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Original Research Article

A CROSS-SECTIONAL STUDY OF SURGICAL SITE INFECTION RATES FOLLOWING ELECTIVE VERSUS EMERGENCY ABDOMINAL SURGERIES AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Surgical site infection (SSI) is one of the most common postoperative complications and contributes significantly to increased morbidity, prolonged hospital stay, and healthcare costs. Abdominal surgeries, particularly emergency procedures, are associated with higher risk of SSI due to contamination, inadequate preoperative preparation, and associated comorbidities. The aim is to compare the rates of surgical site infections following elective versus emergency abdominal surgeries at a tertiary care hospital. The objective is to determine the incidence of SSI in elective abdominal surgeries. To assess the incidence of SSI in emergency abdominal surgeries. To compare associated risk factors and postoperative outcomes between elective and emergency abdominal surgeries with respect to SSI.

Materials and Methods: This hospital-based cross-sectional observational study was conducted in the Department of General Surgery at a tertiary care hospital over a period of 18 months. A total of 200 patients undergoing abdominal surgeries were included, comprising 103 elective and 97 emergency surgeries. Detailed demographic, clinical, operative, and postoperative data were collected using a structured proforma. SSI was assessed according to standard clinical criteria. Statistical analysis was performed using SPSS software, and p-value <0.05 was considered statistically significant.

Results: The overall incidence of SSI was 22.0% (44/200). SSI was significantly higher in emergency abdominal surgeries 31 (32.0%) compared with elective abdominal surgeries 13 (12.6%) (OR=3.25, 95% CI: 1.58-6.69, p=0.001). In elective surgeries, diabetes mellitus, anemia, drain use, and prolonged operative duration were significantly associated with SSI. In emergency surgeries, contaminated/dirty wounds, perforation/peritonitis, delayed surgery, prolonged operative duration, and drain usage showed significant association with SSI. Emergency surgeries were also associated with increased wound dehiscence and longer hospital stay.

Conclusion: Emergency abdominal surgeries had significantly higher SSI rates and poorer postoperative outcomes compared with elective abdominal surgeries. Proper perioperative management, infection-control measures, early intervention, and identification of modifiable risk factors are essential to reduce SSI and improve surgical outcomes.

Keywords: Surgical Site Infection. Emergency Abdominal Surgery. Elective Abdominal Surgery.

INTRODUCTION

Surgical site infection (SSI) remains one of the most common healthcare-associated infections worldwide and continues to be a major cause of postoperative morbidity and mortality. SSI is defined as an infection occurring within 30 days after surgery or within one year in cases involving implants, affecting either the incision or deep tissues at the operative site. Abdominal surgeries are particularly associated with a higher incidence of SSI due to exposure to endogenous gastrointestinal flora, prolonged operative duration, contamination, and emergency surgical interventions. SSIs contribute significantly to increased hospital stay, healthcare expenditure, readmission rates, delayed wound healing, and patient discomfort, thereby placing a substantial burden on healthcare systems and patients alike. Despite advances in aseptic techniques, antibiotic prophylaxis, sterilization procedures, and perioperative care, SSIs continue to be an important surgical complication, especially in developing countries where resource limitations and patient-related factors may adversely influence outcomes.[1,2]

The incidence of SSI varies depending upon the type of surgery, wound classification, patient comorbidities, nutritional status, duration of surgery, and perioperative infection control practices. Elective abdominal surgeries are generally planned procedures where adequate preoperative preparation, optimization of patient condition, and prophylactic antibiotic administration are feasible, resulting in comparatively lower SSI rates. In contrast, emergency abdominal surgeries are often performed under urgent conditions with limited preoperative preparation, contaminated operative fields, bowel perforation, trauma, or peritonitis, increasing the likelihood of postoperative wound infections. Emergency procedures are therefore considered a major independent risk factor for SSI. Comparing SSI rates between elective and emergency abdominal surgeries helps in understanding the influence of surgical urgency and identifying preventive strategies for reducing postoperative infections.[3]

Several studies have demonstrated that factors such as diabetes mellitus, obesity, anemia, smoking, prolonged operative time, contaminated wounds, use of drains, and inadequate antibiotic prophylaxis are associated with higher SSI rates. The microbial profile of SSI commonly includes Staphylococcus aureus, Escherichia coli, Klebsiella species, Pseudomonas aeruginosa, and anaerobic organisms, particularly in abdominal procedures. Early identification of risk factors and implementation of evidence-based preventive measures such as proper hand hygiene, sterile techniques, timely antibiotic prophylaxis, glycemic control, and postoperative wound care are essential to minimize SSI occurrence.[4,5]

Aim: To compare the rates of surgical site infections following elective and emergency abdominal surgeries at a tertiary care hospital.

