Original Article

Occurrence of pressure ulcers in patients undergoing elective surgeries*

Ocorrência de úlcera por pressão em pacientes submetidos a cirurgias eletivas

Ocurrencia de úlcera por presión en pacientes sometidos a cirugías electivas

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ABSTRACT

Objective: To identify the occurrence of stages II, III and IV pressure ulcers in patients undergoing elective surgery. **Methods:** A quantitative approach, with non-experimental research design, of a descriptive and prospective type. The sample consisted of 148 adult patients of both genders, undergoing elective surgery, according to predetermined selection criteria. **Results:** Of the sample evaluated, 108 patients were discharged from hospital, three patients died and 37 developed pressure ulcers. These patients presented 44 lesions, the majority of which were diagnosed as stage II (56.8%), followed by stage I (40.9%) and stage III (2.3%) lesions. The body areas most affected were the sacral / gluteal region (68.2%), the heels (18.1%), dorsal region (9%) and the external ear (4.6%). **Conclusion:** The occurrence of pressure ulcers was 25%, indicating the need for implementation of effective interventions for the prevention of these adverse events in the perioperative period.

Keywords: Pressure ulcer/epidemiology; Perioperative nursing; Surgical procedures, elective; Incidence

RESUMO

Objetivo: Identificar a ocorrência de úlcera por pressão em pacientes submetidos a cirurgias eletivas de porte II, III e IV. **Métodos:** Estudo de abordagem quantitativa, com delineamento de pesquisa não experimental, tipo descritivo e prospectivo. A amostra foi composta por 148 pacientes adultos, de ambos os gêneros, submetidos à cirurgia eletiva, conforme os critérios de seleção determinados previamente. **Resultados:** Da amostra avaliada, 108 pacientes receberam alta hospitalar, três faleceram e 37 desenvolveram úlceras por pressão. Esses pacientes apresentaram 44 lesões, sendo a maioria diagnosticada de estágio II (56,8%), seguida por lesões de estágio I (40,9%) e estágio III (2,3%). As áreas corporais mais acometidas foram a região sacro/glútea (68,2%), calcâneos (18,1%), região dorsal (9%) e o pavilhão auricular (4,6%). **Conclusão:** A ocorrência de úlcera por pressão foi de 25% indicando a necessidade de implementação de intervenções efetivas para a prevenção desse evento adverso no perioperatório.

Descritores: Úlcera por pressão/epidemiologia; Enfermagem perioperatória; Procedimentos cirúrgicos eletivos; Incidência

RESUMEN

Objetivo: Identificar la ocurrencia de úlcera por presión en pacientes sometidos a cirugías electivas de porte II, III y IV. **Métodos:** Estudio de abordaje cuantitativo, con delineamiento de investigación no experimental, tipo descriptivo y prospectivo. La muestra estuvo compuesta por 148 pacientes adultos, de ambos géneros, sometidos a la cirugía electiva, conforme los criterios de selección determinados previamente. **Resultados:** De la muestra evaluada, 108 pacientes recibieron alta hospitalaria, tres fallecieron y 37 desarrollaron úlceras por presión. Esos pacientes presentaron 44 lesiones, siendo la mayoría diagnosticada de estadío II (56,8%), seguida por lesiones de estadío I (40,9%) y estadío III (2,3%). Las áreas corporales más afectadas fueron la región sacro/glútea (68,2%), calcáneos (18,1%), región dorsal (9%) y el pabellón auricular (4,6%). **Conclusión:** La ocurrencia de úlcera por presión fue del 25% indicando la necesidad de implementación de intervenciones efectivas para la prevención de ese evento adverso en el perioperatorio.

Descriptores: Úlcera por presión/epidemiología; Enfermería perioperatoria; Procedimientos quirúrgicos electivos; Incidencia

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INTRODUCTION

In many health care settings, among the adverse events that may affect the patient, pressure ulcers (PU) stand out. The definition developed by the *European Pressure Ulcer Advisory Panel (EPUAP)* [1], published in 1998 and revised in 2009, describes pressure ulcers as an area of localized damage to the skin and underlying structures, usually over a bony prominence, due to pressure or friction and / or a combination thereof.

