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MEDICAL DEVICE-RELATED PRESSURE INJURY: FREQUENCY AND ASSOCIATED FACTORS

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ABSTRACT

Objective: to analyze the occurrence of pressure injuries related to medical devices in patients admitted to an intensive care unit. **Method:** quantitative, observational, descriptive, prospective cohort study, carried out with 171 patients, from May 15 to August 31, 2018 in the intensive care units of a public hospital in the Federal District. **Results:** the main risk factors were the presence of pressure injuries at admission, with a significant association for the formation of pressure injuries related to medical devices (p=0.002), and patients who progressed to death, with an association for the formation of pressure injuries related to medical devices (p=0.012); medical device-related pressure injury incidence rate of 40.35%. **Conclusion:** the use of medical devices has grown, as well as the appropriation of these technologies in the critical care environment. The multidisciplinary team should be aware of the formation of pressure injuries related to medical devices that can affect hospitalized patients.

DESCRIPTORS: Pressure injury. Equipment and provisions. Risk factors. Intensive care units. Hospitalization. Stomatherapy.

LESÃO POR PRESSÃO RELACIONADA A DISPOSITIVOS MÉDICOS: FREQUÊNCIA E FATORES ASSOCIADOS

RESUMO

Objetivo: analisar a ocorrência de lesões por pressão relacionadas a dispositivos médicos em pacientes internados em unidade de terapia intensiva. **Método:** estudo quantitativo, de caráter observacional descritivo, do tipo coorte prospectivo, realizado com 171 pacientes, no período de 15 de maio a 31 de agosto de 2018 nas unidades de terapia intensiva de um hospital público do Distrito Federal. **Resultados:** os principais fatores de risco foram presença de lesões por pressão na admissão, com associação significativa para a formação de lesão por pressão relacionada a dispositivos médicos (p=0,002), e pacientes que evoluíam ao desfecho óbito, com associação para formação de lesão por pressão relacionada a dispositivos médicos (p=0,012); taxa de incidência de lesão por pressão relacionada a dispositivos médicos de 40,35%. **Conclusão:** o uso de dispositivo médico tem crescido, bem como a apropriação dessas tecnologias no ambiente de cuidados críticos. A equipe multiprofissional deve ficar atenta para a formação das lesões por pressão relacionadas a dispositivos médicos que podem acometer os pacientes internados.

DESCRITORES: Lesão por pressão. Equipamentos e provisões. Fatores de risco. Unidades de terapia intensiva. Hospitalização. Estomaterapia.

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LESIÓN POR PRESIÓN RELACIONADA A DISPOSITIVOS MÉDICOS: FRECUENCIA Y FACTORES ASOCIADOS

RESUMEN

Objetivo:analizar la ocurrencia de lesiones por presión relacionadas a dispositivos médicos en pacientes internados en unidad de terapia intensiva. **Método:** estudio cuantitativo, de carácter observacional descriptivo, del tipo cohorte prospectivo, realizado con 171 pacientes, en el periodo del 15 de mayo al 31 de agosto de 2018 en las unidades de terapia intensiva de un hospital público del Distrito Federal. **Resultados:** los principales factores de riesgo fueron presencia de lesiones por presión en la admisión, con asociación significativa para la formación de lesión por presión relacionada a dispositivos médicos (p=0,002), y pacientes que evolucionaron al desenlace de muerta, con asociación para la formación de lesión por presión relacionada a dispositivos médicos (p=0,012); tasa de incidencia de lesión por presión relacionada a dispositivos médicos del 40,35 %. **Conclusión:** el uso de dispositivo médico ha aumentado, así como también la apropiación de esas tecnologías en el ambiente de cuidados críticos. El equipo multiprofesional debe ser consciente de la formación de lesiones por presión relacionadas a dispositivos médicos que pueden afectar a los pacientes internados.

DESCRIPTORES: Lesión por presión. Equipamientos y provisiones. Factores de riesgo. Unidades de terapia intensiva. Hospitalización. Estomaterapia.

