

Original Article

FREQUENCY AND RISK FACTORS OF POSTSURGICAL SITE INFECTIONS IN PATIENTS VISITING TERTIARY CARE HOSPITALS IN DISTRICT PESHAWAR

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Abstract:

Background: According to WHO report in 2016 the post-surgical site infection rate in patients was 11%. In Pakistan, 12.7% SSI rates were reported in emergency cases and 4.6% in elective surgeries. In Objective of this study is to find surgical site infection (SSI) frequency and risk factors in patients admitted to tertiary care hospitals in Peshawar.

Materials and Methods: A cross-sectional analytical study was conducted from October 2021 to March 2022 using a non-probability consecutive sampling technique. One hundred and thirty patients who had undergone surgery were selected. Data was collected using a questionnaire and analyzed using SSPSS-23.

Results: The frequency of SSIs in Peshawar was 30%, highest frequency is reported un age group between 15 -20 years. Emergency surgery got 31% SSIs, while 28% of patients on whom elective surgery was performed got 33% SSIs. Laparoscopic surgery had 33% frequency of SSIs as compared to 29% with open conventional surgery. SSIs was reported in 62% of smokers, 33% of hypertensive and 40% with diabetes.

Conclusion: The study has found that the frequency of SSIs in Peshawar is 30%. Males, emergency and laparoscopic surgery is at a higher risk of getting SSIs. Smokers, Diabetics and hypertensive patients are more prone to SSIs.

Keywords: Infections, Post-surgical, Tertiary care hospital

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INTRODUCTION:

A postoperative surgical site infection is defined as any infection that occurs within 30 days of surgery. Surgical site infections (SSIs) may occur after surgery, and that may delay healing, therefore increasing the cost of care¹. Most commonly isolated in SSIs are extended-

spectrum β -lactamase-producing *Escherichia coli*, followed by *Enterococcus* species².

Different types of SSIs include superficial Incision surgical infection, deep incision surgical site infection, organ/space site infection, cellulitis, necrotizing soft tissues infection, necrotizing fasciitis, gas gangrene, impetigo, erysipelas, tetanus etc³. The Risk factors included in many studies were obesity, complicated emergency surgery, prolonged surgical duration, chronic obstructive pulmonary disease, and other respiratory conditions, diabetes, smoking, coronary artery

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disease, peripheral vascular disease or limb ischemia, hypertension, bleeding disorders, renal disease, preoperative sepsis, and female gender⁴.

When the microbiological flora concentration is more than 10,000 microorganisms per gram of tissue, there is a high risk for an infected wound⁵. According to the 2016 WHO report, the post-surgical site infection rate in patients was 11%³. In one of the studies, it showed Surgical site infections (SSI) associated with colorectal surgery are 4 times more than any other abdominal surgery. Four frequently reported factors leading to a higher incidence of infections include; advanced age, peri operative complications leading to morbidity, type of surgical wound (clean, clean-contaminated, contaminated or dirty), and surgeries for neoplasm in Pakistan⁶. In a study conducted in Ghana on post-surgical infection-causing organisms, the most common species included *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Acinetobacter baumannii*. The majority of organisms were multi-drug resistant, including 86% of *E. coli*, 52% of *A. baumannii* and 86% of *K. pneumoniae*, and 65% (17/26) of the cefotaxime-resistant *K. pneumoniae* were extended spectrum β -lactamase producing⁷. Due to the increasing number of surgical procedures daily, the number of SSIs increases accordingly. Surgical site infections (SSI) are a significant health issue for both developed and developing countries. Incidence of SSIs in the mainland China was reported as 4.5% and 14.8% in Africa⁸. Another study done in Japan reported that postoperative infections occurred in 10.7% of 6582 patients who had undergone digestive surgery (6.8% for endoscopic surgery and 18.7% for open surgery)⁹. In another study, data was collected from 84 different areas of Pakistan from 858 patients. Among those 6.5% of patients develop SSI¹⁰.

This research studied the frequency and risk factors of infections in patients after undergoing surgeries in tertiary care hospitals in Peshawar.

MATERIALS AND METHODS:

A cross-sectional analytical study was done from October 2021 to March 2022 using non probability consecutive sampling technique. This study was conducted at Surgical and Allied Wards/OPDs in Tertiary Care Hospitals in Peshawar including Khyber Teaching Hospital Peshawar, Lady Reading hospital Peshawar and Hayatabad Medical Complex on patients who have been operated. The inclusion criterion was Postoperative patients with age 15 to 90 years reporting within one month of surgical procedure with and without surgical site infection. An exclusion criterion was patient's not giving consent.

