OPEN ACCESS ORIGINAL RESEARCH ARTICLE

INCIDENCE OF SURGICAL SITE INFECTIONS FOLLOWING SURGERY AT A TERTIARY CARE HOSPITAL IN PUNJAB, PAKISTAN.

Umair Bin Nasir[1], Shahzad Naveed Jawaid[2], Rai Ahmad Khan Kharl[3], Nabeela Riaz[4], Muhammad Kareem Ullah[5], Inayat Husain Anjum[6]

Abstract

BACKGROUND: Post-operative surgical wound infection is basically, any infection that develops in a wound following surgery. Urinary tract infections are the most frequent hospital-acquired infections, followed by surgical site infections (SSIs). SSIs are a major lobal public health concern and contribute significantly to patients' morbidity and mortality. The antibiotic resistance linked to surgical site infections is also a global therapeutic problem for healthcare providers. **METHODS:** Patients admitted to surgery and surgical allied wards of the Lahore General Hospital were included in this cross-sectional study. Using a non-probability convenient sampling strategy, 83 patients in total were enrolled for the study. The relevant points for including SSIs were: Pus or purulent discharge from an incision accompanied by pain, any two distinguishing symptoms of inflammation, and surgeon's diagnosis of SSI. **RESULTS:** The patients' average age was 36.82 ± 18.91 years. Out of 83 patients, the SSI rate has been found to be 27.71 %, with 23 of them experiencing SSIs. Out of nine patients over 60 years old, four (44.4%) had SSIs, indicating a higher incidence of SSIs in older people. Compared to patients in rural areas, those in urban areas had a greater likelihood of SSIs. Similarly compared to patients operated with an emergency surgery (27.77%), patients operated under an elective surgery had a higher prevalence of surgical site infections (SSIs; 37.93%). Of the 19 patients, seven (36.8%) had SSIs; these individuals were more likely to be obese. **CONCLUSION:** According to the findings, patients admitted to Lahore General Hospital had a high incidence of SSIs. Co-morbidities, advanced age, obesity, duration of surgery, major operations, and anemia were the main risk variables that were found. It is important to take action to reduce SSIs in these high-risk populations.

KEYWORDS: Surgical Site infections, Surgery, Incidence, population, Patients

1. Medical Officer, Surgery Unit 2, Lahore General Hospital, Lahore, Pakistan
2. Senior Registrar, Surgery Unit 2, Lahore General Hospital, Lahore, Pakistan
3. Consultant Vascular Surgeon, Armed Forces Hospital Alhada Taif, Saudi Arabia
4. Medical Officer, Surgery Unit 2, Lahore General Hospital, Lahore, Pakistan
5. Associate Professor, Surgery Unit 2, Lahore General Hospital, Lahore, Pakistan
6. Consultant Surgeon, DHQ Vihari

Corresponding Author: Dr Umair Bin Nasir. Medical Officer Surgical Unit 2, Email: Umair_4917@hotmail.com Cell #: 03234303473

How To Cite This Article: Nasir UB [1], Jawaid SN[2], Kharl RAK[3], Riaz N[4], Ullah MK[5], Anjum IH[6] **INCIDENCE OF SURGICAL SITE INFECTIONS FOLLOWING SURGERY AT A TERTIARY CARE HOSPITAL IN PUNJAB, PAKISTAN.** JPUMHS;2024:14:01,27-32. http://doi.org/10.46536/jpumhs/2024/14.01.490

RECEIVED FEB 26. 2024, ACCEPTED ON 15 MARCH 2024, PUBLISHED ON 30 MARCH 2024.

INTRODUCTION

Post-operative surgical wound infection is the term used to describe an infection of a wound following surgery. Hospital-to-hospital variations exist in the prevalence of these infections, which can occur anywhere beginning from the suture line to the site of surgery. One kind of nosocomial infection is surgical wound infection [1.] Infections obtained in hospitals or in other healthcare institutions are known as nosocomial infections. A patient must be admitted in a hospital or a healthcare facility for reasons other than infection in order to have contracted a nosocomial infection, and the patient does not exhibit any symptoms of an active or developing an infection [2.]