The presence of PU carries negative results for the patient, such as: pain, additional treatment and surgery, prolonged hospital stay, mutilation, increased morbidity and costs [2].

Costs can be divided into two groups, namely: the quantifiable and non-quantifiable. The second group contains the costs related to pain, discomfort, decreased self-esteem, scars, odor, difficulty with self-care, and many other issues that are present in the daily life of the individual with pressure ulcers [3].

In regard to the financial costs involved with this problem, in a study conducted in the UK it was noted that the estimated annual cost related to the development of pressure ulcers ranges from £ 180 million to £ 2 billion [4]. Other research in the same country indicated that the average cost expenditure by the health system, on the compensation sought, when there was an occurrence of this type of injury was reported in the amount of £ 37,295 and could extend up to £ 375,000 [5].

In the international literature, a study conducted in the Netherlands found that the incidence of PU was 10.9%, [6] and in Australia it was 18% [7].

In Brazil, for chronically ill and bedridden patients hospitalized in general hospitals, research has indicated incidence values between 17.7% and 39.8% [8,9], and in a study conducted with patients with spinal cord injuries admitted to a teaching hospital, the authors identified the occurrence of PU in 42.5% [10] of the subjects investigated.

During our analysis of PU development in surgical patients, we noted that research studies conducted and published in the international literature have obtained similar incidence rates (21.2% and 21.5%, respectively) [11,12]. In contrast, in a study conducted in Turkey, the results indicated a high incidence of 54.8% [13].

In the national literature, data about the development of PU in surgical patients are scarce. Among the studies identified, there was the study of Pachemskhy [14], in which the results demonstrated a 37% incidence in patients admitted to the surgical clinics; however, the study did not indicate whether the sample had an operation during the period of hospitalization investigated. In another study [15], the overall incidence for the development of PU was 13.3% in patients undergoing neurosurgery. However, it is noteworthy that other national publications focusing on surgical patients were not found.

Thus, considering the dearth of research on the development of PU in surgical patients in Brazil, some questions are relevant: what is the magnitude of this problem? Likewise, does the maintenance of high epidemiological rates reveal the inevitability of this adverse event or does it indicate incomplete knowledge on the subject and, consequently, the need for investment in conducting studies aimed at understanding this adverse event, as well as for the implementation of preventive actions?

Faced with these real considerations, we believe it has been outlined that the development of an adverse event, such as pressure ulcers, in patients treated in health services generates, along with high financial cost, a negative impact on the lives of these patients, as well as their families. In an attempt to contribute support that assists in the understanding of the issue, the present study was conducted with the objective of identifying the occurrence of pressure ulcers in patients undergoing elective surgery of type II, III and IV, in a university hospital in the state of Paraná.

METHODS

The research design was quantitative, non-experimental, of a descriptive and prospective type.

This research was conducted at a general university hospital, with regional coverage, with 367 beds that catered exclusively to users of the Unified Health System. The Surgical Center (SC) had seven operating rooms and its surgical volume was approximately 500 procedures per month (inpatients and outpatients).

The target population consisted of adult patients of both genders, who had elective surgeries that were type II (duration time in the range of 2 to 4 hours), III (duration time of 4 to 6 hours), and IV (duration time above 6 hours).

In the study, the inclusion criteria for subjects were: adults (aged 18 years) who experienced elective surgeries with durations greater than 2 hours, and who were without pressure ulcers when assessed in the preoperative period.

When the condition of mobility of the patient did not allow the collection of data related to weight and height, and data was not available within the chart, the individual was excluded from the sample.

The sample consisted of 148 inpatients in the study hospital. The determination of sample size was calculated using the power analysis method, considering a

sampling error of 0.7 and an estimated incidence for the event of 25%, which was based on incidence for the event obtained in different surgical patient scenarios found in available research literature. The sampling error of 0.8 was considered adequate [16]. The option of the power analysis method, an advanced statistical technique, was performed to assure the determination of an adequate sample size.