INTRODUCTION

The skin is an organ that surrounds the entire human body, protecting it and adapting it to the environment. Its main functions are the regulation of body temperature, protection against dehydration and infection, and the collection of sensory information. The skin is formed by two main layers, which are the epidermis and dermis, in addition to the subcutaneous tissue, which serves to unite the skin to the other tissues[1].

Pressure injury (PI) "is a condition located in the skin and underlying soft tissues, it can affect bony prominences or be related to a medical device or another. The lesion can present as intact skin or an open ulcer and can be painful." Medical device-related pressure injury (MDRPI) is caused by pressure exerted by devices used for medical diagnosis and treatment[2].

MDRPI mirrors the shape and location of a medical device. As the material of the devices is mostly rigid plastic, these devices produce an external pressure source that triggers injuries3. MDRPI staging occurs in stages (stage 1, 2, 3, 4, or non-classifiable)2.

The literature emphasizes that among the main risk factors for the formation of MDRPI are the medical diagnoses that influence the severity of the patient's hospitalization; the length of stay; the use of drugs (mainly vasoactive drugs and sedatives/analgesics, which influence sensory perception);comorbidities that worsen the prognosis; hemodynamic worsening that progresses to death; and skin changes resulting from previous PIs, among others[3,4].

As patients hospitalized in intensive care are more prone to PI due to hemodynamic instability, changes in blood circulation, use of vasoactive drugs (which alter skin integrity through peripheral vasoconstriction), among other factors, PI in the sacral and heels region have been tracked for decades, but the incidence or acquired rates from medical devices are not yet widely reported. However, many institutions reduced the number of traditional PIs (sacral, buttocks and calcaneus), but did not maintain care with MDRPI. Thus, an increase in device-related injuries was observed[5].

A study in the United States on the prevalence of PI, with 104,266 patients, showed a rate of 19.9% of MDRPI, while 14.3% were of PI in the sacral region, 10.2% in the calcaneus and 8.8% in the buttocks, however the devices that correlated with the injury were not described[6].

Patients most at risk for MDRPI are those with impaired sensory perception, such as neuropathy and communication deficits (oral intubation, language barriers, unconsciousness, or non-verbal status)[4]. To carry out this identification of patients who are at greater or lesser risk of developing PI, several assessment scales have been used.

For the assessment of PI risk factors, the Braden scale is used in clinical nursing practice in many health organizations, especially in the United States, enabling total scores in order to direct preventive interventions. The Braden scale captures several domains (activity, sensation, and mobility) that are not captured by other predictors, such as patient severity score and comorbidity burden[7].

The National Pressure Ulcer Advisory Panel (NPUAP)2 incorporated protocols to reduce the risks in the formation of MDRPI, such as choosing the correct size of the medical device to fit the individual; protect the skin with dressings in high-risk areas (eg, bridge of the nose); inspect the skin in contact with the device daily; note swelling under the device and the potential for skin injury; and confirm that the devices are not placed directly under a person who is bedridden or immobile.

As the term "MDRPI" was included in the new NPUAP guidelines in 2016, the investigation brings a scientific contribution to the knowledge of the subject and its exploration in the field of nursing and related areas, which provide direct or indirect assistance to patients hospitalized in a unit of intensive care (ICU). The PI indicators reveal important points about the quality of care provided. A study carried out in Turkey with 142 nurses working in the ICU showed that nurses do not have enough knowledge about MDRPI[3,8,9]. Therefore, the objective of this study was to analyze the occurrence of MDRPI in patients admitted to the ICU of a public hospital located in the Federal District (*Distrito Federal-DF*).

METHOD

This is an exploratory, descriptive, cohort study, with a longitudinal prospective nature, with a quantitative approach, carried out in a general hospital in the *Secretaria de Estado de Saúde do Distrito Federal/SES – DF* (State Department of Health of the Federal District), a member of *Sistema Único de Saúde/SUS* (Unified Health System), with different clinical and surgical specialties. The ICU, object of the study, serves adults and is classified as type II, totaling 61 beds, with 9 isolation beds.

The sample consisted of all clients admitted and hospitalized in the referred unit in the period from May 15 to August 31, 2018. Considering the time available to carry out the study, the time unit was manipulated, and the time interval between May and August was defined, since it would be possible to find a diversity of hospitalizations, with a variety of diagnoses. In addition, international studies carried out on this topic included this observation period.[5,6].

