Original article

POST-DISCHARGE SURGICAL SITE INFECTION: OCCURRENCE AND CHARACTERIZATION OF GENERAL SURGERY OUTPATIENTS

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ABSTRACT: The objective of this study was to investigate the occurrence of surgical site infection and describe the characteristics of cases of general surgery outpatients in post-discharge follow-up in a hospital in the Federal District, in Brazil. This was a descriptive, retrospective study corresponding to the years 2011 to 2013, conducted from August 2015 to July 2016, based on consulting the hospital's information systems and the medical records of patients. In the study period, 2,772 general surgery procedures were performed and 2,283 (82.28%) patients received post-discharge follow-up. Eighty-five cases of infection were diagnosed, equivalent to a mean rate of 3.7% in the period. There was a higher occurrence of infection between the sixth and tenth day after surgery. The data reinforces the relevance of post-discharge surveillance instituted in the health service and provides results indicators that may help define strategies for improving measures aimed at preventing and controlling surgical site infections.
DESCRIPTORS: Cross infection; Surgical wound infection; Follow-up; General surgery; Medical-surgical nursing.

INFECÇÃO DE SÍTIO CIRÚRGICO PÓS-ALTA: OCORRÊNCIA E CARACTERIZAÇÃO DE EGRESSOS DE CIRURGIA GERAL

RESUMO: Objetivou-se investigar a ocorrência de infecção de sítio cirúrgico e descrever as características dos casos de pacientes em seguimento pós-alta de Cirurgia Geral, em ambulatório de hospital do Distrito Federal, Brasil. Estudo descritivo, retrospectivo dos anos 2011 a 2013, realizado de agosto de 2015 a julho de 2016, a partir de consulta a sistemas de informações do hospital e prontuários de pacientes. No período do estudo, foram realizados 2.772 procedimentos na especialidade Cirurgia Geral e 2.283 (82,28%) pacientes compareceram ao acompanhamento pós-alta. Foram diagnosticados 85 casos de infecção, uma incidência média de 3,7% no período. Verificou-se maior ocorrência de casos de infecção entre o 6º e 10º dia pós-operatório. Os dados reforçam a relevância da vigilância pós-alta instituída no serviço de saúde e mostram indicadores de resultado que podem auxiliar na definição de estratégias para melhoria de ações de prevenção e controle de infecções de sítio cirúrgico.
DESCRITORES: Infecção hospitalar; Infecção da ferida cirúrgica; Seguimentos; Cirurgia geral; Enfermagem médico-cirúrgica.

INFECCIÓN POST-ALTA DE SITIO QUIRÚRGICO: OCURRENCIA Y CARACTERIZACIÓN DE PACIENTES SALIENTES DE CIRUGÍA GENERAL

RESUMEN: Se objetivó investigar la ocurrencia de infección del sitio quirúrgico y describir las características de casos de pacientes en seguimiento post-alta de Cirugía General, en servicio de hospital del Distrito Federal, Brasil. Estudio descriptivo, retrospectivo de anos 2011 a 2013, realizado entre agosto de 2015 a julio de 2016, consultando sistemas de información del hospital e historias clínicas de pacientes. En el período estudiado fueron efectuados 2.772 procedimientos en la especialidad de Cirugía General, 2.283 (82,28%) pacientes comparecieron a seguimiento post-alta. Fueron diagnosticados 85 casos de infección, una incidencia promedio del 3,7% en el período. Se verificó mayor ocurrencia de infecciones entre 6º y 10º días del posoperatorio. Los datos potencian la relevancia del seguimiento post-alta implantado en el servicio de salud y muestran indicadores de resultados que colaboran en la definición de estrategias para mejorar acciones preventivas y control de infecciones del sitio quirúrgico.
DESCRIPTORES: Infección Hospitalaria; Infección de la Herida Quirúrgica; Estudios de Seguimiento; Cirugía General; Enfermería Médico-Quirúrgica.

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INTRODUCTION

Healthcare-associated infections (HAIs) are a serious public health problem in Brazil and around the world, and one of the leading causes of morbidity and mortality among people who have undergone procedures in health services[1-2]. HAIs are acquired during the care process in hospitals or other healthcare locations, and not being present at the time of admission or after discharge from the hospital. They constitute a patient safety problem due to the impact they cause, such as longer hospital stay, long-term incapacity, increased antimicrobial resistance, higher mortality rates, and greater expenses for the health system, patients and family members[3]. According to the National Health Surveillance Agency (ANVISA), it is estimated that at least seven out of every 100 inpatients in developed countries and ten in developing countries will acquire HAIs[1].

