Pressure injuries resulting from surgical positions: occurrence and risk factors

Lesões por pressão decorrentes do posicionamento cirúrgico: ocorrência e fatores de risco

Lesiones por presión resultantes del posicionamento quirúrgico: ocurrencia y factores de riesgo

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ABSTRACT: Objective: To verify the occurrence of pressure injuries resulting from surgical positioning and analyze associated risk factors. **Method:** Observational, cross-sectional, prospective study with a quantitative design conducted at a large hospital in São Paulo, with 128 patients. **Results:** The occurrence of pressure injuries was observed in 5.47% of the study participants, which was related to: the score of the Surgical Positioning-Related Pressure Injury Risk Assessment Scale, with an *odds ratio* of 1.54 for each unit increase; surgery time, with an *odds ratio* of 85.7% for each additional hour; prone surgical position, with an *odds ratio* of 13.42 compared to other positions; and neurosurgery specialty, with an *odds ratio* of 10.65 compared to other specialties. **Conclusion:** Surgical patients exhibit characteristics that put them at risk of developing pressure injuries, and the instrument used in the risk assessment proved to be relevant.

Keywords: Pressure ulcer. Patient positioning. Perioperative nursing.

RESUMO: Objetivo: Verificar a ocorrência de lesões por pressão decorrentes do posicionamento cirúrgico e analisar os fatores de risco associados. **Método:** Estudo observacional, transversal, prospectivo, com delineamento quantitativo, desenvolvido em hospital de extraporte da cidade de São Paulo, com 128 pacientes. **Resultados:** Observou-se ocorrência de lesão por pressão de 5,47% entre os participantes do estudo, relacionando-se com: escore da Escala de Avaliação de Risco para o Desenvolvimento de Lesões Decorrentes do Posicionamento Cirúrgico, razão de chances de 1,54, para cada unidade acrescida; tempo de cirurgia, razão de chances de 85,7%, para cada hora adicionada; posição cirúrgica em prona, razão de chances de 13,42, em relação às demais posições; e especialidade de neurocirurgia, razão de chances de 10,65, em relação às demais especialidades. **Conclusão:** Observou-se que os pacientes cirúrgicos apresentam características que os colocam em risco de desenvolver lesão por pressão, e o instrumento utilizado na avaliação de risco mostrou-se relevante.

Palavras-chave: Lesão por pressão. Posicionamento do paciente. Enfermagem perioperatória.

RESUMEN: Objetivo: Verificar la ocurrencia de lesiones por presión resultantes del posicionamiento quirúrgico y analizar los factores de riesgo asociados. **Método:** Estudio observacional, transversal, prospectivo, con diseño cuantitativo, desarrollado en un hospital de gran tamaño de la ciudad de São Paulo, con 128 pacientes. **Resultados:** Se observó la ocurrencia de lesiones por presión del 5,47% entre los participantes del estudio, relacionándose con: puntaje en la Escala de Evaluación de Riesgos para el Desarrollo de Lesiones Derivadas del Posicionamiento Quirúrgico, con *odds ratio* de 1,54 para cada unidad agregada; tiempo de cirugía, con *odds ratio* del 85,7%, por cada hora agregada; posición quirúrgica prona, con *odds ratio* de 13,42, en relación a las demás posiciones; especialidad de neurocirugía, con *odds ratio* de 10,65, en relación con otras especialidades. **Conclusión:** Se observó que los pacientes quirúrgicos presentan características que los ponen en riesgo de desarrollar lesiones por presión y el instrumento utilizado en la evaluación de riesgos resultó relevante.

Palavras clave: Úlcera por presión. Posicionamiento del paciente. Enfermería perioperatoria.

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INTRODUCTION

The quality of care in healthcare services is increasingly intertwined with patient safety. Consequently, organizations have intensified their monitoring of adverse events with the goal of diminishing the rate of harm inflicted upon patients. A preventable adverse event (AE) denotes harm to the patient that is correlated with an active failure, latent condition, or violation of norms and standards[1-3].

In this context, pressure injuries (PI) serve as a crucial care indicator, as these injuries represent a harmful adverse event that, in the majority of cases, can be prevented[1-3].

A systematic review encompassing over 2.5 million patients worldwide revealed that the incidence of PI remains significantly high, afflicting more than one in ten adult hospitalized patients[4].