During the data collection period, 230 patients were admitted to the study unit. Of these, 59 participants were excluded (15 whose legal representatives did not authorize the patients to participate in the study; 9 were hospitalized in an isolation environment, not authorized to enter due to the condition of risk of contamination by tuberculosis, meningitis, H1N1 and parotitis; 30 patients who were discharged or died before having effective contact with those responsible; and 5 patients who were unconscious and did not receive visits from their legal guardians). At the end of the data collection period, the sample consisted of 171 patients.

For data collection, it was prepared by the researcher, with support from the literature[2,10], an instrument containing demographic information (age, race and sex), date of admission, length of hospital stay and clinical data, collected from the patient's electronic medical record (via trakcare). Other data, such as list of therapeutic devices, risk factors, presence of MDRPI before admission to the ICU, stage of injury, date on which the injury started and whether it was documented as MDRPI, were observed with the patient. A pilot study was carried out with 10 patients to verify the adequacy of the instrument and make adjustments, if necessary. As it was not necessary to adjust the instrument, the 10 patients were included in the final study sample.

Regarding sociodemographic variables, age and sex were described. As for the variables related to the clinical condition, the following were described: length of stay; the person's state of consciousness at the time of entry, based on the Glasgow Coma Scale, as mild (13 to 15 points), moderate (9 to 12) or severe (3 to 8); and mobility, between care-dependent or independent[11].

To assess the risk of developing PI, the Braden scale was used, classified as high risk (≤ 12), moderate risk (13 and 14), low risk (15 and 16 if < 75 years, 15 and 18 if > 75 years). years), without risk (> 17); the medical diagnosis on admission; the presence of comorbidities; the outcome (death or discharge); and the presence or absence of PI at the time of admission[7].

Data collection was carried out in three stages. In the first, the signatures of the Term of Consent or Assent of the person in charge were collected, in the afternoon (time of visit by family members or guardians). In the next step, the medical records were analyzed to collect the diagnoses of hospitalization and origin, among other information necessary for the study, also in the afternoon. In the third stage, the researcher carried out a daily and continuous assessment of the patient in the morning, through a complete physical examination, focusing on the inspection and evaluation and reassessment of the lesions of the patients included in the study, until the patient's discharge or death.

Data treatment was performed using descriptive statistics appropriate to the variables regarding the measurement scale, namely frequency distributions, measures of central tendency (mean and median) and measures of dispersion (standard deviation), presented in the form of tables.

To analyze the relationships between the variables, the chi-square test of independence was used for situations in which both variables were nominal. In the case of quantitative variables, the assumptions of parametric tests were evaluated, namely the normality of distribution of the Kruskal-Wallis test and the calculations of prevalence and incidence. Prevalence and incidence calculations were performed by Eqs. 1 and 2:

$$\text{Prevalence rate} = \frac{\text{number of existing cases}}{\text{number of people in the population}} \times 100 \quad (1)$$

$$\text{Incidence rate} = \frac{\text{number of "new cases" in a given period}}{\text{number of people in the population}} \times 100 \quad (2)$$

The incidence refers to the number of new cases that appear in the population at risk, that is, in patients who do not yet have lesions, but are at risk of developing them. Prevalence is defined by the ratio between the number of patients with an existing lesion and the total number of hospitalized patients at a specific moment in time[12].

The level of significance admitted was 5%, and data processing was performed using the Statistical Package for Social Science (SPSS) software, version 20.0, for Windows. The study complied with Resolution 466/12. The project was approved by the Research Ethics Committee of the Fundação de Ensino e Pesquisa em Ciências da Saúde (FEPECS), in DF, under opinion no. 2599719.

RESULTS

The sociodemographic profile of the 171 patients who made up the sample revealed that 53% of them are male. The average age is 58.5 years. Regarding the medical diagnosis of patients on admission, there was a predominance of grouping diagnoses involving problems related to the respiratory system (30.74%), followed by cardiac alterations (10.78%). With lower frequencies, medical diagnoses were identified related to infectious, contagious and metabolic problems (10.38%), respectively, neurological (9.78%), renal (8.38%), surgical (6.79%) and trauma (5.59%).

