

## EVALUATION OF UNDERREPORTED SURGICAL SITE INFECTION EVIDENCED BY POST-DISCHARGE SURVEILLANCE

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*The Surgical Site Infection (SSI) has been pointed as one of the most important infection sites. This study aimed to determine the surgical site infection incidence during hospitalization and the impact of notification after discharge through two methods. This prospective study was carried out in the digestive system surgery service (DSS) of two general hospitals of São Paulo, in the period from August, 2001 to March, 2002. Incidence levels of 6.7% and 4.5% were notified in the institutions A and B respectively. The incidence of SSI after discharge in the institution A was 27% and 13.4% in the institution B. Surveillance after discharge evidenced global rates of 33.7% and 17.9% for institutions A and B respectively. The rates of infection increased 5.02 and 3.98 times respectively in institutions A and B.*

**DESCRIPTORS:** cross infection; infection control; nursing

## EVALUACIÓN DE LA SUB NOTIFICACIÓN DE INFECCIÓN DEL SITIO QUIRÚRGICO EVIDENCIADA A TRAVÉS DE LA VIGILANCIA DESPUÉS DEL ALTA

*La Infección del sitio quirúrgico (ISQ) ha aparecido como uno de los más importantes sitios de infección. La finalidad de este estudio fue determinar la incidencia de la infección del sitio quirúrgico durante la internación y el impacto de la notificación después del alta a través de dos métodos. Se trató de un estudio prospectivo, en el servicio de cirugía del sistema digestivo (CSD) de dos hospitales generales de São Paulo, en el periodo de agosto de 2001 a marzo de 2002. Se diagnosticaron durante la internación una incidencia de 6,7% y de 4,5% para las instituciones A y B, respectivamente. Analizándose la incidencia de ISQ, después del alta, en la institución A esto era del 27% y del 13,4% en la institución B. De esta manera, con la vigilancia después del alta, se verificó una tasa global del 33,7% y del 17,9% de ISQ para las instituciones A y B, respectivamente, significando un incremento de la tasa de infección en 5,02 y 3,98 veces para las instituciones respectivas.*

**DESCRIPTORES:** infección hospitalaria; control de infecciones; enfermería

## AVALIÇÃO DA SUBNOTIFICAÇÃO DA INFECÇÃO DO SÍTIO CIRÚRGICO EVIDENCIADA PELA VIGILÂNCIA PÓS-ALTA

*A infecção do sítio cirúrgico (ISC) tem sido apontada como um dos mais importantes sítios de infecção. Este estudo objetivou determinar a incidência da infecção do sítio cirúrgico durante a internação, e o impacto da notificação pós-alta por meio de dois métodos. Trata-se de estudo prospectivo, realizado no serviço de cirurgia do aparelho digestivo (CAD) de dois hospitais gerais de São Paulo, no período de agosto de 2001 a março de 2002. Durante a internação, foi notificada incidência de 6,7 e de 4,5% para as instituições A e B, respectivamente. Analisando-se a incidência da ISC, após a alta, na instituição A foi de 27% e de 13,4% na B. A realização da vigilância pós-alta evidenciou taxa global de 33,7 e 17,9% de ISC para as instituições A e B, respectivamente, representando incremento da taxa de infecção em 5,02 e 3,98 vezes para as respectivas instituições.*

**DESCRIPTORES:** infecção hospitalar; controle de infecções; enfermagem

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## INTRODUCTION

In the context of hospital infections (HI), Surgical Site Infection (SSI) has stood out as one of the most important infection sites, with an average 60% increase in hospitalization periods. In addition, it also demands great prevention efforts<sup>(1-2)</sup>.

SSI refers to infections that occur in surgical incisions, affecting tissues, organs and cavities manipulated during surgery. Diagnosis can occur up to 30 days after the procedure, or even one year in cases involving prostheses<sup>(1-2)</sup>.

SSI is a relevant complication, since it contributes to increasing post-surgery patient mortality and morbidity rates. Thus, it causes physical and emotional harms, as well as having to leave work and social life. In addition, it considerably raises treatment costs and increases hospital stay. Despite being the most common surgery complication, SSI should be avoided and its occurrence should be within the levels accepted by competent organs<sup>(1-2)</sup>.

According to the Health Ministry, Rule 2.616/98<sup>(3)</sup>, every hospital must have rules and guidelines for hospital infection control and prevention, organized through Hospital Infection Control Programs (HICP), developed by Hospital Infection Control Commissions (HICC). Hence, it is the HICC's responsibility to perform epidemiologic surveillance for every patient, especially those with higher infection risks, such as surgical patients. It is also suggested that surveillance be done through prospective methods, such as the active, systematic, and continuous search for hospital infections and their dissemination<sup>(1-5)</sup>.

