

Pressure injuries in orthopedic patients: clinical, sociodemographic and care profile**

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ABSTRACT

Objective: To describe the clinical and epidemiological profile of patients with pressure injuries treated at the Stomatherapy unit of a reference institute in Traumatology and Orthopedics. **Method:** A descriptive and documentary study with a quantitative approach was conducted from January 2022 to December 2023, based on the analysis of medical records corresponding to patients followed-up at the Stomatherapy unit of a reference institute in Traumatology and Orthopedics. **Results:** Predominance of the female gender, aged patients and overweight individuals was observed. The most frequent comorbidities were systemic arterial hypertension, diabetes *mellitus*, kidney disease, hypothyroidism, Chronic Obstructive Pulmonary Disease and rheumatoid arthritis. The median hospitalization time was longer than the follow-up period in the Stomatherapy unit. Most pressure injuries were identified in the post-operative period, with predominance of Stage 2, unstageable and deep tissue injuries. The most affected anatomical regions were the calcaneus bones and the sacrococcygeal area. The incidence of injuries was higher on the ipsilateral side of the procedures proposed. No deaths attributable to pressure injuries were recorded. **Conclusion:** The patients' profile was characterized by aged female adults with multiple comorbidities and overweight status, with predominance of injuries in specific pressure areas, especially in the post-operative context.

KEYWORDS: Stomatherapy. Orthopedic Nursing. Pressure injuries.

Perfil clínico e epidemiológico de pacientes ortopédicos com lesão por pressão

RESUMO

Objetivo: Descrever o perfil clínico e epidemiológico de pacientes com lesão por pressão atendidos na unidade de estomaterapia de um instituto de referência em traumatologia e ortopedia. **Método:** Estudo descritivo, documental de abordagem quantitativa, por meio da análise de prontuários de pacientes acompanhados pela unidade de estomaterapia de um instituto de referência em traumatologia e ortopedia, de janeiro de 2022 a dezembro de 2023. **Resultados:** Observou-se predominância do sexo feminino, pacientes idosos e indivíduos com sobrepeso. As comorbidades mais frequentes foram hipertensão arterial sistêmica, diabetes *mellitus*, doença renal, hipotireoidismo, doença pulmonar obstrutiva crônica e artrite reumatoide. A mediana do

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****Origin of the article:** Extracted from the Course Conclusion paper entitled "Clinical and epidemiological profile of orthopedic patients with pressure injuries", presented in 2025 at the Residency-based Nursing Graduate Program in Clinical and Surgical Nursing with a Focus on Traumatology and Orthopedics offered by *Universidade Federal do Estado do Rio de Janeiro*.

período de internação hospitalar foi superior ao período de acompanhamento pela unidade de estomaterapia. A maioria das lesões foi identificada no pós-operatório, sendo predominantes aquelas em estágio 2, não classificáveis e tissulares profundas. As regiões anatômicas mais acometidas foram os calcâneos e a sacrococcígea. A ocorrência das lesões foi maior ipsilateral ao procedimento proposto. Não foram registrados óbitos atribuídos à lesão por pressão. **Conclusão:** O perfil dos pacientes foi caracterizado por idosos, sexo feminino, com múltiplas comorbidades e sobrepeso, apresentando predominância de lesões em áreas de pressão específicas, especialmente no contexto pós-operatório.

DESCRIPTORES: Estomaterapia. Enfermagem ortopédica. Lesão por pressão.

Lesiones por presión en pacientes ortopédicos: perfil clínico, sociodemográfico y asistencial

