

## PROSPECTIVE STUDY OF SURGICAL SITE INFECTIONS: A CROSS-SECTIONAL STUDY

Nilam V. Patel<sup>1</sup>, Vivek A. Patel<sup>2</sup>, Pranay D. Bhatt<sup>3</sup>

<sup>1</sup>Tutor, Department of Microbiology, Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat, India.

<sup>2</sup>Professor, Department of Orthopaedics, Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat, India.

<sup>3</sup>Resident and Post Graduate Student, Department of Orthopaedics, Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat, India.

Received : 17/02/2023  
Received in revised form : 02/03/2023  
Accepted : 28/03/2023

**Keywords:**  
Hospitalization, Infection control,  
Microbiology, Surgical site infections.

Corresponding Author:  
**Dr. Nilam V. Patel,**  
Email: drnilamvivekpatel@gmail.com

DOI: 10.47009/jamp.2023.5.4.162

Source of Support: Nil,  
Conflict of Interest: None declared

*Int J Acad Med Pharm*  
2023; 5 (4); 813-815



### Abstract

**Background:** Surgical site infections (SSI) continue to be a serious issue in all surgical departments across the hospital, despite the use of aseptic procedures, antimicrobial medications, and sterilization. This study aims to ascertain the surgical site infection rate during hospitalization as well as in post-discharge because of the epidemiological relevance of this issue and the significance of doing post discharge surgical patient surveillance. **Materials and Methods:** The study covered all of the cases that were determined to have SSI. A thorough history of the patient was gathered, including information regarding gender, age, the location of the diagnosis, the time between surgery and the SSI report, and the SSI. During daily rounds infection control nurse collects all the details from the post-operative patients. It is scrutinized for the signs and symptoms as per CDC criteria for confirmation SSI and pus or swab a sample are sent to Microbiology laboratory for isolation, identification and antimicrobial susceptibility testing. **Result:** Participants in the study ranged in age from 23 to 70, with an average age of 38. 61% of the patients were men, according to the gender breakdown. 2% of infections were found in hospitalized patients before the seventh day following surgery. In terms of post-discharge detection, the highest infection rates in hospitals were discovered before the 14th day following surgery; 14%. In terms of classification of infections, superficial infections predominated between 3% and 30%. Most infections were discovered after superficial secretions. **Conclusion:** Surgeons, infection control specialists, health planners, and the general public are increasingly acknowledging surgical site infection as a sign of the caliber of patient care. Although it is impossible to entirely eradicate surgical site infections, bringing the infection rate down to a minimal level could have major positive effects by lowering postoperative morbidity and mortality as well as resource waste in the healthcare system. As a result, accurate SSI rates can be determined by conducting follow-up both during and after hospitalization.

## INTRODUCTION

The term "surgical site infection" (SSI), formerly known as "postoperative wound infection," refers to an infection that develops up to 30 days following surgery if no prosthetic is installed in the patient and up to 1 year.<sup>[1,2]</sup>

One of the most frequent postoperative consequences, surgical site infections increases morbidity and death among hospital inpatients. Surgical site infections continue to be a serious issue in all surgical departments across the hospital, despite the use of aseptic procedures, antimicrobial medications, and sterilisation. The third-most frequently reported nosocomial infection is SSI,

according to the National Nosocomial Infections Surveillance Report.<sup>[3,4]</sup>

Like many medical topics, surgical site infection (SSI) has more than a straightforward one-line definition. The reason for this is that there are many different clinical manifestations of SSIs, and SSIs that penetrate tissues at different depths may have effects ranging from mild sepsis to severe, life-threatening sepsis.<sup>[5,6]</sup>

In an effort to standardise its classification, the US Centres for Disease Control and Prevention (CDC) divided SSIs into three groups based on the depth of the tissues involved: superficial incisional, deep incisional, and organ/space.<sup>[7,8]</sup>

A SSI is typically defined as the presence of inflammation or pus discharge that results (within 30 days) from a surgical wound that was mostly closed. There has been an alarming surge in SSI in low and middle income nations despite improvements in SSI control practises such enhanced operating room ventilation, sterilisation methods, use of barriers, and surgical skill. Due to the advent of bacteria with heightened resistance to antibiotics, an increase in SSI is linked to an increase in morbidity and death.<sup>[9,10]</sup>

Acquisition of a surgical site infection is influenced by a number of variables, including bacterial exposure and the host's capacity to regulate the unavoidable bacterial contamination of the incision. They are often brought on by microorganisms that are injected into the surgical site during surgery. Between 70% and 95% are brought on by the patient's own flora. Staphylococcus aureus, coagulase-negative Staphylococcus, and Escherichia coli are the most prevalent microorganisms. In some patients, introduction of only 100 colony-forming units of bacteria into the surgical site can cause infection. However, exogenous sources of contamination during surgery such as bacteria transmitted from surgical personnel or heater-cooler units can also lead to infections.<sup>[11,12]</sup>

For surgical patients, a number of post-discharge surveillance techniques are advised. Each institution must therefore employ the techniques that work best for them. This study aims to ascertain the surgical site infection rate during hospitalisation as well as in post-discharge because of the epidemiological relevance of this issue and the significance of doing post discharge surgical patient surveillance.