In this context, it is observed that, regarding SSI in most institutions, surgical patient surveillance occurs only during hospitalization, despite the recommendation of the Center for Disease Control and Prevention (CDCP), in Atlanta. The CDCP emphasizes that these patients, due to specific factors inherent to surgery and their condition, should have their surveillance extended to the post-discharge period<sup>(1)</sup>. Studies that performed surgical patient follow-up after discharge estimate that 12 to 84% of the SSI appears after discharge. This causes underreported rates, since surveillance occurs exclusively during hospitalization<sup>(1-2, 4-8)</sup>.

There are several recommended post-discharge surveillance methods for surgical patients. Therefore, it is mandatory that each institution adopt

what best fits its reality (infrastructure, human resources, physical area, etc); no institution should go without surveillance.

In view of this issue's epidemiological relevance and the importance of performing post-discharge surgical patient surveillance, this study aimed to determine the surgical site infection rate during hospitalization and the impact of post-discharge reporting through different methods.

## CASES AND METHOD

An epidemiological, descriptive, exploratory study was conducted, comparing surgical site infection rates during hospitalization and the impact of post-discharge reports through different methods at two teaching hospitals. Both are tertiary care hospitals located in the city of Sao Paulo, Brazil, and were referred to in the study as Hospital "A" and Hospital "B".

Eligible participants were all patients admitted for digestive system surgery from August 2001 to March 2002. The *National Nosocomial Infection Surveillance System* (NNIS) recommendations were used to determine the inclusion criteria, which are: being an NNIS patient: defined as patients who stayed in the hospital overnight, that is, admission and discharge take place on different days; having undergone an NNIS surgical procedure: defined as those in which a single patient's entrance to the surgery unit is registered, and the surgeon makes at least one incision in the patient's skin or mucous membrane, and closes the incision before the patient leaves the operating room<sup>(1)</sup>.

During hospitalization, two nursing undergraduates performed daily active searches for surgical site infections in the patients included in the study and hospitalized in the digestive system surgery units. The two students were previously trained and received appropriate supervision from the lead researcher. Patient forms, in addition to medical and nursing records, were the primary source for data collection. Direct surgical incision evaluation was done when needed.

Data concerning patient identification were collected, such as gender and age, as well as information about the SSI, place of diagnosis (during hospitalization or after discharge), the interval between surgery date and SSI report and SSI location (that is, the specific site).

SSI was diagnosed using the CDCP guideline for surgical site infection prevention and control, which proposes that purulent secretions should be considered the gold standard for SSI report, as long as it does not characterize a local reaction to stitches. Moreover, it also recommends that, after being reported, the SSI should be classified according to its *location*: superficial (affects only the skin or subcutaneous cell tissue), deep (involves deep structures of muscular wall, fascia and layer), and organ/cavity (involves anatomic structures, which were open or manipulated during surgery)<sup>(1)</sup>; this study complied with these criteria.

Post-discharge surveillance was performed through telephone contact and return visits to the outpatient clinic, due to the difference between the two institutions under study. That is, one institution had a single outpatient clinic with fixed days and hours for patient return visits to remove stitches and undergo medical evaluation. At the other institution, patients were instructed by the surgeon to return to the clinic or other locations (basic health units, etc), and appointment times did not depend on institution control.

Hospital A determined that post-discharge follow-up would be performed through telephone calls, between the 7<sup>th</sup> and 14<sup>th</sup> day, due to some difficulties regarding physical structure and the different assistant physicians' work hours at the outpatient clinic<sup>(9)</sup>. Telephone calls were made using a specific printed guideline, which included the questions to be asked to the patient. At this moment, special care was taken to avoid answer induction. The instrument used was founded on objective questions that yielded precise answers regarding the surgical incision, such as: hyperthermia, heat, redness, dehiscence, pus on the surgical incision and, when present, individuals were asked to describe the secretion in detail - its aspect, color, location, quantity and/or need for medical return due to any event related with the surgery and/or antibiotics. After the contact, each case was discussed among the study group and, when necessary, with the assistant team, with a view to obtaining homogeneous criteria to report cases or not.

Patients who, for some reason, were not home or were not located on the first call, were called again at a previously scheduled time, during the same week, so as to guarantee that the highest possible number of patient was reached.