Surgical site infection (SSI) is one of the main manifestations of HAI in Brazil, ranking third among all infections in health services. It is found in 16% of infections in hospitalized patients and related to surgical procedures, with or without insertion of implants, in inpatients or outpatients[4]. SSI affects different anatomical planes and may occur within 30 days of surgical procedures, or within one year in cases of prosthesis implantation[4].

Surgical site infections are one of the most dreaded complications of surgeries, since they represent serious and costly episodes and are associated with morbidity and mortality. The risk of death or spending time in an intensive care unit is two times higher in infected patients, and the chances of being readmitted after discharge are five times higher[4-5].

There are various factors that increase the risk of acquiring SSI, such as ages at both extremes, the patient's clinical condition, length of hospital stay prior to the operation, inappropriate application of antibiotic prophylaxis, duration of the surgery, contamination potential of the procedure, technical expertise of the surgical team, physical environment of the operating room, immunodeficiency, and presence of preexisting diseases[6]. They may also be associated with the pathogen itself, i.e., its antimicrobial resistance and virulence[2]. These infections can be caused by microbial agents from an endogenous source, such as the skin, nose, mouth, gastrointestinal tract or vagina of the patient, and/or exogenous sources, such as health professionals providing care, visitors, medical equipment, and the environment[4].

High hospitalization costs have been an important catalyst for reducing the length of hospital stay. At the same time, early discharge is challenging in relation to SSI detection. Surveillance of surgical patients, in most institutions, occurs during the period of hospitalization[7]. Patients who have been subjected to surgical procedures should be monitored during the hospitalization period and, with the same degree of caution, after discharge, since statistically, 12% to 84% of SSI is diagnosed when the patient is no longer in the hospital, which underscores the importance of post-discharge surveillance[2,6].

Based on instructions from ANVISA, which recommends various ways in which hospitals can carry out post-discharge surveillance[1], the Surgical Outpatient Care Service (SAAEC, as per its acronym in Portuguese) was created in 2005 in a teaching hospital in the Federal District. The core objective of the service is to monitor outpatients from the general surgery specialty to decrease the underreporting of cases of SSI[2].

It should be emphasized that SSI prevention, based on the identification of characteristics associated with the problem, contributes to the implementation of measures to minimize their occurrence and thereby reduce the possibility of readmission of surgical patients. Therefore, the objective of the present study was to investigate the occurrence of surgical site infection and describe the characteristics of cases of general surgery patients in post-discharge follow-up, in a teaching hospital in the Federal District, Brazil.

METHOD

This was a descriptive retrospective study with a quantitative approach. Data were collected from August 2015 to July 2016, by consulting the records of SAAEC, based on the statistical data from the

Hospital Infection Control Committee of the institution and medical records of patients who received care from 2011 to 2013. This period was established by the researchers due to their interest in increasing data from care results indicators in general surgery, in relation to the occurrence and characterization of SSI in the post-discharge period of patients who had been treated in the SAAEC. These data were first obtained in a previous study[2], which enabled obtaining a history of relevant information.

An instrument designed by the researchers was used to record the variables of interest of the study: sex and age of the patients; surgical operations performed; SSI reported; and time interval between the surgical operation and SSI diagnosis in the post-discharge period. The data were compiled using the program Microsoft Office Excel® 2007.

Outpatient follow-up in the SAAEC occurs in the first 30 days after the surgical operation, or up to one year after, in cases of prosthesis implantation. When discharged, the patient is instructed to return to the SAAEC between the sixth and tenth postoperative day. At the time of this return visit, the patient's general clinical condition is assessed and the surgical site is directly inspected. Surgical stitches are then totally or partially removed and instructions are given, or other necessary procedures are performed by the health service care team, i.e., surgeons and residents, as well as nursing technicians from the Hospital Infection Control Committee and undergraduate nursing students participating in a university extension project, under the supervision of a professor[2].

The following results indicators for post-discharge SSI surveillance were calculated as proportions, expressed in the form of percentages:

- Proportion of return visits: total number of patients who returned to the health service in relation to the total number of patients who underwent surgical procedures, by year; the numerator of this proportion was based on a single return visit, and excluded subsequent return visits by patients who came back to the health service more than once;

- Proportion of losses: total number of patients who did not return to the health service in relation to the total number of patients who underwent surgical procedures, by year;

- Proportion of SSI incidence (cumulative incidence): total number of cases reported in relation to the total number of patients who received outpatient follow-up, by year; only the first occurrence of SSI of each patient was registered;

- Proportion of surgical operations according to contamination potential (clean potentially contaminated, contaminated, and infected)[8];

- Indicators of proportional distribution of SSI cases: proportion of cases according to categories of variables of interest (clinical or laboratory analysis) and time intervals between surgical operations and SSI diagnosis (6 to 10, 11 to 15, 16 to 30, >31 days).