To facilitate the achievement of the proposed objective, an instrument was designed to collect data, which was subjected to face and content validation by five experts: nurses, involved in clinical care activities during the perioperative period, three teachers in the area of the Surgical Center, and a professor who conducted research on the subject of pressure ulcers. The concordance of responses between the experts on the instrument items was above 80%. Their suggestions were related to the form of presentation of the instrument, which were accepted by the researchers.

After the steps of face and content validation, the instrument was used in three patients in order to detect possible requirements for adaptation in the form of validated instrument application; however, there were no changes.

The instrument contained sociodemographic data, the surgical anesthetic procedure and the systematic evaluation of the patient's skin.

The pressure ulcer was classified according to the proposal of the *National Pressure Ulcer Advisory Panel* (NPUAP) [17], in four stages as follows: *stage I* – hyperemia in intact skin that does not blanch after removal of the pressure, generally over bony prominences; dark skin can present with different coloration from the surrounding area; this area may be painful, firm or softened, warmer or cooler than the surrounding tissues; *stage II* – partial thickness skin loss, presents as superficial ulcer with a wound bed with a pale, red color without slough, can present as a blister – serous or sero-hematic – intact or broken; *stage III* – loss of total skin thickness, subcutaneous fat may be visible but without exposure of bone, tendon or muscle, slough may be present and may include undermining and tunneling; and *stage IV* – total tissue loss with exposed bone, muscle and tendon, there may be the presence of slough or eschar in some parts of the wound bed frequently, includes undermining and tunneling, the depth of the lesion depends on its anatomical location, may present as shallow or deep.

Data collection on the systematic evaluation of the patient's skin and the data related to the preoperative and postoperative period was performed by one of the researchers to standardize the data record and increase reliability of the results shown. The data relative to the intraoperative period were obtained from the patients' charts.

The data collection procedure was performed as follows:

– after admission to the inpatient unit, patients were compared to the established inclusion and exclusion criteria, and a determination was made as to whether the subject could be included in the research or not. After confirmation of surgery, the selected patient or his responsible person was informed about the purpose of the study and asked to sign the Terms of Free and Informed Consent;

– in the immediate preoperative period (considered as the 24 hours before surgery), the researcher conducted the first visit (Assesssment 1) with the patient, collecting personal data and performing the first systematic evaluation of the skin;

– the first postoperative day, the researcher conducted a second visit to the patient (Assessment 2) that included the systematic evaluation of the skin and collection of data from the medical records.

– in the postoperative period, the researcher conducted systematic assessments (Assessments 3, 4, 5 ...) of the patient's skin, which occurred on alternate days. Assessments continued for each participant until obtaining the outcome investigated (pressure ulcer) or until discharge, transfer from the service, or death. The 48-hour interval between assessments of skin was determined to meet the Clinical Guidelines for Prevention and Management of Pressure Ulcers, recommended by the *Wound, Ostomy, and Continence Nurses Society* (WOCN) [18].

To achieve the number of individuals that composed the sample (n = 148), 304 visits were conducted preoperatively (Assessment 1); of these, 156 patients could not be included for the following reasons: 82 for duration of surgery proposed to be less than two hours, 28 for suspension of surgery, and 46 for changes in the date of surgery.

In subsequent evaluations, there was variation in the number of times that patients were visited by the researcher; this data is justified mainly by the difference in length of stay of subjects prior to hospital discharge. In total, 570 assessments were performed; the mean number of visits per patient was 2.72, and the maximum number of visits per patient was 11, which occurred with two research participants.

Data analysis was performed in a descriptive manner. To facilitate the organization of the collected data, we built a database using the software Epidata 3.1, Portuguese version.

After this, the data were presented according to the nature of the variables (quantitative or qualitative). The gender and medical specialty were the qualitative

variables investigated, described by the frequency distribution of participants between the existing categories. Quantitative variables were evaluated for measurement of position (mean) and dispersion (standard deviation). Quantitative variables studied were: age, body mass index (BMI), duration of anesthesia and surgery.

