardiology unit and to identify the factors associated with discharge and death outcomes. **Method:** Observational, retrospective cohort study. Patients who developed PU during their stay in the intensive care units (ICUs) of a philanthropic hospital in São Paulo and were recorded in the database from January 2018 to June 2020 were included. The study was approved by the institution's Research Ethics Committee. Fisher's Exact Test, Student's *t*-test, and Pearson's χ^2 test were used to assess the associations, with a significance level of 0.05. **Results:** Among 456 critically ill patients evaluated, 51 developed PU in the ICU, with a prevalence of 11%. The sample consisted of 84.3% male patients, with a mean age of 75.8 years (SD=13.6). Sacral PU were present in 70.5% of the cases. Nutritional risk, SAPS 3 score, length of ICU stays, capillary refill time, age, and RASS score showed significant correlations with death as an outcome. **Conclusion:** Clinical factors correlated with death outcomes were identified in critically ill patients who developed PU in the ICU. As a clinical implication, the findings highlight the importance of guiding care teams to implement targeted care strategies for these patients.

DESCRIPTORS: Pressure ulcer. Enterostomal therapy. Intensive care units. Critical care.

Análise de perfil e desfechos de internação em pacientes críticos que desenvolveram lesão por pressão

RESUMO

Objetivo: Descrever o perfil clínico dos pacientes que desenvolveram lesão por pressão durante cuidados intensivos em unidade cardiológica, identificar os fatores associados ao desfecho alta e óbito. **Método:** Estudo observacional, de coorte retrospectivo. Incluídos os pacientes que adquiriram uma lesão por pressão durante a internação nas unidades de terapia intensiva de um hospital filantrópico em São Paulo e estavam registrados na base de dados de janeiro de 2018 a junho de 2020. Aprovado no Comitê de Ética em Pesquisa da instituição. Os testes Exato de Fisher, t-Student e χ^2 de Pearson, com significância de 0,05, foram adotados para avaliar a existência de associação. **Resultados:** 456 pacientes críticos avaliados, 51 desenvolveram lesão por pressão na unidade de terapia intensiva com prevalência de 11%. Amostra composta de 84,3 do sexo masculino, média de 75,8 anos (DP=13,6), a lesão por pressão em região sacral foi em 70,5% dos casos. Risco nutricional, SAPS 3, tempo de internação em unidade de terapia intensiva, tempo de enchimento capilar, idade e RASS demonstraram correlação significativa com o desfecho óbito. **Conclusão:** Identificaram-se fatores clínicos que se correlacionam

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com desfecho óbito em pacientes críticos que desenvolveram lesão por pressão na unidade de terapia intensiva. Como implicação clínica, destaca-se a relevância para direcionamento das equipes assistenciais para implementar metas de cuidado direcionadas a esses pacientes.

DESCRITORES: Lesão por pressão. Estomaterapia. Unidades de terapia intensiva. Cuidados críticos.

Análisis del perfil y desenlaces de hospitalización en pacientes críticos con lesiones por presión

RESUMEN

Objetivo: Describir el perfil clínico de los pacientes que desarrollaron lesiones por presión (LP) durante los cuidados intensivos en una unidad cardiológica, e identificar los factores asociados con el alta hospitalaria y el fallecimiento. **Método:** Estudio observacional, de cohorte retrospectiva. Se incluyeron pacientes que adquirieron una LP durante su estancia en las unidades de cuidados intensivos (UCI) de un hospital filantrópico en São Paulo y que estaban registrados en la base de datos entre enero de 2018 y junio de 2020. Estudio aprobado por el Comité de Ética en Investigación de la institución. Se utilizaron las pruebas Exacta de Fisher, t de Student y χ^2 de Pearson, considerando una significancia del 0,05 para evaluar la existencia de asociaciones. **Resultados:** Se evaluaron 456 pacientes críticos, de los cuales 51 desarrollaron LP en la UCI, con una prevalencia del 11%. La muestra estuvo compuesta en un 84,3% por hombres, con una edad media de 75,8 años (DE=13,6); el 70,5% de las lesiones por presión se localizó en la región sacra. El riesgo nutricional, el SAPS 3, la duración de la estancia en la UCI, el tiempo de llenado capilar, la edad y la escala RASS demostraron correlación significativa con el desenlace de fallecimiento. **Conclusión:** Se identificaron factores clínicos que se correlacionan con el desenlace de fallecimiento en pacientes críticos que desarrollaron LP en la UCI. Como implicación clínica, se destaca la relevancia de orientar a los equipos asistenciales para implementar metas de cuidado dirigidas a estos pacientes.