RESUMEN

Objetivo: Describir el perfil clínico y epidemiológico de pacientes con lesiones por presión atendidos en la unidad de Estomaterapia de un instituto de referencia en Traumatología y Ortopedia. **Método:** Estudio descriptivo, documental y de enfoque cuantitativo, desarrollado entre enero de 2022 y diciembre de 2023 y basado en el análisis de historias clínicas de pacientes atendidos en la unidad de Estomaterapia de un instituto de referencia en Traumatología y Ortopedia. **Resultados:** Se observó predominio del sexo femenino, pacientes de edad avanzada e individuos con sobrepeso. Las comorbilidades más frecuentes fueron hipertensión arterial sistémica, diabetes mellitus, enfermedad renal, hipotiroidismo, Enfermedad Pulmonar Obstructiva Crónica y artritis reumatoide. La mediana del tiempo de hospitalización fue superior al período de seguimiento en la unidad de Estomaterapia. La mayoría de las lesiones se identificó en el período postoperatorio, con predominio de lesiones en estadio 2, no clasificables y lesiones de tejido profundo. Las regiones anatómicas más afectadas fueron los talones y la región sacrococcígea. La incidencia de las lesiones fue mayor en el lado ipsilateral a los procedimientos realizados. No se registraron muertes atribuidas a las lesiones por presión. **Conclusión:** El perfil de los pacientes se caracterizó por mujeres de edad avanzada, con múltiples comorbilidades y sobrepeso, presentando predominio de lesiones en áreas de presión específicas, especialmente en el contexto postoperatorio.

DESCRIPTORES: Estomaterapia. Enfermería ortopédica. Lesiones por presión.

INTRODUCTION

Pressure injuries (PIs) are characterized as localized damage to the skin and/or underlying tissues, generally over bony prominences^{1,2}. Their etiology is multifactorial and can result from the combination of extrinsic factors (such as pressure, shear, friction and changes in local microclimate) with intrinsic ones like lifestyle, advanced age, Body Mass Index (BMI), nutrition and associated pathologies¹. They are classified as stages 1, 2, 3, 4, unstageable PIs, deep tissue injuries, medical-device related injuries and mucous membrane PIs^{1,2}.

They are habitual adverse events in several care contexts³. According a nationwide report of healthcare-related incidents, 20.3% of all events notified to the national Health Surveillance System (*Sistema Nacional de Vigilância Sanitária*, SNVS) between 2014 and 2022 corresponded to PIs; 72.21% of the “never events” referred to Stage 3 PIs and 21.57% to Stage 4 PIs⁴.

Preserving skin integrity is a constant challenge for care teams, especially in hospital contexts. In this scenario, an increasing volume is observed in terms of scientific production targeted at identifying risk factors, implementing preventive protocols and monitoring pressure injuries in clinical and critically-ill patients⁵. However, the studies specifically focused on the orthopedic population are still scarce, despite the assistance- and surgical-related particularities that increase these patients' vulnerability to developing pressure injuries.

Orthopedic patients present specific factors associated to PI risk, such as restricted mobility, difficulty changing to the supine position, prolonged immobilization, use of orthopedic devices and circulatory alterations arising from surgical procedures⁶. In addition to that, prolonged peri-operative times and the functional limitations resulting from orthopedic conditions can increase the incidence of these injuries.

Given the clinical relevance of this theme, the volume of PI notifications and the scarcity of studies specifically targeted at orthopedic patients, it becomes necessary to conduct more in-depth studies on the topic.

OBJECTIVES

To describe the clinical and epidemiological profile of patients with pressure injuries treated in the Stomatherapy unit of a reference institute in Traumatology and Orthopedics.

METHODS

This is a descriptive and documentary study with a quantitative approach, developed at an institute that is a reference in Traumatology and Orthopedics located in the state of Rio de Janeiro. It was prepared according to the recommendations set forth in *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE).

The medical records analyzed were those corresponding to patients hospitalized with pressure injuries and followed-up in the Stomatherapy unit from January 1st, 2022, to December 31st, 2023.

The sample was selected by convenience. Medical records of patients aged at least 18 years old, who developed pressure injuries during their hospitalization and who were evaluated at least once in the Stomatherapy unit during the period established were included. Medical records lacking essential information to characterize the sample and analyze the outcomes were excluded. A total of 230 records were initially identified as eligible for analysis, excluding 110 of them. Thus, 120 medical charts comprised the final study sample, as presented in Figure 1.