> "PI refers to localized damage to the skin and/or underlying soft tissues, typically occurring over a bony prominence or in association with the use of medical devices. It occurs due to intense and/or prolonged pressure, often compounded by shear. Additionally, factors such as microclimate, nutrition, perfusion, comorbidities, and the individual's overall condition can influence its development"[5].

According to the National Pressure Injury Advisory Panel (NPIAP), PIs are classified based on the degree of tissue involvement into several stages: stages 1, 2, 3, and 4, along with categories for unclassifiable injuries, deep tissue injuries, those related to medical devices, and those affecting membranes and mucous membranes[5].

PI can affect patients in various scenarios, including surgical settings. This issue has garnered significant attention in healthcare institutions, as patients undergoing surgical procedures are exposed to several risk factors that increase their susceptibility to developing this type of AE[6,7].

Several factors specific to the perioperative period can exacerbate the risk of surgical patients developing PI. These factors include tissue ischemia stemming from reduced capillary blood flow, immobility, and pressure on relatively firm surfaces. Additionally, the particulars of each surgical positioning, variations in surgery duration, decreased sensory perception due to anesthesia and/or sedation, reduced ability to perceive pain or discomfort, low operating room (OR) temperature, episodes of hypotension, and other characteristics unique to surgicenters contribute to this heightened risk[8,9].

The combination and severity of these extrinsic factors, when coupled with the patient's intrinsic factors, can further increase the risk of developing PI in the surgical context[6,7].

Correct surgical positioning is imperative for the successful and safe execution of procedures. However, when performed incorrectly, it can lead to complications in various bodily systems, including the integumentary system[9].

The nursing care administered to the patient during the intraoperative period undoubtedly impacts the postoperative phase. Complications such as PI can prolong hospitalization time, escalate costs, and exacerbate the patients' clinical condition[7,9].

Despite being a significant challenge in clinical practice, nurses are tasked with identifying individuals exhibiting characteristics that elevate the risk of developing complications. They must then devise preventive measures and implement individualized care plans aimed at mitigating the onset of these injuries[6,7,9-11].

As a result, risk assessment facilitates early intervention and serves as a crucial element for nursing in developing and implementing effective preventive strategies and a targeted care plan. To achieve this, specific instruments, also referred to as "risk assessment scales," tailored to the patients' context, must be utilized[6-9,11].

At the national level, the first risk assessment scale for surgical patients was introduced in 2013: the Risk Assessment Scale for the Development of Injuries Resulting from Surgical Positioning (*Escala de Avaliação de Risco para o Desenvolvimento de Lesões Decorrentes do Posicionamento Cirúrgico* – ELPO). This instrument was developed and validated by a Brazilian nurse as part of her doctoral thesis[11].

In an effort to enhance the clinical practice of perioperative nurses, particularly concerning care during patient surgical positioning, and acknowledging the ELPO as an evidence-based, valid, and reliable instrument for assessing the risk of injuries related to positioning among surgical patients, we were inspired to conduct the current study.

OBJECTIVE

To examine the incidence of PI caused by surgical positioning and assess the risk factors associated with the surgical environment.

METHOD

This observational, cross-sectional, prospective study with a quantitative design adhered to the criteria established by the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines[12]. The study was conducted at a private, general, extraport hospital in São Paulo between May and June 2017, which performs an average of 2,800 anesthetic-surgical procedures per month across all specialties.

The sample was obtained by convenience to include the largest number of participants during the collection period. Inclusion criteria were: adult patients (over 18 years of age), of both biological genders (male and female), undergoing anesthetic-surgical procedures of any specialty, and who remained hospitalized at the study's host institution during the second phase of research in the immediate postoperative period (IPO).

The initial sample consisted of 167 adult patients followed by the main researcher during the first phase of the study (intraoperative period), where the ELPO scale was applied. However, it was not possible to follow up with 39 patients in the second phase (IPO) for the following reasons: one patient (2.6%) was absent from bed, six patients (15.4%) were not clinically fit to participate, 11 patients (28.2%) did not wish to be evaluated, and 21 patients (53.8%) had already been discharged. This resulted in a 23.4% loss of the initial sample for follow-up.

Thus, the final sample consisted of 128 adult patients undergoing surgical procedures, who were followed in both phases of the research and voluntarily agreed to participate. Informed consent was obtained in writing from all individuals involved in the study.

