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Occurrence of Pressure Injuries before and during the Covid-19 Pandemic: a comparative study

Ocorrência de Lesão por Pressão antes e durante a Pandemia de Covid-19: um estudo comparativo

Ocurrencia de Lesiones por Presión antes y durante la Pandemia de Covid-19: un estudio comparativo

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Abstract

Objective: To compare the occurrence of Pressure Injuries (PI) in patients hospitalized before and during the Covid-19 pandemic. **Method:** This is a cross-sectional, retrospective and comparative study, with a quantitative approach, in which medical records of patients who developed PI twelve months before and in the first twelve months of the Covid-19 Pandemic, in a hospital in southern Brazil, were analyzed. **Results:** PI affected 544 patients in the twelve months prior to the pandemic and in the first twelve months of the event. In both periods, there was a higher occurrence of stage 2 PI, with 30% and 42.1%, respectively, and the sacral region was the most affected in both periods, with 42.9% in the first period and 30.2% in the second. Also noteworthy was the increase in pressure injuries in the anterior face region, from 5.9% to 14.3% from one period to the next, with the majority of cases occurring in Intensive Care Units (ICU), reaching 60% and 77%. **Conclusion:** When compared to the previous year, there was an increase in the number of PI cases in the first year of the Covid-19 pandemic, especially in ICUs and in the type of PI, with a higher incidence of injuries in the sacral and facial anatomical regions.

Descriptors: Enterostomal Therapy; Pressure Ulcer; Covid-19.

Whats is already known on this?
The Covid-19 pandemic has led to a high number of admissions to Intensive Care Units, with a consequent increase in pressure injuries.

What this study adds?
With the pandemic, the characteristics of pressure injuries have changed, especially due to the need to keep patients prone, causing injuries to anterior regions of the body.

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Resumo

Objetivo: *Comparar a ocorrência de Lesões por Pressão (LP) em pacientes internados antes e durante a pandemia de Covid-19.* ***Método:*** *Trata-se de um estudo transversal, retrospectivo e comparativo, com abordagem quantitativa, no qual foram analisados prontuários de pacientes que desenvolveram LP doze meses antes e nos doze meses iniciais da Pandemia de Covid-19, em um hospital do Sul do Brasil.* ***Resultados:*** *As LP acometeram 544 pacientes nos doze meses prévios à pandemia e nos primeiros doze meses do evento. Em ambos os períodos, houve maior ocorrência de LP de estágio 2, com 30% e 42,1%, respectivamente, sendo a região sacral a mais acometida nos dois períodos, com 42,9% no primeiro momento e 30,2% no segundo. Destaca-se ainda, o crescimento de lesões por pressão na região de face anterior, de 5,9% a 14,3% de um período a outro, sendo a maioria dos casos ocorridos nas Unidades de Terapia Intensiva (UTI), chegando a 60% e 77%.* ***Conclusão:*** *Quando comparado ao ano anterior, houve aumento do número de casos de LP no primeiro ano de pandemia de Covid-19, especialmente nas UTIs e no tipo de LP, evidenciando-se maior incidência de lesões em regiões anatômicas sacral e de face.*

Descritores: *Estomaterapia; Úlcera por Pressão; Covid-19.*

Resumén

Objetivo: *Comparar la aparición de Lesiones por Presión (LP) en pacientes hospitalizados antes y durante la pandemia de Covid-19.* ***Método:*** *Se trata de un estudio transversal, retrospectivo y comparativo, con abordaje cuantitativo, en el cual fueron analizadas las historias clínicas de pacientes que desarrollaron LP doce meses antes y en los primeros doce meses de la pandemia de Covid-19, en un hospital del sur de Brasil.* ***Resultados:*** *La LP afectó a 544 pacientes en los doce meses anteriores a la pandemia y en los primeros doce meses del evento. En ambos períodos, hubo una mayor ocurrencia de LP en estadio 2, con 30% y 42,1%, respectivamente, y la región sacra fue la más afectada en ambos períodos, con 42,9% en el primero y 30,2% en el segundo. Destaca también el aumento de las lesiones por presión en la región de la cara anterior, pasando de un 5,9% a un 14,3% de un periodo a otro, siendo la mayoría de los casos en las Unidades de Cuidados Intensivos (UCI), alcanzando el 60% y el 77%.* ***Conclusión:*** *En comparación con el año anterior, hubo un aumento en el número de casos de LP en el primer año de la pandemia de Covid-19, especialmente en las UCIs y en el tipo de LP, con una mayor incidencia de lesiones en las regiones anatómicas sacra y facial.*