Means calculated:

- Return visits of patients to the health service: total number of patients who returned to the health service in relation to the total number of patients who underwent surgical procedures in the period, by year;

- Losses obtained: total number of patients who did not return to the health service for a visit in relation to the total number of patients who underwent surgical procedures in the period, by year;

The inclusion criteria were any patient who received general surgery follow-up in the SAAEC, in the period from January 2011 to December 2013, provided they were not subject to any applicable exclusion criteria.

Patients with incomplete data in the consulting sources used, regarding the aforementioned variables of interest, and patients under 18 years of age were excluded from the study.

The project was examined by the Human Research Ethics Committee of the Faculty of Health Sciences of the University of Brasília and approved under No. 1.150.652, on August 12, 2015.

RESULTS

In the period under analysis (2011 to 2013), 2,326 patients were treated in the SAAEC; 43 were excluded based on the established criteria, resulting in a sample of 2,283 patients.

The ages in the sample ranged from 19 to 104 years old, distributed in the following age groups: 51 (2.23%) were between 18 and 20 years old; 274 (12%) between 21 and 30 years old; 495 (21.68%) between 31 and 40 years old; 468 (20%) between 41 and 50 years old; 453 (19.85%) between 51 and 60 years old; 361 (15.81%) between 61 and 70 years old; 137 (60%) between 71 and 80 years old, and only 44 (1.93%) were 81 years of age or older. With respect to sex, 1,336 (58.52%) were women and 947 (41.48%) were men.

The mean proportion of return visits by patients was 82.28%: in 2011, 734 surgeries were performed and 577 (78.61%) of the patients came back to the health service; in 2012, the number of surgical operations rose to 1,109 and 881 (79.44%) returned; and, in 2013, 929 surgeries were performed and 825 (88.8%) of these patients returned for a visit.

The mean proportion of losses in the period was 17.7%. In 2011, 157 (21.38%) of the patients did not return to the SAAEC; in 2012, 288 (20.55%); and in 2013, 104 (11.19%) did not come back to the health service.

Ninety types of general surgery operations were identified. In the analysis of cases of multiple surgeries on the same patient, using the same access, only the procedure with the highest risk of infection was considered, as recommended by ANVISA. Among these surgical operations, there was a higher frequency of herniorrhaphies, corresponding to 745 (32.63%) cases in the sample, followed by cholecystectomies, with 646 (28.29%) of the total.

The SSI distribution among the procedures was proportional; out of a total of 86 reports in the period, 22 (25.58%) were for herniorrhaphies, followed by 7 (8.14%) for cholecystectomies. The predominant frequency of surgical operations among patients in outpatient follow-up and the proportional distribution of SSI cases are presented in Table 1.

Table 1 – Frequency of the types of surgical operations and proportional distribution of cases of surgical site infection among patients who had received care in the hospital. Brasília, DF, Brazil, from 2011 to 2013

Surgical operations	Frequency		SSI	
	N	%	N	%
Herniorrhaphy	745	32.63	22	25.58
Cholecystectomy	646	28.29	7	8.14
Thyroidectomy	92	4.02	1	1.16
Excision of tumors	84	3.70	7	8.14
Appendectomy	76	3.33	4	4.65
Excision of lipoma	76	3.33	-	-
Portacath implant	76	3.33	2	2.33
Other	488	21.37	43	50
Total	2,283	100	86	100

Figure 1 shows the cumulative incidence of cases of SSI in the study period. The largest proportion was in 2012, with 37 cases (4.19%), and the other years had similar rates: 21 (3.63%) in 2011, and 27 (3.27%) in 2013.

