

EVALUATION OF DIFFERENT FACTORS THAT INFLUENCE SURGICAL SITE INFECTION IN TERTIARY CARE HOSPITALS, PESHAWAR

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ABSTRACT

Surgical site infection is a significant hazard for the patient which can cause the post-surgical procedure, the surgical site infection causes are old age, smoking, diabetes, poor wound care and the prolong hospital stay. A cross sectional study was conducted from the patients among 60 patients in the various hospitals in Peshawar. Our study founded that 33.3%(20 persons) patients developed surgical site infection due to old age of the patients, long hospital stay ,smoking, diabetes and less wound care. Surgical site infection effected both male and female. According to our study advance age patients were more near to surgical site infection with high frequency whose age were 46 years to 60 years 10 patients(50%) developed surgical site

infection. As found that hospital stay is also one of the cause of SSIs the patients who did stay, from the 31 days to 45 days are 9 patents (45%). From results smoking is another cause of SSIs that 8 (40%) were smokers. The other cause of surgical site infection was diabetes so when a patient have diabetes so the risk of surgical site infection is more as compare to the other causes of SSIs. According to finding 9 patients (45%) were diabetic patients who developed surgical site infection. We found that 7 patients (35%) who developed the surgical site infection because of lack or poor wound care. In the other side according to our study the main causes of surgical site infections are age, smoking, diabetes, improper wound care and the prolong hospital stay these are the causes of surgical site infection. The study highlighted that to arrange training for health care worker to short surgery duration. Similarly short hospital stay, sterile environment and the proper wound care decrease the rate of surgical site infection.

Keywords: Tertiary Care Hospital, Surgical Infection, Influence, Wound Care, Sterile.

INTRODUCTION

The infection can cause due to virus, bacteria, and fungi and sometimes it involved parasite. Symptoms are depending on the infection in which the infection is accrue after surgery. Surgical site infection is occur in that part of the body where the surgery had done. Surgical site infection may be affect deep and superficial tissues such in deep effect the muscle and superficial surgical site infection effects the skin and subcutaneous tissues.

Main Causes of surgical site infections includes Contamination during surgery, Poor wound care, Patient health condition such as diabetes, Age of patent, Smoking, weak immune system and patient obesity And the symptoms may include redness and swelling, pain, pus or discharge, and fever.

Pre-operative administer antimicrobial prophylaxis is important to prevent surgical site infection. Intra operative decrease minimize tissue trauma, maintain sterile technique and use a sterile environment during surgery. Post-operative the wound care is must and proper dressing changes, silver dressing is important to reduce surgical site infection risk.

When the patients don't care of wound in the result increase the mortality and morbidity ratio, prolong hospital stay is also the cause of surgical site infection, increase healthcare costs it is due to prolong hospital stay.

In patient the most common infection is nosocomial infection. It is due to the prolong hospital stay in hospital. It increase mortality, morbidity and hospital costs. In early 2003, 16 European countries recognized that nosocomial infection is related with the surgical site infection, so they also allowed the proper protocol to decrease the rate of SSI. (Academy and Kamenica 2010)

30 years ago the lad mark study of disease control and prevention centers (CDC) on the efficiency of nosocomial infection control were provided the national portrait at surveillance of the surgical site infection as a serious issue in the united states he found that the lowest surgical site infection rates had strongest surveillance and prevention programs.(Academy and Kamenica 2010)

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Surgical site infection can increase the hospital stay and increase the costs also. The factors affecting surgical site infection vary greatly from one country to another country. (Huda *et al.* 2026)

Healthcare associated infection as a public health care concern. Surgical site infection is the type of infection that occur post-operative. Surgical site infection may be sometime superficial infection that contain skin .And other surgical site infection is serious affect the underlying of skin, organs, or implanted material. According to WHO hospital acquired infection is the major infectious disease. (Jain *et al.* 2019).