DESCRIPTORES: Úlcera por presión. Estomaterapia. Unidades de cuidados intensivos. Cuidados críticos.

INTRODUCTION

Pressure ulcers (PU) result from sharp and/or prolonged pressure, combined with shear forces. This type of injury affects the skin and/or underlying soft tissues, especially in areas over bony prominences or because of the use of health care devices. Injuries can present both with intact skin and as open ulcers[1].

PUs are classified into stages 1, 2, 3 and 4, according to the type of tissue affected. In addition to this classification, some additional definitions are used, such as unclassifiable PU, when the depth of the lesion cannot be determined because of the presence of unviable tissue. There is also deep tissue PU, which may or may not present skin rupture, manifesting itself by deep red, maroon, or purple discoloration of the skin, or even by blood blisters, in which deep tissue damage is evident. In 2016, the National Pressure Injury Advisory Panel (NPIAP) included two new definitions: mucosal membrane pressure injury and medical device-related pressure injury (MDRPI)[1].

Pressure injuries or pressure ulcers are frequent findings in health care settings, especially with regard to patients under critical care in intensive care units (ICUs). Adverse events associated with health care have been widely discussed, with emphasis on pressure injury acquired in hospital organizations, as it is a potentially preventable event and may have increased hospitalization time, hospital costs, nursing workload, infections, and even death as an outcome[2] .

Severe patients are at high risk of developing PU compared to other patients hospitalized for critical health, ICU interventions, and pre-existing diseases. In this population, decreased nutrition, use of vasoactive drugs, decreased level of consciousness, and decreased mobility are important risk factors for the development of PU. In addition, several invasive and non-invasive devices are commonly used in these patients, increasing the chance of developing MDRPI[3,4].

The preservation of skin integrity in critically ill patients inside the ICU represents a challenge for the care team. For years, research and efforts aimed at identifying, screening, and implementing preventive actions have gained ground in the care of hospitalized patients. Recent studies have shown the scientific concern in describing the risk factors and the prevalence of PU in the context of intensive care. These studies highlighted worse outcomes in skin integrity, associating them with intrinsic factors of the underlying pathology at hospitalization, micro and macro hemodynamic evaluation, use of vasoactive drugs, mechanical ventilation, comorbidities, and use of medical devices[5,6].

This reflection reveals that the relatively high incidence of PU in ICU patients warrants further investigation of the underlying causes of PU, despite the implementation of preventive nursing practices and various risk assessment methods. In addition, information about the clinical outcomes of patients who develop PU in critical contexts, particularly in the Brazilian population, remains scarce.

OBJECTIVES

To describe the clinical profile of patients who developed PU during admission to the cardiac ICU and identify the factors associated with discharge and death.

METHODS

Observational, retrospective cohort study, guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). The sample consisted of patients admitted to the adult cardiological ICU, with 23 beds in a large philanthropic hospital, located in the state of São Paulo, and who were evaluated for the collection of the PU prevalence indicator in that institution.

Data were collected through a database called "Pressure Injury Prevalence Indicators", stored on the virtual hard disk of the Stomatherapy Specialized Nursing Service of that hospital. This base was prepared in Excel® spreadsheet format. Only the nurses specialized in stomatherapy in this service have access to the data of this database, which are used to calculate the prevalence of PU and create institutional indicators of PU.