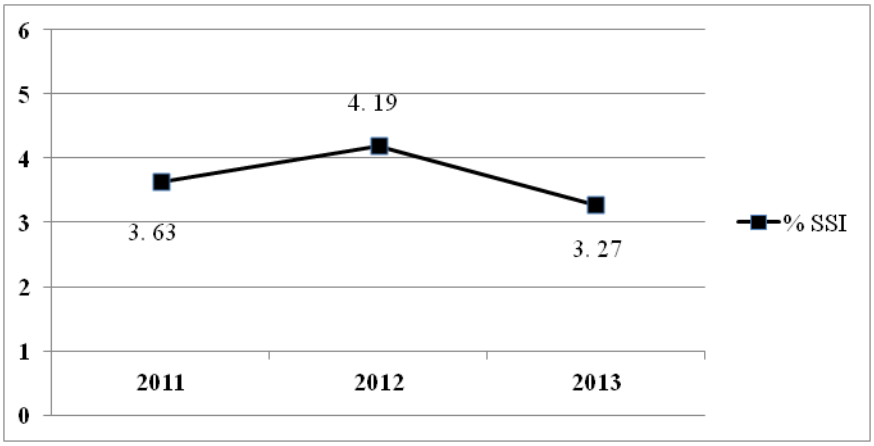

Figure 1 - Cumulative incidence (%) of cases de surgical site infection, by year. Brasília, DF, Brazil, 2011 to 2013

The frequency of SSI cases, according to contamination potential, is presented in Table 2. Forty-four reports (51.16%) were identified, i.e., most of the cases of SSI reported occurred in clean surgeries and the fewest number of reports were in contaminated surgeries, with 12 cases (13.95%).

Table 2 - Frequency of SSI cases, according to contamination potential among patients in post-discharge follow-up. Brasília, DF, Brazil, 2011 to 2013

Classification based on contamination potential	Proportion of total number of SSI reports	
	N	%
Clean	44	51.16
Potentially contaminated	17	19.77
Contaminated	12	13.95
Infected	13	15.12
Total	86	100

Table 3 presents the proportion of the distribution of procedures according to contamination potential and the SSI distribution of the total of each classification according to contamination potential. The distribution indicates a higher proportion of SSI reports in surgeries classified as infected and contaminated.

Table 3 – Distribution of surgical operations according to contamination potential and respective distribution of SSI cases reported, among patients in post-discharge follow-up. Brasília, DF, Brazil, 2011 to 2013

Classification based on contamination potential	Frequency		SSI by classification	
	N	%	N	%
Clean	1,346	58.96	44	3.26
Potentially contaminated	772	33.82	17	2.20
Contaminated	96	4.20	12	12.50
Infected	69	3.02	13	18.84
Total	2,283	100	86	100

Figure 2 shows the distribution of surgical operations and the distribution of SSI cases by age. Only 542 (23.74%) procedures were performed on patients 61 years of age or older, and 26 (30.23%) of the SSI were manifested in this group, mostly in proportional terms.

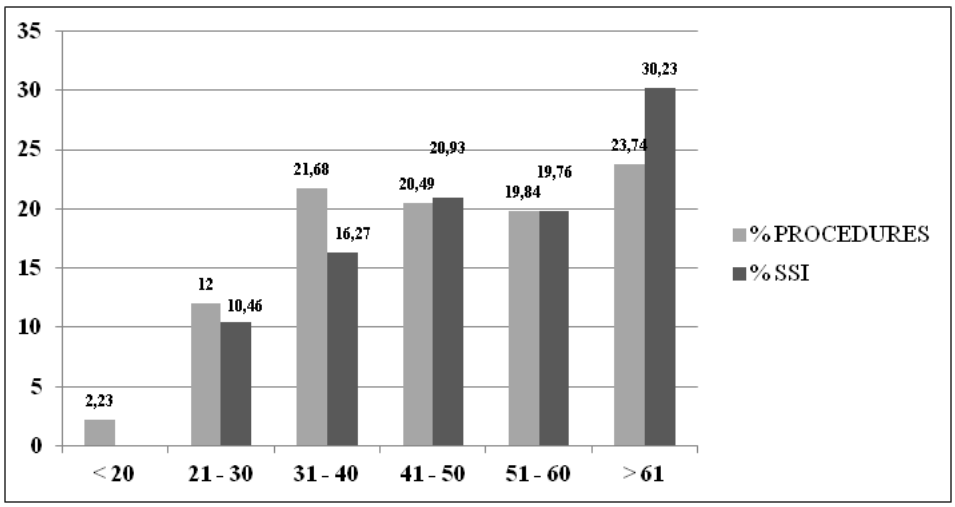

Figure 2 – Relative frequency (%) of surgical procedures and cases of SSI, by age group, among patients in post-discharge follow-up. Brasília, DF, Brazil, 2011 to 2013

Surgical site infection was diagnosed through clinical analysis in 76 (88.37%) of the cases, and material was collected for lab tests in only 10 (11.63%) patients.