Two instruments were used for data collection. Form 1 was applied during both phases, covering information on patient characterization, surgery details, and skin condition. In the first phase, during the intraoperative period, patient and surgery characteristics were recorded, and skin integrity was assessed. In the second phase, during the IPO period, the possibility of the patient having developed PI was identified by inspecting the skin, focusing on the regions that remained at risk due to surgical positioning.

Form 2 included the patient's characterization and the ELPO scale, which was used to assess the patient's risk of developing PI. This form was applied during the first phase of data collection, in the intraoperative period, when the patient was positioned on the surgical table.

Data collection was carried out by the first author, in two phases:

- Phase 1: In the intraoperative period, in the OR, during surgical positioning, the researcher characterized the patient and assessed the risk of developing pressure ulcers using the ELPO scale;
- Phase 2: In the immediate postoperative period, on the day following surgery, in the Inpatient Unit (UI) or the Intensive Care Unit (ICU), the researcher checked for the occurrence of PI after the anesthetic-surgical procedure by inspecting the skin.

ELPO consists of seven items: type of surgical position, surgery duration, type of anesthesia, support surface, limb position, comorbidities, and patient age. Each item has five sub-items, scored from 1 to 5. The total scale score can range from 7 to 35 points. A higher score indicates a greater risk of developing injuries due to surgical positioning. A score of 20 is used as a cutoff point to differentiate risk levels: a score between 7 and 19 points indicates a lower risk, while a score between 20 and 35 points indicates a higher risk for developing PI from surgical positioning[11].

The achieved results were analyzed quantitatively using statistical tools and resources. Tables and graphics were employed to facilitate better visualization and comprehension of the data.

Categorical variables were described using absolute and relative frequencies, while numerical variables were described using the median, first quartile, and third quartile. Fisher's exact tests were employed to assess potential associations between the factors studied and the occurrence of PI for categorical variables. For numerical or ordinal measurements, Mann-Whitney tests were utilized.

The tests were conducted when representation existed in all studied categories. In the event of a significant association, the odds ratio of PI was described, obtained through simple logistic regression adjustment. The incidence of PI was presented alongside a 95% confidence interval (95% CI), derived using the Wilson method. The analyses were performed using the R. Core Team® software package, with a significance level set at 5%.

This research was submitted to and approved by the Research Ethics Committee of the study's host institution through Plataforma Brasil, in accordance with the ethical standards and principles outlined in Brazilian Resolution No. 466/2012, issued by the National Health Council, which governs research involving human subjects[13]. Approval was granted under Opinion No. 1.981.439.

RESULTS

The sample comprised 128 patients, with ages ranging from 19 to 87 years and a median age of 53.5 years. The majority of patients (54.7%) were male. Regarding comorbidities, 22.7% were obese, 22.7% were hypertensive, 9.4% were diagnosed with cancer, and 9.4% were diabetic.

The presence of PI was observed in seven out of the 128 patients evaluated after the surgical procedure, resulting in an occurrence of 5.47% (95% CI between 2.67 and 10.86%). Among these patients, five had only one lesion (3.9%), one patient had two injuries (0.8%), and another patient had three injuries (0.8%), totaling 10 PI.

Regarding the locations of the injuries, seven (70%) occurred on the face, with six in the zygomatic region and one on the chin. Among the zygomatic injuries, four were on the left side. Additionally, two patients had lesions on both sides of the face (on both the right and left zygomatic bones). In terms of the injury category, seven were classified as Stage 1 (70%), while three were classified as Stage 2 (30%) (Table 1).

The sum of ELPO points ranged from 10 to 23 (Figure 1), with a median of 16 points.

In the group of patients who developed PI, the median ELPO score was 19 points (p=0.007), suggesting an *odds ratio* of 1.54 (95% CI between 1.13 and 2.27) for each additional unit added to the total score value.

The duration of surgery ranged from 0.33 to 8.67 hours, with a median of 1.67 hours (Table 2). There was an association between the duration of the procedure and the occurrence of PI post-surgery (p=0.003). The group that developed PI had a longer median surgery time: for each hour of surgery, the *odds ratio* of developing PI increased by 85.7% (*odds ratio* of 1.857 with a 95% CI between 1.24 and 2.95).

Regarding surgical positioning (Table 3), 55.5% of patients were positioned supine. Compared to other positions, the prone position had an *odds ratio* of developing PI of 13.42 (95% CI between 2.68 and 98.66; p=0.003).

Regarding the specialty of surgery (Table 4), 35.2% were general surgeries, 21.9% were neurosurgeries, 18.8% orthopedic, 10.9% urological, and 6.2% were gynecological surgeries.