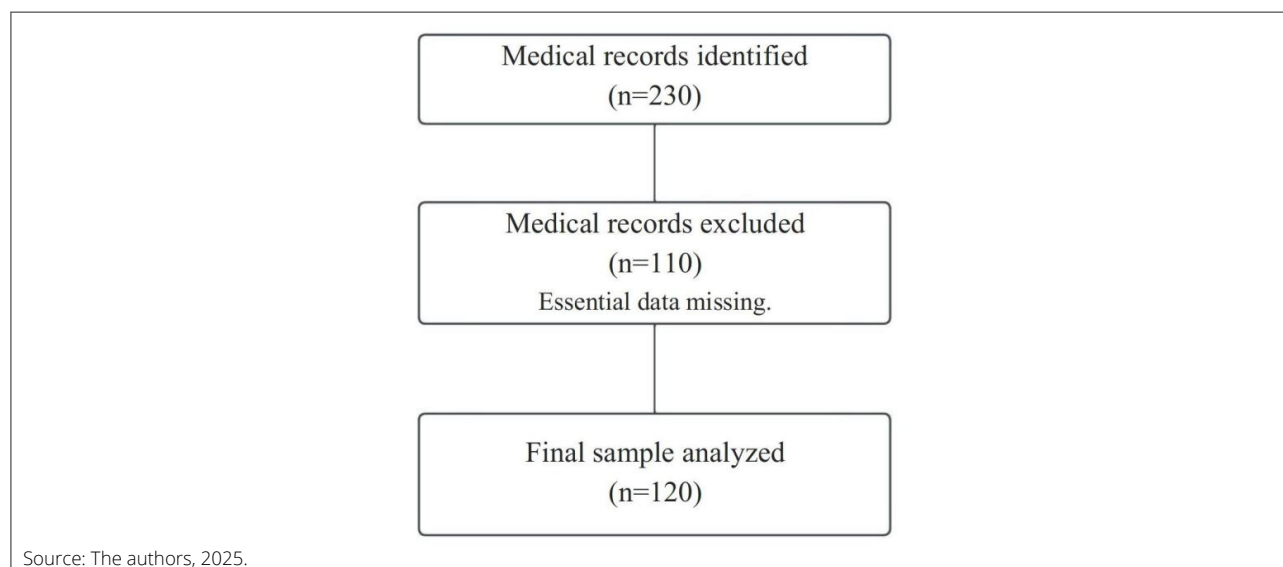


Figure 1. Flowchart showing the process followed to select the study sample. Rio de Janeiro, 2025.

Data collection took place between November 2024 and January 2025 by analyzing physical and virtual medical records, considering the institutional data storage system transition process. In order to ensure standardization when extracting the data, a structured data collection instrument created in the *Google Forms* platform was used, with previously defined variables based on the study objectives.

The variables collected included gender, age, smoking habit, Body Mass Index, comorbidities, corticosteroid use (or not), procedures proposed, pressure injury location, injury stage at the first evaluation, hospitalization time, follow-up time in the Stomatherapy unit, incidence and cause of death.

The Body Mass Index (BMI) was calculated by the researchers. Considering the bodily changes related to aging, such as reduced muscle and bone mass and body fat redistribution, age groups were respected when analyzing the results. The follow-up period in the Stomatherapy unit and the hospitalization time were also calculated by the researchers.

The data collected were double-checked and organized in a *Microsoft Excel* spreadsheet. The analytical unit used varied according to each variable researched. The sociodemographic and clinical analyses considered the number of patients; in turn, those referring to location and categorization of the injuries considered the total number of pressure injuries identified.

Distribution of the continuous variables was assessed with the D'Agostino-Pearson test. The statistical analyses were performed in *Python* (version 3.10) considering a 5% significance level. None of the variables considered in this study followed normal distribution.

Taking into account the study descriptive design, it was decided to use descriptive statistics to characterize the sample. The categorical data were presented as absolute and relative frequencies, whereas the numerical ones were expressed as medians and interquartile ranges (IQRs).

The research met the guidelines set forth in National Health Council Resolution No. 466/2012. The study was approved by a Research Ethics Committee under Opinion No. 7,098,772 and CAAE No. 78786024.7.3001.5273.

RESULTS

A total of 120 medical records corresponding to patients with pressure injuries followed-up in the Stomatherapy unit were analyzed. In relation to the sociodemographic data, discrete predominance of the female gender was noticed with 61 patients (50.8%), whereas 59 (49.2%) participants belonged to the male gender. The age median was 68 years old (IQR: 58–78).