Surgical site infections are the most concerning problem that can happen after surgery and these infections occur mostly at the surgery site where the surgery done, or from 30 days or 1 year if a medical device is implanted. Surgical site infection can affect the skin, or go deeper into muscle and sometimes severe then damage the organ. There are various reasons of surgical site infection that as patient own body bacteria, while some come from hospital environment after surgery or during surgery. Some other causes like diabetes, obesity, smoking and longer hospital stay. Surgical site infection also increase the hospital stay duration and also increase the health costs and some time it goes to serious complication. Globally surgical site infection due to 2% to 20% at hospital stay. The risk of these infections is depend on the proper surgery done in clean the environment and the patient must wound care after surgery. (Mohan *et al.* 2023)

Post-operative wound infection is a major complication in a surgical care affecting patient outcomes and the health care resources. The antibiotic resistance among the common pathogens has made treating these infection increasing challenging. The investigation found that microorganism that cause surgical site infection, aiming to identify some best strategies and inform surgical site infection and how it is manage. By analyzing current evidences seeks to advance understanding of surgical site infection and improve patient care.

The Center for Disease Control and Prevention (CDC) categorized that surgical site infection into three types as skin and underlying tissue, infection that involve deeper tissue layers and infection that involve the organs. Surgical site infections are the common problem after gastrointestinal surgery effecting 10% to 30%.Surgical site infection can lead from mild to severe, requiring longer hospital stay and some additional treatment. Understanding the risk and causes of surgical site infection to prevent a patient from infection and improving patient outcomes. (Giri *et al.* 2013)

Surgical site infection are significant concern in health care, impacting patient outcome and increasing health care cost and also hospital stay. According to Control for Disease and Prevention (CDC) define that surgical site infection as in infection that occur post of surgery in any part of the body where the surgery had done. These infection is divided into two main category one is superficial incisional surgical site infection and the other is deep incisional surgical site infection which contain organs of the body. (Allegranzi *et al.* 2016)

Surgical site infection is challenging for a health care sector in the resulting in increased patient suffering, patient financial burden on the health care system. The aim is to explore and prevent the surgical site infection before the surgery and focus on evidence base to prevention surgical site infection. The practice and health care worker should the proper protocol to save the patient from the surgical site infection,

the protocol is must to prevent the surgical site infection for a patient. (Allegranzi *et al.* 2016)

Surgical site infections are significant globally each year millions of people are affecting due to the surgical site infection. According to World Health Organization (WHO) surgical site infection is the most common health care associated infection in the low and middle income countries impacting every third patient which had done surgery. Even in the high income countries surgical site infection remain a leading cause of health care associated infections. The worldwide surgical site infections combined with increasing issue of antibiotic resistance highlight the need for standardized guideline to prevent these infections. To address this issue, (WHO) developed evidence base given recommendation for surgical site infections prevention. These guidelines aim to provide a deep approach to decrease the risk of surgical site infection by various measure during the surgery, before and after the surgery. They are intended surgical team to prevent infection and hospital administrator (Ansari *et al.* 2019).

Surgical site infection are significant in health care, representing the most common preventable hospital acquired infections. These infections occur when the pathogen such as virus, bacteria fungi enter to the human body through an incisional part where the surgery done .When the infection occur in the body so it can lead to increase morbidity, mortality, hospital stay and costs. Surgical site infection occur within 30 days or after 1 year for implanted organs. SSI classified into three types that as Superficial incisional infection is involving only the skin and subcutaneous tissue, deep incisional infection is involving the muscles and fascia and Organ space infection that is involving the internal body organs and cavities. The risk factors is like Diabetes, Obesity, Immunosuppression as well as involve surgical factors such as long hospital stay, implant use and poor wound care after surgery. The prevention is proper patient preparation strict sterile technique during surgery and post-operative wound care and antibiotic. Common causes when patient have own flora ,bacteria or some other unsterile equipments present in operating room mean that environment is sterilized or not sterilized surgery has done. The diagnosis is clinical presentation, microbiological test and histological testing. The treatment is depends on the severity of infection involving wound opening, debridement and antibiotics.

Surgical site infection pose a significant in developing countries like Pakistan, where a surveillance system is often lacking and don't present equipment. Effective wound care management and the prevention strategies is crucial to reducing the rate of the surgical site infections. Local data collection and surgical site surveillance are very essential for the policy and guideline. However there are scarcity of research on surgical site infection in Pakistani hospital. As a major tertiary care hospital Abbottabad challenge essential patient load and proper hygiene increasing the risk of surgical site infections. (Sattar *et al.* 2019)

METHODOLOGY

Study Design

This study used a cross sectional descriptive research and utilized a questionnaire to evaluate of different factors that influence surgical site infection in tertiary care hospital Peshawar.