Descriptores*: Estomaterapia; Úlcera por presión; Covid-19.*

INTRODUCTION

Pressure Injuries (PI) consist of damage to the skin and underlying soft tissues caused by prolonged pressure on bony prominences and/or pressure caused by shear. Injuries can also occur due to prolonged pressure or friction caused by medical devices.[1]

They are classified in stages from 1 to 4, progressively according to the degree of tissue damage. They can also be called unclassifiable PI, deep tissue PI (DTPI), medical device-related PI and mucous membrane PI.[1]

PI is an adverse health event, is preventable and has a negative impact on the patient's recovery, which can result in increased hospitalization time, a worse prognosis, physical and emotional damage and a greater risk of morbidity and mortality, as well as increased costs related to treatments and hospitalizations.[1]

Considering the negative impact of PI on both the patient and the health services, there is a need to constantly monitor the occurrence of this event, as well as its related factors, in order to subsidize professional practice, showing the need to evaluate and update prevention measures and the appropriate management of these injuries.[2-3]

The National Pressure Injury Advisory Panel (NPIAP) has taken a position on the increase in cases of this condition after the start of the Covid-19 pandemic, suggesting that this surge may be related to the greater number of hospital admissions and even to the profile of patients affected by the SARS-CoV virus, when compared to those affected by other diseases.[4]

Covid-19 is an infectious condition with high transmissibility and is characterized by the manifestation of respiratory symptoms that can progress to severe acute respiratory syndrome (SARS).[5,7] The severe form of the disease significantly impairs gas exchange, since the affected individual manifests severe respiratory distress, requiring hospitalization, often in intensive care units. Thus, these people require constant assessment, oxygen support and there may also be a need for orotracheal intubation, management with vasoactive drugs, sedation and neuromuscular blockers.[3,6,8] In addition, it should be borne in mind that these patients had refractory hypoxemia, which may require adjunctive alternatives to improve oxygenation, such as the prone position (PP).[2-3]

With regard to pronation, it should be noted that it has resulted in a change in the characterization of the occurrence of PI, since this position affects areas that are usually spared from the application of constant pressure, which began to show tissue damage, thus showing lesions in anterior facial and body regions. A cohort study carried out in 2022 with 150 critically ill patients who were prone showed that 56% of them developed facial injuries.[9]

In addition, the use of vasoactive drugs, sedatives and a long period on invasive mechanical ventilation, which are common in the management of patients affected by Covid-19, are also risk factors for the occurrence of pressure injuries and other skin lesions.[3,9]

Considering the scarcity of studies on the occurrence of PI during pandemics, the possibility of identifying early warnings and preventing such injuries in severe cases of Covid-19, understanding the complexity of the critical respiratory patient and the inherent risks associated with PI, this study aimed to compare the occurrence of PI in patients admitted to a tertiary hospital in the south of the country, in the period corresponding to the twelve months prior to and the first twelve months of the Covid-19 pandemic.

METHODS

This was an observational, retrospective and comparative study, with a quantitative approach, which followed the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). The STROBE initiative has a system that guides the researcher through 22 recommendations that should be implemented in observational research, outlining each component of the project: title; abstract; introduction; method; results; discussion; and other information.[10]

The study was carried out in a large tertiary care public university hospital located in Curitiba, Paraná, Brazil, with a capacity of 600 beds, 60 of which are allocated to the Intensive Care Unit (ICU). During the Covid-19 pandemic, the institution identified the need to increase the supply of ICU beds, so 100 beds were allocated exclusively to patients hospitalized with the disease.

The institution has a specialized Dermatological Nursing service, made up of four specialist nurses, called the Skin Care Team (SCT). This group assesses and prescribes care and treatment for patients who have developed PI, as well as making notifications in the institution's own system, training in skin care and tabulating hospital indicators. The SCT uses the Excel tool to record the date of diagnosis, its stage, anatomical site, wound characteristics (bed, exudate, edges, peri-injured skin and signs of infection), treatment used, patient comorbidities, hospitalization unit and healing date related to the occurrence of PI. The tabulation of this information was the source of the data for this study, which was a convenience sample in which incomplete records without any of the above information were excluded.

For the purposes of this study, only patients who developed PI during their stay at the institution were considered. After identifying this sample, medical records were selected with retrospective data referring to hospitalized individuals who had developed PI in the institution between the periods of March 2019 to March 2020 (before the pandemic) and April 2020 to March 2021 (during the pandemic), admitted to the wards and ICUs in both periods. It should be noted that individuals who had previously suffered a pressure injury at home, in other healthcare institutions or in long-term care facilities were excluded.

