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Risk factors for surgical site infection in potentially contaminated surgeries

Fatores de risco para infecção do sítio cirúrgico em cirurgias potencialmente contaminadas

Factores de riesgo para infección de la zona quirúrgica en cirugías potencialmente contaminadas

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ABSTRACT

Objective: To associate the intraoperative period risk factors of potentially contaminated surgeries with the occurrence of surgical site infection in the postoperative period at the hospital and at domicile. **Method:** A longitudinal, descriptive and quantitative study was realized from February to June 2015 with 90 patients and with an interview and observation script applied during the surgical procedure. **Results:** The surgical site infection occurred in nine participants in the postoperative hospital and 42 in the domicile. **Conclusion:** Hospital and domicile control and follow-up are suggested, preventing the risk of infections and making patient safety possible.

DESCRIPTORS: Stomatherapy; Patient safety; Intraoperative period; Surgical wound infection; Hospital infection.

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RESUMO

Objetivo: Associar os fatores de risco do período intraoperatório de cirurgias potencialmente contaminadas com a ocorrência de infecção do sítio cirúrgico no período pós-operatório hospitalar e em domicílio. **Método:** Estudo longitudinal, descritivo e quantitativo realizado de fevereiro a junho de 2015 com 90 pacientes e com um roteiro de entrevista e de observação aplicado durante o tempo de procedimento cirúrgico. **Resultados:** A infecção do sítio cirúrgico ocorreu em nove participantes no pós-operatório hospitalar e em 42 no domicílio. **Conclusão:** Sugerem-se o controle e o acompanhamento hospitalar e domiciliar, prevenindo o risco das infecções e viabilizando a segurança do paciente.

DESCRITORES: Estomaterapia; Segurança do paciente; Período intraoperatório; Infecção da ferida operatória; Infecção hospitalar.

RESUMEN

Objetivo: Asociar los factores de riesgo del período intraoperatorio de cirugías potencialmente contaminadas con la incidencia de infección de la zona quirúrgica en el período posoperatorio hospitalario y en domicilio. **Método:** Estudio longitudinal, descriptivo y cuantitativo realizado desde febrero hasta junio de 2015 con 90 pacientes y con un itinerario de entrevista y de observación aplicado durante el tiempo de procedimiento quirúrgico. **Resultados:** La infección de la zona quirúrgica ocurrió en nueve participantes en el posoperatorio hospitalario y en 42 en el domicilio. **Conclusión:** Se sugieren control y seguimiento hospitalario y domiciliario, previniendo el riesgo de las infecciones y viabilizando la seguridad del paciente.

DESCRIPTORES: Estomaterapia; Seguridad del paciente; Período intraoperatorio; Infección de la herida operatoria; Infección hospitalaria.

INTRODUCTION

The surgical act is related to risks in the health services, and the surgical complications correspond to a large proportion of the deaths and damages, but these are, however, preventable [1].

Infections are conceived as the most common complications of the surgical patient and are qualified as hospital when arising from surgeries and cross infections or from invasive procedures performed in in-hospital settings. Some risk factors, such as material sterilization, the number of people in the operating room, and the team's experience, are responsible for the increase in Hospital Infection rate (HI) and are directly related to surgical manipulation, manifesting on the thirtieth day of postoperative or, even, a year later, in cases of implants and prosthetic surgeries[2,3].

The HIs with the highest institutional and domicile index are Surgical Site Infections (SSI), which may originate from poor surgical manipulation involving subcutaneous tissue, deep soft tissues (fascia and muscle), organs and incised cavities. The SSIs occupy the third position among all infections in health services and occur in 11% of the surgeries performed in Brazil, varying according to the surgical procedure performed[3,4].

The most common source of microorganisms is the patient's endogenous flora. It is estimated that after 24 hours from the surgical act the wound is sealed and thus protected from exogenous contamination. Infections at other sites may be sources of microorganisms that contaminate the surgical wound and should be investigated and treated in the preoperative for elective surgeries. These exogenous sources should be considered during the surgical procedure and, as such, strict aseptic technique should be maintained in order to prevent the contamination[3].

The United States Centers for Disease Control and Prevention (CDC) warn that the terminology of *surgical wound infection* should be replaced by the term *surgical site infection*, since not all infection associated with surgical manipulation occurs in the wound as such, but also in organs or spaces[5].

