LESIONS ARISING OUT OF SURGICAL PROCEDURE: RELATED FACTORS

Lesões provenientes de procedimento cirúrgico: fatores relacionados

Lesiones provenientes de procedimiento quirúrgico: factores relacionados

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ABSTRACT: Objectives: To analyze scientific publications regarding skin lesions resulting from surgical procedures and to identify the risk factors associated with their occurrence. **Method:** Integrative literature review study, with publications from 2012 to 2018, using PubMed Library and Virtual Health Library databases. **Results:** Of the eight studies that contemplated the subject, 87.5% were researches developed in hospital institutions and 12.5% in medical centers; 25.0% of the studies used case-control method, 25.0% were retrospective analysis studies, 12.5% were sample selection studies, 12.5% were cross-sectional studies, 12.5% were case reports and 12.5% were cohort studies. In total, 50.0% had been published in medical journals, 12.5% in nursing journals and 37.5% in journals of other health areas. **Final considerations:** The lesions that occur due to surgical procedures are mostly related to skin, both intraoperatively and in the immediate postoperative period. In addition to pressure ulcers, the presence of intraoperative burns and the appearance of skin lesions in the postoperative period were noted.

Keywords: Pressure ulcer. Wounds and injuries. Burns. Operating rooms. Patient positioning.

RESUMO: Objetivos: Analisar as publicações científicas referentes a lesões de pele decorrentes de procedimento cirúrgico e identificar os fatores de risco associados à ocorrência das lesões. **Método:** Estudo de revisão integrativa de literatura, com publicações do período de 2012 a 2018, utilizando as bases das bibliotecas PubMed e Biblioteca Virtual de Saúde. **Resultados:** Dos oito estudos que contemplaram o objetivo, 87,5% foram pesquisas desenvolvidas em instituições hospitalares e 12,5% em centro médico; e 25,0% dos estudos utilizaram o método de caso controle, 25,0% eram estudos de análise retrospectiva, 12,5% eram estudo de seleção de amostra, 12,5% estudo transversal, 12,5% relato de caso e 12,5% estudo de coorte. Das publicações, 50,0% foram em revistas médicas, 12,5% em revistas de enfermagem e 37,5% em revistas de outras áreas da saúde. **Considerações finais:** As lesões que acontecem apor conta de procedimento cirúrgico, em sua maioria, são relacionadas à pele, tanto no intraoperatório quanto no pós-operatório imediato. Além das lesões por pressão, destacaram-se a presença de queimaduras no intraoperatório e o aparecimento de lesões de pele no período pós-operatório.

Palavras-chave: Lesão por pressão. Ferimentos e lesões. Queimaduras. Salas cirúrgicas. Posicionamento do paciente.

RESUMEN: Objetivos: Analizar las publicaciones científicas referentes a lesiones de piel decurrentes de procedimiento quirúrgico e identificar los factores de riesgo asociados a la ocurrencia de las lesiones. **Método:** Estudio de revisión integrativa de literatura, con publicaciones del período de 2012 a 2018, utilizando las bases de las bibliotecas PubMed y Biblioteca Virtual de Salud. **Resultados:** De los ocho estudios que contemplaron el objetivo, un 87,5% fue investigación desarrollada en instituciones hospitalarias y un 12,5% en centro médico; y un 25,0% de los estudios utilizaron el método de caso control, un 25,0% era estudio de análisis retrospectivo, un 12,5% era estudio de selección de muestra, un 12,5% estudio transversal, un 12,5% relato de caso y un 12,5% estudio de cohorte. De las publicaciones, un 50,0% fue en revistas médicas, un 12,5% en revistas de enfermería y un 37,5% en revistas de

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otras áreas de la salud. **Consideraciones finales:** Las lesiones que ocurren por cuenta de procedimiento quirúrgico, en su mayoría, son relacionadas a la piel, tanto en el intraoperatorio como en el posoperatorio inmediato. Además de las lesiones por presión, se destacaron la presencia de quemaduras en el intraoperatorio y la aparición de lesiones de piel en el período posoperatorio.