In the group of patients who developed PI, there was a higher prevalence among those who underwent procedures in the neurosurgery specialty, with five out of the seven cases of PI originating from this specialty (p=0.006). This represents an *odds ratio* of 10.65 (95% CI between 2.15 and 77.73) compared to other specialties.

DISCUSSION

Issues related to PI present a significant challenge for Nursing, as their development is often associated to multiple factors that cannot always be eliminated[6,7,9].

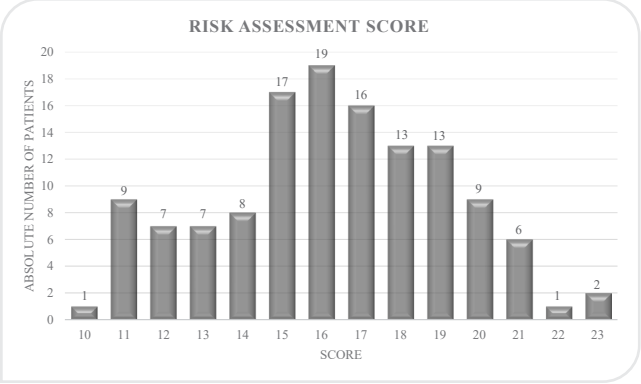

Figure 1. Frequency of patients according to the score of the Surgical Positioning-Related Pressure Injury Risk Assessment Scale.

Table 1. Location and staging of pressure injuries triggered by surgical positioning.

Location of the pressure injury	Stage 1	Stage 2	n (%)
Right zygomatic region	2	0	2 (20)
Left zygomatic region	2	2	4 (40)
Mental region	1	0	1 (10)
Dorsal region	0	1	1 (10)
Sacral region	1	0	1 (10)
Right knee	1	0	1 (10)
Total	7 (70)	3 (30)	10 (100)

Table 2. Surgery time according to the onset of pressure injury.

Length of surgery (hours)	Total (n=128) (%)	Without pressure injury (n=121) (%)	With pressure injury (n=7) (%)	p-value*
Up to 1 hour	29 (22.7)	29 (24.0)	-	0.004
More than 1 to 2 hours	50 (39.1)	49 (40.5)	1 (14.3)	
More than 2 to 4 hours	35 (27.3)	32 (26.4)	3 (42.9)	
More than 4 to 6 hours	12 (9.4)	10 (8.3)	2 (28.6)	
More than 6 hours	2 (1.6)	1 (0.8)	1 (14.3)	

*p-values for Mann-Whitney tests.

Table 3. Type of surgical position according to the onset of pressure injury.

Type of surgical position	Total (n=128) (%)	Without pressure injury (n=121) (%)	With pressure injury (n=7) (%)	p-value*
Supine	71 (55.5)	69 (57.0)	2 (28.6)	0.368
Lateral	8 (6.2)	8 (6.6)	-	
Trendelenburg	-	-	-	
Prone	24 (18.8)	19 (15.7)	5 (71.4)	0.003
Lithotomy	25 (19.5)	25 (20.7)	-	

*p-values for Mann-Whitney tests.

Table 4. Surgical specialty according to the onset of pressure injury.

Surgical specialty	Total (n=128)	Without pressure injury (n=121)	With pressure injury (n=7)	p-value
Oral and Maxillofacial	1 (0.8)	1 (0.8)	0 (0.0)	-
Head and Neck	2 (1.6)	2 (1.7)	0 (0.0)	-
Cardiology	1 (0.8)	1 (0.8)	0 (0.0)	-
General	45 (35.2)	44 (36.4)	1 (14.3)	0.420*
Gynecology	8 (6.2)	8 (6.6)	0 (0.0)	-
Neurosurgery	28 (21.9)	23 (19.0)	5 (71.4)	0.006*
Orthopedics	24 (18.8)	23 (19.0)	1 (14.3)	>0.999*
Otorhinolaryngology	1 (0.8)	1 (0.8)	0 (0.0)	-
Plastic	4 (3.1)	4 (3.3)	0 (0.0)	-
Thoracic	1 (0.8)	1 (0.8)	0 (0.0)	-
Transplant	1 (0.8)	1 (0.8)	0 (0.0)	-
Urology	14 (10.9)	14 (11.6)	0 (0.0)	-
Length of surgery (hours)				
Median [Q1; Q3]	1.67 [1.08; 2.83]	1.62 [1.08; 2.75]	3.83 [2.63; 4.12]	0.003†

Categorical variables described by absolute value and, in parentheses, percentage.