Regarding the SSI control, it is advised that surgical patients be followed from surgery to dSSIharge and followed up in an outpatient clinic, which is not a practice performed in Brazilian hospitals. In this sense, under-reported SSI rates are generated, far below the reality[6].

In one of the studies searched, 2.203 surgical anesthetic procedures were analyzed, of which 81 patients developed SSI. Of these, 59 (72.84%) patients were submitted to potentially contaminated surgeries, such as: colectomy, cholecystectomy, biliodigestive derivation,

pancreaticoduodenectomy, enterectomy, nephrectomy, gastrectomy, gastroplasty and exploratory laparotomy[7].

The reported SSI rate, based on CDC-based data and parameters, shows increased values. These indices are high, given the lack of investigation, monitoring and control of these risk factors in preoperative care; as a consequence, there is a high rate of SSI in potentially contaminated surgeries, even considering these interventions the most performed. The association between risk factors and the occurrence of SSI has not been sufficiently clarified, which justifies the necessity for research that offers subsidies to elucidate the problem and contribute to the quality of perioperative nursing[7-9].

In a hospital in the southern region of Brazil, 2.259 surgical procedures were performed in 2013. Of these, 1.248 (55.25%) were classified as potentially contaminated surgeries, which is the type of surgery most performed at the hospital of choice, being that 82 (6.57%) patients acquired HI and 35 (2.80%) developed SSI. In view of this reality, a survey was made of the intraoperative risk factors related to the occurrence of SSI during the postoperative period at the hospital and at domicile, with the objective of realizing a possible implementation of strategies and solutions that would enable its reduction and, consequently, the SSI index, choosing to study the SSI of this classification of surgery because this is a complication present in the institution. For the association of intraoperative risk factors with the presence/absence of SSI in the hospital postoperative period, some categories were evaluated: invasive devices such as central venous pressure catheter (CVP), mean arterial pressure catheter (MAP), Permanent vesical catheter (PVC) and laminar tube drain; bladder eliminations during the surgical procedure; and duration of the procedure. These were the categories selected after analyzing the statistical data that influenced the occurrence or not of the SSI.

It is not only the involvement of nursing, but also of the entire health team, that is fundamental to good prevention and infection control practices, and it is the responsibility of all who work in care to ensure quality improvement. Considering the follow-up of the surgeries after the surgical procedure, a monitoring method should be established throughout the perioperative period[10].

The epidemiological monitoring of HI is the active, systematic and continuous observation of its occurrence and its distribution among patients and of the events and conditions that affect the risk of its occurrence, with a view to the proper execution of prevention and control actions. The National Hospital Infection Monitoring System (NNIS) was organized in the USA in 1970 and adapted to the brazilian reality in 1993. Since then, this process has been implemented in the control of infections. For NNIS, HI are classified as: urinary system, respiratory system, vascular system and SSI, which corresponds to 20% of infections[10].

In this perspective, the following research question was elaborated: What is the relation of the risk factors of the intraoperative period with the occurrence of SSI in patients submitted to potentially contaminated surgeries, performed in a school hospital in the South region of Brazil?

OBJECTIVES

To verify the association of risk factors of the intraoperative period of surgeries potentially contaminated with the occurrence of SSI in the postoperative period at the hospital and at domicile.

METHODS

A longitudinal study with quantitative descriptive approach performed in two surgical hospitalization units and surgical center of a school hospital in the southern region of Brazil. The sample consisted of 90 patients hospitalized in these hospitalization units, with 30 beds each. The number of participants was determined through the Web Statistics Teaching-Learning System (SEstatNet), based on the number of potentially contaminated surgeries performed in the year 2013[11].

Inclusion criteria were: over 18 years of age; being intraoperative from any of the potentially contaminated elective surgeries performed during the period of data collection until saturation of the sample; and to make a post-dSSIharge hospital contact. The following were excluded: patients submitted to previous surgeries already contaminated; who had already had previous hospitalization; which had already been inserted into the

sample at some point; and who were re-hospitalized or had any type of confirmed systemic infection. Patients were selected from hospitalization, when the researcher identified, during the shift, those who could participate (non-probabilistic sample). After confirmation with the patient's data, the patient was approached in its hospitalization room and informed about the purpose of the research, the instruments used and the ethical aspects of human research.