Palabras clave: Úlcera por presión. Heridas y traumatismos. Quemaduras. Quirófanos. Posicionamiento del paciente.

INTRODUCTION

In the last decade, patient safety has become prominent in discussions of caring for people and the processes surrounding it. Several studies have sought best practices to obtain safety, and institutions have been constantly aiming to improve their processes with accreditation certificates. The Surgical Center (SC), due to its complexity, deserves a different look at patient care, with the performance of different professionals and the integration of several units; its specificity demands attention in the processes surrounding the patient[1].

The SC in a hospital is where most adverse health events occur to patients. There, therapeutic and diagnostic procedures of small, medium and high complexity are performed, requiring a complex and interdisciplinary work process, since surgical interventions integrate health care, contributing to the prevention of physical damage and loss of lives. Often, SCs are associated with risks of complications and death[2].

In this context, surgical positioning is an essential and often underestimated step. However, it must be considered that it can lead to serious but preventable injuries[3]. The patient is totally dependent on the care implementation team to prevent or minimize positioning problems. On the other hand, the team should protect the neuromuscular and cutaneous integrity, maintaining body alignment and respiratory and circulatory functions, especially[4].

All members of the surgical team (nurse, float nurse, anesthesiologist, surgeon and assistants) are responsible for positioning the patient to the surgery. Therefore, they should be involved in identifying risks, maintaining patient safety and, thus, protecting possible adverse events during surgery[5].

Prolonged permanence in the same position may lead to potential risk for anatomical and physiological changes, joint damage, stretching, muscular effort, nerve damage or dislocations[6], resulting in musculoskeletal pain, skin and peripheral nerves lesions and compartment syndrome[4].

Thus, the interest of this research emerged in the discipline of Clinical Teaching in Surgery, on the field on quality indicators, posing to researchers the following guiding question: What are the injuries related to surgical procedure described in the literature?

OBJECTIVES

- To analyze scientific publications regarding skin lesions resulting from surgical procedure;
- To identify the following risk factors associated with the occurrence of lesions: type of anesthesia, procedure performed and length of surgery.

METHOD

This is a retrospective study, an integrative literature review encompassing a time span of six years. The following steps were taken to prepare the review: definition of guiding question and objectives, search for evidence in literature, establishment of inclusion and exclusion criteria of articles, analysis, inspection, discussion and presentation of results[7].

The guiding question of this research was elaborated based on the PICO strategy (Patient, Intervention, Comparison, Outcomes). Thus, the question delimited was: What are the injuries related to surgical procedures described in the literature? The databases used were the US National Library of Medicine (PubMed) and the Virtual Health Library (VHL).

Inclusion criteria were: original articles published in Portuguese and English available electronically in full, with level of evidence for randomized controlled clinical trials; and observational studies and case reports addressing injuries related to surgical procedures, interventions and/or prevention care, published from 2012 to 2018. We aimed at more updated articles, since science is in constant renewal. Review studies and meta-analyzes, dissertations, theses and editorials were excluded.

During search, the mode was adapted according to the particularity of each database, using the following health descriptors:

- Pressure ulcer;
- Wounds and injuries;
- Burns;
- Operating rooms;
- Patient positioning (Chart 1).

In order to select the articles, a strategy of analysis was elaborated according to the guiding question and inclusion and exclusion criteria. Such analysis was done through the reading of titles, abstracts and full texts and resulted in six articles. After this step, duplicates were excluded (Figure 1).

For the analysis and subsequent discussion of the articles, a synoptic table was created by the researchers, which included the following aspects considered relevant: name of study authors, lesions described, characterization of sample and conclusions. Data was processed through Microsoft Office Excel 2010, followed by descriptive statistics, shown in the form of figures and tables.

RESULTS

Twenty articles were found on the proposed theme; however, only eight were analyzed, as these included the established inclusion criteria. Of these, seven (87.5%) had been found on PubMed and one (12.5%) on VHL.

Of the articles selected, seven (87.5%) were research carried out in hospital institutions and one (12.5%) in a medical center.