With respect to the interval of time between the surgical operation and the SSI diagnosis, 24 (27.91%) of the cases were diagnosed between the 6th and 10th postoperative day, 22 (25.58%) were reported between the 11th and 15th, 22 (25.58%) between the 16th and 30th, and 18 (20.93%) cases from the 31st postoperative day on.

DISCUSSION

Surveillance of surgical patients in most institutions only occurs in the hospitalization period, resulting in lower SSI rates, compared to institutions with post-discharge follow-up[7]. The need for post-discharge surveillance is justified by the fact that 75% of SSI cases are diagnosed in the post-discharge period. There is also a problem of underreporting in health services[9].

The World Health Organization recommends three measures for promoting patient safety: prevention of adverse events, identification of adverse events that have occurred, and minimization of their effects through effective interventions[10]. In this regard, SSI has been considered a high-impact complication in the clinical progress, recovery, and rehabilitation of surgical patients. For this reason, active surveillance is recommended, through the use of tools tailored to the structure of each health service[11].

The hospital under study decided on its own that discharged surgical patients should come back for a return visit, during which time different post-discharge surveillance methods were applied, such as direct inspection of the surgical site, consulting of medical records, collecting culture samples for microbiological testing when indicated, and clinical assessment of the patient. The outpatient strategy has proven to be effective compared to telephone calls, due to difficulties such as wrong phone numbers having been supplied or phones programmed not to receive calls, or patients and/or family members not knowing how to provide accurate information when questioned, among other aspects. This was noted in a study where the rate was 8.1% lower by phone calls as opposed to outpatient follow-up[11].

On the other hand, outpatient follow-up requires more trained personnel and a more elaborate physical structure. It also depends on the collaboration of health teams and the physical and financial conditions of patients, who need to come again to the institution. Another argument in favor of outpatient follow-up is that patients are generally not able to self-diagnose, as demonstrated by the fact that they are not qualified to provide reliable information about possible SSI[11].

In addition to outpatient follow-up and phone calls, some institutions use questionnaires administered to patients or surgeons, home visits, analysis of medical records, and microbiological testing. It is important to note that none of these methods are totally efficient on their own. The ideal is to mix various strategies in order to reach a larger number of patients and obtain quality information[11].

Many difficulties arise within the social context of patients that hinder them from returning to the health service for outpatient assessment, such as long distances between the home and the institution, low socioeconomic status, difficult access to transportation services, lack of third party help in the case of dependent patients, and that some patients are also told to return to the health service in the weeks following their first consultation when, at the physician's discretion, they need to be reassessed. Given these factors, the rate of outpatient return visits in the present study can be considered satisfactory, since the mean rate of return visits was 82.28% for the years under analysis and mean loss was 17.71%.

In relation to the age groups of the patients treated in the SAAEC, it was found that operative procedures tended to be more frequent the older the patient, because the distribution of operations does not follow the same pattern as the distribution of the population in the different age groups. An analysis of the age pyramid published in the last census conducted by the Brazilian Institute of Geography and Statistics (IBGE), in 2010, showed that the pyramid is wide in its base and center and narrows as it moves up to the peak, which represents an older population[12]. For example, in terms of the population between 21 and 30 years of age, the pyramid reveals that approximately 17.9% of the population is in this age group, whereas in the present study only 12% of the surgical procedures occurred in this age group. However, a profile of the population over age 60 results in an even larger difference: only 1% of the population was older than age 60, but 23.4% of the procedures in the present study occurred in this age range.

It is well-known that aging causes various natural and common changes in the senescence process, associated with various chronic diseases that render this age group more vulnerable to surgical interventions, as shown in another study[13]. Elderly people have lower organic reserves for reacting to aggressive procedures, such as a surgical operation, making them a risk group that requires attention and care throughout the process, in order to reduce the possibilities of postoperative complications[14]; including SSI, which is one of the main manifestations of hospital infection in elderly people[15].

The present study found a higher proportional occurrence of SSI in people over 60 years old. The frequency of operations and SSI distribution by age were similar among all the age groups, with the exception of people over age 60, where this similarity no longer applied. Health teams should strive to control all the factors in order to avoid complications, since besides the financial costs of long hospital stays, there are immeasurable costs to patients and families, such as pain and suffering that affect the quality of life of all those involved. Complications can also result in an inactive limb, functional loss of an organ, or even death[15].