An instrument based on a narrative review developed prior to the qualification of the study, named as "interview and observation script" was developed and validated by means of a pilot test with 15 participants, 20 days before the beginning of the data collection. The collection period was from February 12 to June 30, 2015.

This instrument contained identification data, such as: patient's initials, hospital registry number, hospitalization surgical unit, room and bed numbers, date of hospitalization, reason for hospitalization, and date and time of interview. In addition, it presented the characteristics of the surgical site dressings, as well as the absence of it, categorized as the dependent variables of the study, to be: dry and clean, presence or not of pain, hyperemia, heat, edema and dehSSIence. We also investigated the characteristics of SSI in the presence of pain, redness, heat, edema, fever, dehSSIence and purulent exudate to classify these as superficial incisional, and this SSI classification is the only one observed during data collection.

Data collection was performed daily, from the moment that the patient was selected in the preoperative period until dSSIharge. After seven days of hospital dSSIharge, a telephone contact was made with the participants or the companions, to investigate aspects related to the healing process of the surgical incision, as well as the clinical condition of the patient. This return in seven days occurred because, according to the CDC, this period is considered the critical time and risk of development of SSI of the surgical interventions. The patients did not pass an outpatient return evaluation, since not everyone had the opportunity of this consultation. When the presence of SSI was identified, the patient was instructed to return to the hospital to be evaluated by the health team and initiate appropriate treatment according to their clinical condition.

The data were exported and analyzed by the statistical package *Statistical Package for Social Sciences* (SPSS) - version 22.0. The dependent and independent variables were analyzed descriptively by simple frequency, percentage, and position and dispersion measurements. For the association of categorical variables, the Chi-square test (χ^2) was used for bivariate analysis of risk factors with the presence/absence of SSI.

The bivariate association was analyzed through binary logistic regression to verify the association between SSI (in the postoperative period and at domicile) and its intraoperative risk factors. In this regression model, only the variables with $p \leq 0.200$ compared to the presence of SSI were inserted, adopting a significance level of 5% ($p = 0.05$) and the limit being based on the fact that the deviation is originated from chance or not. To confirm the influence of risk factors on the occurrence of SSI, the EXP (B) - OR interval was 1.

The research was approved by the Committee of Ethics in Research with Human Beings, with the opinion of 925.511/14, and has the Certificate of Presentation for Ethical Assessment (CPEA) nº 39866414.1.0000.0115.

RESULTS

Of the 90 patients, four (4.4%) were young adults, 62 (68.9%) were adults and 24 (26.7%) were elderly. Regarding sociodemographic data, 68 (75.6%) were women and 82 (91.1%) had children. As to the level of schooling, 24 (26.7%) had completed elementary school and 27 (30%) had completed high school. Regarding comorbidities, 48 (53.3%) had systemic arterial hypertension (SAH), 23 (25.6%) had diabetes mellitus (DM) and 19 (21.3%) had morbid obesity. Regarding the use of alcoholic beverages/cigarettes, 33 (36.7%) used alcohol and 32 (35.6%) were smokers. With regard to the diagnosis of the most frequent diseases, 23 (25.6%) had acute cholecystitis; 21 (23.3%) had cholelithiasis and 17 (18.9%) were diagnosed with morbid obesity.

SSI in the postoperative period was identified in nine (10%) patients. For the association of intraoperative risk factors with the presence/absence of SSI in the hospital postoperative period (categorical variables), a bivariate analysis was performed using the χ^2 test, presented in Table 1, with a level of significance, i.e., the variables: use of invasive devices such as CVP catheter ($\chi^2 = 11.250$ and $p = 0.001$), MAP catheter ($\chi^2 = 12.180$ and $p < 0.001$),

PVC (χ^2 = 8.889 and p= 0.003) and laminar tube drain (χ^2 = 12.461 and p <0.001); and bladder eliminations during the surgical procedure (χ^2 = 7.780 and p = 0.005). The Mann-Whitney U test (U = 217.000 and p = 0.047) was used to analyze the variable duration of the procedure, due to the fact that the variable presents a result in time, that there is no reference category and that there is no reference category homogeneity of the variances with the presence/absence of SSI occurred in the postoperative period according to this variable. Thus, the mean duration of each surgery was 131.44 minutes (SD = 72.740).