The research method comprised two (25.0%) case-control studies, two (25.0%) retrospective analysis studies, one (12.5%) sample selection study, one (12, 5%) cross-sectional study, one (12.5%) case report and one (12.5%) cohort study.

Regarding the type of journal in which articles were published, four (50.0%) appeared in medical journals, one (12.5%) in a nursing journal and three (37.5%) in journals of other areas of health.

Regarding the years of publication and the number of publications selected in studies, the time span was from 2012 to 2018. There was a higher percentage of publications between 2013 and 2015, with two articles (25.0%) in each year (Figure 2).

The types of surgical specialties involved in studies are subdivided into general, cardiac, orthopedic, thoracic, neurological and plastic surgery. They are all studies of patients submitted to surgical procedures, with samples varying from 143 to 32,963 individuals. Chart 2 summarizes the results of this integrative review.

DISCUSSION

Regarding the objective of this review, we observed, in the eight articles selected, some variants that were directly associated with lesions arising from surgical procedures, such as procedure performed, duration of surgery and type of anesthesia.

The research for injuries suffered by the surgical patient is of paramount importance to draw attention to the fact that the surgical team must establish care to preserve the physical integrity of the patients.

In a study on perioperative lesions, burns and pressure ulcers (PUs) were highlighted. The authors report that 10.7% of 2,69 patients had PUs after surgical procedure[12].

Other investigations report skin lesions after surgical procedure related to the type of surgery; however, the authors do not point out the type of surgery with a higher incidence of lesions. Cardiovascular, thoracic, orthopedic, neurological, plastic, urologic, bariatric, general, hepatobiliary, oncologic, trauma, transplantation and vascular specialties are among the surgeries

Chart 1. Distribution of search strategies, according to database and number of articles found.

Databases	Search	Retrieved articles	Articles
PubMed	Pressure Ulcer *AND Patient positioning*; *Wounds and Injuries AND Patient positioning*; *Burns and Patient Positioning*; *Pressure Ulcer AND Operating rooms*; *Wounds and injuries AND Operating rooms*; *Burns AND Operating rooms*	14	7
VHL	Pressure ulcer AND Operating rooms; Wounds and injuries AND Operating rooms; Burns AND Operating rooms; Pressure ulcer AND Patient positioning; Wounds and injuries AND Patient positioning; Burns AND Patient Positioning	6	1

VHL: Virtual Health Library.

highlighted by the authors. Lesions range from impaired skin and tissue integrity, considered as PU stage I to stage IV[9,11-13].

Besides PUs reported by the authors, other researchers consider that these are directly related to burns occurred during surgical procedures. The highest burn rate is connected to the electrocautery device, which, in most cases, is the starting point for burns[10,17]. One study identified that 90% of burns were caused by electrocautery[17].

Another important feature is related to the presence of the components essential for the onset of fire, which are found abundantly in the SC. The three basic items are the oxidizer, the source of ignition and the fuel. The oxidant reported by the authors was oxygen because, due to complex surgical procedures and high levels of sedation, high concentrations of oxygen were offered[10,17]. The authors believe that, for the most part, SC burns could be avoided by taking adequate and effective precautionary measures.