The systematic collection of this database occurs on a timely and monthly basis, through a complete evaluation of the skin in all inpatients on a specific day and is carried out by a nurse trained by the stomatherapy group. Based on the data obtained, it is possible to identify the number of patients who developed PU at the institution, in addition to details related to the stage of injury, anatomical region, relationship with medical devices, Braden scale, use of mechanical containment. Through collection in electronic medical records, data were complemented with clinical information, such as: age, sex, Richmond Agitation-Sedation Scale (RASS), diagnosis of hospitalization, hospital outcome, clinical history, length of ICU stay, use of vasoactive drugs, use of norepinephrine greater than 0.30 micrograms per kilogram per minute at hospitalization, mechanical circulatory assistance device, mechanical ventilation, presence of nutritional risk assessed routinely through the application of the Nutritional Risk Screening scale (NRS-2002) by the nutritionist, clinical annotation of capillary filling time less than or equal to 3 seconds recorded in nursing or medical evolution, and Simplified Acute Physiology Score 3 (SAPS3). Laboratory tests were also collected: hemoglobin [reference value (RV):11.7 to 14.9 g/dL], platelets [RV: 140,000 to 450,000 /mm3], lactate [(RV): 4.5 to 14.4 mg/dL], and albumin [(RV): 3.5 to 5.2 g/dL].

Patients with PU acquired during ICU hospitalization and who were registered in the database between January 2018 and June 2020 were included. Patients who had PU on admission to the ICU and a stay of less than 24 hours in the unit were excluded.

To calculate the prevalence of PU, the NPIAP recommendation was used: total number of patients with acquired PU/ total number of patients evaluated x 100. Data were compiled in an Excel spreadsheet and analyzed using the statistical *software* SPSS22.0. The results were presented in descriptive statistics, including percentages, frequencies, and standard deviation (SD) to describe all variables analyzed. Quantitative variables were verified for normality by the Shapiro-Wilk test.

To assess the presence of associations, Pearson's χ^2 test and Fisher's exact test were applied to categorical variables, Student's t-test was used for continuous variables with normal distribution and the Mann-Whitney test was used for numerical variables with non-normal distribution. All tests were performed at a significance level of 0.05. The analyses were performed using the R software.

The research was submitted to the institution's Research Ethics Committee (REC), in compliance with resolution 466/12 of the National Health Council concerning research involving human beings, and data collection was carried out only after approval by the REC, under approval number 4,781,285/2021. As this research uses secondary data extracted from pre-existing databases, institutional documents and patient records, the REC was asked to waive the consent form. It is noteworthy that no research participant was approached to collect more information.

RESULTS

A total of 456 patients were evaluated during the study period, of which 51 developed PU during ICU admission, representing a cumulative prevalence of 11%. With regard to the clinical and epidemiological profile of patients who developed PU, a mean age of 75.8 years (SD=13.6) was observed, with a mean length of ICU stay of 46.9 days (SD= 33.5) and a median hospital stay of 65 days. Regarding the prediction of mortality in the ICU, estimated by the score in the Simplified Acute Physiology III (SAPS3), it ranged from 35 to 96 with an average of 60.2 (SD=13.2) (Table 1).

The nutritional risk assessment was not identified in a medical record. The clinical data shown in Table 1 were complemented with data from laboratory tests, in which the mean serum hemoglobin was 8.8 mg/dL (SD=1.5), the mean albumin was 2.9 mg/dL (SD=0.6), and the mean serum lactate was 28.8 mg/dL (SD=38).

Regarding PU, the total number of injuries identified was 61 (Table 2), with an average of 1.2 injuries per patient (SD=0.6). Most PUs were developed in bone prominences, with only 7.8% of injuries related to the use of medical devices.

There was a predominance of PU developed in the sacral region, representing 70.5% of the total. The most frequent staging was stage 2 (39.3%), followed by unclassifiable PU (21%), as shown in Table 2.

In order to correlate the variables collected with the clinical outcome of hospitalization, which may be discharge/transfer or death, a possible predictor of mortality with statistically significant differences in patients with PU was the presence of nutritional risk, capillary filling time >3 seconds, longer ICU stay, depth of sedation through the RASS score, higher SAPS 3 score and lower platelet concentration, as shown in Table 3.