According to the 2010 IBGE Census, it was found that there are more women than men in the population. It is therefore not surprising that in the distribution of surgical procedures by sex, the rate was higher among female patients. Very similar proportions were noted in other studies[2,5,12].

The present study revealed a higher occurrence of herniorrhaphies and cholecystectomies. A herniorrhaphy is a common general surgery procedure[16] for which there is a wide variety of surgical techniques. The choice of technique has been based on the Nyhus classification, which takes into account points such as the hernia location in the inguinofemoral region, the type of hernia, and the characteristics of the floor of the inguinal canal[17]. In the institution in question, this surgery was performed in the central operating room, although studies have demonstrated that there is no difference in the occurrence of infection between patients who do an outpatient procedure and those who undergo a conventional intervention[2].

Cholecystectomies can be done the conventional way or via videolaparoscopy. The latter technique

has greater advantages compared to conventional interventions due to lower surgical impact and length of hospital stay. This technique enables quicker resumption of normal daily activities, less risk of postoperative complications, and lower aesthetic impact. Both techniques are used in this hospital, chosen at the discretion of the surgical team[2,18].

Even though the institution under study is a teaching hospital, which seeks to prepare professionals to treat a wide variety of cases according to the specialties, in addition to understanding that the students for residency and undergraduate programs were lacking the necessary technical expertise for the procedures, the mean incidence of SSI cases was similar to that of other studies. There was a mean rate of 3.69% for the years studied, whereas in another study that used the same methods, the mean proportion of SSI was 3.4%[2]. A different study, which examined orthopedic surgery patients who had undergone post-discharge follow-up for at least one year, identified an overall incidence of 6%[19].

The SSI reported occurred more in herniorrhaphies, which is a clean procedure, and cholecystectomies, which is a contaminated procedure. Even though this result seemingly strikes at the recommendations for expected SSI rates according to contamination potential, it was not the case. A higher SSI rate was found in a clean procedure, but there was also a major advantage in that this procedure was performed more than any other procedure in the period. Therefore, proportionally, the results are within a normal range, as well as the results for cholecystectomies. When these results are compared with SSI rates according to contamination potential of 1% to 5% in clean surgeries, 3% to 11% in potentially contaminated surgeries, 10% to 17% in contaminated surgeries, and over 27% in infected surgeries[20], it can be seen that they are normal.

In terms of SSI diagnosis, 88.37% were reported through clinical analysis. This method, which is recommended by ANVISA, is considered sufficient for detecting an SSI and entails identifying phlogistic signs in the planes of the wound[4]. The low proportion of SSI reports through laboratory confirmation (11.63%) was obtained through swab cultures, which is a method not recommended by ANVISA. The regulatory agency recommends collecting the purulent material located in the deepest part of the wound, preferably aspirated using a syringe and needle. When puncture with a needle is not possible, the material should be aspirated using just an insulin-type syringe. Swabs should only be used when the aforementioned procedures are not possible[4,21].

In relation to the time interval between the surgical procedure and SSI diagnosis, there was a higher occurrence between the 6th and 10th postoperative day. Distribution was similar in the other time intervals, with the lowest percentage on the 31st postoperative day. Similar results were also found in a previous study[2]. This finding justifies ANVISA's recommendation to extend the surveillance of surgical patients to 30 days or up to one year if a prosthesis was implanted[4].

It should be mentioned that the main difficulty in conducting this study was the data search, since there were incomplete information and erasures in the medical records of patients, resulting in exclusions from the sample due to failure to meet the established inclusion criteria. Nevertheless, it was possible to obtain a considerable sample for the study, with significant results indicators. These indicators may help (re)define SSI prevention and control measures and strategies, and enhance the quality of surgical care. In summary, the present study made contributions to this area by demonstrating the relevance of instituting post-discharge surveillance in Brazilian health institutions, from the perspective of raising care standards.

CONCLUSION

The results of this study revealed important characteristics about the occurrence of SSI in post-discharge general surgery patients, from 2011 to 2013, in a hospital in the Federal District in Brazil. The main findings of the study indicated a predominance of female adults in outpatient follow-up, with a high mean proportion of return visits to the health service. The cumulative incidence of SSI was highest in 2012, and there were a higher number of reports in relation to clean surgeries. In proportional terms, SSI was reported more among elderly patients. Clinical analysis was the main method for diagnosing SSI, which primarily occurred between the 6th and 10th postoperative day of post-discharge follow-up.

This study, therefore, collected indispensable information which indicated the need to adopt further

measures for better SSI prevention and control, reflected in higher quality care and aligned with the key goal of surgical safety.

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