Objectives

1. To determine the incidence of surgical site infections in patients undergoing elective abdominal surgeries.
2. To assess the incidence of surgical site infections in patients undergoing emergency abdominal surgeries.
3. To compare the associated risk factors and postoperative outcomes between elective and emergency abdominal surgeries with respect to surgical site infection.

MATERIALS AND METHODS

Source of Data: The data were collected from patients undergoing elective and emergency abdominal surgeries admitted to the Department of General Surgery at the tertiary care hospital. Relevant clinical history, examination findings, operative details, laboratory investigations, and postoperative outcomes were recorded using a structured proforma.

Study Design: The study was conducted as a hospital-based cross-sectional observational study.

Study Location: The study was carried out in the Department of General Surgery of a tertiary care teaching hospital.

Study Duration: The study was conducted over a period of 12 months.

Sample Size: A total of 200 patients undergoing abdominal surgeries were included in the study.

Sample Size Calculation

The sample size was calculated using the prevalence formula:

$$n = \frac{Z^2 \times p \times q}{d^2}$$

Where:

n = required sample size

Z = 1.96 for 95% confidence interval

p = expected prevalence of SSI (assumed 15%)

q = 1 − p

d = allowable error (5%)

The calculated sample size was approximately 196, which was rounded off to 200 patients for better statistical validity.

Inclusion Criteria

- Patients aged 18 years and above.
- Patients undergoing elective abdominal surgeries.
- Patients undergoing emergency abdominal surgeries.
- Patients willing to participate and provide informed consent.
- Patients available for postoperative follow-up during hospital stay.

Exclusion Criteria

- Patients with pre-existing surgical wound infection before surgery.
- Patients undergoing minor surgical procedures not involving abdominal incision.
- Immunocompromised patients such as HIV-positive individuals or patients on chemotherapy/steroids.

- Patients lost to follow-up before assessment of surgical site infection.
- Patients who refused consent for participation in the study.

Procedure and Methodology: After obtaining approval from the Institutional Ethics Committee and informed written consent from the patients, eligible patients undergoing elective and emergency abdominal surgeries were enrolled in the study. Detailed demographic information including age, gender, body mass index, comorbidities, smoking history, and nutritional status were recorded. Clinical examination and relevant laboratory investigations such as hemoglobin level, blood sugar, total leukocyte count, and serum albumin were documented.

Patients were categorized into elective and emergency surgery groups. Details regarding type of surgery, duration of surgery, wound classification, antibiotic prophylaxis, intraoperative contamination, use of drains, and duration of hospital stay were noted. Standard aseptic precautions and institutional antibiotic protocols were followed for all surgeries.

Postoperatively, patients were monitored regularly for evidence of surgical site infection. SSI was assessed based on clinical features such as redness, swelling, pain, purulent discharge, fever, wound dehiscence, and positive culture reports according to Centers for Disease Control and Prevention (CDC) criteria. Patients were followed during their hospital stay and wound status was assessed periodically until discharge.

Sample Processing: Wound swab or pus samples from suspected surgical site infections were collected under sterile precautions and sent to the microbiology laboratory for culture and sensitivity testing. Samples were processed using standard microbiological techniques for identification of causative organisms and antibiotic susceptibility patterns.

Statistical Methods: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 28.0. Quantitative variables were expressed as mean ± standard deviation, while qualitative variables were expressed as frequencies and percentages. The Chi-square test or Fisher's exact test was used for comparison of categorical variables. Independent t-test was used for comparison of continuous variables between groups. A p-value of less than 0.05 was considered statistically significant.

Data Collection: Data were collected prospectively using a predesigned and pretested case record form. Information regarding patient demographics, clinical profile, operative details, postoperative findings, microbiological reports, and surgical site infection outcomes were systematically documented and analyzed.