At Hospital B, post-discharge patient control was performed through outpatient return visits simultaneous to the medical return, so as to avoid additional transportation costs for patients. Returns occurred between the 7<sup>th</sup> and 14<sup>th</sup> day after the surgery, or after longer periods in cases of longer hospital stays. Patients were seen by a study group member, who evaluated the patient and checked the surgical incision site for hyperemia, heat, redness, dehiscence, secretion on incision and, if present, its aspect, color, location and quantity.

With a view to avoid SSI overreporting, during hospitalization, each report was compared to those of the outpatient clinic, through periodical patient report verifications, so that there were no incomplete or lacking data, nor double report forms. In other words, it was guaranteed that there were no duplicate reports of diagnoses reached at the hospital, outpatient clinic or on the telephone. In order to comply with the study method, which determines that patient follow-up should include up to the thirteenth day after the surgery, a second telephone contact was established with patients from both institutions between the twenty-first and thirtieth day, so as to complete this stage.

The research project was approved by both Institutional Review Boards involved. Patients provided informed consent for the follow-up, including intra-hospital post-surgery, outpatient clinic visits and/or posterior telephone contact.

Data analysis and statistical tests were performed using Excel 2000<sup>R</sup>, Epi-info (version 6.04) and the Statistical Products and Service Solutions (SPSS) for Windows (version 10.0: SPSS, Inc. Chicago, III). Univariate, simple descriptive (absolute) and percentage analyses were used to compare groups and SSI rates during and after discharge.

## RESULTS

The sample from Hospitals A and B consisted of 252 (41.4%) and 357 (58.6%) patients, respectively, subjected to digestive system surgeries regarding the following procedures: herniorrhaphy, cholecystectomy, laparotomy, and colectomy. Study participants were, on the average, 48 years old, ranging from 1 to 91 years. As to gender, 53% of the patients were men. Regarding SSI diagnosed during hospitalization, Hospital A presented a rate of 6.7% (17/252), against 4.5% at Hospital B (16/357). As to SSI detected after discharge, the rate for Hospital A was 27% (68/252), and 13.4% for Hospital B (48/357).

Table 1 - Distribution of patients subjected to digestive system surgeries at hospitals A and B, according to Surgical Site Infection (SSI) report - during hospitalization and post-discharge - and global incidence at both institutions, Sao Paulo, SP, 2001-2002

Institutions	Patients N	SSI %		Total SSI	Global Incidence %
		Hospitalization	Post-discharge		
Hospital A	252	17 (6.7)	68 (27)	85	33.7
Hospital B	357	16 (4.5)	48 (13.4)	64	17.9
<b>Total</b>	<b>609</b>	<b>33 (5.4)</b>	<b>116 (19)</b>	<b>149</b>	<b>24.5</b>

Post-discharge surveillance revealed a global SSI rate of 33.7% and 17.9% for hospitals A and B, and an important impact on the infection rate of 5.02 and 3.98 times for hospitals A and B, respectively. It is surprising that, if post-discharge surveillance had not been performed, the global SSI rate would have been seriously underreported.

Table 2 - SSI occurrence interval at hospitals A and B, according to the diagnosis moment, Sao Paulo, SP, 2001-2002

Institution	A				B			
	Hospitalization		Post-discharge		Hospitalization		Post-discharge	
Post-surgery interval (days)	n	%	n	%	n	%	n	%
<7	7	41	27	40	8	50	9	19
>7 a <14	8	47	21	31	4	25	29	60
>14 a <21	0	0	12	18	2	12.5	6	13
>21 a 30	2	12	8	11	2	12.5	4	8
<b>Total</b>	<b>17</b>	<b>100</b>	<b>68</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>48</b>	<b>100</b>

Percentage of diagnosed SSI according to post-surgery interval (days)

During patients' stay at Hospital A, 41% of infections were detected before the 7<sup>th</sup> day after surgery. At Hospital B, detection reached 50%. Regarding post-discharge detection, in hospitals A and B, the highest infection rates were found before the 14<sup>th</sup> day after surgery; 81% and 79%, respectively.

Table 3 - Distribution of surgical site infections at hospitals A and B, according to total classification and reported site. Sao Paulo, SP, 2001-2002

Hospital	A				B			
	Hospitalization		Post-discharge		Hospitalization		Post-discharge	
Infection Site	n	%	n	%	n	%	n	%
Superficial	10	59	67	98.5	14	87.5	44	92
Deep	6	35	1	1.5	2	12.5	2	4
Organ/cavity	1	6	-	-	-	-	2	4
<b>Total</b>	<b>17</b>	<b>100</b>	<b>68</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>48</b>	<b>100</b>

Regarding infection classification, superficial infections prevailed for both hospitals. The vast

majority of infections detected after discharge (>90%) also belonged to the same category.

