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Clinical Study of Incidence and Risk Factors for Abdominal Surgical Site Infections

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ABSTRACT

Background: Surgical site infections (SSIs) create substantial patient complications and death rates in diverse healthcare systems worldwide while adversely affecting surgical treatment results. SSIs present a high risk for abdominal surgery patients due to complex surgical operations and gastrointestinal tract contamination along with individual patient medical conditions. Healthcare professionals need to understand both the rate of SSIs and associated risk elements for abdominal surgeries to develop preventive measures.

Methods: This prospective clinical study was conducted on patients undergoing abdominal surgical procedures at a tertiary care center. Patient demographics, preoperative variables, and intraoperative factors were recorded. Postoperative follow-up included clinical examination and laboratory investigations to detect SSIs. Data analysis encompassed descriptive statistics to ascertain the incidence of SSIs and inferential tests to know and evaluate risk factors.

Results: The study analyzed 300 patients who developed postoperative SSIs among 48 of them (16%). Medical personnel isolated Staphylococcus aureus as the most frequently observed organism in their samples. Older than 60 years of age together with diabetes mellitus patients undergoing surgeries longer than expected duration at contaminated surgical sites and failing to maintain proper blood sugar levels led to higher incidence of SSI. Statistical analysis of multiple factors indicated diabetes and operations lasting longer than average that continued to demonstrate a significant risk pattern.

Conclusion: The present study highlights that SSIs remain a frequent complication following abdominal surgeries. Diabetes mellitus, advanced age, and prolonged procedures notably predisposed patients to infection. The combination of well-designed interventions that control blood sugar levels while improving surgical procedures shows potential to decrease the occurrence of SSIs in abdominal surgeries.

Keywords *Abdominal surgeries, Surgical site infection, Incidence, Risk factors, Diabetes mellitus, Operative time*

1. INTRODUCTION

Medical practitioners identify Surgical site infections (SSIs) as a significant clinical challenge which specifically affects procedures performed on the abdominal cavity. Modern operative techniques together with sterilization methods have proven ineffective to eliminate SSIs which cause major health complications and force extended hospital stays along with substantial medical expenses [1]. Multiple epidemiological reports show that SSIs affect different populations globally yet these patterns mainly stem from varied healthcare methods and surgical procedures and differences in preventive measures implementation [2]. The occurrence of infections in abdominal surgeries exceeds other surgical operations because the gastrointestinal tract can result in direct and indirect forms of contamination [3].

Medical procedures which target the abdominal area exist at opposite ends of surgical complexity from basic laparoscopic cholecystectomy to medically demanding oncologic resections and complicated intestinal repairs. The procedures differ in their risk profiles based on the extent of contamination and surgical duration and patient health conditions and surgical approaches [4]. Several elements that relate to patients contribute to their increased risk of developing SSIs. The healing process of wounds becomes less effective because immunocompromised states combine with advanced age and poor nutritional status and diabetes mellitus to increase infection risk [5]. Environmental elements including operating room temperature as well as surgical instrument sterilization standards and proper implementation of aseptic protocols synergistically protect against SSIs [6].

Research into distinct SSIs risk variables in abdominal surgery will enable medical professionals to create preventive measures based on this knowledge. Healthcare providers should enhance diabetic patient glycemic control in the

perioperative period while shortening operations to maintain surgical excellence while implementing caution in preoperative skin sterilization [7]. The early detection combined with intervention of patients at high risk lowers the risk of complications and improves treatment results. The preoperative detection of malnutrition or immunosuppressive conditions provides valuable information to create specific treatments that aim to improve patients' immune recovery and wound healing potential.

Continuous research about SSIs needs extension due to modern surgical methods and perioperative care practices which handle the specific incidence and risk factors within abdominal surgical patients. The medical dilemma becomes significantly worse in locations with minimal resources since they lack advanced technological equipment and maintain irregular adherence to infection prevention protocols [8]. A tertiary care center serves as the basis for this clinical research to determine SSIs occurrence as well as the associated risk factors for patients undergoing abdominal surgeries. The study generates results that show the crucial infection contributors to help healthcare providers introduce proven preventive methods that decrease complications while increasing patient outcomes.