RESULTS

Table 1: Comparison of SSI Rates Following Elective versus Emergency Abdominal Surgeries

Type of surgery	Total cases	SSI present n (%)	SSI absent n (%)	OR	95% CI	χ^2 value	p-value
Elective abdominal surgery	103	13 (12.6)	90 (87.4)	Reference	-	-	-
Emergency abdominal surgery	97	31 (32.0)	66 (68.0)	3.25	1.58-6.69	10.89	0.001
Total	200	44 (22.0)	156 (78.0)				

[Table 1] compares the rates of surgical site infection (SSI) between elective and emergency abdominal surgeries among 200 study participants. Out of 103 patients who underwent elective abdominal surgery, SSI was observed in 13 (12.6%) patients, whereas 90 (87.4%) patients did not develop SSI. In contrast, among 97 patients who underwent emergency abdominal surgery, SSI occurred in 31 (32.0%) patients while 66 (68.0%) patients remained free from infection. Overall, the total incidence of SSI in the study population was 44 (22.0%).

Emergency abdominal surgeries demonstrated a significantly higher risk of developing SSI compared to elective surgeries, with an odds ratio (OR) of 3.25 and 95% confidence interval (CI) of 1.58-6.69. The association was statistically highly significant (χ^2=10.89, p=0.001).

Table 2: Incidence of SSI and Associated Factors in Elective Abdominal Surgeries

Variable	Elective cases n (%)	SSI present n (%)	SSI absent n (%)	OR	95% CI	χ^2 value	p-value
Total elective surgeries	103 (100.0)	13 (12.6)	90 (87.4)	-	-	-	-
Diabetes mellitus present	23 (22.3)	6 (26.1)	17 (73.9)	3.68	1.10-12.36	4.87	0.027
Obesity present	20 (19.4)	5 (25.0)	15 (75.0)	3.13	0.90-10.88	3.45	0.063
Anemia present	29 (28.2)	7 (24.1)	22 (75.9)	3.61	1.10-11.87	4.85	0.028
Drain used	36 (35.0)	8 (22.2)	28 (77.8)	3.54	1.06-11.80	4.63	0.031
Duration of surgery >120 min	33 (32.0)	9 (27.3)	24 (72.7)	6.19	1.74-21.97	9.45	0.002

[Table 2] shows the incidence of surgical site infection and associated risk factors among patients undergoing elective abdominal surgeries. Among the 103 elective surgeries included in the study, SSI developed in 13 (12.6%) patients, while 90 (87.4%) patients did not develop postoperative infection.

Diabetes mellitus was present in 23 (22.3%) elective surgery patients, among whom 6 (26.1%) developed SSI. Diabetes showed a statistically significant association with SSI (OR=3.68, 95% CI: 1.10-12.36, χ^2=4.87, p=0.027). Obesity was observed in 20 (19.4%) patients, with SSI occurring in 5 (25.0%) cases. Although obese patients demonstrated a higher SSI rate, the association did not reach statistical significance (p=0.063).

Anemia was present in 29 (28.2%) patients, and 7 (24.1%) of these developed SSI. Anemia showed a significant association with SSI (OR=3.61, 95% CI: 1.10-11.87, p=0.028). Drain usage was recorded in 36 (35.0%) patients, among whom 8 (22.2%) developed SSI, and this factor was also significantly associated with infection (OR=3.54, p=0.031).

Prolonged duration of surgery exceeding 120 minutes was observed in 33 (32.0%) patients, with 9 (27.3%) developing SSI. This variable showed the strongest association with SSI in elective surgeries (OR=6.19, 95% CI: 1.74-21.97, χ^2=9.45, p=0.002).

Table 3: Incidence of SSI and Associated Factors in Emergency Abdominal Surgeries

Variable	Emergency cases n (%)	SSI present n (%)	SSI absent n (%)	OR	95% CI	χ^2 value	p-value
Total emergency surgeries	97 (100.0)	31 (32.0)	66 (68.0)	-	-	-	-
Contaminated/dirty wound	53 (54.6)	24 (45.3)	29 (54.7)	4.37	1.65-11.56	9.54	0.002
Peritonitis/perforation	44 (45.4)	21 (47.7)	23 (52.3)	3.93	1.58-9.73	9.21	0.002
Diabetes mellitus present	23 (23.7)	11 (47.8)	12 (52.2)	2.48	0.94-6.50	3.49	0.062
Delay in surgery >12 hours	41 (42.3)	20 (48.8)	21 (51.2)	3.90	1.58-9.58	9.24	0.002
Duration of surgery >120 min	47 (48.5)	22 (46.8)	25 (53.2)	4.01	1.60-10.07	9.25	0.002
Drain used	57 (58.8)	25 (43.9)	32 (56.1)	4.43	1.61-12.20	9.00	0.003