*p-values for Fisher's exact test; †P values for Mann-Whitney tests.

The primary objective of surgical positioning is to ensure adequate exposure of the surgical site. However, the significant challenge lies in achieving this goal in a manner that is anatomically and physiologically tolerable for the body structures involved. Other factors to consider include surgeon preference, anesthesiologist requirements, and any predisposing conditions of the patient. The combination of these elements, along with the inherent circumstances

of the anesthetic-surgical procedure, can influence the patient's risk of developing PI[6,7,9-11].

In the present study, PI were observed in seven out of the 128 patients who were followed both intraoperatively and postoperatively. Among the patients affected by pressure injuries, a total of 10 injuries were observed: five patients had one injury, one patient had two injuries, and one patient had three injuries.

The occurrence of PI in healthcare institutions is considered an AE resulting in harm. According to the Brazilian National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária* – Anvisa) and the Health Surveillance Notification System (*Sistema de Notificação em Vigilância Sanitária* – NOTIVISA), the ideal scenario is the absence of such events, or if they do occur, their incidence should be as close to zero as possible[2,14,15].

Damage related to PI can vary from mild to severe, depending on the stage of the injury. Stages 3 and 4 of PI are considered "never events", meaning they should never occur in healthcare settings[2,14,15]. In this study, regarding the classification of damage/AE, five patients had mild damage, and two had moderate damage, characterized by stages 1 and 2 of the injuries they presented, respectively.

AE is defined as an event or circumstance that could result, or has resulted, in unnecessary harm to the patient. Damage, in this context, implies impairment in the structure or functions of the body and/or any harmful effect resulting therefrom, including illness, injury, suffering, disability, or death, and can be physical, social, or psychological[2,14,15].

Therefore, the perioperative team encounters significant challenges due to the consequences of immobility and unrelieved pressure during surgery, which are compounded by the effects of anesthesia and surgery. It is imperative for the team to implement care measures aimed at minimizing these effects. Studies consistently identify this type of injury as a common surgical complication[6,7,10,11].

A study conducted with 944 patients classified as high risk for developing PI found a significant reduction in the incidence of such injuries (from 4.8 to 1.6%) following the implementation of a package of preventive measures. These measures included patient education, application of protective coverings, control of skin moisture, and utilization of support surfaces[16].

In a study on the occurrence of PI resulting from surgical positioning, conducted with 239 patients undergoing elective surgery, an incidence of 37.7% was identified. Among them, 81 patients (90%) had injuries classified as Stage 1[6].

Another study, involving a sample of 154 patients undergoing surgical procedures at a large university hospital, found that 66.9% of patients had a low risk of developing PI during the intraoperative period. However, seven patients developed PI by the end of the surgery. Among the patients affected by pressure injuries, four (57.1%) had more than one lesion, totaling 11 lesions[7].

In another study involving 52 patients, 18 (34.6%) were classified as high risk for developing PI, and four patients (8%) developed PI in the IPO period, resulting in an incidence of 7.69%[17].

Therefore, the occurrence of PI in any healthcare institution contradicts patient safety and the quality of care. Recognizing this global issue, Anvisa created and published Resolution of the Collegiate Board (*Resolução da Diretoria Colegiada* – RDC) No. 36, dated July 25, 2013, which mandates the implementation of Patient Safety Centers (PSC) in healthcare services. The primary objective of these centers is to implement various safety actions, including measures aimed at preventing PI. One such initiative is the implementation of Safe Practices for Pressure Injury Prevention in Health Services[2,14].

The application of the ELPO scale during the intraoperative period among the patients in the sample yielded a median score of 16 points, with a significant relationship observed between the score and the development of PI. For patients with a median score of 19 points on the scale, an *odds ratio* of 1.54 was obtained for each unit added to the total score value. This implies that for each additional point on the ELPO scale, there is a greater likelihood of the patient developing PI.

According to NPIAP, structured risk assessment is an integral component of the screening policy, aiming to identify patients at risk of developing PI to plan and implement preventive interventions. It is essential to select a brief assessment instrument that is suitable for the population, valid, and reliable[8]. ELPO has demonstrated effectiveness as a risk assessment tool for PI, meeting all these requirements[17-19].