As for the clinical data, 13 patients (10.8%) had a tobacco use history.

The Body Mass Index median was 25 kg/m² (IQR: 22–29 kg/m²) among the adults and 27 kg/m² (IQR: 23–31 kg/m²) among the older adults. In all, 25 patients (20.8%) used corticosteroids.

The most prevalent comorbidities were systemic arterial hypertension, diabetes *mellitus*, kidney disease, hypothyroidism, Chronic Obstructive Pulmonary Disease, rheumatoid arthritis and cardiopathies, as presented in Table 1.

Table 1. Main comorbidities presented by the patients with pressure injuries. Rio de Janeiro, 2025.

Comorbidities	n	%
Systemic Arterial Hypertension	78	65
Diabetes <i>mellitus</i>	40	33.3
Kidney disease	13	10.8
Hypothyroidism	9	7.5
Chronic Obstructive Pulmonary Disease	7	5.8
Rheumatoid arthritis	7	5.8
Cardiopathies	7	5.8

Source: The authors, 2025.

Note: The same patient may have presented more than one comorbidity.

Among the patients analyzed, 20 (16.0%) evolved to death. The main causes recorded were multiple organ dysfunction and septic shock, both with five cases, followed by pulmonary septic shock with two. The other causes included respiratory failure, pneumonia, subacute osteomyelitis, massive pulmonary thromboembolism, cardiogenic shock, mixed shock and associated neoplasms.

As for the assistance-related data, the hospitalization time median was 47 days (IQR: 22–112); in turn, the median corresponding to the follow-up period in the Stomatherapy unit was 19 days (IQR: 4–58). Among all the patients, 22 (18.3%) were evaluated during the pre-operative period, whereas 98 (81.7%) were subjected to the evaluation during the post-operative period.

A total of 261 pressure injuries were identified. In relation to number of injuries per participant, 64 (53.3%), 23 (19.2%) and 17 (14.2%) presented one, two and three, respectively (Table 2).

Table 2. Distribution corresponding to the pressure injuries according to their stage at the first evaluation. Rio de Janeiro, 2025.

Pressure injury stages	n	%
Stage 2 pressure injury	73	28.0
Unstageable pressure injury	68	26.1
Deep tissue injury	50	19.2
Stage 1 pressure injury	30	11.5
Medical device-related injury	26	10.0
Stage 4 pressure injury	7	2.7
Stage 3 pressure injury	5	1.9
Mucous membrane injury	2	0.8

Source: The authors, 2025.

Given the specificity of the cases analyzed, the procedures proposed did not present significant frequencies in the individual evaluations. In order to ease the analysis, the data were categorized according to the anatomical sites where the procedures were performed, namely: Lower Left Limb (LLL), Lower Right Limb (LRL) and Trunk. Three patients had procedures performed on different sites: one on the Trunk and LLL; one on the Trunk, LLL and LRL; and one on LLL and LRL (Table 3).

In addition to the orthopedic procedures categorized by anatomical sites, hospitalizations related to clinical management and debridement of pressure injuries were identified. It is noted that all the participants included in the study presented orthopedic conditions in the pre- or post-operative period, considering the assistance profile of the institution, characterized as a reference center in Traumatology and Orthopedics, with admission strictly by central referral. These cases were presented separately due to the assistance-related particularities involved and to the low frequency observed, enabling better data organization interpretation, as shown in Table 4.

Among the participants subjected to LRL procedures, it was found that 33 injuries (26.6%) were contralateral, 56 (45.2%) were ipsilateral and 35 (28.2%) were located in the midline. Among those with LLL procedures, 11 injuries (16.4%) were contralateral, 29 (43.3%) were ipsilateral and 27 (40.3%) were located in the midline. In turn, among the patients with procedures performed on the Trunk, 15 (27.3%) presented pressure injuries in the midline, 23 (41.8%) on the right side of the body and 17 (30.9%) on the left side of the body. None of the procedures proposed was performed on the upper limbs.

The anatomical regions most affected by pressure injuries were the calcaneus and sacrococcygeal ones.