Data was collected between November and December 2022. The data was tabulated in an Excel spreadsheet, including the characterization of the patients (age, gender, marital status) and the characterization of the PI (anatomical location, classification, sector where the PI developed and the patient's clinical outcome).

The data were analyzed using the computer program Stata/SE v.14.1. StataCorpLP, USA. Results for quantitative variables were described by mean, standard deviation, median, minimum, and maximum. Categorical variables were described by frequency and percentage. Student's t-test for independent samples or the Mann-Whitney non-parametric test were used to compare the "before pandemic" and "pandemic" periods in relation to quantitative variables. For categorical variables, comparisons were made using Fisher's exact test or the Chi-square test. Values of $p<0.05$ indicated statistical significance.

The research was approved by the Institution's Research Ethics Committee, following all the ethical aspects set out in Resolution 466/2012 of the National Health Council, and was approved by Opinion No. 5.075.321 and CAAE 52561221800000096.

RESULTS

The total sample consisted of 544 patients who developed a pressure injury during hospitalization, divided into two periods: the first before the Covid-19 pandemic, from March 2019 to March 2020, with 27.9% of the sample (n=152); and the pandemic period, from April 2020 to March 2021, with 72.1% (n=392).

The sectors with the highest incidence of PI in both periods were ICUs, with 92 patients in the pre-pandemic period (60%) and 300 patients (77%) in the first 12 months of the pandemic. It was also noted that there were no cases of PI developed in the Surgical Center unit.

As for gender, there was a predominance of males, with similar portions of 59.2% (n=90) and 59.7% (n=234) in the intervals. The samples also converged in terms of marital status, with more married patients (43.4%). With regard to age, the average for the pandemic period was 59.7 years (SD 16.7), higher than the pre-pandemic period, which resulted in 53.1 years (SD 24.9), as well as showing statistical significance (p=0.003).

As Table 1 shows, during the hospitalization period, lesions increased significantly, as did the percentage of patients with four or more PI (p=0.002).

Table 1. Occurrence of Pressure Injury, in the periods before and during the Covid-19 pandemic, in a tertiary level hospital in Paraná. Curitiba, PR, Brazil, 2022.

Variable	Classification	Period		p*
		Pre-pandemic	During the pandemic	
Number of injuries developed during the entire hospitalization period	1	114 (75%)	254 (64.8%)	p=0.002
	2	26 (17.1%)	58 (14.8%)	
	3	9 (5.9%)	36 (9.2%)	
	4 or more	3 (2%)	44 (11.2%)	

p* Chi-square test, p<0.05.
Source: The authors (2022).

Regarding the incidence rate of PI per patient-day, there was a statistically significant relationship (p=0.018), i.e. for every 100 patients/day in the period before the pandemic, approximately eight developed a pressure injury (0.079); and in the period of the pandemic this number increased to approximately 10 per 100 patients (0.096).

As shown in Table 2, prior to Covid-19, the most prevalent outcome was hospital discharge before the PI had healed (45.4%). This is different to when the disease was prevalent, causing many deaths in the institution (57.7%), figures that lead to a p-value of <0.001.

Table 2. Characterization of the clinical outcome of patients with pressure injuries in the periods before and during the Covid-19 pandemic in a tertiary-level hospital in Paraná. Curitiba, PR, Brazil, 2022.

Classification		Period		p*
		Pre-pandemic	During the pandemic	
Outcome	SCT discharge due to healing of the PI	27 (17,8%)	24 (6,1%)	p <0.001
	Discharge from hospital without discharge from the SCT (without healing)	69 (45,4%)	142 (36,2%)	
	Death	56 (36.8%)	226 (57.7%)	

*Fisher's exact test or Chi-squared test, p<0.05.
Source: The authors (2022).

Regarding the classification of PI, Table 3 shows that stage 2 PI were the most common in both periods (30% and 42.1%). However, when we compare PI related to medical devices, we see an exponential increase in their occurrence, from 1.4% (n=3) to 7.6% (n=51).

Table 3. Characterization of the occurrence of pressure injuries according to classification, in the periods before and during the Covid-19 pandemic, in a tertiary-level hospital in Paraná. Curitiba, PR, Brazil, 2022.

Classification of Injury	Period			
	Pre-Pandemic		Pandemic	
	n	%	n	%
PI 1	44	21.7%	52	7.7%
PI 2	61	30.0%	283	42.1%
PI 3	18	8.0%	27	4.0%
PI 4	2	1.0%	0	0.0%
Unclassifiable PI	10	4.9%	73	10.8%
DTPI	57	28.1%	166	24.7%
Related to medical devices	3	1.4%	51	7.6 %
Mucous membrane	8	3.9%	21	3.1 %
Total	203	100.0%	673	100.0%

Source: The authors (2022).

