

Prevalence of Surgical Site Infection in General Surgery in A Tertiary Care Centre in Pakistan

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ABSTRACT

Objective: To identify the prevalence and root causes of infection in surgical sites in tertiary cares hospitals in Peshawar and Multan, Pakistan.

Study Design: Retrospective study

Place and Duration: Lady Reading Hospital Peshawar and Bakhtawar Amin Medical & dental college Multan. The survey period for these special education institutions is nine months from 1st April 2020 to 31st December 2020.

Methodology: The study included 1471 patients with elective surgery and 233 patients with emergency surgery. Optional surgical procedures include hysterectomy, plastic hernia, gastrectomy, mastectomy, intestinal anastomosis, hemorrhoidal resection, fistulectomy, parotid gland resection, and thyroidectomy. Common operations in emergencies were exploratory laparotomy and resection anastomosis of bowel.

Results: The current study covered 1471 selective and 233 emergency surgeries from 1st April 2020 to 31st December 2020, with a SSI rate of 12.5% in elective surgeries (208) and 17.7%(40) in emergency surgeries in Lady Reading Hospital Peshawar and Bakhtawar Amin Medical & dental college Multan, General Surgery units. Of the three types, superficial incision SSI was the most common (115 cases) following deep incision SSI (68 cases), and finally organ / cavity SSI (59 cases).

Conclusion: This study provides evidence about risk factors for developing SSI in a large general surgery population in Pakistan. In actual, patient age, contaminated wounds, long surgery times, lack of prophylactic antibiotics, drainage use, and long-term hospitalization have been observed to be associated with an increased incidence of SSI.

Keywords: General surgery, Nosocomial infection, SSI, Surgical site infection, Surgery

INTRODUCTION

Microbial contamination of a wound of surgery within duration of 30 days after surgery or within 1 year after surgery if an implant is inserted into the patient's body is defined as Surgical site infection (SSI)(1). Surgical site infections can extend from the skin and superficial subcutaneous incisions to deep subcutaneous tissue and organ spaces(1). This infection increases morbidity, hospitalization time, medical expenses, and mortality (2-4).

More than 30% of HIAs are surgical site infections (SSIs), defined as surgical-related infections that occur in or near the surgical incision within 30 days after surgery or within 90 days after prosthesis implantation (5). Surgical site infection (SSI) is one of the most common postoperative complications, with reports ranging from 2.1% to 7%(6). 0.7% to 12% of patients developed SSI after adult spinal surgery and costs of mortality, morbidity and postoperative medical costs may increase(7, 8). 12 to 16% of all pathological infections were reported thus making SSI the third most reported nosocomial infection according to the National Nosocomial Infection Control System (NNIS)(9).

SSI has a number of effects on patients and the health care system, including patient discomfort, long hospitalizations and hours off work. In addition, SSI increased the cost of treatment, and the cost of surgery

rose sharply from 300% to 400% (8). SSI extended the hospitalization and raised the antibiotic prescription and lab costs. Almost 60% of the total patients reported to ICU, with most of the patients being hospitalized and mortality rate two times higher comparing to that of uninfected patients. It is worth noting that about 40 to 60% of these infections can be prevented(8, 10).

Therefore, the purpose of our study is to identify the prevalence and root causes of infection in surgical sites in tertiary cares hospitals in Peshawar, Pakistan. This study can provide a detailed understanding of infections at surgical sites in various tissues and support evidence-based interventions in healthcare settings.