The clinical features that demonstrate correlation with significant statistics with $p<0.10$ were heart failure ($p=0.065$), cardiorespiratory arrest in the ICU ($p=0.080$), and use of norepinephrine ≥0.3 mcg/kg/min ($p=0.073$).

DISCUSSION

The evaluation of the clinical profile of patients admitted to the cardiological ICU showed a prevalence of 11% in the involvement of PU, affecting mostly elderly patients, male, with a high-risk score for the development of PU according to the Braden scale, diagnosis of sepsis, and cardiac diseases, whose most frequent outcome was death. These findings highlight the relevance of initiatives aimed at quality in health care and patient safety, sensitive issues in the context of care and which have been widely discussed.

Adverse events, such as the development of PU, are serious problems with great repercussions on mortality, morbidity, and quality of life of patients, and are associated with negative outcomes for health services, with high costs, and unfavorable care indicators[7,8].

Epidemiological studies have been developed and have demonstrated high rates of prevalence and incidence of PU in this population and important heterogeneity in the findings, mainly linked to the type of study, data collection methodology, and prevention interventions used in the mentioned scenario[2].

Regarding sex, a review of the literature published by Chung et al.[9] in 2022 listed 11 studies, in which sex emerged as a prognostic indicator for the development of PU, corroborating the hypothesis that male patients are more likely to develop

Table 1. Characterization and clinical profile of patients admitted to the cardiac intensive care unit with pressure ulcer. São Paulo, 2021.

Variables	N	%
Sex		
Male	43	84.3
Female	8	15.7
Causes of hospitalization		
Sepsis	23	46.0
Cardiac symptoms	16	31.3
Neurological symptoms	4	7.8
Trauma	3	5.8
Respiratory symptoms	2	3.9
Surgery	3	5.9
Patient outcome		
Hospital discharge	15	29.4
Death	34	66.7
Transfer	2	3.9
Braden scale		
Low risk	3	5.9
Moderate risk	6	11.8
High risk	42	82.4
Diabetes Mellitus		
Yes	20	39.2
No	31	60.8
Heart failure		
Yes	19	37.3
No	32	62.7
Kidney failure		
Yes	20	39.2
No	31	60.8
Nutritional risk		
Yes	45	88.2
No	5	9.8
Mechanical containment		
Yes	20	39.2
No	31	60.8
Mechanical ventilation		
Yes	36	70.6
No	15	29.4
Vasopressor		
Yes	35	68.6
No	16	31.4
Norepinephrine ≥0.3 mcg/kg/min*		
Yes	28	54.9
No	23	45.1
Mechanical circulatory support device		
Yes	7	13.7
No	44	86.3

*microgram/kilogram/minute.

Table 2. Location and stage of pressure ulcer in patients admitted to the cardiac intensive care unit. São Paulo, 2021.

	Gluteus		Sacral		Calcaneus		Malleolus		Others		Total
	n=5	%	n=43	%	n=4	%	n=1	%	n=8	%	
Stage 1	0	0.0	6	9.8	0	0.0	0	0.0	3	4.9	9
Stage 2	4	6.6	18	29.5	2	3.3	0	0.0	0	0.0	24
Stage 3	0	0.0	4	6.6	0	0.0	0	0.0	1	1.6	5
Stage 4	0	0.0	2	3.3	0	0.0	0	0.0	0	0.0	2
UC*	0	0.0	9	14.8	0	0.0	0	0.0	4	7.0	13
DT †	1	1.6	4	6.6	2	3.3	1	1.6	0	0.0	8

UC: unclassifiable; DT: deep tissue.

Table 3. Factors associated with mortality in patients with pressure ulcer, according to univariate analysis. São Paulo, 2021.