The normal distribution of each variable (BMI, duration of anesthesia, and surgery) was verified, conforming to the *Kolmogorov-Smirnov test*. Because the sample groups (group with pressure ulcers and group without pressure ulcers) did not present a normal distribution, the Mann-Whitney U-test was employed ($p < 0.05$).

In relation to ethical aspects, the study was approved by the Ethics in Research Committee of the study institution, as required by Resolution 196/96 of the National Health Council, which regulates research involving human subjects (Case no. 9.939/09, Assent no. 117/09).

RESULTS

In this sample, 108 patients were discharged from hospital, three patients died, and 37 patients developed pressure ulcers, determining the occurrence of the outcome investigated at 25%.

The data in Table 1 show the occurrence of the outcome studied in relation to the age group of the sample. For the group of patients who developed PU it can be observed that the largest percentage (21.7%) was in patients aged between 48 and 58 years, followed by the age group of 38 to 48 years old (18.9%). For this group, the mean age was 55.83 years with a standard deviation of 29.73. The mean age of the group of patients who did not develop PU was 51.19 years, with a standard deviation of 16.10.

Table 1 – Distribution of study participants (n = 148), according to age and the occurrence of pressure ulcers. Londrina-PR, 2009-2010

Age Range	Patient with PU *	Patient without PU	Total
	n	n	n
18 – 28	3 (8.1)	10.9%	13 (8.8)
28 – 38	3 (8.1)	11 (9.9)	14 (9.4)
38 – 48	7 (18.9)	27 (24.4)	34 (23)
48 – 58	8 (21.7)	21 (18.9)	29 (19.6)
58 – 68	6 (16.2)	24 (21.6)	30 (20.3)
68 – 78	6 (16.2)	12 (10.8)	18 (12.1)
> 78	4 (10.8)	6 (5.4)	10 (6.8)
Total	37 (100)	111 (100)	148 (100)

* Pressure ulcer

In the sample studied, 62% of patients who developed pressure ulcers were female and 38% were male. For the group without PU, the sample consisted of 55% male and 45% female patients.

Regarding the variable of body mass index (BMI) and the development of PU, it can be seen that in 48.7% of patients with ulcers, the calculated BMI was in the normal range, and the mean BMI of the group was 29.73 kg / m^2 with a standard deviation of 12.74, this index is classified as overweight. For the group without PU, the mean BMI was calculated at 26.67 kg/m^2, with a standard deviation of 6.56, also classified as overweight (Table 2).When comparing the mean values of BMI between the groups with and without PU, the Mann-Whitney U-test ($\alpha = 0.05$) showed no statistically significant difference ($p = 0.871$).

The data in Table 3 indicate the development of PU according to medical specialty; patients undergoing neurosurgery (35.1%) and surgeries of the digestive system (21.7%) were those with the highest occurrence of ulcers.

Table 2 – Distribution of the study subjects (n = 148), according to the Body Mass Index (BMI) and the occurrence of pressure ulcers. Londrina-PR, 2009-2010

BMI (kg/m 2)	Classification	Stage	Patient with PU *	Patient without PU	Total
			n	n	n
<18.5	Underweight	0	3 (8.1)	3 (2.7)	6 (4,1)
18.5 to 24.9	Normal	0	18 (48.7)	50 (45.1)	68 (45,9)
25 to 29.9	Overweight	I	7 (18.9)	41 (36.9)	48 (32,4)
30 to 39.9	Obesity	II	2 (5.4)	11 (9.9)	13 (8,8)
> 40.0	Severe obesity	III	7 (18.9)	6 (5.4)	13 (8,8)
Total			37 (100)	111 (100)	148 (100)

* Pressure ulcer

Table 3 – Distribution of the study subjects (n = 148), according to the medical specialty and the occurrence of pressure ulcers. Londrina-PR, 2009-2010.