Urinary tract, respiratory, and surgical wound infections are different examples of nosocomial infections [3]. Following urinary tract infections, surgical wound infections are the most frequent nosocomial infections [4,12]. 19 % to 40 % of all diseases contracted in hospitals are caused by these infections [5]. Although postoperative wound infection can happen anywhere from the first day to years following the surgery, and it usually manifests itself between fifth to tenth day after a surgery [6].

A wound infection is considered serious when there is purulent discharge, or if further treatment is needed to ensure proper drainage. According to a number of bacteriological investigations, both gram-positive and gram-negative bacteria are involved in the infections of surgical wounds [4]. Staphylococcus aureus (32.67%) is the most prevalent among these causative bacteria, followed by Proteus (4.27%), Escherichia coli (11.44%), Pseudomonas aeruginosa (16.63%), and Klebsiella pneumonia (28.29%) [10].

Although they continue to be a less common cause of death but a significant cause of morbidity in surgical patients, post-operative SSIs can be extremely fatal. Moreover, SSIs considerably raise the treatment costs and increased stay in the hospital. Due to lack of resources, even simple life-saving surgeries like caesarean sections and appendectomies are linked to high rates of wound infections further amplifying high mortality rate in developing countries [11,12].

Surgical site infections are a major problem practically affecting all Pakistani hospitals; thus, this concern must be dealt with on priority basis. The prevention of the wounds and their care are critical to surgical success. The prerequisites for implementing policies that reduce the frequency of surgical site infections (SSIs) are data collection, wound surveillance, and surgical inspection. Lahore General Hospital (LGH) has to deal with a high patient output daily and thus accentuates the risk of numerous hazards associated with SSIs.

METHODS:

This was a cross-sectional survey, was conducted from July to August 2023 in the two surgery units. Using a non-probability convenient sampling strategy, a sample size of 83 was obtained. All patients who had undergone surgery (major or minor) and whose post-operative stay was longer than three days and who were admitted to surgery wards were included. Patients who had been discharged from the hospital and developed SSIs afterwards, for which no treatment had been initiated, were also included in the study. Patients of both sexes and all ages were present. Patients who developed SSIs after being discharged from the hospital, were hospitalized for treatment, and had their treatment initiated were not included in the sample.

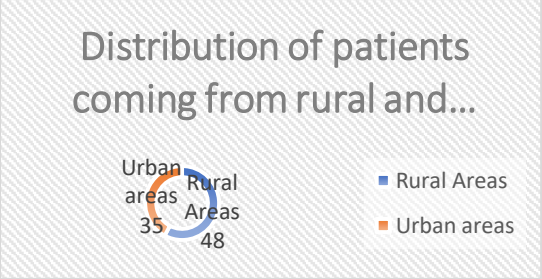
A structured questionnaire with multiple relevant variables was created. Post graduate trainees visited the surgical wards, gathering data from their respective wards, in two male and two female chambers. Every patient gave their informed consent, and data was maintained confidentiality. SSIs were examined and evaluated, to avoid contamination, an aseptic method was employed throughout the wound examination.

SPSS version 23.0 was used to analyze the data. Quantitative factors like age, duration of operation, and stay in the hospital before surgery were expressed as mean ± SD, whereas categorical variables like gender, anemic or non-anemic were expressed as frequency and proportion. Tables and figures were used to present the data.

RESULTS:

Eighty-three patients in both surgical (A and B) wards at LGH over the course of two months participated in this study. There were 37 (44.5%) men and 46 (55.5% women). from the 83 patients, 29 (34.9%) were single, 3 (0.3%) were widowed, and 2 (0.2%) was divorced and 49 (59.0 %) were married. There were 48 patients (57.8%) from rural areas and 35 patients (42.1%) from urban areas. 17 patients (38.81%) were literate, compared to 66 (79.51%) who were illiterate. 57 (20.4%) of the surgeries were elective, and 26 (31.3%) of the cases involved emergency procedures.

Fig 1: Showing distribution of rural and urban areas



The age distribution frequency of the patients is mentioned in Table 1.

Age in years	Frequency	SSIs
less than 15	8	12.5 %(1)
15 - 40	43	30 %(13)
41 - 60	23	21 % (5)
Above 60	9	44.4%(4)
Total	**83(72%)**	**23(28%)**

Table 1: Age distribution of patients

From 83 patients 23 (28 %) patients developed SSI while 6028 %) (72 %) did not developed any SSIs as shown in figure 2.