## MATERIALS AND METHODS

Departments of Orthopaedics and Microbiology collaborated on a prospective cross-sectional study that lasted six months at Medical College and Hospital. The investigation was conducted in orthopaedics, general surgery, and obstetrics and gynaecology wards. The study covered all of the cases that were determined to have SSI. All of the procedures were carried out in compliance with ethical standards, and the study was given approval by the college's institutional ethical committee.

### Inclusion Criteria

In accordance with the definition of SSI, all age groups were included, with the exception of children under the age of five. All patients who provided written consent for the study were also included.

### Exclusion Criteria

The study was eliminated for infections that appeared 30 days after surgery, infections at the site of the episiotomy, infections at the donor sites for split skin grafts, and refusals to grant consent to participate.

The trial participants who were hospitalized in the surgery units underwent daily active searches for surgical site infections by the skilled researchers. The lead researcher provided the assistant researchers with the necessary guidance and training beforehand. A thorough history of the patient was gathered, including information regarding gender, age, the location of the diagnosis, the time between surgery and the SSI report, and the SSI.

SSI was classified as per its location as follows:

Superficial (affects only the skin or subcutaneous cell tissue),

Deep (involves deep structures of muscular wall, fascia and layer),

Organ/cavity (involves anatomic structures, which were open or manipulated during surgery)

The tool was built on unbiased inquiries that provided accurate answers regarding the surgical incision. Following the encounter, each case was addressed by the research group and, where needed, the assistance team in order to establish uniform standards for whether or not to report cases.

To ensure that the greatest number of patients was reached, patients who, for some reason, were not at home or could not be located on the first call, were called again at a previously specified time, during the same week.

Utilising Statistical Products and Service Solutions (version 20.0: SPSS, Inc. Chicago, III), data analysis and statistical testing were carried out.

## RESULTS

200 patients who had undergone surgery for hernioplasty, cholecystectomy, laparotomy, and appendectomy made up the sample from the hospital. Participants in the study ranged in age from 23 to 70, with an average age of 38. 61% of the patients were men, according to the gender breakdown.

Our hospital reported a 5% rate for SSI diagnosed during hospitalization and a 31% rate for SSI discovered after discharge.

2% of infections were found in hospitalized patients before the seventh day following surgery. In terms of post-discharge detection, the highest infection rates in hospitals were discovered before the 14th day following surgery; 14%. In terms of classification of infections, superficial infections predominated between 3% and 30%. Most infections were discovered after superficial secretions.

**Table 1: SSI occurrence interval at hospital according to the diagnosis**

Post-surgery intervals (days)	Hospitalization	Post discharge
< 7	4	18
7 to 14 days	4	28
15 to 21 days	0	14
22 to 30 days	2	2

Total	10	62
-------	----	----

**Table 2: Distribution of surgical site infections at hospital according to classification and reported site**

Infection site	Hospitalization	Post discharge
Superficial	6	60
Deep	4	2
Organ	0	0
Total	10	62

## DISCUSSION

SSI is an infection that develops at the surgical incision and surgical space after surgery. SSI can sometimes simply affect the skin, or it might affect facial planes and organ space in addition to subcutaneous tissue. Due to SSI, the cost and length of the patient's postoperative hospital stay as well as their overall morbidity have increased, placing an increased financial load on the healthcare system. Every surgeon finds surgical site infection (SSI) to be particularly difficult, and everyone is attempting to find solutions to the issue.<sup>[13]</sup>

Because of co-morbid diseases and a weakened immune system, high SSI rates are more common in older age groups. In our study, men (61%) acquired SSI at a higher rate than women (39%). Varsha S. et al,<sup>[14]</sup> demonstrated in their study that the proportion of SSI among males (7.4%) and girls (5.1%) was nearly identical; supporting the findings published by Kikkeri N. et al. Long pre-operative hospital stays are a significant risk factor for SSI in the current investigation. These results could be compared to other results. Our study found that using preoperative antibiotics reduced the incidence of SSI.<sup>[15]</sup>

The majority of SSI might be discovered between the 15<sup>th</sup> and the 21<sup>st</sup> day, with averages above 80% before the 15th day, according to several studies.<sup>[6-8]</sup> Even the seventh day of the current study showed a percentage of SSI detected during patient hospitalisation of 3%. Additionally, this number increased, rising to 28% between hospital release and the 14th day following surgery.