DISCUSSION

The findings showed discrete predominance of the female gender, a similar result to the one observed in epidemiological studies on pressure injuries^{7,8}. However, the literature specifically related to orthopedic patients frequently describes higher incidence among adult men, especially in institutions targeted at serving trauma and emergency cases.

The predominance of aged patients noticed in this study is related to the physiological changes inherent to aging^{9,10}, including reduced cutaneous elasticity, diminished tissue perfusion and greater skin frailty, factors that increase susceptibility

Table 3. Distribution corresponding to the pressure injuries according to orthopedic procedure sites. Rio de Janeiro, 2025.

Procedure sites	Main pressure injury locations	n
Lower Right Limb (n=62*)	Right calcaneus	24
	Sacroccygeal region	22
	Left calcaneus	15
	Right gluteal region	8
	Genitalia	6
	Right tibial region	6
	Left gluteal region	5
	Right lateral malleolar region	5
	Dorsal region	3
	Right inguinal region	3
	Left lateral malleolar region	3
	Left tibial region	3
	Right elbow	2
	Right femoral region	2
	Right ischial region	2
	Left ischial region	2
	Occipital region	2
	Intergluteal region	2
	Others [†]	9
	Total:	124
Lower Left Limb (n=33*)	Sacroccygeal region	16
	Left calcaneus	12
	Right calcaneus	8
	Occipital region	4
	Left tibial region	4
	Genitalia	3
	Left femoral region	3
	Left gluteal region	2
	Intergluteal region	2
	Left lateral malleolar region	2
	Others [†]	11
	Total:	67
Trunk (n=21*)	Sacroccygeal region	7
	Right calcaneus	7
	Left calcaneus	5
	Right tibial region	5
	Mental region	3
	Left tibial region	3
	Left elbow	2
	Lips	2
	Right gluteal region	2
	Right lateral malleolar region	2
	Others [†]	17
	Total:	55

Source: The authors, 2025.

*The same patient may have presented the procedure proposed in more than one anatomical region; [†]Single instances were removed to ease visualization of the table.

Note: The same patient may have presented more than one pressure injury.

Table 4. Distribution corresponding to the pressure injuries according to the procedures. Rio de Janeiro, 2025.

Other procedures	Pressure injury locations	n
Clinical (n=6*)	Left calcaneus	3
	Right gluteal region	2
	Sacroccygeal region	2
	Others [†]	7
		Total: 14
Pressure injury debridement (n=2*)	Others [†]	7

Source: The authors, 2025.

*The same patient may have presented the procedure proposed in more than one anatomical region; [†]Single instances were removed to ease visualization of the table.

Note: The same patient may have presented more than one pressure injury.

to developing pressure injuries⁹. However, as was the case with the female gender predominance, the advanced aged found contrasts with literature findings that point to a population of orthopedic patients predominantly comprised by adult men^{7,8}. This difference can also be related to the profile of the institution under study.

The smoking habit is a relevant risk factor for developing pressure injuries (PIs), as it impair vascular response by means of multiple pathophysiological mechanisms, with hemodynamic and autonomic alterations, increased oxidative stress, activation of inflammatory pathways, endothelial dysfunction, pro-thrombotic states and changes in lipid metabolism standing out among them¹¹.

The Body Mass Index is a relevant criterion to assess PI development risk, as incidence is higher in patients close to the extremes: low weight or obesity^{12,13}. The predominance of overweight is pointed out, a condition associated with increased pressure exerted over bony prominences and with difficulty moving^{9,14}.

Previous corticosteroid use is an extrinsic risk factor for developing PIs. A number of studies indicate that chronic corticoid use leads to suppressing the inflammatory phase of the wound healing process¹⁵. In the current study, 25 patients (20.8%) made previous corticosteroid use, although the time per patient using that medication class was not quantified, thus precluding connecting the data.

The main comorbidities identified were systemic arterial hypertension, diabetes *mellitus* and kidney disease, conditions widely described as factors associated with reduced tissue perfusion and with impaired wound healing processes^{7,8,13}.

None of the deaths was directly attributed to pressure injuries. However, high frequency of septic shock and multiple organ dysfunction was observed among the causes recorded; these conditions are frequently associated with hospitalized patients' clinical severity^{16,17}.