## DISCUSSION

Hospital infection control programs that do not include post-discharge follow-up for surgical patients generate underreported rates. Studies show that 12 to 84% of all SSI become evident after hospital discharge. This confirms the importance and necessity of this type of systemized follow-up, emphasized by the current trend of shorter hospital stays. Moreover, it is mandatory to obtain accurate rates, thus permitting inter-hospital comparisons<sup>(1-2,4,7-8)</sup>.

The SSI rate detected during hospitalization in both groups was lower than that referenced in Brazilian studies. The 13% average hospital infection rate in Brazil<sup>(2,10-11)</sup> translates a certain tranquility regarding the percentages found in this study. However, since it is acknowledged that most studies do not cover surgical patient follow-up after discharge, special care should be taken when interpreting the data.

Surgical patient follow-up rates (outpatient clinic and telephone) reached 90% in Hospital A and 96.9% in Hospital B. Besides the two institutions having similar rates, it was observed that global patient loss during follow-up did not exceed 10%. This is highly satisfactory, considering parameters from other studies, which reported that between 64 and 89% of patients returned for post-discharge visits<sup>(4, 8)</sup>.

Regarding the methods used for post-discharge surveillance, it is observed that outpatient clinic returns have been considered the reference method, whose main advantage is the fact that it proposes that every SSI should be notified, regardless of its location. This is determined based on the observed difficulty because, when physicians report SSI at their offices/outpatient clinics, superficial SSI go unnoticed and are not reported. This happens because superficial SSI usually do not require antimicrobial therapy, besides being simple and generally solved by applying local heat<sup>(1, 6, 12)</sup>.

On the other hand, this type of follow-up (outpatient clinic return), performed exclusively by the Hospital Infection Control Commission staff, has been associated with higher reliability and good return rates. This occurs despite the fact that this modality implies differentiated physical and human resources, which is not always possible for most institutions<sup>(12)</sup>.

The telephone contacts performed in Hospital A could be considered an easy, low cost method. It tends to be used when patients are not able to return to the hospital's outpatient clinic. The method's sensitivity could be a limitation, due to information bias. However, since contacts were made by a specific trained professional in this study, who asked objective clear questions, it is believed that the information bias has been minimized<sup>(12)</sup>.

In order to perform surgical-patient follow-up after hospital discharge, the CDCP recommends an ideal period of up to 30 days after surgery. However, several studies have stated that most SSI could be identified between the 15<sup>th</sup> and the 21<sup>st</sup> day, with averages above 80% before the 15<sup>th</sup> day<sup>6-8</sup>.

In the present study, even the 7<sup>th</sup> day revealed a percentage of 41% and 50% of SSI diagnosed during patient hospitalization at Hospitals A and B, respectively. In addition, from hospital discharge to the 14<sup>th</sup> day after surgery, this percentage was higher, reaching 81% for Hospital A and 79% for Hospital B. This finding, according to some authors, justifies that post-discharge follow up of surgical patients could be reduced to 15 days<sup>(4, 7-8)</sup>.

Regarding specific SSI sites, the most frequent were the superficial, both intra-hospital and after discharge. As mentioned before, the vast majority of SSI diagnosed after discharge is superficial<sup>(4, 8)</sup>, exactly due to the possibility of early discharge and shorter hospital stay. However, when follow-up is performed by professionals who were not trained according to the specific method for hospital infection diagnosis, this infection category is often ignored, since it neither poses any limitations to the

patient nor requires re-hospitalization, and, especially, it is easy to solve from a clinical perspective. This causes underreports to the hospital infection control service.

## CONCLUSION

This study found 6.7% and 4.5% rates for surveillance limited to the hospitalization period. For global rates including post-discharge SSI follow-up, incidence rates were 27% and 13.4% for Hospitals A and B, respectively. Hence, it is observed there was an important impact on infection rates, of 5.02 and 3.98 times for the study institutions.

During post-discharge surveillance, a higher SSI rate was observed for Hospital A, which performed patient follow-up through over the telephone.

Both groups showed prevalence for superficial SSI, both during hospitalization and after discharge.

Hence, this study confirms the importance of performing surgical patient follow-up during hospitalization as well as after discharge as a way to guarantee reliable SSI rates. This would make it feasible to implement prevention and control measures, since epidemiological comprehension requires knowledge regarding infection risks as well as determinant or associated factors.

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