Among the main comorbidities that affected patients admitted to the ICU during the observation period, arterial hypertension (SAH) represented 30.35%, followed by diabetes mellitus (DM) with 19.07%, lung diseases with 13.23% and accident cerebrovascular disease with 8.56%. We observed 28.79% of patients with PI on admission.

Upon admission of the patient to the ICU, 74 general PIs (28.79%) were detected. Of these lesions, the distribution of sites was as follows: sacral with 55.41%, followed by the calcaneus and trochanter with 14.86%, auricular region and

malleolus with 6.76% and scapular region with 1.35%, emphasizing that they were multiple lesions were detected at different sites in the same patient.

Regarding the classification of the stages of PI identified at admission, there was a predominance of stage 1, with 44.59%, followed by stages 2 (32.43%), 3 (9.46%), unclassifiable (8, 11%) and stage 4 (5.41%).

It was observed that 95.32% of the patients had their mobility classified as dependent. As for the state of consciousness, 42.69% were considered severe (based on the Glasgow Coma Scale), and 73.68% were at high risk for PI formation.

Regarding the length of stay, the average was 17.97 days. The time for emergence of MDRPI had a mean of 19.84 days and a median of 12 days. Some patients were hospitalized for more than 2 years, due to the need for home respiratory support and were waiting for it to be made available by the Health Department of the Federal District. At the time of data collection, incident injuries were identified in patients in a long period of hospitalization.

Data related to the use of drugs demonstrated the large number of drugs used in the treatment of patients. Antibiotics, with 41.48%, were the most prevalent, followed by sedatives/analgesics, with 26.14%, vasoactive drugs, with 16.48%, antihypertensives, with 7.95%, and other drugs that added 1.70%.

Medical devices identified at patient admission

Medical devices were used according to the clinical situation and the need for optimizing the health status or monitoring patients.

918 devices were identified. The mean number of devices was 5.36 for each of the 171 patients. Pulse oximetry was used in 171 patients, followed by a long-term bladder catheter in 144 patients, and an orotracheal tube (OTT), used in 136 patients. In addition to other devices: male external urinary collector, sphygmomanometer, gastrostomy, chest drain, abdominal drain.

Regarding the PIs related to the devices, there was a predominance of the orotracheal tube with 63.76%, followed by the nasogastric catheter / nasoenteral catheter / orogastric catheter with 24.06% and pulse oximetry with 11.69% (Table 1) . It is noteworthy that more than one lesion was observed in the same patient.

Table 1. Distribution of medical devices that did or did not form a medical device-related pressure injury in the intensive care unit. Brasília (DF) – 2018.

Device	With MDRPI N (%)	Without MDRPI N (%)	Total
Pulse oximetry	20(11.69)	155 (90.64)	171
Long-term bladder catheter	9(6.25)	135 (93.75)	144
Orotracheal tube	88 (63.76)	48 (35.23)	136
Nasogastric catheter/nasoenteral catheter /orogastric catheter	32 (24.06)	101 (75.93)	133
Arterial and venous catheters	0 (0.00)	131 (100)	131
Other devices	13 (14.13)	79 (85.86)	92
Tracheostomy	8 (18.60)	35 (81.39)	43
Peripheral catheters and adhesives	2 (4.76)	40 (95.23)	42
Nasal catheter	3 (23.07)	10 (76.92)	13
Oxygen mask	6 (54.54)	5 (45.45)	11
Splints, tractions and plastered appliances	0 (0.00)	2 (100)	2
Total	181 (19.85)	743 (82.48)	918

MDRPI = Medical device-related pressure injury.

The places with the highest prevalence of formation of MDRPI were ears (32.60%); lips (19.34%) – resulting from the use of OTT, nasal catheter and oxygen mask –; nostrils (17.67%) and fingers (11.05%); and other sites (3.87%), resulting from the adhesive for fixation of venous or arterial catheter (in the right upper limb and subclavian), fixation of the long-term bladder catheter (in the inguinal and vaginal regions), gastrostomy ostium, collector male external urinary tract (located at the base of the penis, where it is attached). Regarding the classification of the MDRPI stage, stage 2 was observed in 51.38% of the injuries, followed by stage 1, with 43.64%, and 3, with 4.97%.

