

INCIDENCE OF INFECTION OF SURGICAL SITE IN HOSPITAL DAY: COHORT OF 74,213 PATIENTS MONITORED

Incidência de infecção de sítio cirúrgico em hospital dia: coorte de 74.213 pacientes monitorados

Incidencia de la infección del sitio quirúrgico en el día de hospital: cohorte de 74,213 pacientes monitoreados

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ABSTRACT: Objectives: To describe the incidence of surgical site infection (SSI) after discharge from a Daycare Unit (DU) and to compare these indicators with data from conventional hospitals. **Method:** This is a historical cohort study including 74,213 patients who underwent surgery and were monitored at a DU in Salvador (Bahia State, Brazil), between 2012 and 2017. **Results:** During the studied period, the DU surveillance system monitored 85.1% of patients after discharge. We found a total SSI incidence of 0.3%, varying between 0.2 and 0.4% in those years. These rates were statistically lower than those reported for SSI in hospitalized patients. **Conclusion:** The SSI indicators revealed in this study confirm that outpatient surgical care poses lower risks of infection acquisition for the operated patients, when compared with surgical infection data of patients from conventional hospitals. However, a follow-up system for patients after discharge is essential to avoid sub-reporting and sub-records regarding SSI data, considering that risks can be hidden and unrealistic rates can be identified in their absence. **Keywords:** Surgical wound infection. Day care, medical. Patient safety.

RESUMO: Objetivos: Descrever a incidência de infecção do sítio cirúrgico (ISC) em seguimento após alta em hospital dia (HD) e comparar esses indicadores com dados de hospitais convencionais. **Método:** Estudo de coorte histórica composto de 74.213 pacientes operados e monitorados num HD de Salvador (BA), entre 2012 e 2017. **Resultados:** No período estudado, o sistema de vigilância do HD monitorou 85,1% dos pacientes após a alta e foi identificada incidência total de ISC de 0,3%, com variação de 0,2 a 0,4% entre os anos, taxas estatisticamente menores do que as reportadas para ISC em regime de internação hospitalar. **Conclusão:** Os indicadores de ISC revelados neste estudo ratificam que a modalidade da assistência cirúrgica ambulatorial porta menor risco de aquisição de infecção para os pacientes operados, quando comparados com os dados de infecção cirúrgica de pacientes em hospitais convencionais. Entretanto, torna-se indispensável um sistema de seguimento dos pacientes após a alta, no sentido de evitar a subnotificação e os sub-registros dos dados de ISC, pois na ausência de ambos se podem ocultar riscos e identificar taxas irreais. **Palavras-chave:** Infecção da ferida cirúrgica. Hospital dia. Segurança do paciente.

RESUMEN: Objetivos: Describir la incidencia de la infección del sitio quirúrgico (ISQ), después del alta del centro de día (CD) y comparar esos indicadores con los datos de hospitales convencionales. **Método:** Estudio de cohorte histórico con 74,213 pacientes operados y monitoreados en un CD en Salvador (Bahia, Brasil), entre 2012 y 2017. **Resultados:** Durante el período estudiado, el sistema de vigilancia del CD monitorizó el 85,1% de los pacientes después del alta, y se identificó una incidencia total de la ISQ del 0,3%, que varía desde el 0,2% hasta el 0,4% entre los años. Esas tasas son estadísticamente más bajas que las reportadas para ISQ bajo el régimen de hospitalización integral. **Conclusión:** Los indicadores de la ISQ revelados en este estudio confirman que la modalidad de atención quirúrgica ambulatoria conlleva un menor riesgo de adquisición de infección para los pacientes operados, en comparación con los datos de infección quirúrgica de pacientes en hospitales convencionales. Sin embargo, es indispensable un sistema de seguimiento para los pacientes después del alta hospitalaria, para evitar el sub-reporto y los subregistros de los datos de la ISQ, ya que en ausencia de ambos se pueden ocultar riesgos y se pueden identificar tasas poco realistas. **Palabras clave:** Infección de la herida quirúrgica. Centro de atención diurna. Seguridad del paciente.

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INTRODUCTION

Despite all the progress of technical and scientific knowledge and technological improvements in the Health area, health care-associated infections (HAI) are still a threat to the safety of patients worldwide.

Among these infections, the surgical site infection (SSI) is considered the most common in health care, affecting 31% of all HAI among hospitalized patients. It is associated with a 3% mortality rate and with 75% of deaths due to surgical procedures. Despite this negative potential, these infections can be prevented in up to 60% of cases by adopting prevention and control measures¹⁻⁴.