METHODOLOGY

After receiving ethical approval from IRB of the Hospitals, a retrospective study of patients admitted to general surgery unit was conducted at the Lady Reading Hospital Peshawar and Bakhtawar Amin Medical & dental college Multan. The survey period for these special educations institutions is one year from 1st April 2020 to 31st December 2020. The study included 1471 patients with elective surgery and 233 patients with emergency surgery. Optional surgical procedures include hysterectomy, plastic hernia, gastrectomy, mastectomy, intestinal anastomosis, hemorrhoidal resection, fistulectomy, parotid gland

resection, and thyroidectomy. Common operations in emergencies were exploratory laparotomy and resection anastomosis of bowel. A retrospective chart review from hospital database was conducted during the study period. This retrospective chart reviews existing data recorded for reasons other than research. This is called a "chart test" because the source of the data is the patient's medical records. The details described include the type of surgery by type of wound, the type and duration of surgery, the antibiotic precautions used, the drainage tube used, pre-hospital and complete hospitalization, and other types of surgery. Each patient's data from admission to discharge was assessed and evaluated up to 30 days.

Wound infections are diagnosed if any of the following conditions are met: Serous or non-purulent discharge from wound with signs of inflammation, swelling, redness, fever, elevated local temperature, fever above 38 ° C, susceptibility, local tumors (/ purulent) collection, surgeon intentionally opened the wound. Suture abscess was not included in the study. The identified SSIs fall into three categories: superficial incision SSI, deep incision SSI and organ/space SSI.

SSI is diagnosed within 30 days after surgery for SSI surface incision, within 30 days after surgery for without body implants, and within 1 year for SSI with Deep incision: SSI superficial incision include subcutaneous tissue and skin tissues, deep incision of SSI deep involves deep soft tissue like fascia, muscle, and other anatomical parts like organs and cavities, other than incision whether opened or activated during surgery and at least one or the following details:

- From the superficial/deep incision the purulent drainage in deep and superficial incision SSI and also from drain
- Organisms (surfaces and organs / SSI cavities) isolated from body fluids or tissue cultures aseptically obtained from the incision.
- Signs and symptoms like Pain, temperature, oedema, rashes, tenderness detects infection. If the incision is not culturally negative, the surgeon intentionally makes a shallow incision (shallow / deep SSI incision).
- Detect signs of an abscess or other infection through direct examination, reoperation, histopathology, or x-ray examination (SSI and SSI sections within the organ / body cavity).

Precautionary measurements for the surgical procedures. Hair removal from incision site, proper control of blood sugar levels (diabetes), preoperative disinfection baths, and skin preparation with disinfectants are measurements for preoperative patient preparation. The surgical team followed universal precautions. Prophylactic antibiotics are prescription drugs for all patients and are usually given intravenously. Follow standard intraoperative stylization and disinfection guidelines. Instant discharge of patient after surgery to prevent surgical site infection.

RESULT

The current study covered 1471 selective and 233 emergency surgeries from 1st April 2020 to 31st December 2020, with a SSI rate of 12.5% in elective surgeries (208) and 17.7%(40) in emergency surgeries in the Lady

Reading Hospital Peshawar and Bakhtawar Amin Medical & dental college Multan, General Surgery units. Of the three types, superficial incision SSI was the most common (115 cases) following deep incision SSI (68 cases), and finally organ / cavity SSI (59 cases). Table 1 shows the SSI rates associated with the most common surgeries.

Surgical procedure	Rate of SSI
Small bowel	58 (6%)
Colon	103 (6.5%)
Gastric	24 (2.5%)
Hepato-pancreatico-biliary	20 (4%)
Exploratory laparotomy	172 (16%)
Appendectomy	78 (8%)
Hernia repair	16 (1.5%)
Urological	24 (2.5%)

Exploratory laparotomy (16%) is the most common surgery for SSI, followed by colon surgery (13%) and appendectomy (8%). At least hernia repair (1.5%) and hepatic pancreatobiliary surgery (2%) were the least associated with SSI. The most common site of infection is the incision site (4.1%), and the most common microorganisms are group A beta hemolytic Streptococcus pyogenes and staphylococci.