It was also recognized the prevalence of patients who developed SSI during the postoperative period, identified as five (55.6%), who used antiemetics, and the same value of the use of MAP. Of the total, seven (77.8%) participants used DBC; six (66.7%) used drains, mostly the laminar tube drain; and five (55.6%) were classified as ASA II, according to the American Society of Anesthesiologists (ASA) classification, during the period of surgery, according to Table 1.

In the postoperative period, the incidence of SSI was higher, being present in 42 (46.7%) patients. By the χ^2 test, it was not possible to identify the level of significance of intraoperative risk factors in the presence of SSI in any of the variables, since the value of p> 0.05, so there was no difference between them.

It was noted that 29 (75.2%) of the patients who developed SSI in the domicile postoperative period

Table 1. Bivariate analysis between the modifiable risk factors of the intraoperative period and the presence/absence of surgical site infections (SSI) in the postoperative period. Florianopolis, Santa Catarina, Brazil, 2015.

Risk factors	Without hospital SSI n = 81 (90%) n (%)	With hospital SSI n = 9 (10%) n (%)	Total n = 90 (100%) n (%)	χ^2	*p*
Medications (Antiemetic)					
Yes	64 (82.1%)	5 (55.6%)	69 (79.3%)		
No	14 (17.9%)	4 (44.4%)	18 (20.7%)	3.452	0.063
Invasive device (Central venous pressure)					
Yes	6 (7.4%)	4 (44.4%)¥	10 (11.1%)	11.250	0.001*
No	75 (92.6%)	5 (55.6%)	80 (88.9%)		
Mean arterial pressure					
Yes	9 (11.1%)	5 (55.6%)¥	14 (15.6%)	12.180	< 0.001*
No	72 (88.9%)	4 (44.4%)	76 (84.4%)		
Permanent vesical catheter					
Yes	23 (28.4%)	7 (77.8%)¥	30 (33.3%)	8.889	0.003*
No	58 (71.6%)	2 (22.2%)	60 (66.7%)		
Drains					
Yes	27 (33.3%)	7 (77.8%)	34 (37.8%)	6.807	0.009
No	54 (66.7%)	2 (22.2%)	56 (62.2%)		
Type of drain (Laminar tube)					
Yes	13 (16%)	6 (66.7%)¥	19 (21.1%)		
No	68 (84%)	3 (33.3%)	71 (78.9%)	12.461	< 0.001*
ASA					
I	17 (21%)	0 (0%)	17 (18.9%)		
II	49 (60.5%)	5 (55.6%)	54 (60%)	4.501	0.105
III	15 (18.5%)	4 (44.4%)	19 (21.1%)		
Bladder elimination					
Yes	25 (30.9%)	7 (77.8%)¥	32 (35.6%)	7.780	0.005*
No	56 (69.1%)	2 (22.2%)	58 (64.4%)		
Duration of procedure					
Mean	123.27	205.00	131.44	217.000	0.047*
Standard Deviation	58.090	135.485	72.740		

χ^2 = Chi-square; *p* = level of significance; ¥ = Residual adjustment ≥ 2.0; *p ≤ 0.05; ASA = American Society of Anesthesiologists. Source: author databases.

used antiemetics and none of them used a nasogastric tube (NGT) (100%). Regarding the breakdown of the technique of the procedure, 10 (23.8%) had this intercurrence for the development of SSI during the surgical procedure, as presented in Table 2.

In Table 3, the adjusted analysis did not identify any variables influencing the SSI in the postoperative period in the hospital. On the other hand, the crude analysis indicated that most of the variables presented a chance for SSI to appear, in which the following were pointed out: PVC (RC = 10.00; 95% CI = 2.11 - 47.38); MAP (RC = 10.00, 95% CI = 2.26-44.20); and laminar tube drain (RC = 10.46, 95% CI = 2.32-47.24).

Regarding the risk factors influencing the appearance of SSI during the postoperative period, both in the crude and in the adjusted analysis, none of them induced the onset of infections, being unexplained in the prevalence of SSI, according to Table 4.

Table 2. Bivariate analysis of the modifiable risk factors of the intraoperative period with presence/absence of surgical site infections (SSI) in the postoperative period. Florianopolis, Santa Catarina, Brazil, 2015.