Table 4 also shows that the sacral/coccygeal region was the most frequently affected, with 42.9% (n=87) and 30.2% (n=203) occurring in the first and second time periods. However, there was a noticeable increase in PI on the face, from 5.9% (n=12) to 14.3% (n=96), when analyzing the periods. There was also an increase in PI in the genitals, which previously manifested in 1.5% (n=3) of critically ill patients, which increased during the pandemic to 3.6% (n=24).

Table 4. Characterization of the occurrence of pressure injuries in terms of anatomical location, in the periods before and during the Covid-19 pandemic, in a tertiary-level hospital in Paraná. Curitiba, PR, Brazil, 2022.

Anatomical location	Period			
	Pre-pandemic		Pandemic	
	N	%	N	%
Skull	6	3.0%	22	3.3%
Face	12	5.9%	96	14.3%
Ears	17	8.4%	38	5.6%
Calcaneus	37	18.2%	86	12.8%
Sacra/Coccygeus	87	42.9%	203	30.2%
Gluteus/Intergluteus	12	5.9%	41	6.1%
Anterior Thorax	4	2.0%	55	8.2%
Posterior Thorax	8	3.9%	16	2.4%
Genitalia	3	1.5%	24	3.6%
Knees	0	0.0%	7	1.0%
Trochanter	7	3.4%	27	4.0%
Abdomen	2	1.0%	16	2.4%
Upper Limbs	1	0.5%	0	0.0%
Lower Limbs	7	3.5%	42	6.2%
Total	203	100%	673	100%

Source: The authors (2022).

DISCUSSION

In line with this research, a study carried out with 122 patients in 2018 at a university hospital in Sergipe showed a similarity between the occurrence of PI among men and women.[11] However, other studies show that males are more affected among patients who have developed PI during the Covid-19 pandemic. Unfortunately, the reasons why males predominate in this scenario are not well established in the scientific literature. However, culturally speaking, men attend health services less frequently and, in general, are not adherent to health promotion and prevention practices, a factor that can cause a higher incidence of hospitalization in highly complex services, such as the ICU.[13-14]

In contrast to the present study, a systematic review of the literature analyzed 42 articles and found that this factor is not related to the development of PI.[15] While the age group, made up mostly of elderly people, corroborates the literature.[12,15] In fact, a study carried out in the United States of America analyzed 16 publications and found that the age range of the patients was between 52 and 71 years.[16] It's important to note that senescent people are often faced with situations that can affect their mental state, perceptual capacity, nutrition and mobility, as well as acute conditions resulting from chronic diseases that lead to hospitalization, institutionalization and dependence on care - and these can increase the risk of developing PI and, above all, aging leads to a decrease in the elasticity and thickness of the skin.[17-18] With regard to Covid -19, a high cumulative incidence rate of PI in critically ill patients was observed in a similar study of 668 patients in São Paulo, and the diagnosis of Covid-19 mainly affected the elderly and those with other chronic diseases.

It is undeniable that the nutritional status of individuals with Covid-19 is a risk factor for the increase in these lesions, after all, a hypercatabolic state is established, due to the high potential for nutritional deficiencies associated with the viral infection, interventions such as prone positioning and the use of high-dose sedatives.[19-20]

In the Covid-19 scenario, there was also a lack of professionals on the market and understaffing of the team, which directly interfered with the implementation of patient safety measures, while there were several difficulties being faced by frontline professionals, such as: work overload; long-term fatigue; fear of infection; as well as frustration with the excess of daily deaths. Coupled with this, there was also the difficulty of acquiring prevention materials, such as adequate support surfaces to promote pressure redistribution, resulting in an increase in PI.[21]

PI are commonly related to the non-implementation of skin care measures or the lack of a protocol based on scientific evidence and are considered preventable. However, the clinical picture of individuals affected by Covid-19 differs from other previous hospitalizations and pathophysiological aspects of the disease have corroborated to the appearance of PI, since infection with the new coronavirus favors systemic coagulopathy with hypercoagulation and microvascular occlusion, which is linked to a variety of skin manifestations and clinical complications.[20-21]

Thus, Stomatherapy services and wound prevention and treatment groups have needed to change and remodel, with a view to developing innovative and comprehensive clinical practices for people in critical care, especially due to Covid-19. There are countless ways of caring for the skin of hospitalized patients, such as daily observation, alerting patients to the risk of developing PI, using the Braden scale; repositioning the patient according to tolerance for alternating pressure areas; the use of preventive coverings, such as multilayer foams; humidity control; nutritional assessment and treatment. Despite this, skin lesions defined as PI increased during the pandemic.