SSI conceptually refers to infections that occur after surgery in the body site where the procedure was performed, and they may involve skin, tissues, organs or implanted material, within the first 30 days or up to 90 days, if implants are placed¹⁻³.

The development of a SSI causes a substantial increase in the clinical, psychological and economic burden of surgery, which is attributed to the increase in direct costs by expanding patient's hospitalization time, diagnostic tests and treatments. Therefore, it is more costly to health systems, especially public ones. Patients with SSI are twice as likely to die or need intensive care and five times as likely to be re-hospitalized. Hospitalization costs are twice high for an infected patient if compared to an operated or uninfected patient^{5,6}.

In addition, SSI have an adverse impact on patients' mental and physical health, which can range from delayed wound healing to secondary complications. This consequently increases their morbidity and mortality to other intangible situations, such as pain, anguish, anxiety, prolonged time away from home, family and work⁵.

Many factors contribute to the risk of these infections, such as those related to patients and team, and mainly to the possibility of surgical wound contamination during the operative procedure and perioperative. Therefore, the greater the microbial contamination in this period, the greater the chance of infection due to the introduction of microorganisms in the open and manipulated surgical cavity^{6,7}.

SSI epidemiological surveillance is an important strategy for the quality and safety of operated patients. Such surveillance occurs through the systematic monitoring of infection data and the possibility of adopting measures to prevent and control these diseases. However, most of these surveillance

systems are aimed at hospitalized patients, and a few follow-up those who have already been discharged. This contributes to insufficient reporting of these infections, considering that 12 to 84% of the SSI are manifested after discharge, thus emphasizing the relevance of a post-discharge surveillance system^{6,8,9}.

Studies by the World Health Organization (WHO) show that SSI affect one third of operated patients, and their incidence varies in underdeveloped and developing countries (11.8 per 100 surgeries, ranging from 1.2 to 23.6). In European countries, rates are of 9.5% (colon surgeries), 3.5% (cardiac surgeries), 2.9% (caesarean sections), 1.4% (cholecystectomies), and 1.0% (orthopedic surgeries)².

A systematic review by European researchers at hospitals in France, Germany, Italy, Spain, and the United Kingdom confirmed a significant number of SSI occurring in various surgical specialties in Europe: cardiothoracic surgeries (9.2% SSI rate in the United Kingdom; from 1.9 to 2.5% in France), general surgeries (7.8% rate in the United Kingdom), and ear, nose and throat (ENT) surgeries (36% rate in France)⁵.

A research conducted in hospitals from 16 cities in Turkey identified an overall SSI rate of 4.3% among 41,563 procedures¹⁰. A similar study in six cities in India reported a 4.2% SSI rate in 28,340 surgeries¹¹. An international study, which aimed to determine the impact of SSI on health care costs in outpatient procedures, through a retrospective cohort of patients, identified rates of 0.3 and 0.5% (cholecystectomies), 0.6 and 0.5% (herniorrhaphy), and 0.8% (breast surgeries)¹². In Colombia, 193 cases of SSI were observed in 5,063 procedures (3.8%)¹³.

In Brazil, the pioneering assessment of incidence of SSI dates back to 2000, in a 23-year prospective study conducted in Recife City, Pernambuco State, Brazil, which identified an 11% total incidence of SSI (1,622 cases in 14,694 surgeries) and a 5.8% rate in clean surgical procedures. This study reports an SSI total rate of 0.4% for outpatient surgeries (130 cases in 27,580 procedures) and an SSI rate of 0.5% for clean surgical procedures¹⁴.

A study that investigated the occurrence of SSI after discharge from an outpatient clinic of a Brazilian university hospital found that in 2,772 procedures performed within the general surgery specialty, 2,283 patients (82%) attended their follow-up consultations after discharge, in which 85 cases were of infection, with a total incidence of 3.7%⁶.

Despite the growing number of published studies on SSI, few data, such as those cited here, have been published on the incidence of these infections after discharge, specifically in non-conventional health services, such as Daycare Units (DU). Thus, there is a significant knowledge gap, considering that outpatient surgeries are an increasing trend that allows major benefits, such as lower costs, more care provided and, *a priori*, lower risks of infection.

Hence, this study seeks to answer the following main question: What is the incidence of SSI after discharge and surgeries performed at Daycare Units? Are these infections comparatively lower than those observed in conventional hospitals?

OBJECTIVE

To describe the incidence of SSI after discharge from a Daycare Unit (DU) and to compare these indicators with conventional hospitals.

METHOD

This is a retrospective cohort study, which allows the observation of groups exposed (patients operated at a DU) to a risk factor that may be the cause of a disease that will be detected in the future¹⁵. The concept of DU was used as “intermediate assistance between hospitalization and outpatient care for the performance of clinical or surgical procedures that require patients to remain in the unit for a maximum of 12 hours,” as defined in legislation.