Risk factors	Without home SSI n = 48 (53,3%) n (%)	With home SSI n = 42 (46,7%) n (%)	Total n = 90 (100%) n (%)	χ^2	*p*
Medications (Antiemetic)					
Yes	40 (85.1%)	29 (72.5%)	69 (79.3%)		
No	7 (14.9%)	11 (12.6%)	18 (20.7%)	2.093	0.148
Invasive device (Nasogastric tube)					
Yes	3 (6.3%)	0 (0%)	3 (3.3%)		
No	45 (93.8%)	42 (100%)	87 (96.7%)	2.716	0.09
Permanent vesical catheter					
Yes	12 (25%)	18 (42.9%)	30 (33.3%)		
No	36 (75%)	24 (57.1%)	60 (66.7%)	3.214	0.07
Breakdown of surgical technique (Small break)				1.960	0.162
Yes	6 (12.5%)	10 (23.8%)	16 (17.8%		
No	42 (87.5%)	32 (76.2%)	74 (82.2%)		
Bladder elimination					
Yes	13 (27.1%)	19 (45.2%)	32 (35.6%)	3.222	0.07
No	35 (72.9%)	23 (54.8%)	58 (64.4%)		

χ^2 = Chi-square; *p* = level of significance. Source: author databases..

Table 3. Binary logistic regression analysis of intraoperative risk factors in the presence of surgical site infections (SSI) in the postoperative period. Florianopolis, Santa Catarina, Brazil, 2015.

Risk factors	Gross analysis		Adjusted analysis	
	RC	IC 95%	RC	IC 95%
Medications (Antiemetic)				
Yes	0.27	0.06 – 1.15	0.40	0.11 – 1.43
No	1.00		1.00	
Invasive device (Central venous pressure)				
Yes	10.00	2.11 – 47.38	3.72	0.22 – 63.33
No	1.00		1.00	
Mean blood pressure				
Yes	10.00	2.26 – 44.20	0.60	0.05 – 7.41
No	1.00		1.00	
Permanent vesical catheter				
Yes	8.83	1.70 – 45.68	1.27	0.05 – 30.18
No	1.00		1.00	
Drains				
Yes	7.00	1.36 – 36.02	0.62	0.13 – 3.20
No	1.00		1.00	

....continue

Table 3. Continuation...

Risk factors	Gross bruta		Adjusted analysis	
	RC	IC 95%	RC	IC 95%
Drain (Laminar tube)				
Yes	10.46	2.32 – 47.24	0.60	0.12 – 2.97
No	1.00		1.00	
ASA				
I	0.00	0.00 – 0.00	0.43	0.08 – 2.45
II	0.38	0.09 – 1.61	0.90	0.24 – 3.36
III	1.00		1.00	
Bladder elimination				
Yes	7.84	1.54 – 40.44	4.22	0.22 – 81.57
No	1.00		1.00	
Duration of procedure				
Mean	1.01	1.00 – 1.01	1.00	0.98 – 1.00
Standard Deviation	1.00		1.00	

Adjusted Analysis = All variables were entered into the model adjusted independently of the value of p. The variables with p ≤ 0.200 remained in the adjusted model. ASA = American Society of Anesthesiologists; 95% CI = 95% Confidence Interval; RC = Reason for Chance. Source: author databases.

Table 4. Binary logistic regression analysis of intraoperative risk factors in the presence of surgical site infections (SSI) in the postoperative period. Florianopolis, Santa Catarina, Brazil, 2015.

Risk factors	Gross bruta		Adjusted analysis	
	RC	IC 95%	RC	IC 95%
Medications (Antiemetic)				
Yes	0.46	0.16 – 1.33	0.46	0.14 – 1.53
No	1.00		1.00	
Invasive device (Nasogastric tube)				
Yes	0.00	0.00 – 0.00	0.00	0.00 – 0.00
No	1.00		1.00	
Permanent vesical catheter				
Yes	2.25	0.92 – 5.50	1.34	0.07 – 24.82
No	1.00		1.00	
Breakdown of surgical technique (Small break)				
Yes	2.19	0.72 – 6.65	2.93	0.89 – 9.72
No	1.00		1.00	
Bladder elimination				
Yes	2.22	0.92 – 5.36	2.31	0.13 – 39.92
No	1.00		1.00	

Adjusted Analysis = All variables were entered into the model adjusted independently of the value of p. The variables with p ≤ 0.200 remained in the adjusted model. 95% CI = 95% Confidence Interval; RC = Reason for Chance. Source: author databases.