[Table 3] presents the incidence of surgical site infection and associated risk factors among patients undergoing emergency abdominal surgeries. Among the 97 emergency surgeries included in the study, SSI occurred in 31 (32.0%) patients, whereas 66 (68.0%) patients did not develop SSI.

Contaminated or dirty surgical wounds were present in 53 (54.6%) patients, of whom 24 (45.3%) developed SSI. This factor showed a statistically significant association with postoperative infection (OR=4.37, 95% CI: 1.65-11.56, χ^2=9.54, p=0.002). Similarly, peritonitis or perforation was noted in 44 (45.4%) patients, and SSI developed in 21 (47.7%) of these cases. The association between peritonitis/perforation and SSI was statistically significant (OR=3.93, p=0.002).

Diabetes mellitus was present in 23 (23.7%) patients, among whom 11 (47.8%) developed SSI. Although diabetic patients showed a higher proportion of infection, the association was not statistically significant (p=0.062). Delay in surgery of more than 12 hours was observed in 41 (42.3%) patients, and SSI occurred in 20 (48.8%) of them. Delayed surgery demonstrated a strong and statistically significant association with SSI (OR=3.90, p=0.002).

Prolonged operative duration greater than 120 minutes was seen in 47 (48.5%) patients, with SSI occurring in 22 (46.8%) patients, which was statistically significant (OR=4.01, p=0.002). Drain usage was recorded in 57 (58.8%) patients, and 25 (43.9%) of them developed SSI. Drain placement also showed a significant association with SSI (OR=4.43, p=0.003).

Table 4: Comparison of Risk Factors and Postoperative Outcomes between Elective and Emergency Abdominal Surgeries

Variable	Elective surgery n=103	Emergency surgery n=97	OR / Mean difference	95% CI	Test value	p-value
Diabetes mellitus	23 (22.3)	23 (23.7)	OR=1.08	0.56-2.09	χ^2=0.05	0.817
Obesity	20 (19.4)	21 (21.6)	OR=1.15	0.58-2.28	χ^2=0.15	0.696
Anemia	29 (28.2)	33 (34.0)	OR=1.32	0.72-2.40	χ^2=0.80	0.370
Contaminated/dirty wound	9 (8.7)	53 (54.6)	OR=12.58	5.70-27.78	χ^2=49.21	<0.001
Drain used	36 (35.0)	57 (58.8)	OR=2.65	1.50-4.70	χ^2=11.39	0.001
Duration of surgery >120 min	33 (32.0)	47 (48.5)	OR=1.99	1.12-3.54	χ^2=5.61	0.018
SSI developed	13 (12.6)	31 (32.0)	OR=3.25	1.58-6.69	χ^2=10.89	0.001
Wound dehiscence	4 (3.9)	12 (12.4)	OR=3.49	1.09-11.24	χ^2=4.89	0.027
Reoperation required	2 (1.9)	7 (7.2)	OR=3.93	0.80-19.40	χ^2=3.23	0.072
Hospital stay, days	6.8 ± 2.1	9.7 ± 3.4	MD=2.9	2.11-3.69	t=7.21	<0.001
Duration of surgery, min	104.3 ± 31.6	123.6 ± 37.8	MD=19.3	9.55-29.05	t=3.91	<0.001

[Table 4] compares the risk factors and postoperative outcomes between elective and emergency abdominal surgeries. The prevalence of diabetes mellitus was comparable between elective [23 (22.3%)] and emergency surgeries [23 (23.7%)], and the difference was not statistically significant (p=0.817). Similarly, obesity and anemia were slightly more common in emergency surgeries, but these differences were not statistically significant (p>0.05).