Numerical variables	Discharge or transfer	Death	p-value	Test
	Mean/median	Mean/median		
Total days in ICU	28.0	46.0	0.005	Mann-Whitney
Age	75.0	80.0	0.168	Mann-Whitney
Lower RASS in ICU	0.0	-3.5	0.038	Mann-Whitney
SAPS 3	51.0	62.0	0.029	Mann-Whitney
Platelets	180,000.0	127,000.0	0.000	Student's t
Lactate	15.0	18.5	0.051	Mann-Whitney
Categorical variables	**Percentage**	**Percentage**	**p-value**	**Test**
Nutritional risk				
Yes	29.0	71.1	0.040	Fisher's exact test
No	80.0	20.0		
Capillary filling time: <3 seconds				
Yes	10.5	89.5	0.013	Pearson χ^2
No	46.9	53.1		

*p<0.05.
ICU: intensive care unit; RASS: Richmond Agitation-Sedation Scale; SAPS3: Simplified Acute Physiology Score 3.

PU than female patients[9,10]. Age is also associated with the development of PU due to several factors, not only related to mobility conditions, but also to anatomical and functional alterations of the skin, such as a lower capacity for regeneration and reduction in tissue tolerance, factors that can be exacerbated in critical care settings[2,11].

The involvement of PU in critically ill patients is often associated with the use of vasopressors, longer ICU stays, and unfavorable outcome at hospitalization, reported in multicenter studies[12-14].

The use of one or more vasopressors in critically ill patients is a frequent practice, given the clinical condition, which often requires drug support for the maintenance of blood pressure and tissue perfusion. The association between the use of vasoactive drugs and PU may be related to the vasoconstrictive effect of these drugs, which can lead to decreased blood flow in specific areas of the body, including skin tissue[15].

In addition, another factor intrinsic to the critical status of these patients is the imbalance of tissue oxygenation, related to hemodynamic instability, which favors the development of acute skin failure. In addition, hematological changes such as those identified in the sample of this study corroborate the reduction in tissue oxygenation, showing a significant correlation with the patient's hospital outcome[15,16].

The use of sedation in these patients is also frequent, and it is possible to see an association between patients with lower RASS, that is, with deeper sedation, according to the sedation assessment scale, and higher mortality in patients who developed PU. A study carried out with this population shows an association with the development of PU in patients with the highest level of sedation, mainly due to the decreased mobility and severity of this population[17].

Patients admitted to the ICU are more vulnerable to extrinsic and intrinsic factors that contribute to the development of PU. Early risk identification can be performed through the application of different scales, such as the Braden scale, which, although not specifically developed for critical patients, it is often used for this group[3]. The scale assesses factors such as mobility, sensitivity, and nutritional status, aspects often changed in the context of intensive care, which contributes to the development of the injury[2,12,18]. Another relevant aspect is that the increase in the length of stay in the ICU was associated with the development of PU, probably given the greater exposure to risk factors and the severity of the clinical condition.

Nutritional risk was a significant predictor in the present study, which is also mentioned in several studies, in which nutrition plays an important role in promoting the maintenance of skin tissue, in the prevention and treatment of PU[19]. Decreased tolerance of the skin and tissues of the skin system to pressure, friction, and shear forces may be caused by decreased calorie intake, dehydration, and reduced serum albumin levels, especially among aged persons[20].

In this study, the predominance of stage 2 PU was observed, in which the epidermis breaks open and the dermis is exposed or a blister with serous fluid[1] appears, and the most affected site was the sacral region. These findings are in line with other studies and may be related to the dorsal position being widely adopted in the care of critical patients, whether for performing procedures in bed or for severity[11,17]. In addition, headboards are often elevated above 30°, aiming at preventing pneumonia associated with mechanical ventilation, which contributes to increased pressure, friction, and shear forces in this region[18,21].

The number of more severe injuries, stages 3, 4, unclassifiable and deep tissue PU identified in the sample also draws attention, since they represent almost 50% of the identified injuries when added together. In addition to being an adverse event with significant impacts on quality of life and morbidity and mortality of patients, the development of a PU in the critical scenario is also related to the increase in hospital costs, the decrease in transfers from healthcare insurance companies, and disallowances during the account audit process. Thus, investing in preventive interventions, risk mapping, and searching for constant improvement should be among the care goals of the care team[22,23.]