DISCUSSION

In a study realized with 96 patients submitted to oncological surgeries of the digestive tract and potentially contaminated surgeries, 26 (13.2%) developed SSI. The mean time of the surgeries was 238 minutes; of the patients who developed SSI, 17 (65.4%) passed for a surgical procedure with the duration of more than 240 minutes. Corroborating the study analyzed, the present study presented an average surgical time of 205 minutes in patients who developed SSI[12].

Regarding the antiemetic drug administration, the study revealed that patients who took this drug intravenously developed SSI. Antiemetics reduce the

risk of aspiration and are recommended for association with general anesthesia, especially in the digestive tract and biliary tract surgeries. Nausea and emesis, in addition to being uncomfortable, increase pain and may alter the healing process of surgical site incisions in the abdominal wall. In this case, it is understood that the use of this medication may prevent the appearance of SSI, however, the mechanisms of action of the antiemetic drugs block the central H1 receptors, which are the histamine receptors. These histamine receptors, when interacting with the molecular mechanisms of antihistamines, provoke an anti-inflammatory action. With this drug interaction, the antiemetics inhibit the anti-inflammatory effect of these receptors, exposing the organism to secondary infections[13]. In this sense, it can be said that the action of the antiemetic is a factor for the occurrence of SSI.

The control of MAP during the surgical procedure may be indispensable, however it contributes to the appearance of local or systemic infections, the prevalence of which is associated with aspects of the type of catheter, its frequency of manipulation and exchange, and factors related to patient characteristics. Human skin and mucous membranes are the protective and protective barriers of the body, aided by the mechanical removal of bacilli, such as sweating, peristalsis and salivation. The insertion of catheters causes a rupture of these barriers, providing and favoring the infectious process[14]. However, the influence of MAP in the development of SSI was not a predominant factor in the researched scientific studies[7,15-17].

The SSI has been identified in patients who had bladder catheterization performed during the intraoperative period, with urinary tract infection being the most frequent and corresponding to 38.5% to 40% of all nosocomial infections. One of the factors for the occurrence of this infection is the residence time with PVC. Bladder catheterization is associated with the development of SSI, especially for the duration of PVC, since this risk increases from 3% to 10% for each day with the device[11]. In this study, SSI was developed in seven (77.8%) patients who were catheterized with PVC, confirming it as a risk factor.

The use of the drain, although necessary, is a gateway to microorganisms and its use must be done after clinical evaluation, taking into account the risk versus benefit relationship. In this sense, it is recommended to use drains in a closed drainage system, respecting the care with its handling and a shorter residence time. Because they are predisposing to SSI, patients are at risk of developing them for up to 15 days, while in the absence of drainage, this period decreases to nine days. If drainage systems are opened, the risk factors for infections can reach up to 15.7%; or up to 10.1%, in cases of closed drainage system. In addition, the use of drains in the surgical act allows the retrograde migration of bacteria from the skin flora, being a conditioning factor to the appearance of SSI. In this study, there was the development of SSI in patients who had drains, similarly to the study that showed SSI in patients who carried a Penrose drain[12]. Regarding the preoperative evaluation of the patient, ASA's main objective is to reduce the morbidity related to the anesthetic-surgical act and must be performed by the anesthesiologist. With this analysis, the professional obtains a clinical profile, reducing the risks for the surgical complications, highlighting the infectious ones. In addition, the evaluation aims to identify and diagnose diseases and dysfunctions that may compromise the intraoperative period[18].

In this research, it was observed the association of the clinical condition of the patient with SSI, since the patients classified with ASA II developed it. In a study realized with 17.144 surgical procedures for three years, 538 cases of SSI were reported, and the highest rate was observed for patients classified as ASA II, totaling 167 (32.6%) cases. In this sense, it is confirmed that the clinical state has a direct association with the development of SSI. This distribution is confirmed because the rate of this infection is proportional to the complexity of the individual, since the greater the severity, the higher the SSI level[19].

Monitoring of the surgical patient should be expanded beyond hospital admission, since it is observed that, when there is monitoring in the post-discharge period, SSI rates increase. The prioritization of strategies, such as outpatient follow-up and telephone contact, is essential for the correct identification of SSI in the postoperative period at domicile and to reduce the chances of developing these infections, since 12 to 84% of the cases are confirmed during the domicile period[4].

Sometimes, short periods of manifestation are found according to the SSI etiology, usually within the fourth to the sixth postoperative day. In other situations, the period is longer, occurring 30 to 90 days after surgery. The absence of follow-up after hospital discharge generates underreported rates and, consequently, underestimation of the true incidence, impact, and relevance of SSI[20].