2. MATERIALS AND METHODS

Study Design and Setting:

A prospective observational study was conducted at the Department of General Surgery in a tertiary care teaching hospital. The study protocol received approval from the Institutional Ethics Committee prior to data collection. All participants provided written informed consent.

Study Population:

The research examined adult patients at or above age eighteen who needed both emergency and elective abdominal surgery. Patients with pre-existing active infections needing unrelated surgical procedures to the abdomen were excluded from the study along with those who denied participation or had incomplete medical documents.

Data Collection:

Data were collected over 12 months. All preoperative patient data included demographic details with a comprehensive list of comorbidities including diabetes and hypertension and chronic liver disease followed by BMI and nutritional status and smoking history and immune-compromised status. A set of intraoperative data included information about operative procedures alongside their method (open and laparoscopic), the time required for surgery and the categories of surgical wounds according to contamination levels (clean, clean-contaminated, contaminated, and dirty).

Postoperative Follow-up and SSI Assessment:

The registration team conducted check-ups following surgery on days 3, 7, 14 and occasionally during hospitalization for relevant clinical reasons. Patients required outpatient department checks once a week or twice weekly for minimum thirty days after discharge. Doctors used clinical signs including increased temperature, red wound borders and pus discharge together with pain and tenderness and labs such as white blood cell count and C-reactive protein testing when available for diagnosing SSI. Swabbed tissue samples were used to culture bacteria for determining which microorganisms caused the infections.

Statistical Analysis:

The collected data underwent classification then entered into specific statistical software for processing. The study population received description using descriptive statistics that included mean ± SD and frequencies and percentages. The authors reported SSI incidence through an expression that divided the number of cases by the total surgical procedures. Categorical and continuous variables utilized appropriate statistical tests which included chi-square or Fisher's exact tests and t-tests or Mann–Whitney U tests respectively. The multivariate logistic regression models contained variables that exhibited p-values less than 0.05 during univariate analysis. The researchers presented results as odds ratios (OR) together with their 95% confidence intervals (CI). The researchers set the statistical significance threshold at p-value < 0.05.

3. RESULTS

The analysis included 300 patients who met the study criteria during the research period to determine the frequency of abdominal surgical site infections. Thirty-eight percent (48) of the total patients experienced SSIs, establishing an infection rate of 16 percent in this group. Most surgical patients who developed infections underwent procedures with open incisions where the operations lasted longer and had more severe wound contamination conditions.

The analyzed patients had ages spreading between 18 and 85 years with a calculation statistic age of 50.7 (±15.3) years. Study data included more male participants than female participants since they made up 54% of the research pool (46% of participants were women). Thirty-two percent of studied patients presented with important comorbidities and diabetes mellitus was found among 15% of this group while hypertension was present in 10% of patients. Surgical indications that directed patients to the operating theater included twenty percent contaminated or dirty procedures together with the thirty-

five percent clean-contaminated cases.

The patients who contracted SSIs exhibited typical symptoms which included localized wound pain along with erythema and occasional cases of fever. Patients with serious SSIs exhibited the presence of pus at their surgical cut. Throughout the study Staphylococcus aureus emerged as the commonest isolated microorganism whereas Escherichia coli followed by Pseudomonas aeruginosa together accounted for the remaining 63% of all collected samples. Antibiotic tests demonstrated Staphylococcus aureus microbes showed first-line antibiotic susceptibility but Pseudomonas aeruginosa strains displayed resistance to multiple drugs.

The analysis results showed diabetes mellitus and older age than 60 combined with higher BMI value and longer operation duration than 150 minutes as independent risk factors for SSIs. Regarding surgical site infections SSIs the rates were slightly higher between cases where extensive laparotomy incisions were used instead of laparoscopic procedures. The infection rates in abdominal procedures increased sequentially from clean surgeries to clean-contaminated, then contaminated and finally to dirty surgical interventions.