Study Setting

The participants were figure out from the Burns and Plastic Surgery Center Hayatabad Peshawar, Institute of Kidney Disease and Irfan General Hospital. Our study comprises the evaluation of different factors that causes surgical site infection.

Sampling Technique

For this study convenience sampling technique was used. Data was collected from random patients who were easily available at a given time and willing to participate in our research.

Sampling size

Total number of surgical site infection patients was 60 N=60 by using of sample size formula, sample size was 60.

$$n = z^2 \cdot p \cdot q \div E^2$$

Inclusion Criteria

Patients who had done some type of surgery and Patients with surgical site infection will be included in this study

Exclusion Criteria

All other infected patients are excluded from the study who did not undergo any type of surgery

Data Collection Tool

The data was collected by self-administrated questionnaire. 60 questionnaire data was collected

from the male and female both who did the surgery, although they had students ,former, labour and teachers. Out of 60 the ratio of male and female is 40 and 20 respectively

Data Analysis

The data was analyzed through SPSS data system to evaluate different factors that influence

surgical site infection in tertiary care hospital Peshawar and to determine the percentage of

post-surgical infection. Data was analyzed by using frequency table and descriptive statistic

to find surgical site infection.

RESULTS

Demographic information of patients

In this research study data was collected from 60 participant out of which 40 (66.7%) males and 20 (33.3%) females. The majority of participant (58.3%) fall within (16 to 30 years). Followed by these in the (1 to 15 years) range (15%), 9 (15%) lie (31 to 45 years) 10(16.7%) participants fall in (40 to 60 years). Large number of participant in this research were students 40 (66.7%), data was collected from 10(16%) teachers, 9(15%) labor and only 1(1.7%) former. The data was collected from 18(30%) participant who had done surgery 41 to 50 days ago, 14 (18.3%), 1 to 7 days ago, 11

(18.3%) , 11 to 20 days ago other 12 (18.3%),21 to 30 days ago lower number of participant 6 (10%) had done surgery 31 to 40 days before our study. Among 60 participant 20 (33.3%) develop surgical site infection and 40 (66.7%) did not develop surgical site infection.

Table: Demographic information of the patients

S. No	Variables		Frequency	Percentage
1	Age	1 to 15 years	9	15%
		16 to 30 years	32	58.3%
		31 to 45 years	9	15.0%
		46 to 60	10	16.7%
2	Gender	Male	40	66.7%
		Female	20	33.3%
3	Occupation	Students	40	66.7%
		Former	1	1.7%
		Labor	9	15.0%
		Teachers	10	16.7%
4	Surgery duration	1 to 10 days	14	23.3%
		11 to 20 days	12	20%
		21 to 30 days	10	16.7%
		31 to 40 days	6	10.0%
		41 and above	18	30.0%
5	SSI	Yes	20	33.3%

Hospital and surgery related factors

According to the study among the 60 individuals where the general surgery was most prevalent procedure making up to 40% of cases while ENT surgery accounted for 25%.A significant majority ,90% received antibiotic before surgery, In term of

post-operative care most patients (63.3%) had a relatively short hospital stay of 1 to 15 days where 11 (18.3%) stay for 16 to 30 days in hospital. 9 (15.0%) stay for 31 to 45 days after surgery only 2 (3.3%) participants stay for 46 to 60 days in hospital after procedure.