Monitoring methods for SSI for 30-day post-discharge follow-up may include: active search, passive reporting, chart review, microbiological examination, and database review. According to a study by Pina, Ferreira and Uva, regarding the evaluation of monitoring methods after discharge, it is considered that, among the various options, there is no one that can be recommended, but that monitoring should be performed[20].

Forty two (46.7%) patients with SSI were identified in the domicile period, and the identification of this infection in the hospital environment was only in nine (10%) of the total. Regarding the intraoperative risk factors for SSI in the postoperative period at domicile, there was no mention of the risk associated with the variables analyzed and interpreted, except for the use of antiemetics. Other categories, such as the use of NGT, PVC use and bladder eliminations during the surgical procedure, were present in a smaller number in those who had SSI. Of the 42 patients who developed the infection at domicile, 29 (72.5%) received intravenous antiemetics during the surgical procedure.

In view of these factors and discoveries, it was possible to identify that there is an association of risk factors during the intraoperative period in surgeries potentially contaminated with the onset of SSI in the postoperative period.

Nursing, an integral profession of health services, is concerned with the quality of care, which is reproduced in the maturation and growth of professional practice. When returning to the surgical area, the necessity for peculiar care during the perioperative period is observed. In the quest for excellence in the quality of care provided to the surgical patient, the planning of the actions becomes indispensable and basic in the practice of perioperative nursing[21].

Understanding the dynamics related to the operative periods is the differential factor for a good practice of nursing care, since each period has its peculiarities, which allow the execution of specific and personalized care[22].

For the implementation of prevention and control measures, it is essential that professionals acquire knowledge about these risk factors, which contribute to the development of infections. It is only after mastering this knowledge that it is feasible to plan and intervene with the aim of minimizing infection rates or even eliminating some of them[20].

CONCLUSION

With this study, it was possible to verify the association of intraoperative risk factors with the occurrence of SSI in the postoperative period, both hospital and domicile. The incidence of SSI development in the postoperative period was higher.

In this research, the main intraoperative risk factors for the development of SSI in the postoperative hospital in the participants were: having been medicated with antiemetic; have used MAP catheter, PVC and drains, specifically the laminar tube drain; and be classified as ASA II. The potentially contaminated surgeries monitored and evaluated in this research were: cholecystectomy, gastroplasty, gastrectomy, nephrectomy, pancreaticoduodenectomy, colectomy, enterectomy, biliodigestive shunt and exploratory laparotomy. The risk factors that influenced the most were: duration of surgical time; the use and manipulation of invasive devices; conditions, consistent with the presence of moderate underlying diseases; execution of the surgical technique inadequately; and drug administration, with emphasis on the use of antiemetics, on the risk and benefit relationship.

The necessity for control and follow-up of surgical patients in relation to exposure to risk factors for the development of SSI is highlighted, as there is still not enough clarity about this association. It is essential that perioperative nursing is attentive to care, especially in the intraoperative period, making possible the implementation of efficient and accurate monitoring methods. The risk assessment to which patients are susceptible assists in predicting the development of SSI.

It was observed that there is a gap in the orientation of patients regarding domicile care, given the presence of SSI and their health condition.

Still, it was difficult to find scientific studies that emphasized, besides the risk factors, the association and the comparison of these in each surgical process, contributing to the presumption of strategies and planning for the prevention and knowledge of this event, due to its real importance and global magnitude.

In this way, these results aim to maintain the way for the discussion and the development of research that allow the generation of SSI data, serving as a basis for changes in the professional practice scenario of nurses and in their role, promoting actions and practices for the benefit of two patients in their recovery and their postoperative treatment, as well as to the health institution, with the reduction of costs from infections, thus maintaining the quality of patient safety.

AUTHOR'S CONTRIBUTION

Conceptualization, Martins T; Amante LN; Virtuoso JF; Silva R; Pinho FM; Henckemaier L and Lopes RMO; Methodology, Martins T; Amante LN and Virtuoso JF; Investigation, Martins T; Amante LN; Virtuoso JF; Silva R; Pinho FM; Henckemaier L and Lopes RMO; Writing - Review & Editing, Amante LN and Virtuoso JF; Recursos, Martins T; Amante LN and Virtuoso JF.

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