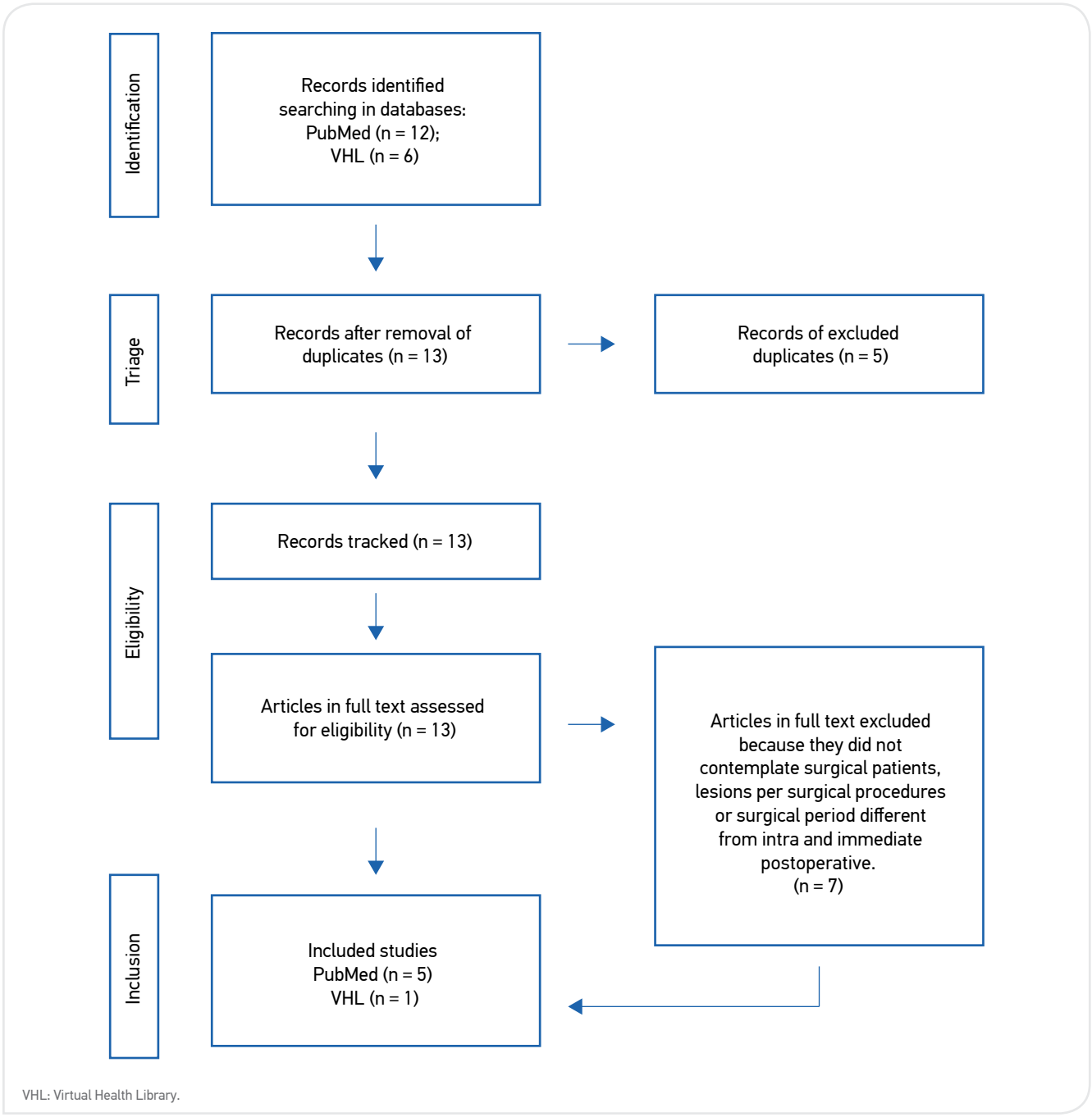

Figure 1. Flowchart for selection of articles included in the review.

Regarding the length of procedures, it was verified that, soon after the surgery, it is already possible to identify PU and this is due to the prolonged time of immobility and pressure exerted in certain areas of the patient's body. A high index of patients with lesions after longer procedures was reported. Of the 297 patients followed up, 44 presented PU, with a rate of 9.8% of lesions found in the first 30 minutes after surgery, and 5.1% of patients with lesions after the first 30 minutes after surgery[11,13].

There was a higher incidence of lesions in patients with prolonged surgery time (period equal to or greater than 4 hours), with a mean of 4.5% lesions found in patients in the first 24 hours after surgery[11].

The greater the surgery, the greater the risk of the individual acquiring injury, since more complex surgeries require a longer surgical time. In addition, under general anesthesia, in which the patient is immobile for a long period, anesthetics that are more potent are administered[11,13]. More attention is recommended in the postoperative period because the incidence of PUs is remarkable in this period[12].