Nevertheless, the sum of risk factors, the difficulty of discharge, and the complexity of the patient can, in some cases, give rise to an inevitable PU[24]. However, for such a statement, it is essential to ensure that all prevention care based on scientific evidence has been properly applied. In addition, it is essential to conduct a detailed analysis to identify root causes, ensuring that there are no opportunities for improvement that may have been overlooked[22].

It is noteworthy that the sample of this study reflects the characteristics and clinical profile of critical patients in a cardiac ICU of a philanthropic hospital, with a consolidated PU prevention protocol, which, although its application has not been measured in this study, may introduce a potential bias in the findings given the resources available and the therapies adopted.

Limitations

As this is a retrospective study, there are limitations related to the possible underreporting of cases and incomplete registration of care findings. Hospitalization in an ICU requires highly complex care, with the need for more detailed studies to support continuous improvements in the care provided to these patients.

Recommendations

The results of the present study highlight the clinical variables most strongly associated with the outcome of death. As a recommendation for clinical practice, it is necessary to implement early prevention measures to minimize the risk of developing PU in critically ill patients.

CONCLUSION

PU was a frequently present in critically ill patients, and significant clinical variables associated with death were ICU time, lower RASS, SAPS 3, nutritional risk, platelets and capillary filling time >3 seconds.

The results obtained can contribute to the evaluation and decision-making of the care team at the bedside, highlighting the need to implement preventive measures in order to improve the clinical outcome and contribute to the reduction of this event. We emphasize the need for further investigations to validate the correlations evidenced in the present study and other contributions to the management and prevention of PU in critically ill cardiac patients.

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REFERENCES

1. European Pressure Ulcer Advisory, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers/injuries. prevention and treatment of pressure ulcers/injuries. clinical practice guideline [Internet]. 2019. [acessado 2024 Jun. 21]. Disponível em: https://internationalguideline.com/
2. Serrano ML, González M´´endez MI, Carrasco Cebollero FM, Lima Rodríguez JS. Risk factors for pressure ulcer development in Intensive Care Units: a systematic review. Med Intensiva. 2017;41(6):339-46. https://doi.org/10.1016/j.medin.2016.09.003
3. Adibelli S, Korkmaz F. Pressure injury risk assessment in intensive care units: comparison of the reliability and predictive validity of the Braden and Jackson/Cubbin scales. J Clin Nurs. 2019;28(23-24):4595-605. https://doi.org/10.1111/jocn.15054
4. Barreto RMS, Santos RLN, Melo EMVB. Profile of people with pressure injuries admitted to the intensive care unit. O Mundo da Saúde. 2019;43(4):1030-43. https://doi.org/10.15343/0104-7809.2019430410301043
5. Soodmand M, Moghadamnia MT, Aghaei I, Ghasemzadeh G, Lili EK, Rad EH. Effects of hemodynamic factors and oxygenation on the incidence of pressure ulcers in the ICU. Adv Skin Wound Care. 2019;47(6):359-64. https://doi.org/10.1097/01.ASW.0000553599.20444.f4
6. El-Marsi J, Zein-El-Dine S, Zein B, Doumit R, Badr LK. Predictors of pressure injuries in a critical care unit in Lebanon: prevalence, characteristics, and associated factors. J Wound Ostomy Continence Nurs. 2018;45(2):131-6. https://doi.org/10.1097/WON.0000000000000415
7. Brasil. Agência Nacional de Vigilância Sanitária. Nota técnica GVIMS/GGTES nº 03/2017. Práticas seguras para prevenção de lesão por pressão em serviços de saúde [Internet]. 2017 [acessado 2024 Ago. 21]. Disponível em: https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/notas-tecnicas/notas-tecnicas-vigentes/nota-tecnica-gvims-ggtes-no-03-2017.pdf
8. Cavalcante MLSN, Borges CL, Moura AMFTM, Carvalho REFL. Indicators of health and safety among institutionalized older adults. Rev Esc Enferm USP. 2016;50(4):602-9. https://doi.org/10.1590/S0080-623420160000500009
9. Chung ML, Widdel M, Kirchhoff J, Sellin J, Jelali M, Geiser F, et al. Risk factors for pressure injuries in adult patients: a narrative synthesis. Int J Environ Res Public Health. 2022;19(2):761. https://doi.org/10.3390/ijerph19020761
10. Assis IIC, Santos JE, Abib MLVS, Bueno LF, Coelho MMF, Cortez DN, et al. Medical device-related pressure injury in an intensive care unit: a cross-sectional study. Wound Manag Prev. 2021;67(11):26-32. PMID: 35030095.
11. Pachá HHP, Faria JIL, Oliveira KA, Beccaria LM. Lesão por pressão em unidade de terapia intensiva: estudo de caso-controle. Rev Bras Enferm. 2018;71(6):3203-10. https://doi.org/10.1590/0034-7167-2017-0950
12. Oliveira BA, Zanchetta FC, Barbieri B, Falcioni CAS, Araújo EP, Lima MHM. Point prevalence and risk factors for pressure ulcers in hospitalized adult patients: a cross-sectional study. Einstein (São Paulo). 2024;22:eAO0811. https://doi.org/10.31744/einstein_journal/2024AO0811