Duration of study was six months after approval of synopsis. According to WHO formula with prevalence 9.294%⁴ with margin of error 5% and 95% confidence interval the calculated sample size is 130. After approval from Ethical Committee of Khyber Medical College (IREB NO.54/DME/KMC), the data was collected by questionnaire. The participants were assured that this survey was purely for research, data review and their confidentiality will be maintained and if agreed upon a written informed consent was obtained from them. All the included patients were interviewed on well-designed questionnaire. The data was collected by the researcher through face-to-face interview. The collected data was then analyzed to produce the results. Data was analyzed using SPSS-23. Descriptive analysis of the data was done and presented primarily in the form of frequencies, percentages, tables, and bar charts. Analytical analysis was done using Chi square between gender and Post Surgical Site Infections and P value of 0.05 or less was taken as significant.

RESULTS:

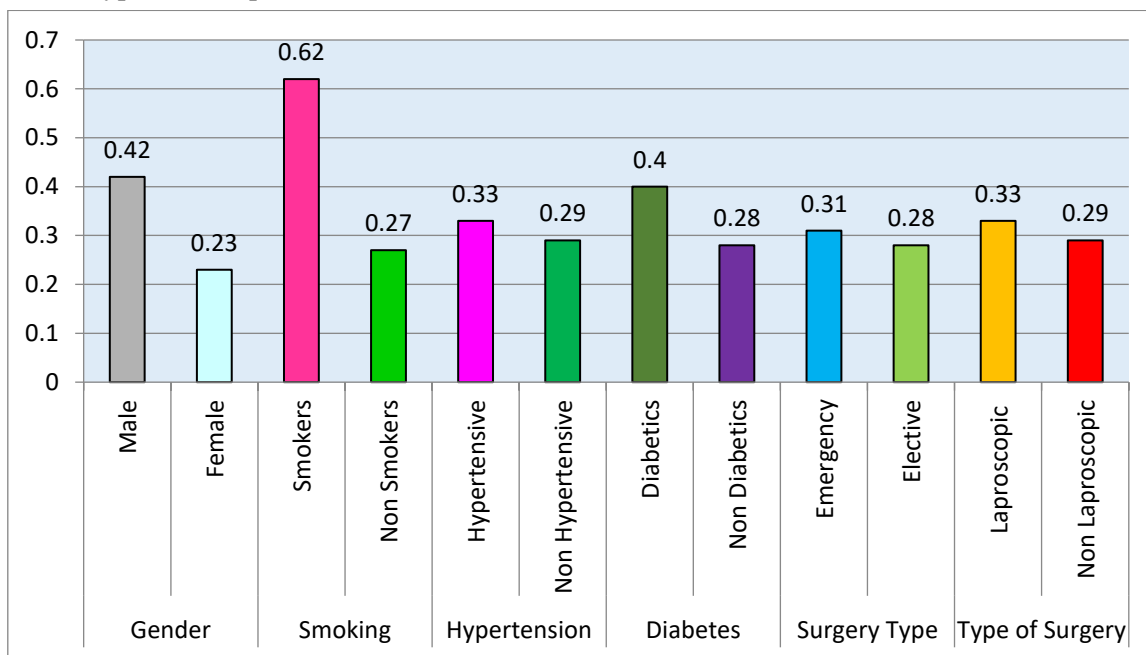
Frequency of SSIs in Tertiary care hospitals in Peshawar is reported in 39 patients constituting 30%. From age 15-30 out of total 62 people, 13 were infected (20.96%). From age 30-45 out of total 26 people 7 were infected (26%). From age 46-60 out of total 32 people 14 were infected (43%). From age 61-75 out of total 8

people 3 were infected (37.5%). From age 76-90 out of total 2 people 2 were infected (100%). 42% males and 23% females got SSIs. 31% on whom emergency surgery was performed got SSIs while 28% patients got infected on whom elective surgery was performed. 33% on whom laparoscopic surgery was performed got infected while 29% patients on whom open conventional surgery was performed got infected. 27% non-smokers got SSIs while 62% smokers got SSIs. The frequency of SSI among the Non-hypertensive patients was 29% while

in hypertensive patients it was 33%. In non-diabetic patients the frequency of SSIs was 28% while it was 40% in diabetics.