Sepsis is considered a risk factor for developing PIs, as addressed in some literature materials¹⁷⁻¹⁹. In turn, the inverse relationship has also been analyzed. An international study conducted at an intensive treatment unit indicated that patients with PIs can develop infections evolving to sepsis, associating PI-induced sepsis with high mortality risks²⁰.

The high frequency of evaluations during the post-operative period can be explained by the institution's assistance profile, predominantly characterized by elective procedures. The predominantly elective profile of the institution may contribute to longer peri-operative times and to prolonged exposure to immobility, factors that favor the development of pressure injuries, especially in patients subjected to large-size orthopedic surgeries. These patients frequently present restricted mobility, edema and pain, in addition to using orthopedic devices, factors directly related to the risk of developing pressure injuries^{6,12}.

The prolonged hospitalization times observed in this study is in consonance with the literature^{3,7,15}, which shows that pressure injuries are associated with longer hospitalizations and higher care complexity. The follow-up period in the Stoma-therapy unit presents a shorter trend than the hospitalization one. This fact indicates that the extended hospitalization times can be related to the orthopedic patients' clinical severity, especially due to the need for restricted mobility, prolonged rehabilitation, surgical procedures and higher risk of infectious and functional complications.

More than half of the participants presented only one pressure injury. As for their stages, there was predominance of Stage 2, unstageable and deep tissue injuries.

The significant incidence of unstageable PIs can be linked to work organization in the Stomatherapy unit, which has female nurses specialized in Dermatology Nursing and Stomatherapy. The assistance provided to the patients is implemented by opinion requests. Consequently, such requests are mostly made for complex injuries that require specialized treatment.

The most affected anatomical regions were the calcaneus bones and the sacrococcygeal area, a finding that is compatible with national and international studies^{7,8,15,21}. The predominance of injuries in these regions evidences the need to intensify preventive measures related to pressure relief, decubitus change, use of pressure-redistributing surfaces and ongoing skin integrity monitoring during hospitalization. These results suggest prolonged permanence in the dorsal decubitus position and reduced mobility during the hospitalization period.

The findings detected in this study reinforce the relevance of specialized Stomatherapy professionals' work in early identifying risk factors, monitoring skin integrity and implementing preventive strategies targeted at reducing the incidence of pressure injuries in hospitalized orthopedic patients. Systematic evaluations in charge of specialized teams can contribute to earlier interventions, to preventing complications and to qualifying Nursing assistance.

Study limitations

Among the limitations inherent to the retrospective design, the possibility of information bias resulting from having used secondary data obtained from medical records stood out. In addition to that, having implemented convenience sampling may have impaired representativeness of the sample and limited generalization of the results.

Another important limitation refers to the brief time clipping selected for the study, resulting from institutional difficulties associated with the pandemic period and with the data storage system transition process.

It is noted that no predictive scale for pressure injury risk was used (such as the Braden Scale), which restricted more in-depth analyses related to risk stratification corresponding to the patients evaluated.

Recommendations

Given these findings, the recommendation is to develop specific protocols to prevent pressure injuries in orthopedic patients, as well as multicenter studies with probability samples. It is also suggested that more in-depth research studies are conducted about the relationship between orthopedic procedure sites and pressure injury development.

CONCLUSION

Orthopedic patients are at a high risk of developing pressure injuries due to the mobility limitations, the need to use orthopedic devices and the functional restrictions associated with surgical treatments.

The results showed predominance of aged patients, overweight and with multiple comorbidities, factors that potentiate the risk for pressure injury incidence.

The most affected anatomical regions were the calcaneus bones and the sacrococcygeal area; in turn, Stage 2, unstageable and deep tissue injuries presented higher frequency.

More than half of the patients presented only one pressure injury. The evaluations were more frequently performed during the post-operative period. Longer hospitalization times were recorded. Higher frequency of ipsilateral injuries in relation to the procedures was observed. None of the deaths had pressure injuries as main cause.

Therefore, the importance of Nursing teams' performance in terms of implementing preventive strategies, early identifying risk factors and adequately managing pressure injuries in orthopedic patients is highlighted.

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