13. Assis SF, Vieira DFVB, Sousa FREG, Pinheiro CEO, Prado PR. Adverse events in critically ill patients: a cross-sectional study. Rev Esc Enferm USP. 2022;56:e20210481. https://doi.org/10.1590/1980-220X-REEUSP-2021-0481en

14. Rodrigues JM, Gregório KC, Westin UM, Garbuio D. Incidência e fatores relacionados ao aparecimento de lesões por pressão em unidade de terapia intensiva. ESTIMA, Braz J Entrostomal Ther. 2021;19:e1121. https://doi.org/10.30886/estima.v19.1014_PT

15. Ayello EA, Levine JM, Langemo D, Kennedy-Evans KL, Brennan MR, Gary Sibbald R. Reexamining the literature on terminal ulcers, SCALE, skin failure, and unavoidable pressure injuries. Adv Skin Wound Care. 2019;32(3):109-21. https://doi.org/10.1097/01.ASW.0000553112.55505.5f

16. Kim JH, Shin HK, Jung GY, Lee DL. A case of acute skin failure misdiagnosed as a pressure ulcer, leading to a legal dispute. Arch Plast Surg. 2019;46(1):75-8. https://doi.org/10.5999/aps.2018.00087

17. Sasabe Y, Niitani M, Teramoto C, Yamaga S, Shime N, Tanabe K, et al. Deep sedation predicts pressure injury in patients admitted to intensive care units. Nurs Crit Care. 2022;27(6):877-84. https://doi.org/10.1111/nicc.12753

18. 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. https://doi.org/10.1007/s00134-020-06234-9

19. Munoz ND, 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. https://doi.org/10.1097/01.ASW.0000653144.90739.ad

20. Ottaviani S, Rondanina E, Arnone F, Brucato V, Campigli R, Bona MD, et al. Multidimensional-based prediction of pressure ulcers development and severity in hospitalized frail oldest old: a retrospective study. Clin Interv Aging. 2024;19:1509-17. https://doi.org/10.2147/CIA.S440943

21. Chaboyer WP, Thalib L, Harbeck EL, Coyer FM, Blot S, Bull CF, et al. Incidence and prevalence of pressure injuries in adult intensive care patients: a systematic review and meta-analysis. Crit Care Med. 2018;46(11):e1074-e1081. https://doi.org/10.1097/CCM.0000000000003366

22. Black JM. Root cause analysis for hospital-acquired pressure injury. J Wound Ostomy Continence Nurs. 2019;46(4):298-304. https://doi.org/10.1097/WON.0000000000000546

23. Delgado SA. Strategies to avoid the unavoidable: preventing hospital-acquired pressure injury. Am J Crit Care. 2019;28(5):353. https://doi.org/10.4037/ajcc2019590

24. Pittman J, Beeson T, Dillon J, Yang Z, Mravez M, Malloy C, et al. Hospital-acquired pressure injuries and acute skin failure in critical care: a case-control study. J Wound Ostomy Continence Nurs. 2021;48(1):20-30. https://doi.org/10.1097/WON.0000000000000734