In a survey that included 1,471 elective and 233 emergency operations, there was a significant difference of SSI incidence between emergency and selective operations. Table 2 shows baseline data for patients who underwent selective and emergency surgery in this study. Patients in the selective surgery group were from 11 to 72 years with mean age of 56 years ± 8 years. Among them, 655 women and 816 men. The emergency surgery group included 125 men and 108 women with an average age of 44 years (16-75 years). The average BMI for patients undergoing elective surgery is 11, and the average body mass index for emergency surgery patients is 22. The number of known diabetics in the elected age group was 625 (16%), and the emergency age group was 52 (11%). Of the patients undergoing selective surgery, 35% of patients suffer from ASA I status, followed by 9% of ASA II patients and 7% of ASA III patients. Patients requiring emergency surgery are ASA III (18%), ASA II (7%), ASA I (2%), and ASA IV (2%). 91% (1394) of elective surgical interventions received prophylactic antibiotic treatment and 123 (34%) of emergency surgical interventions also received same intervention. Table 2 shows data comparing the parameters related to the above elective and emergency operations.

Patient parameters	Elective surgeries	Emergency surgeries
Age	56 (±8 years)	44 years (±7 years)
Male:female	0.7	1.5
Body mass Index (kg/m ²)	22	24
Diabetics	16%	11%
ASA status	I	III
Prophylactic antibiotics given	91%	34%
Rate of SSI	12.5% (208/1471)	17.7% (40/233)

This study evaluated various risk factors that may be associated with SSI. Table 3 compares the various risk factors for SSI and shows that there is a statistically significant difference in the number of SSI cases with prophylactic antibiotics compared to without antibiotics. In addition, drain use was found to be statistically more significant with SSI than without drain. We investigated the impact of SSI on the healthcare system. The overall hospital mortality rate is 1.2% and cases of organ / SSI cells have been reported (2 of 59). After surgery, 1.3% of long-term / area SSI patients (3 of 59) and 1.8% of deep SSI patients (3 of 68) should be re-examined. The average duration of antibiotic use after superficial SSI surgery was 3-5 days, deep SSI incisions were 5-7 days, and patients with long-term organ/ cavity SSI average 7-10 days. The mean length of stay in the intensive care unit for patients with deep incisions and long-term / interstitial SSI is 2 days (range 0-12 days). Patients with superficial SSI are those who have been transferred directly to each ward for rehabilitation. The average length of stay for superficial SSI patients is 2 days (0-8 days), for deep SSI patients 5 days (2-11 days), and for long-term / true cases 7 days (4-18 days).

Variable	No. SSI/total	P-value
Gender		
Males	163/1071	0.1031
Females	85/633	
Age		
<30 years	63/412	0.1010
31-60 years	101/801	
> 60 years	84/490	
Type of wound		
Clean	94/897	0.0652
Clean contaminated	145/633	
Contaminated	51/174	
Duration of surgery		
0-1 hour	80/913	0.1732
1-2 hours	87/452	
>2 hours	81/339	
Antibiotic prophylaxis given		
Yes	175/1103	0.0000
No	73/601	
Drain used		
Yes	65/513	0.0000
No	183/1191	
Total hospital stays		
<2 days	42/391	0.-3.152
2-5 days	132/986	
> 5 days	74/327	

DISCUSSION

Surgical site infections are the most common complication among surgical patients. Surgical site infections (SSIs) are the third most common nosocomial infections, accounting for about a quarter of all nosocomial infections(11). This study shows that elective surgery has an SSI rate of 12.5% and emergency surgery has a SSI rate of 17.7%. Of the three types, superficial incision SSI was the most common (115 cases), deep incision SSI (68 cases), and finally organ / cavity SSI (59 cases). Exploratory laparotomy (16%) is the most commonly associated surgery with SSI, and the most common site of infection is the incision site (4.1%).

The study reported that the prevalence of SSI in emergency surgery was higher (17.7%) compared to elective surgery (12.5%). This is consistent with previously reported studies in which emergency surgery showed higher SSI rates(12-15). Emergency surgery increases the likelihood that the wound type is contaminated or cleanly contaminated. Antibiotic prevention is less common and surgery is longer than selective surgery.