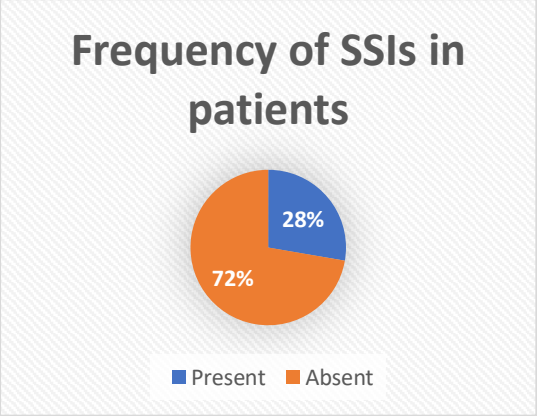


Fig 2: Frequency of SSIs in patients presenting in surgery ward

Our study shows that 26 patients (31.3%) had gastrointestinal issues at the time of presentation. three patients (0.3%) had genitourinary issues, and seventeen patients (34.9%) had presented with RTA (road traffic accidents) while twenty patients (24.0 %) had weapon injuries. Table 2 displays the number of days that each patient's present illness has lasted. Additionally, it displays the frequency of SSIs by duration across various categories.

Duration in days	Frequency	SSIs
less than 30	65(78.3%)	20(30.7%)
30 - 60	5(6%)	2(40%)
more than 60	13(15.6%)	3(23%)
Total	**83 (100 %)**	**23(28%)**

Table 2: Frequency of number of days illness of patients lasted

In this study, 90 % of the sample population belonged to the lowest economic class. Just 1 % belonged to the upper economic class, whereas 9 % patients belonged to the middle class. Socioeconomic status and SSIs did not statistically significantly correlate (p = 0.706).

The majority of patients were not obese. Of the 83 patients, 76 81% were not obese, and 19 % met the criteria for obesity. The statistical significance of the relationship between obesity and SSIs was 0.734 (p = 0.734). Seventeen percent (17%) patients had undergone a minor procedure, and 83 % had undergone a major surgery. SSIs were formed by 74% patients who had undergone major surgery and 26% patients who had undergone minor surgery.

The frequency of SSIs in patients undergoing several hours of surgery is displayed in Table 3. The statistical significance of the correlation between the length of surgery a patient underwent and SSIs was 0.76

Duration in minutes	Frequency	SSIs
Less than 60	10(12%)	2(20%)
60 - 90	26(31.3%)	6(23%)
More than 90	47(56.6%)	15(31.9%)
Total	83(100%)	23(28%)

Table 3: Duration of surgery in minutes and frequency of SSIs

The pre-operative hospital stays and SSIs did not significantly correlate (p=0.94). The results also concluded that the majority of patients did not experience any related morbidity. The

incidence of SSIs and associated-morbidity were statistically significantly correlated (p = 0.05).

DISCUSSION:

A significant risk of any surgical procedure is the infection of wounds after the surgery, which carries a heavy cost in terms of patient morbidity and death. In order to determine the frequency of SSIs, their correlation with the kind and location of surgery, and the risk factors linked to SSIs, we conducted a study at the Lahore General Hospital.

As per our analysis, 24.7% of patients, had SSIs. Same findings were found in a study in Saudi Arabian hospitals, found that 14% of patients developed SSIs [1.] According to our research, patients over 60 years old had a larger percentage of SSIs, while those under 15 years old showed lower percentage. This shows that with advancing age the risk of SSIs increases, Same findings were found in a study conducted in India [2.] The increasing frequency in older age groups is most likely due to the fact that growing older is linked to a higher risk of developing multiple chronic diseases and delayed wound healing.

As per our research findings, men got SSIs at a little greater rate than women. Similar to a study carried out in Abbottabad [5.] there was no statistically significant relationship between the emergence of SSIs and marriage status, academic performance, socioeconomical status, and employment. Another major risk factor associated with the old patients is obesity. Our results showed, obese patients had a higher incidence of SSIs than patients who were not fat. Extended wound healing has been associated with increased weight gain, which is an established risk factor for deep superficial infection [3,6.]