Regarding the type of anesthesia, the general one is most associated with skin lesions. Patients submitted to general anesthesia had a variation 4.8 times greater when compared to patients who underwent local anesthesia[13].

Patients under general anesthesia are more exposed to burns because the sedation rate is higher in relation to other anesthetic drugs, which consequently requires a higher rate of oxygen, a potential component for fires[17].

Authors of a study reported difficulties in approaching this data, since the research was directed at critical patients, which directly influenced the use of general anesthetics in prolonged surgeries, linked to the patients' clinical situation[12]. The other authors do not point out an association between the anesthetic agent and the occurrence of lesions.

FINAL CONSIDERATIONS

In view of this study, the literature analyzed showed the incidence of lesions resulting from surgical procedures. The most common are PUs, with more evidence of postoperative appearance, and burns, which have more visibility in the intraoperative period.

The type and the length of surgery are highly relevant factors to generate trauma; however, the surgical team should promote care during the operative act, from the proper positioning to the use of accessories to distribute pressure and protect the bony prominences. As for burns, attention is focused on the use of electrocautery and components that could lead to the onset of fire in the operating room.

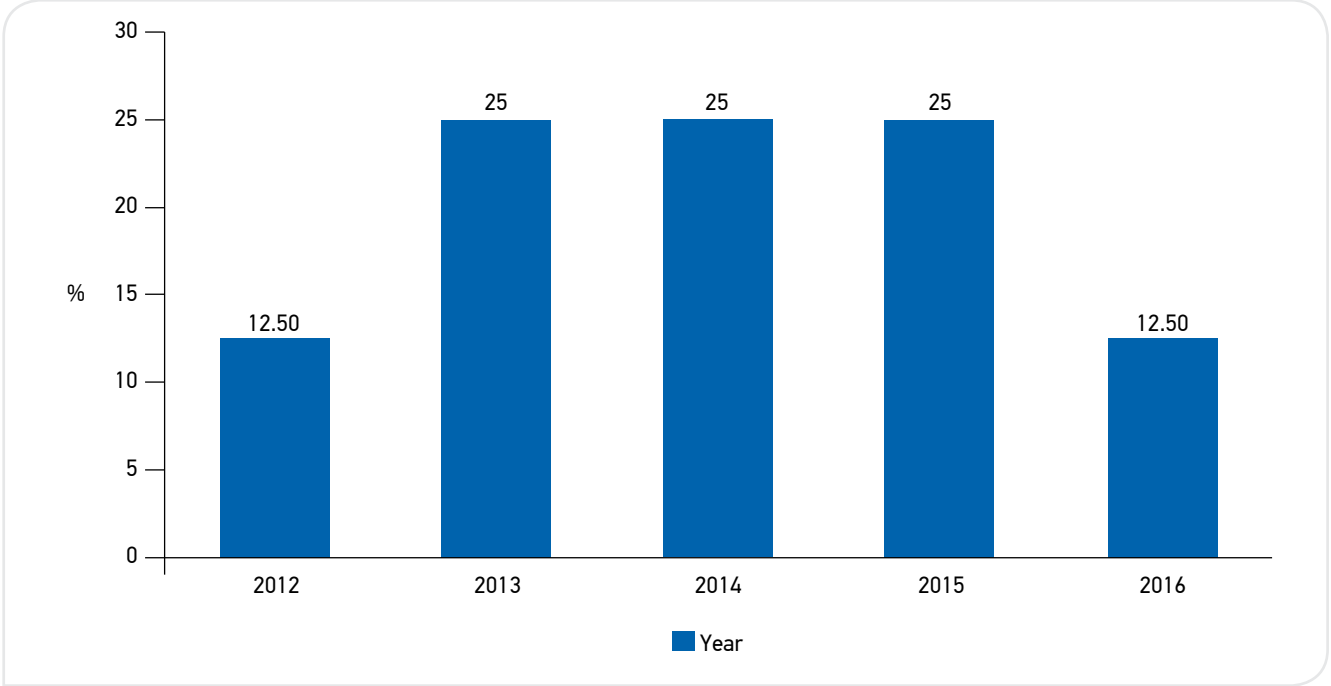

Figure 2. Quantitative view of publications per year, with time span from 2012 to 2018.