The studied DU is a private organization, located in Salvador City, Bahia State, Brazil, which serves patients with health insurance plans and performs, exclusively, surgical procedures following the DU system. It has figures around 1,000 surgeries per month and an average of 12,000 surgical procedures per year. The most frequent performed surgeries in this unit, included in this study, are from the following specialties: general (hernioplasty, skin lesion and breast lump removal), otorhinolaryngology (tonsillectomy, tonsillectomy), vascular (varicose vein excision), hand surgeries, plastic surgeries, hysteroscopy, ophthalmology (facetectomy), hemorrhoidectomy, among others.

In this hospital, the Hospital Infection Control Program (HICP) has an epidemiological surveillance system for every patient operated at the institution, which consists of monitoring patients during hospitalization and after discharge. Patients admitted for endoscopic examinations and other non-surgical procedures, such as central catheter implantations for chemotherapy, laser and double J stent removal, were excluded from this surveillance system.

Each operated patient has a HCAI follow-up form, including the following data: identification, age, telephone, base diagnosis, date and type of surgery, name and number of the surgeon’s regional council, surgical time, clinical classification system (ASA), prophylactic antibiotic use, and complications during the intraoperative phase.

Follow-up after discharge is performed by three HICP nursing interns, who were properly trained and systematically supervised. It consists of contacting all operated patients by telephone within 28 to 30 days after surgery to identify their postoperative evolution and possible adverse events, including infections after surgical procedure that was manifested after discharge from the institution. During this telephone call, interns follow a standard procedure to identify the patient’s general condition, surgical incision conditions, occurrence of secretions or fever, return to medical consultation, and use of subtle medications to minimize biased responses. A maximum of three telephone attempts per patient is the standard, and, if contact is not possible, the patient is considered a “non-contact” and is excluded from the database of patients monitored by the HICP. Telephone contact data are recorded on patient records.

This cohort included the HCAI follow-up forms of patients undergoing surgical procedures at the researched DU headquarters, between 2012 and 2017. A total of 74,213 monitored patients was contacted during follow-up after discharge.

Data were collected in January and February of 2018, with the aid of a specific instrument to record the research variables of interest: number of performed surgeries, number of patients monitored after discharge by the HICP, and number of SSI per contamination potential of surgeries. We used the diagnostic criteria for SSI adopted by the Brazilian Health Regulatory Agency (ANVISA)³.

Data were stored and analyzed in the Epi-Info program.

The research project was submitted to the Research Ethics Committee and approved according to the Certificate of Presentation for Ethical Consideration (CAAE) No. 84696018.9.0000.0057.

RESULTS

The distribution of surgical procedures performed and monitored in the studied DU is shown in Table 1.

Table 1 shows that, between 2012 and 2017, 87,166 patients underwent surgeries at the hospital under study, of whom 73,734 patients were monitored after discharge. The proportion of patients monitored between the studied years ranged from 78.7% (2016) to 90.6% (2012), with a total of 85.1% of patients followed-up after discharge.

Table 2 presents the incidence of SSI in DU-monitored patients according to the study years. There is a total SSI incidence of 0.3%, and an almost constant annual incidence during the analyzed period, with a variation of 0.2% in 2013; 0.3% in 2012 and 2015; and 0.4% in 2014 and 2017.

The incidence of SSI according to the potential for surgery contamination is presented in Table 2. 177 SSI (0.4%) were observed during the studied period, of which 41,771 were clean surgical procedures, 15 infections among the potentially contaminated surgeries (0.2%), 39 SSI in contaminated surgeries (0.2%), and no infections in surgeries classified as infected. Table 3 data also show that among 73,734 surgeries monitored in the studied years, 56.6% were considered clean (41,771/73,734), 32.1% were contaminated surgeries (23,701/73,734), 11.8% were potentially

contaminated surgeries (8,724/73,734), and only 0.02% were infected surgeries (17/73,734).

DISCUSSION

In this study, the surveillance system after discharge of operated patients, which was implanted in the researched DU headquarters, monitored 85.1% of the cohort of 73,734 patients. Such monitoring was considered significant and in accordance with a study at a Brazilian university hospital⁶, in which the authors followed-up after discharge 82% of outpatient surgical patients, thus validating the telephone contact methodology. When well systematized, this is an effective method for monitoring post-discharge surgical patients, as verified here.