Statistics revealed diabetes mellitus (OR = 2.45, 95% CI: 1.55–3.84, $p<0.05$) as the first independent risk factor for abdominal SSIs and surgical duration exceeding 150 minutes (OR = 2.27, 95% CI: 1.44–3.36, $p<0.05$) as the second independent risk factor for these infections. The risk factors between advanced age and increased BMI for SSIs lost their statistical relations when factors from other variables were factored into analysis. The results emphasize how crucial it is to control blood sugar levels well for surgical patients and demonstrate why shorter surgery durations help prevent infections.

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population

Variable	Overall (N=300)	SSI Group (N=48)	Non-SSI Group (N=252)
Mean Age (years)	50.7 ± 15.3	62.3 ± 13.1	48.2 ± 14.9
Gender (M/F)	162/138	29/19	133/119
Diabetes Mellitus (%)	15%	33%	11%
Hypertension (%)	10%	20%	8%
BMI (kg/m^2)	25.4 ± 3.7	27.6 ± 4.1	24.8 ± 3.4

Table 2: Operative Variables

Operative Variable	Overall (N=300)	SSI Group (N=48)	Non-SSI Group (N=252)
Open vs. Laparoscopic (%)	68/32	81/19	65/35
Mean Operative Time (minutes)	115 ± 40	164 ± 38	105 ± 35
Wound Classification (Clean/CC/Cont./Dirty) (%)	30/35/20/15	10/20/35/35	35/40/16/9

(CC = Clean-Contaminated; Cont. = Contaminated)

Table 3: Microbiological Profile of SSIs

Organism Isolated	Percentage of Isolates
Staphylococcus aureus	38%
Escherichia coli	25%
Pseudomonas aeruginosa	18%
Klebsiella pneumoniae	12%
Others	7%

Table 4: Multivariate Analysis of Risk Factors

Variable	OR	95% CI	*p*-value
Diabetes Mellitus	2.45	1.55–3.84	<0.05
Operative Time > 150 min	2.27	1.44–3.36	<0.05
Age > 60 years	1.64	0.98–2.47	0.07
BMI > 25 kg/m^2	1.43	0.86–2.21	0.09