Chart 2. Summary of researches included in integrative review.

Authors, country and year	Described lesions	Sample characterization	Conclusions
Steyer et al. (Brazil, 2016)[9]	Impaired tissue integrity of skin	Of the 143 patients undergoing bariatric surgery, 133 had impaired tissue integrity.	The scarcity of nursing studies on bariatric surgery has limited the discussion of data, corroborating the need to expand investigations on the subject.
Jalali et al. (Iran, 2015)[10]	Thermal lesion	300 patients submitted to cardiac surgery, divided into two groups, were selected: 150 before the engineering modifications and 150 after the modifications. 110 patients with burns were identified: 75 before and 35 after the modifications.	Surveillance and repair of defects by specialized professionals have had significant effects in reducing the incidence of burns.
Hayes et al. (United States, 2015)[11]	Pressure ulcer	A study with 32,963 patients who had no lesions at admission, submitted to cardiac, general, hepatobiliary, neurological, oncological, plastic, thoracic, transplantation, trauma, urological and vascular surgeries. 931 PUs were documented.	The immediate postoperative period and prevention efforts should focus on postoperative care when most PUs develop.
O'Brien et al. (United States, 2014)[12]	Stage II, III and IV pressure ulcers, deep and / or unstable tissue injury	2,695 patients were selected, of whom 288 presented lesions: 261 with PU type II, 22 PU type III, 10 PU type IV, 23 deep tissue PU and 88 unstable tissue PU.	Postoperative PUs were present in 10.7% of the critically ill patients.
Shaw et al. (Taiwan, 2014)[13]	Stage I pressure ulcer	Of the 297 patients who underwent surgical procedures with more than 30 minutes under spinal or general anesthesia, 29 acquired stage I PU immediately after surgery and 15 stage I PU after 30 minutes of surgery.	Type of anesthesia, patients with old age, type of surgery and surgery position are associated with the development of PU.
Eteuati et al. (Australia, 2013)[14]	Brachial plexus lesion	Between 2005 and 2010, 548 laparoscopic colorectal resections were performed, with five cases of brachial plexopathy due to the long stay in the Trendelenburg position.	To prevent brachial plexopathy, precautions are recommended: changes in patient positioning, especially with lower BMI, placing in position with both arms held to the side of the trunk and use of cushions with gel or foam pads and pillows.
Jellish et al. (United States, 2013)[15]	Brachial lesion	Somatosensitive monitoring of potential risks (PESS, acronym in Portuguese) was used to detect brachial plexus lesions related to the positioning during cranial base surgery. Sixty-five patients, aged 15-77 years, were studied. The sensitivity of PESS for lesion detection was 57%, and the specificity was 94.7%.	If there is adjustment in the position with improvement in SSEP, nerve injury can be avoided. Thus, the monitor can be used for routine evaluation of brachial plexus in surgical procedures or, at least, in obese patients.
Mehta (United States, 2013)[16]	Chemical burn and thermal injury to skin, nose, mouth, lips, trachea, pharynx and thorax	5,194 complaints collected about surgical failures, of which 103 were caused by fires, and 90% of the fires were caused by electrocautery. Of the lesions caused by electrocautery, 86% occurred in the skin and 10% in the mouth.	Recognition of the fire triad is crucial to prevent fires. Further education and communication between SC staff and fire prevention protocols in high-risk procedures can reduce the occurrence.

PU: Pressure Ulcer; BMI: body mass index; CC: surgical center.

Regarding the initial objective of the research, there were gaps reported in the studies to address the lesions that may occur after the surgical procedure. Even inserting descriptors that involved different types of lesions, only articles describing pressure ulcers or burns were found, which met the inclusion criteria.

Understanding which factors have generated these gaps is beyond the reach of researchers, but it is notable that there are other lesions that can be generated by surgical procedures, either by positioning or chemical or electrical items. Therefore, the research must be deepened, with the purpose of intensifying evidence regarding the topic addressed.

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