Nevertheless, their differential diagnosis is a challenge, especially in the critical care environment, considering acute skin failure (ASF). What differentiates them are the causative factors and the implementation of preventive measures, i.e. PI results from pressure, friction and pressure with shear forces in areas of bony prominence or due to the use of devices, while ASF has clinical and hemodynamic instability as a causative factor, resulting in tissue hypoxia that affects different areas of the body, in bony prominences or not.[1,22]

In 2020, the NPIAP, still at the beginning of the pandemic, issued a document related to the complexity of the patient with Covid-19 and the emergence of inevitable PI, and reports on the pathophysiology of the virus, hemodynamic instability and intrinsic and extrinsic factors, as its causes, which is assimilated with the factors that cause ASF, making it difficult to differentiate between PI and ASF.[4]

Illustrating this scenario, a study carried out in an ICU for the care of patients diagnosed with Covid-19 revealed that, after a detailed inspection of a case of Deep Tissue PI, with an investigation on preventive measures proportional to the patient's risk, as well as an analysis by the multiprofessional team of the pathology and its clinical condition, the lesion was no longer considered a PI, i.e. an adverse event, and was redefined as an ASF.[22] This difference is complex and requires a detailed assessment of the findings that underpin decision-making.

Regarding the characterization of PI, it has been pondered that the Covid-19 pandemic has required an increase in prone patients and a potential complication of this position is PI, which manifests itself in regions that were not common before - such as the malar region, nasal, frontal, mandible, lips,

sternal region and iliac crests - that is, anatomical regions different from those in bedridden patients in the supine position, and it is reported in studies that prone patients have an 80% higher incidence of PI.[9,23-24]

During the pandemic, the exponent "number of patients" and "non-specialized ICU nursing staff" also led to an increase in PI rates. Many authors have reflected on the importance of specialized professionals and aspects associated with understaffing, especially during the Covid-19 pandemic, with a view to providing care with the lowest possible risk of harm.[9,25]

There is a prevalence of PI in ICU patients, as observed in a university hospital, with 32.4% of cases among 176 patients admitted for at least 24 hours. Critical clinical conditions in patients newly admitted to the ICU are common and expected, such as aggravations of chronic diseases, requiring therapeutic interventions such as intubation and sedatives, which make voluntary activities impossible and therefore any capacity for self-care related to nutrition and body hygiene.[26-27]

Despite the high incidence, this is not a challenge exclusive to the ICU, as patients admitted to medical and surgical clinics can also be affected by this condition. Therefore, all professionals in hospitalization services should implement protocols to prevent and reduce its occurrence to a minimum.[14]

As for the study's limitations, we would highlight the scarcity of studies in the literature on pressure injuries in pandemics, leaving this publication as a contribution to the academic community on the subject of pressure injuries in a condition which, until then, had not been observed due to the demand for patients who were submitted to the prone position; we also noticed a gap in knowledge related to nursing care for PIs in the prone position, which requires more robust scientific evidence.

CONCLUSION

In conclusion, during the first year of Covid-19, PIs occurred more frequently in hospitalized patients when compared to the period before the pandemic, especially in those under intensive care. Furthermore, the number of lesions per patient increased and there was a change in the anatomical location of the lesions, with a higher incidence in areas such as the face, genitalia and back.

Although intensive care services have protocols and other measures aimed at preventing their occurrence, during the Covid-19 pandemic there has been a change in the profile of hospitalized patients, as consequence of the pathophysiology of the disease, hemodynamic instability, tissue hypoxia, restriction of patient mobilization, nutritional status, and prone position, resulting in major challenges for injury prevention. In addition, during the pandemic, there was a significant increase in stress and work overload for the teams, which can compromise the quality of care.

Finally, further studies are needed to investigate the prevalence and incidence of PI in patients hospitalized for Covid-19 and the factors related to its occurrence, with a view to improving the tools and measures already used for prevention or structuring new technologies, in order to contribute to the better qualification of nursing practices in this context.

CONTRIBUITIONS

Contributed to the conception or design of the study/research: Oliveira LB, Machado LD, Assis GM, Alcantara CB. Contributed to data collection: Oliveira LB, Machado LD, Alcantara CB. Contributed to the analysis and/or interpretation of data: Oliveira LB, Machado LD, Assis GM, Alcantara CB, França FES, Girondi JBR. Contributed to article writing or critical review: Oliveira LB, Machado LD, Assis GM, Alcantara CB, França FES, Girondi JBR. Final approval of the version to be published: Oliveira LB, França FES.

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