Incidence and prevalence

During the ICU stay, 140 lesions appeared (it is noteworthy that some patients had more than one lesion) in 69 patients, which is equivalent to an incidence rate of MDRPI of 40.35%. The prevalent lesions were 31 in 9 hospitalized patients, establishing a prevalence rate of 45.61%.

Risk factors associated with medical device-related pressure injuries

As risk factors, the following were observed: the clinical severity of the hospitalized patients; the change in mobility; outcomes such as death and discharge; comorbidities such as DM and SAH; the presence of PI on admission; the general conditions of the patient regarding the medical diagnoses of hospitalization; the use of devices; and adjuvant drugs in use.

Table 2 shows the results of the chi-square test between the lesion site and risk factors. "p" values were observed with a significant association for the outcome variables (death) (p=0.012) and presence of PI on admission (p=0.002).

Table 2. Chi-square test between medical device-related pressure injury and risk factors. Brasília (DF) – 2018.

Variables	X^2	d.f.	p value
Presence of pressure injury on admission	49.89	25	0.002
Outcome (discharge and death)	22.66	10	0.012
Severity (Glasgow Coma Scale)	32.91	25	0.133
Other general conditions (medical diagnosis on admission)	22.83	25	0.588
Mobility	2.81	5	0.729
Comorbidities (systemic arterial hypertension and diabetes mellitus)	14.93	20	0.780
Drugs in use	13.97	25	0.962

X^2 = Chi-square test; d.f. = degrees of freedom.

When the Kruskal-Wallis test was performed for the association between the risk factor, length of stay and the location of the MDRPI, it was noticed by the "p" value that there was no significance, that is, the type of injury caused by the device was not influenced by the mean length of stay.

DISCUSSION

Regarding the characterization of the sociodemographic and clinical profile of patients admitted to the ICU, the present study shows the predominance of male adults (52.6%), corroborating data from a research carried out in China (n=694), which presented 67.3% of hospitalization of male patients[4].

Medical diagnoses were grouped according to prevalence, with respiratory and cardiac diagnoses being the most common. The frequency of the respiratory system is justified by the increasing cases of lung diseases, the third comorbidity found in the study, with 13.23%, which are prevalent in the elderly[13].

Several comorbidities were observed in the present study. A study with 694 patients in the ICU in China observed the prevalence of several comorbidities, among which: 30.4% were hospitalized due to respiratory diseases and, in general, 60.1% had a history of chronic diseases[4]. In Italy, a study on MDRPI identified cardiovascular diseases as the main comorbidities[13].

It was observed that DM was the second comorbidity that most affected ICU patients (19.07%). This condition causes peripheral neuropathy, hindering blood circulation and increasing the risk of skin lesions[3].

The severity of patients admitted to the ICU influences the emergence of PI. The Glasgow Coma Scale was observed in the classification of patients, predicting the evolution of mortality. In the survey on screen, 42.69% of patients were considered severe, representing an important risk factor in the formation of MDRPI[11].

Regarding the Braden scale, 73.68% (126 patients) were at high risk for MDRPI formation. A study carried out in Iceland on MDRPI showed that, on the Braden scale, scores lower than 12 points were considered high risk[14].

Research carried out in Turkey in 5 ICUs, with 175 patients, showed that the high-risk group on the Braden scale had a low level of activity, nutritional problems and weak stimulus perception, being mainly confined to mattresses and connected to one or more devices, which made them more prone to MDRPI[15]. Research shows that the increase in nursing care aimed at prevention reduces the development of injuries. Care should be based on the observation of the existence of pressure, friction, shear and moisture in the skin - factors that influence the formation of PI[7,16].