Specialty	Patient with PU *	Patient without PU	Total
	n	n	n
Neurosurgery	13 (35.1)	22 (19.9)	35 (23.7)
Digestive tract	8 (21.7)	26 (23.4)	34 (23)
Urology	3 (8.1)	24 (21.6)	27 (18.2)
Orthopedics	5 (13.5)	13 (11.7)	18 (12.1)
Morbid obesity	5 (13.5)	6 (5.4)	11 (7.4)
Cardiovascular	2 (5.4)	7 (6.3)	9 (6.1)
Other	1 (2.7)	13 (11.7)	14 (9.5)
Total	37 (100)	111 (100)	148 (100)

* Pressure ulcer

For patients who developed pressure ulcers, the mean duration of surgery was 4h30min, with a standard deviation of 2 hours, which classified the procedures as Type III. The duration of anesthesia had a mean of 5h30min, with a standard deviation of 2h12min.

In relation to patients who were not affected by ulcers, the results indicated that the durations of surgery and anesthesia were lower when compared to the group of patients who developed pressure ulcers. The mean duration of surgery was 3h30min, the mean time of anesthesia was 4h30min: so the surgeries for this group, on average, were classified as Type II.

The application of the Mann-Whitney U-test ($\alpha = 0.05$) showed a statistically significant difference between the mean duration of surgery ($p = 0.002$) and duration of anesthesia ($p = 0.001$) of subjects with and without PU.

As noted, the occurrence of the outcome examined in this study was 25%, and patients suffering from PU (n = 37) had 44 ulcers (Table 4).

Table 4 – Distribution of the 44 ulcers diagnosed in participants who developed pressure ulcers, according to the PU stage. Londrina-PR, 2009-2010

Type of lesion	n	%
Stage I	18	40.9
Stage II	25	56.8
Stage III	1	2.3
Total	44	100

The areas of the body most affected by patient injuries were: the sacral/gluteal region (30 ulcers), followed by the calcaneus (eight ulcers), dorsal region (four ulcers) and pinna (two ulcers).

DISCUSSION

In this investigation, the average age of the group with and without PU was considered, and a small difference was found between groups (55.83 years and 51.19 years, respectively); however, in terms of age, the group with PU had a higher percentage of subjects between 48 and 58 years, and the group without PU had a higher percentage in the age group between 38 and 48 years. This finding is consistent with research that demonstrated the relationship between age and the development of PU [19-21]. In contrast, a study of the theme indicates that despite the elderly having a known susceptibility for the development of PU, the proper thing is not to evaluate this variable in an isolated manner [22].

In relation to gender, in the group with PU, the majority of subjects were female, and in the group without PU the majority was male. In one study conducted, a relationship was found between the female gender and the development of PU [23], and, in recent research, the incidence of PU was higher in females [22]. However, there was controversy among results of research already reported, which requires further investigation [24].

In relation to the BMI, in the group with and the group without PU, when observing the distribution of subjects, the highest percentage was in the normal range; when verifying the mean, both groups were in the overweight range. However, there was no statistically significant difference between the groups with and without PU in relation to BMI. This variable is discussed in the literature as a risk factor [9]. Thus, lower levels of BMI point to poor nutritional status and higher BMI values indicate worsened conditions for friction and shear. These conditions can provide increased risk for development of PU. Based on these, if the patient is classified into one end of the scale distribution of BMI, for example, underweight or severe obesity, he is at risk [9,24].

A recent study indicated the need to conduct further research to investigate the medical specialty, as a risk factor for development of PU, and pointed to evidence of elevated risk in patients undergoing surgery in the cardiovascular specialty [24].

Thus, as was pointed out, the group without PU had shorter durations of anesthesia and surgery when compared to the group with PU. The duration of anesthesia and surgery were the variables investigated, as indicated by recent literature review, which had as its objective to discuss the risk factors intrinsic to the patient for the development of PU. In the discussion of the review, the author affirmed it was possible to locate studies that showed the relationship between duration of surgery and / or anesthesia and / or length of time on the surgical table with the development of this type of ulcer, and others that did not corroborate this relationship [25]. In the present investigation, there was a statistically significant difference between the mean duration of surgery and duration of anesthesia between the groups with and without PU.

In this sample studied, the occurrence of pressure ulcers was 25%. From this perspective, other studies [23,26-28] also investigated the development of this type of ulcer in surgical patients.