Major number of patients had gastrointestinal issues when they presented first time. SSI incidence was minimal in genitourinary procedures and highest in the gastrointestinal surgeries. Furthermore, SSI rates were found to be more in gastrointestinal surgery as compared to genitourinary surgeries, as per a study carried out in Islamabad [8.] These patients' surgical procedures were divided into two categories, i.e. significant and minor. When we compared both, it's evident that significant procedures to minor surgeries, there was a much greater risk of SSIs [(13,14).] The outcome is aligned with research from a tertiary care hospital in Khairpur medical college in which they discovered an increased probability of SSI during significant procedures [11.]

Considering the duration of procedures and the way they related to surgical site infections (SSIs) proved that a higher percentage of SSIs occurred during surgeries extending more than ninety minutes [(15).] This pattern was most likely brought about by the long recovery period associated with substantial surgeries, which increases the risk of SSIs. likewise, research conducted at the Peoples Medical College and Hospital in Nawab Shah observed that surgical site infections (SSIs) increased with surgical procedures took much longer than eighty minutes [7,11.]

Our study suggested that patients who received the planned surgeries had a higher incidence of surgery than those who received emergency or urgent procedures. SSI rates identified were shown to be large in number in emergency operations, in another study [12,13,16].

Patients compared with co-morbidities such as renal failure and hypertension, patients presenting with diabetes had a greater percentage of SSIs (66.66%). Diabetes is a major contributary risk factor for the occurrence of surgical site infections (SSIs), according to a study conducted at a teaching hospital in Karachi, 20 percent patients with diabetes acquired an infection following the surgery [18.]

Anemia was also observed to be a risk factor, anemic patients experienced an infection following surgery. Anemia has also been linked to an increased risk of SSIs, according to Devrajani [19]

According to our research, patients who were in the hospital for 36–72 hours prior to surgery had the highest percentage of SSIs followed by those who stayed in the hospital for more than 146 hours. A significant risk factor related with pre-operative hospital stays was found in a study done in Lahore. The study indicates that the frequency of SSIs rises in proportion to the length of pre-operative hospital stay [20.]

CONCLUSION: According to the results of our study, 28 % of the 83 patients at the Lahore General Hospital experienced SSIs, or 23 out of

them. The primary risk factor was determined to be associated morbidity. Incidence of SSIs was shown to be statistically significantly correlated with associated morbidity ($p = 0.04$). These can be regarded as significant and possible risk factors. Therefore, it becomes imperative to undertake actions which can reduce the incidence of SSIs in these high-risk populations. Proper information and guidance regarding wound care after discharge, identifying SSIs, and who to contact in case of concern should be amply provided to the patients, appropriate antibiotic prophylaxis must be initiated, surgeons and other operating room staff members should strictly adhere to the laid down aseptic procedures to avoid contamination of the wound.

ACKNOWLEDGMENT: We are thankful of Prof. Dr. Naila Yousif Gynecology & Obstetrics Department PMCH Hospital @PUMHSW Nawabshah for her support & help.

STUDY LIMITATION: As due to scarce resource this study is one centered study on limited sample size; it is therefore recommended to conduct this research study on multicenter health care institution and on large sample size.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors.

ACKNOWLEDGEMENTS: We are thankful to all who were involved in our study.

AUTHORS' CONTRIBUTIONS: All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared.