Table 1: Frequency of SSI and its relation with age of the patients.

Surgical Site Infection	Age of Study Respondent					Total
	15-30	31-45	46-60	61-75	76-90	
No	49	19	18	5	0	91
Yes	13	7	14	3	2	39
Total	62	26	32	8	2	130



Graph 1 : Frequency and Risk factor of surgical site infections

Chi square shows there is a significant association between gender and PSSIs as value of 0.027 which shows male gender is more prone to post-surgical site infection.

Chi square test depicts a significant association between Surgical site Infection and age as a value of 0.036 which shows increasing age has increased association with post-surgical site infection.

DISCUSSIONS:

This study found that the frequency of SSIs in tertiary care hospitals in district Peshawar is 30%. A study done in HMC Peshawar have found that prevalence of SSIs was 27.5%¹¹ while according to WHO its prevalence is 11% worldwide³. The possibility of such a great

difference of prevalence between developed and developing countries can be hygiene problems in the hospitals, lack of proper education among people about the proper care of wounds and stitches and increased frequency of co morbidities like diabetes and hypertension among the population. In a tertiary care hospital in Abbottabad SSI rates were 33.68% with 32 patients developing SSIs of 95¹², which is near to our study result. In our study the first variable that we have studied is age, and our study showed that there is relation between age and SSIs. The rate of SSIs was 20.96% in age group of 15 to 30, 26% in age group from 31 to 45, 43% in age group from 46 to 60, 37.5% in age group from 61 to 75 and 100% in age group from 76 to 90. Ansari Hassan has done a

retrospective study in tertiary care hospitals of Pakistan and has found that elderly people are more prone to SSIs¹³. With increasing age, it takes more time for healing of wounds and because of increased immunodeficiency with age the risk of SSIs increases in elderly people. One of the potential risk factors for increased risk of infection is gender. Our results showed that among 42 males 18 were infected (42%) while out of 88 only 21 were infected (23%). So, males are more prone to SSIs but a study done before in HMC Peshawar has shown contrary results in which 26.8 % males were infected while 29.4% females were infected⁷ Another risk factor that we have studied is type of surgery and in our sample 31.9% on which emergency surgery has been performed got infected and 28.9% on whom elective surgery has been performed. Ansari Hassan in his study has also proved that the rate of SSIs in emergency surgeries 19.2% is more than elective¹³. The possibility of increased risk may be because of rupture of an infected organ, pus formation, leakage and contamination of wound etc. We had also searched out for finding that whether there is an association between the type of surgery and SSIs. 33% of the people who got laparoscopic surgery were infected, while 29.5% who got open-conventional surgery were infected which showed that patients on whom laparoscopic surgeries have been performed are at higher risk than those on whom open-conventional surgery has been performed. On inquiring people about smoking, we found that rate of SSIs in smokers was 62.5% while in non-smokers it was 27.8% and it proved that with smoking surgical site infections risk is increased. The risk of infection rises because smoking disturbs the immune system, delays the wound healing as it delays nutritional supply that are necessary for healing. We investigated further about effect of co morbidities on infection rate after surgery like hypertension and diabetes. In our sample population 29.12% with the history of no hypertension got infected while 33.33 who were hypertensive got infected. The study in Egypt was done on patients on whom C-section

was performed for finding risk factors of SSIs and that had showed diabetes and hypertension in maternity as one of the risk factors for post-surgical infections¹⁴. The probable reason for this is that hypertension decrease blood flow to wound site and also prolong wound discharge. A study in China was done from Jan 2005 to July 2016 on a total of 786 patients who were followed up for 30 days have shown diabetes as a risk¹⁵. In patients about diabetes, we found that 40% of those who are diabetics got infected while only 28.18% non-diabetics were infected. The probable reason is that high blood sugar level causes bacteria to grow more efficiently and another probable reason is that diabetes cause nerve damage and blood vessels damage so proper nutritional supply to wound site is decreased.

CONCLUSION:

The study has found that the frequency of SSIs in Peshawar is 30%, which is much higher than that of other countries. Males are more prone to SSIs than females. Emergency and laparoscopic surgery is at a higher risk of getting SSIs. Smokers, Diabetics and hypertensive patients are more prone to SSIs.