Table: Hospital and surgery related factors

S. No	Variable		Frequency	Percentage
6	Type of surgery	Plastic surgery	8	13.3%
		Orthopedic surgery	7	11.7%
		General surgery	24	40.0%
		ENT surgery	15	25.0%
		Minor surgery	6	10.0%
7	Antibiotics taken	Yes	54	90.0%
		No	6	10.0%
8	Hospital stay	1 to 15 days	38	63.3%
		16 to 30 days	11	18.3%
		31 to 45 days	9	15.0%
		46 to 60 days	2	3.3%

Patients related factors

The study shows that a large number of patients (75%) have postoperative complications, while 25% did not. Smoking habits are known in 26.6% patients, whereas 73.3% non-smokers. Body Mass Index (BMI) is nearly half of the patients (46.7%) have a normal weight, 16.7% underweight, 23.3%, obese, and 13.3% overweight. In wound care, 61.7% of patients taking proper care of their wound, while 38.3% neglected it. Diabetes founded in 21.7% of cases, with the majority (78.3%) being non-diabetic. Proper hygiene practices followed by 73.3% of patients, 26.7% did not maintain hygiene. Malnutrition has seen in 40% of patients, while 60%

not malnourished. Only 13.3% of patients have abnormal cholesterol levels, with 86.7% having normal levels.

Table: Patient related factors

S.No	variables		frequency	percentage
9	Post-operative complications	Yes	45	75.0%
		No	15	25.0%
10	Smoke	Yes	16	26.6
		No	44	73.3%
11	BMI	Under weight	10	16.7%
		Normal	28	46.7%
		Obese	14	23.3%
		Over wight	8	13.3%
12	Wound care	Yes	27	61.7%
		No	23	38.3%
13	Diabetes	Yes	13	21.7%
		No	47	78.3%
14	Hygiene	Yes	44	73.3%
		No	16	26.7%
15	Mall nourished	Yes	24	40.0%
		No	36	60.0%
16	Cholesterol level	Yes	8	13.3%
		No	52	86.7%

DISCUSSION

Based on our finding there are 60 patients, in these 60 patients only 20 patients are effected from the surgical site infection the infection rate is 33.3% because of various problems such as age of the patients, hospital stay, smoking, diabetes and less wound care. Surgical site infection involve both male and female. A research was conducted in Liaquat College of Medicine and Dentistry by sundas fareed the surgical site infection rate was similar to our study that was 33% SSI. Another study was conducted in Peshawar by Imran Ullah the SSI rate was 27% and it is nearer to our findings. Another study was conducted in the Khyber Teaching Hospital Peshawar

by Zeeshan Sattar with findings similar to our results that is 33.68% SSIs rate. According to our study advance age patients were more surgical site infection with high frequency from the age of 46 years to 60 years 10 patients (50%) have developed surgical site infection. As we found that hospital stay is also one of the cause of SSIs in our finding patients who stay from the 31 days to 45 days are 9 patients (45%) did develop infection. From our results smoking is another cause of SSIs as 8 (40%) were smokers who develop SSIs as compare with other research was 37%. The another cause of surgical site infection is diabetes so when a patient have diabetes so the risk of surgical site infection is more as compare to the other causes of infections. So according our finding 9 patients (45%) who have diabetes and developed surgical site infection. We found that 7 patients (35%) who have developed the surgical site infection because of lack of wound care. So all finding of our research shows that we quit smoking so it also decrease the rate of surgical site infection and the other is to take a proper care of wound it decreases the rate of surgical site infection. A study was conducted in Karachi in Liaquat College of Medicine and Dentistry they found that age and poor wound care is the cause of SSI. Similarly another study was conducted in Peshawar and he also found that age, smoking and diabetes is the cause of surgical site infection and it's comparative to our study. The another research which was conducted in Khyber Teaching Hospital Peshawar he found that diabetes, old age and obese patient easily getting surgical site infection.

CONCLUSIONS

Surgical site infection is one of the post-operative infection which cause due to various factors such as prolong hospital stay, diabetes, smoking, age of the patient and not proper care of wound or hygiene. According to results 20 patients (33.3%) out of 60 patients developed surgical site infection. The main causes of surgical site infection is old age according as findings. Similarly diabetes and improper wound care also increase chance of getting infection after surgery. According to this study smokers and patients who stay for long period of time in hospital can get surgical site infection easily. Obesity is also consider one of the cause of SSIs.

RECOMMENDATIONS

- Preoperative skin preparation with antiseptic solutions.
- Strict hand hygiene protocols for healthcare staff.
- Proper sterilization of surgical equipment.
- Antibiotic prophylaxis before surgery (as recommended).
- Post-operative surveillance and monitoring for signs of infection.

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