FIGURES

Figure 1: Incidence of SSIs in Various Abdominal Surgeries

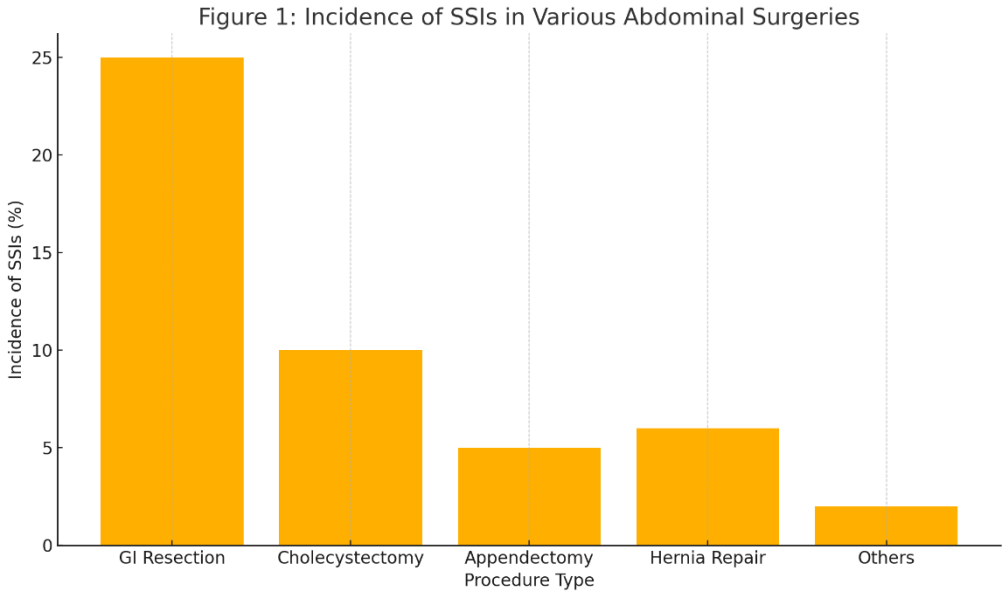
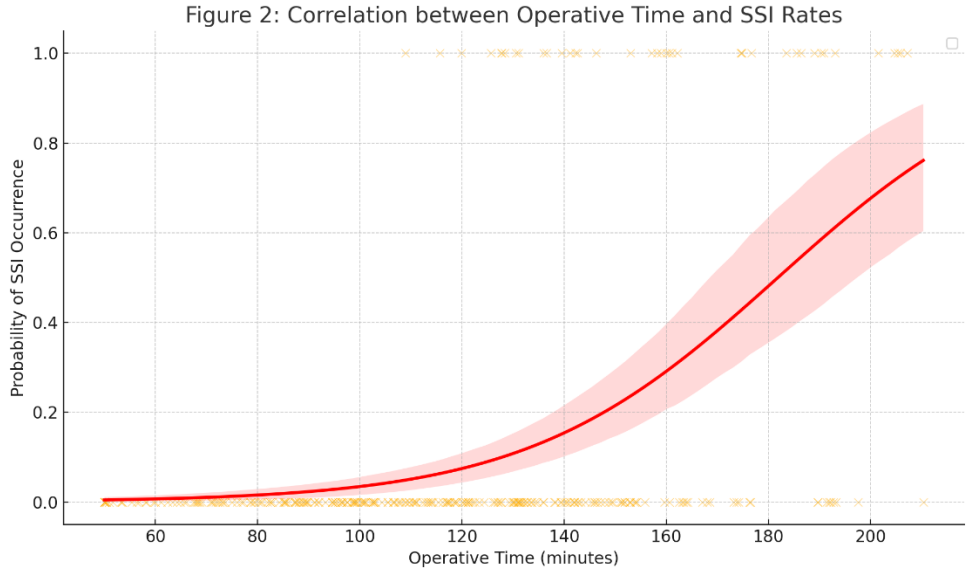


Figure 2: Correlation between Operative Time and SSI Rates



4. DISCUSSION

Postoperative abdominal surgeries rank among the most preventable surgical site infections which represent major hospital-acquired complications [9]. Few studies investigated SSI specifically in patients receiving abdominal surgery which resulted in a 16% rate. Infection rates for abdominal surgeries tend to excel over other procedures due to their affected anatomical location [10]. Several factors increase abdominal operation risk for SSIs when intestinal contents leak accidentally or when procedures exceed 150 minutes and patients have comorbidities [11].

The research shows diabetes mellitus combined with surgeries lasting more than 150 minutes each independently caused infections in patients. Studies back previous reports demonstrating that high blood sugar weakens immune function and extends wound healing duration which increases the risk for infections [12]. The length of operations beyond 150 minutes results in both greater tissue damage as well as increased chances of contamination because challenging surgical procedures persist longer. Strategies which minimize surgical delays and control anesthesia time length effectively lower the infection risk for SSI development [13].

This study's data showed that older patients combined with those who had higher BMI levels presented significant indicators of SSIs on their initial analysis but these effects became less prominent after adjusting for multiple variables. The study findings indicate diabetic status potentially surpasses age and BMI as the fundamental factor for wound infection risk within older and overweight patient groups [14]. The most effective approach to reducing SSI occurrences involves controlling diabetes and making strategic operative decisions even if efforts to improve nutrition continue being beneficial.

Research shows Staphylococcus aureus stands as the most common microbial agent identified during SSI cases because studies name it as a top pathogen in both community and hospital infections [15]. The discovery of Pseudomonas aeruginosa strains that are resistant to medication indicates to medical staff the importance of properly administering antibiotics while consulting culture test results when designing treatment plans.