A study in the United States of America (USA) with 6,377 ICU patients had a mean length of stay below the data obtained by our study – mean between 10 and 12 days17.The mean length of hospital stay for the patient was 17.97 days. A study carried out with 340 patients in Turkey considered ICU stay as a risk factor for the emergence of MDRPI, since the onset of lesions increased with the increase in the number of hospitalization days; 11.8% occurred in the first 24 hours, rising to 48.0% on the 4th day and reaching 82.3% on the 11th day[15].

In the present study, no statistically significant relationship was observed in the relationship between length of hospital stay and the development of MDRPI.

As for the time of formation of the MDRPI, the present study had an average of 19.84 days, with a median of 12 days. Research in 2 hospital follow-up centers after the formation of MDRPI, in Australia and in the USA, identified the time for the appearance of MDRPI, ranging from 3 to 13 days[18]. Another study of MDRPI, specifically of cervical collar performed in the Netherlands, showed an average time of 14 days for lesion formation. Thus, several studies describe averages between 3 and 20 days[19].

This difference between the data of the present study, with regard to the time of formation of MDRPI, compared to data in the literature, may be due to the composition of patients hospitalized in the studied ICU, which varied mainly in terms of length of stay. It is noteworthy that 5 patients had been hospitalized for more than 2 years waiting for home respiratory support, respecting Ordinance 65/2016 of the *SES–DF*[20].

Another important risk factor is the administration of multiple drugs in ICU patients. Vasoactive drugs decrease peripheral blood circulation through vasoconstriction. Sedatives and opioids influence sensory perception. Antibiotics are used to control infections resulting from multidrug-resistant bacteria, especially in cases of septic shock, one of the main causes of death in ICUs[21].

Data related to medication use demonstrated the large number of drugs used to treat patients. Antibiotics, with 41.48%, were the most used drug, followed by sedatives/analgesics, with 26.14%, and vasoactive drugs, with 16.48%. Patients on mechanical ventilation and using sedatives have a 2.07-fold chance of developing MDRPI. Vasopressor-induced peripheral vasoconstriction diverts blood away from the skin and underlying structures and may also contribute to deep tissue damage[15,21,22].

According to the data obtained, an incidence rate of MDRPI of 40.35% was observed, that is, within the average compared to data in the international literature, which range from 27.9% to 60.7%[19-23]. The prevalence rate was 45.61%. A prevalence study in 5 ICUs in Turkey, with 175 patients, found a rate of 40%[15];in another study of 483 ICU patients in Australia and the USA, the rate of MDRPI was 12.8% (17/132) for Australian patients and 8.8% (3/351) for American patients[18]. The prevalence rate observed in China, with 694 patients admitted to the ICU, was 13.1% of MDRPI[4].

In the study, 918 devices were identified, which is equivalent to an average of 5.36 devices for each of the 171 patients, a number corroborated by the literature, with an average between 1.2 and 7/8 devices. These high rates of devices influence the amount and occurrence of MDRPI, as they expose the patient to invasive procedures that attack the skin and adjacent areas[3,4].

When analyzing the MDRPI, there was a predominance of injuries caused by the use of OTT, with 63.76%, and pulse oximetry, with 11.69%. The pressure on the skin resulting from the pulse oximeter can vary from 7 to 20 mmHg, being a predisposing factor for lesion formation. In a study in Turkey with 175 patients, the development of MDRPI was caused by the orotracheal tube in 45.0% and by pulse oximetry in 8.0%[15]. Research in Australia revealed a frequency of 22% due to OTT in 179 patients studied in the ICU[23].

It was evidenced that the sites with the highest number of lesions were ears, with 32.60%; lips, with 19.34%; nostril, with 17.67%; and fingers, with 11.05%. A study in China showed that fingers (32.7%), nose (18.4%), mouth and lips (16.3%), cheeks (7.1%) and legs (7.1%) were anatomical sites of high prevalence for these lesions[4].

Research carried out in the Netherlands observed the ears as the main lesion sites, with 8.0%; the mouth, with 2.3%; and the nose, with 4.5%[19]. These are caused by excessively forceful fixation of the ears and nostrils and by the lack of repositioning of the devices. A study in 3 long-stay hospitals in the United States observed the ears as the main site of injury, ranging from 5% to 71%[24].