The association between surgery time and the occurrence of PI resulting from surgical positioning was evident. The median surgery time was longer in the group of patients who developed PI. For each additional hour of surgery, the odds ratio of developing PI increased by 85.7%. This finding is highly significant, not only for this research but also for informing perioperative nursing practice.

Among patients who presented with PI, 42.9% underwent surgeries lasting between 2 to 4 hours, while 71.5%

of patients who had PI underwent surgeries lasting more than 2 to 6 hours. This result aligns with findings from other studies, indicating a significant relationship between increased surgery time and the development of PI[17,19,20]. For instance, a study aimed at identifying the risk of developing PI related to surgical positioning and its incidence in the SC of a university hospital in Rio de Janeiro found an incidence of 7.69% after surgeries lasting more than 4 hours[17].

Thus, it was evident that the increase in procedure time has a notable impact on the development of PI, indicating a significant correlation between surgery time and the occurrence of injuries related to surgical positioning.

The type of position and surgical specialty were directly related to the development of PI, with a particular emphasis on neurosurgery. Neurosurgery represented an *odds ratio* of 10.65 compared to other specialties, meaning that patients undergoing neurological surgeries in the prone position were 10 times more likely to develop PI than those in other specialties.

The prone position was significant in the sample studied, as the majority of patients affected by PI remained in this position during their surgical procedures. This position is particularly challenging due to the need for strength and coordination among several team members. Additionally, patients in the prone position are typically under general anesthesia and intubated, adding to the complexity and difficulty of the procedure[9].

A similar outcome was observed in a study involving 297 patients, where those in the prone position had a higher *odds ratio* of developing PI compared to patients in the supine position[21]. Additionally, a longitudinal study conducted in a private hospital in São Paulo, which included 199 surgical patients, found that the highest occurrence of PI was associated with the prone position, with a 3.3 times greater likelihood of occurrence compared to the supine position[22]. These findings are consistent with the results of the present research.

In the present study, there was a higher occurrence of lesions located on the face, with six in the zygomatic region and one on the chin. These lesions were associated with the prone surgical position, used by the majority of patients who developed PI. The occurrence of facial lesions in patients positioned prone during surgery aligns with literature data, which indicate that the face is among the regions at the highest risk for developing such injuries in this position[8,22].

The results obtained and the statistical analyses indicate that the development of PI among the patients who made up the sample of this study is related to several factors: the score obtained through the application of the ELPO scale (with a median score of 19 points, indicated an *odds ratio* of 1.54 for developing PI with each unit added to the total score value); surgery time (with each hour added to surgery, the *odds ratio* for developing PI increased considerably); prone surgical position (of the seven affected patients, five remained in this position, representing an *odds ratio* of 13.42); high body mass index (BMI), above 25 kg/m^2 (overweight and obese patients constituted the majority of the sample, resulting in an *odds ratio* of 1.43).

The limitations of the present study are related to the small sample size, especially considering that the majority of patients undergoing elective surgeries were discharged within the first 24 hours after surgery. Therefore, more studies are suggested, with longer collection times and more significant samples. It is also recommended that research be carried out in more than one hospital institution, in order to correlate the findings.

Regarding the contribution to perioperative nursing, this research consolidates information about the risk and development of PI triggered by surgical positioning. Through the implications obtained, it is expected to contribute to future studies, the development of prevention protocols in the surgical context, and the establishment of a patient safety culture, based on the quality of care incorporated into daily intraoperative practice.

CONCLUSION

Among the 128 surgical patients followed up during the intraoperative and IPO periods, the occurrence of PI was 5.47%. The development of PI was related to the ELPO scale score, surgery time above 2 hours, prone surgical position, and neurosurgery specialty.

Surgical patients have characteristics that place them at risk of developing PI. The ELPO scale proved to be a relevant instrument for assessing the risk of developing PI among patients in the surgical context.

Starting from this perspective, it is crucial to comprehensively evaluate the patient, considering all their clinical conditions and the context in which they are situated, in order to provide optimal perioperative nursing assistance. This involves guiding the implementation of early preventive actions based on a reliable risk assessment.

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CONFLICT OF INTERESTS

The authors declare there is no conflict of interests.

AUTHORS' CONTRIBUTION

WAF: Conceptualization, Data curation, Investigation, Writing – original draft, Writing – review & editing. CMM: Writing – review & editing, Visualization. RC: Project administration, Writing – original draft, Writing – review & editing, Supervision.

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