AUTHOR'S CONTRIBUTION:

IU: Proposal Development/ Manuscript Review

JH: Data Analysis

MSK: Data Collection and Analyzing

MSK: Data Entry

UJ: Manuscript Writing

MM: Literature Review and Formatting

REFERENCES:

1. Jenks PJ, Laurent M, McQuarry S, Watkins R. Clinical and economic burden of surgical site infection (SSI) and predicted financial consequences of elimination of SSI from an English hospital. *J Hosp Infect.* 2014 Jan 1;86(1):24-33. <https://doi.org/10.1016/j.jhin.2013.09.012>
2. Alkaaki A, Al-Radi OO, Khoja A, Alnawawi A, Alnawawi A, Maghrabi A, Altaf A, Aljiffry M. Surgical site infection following abdominal surgery: a

- prospective cohort study. *Can J Surg.* 2019 Apr;62(2):111. doi: 10.1503/cjs.004818.
3. Wiseman JT, Fernandes-Taylor S, Barnes ML, Saunders RS, Saha S, Havlena J, Rathouz PJ, Kent KC. Predictors of surgical site infection after hospital discharge in patients undergoing major vascular surgery. *J Vasc Surg.* 2015 Oct 1;62(4):1023-31.
<https://doi.org/10.1016/j.jvs.2015.04.453>
 4. Leaper DJ, Edmiston CE. World Health Organization: global guidelines for the prevention of surgical site infection. *J Hosp Infect.* 2017 Feb 1;95(2):135-6.
<https://doi.org/10.1016/j.jhin.2016.12.016>.
 5. Young PY, Khadaroo RG. Surgical site infections. *Surg Clin.* 2014 Dec 1;94(6):1245-64.
<https://doi.org/10.1016/j.suc.2014.08.008>
 6. Pak H, Maghsoudi LH, Soltanian A, Gholami F. Surgical complications in colorectal cancer patients. *Ann med surg.* 2020 Jul 1; 55:13-8.
<https://doi.org/10.1016/j.amsu.2020.04.024>.
 7. Bediako-Bowan AA, Kurtzhals JA, Mølbak K, Labi AK, Owusu E, Newman MJ. High rates of multi-drug resistant gram-negative organisms associated with surgical site infections in a teaching hospital in Ghana. *BMC Infect Dis.* 2020 Dec; 20:1-9.
<https://doi.org/10.1186/s12879-020-05631-1>.
 8. Ngah JE, Bénét T, Djibrilla Y. Incidence of surgical site infections in sub-Saharan Africa: systematic review and meta-analysis. *Pan Afr med j.* 07-Feb-2021. 2016 Jun 29; 24:171
<https://doi.org/10.11604/pamj.2016.24.171.9754>
 9. Niitsuma T, Kusachi S, Takesue Y, Mikamo H, Asai K, Watanabe M. Current status of postoperative infections after digestive surgery in Japan: The Japan Postoperative Infectious Complications Survey in 2015. *Ann. Gastroenterol. Surg.* 2019 May;3(3):276-84.
<https://doi.org/10.1002/ags3.12236>
 10. Malik AZ, Ali Q. Surgical site infections after elective surgery in Pakistan: Surgipak Study. *JRMC.* 2015 Dec 30;19(3).
 11. Akbar K, Ullah F, Wahid A, Jamil T. Risk factors associated with surgical site infection post-appendectomy. *KJMS.* 2022 Jan 05;14(3):173-179.
 12. 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). doi 10.7759/cureus.4243
 13. Ansari S, Hassan M, Barry HD, Bhatti TA, Hussain SZ, Jabeen S, Fareed S. Risk factors associated with surgical site infections: a retrospective report from a developing country. *Cureus.* 2019 Jun 2;11(6). doi 10.7759/cureus.4801
 14. Gomaa K, Abdelraheim AR, El Gelany S, Khalifa EM, Yousef AM, Hassan H. Incidence, risk factors and management of post cesarean section surgical site infection (SSI) in a tertiary hospital in Egypt: a five-year retrospective study. *BMC Pregnancy and Childbirth.* 2021 Dec; 21:1-9.
<https://doi.org/10.1186/s12884-021-04054-3>
 15. Liu M, Liu SW, Wang LJ, Bai YM, Zeng XY, Guo HB, Liu YN, Jiang YY, Dong WL, He GX, Zhou MG. Burden of diabetes, hyperglycaemia in China from 2016: findings from the 1990 to 2016, global burden of disease study. *Diabetes Metab.* 2019 Jun 1;45(3):286-93.
<https://doi.org/10.1016/j.diabet.2018.08.008>.