An investigation on PI carried out in the ICU in Portugal, with an electronic record of 600 patients, showed that the anatomical location and description of several PIs were associated with medical devices, such as a nasogastric catheter, endotracheal tubes, cervical collars, cannulas and external fixators, being found 29 lesions with these characteristics, corresponding to 22.3% of the total PI[25].

As for the stage of MDRPI, the present study had stage 2 as prevalent, with 51.38% of the injuries. It is noteworthy that one of the main challenges for care is prevention, having as a starting point the identification of the main devices used, the analysis of the apparent cause for the formation of the lesion and the multidisciplinary education. In some cases, the early stages are mistakenly identified as dry exudate (oral, nasal, and gastric), which makes it difficult to start treatment or reposition the device[4,8,9].

The interdisciplinary team performing the patient assessment should include a review of all devices to ensure that the treatment plan addresses the management of medical devices that can cause MDRPI. It is important to emphasize the need to mobilize these fixations for pressure relief and possible identification of lesions in early stages. MDRPI are still "underestimated in clinical practice and rarely reported in the literature", which makes prevention and adequate treatment difficult[1].

The evolution of severity, the use of more vasoactive drugs and the general hemodynamic changes are factors that corroborate the clinical worsening and, as a consequence, the skin lesions[8]. A significant association was identified between MDRPI formation and patient outcome (p=0.012). Patients who died had more MDRPI formation.

At admission, 74 patients with PI were observed. The most common sites were the sacral region, with 55.41%, and the calcaneus, with 14.86%. Research in Portugal, with records in the medical records, observed that of the 98 patients identified with PI, 40.8% had them on admission[25].

The literature describes the sacral region as the main location, due to the immobility and dependence of patients in the ICU - some due to severity and the use of sedatives, which interferes with the propensity for infections and the increase in hospitalization time[4].

There was a significant association between the formation of MDRPI and the presence of PI on admission (p=0.002). Patients admitted to the ICU are at high risk of developing MDRPI due to their critical condition, the inability of some unconscious patients to express feelings of pain, and the prolonged use of many medical devices, in addition, many patients are already hospitalized for a prolonged time in clinical units, which increases the risk of capillary fragility, which affects sensory perception and capillary perfusion[1-4].

With regard to length of stay and location of MDRPI, there was no significant association (p=0.812). Still, it is important to emphasize that exposing the skin to some type of injury increases the risk of infection and, consequently, the length of hospital stay[26].

It is suggested that further studies on the theme proposed in this article be carried out, preferably with longer sampling and time. It is also suggested that team training and comparative studies be carried out, in order to verify if there is a decrease in the incidence rates of MDRPI.

The limitations of the study are due to the fact that the sample is composed of only one hospital. Also, some data were collected from the electronic medical record and may not be complete. In addition, there is a bias resulting from the presence of the researcher in the sector influencing changes in common habits in the team, which may have masked the effective emergence of the formation of MDRPI.

CONCLUSION

The clinical profile of the patients showed medical diagnoses that made up the respiratory system, which involves more frequent use of mechanical ventilation and, consequently, the indication of OTT, which constituted the device that developed 63.76% of MDRPI, with the main sites being the ears, followed by lips.

With regard to the prevalence of MDRPI, the results showed lower rates, which may raise concern, as, in this way, patients acquired the lesions after being admitted to the ICU. A mean incidence rate was observed in comparison with international studies. These are characteristics that emphasize the importance of disseminating knowledge on the subject and the need for team training.

The severity of hospitalized patients, as well as their dependence, with increased immobility, and the use of vasoactive and sedative drugs were the risk factors evidenced for the formation of MDRPI, with a significant association (p=0.012) among patients who progressed to the death outcome and for the formation of MDRPI.

AUTHORS' CONTRIBUTION

Conceptualization: Cavalcanti EO and Kamada I; **Methodology:** Cavalcanti EO and Kamada I; **Research:** Cavalcanti EO; **Writing – First version:** Cavalcanti EO; **Writing – Review & Editing:** Cavalcanti EO; **Resources:** Cavalcanti EO; **Supervision:** Kamada I.

DATA STATEMENT AVAILABILITY

All data were generated or analyzed in the present study.

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