A descriptive, exploratory study was conducted to identify prospective risk factors for PU development in surgical patients of various specialties (n = 286); the results showed that 14.3% of investigated subjects were affected by pressure ulcers [23].

In another retrospective study conducted with orthopedic surgical patients (n = 722), 29.6% of these patients developed pressure ulcers [26].

A prospective cohort study conducted with the objective of assessing whether the presence of PU influenced hospital stay in surgical patients showed that of the cardiovascular patients (n = 204), 109 patients (53.4%) were suffering from pressure ulcers on admission to the intensive care unit [27].

The incidence of pressure ulcers was 20.6% in a longitudinal study that had the objective of detecting risk factors associated with the occurrence of these ulcers, in patients (n = 199) having surgery within different medical specialties [28].

It is noteworthy that, in the present study, patients undergoing surgery for different specialties were included, and patients having neurosurgery and digestive tract surgery were those with the highest occurrence of PU; however, it was observed that the sample was composed of a larger number of subjects of these specialties. This aspect can be considered as a limitation of the research, since it did not investigate the occurrence of PU within only a single medical specialty.

As noted, with regard to areas of the body that were most affected by pressure ulcers, the sacral / gluteal area was the most affected (68.2%), followed by the region of the calcaneus (18.2%), dorsal region (9%) and the pinna (4.6%).

In research also conducted with surgical patients, the results showed that the body areas most affected by pressure ulcers were the sacrum (29.8%), followed by the calcaneus (19.3%), ischial tuberosity (14%), malleolus (12.3%), back (5.3%), hips (5.3%) and, to a lesser extent, ulcers were observed on the legs, head and arms [23].

In a study conducted in hospitalized elderly, the results indicated that the regions most affected by the ulcers were the sacral region (42.6%), heels (18.3%), ischium (14.6%), trochanter (4.6%), lateral malleolus (3.1%) and iliac crest (1.8%) [29]. In other research, the body surfaces that were most affected by pressure ulcers were the sacrococcygeal region, malleoli and calcanei [30]. In the national literature, we encountered a recent study in which the lesions were located primarily in the region sacrococcygeal (65.7%) and calcanei (31.6%) [22].

In relation to the stage of the ulcers that were diagnosed in the sample investigated, we found that the majority were classified as stage II (56.8%), followed by stage I (40.9%) and stage III (2.3%) ulcers.

Comparing these results with those obtained in other studies conducted with surgical patients, it is noteworthy that, in one study, 68.4% of diagnosed ulcers were classified as stage I, 24.6% were stage II, and 7% were stage III [23]. In other research, the results indicated that 27.6% of ulcers diagnosed were stage II, 2.1% were stage III / IV, and the ulcers classified as stage I totaled 70.3% [26].

In most cases, the pressure ulcers developed were classified as stage I (59.3%), followed by stage II, (37.6%); for the stage III and IV ulcers, there was a lower frequency (2.8%) [27]. In recent research, the pressure ulcers encountered were diagnosed as stages I and II (98.6%) [28].

In research conducted with hospitalized orthopedic patients, 22.2% of the diagnosed pressure ulcers were stage I, and 77.8% were stage II [31]. In a recent study, 44.7% of the ulcers were classified as stage I, and 55.3% as stage II [22].

Based on the results of the studies mentioned, it can be inferred that the pressure ulcers that affect most patients are usually diagnosed as stage I and II; these results were also observed in this study.

CONCLUSION

In this study, the occurrence of pressure ulcers was 25%, the sacral / gluteal region was the body area most affected, and most of the ulcers were diagnosed as stage II.

Regarding the limitations of the research, we considered that the exclusion of individuals by the absence of data on weight and height could be characterized as bias. The inclusion of patients in different medical specialties may also be considered as a limitation of the study.

In contrast, because of the shortage of national surveys on the topic investigated, it is emphasized that the present study reaffirms the importance of conducting new research and offers support to indicate the need for the perioperative nurse to propose and implement interventions that can minimize the occurrence of PU and, consequently, improve the care provided to the surgical patient, as well as reducing the costs.

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