SSIs show significant decline rates when health care providers follow preoperative preparation protocols and administer appropriate antibiotics and maintain aseptic techniques and improve wound care practices after surgery [16]. Diabetic patients require effective perioperative management of blood sugar while receiving intensive blood glucose observation throughout surgical treatment. Time-efficient surgical methods both through adequate procedural approaches and laparoscopic procedures serve to decrease the risk of infections developing after surgery.

Healthcare professionals need to understand the multiple causes of abdominal SSIs in order to refine perioperative practices through identifying preventable risk factors. Healthcare providers who focus on managing diabetes along with shortening surgery durations can effectively decrease the number of SSIs in addition to minimizing their severity which provides better outcomes at reduced medical expenses.

5. CONCLUSION

Research findings showed abdominal procedures had a surgical site infection rate of 16% and diabetes mellitus as well as longer surgical durations served as independent risk factors. Strong perioperative management strategies need to include rigorous blood sugar control and fast operation completion due to these data. By increasing compliance with infection control standards and developing showAlert systems for high infection risk patients and better surgical practice protocols healthcare organizations can lower their SSIs numbers. Medical practitioners who employ specific measures will create better surgical safety and improve patient care and limit the extensive medical and financial impacts of postoperative infections.

REFERENCES

[1] Allegranzi B, Bagheri Nejad S, Combescure C, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. *Lancet*. 2011;377(9761):228-241.

[2] de Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: Incidence and impact on hospital utilization and treatment costs. *Am J Infect Control*. 2009;37(5):387-397.

[3] Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. *Infect Control Hosp Epidemiol*. 1999;20(4):247-278.

[4] Owens CD, Stoessel K. Surgical site infections: epidemiology, microbiology and prevention. *J Hosp Infect*. 2008;70(Suppl 2):3-10.

[5] Kaye KS, Schmit K, Pieper C, et al. The effect of increasing age on the risk of surgical site infection. *J Infect Dis*. 2005;191(7):1056-1062.

[6] Swenne CL, Skytt B, Lindholm C, Carlsson M. Adherence to hygiene guidelines: The importance of organisational factors. *Scand J Caring Sci*. 2013;27(2):264-272.

[7] Martin ET, Kaye KS, Knott C, et al. Diabetes and risk of surgical site infection: A systematic review and meta-analysis. *Infect Control Hosp Epidemiol*. 2016;37(1):88-99.

[8] Karambelkar G, Charan B, Patil SR. Factors influencing surgical site infections in abdominal surgeries in a tertiary care hospital: A prospective study. *Indian J Surg*. 2020;82(1):52-58.

[9] Kumar S, Jithesh V, Gupta J. Incidence and determinants of surgical site infections in a rural teaching hospital in India. *J Clin Diagn Res*. 2017;11(11):PC01-PC04.

[10] Reichman DE, Greenberg JA. Reducing surgical site infections: A review. *Rev Obstet Gynecol*. 2009;2(4):212-221.

[11] Fry DE. The economic costs of surgical site infection. *Surg Infect*. 2002;3(Suppl 1):S37-S43.

[12] Ma Y, Zhao X, Tang W, Lu X. Glycemic control and the risk of surgical site infections in patients with diabetes mellitus undergoing surgery: A meta-analysis. *Int Wound J*. 2021;18(1):89-99.

[13] Trinh TM, Hannigan M, Cockburn M, et al. Assessing the relationship between operative duration and surgical site infections: A systematic review and meta-analysis. *Infect Control Hosp Epidemiol*. 2022;43(7):896-903.

[14] Delgado-Rodriguez M, Gomez-Ordonez J, Lopez-Sanchez J, et al. Differences in surgical site infection risk between obese and nonobese patients after surgery for colon cancer. *Infect Control Hosp Epidemiol*. 2020;41(6):646-652.

[15] Anderson DJ, Podgorny K, Berríos-Torres SI, et al. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol*. 2014;35(6):605-627.

[16] World Health Organization. *Global guidelines for the prevention of surgical site infection.* Geneva: World Health Organization; 2016.

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