This finding, according to some authors, justifies that post-discharge follow up of surgical patients could be reduced to 15 days. 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, exactly due to the possibility of early discharge and shorter hospital stay.

## CONCLUSION

Surgeons, infection control specialists, health planners, and the general public are increasingly acknowledging surgical site infection as a sign of the caliber of patient care. Although it is impossible to entirely eradicate surgical site infections, bringing the infection rate down to a minimal level could have major positive effects by lowering postoperative

morbidity and mortality as well as resource waste in the healthcare system. As a result, accurate SSI rates can be determined by conducting follow-up both during and after hospitalization. Implementing preventative and control methods is thus feasible because understanding epidemiology necessitates familiarity with infection risks as well as determinant or related factors.

## REFERENCES

1. Mangram, A. J.; Horan, T. C.; Pearson, M. L.; Silver, L. C.; Jarvis, W. R.; Control, H. I. C. P. A. C. J. I.; Epidemiology, H. Guideline for prevention of surgical site infection, 1999. 1999, 20, 247-280.
2. Uškay, I.; Hoffmeyer, P.; Lew, D.; Pittet, D. J. J. o. h. i. Prevention of surgical site infections in orthopaedic surgery and bone trauma: state-of-the-art update. 2013, 84, 5-12.
3. Hou, Y.; Collinsworth, A.; Hasa, F.; Griffin, L. J. S. O. S. Incidence and impact of surgical site infections on length of stay and cost of care for patients undergoing open procedures. 2023, 11, 1-18.
4. Seidelman, J. L.; Mantyh, C. R.; Anderson, D. J. J. J. Surgical site infection prevention: a review. 2023, 329, 244-252.
5. Spagnolo, A.; Ottria, G.; Amicizia, D.; Perdelli, F.; Cristina, M. L. J. J. o. p. m.; hygiene. Operating theatre quality and prevention of surgical site infections. 2013, 54, 131.
6. Liu, Z.; Dumville, J. C.; Norman, G.; Westby, M. J.; Blazeby, J.; McFarlane, E.; Welton, N. J.; O'Connor, L.; Cawthorne, J.; George, R. P. J. C. D. o. S. R. Intraoperative interventions for preventing surgical site infection: an overview of Cochrane Reviews. 2018.
7. Yoshida, M.; Nabeshima, T.; Gomi, H.; Lefor, A. T. J. J. o. S. E. Technology and the prevention of surgical site infections. 2007, 64, 302-310.
8. Patel, S.; Metgud, R. J. J. o. c. r.; therapeutics. Estimation of salivary lactate dehydrogenase in oral leukoplakia and oral squamous cell carcinoma: a biochemical study. 2015, 11, 119-123.
9. Zabaglo, M.; Sharman, T. Postoperative wound infection. 2020.
10. Petherick, E. S.; Dalton, J. E.; Moore, P. J.; Cullum, N. J. B. i. d. Methods for identifying surgical wound infection after discharge from hospital: a systematic review. 2006, 6, 1-10.
11. Nelson, J.; Bivens, A.; Shinn, A.; Wanzer, L.; Kasper, C. J. A. j. Microbial flora on operating room telephones. 2006, 83, 607-626.
12. Percival, S. L.; Emanuel, C.; Cutting, K. F.; Williams, D. W. J. I. w. j. Microbiology of the skin and the role of biofilms in infection. 2012, 9, 14-32.
13. Stevens, D. L.; Bisno, A. L.; Chambers, H. F.; Everett, E. D.; Dellinger, P.; Goldstein, E. J.; Gorbach, S. L.; Hirschmann, J. V.; Kaplan, E. L.; Montoya, J. G. J. C. I. D. Practice guidelines for the diagnosis and management of skin and soft-tissue infections. 2005, 41, 1373-1406.
14. Shahane, V.; Bhawal, S.; Lele, M. U. J. I. j. o. h. s. Surgical site infections: A one year prospective study in a tertiary care center. 2012, 6, 79.
15. Saravanakumar, R.; Devi, B. P. J. I. J. o. S. O. Surgical site infection in a tertiary care centre-an overview-A cross sectional study. 2019, 21, 12-16.