Between 2012 and 2017, the total incidence of SSI at a DU was 0.3%, ranging from 0.2 to 0.4%. These rates are lower than those reported for SSI in international conventional hospitals, such as the percentages cited by the WHO² (11.8%), rates in conventional hospitals in European countries⁵ (7.8, 8.6, and 3.2%), rates in hospitals in Turkey and India^{10,11} (4.3 and 4.2%), and Colombia (3.8%)¹³.

In addition, when comparing SSI rates of this study with two national surveys conducted in conventional hospitals^{6,15}, there were lower rates at the DU. This confirms that outpatient surgeries pose lower risks of infection.

The overall SSI incidence of 0.3% reported in this study resembles data from an international study on outpatient surgical procedures¹², which also used a retrospective cohort of patients and identified rates of 0.3 and 0.5% (cholecystectomies), 0.5 and 0.6% (herniorrhaphy), and

Table 1. Proportional distribution of monitored patients into surgical procedures according to year, at a Daycare Unit.

Period	Performed surgeries	Number of monitored patients	
		Number	%
2012	12,769	11,577	90.6
2013	13,557	12,002	88.5
2014	13,271	11,292	85.1
2015	14,710	12,723	86.5
2016	16,211	12,754	78.7
2017	16,648	13,865	83.3
Total	87,166	74,213	85.1

Table 2. Incidence of surgical site infection in monitored patients according to year of study, at a Daycare Unit.

Period	Number of monitored patients	Surgical Site Infection	
		Number	%
2012	11,577	32	0.3
2013	12,002	28	0.2
2014	11,292	41	0.4
2015	12,723	43	0.3
2016	12,275	36	0.3
2017	13,865	51	0.4
Total	73,734	231	0.3

Table 3. Incidence of surgical site infection (SSI) in monitored surgeries according to the potential of contamination at a Daycare Unit.

Period (year)	Clean surgeries N (n/SSI%)	Potentially contaminated surgeries N (n/SSI%)	Contaminated surgeries N (n/SSI%)	Infected surgeries N (n/SSI%)
2012	7,052 (26/0.4%)	1,778 (3/0.2%)	2,742 (3/0.1%)	05 -
2013	6,624 (19/0.3%)	2,175 (4/0.2%)	3,201 (5/0.2%)	02 -
2014	6,338 (33/0.5%)	1,191 (1/0.08%)	3,761 (7/0.2%)	02 -
2015	7,038 (30/0.4%)	1,314 (2/0.1%)	4,371 (11/0.2%)	-
2016	7,169 (29/0.4%)	976 0	4,608 (07/1.8%)	01 -
2017	7,550 (40/0.5%)	1,290 (5/0.4%)	5,018 (06/0.1%)	07 -
Total	41,771 (177/0.4%)	8,724 (15/0.2%)	23,701 (39/0.2%)	17 (0)

0.8% (breast surgeries), as well as data reported in a university hospital in Recife¹⁴, which identified 0.4% of SSI in the outpatient clinic.

The infection rate in clean surgical procedures is an indicator of the institution surgical quality. Literature recommends, without specifying to what type of surgical procedure, whether conventional or non-conventional, infection rates lower than 2%. For surgeries classified as potentially contaminated, contaminated and infected, rates lower than 10%; rates of 20%, and 30 to 40%, respectively, are acceptable¹⁵.

In the studied DU, the SSI rate in clean surgical procedures was 0.4, and 0.2% in potentially contaminated and contaminated surgeries, which are significantly lower than those percentages recommended in literature and in some international studies (3.5, 2.5, 6.8, and 8.6%)^{4,9}.

The total SSI percentage of 0.3% over the years studied in this DU, and the total SSI percentage of 0.4% in clean surgical procedures reveal not only the surgical excellence of such service, but that these rates are much lower than those reported for patients operated using the conventional practices. It confirms that outpatient care poses a lower risk of infection acquisition for operated patients, when compared with data from patients who underwent surgeries in conventional hospitals.

However, a follow-up system for patients after discharge is of utmost importance to avoid insufficient reports and notification of data. Whenever there is lack of both data, information can be hidden, and unrealistic rates can be identified.

CONCLUSION

This study achieved its objective and answered the guiding questions. It managed to identify the incidence of SSI in patients after discharge (total incidence of 0.3%, between 2012 and 2017) and to compare these indicators with those of conventional hospitals.

Results showed that the adequacy of the epidemiological surveillance system of SSI, adopted in the researched DU headquarters, proved to be robust. A complete follow-up of 85.1% of patients after discharge was performed, as well as the elaboration of a database including the indicators of SSI of the institution.

The percentages of SSI identified in the studied DU confirm the modality of outpatient surgery as of lower risk of SSI, when compared to data from surgeries performed in conventional hospitals.

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