REFERENCES

1. Al-Abdullah N. A Study to Describe the Epidemiology of Antibiotic Resistance to Enterobacteriaceae in Four Intensive Care Units in Saudi Arabia. The University of Manchester (United Kingdom); 2009.
2. Bhalla GS, Grover N, Singh G, Sarao MS, Mishra D. Antimicrobial susceptibility profile of surgical site infection isolates from a tertiary care center in West India. Journal of Marine Medical Society. 2019 Jan 1;21(1):69-74.
3. Kaur K, Oberoi L, Devi P. Bacteriological profile of surgical site infections. IAIM. 2017 Dec 1;4(12):77-83.
4. Shiferaw WS, Aynalem YA, Akalu TY, Petrucka PM. Surgical site infection and its associated factors in Ethiopia: a systematic review and meta-analysis. BMC surgery. 2020 Dec;20(1):1-5.
5. Sattar F, Sattar Z, Zaman M, Akbar S. Frequency of post-operative surgical site infections in a Tertiary care hospital in Abbottabad, Pakistan. Cureus. 2019 Mar 12;11(3).
6. Mashbari H, Hamdi S, Darraj H, Awaf M, Zaalah S, Hakami F, Hakami KM, Alhazmi E, Hakami SA, Aburasain A, Hakami IA. Knowledge, attitude and practices towards surgical wound care and healing among the public in the Jazan Region, Saudi Arabia. Medicine. 2023 Dec 22;102(51):e36776.
7. Al wan MS, Dhari FJ, Laghari AA, Bilal F, Khaskheli NM: Surgical site infection in elective surgery. J Surg Pakistan. 2011, 16:33-37.
8. Khan FU, Fang Y, Khan Z, Khan FU, Malik ZI, Ahmed N, Khan AH, Rehman AU. Occurrence, associated risk factors, and treatment of surgical site infections in Pakistan. European Journal of Inflammation. 2020 Oct;18:2058739220960547.
9. Zakir KH, Ahmed N, Khan FU, Rahman H. Pattern of surgical antibiotic prophylaxis for surgical site infections in at two teaching hospitals, Islamabad, Pakistan. Journal of Microbiology and Infectious Diseases. 2019 Sep 1;9(03):104-11.

10. Ahmed E, Anwar MI, Idrees R, Toor SA, Mahmood A, Humayun A. Culture-Positivity and Sensitivity in Post-Surgical Patients in a Tertiary Care Hospital. InProceedings 2020 Dec 3 (Vol. 34, No. 1, pp. 11-16).
11. Unar F. Incidence and Most Common Organism Associated Post Caesarean Surgical Site Wound Infection at Khairpur Medical College (Teaching Hospital). Annals of Punjab Medical College. 2019 Mar 31;13(1):48-50.
12. Sajun SZ, Albutt K, Moosajee US, Drevin G, Mukhopadhyay S, Samad L. Self-diagnosis of surgical site infections: lessons from a tertiary care centre in Karachi, Pakistan. Pakistan Journal of Medical Sciences. 2020 Jan;36(1):S55.
13. Zaineb S, Akbar A, Ikram M, Mahboob S, Mahmood A, Khan AW. Incidence and risk factors for maternal surgical site infection after cesarean section. The Professional Medical Journal. 2021 Sep 30;28(10):1495-500.
14. Saleem Z, Ahsan U, Haseeb A, Altaf U, Batool N, Rani H, Jaffer J, Shahid F, Hussain M, Amir A, Rehman IU. Antibiotic utilization patterns for different wound types among surgical patients: findings and implications. Antibiotics. 2023 Mar 30;12(4):678.
15. Hanif N, Raja R, Manan A, Hussain R, Zehra M, Shah A, Aslam D, Musadaq M. Evaluate Utilization Pattern of Antibiotics among Surgical Patients at District Head Quarter Hospital Badin, Sindh, Pakistan.
16. Shaikh Q, Sarfaraz S, Rahim A, Hussain A, Behram S, Kazi AS, Hussain M, Salahuddin N. WHO Point Prevalence Survey to Describe the Use of Antimicrobials at a Tertiary Care Center in Pakistan: A Situation Analysis for Establishing an Antimicrobial Stewardship Program. Antibiotics. 2022 Nov 4;11(11):1555.
17. Gull S, Hussain I, Farogh A, Afshan S, Iqbal M. Incidence and predictor of Post-Operative wound Infection in patients under-went coronary artery bypass grafting. J Clin TrialCardiol. 2018;5(1):1-5.
18. Fatima A, Gohar H, Dawood K, Siddiqui HZ, Sajjad M, Naseem S. Bacteriological Profile and Antimicrobial Susceptibility Pattern of Pus Isolates from Tertiary Care Hospital. Journal of Liaquat University of Medical & Health Sciences. 2022 Oct 4;21(03):190-5.
19. Devrajani BR, Shah SZ, Devrajani T, Qureshi GA. Nosocomial infections in medical ward (Four months descriptive study in a tertiary care hospital). World J Med Sci. 2009;4(1):13-7.
20. Parveen K, Hussain M, Afzal M, Gilani SA. Assess the knowledge and practices of nurses regarding the prevention of infection in burn patient in tertiary care hospital Lahore. Journal of Health, Medicine and Nursing. 2020 May 31;74(2):178-231.