The study found no such difference between men and women, but showed that older patients had a higher prevalence of SSI. Age is associated with a variety of predispositions such as diabetes and anemia, and may be associated with an age-related tendency for SSI. The prevalence of SSI increases when the activity time exceeds 2 hours (19.4%). Long-term surgery can increase air exposure at the surgical site, long-term trauma, long-term pressure under anesthesia, and sometimes even bleeding(16).

The most common pathogens associated with SSI in this study were Streptococcus pyogenes beta-hemolysis and Staphylococcus aureus. Staphylococcus aureus (SA) has always been the most important pathogen for SSI around the world. SA easily soothes all nostrils and human skin. About 20% of the average person consistently settles with SA in the nostrils, and sometimes 30-50% settle in SA. Patients with possible comorbidities such as diabetes, chronic kidney disease, HIV infection, and chronic dermatitis were found to have an increased proportion of carriers. The relative risk to SSI between SA providers is 2-9 times the risk of non-carriers(17). In addition, molecular epidemiology showed that the SA strain that caused the postoperative infection was identical to the strain isolated from the nasal cavity in about 85% of preoperative patients(18).

Without antibiotic prevention, the incidence of SSI is high. Antibiotics are used in patients undergoing clean and contaminated surgery. Prophylactic antibiotics is recommended within one hour of the surgical incision and within 2 hours if vancomycin or floroquinolon is administered to the patient. Antibiotics should be used prophylactically. To measure. Discontinue medication within 24 hours of completion. Cephalosporin is the recommended prophylactic antibiotic for most patients undergoing clean infection surgery (heart, gastrointestinal, orthopedics, blood vessels, gynecology, etc.).

In this study, drainage sites are more often associated with SSI. Drainage tubes are usually placed at the surgical site to prevent the formation of an abscess or hematoma. It is caused by an external or intrauterine infection and can lead to a surgical site infection following the migration of internal (retrograde) bacteria along the surface of the tube(19). As the opposite of passive (open) discharge. Obstructive secretion (CSD) is thought to create a pressure gradient between the wound and the external environment, releasing it into a closed reservoir, reducing the risk of exacerbating microbial infection. In most areas of surgery, studies assessing CSD-related SSI risk after routine surgery have yielded conflicting results. Some studies have shown an increased risk of SSI associated with drainage tube placement, but this is generally related to open drainage rather than the use of CSD. No studies have linked drainage duct location to a reduced incidence of SSI

(including organ / body cavity SSI). Drainage-related complications have been reported, including bacterial fistulas of the intestine, postoperative pain, foreign body reactions, and increased need for blood transfusions.

SSI is an indicator of all medical systems in the hospital. In this study, we investigated the impact of three types of ID cards on the healthcare system. It is well known that long-term / room SSI patients have the highest hospitalization rates and intensive care units. Antibiotics were used the longest after surgery (7-10 days) and were associated with more frequent repeated surgery (2.7%). In fact, two patients (1.8%) died of SSI in organs / body cavities. In the first eight weeks after discharge, the cost of treating a patient with an infection at the surgical site is almost three times that of an uninfected patient. In the United States, these infections can reduce a patient's quality of life, resulting in an additional 3.7 million days of hospitalization and an additional cost of over \$ 1.6 billion annually. Surgical site infections are having 5 times more chances to revisit the hospital. In hospitals, stays in the intensive care unit are 60% longer and are twice as likely to die as those who have had non-infectious surgery(20).

CONCLUSION

This study provides evidence about risk factors for developing SSI in a large general surgery population in Pakistan. In actual, patient age, contaminated wounds, long surgery times, lack of prophylactic antibiotics, drainage use, and long-term hospitalization have been observed to be associated with an increased incidence of SSI. Through this study, subsequent steps will be identified as main concern in the near future, such as defining antibiotic prevention policies, reducing stay time, and reducing surgery time with proper surgical training by the right staff. We also recommend that you use the drain carefully. In an emergency, great care should be taken to reduce the overall incidence of the SSI.

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