Contaminated or dirty wounds were significantly more frequent in emergency surgeries [53 (54.6%)] compared to elective surgeries [9 (8.7%)]. This showed a very strong association with emergency procedures (OR=12.58, 95% CI: 5.70-27.78, χ^2=49.21, p<0.001). Drain usage was also

significantly higher in emergency surgeries [57 (58.8%)] than elective surgeries [36 (35.0%)] with OR of 2.65 (p=0.001).

Prolonged operative duration exceeding 120 minutes was observed more commonly in emergency surgeries [47 (48.5%)] than elective surgeries [33 (32.0%)], and the difference was statistically significant (OR=1.99, p=0.018). Surgical site infection developed in 31 (32.0%) emergency surgery patients compared to only 13 (12.6%) elective surgery patients, indicating significantly increased postoperative infection risk in emergency procedures (OR=3.25, p=0.001).

Wound dehiscence occurred more frequently in emergency surgeries [12 (12.4%)] compared to elective surgeries [4 (3.9%)], showing significant association (OR=3.49, p=0.027). Although reoperation rates were higher in emergency surgeries [7 (7.2%)] than elective surgeries [2 (1.9%)], the difference did not reach statistical significance (p=0.072).

The mean duration of hospital stay was significantly longer in emergency surgeries (9.7 ± 3.4 days) compared to elective surgeries (6.8 ± 2.1 days), with a mean difference of 2.9 days (t=7.21, p<0.001). Likewise, the mean operative duration was significantly higher in emergency surgeries (123.6 ± 37.8 minutes) than elective surgeries (104.3 ± 31.6 minutes), with a mean difference of 19.3 minutes (t=3.91, p<0.001).

DISCUSSION

In the present study, the overall surgical site infection (SSI) rate was 44 (22.0%) among 200 abdominal surgery patients. SSI was significantly higher in emergency abdominal surgeries 31 (32.0%) compared with elective abdominal surgeries 13 (12.6%) with OR 3.25, 95% CI 1.58-6.69 and p=0.001. This finding indicates that emergency surgery patients had more than three times higher odds of developing SSI than elective surgery patients. Similar findings were reported by Jadoon et al (2023),[1] who observed higher SSI rates in emergency abdominal surgeries compared with elective surgeries. Jatoliya et al (2023),[2] also reported significantly higher SSI rates among emergency laparotomy cases compared with elective laparotomy cases, supporting the role of surgical urgency as an important determinant of postoperative infection. Sriranjani et al (2021),[6] similarly demonstrated that emergency abdominal surgeries were associated with increased SSI severity and postoperative morbidity.

In elective abdominal surgeries, SSI incidence was 12.6%. Diabetes mellitus, anemia, drain use and duration of surgery more than 120 minutes were significantly associated with SSI. Diabetes mellitus showed OR 3.68, 95% CI 1.10-12.36 and p=0.027, suggesting impaired wound healing and reduced host defense among diabetic patients. Anemia was also significantly associated with SSI with OR 3.61 and p=0.028, probably due to reduced tissue oxygenation and poor wound healing. Duration of surgery more than 120 minutes showed the strongest association in elective surgeries with OR 6.19 and p=0.002. Similar observations were made by Alkaaki et al (2019),[3] who identified multiple patient-related and procedure-related risk factors for SSI following abdominal surgery. Chadhary et al (2025).[4] also emphasized that patient optimization, glycemic control, appropriate antimicrobial prophylaxis and operative discipline are important measures for SSI prevention. Ejaz et al (2017),[9] further reported that prolonged operative duration and metabolic comorbidities significantly increase SSI risk after major abdominal surgery.

In emergency abdominal surgeries, SSI incidence was 32.0%. Contaminated/dirty wound, peritonitis or perforation, delay in surgery more than 12 hours, prolonged operative duration and drain use were significantly associated with SSI. Contaminated/dirty wounds showed OR 4.37, 95% CI 1.65-11.56 and p=0.002, while peritonitis/perforation showed OR 3.93 and p=0.002. These findings are expected because emergency abdominal surgeries commonly involve bowel contamination, perforation, pus, peritoneal soiling and inadequate preoperative preparation. Aga et al (2015),[5] reported that wound contamination, microbial burden and host-related factors play a major role in the development of SSI. Similarly, Saad et al (2024),[7] highlighted that SSI prevention requires strict adherence to antibiotic prophylaxis, asepsis and perioperative infection-control measures in emergency surgeries.

Comparison of risk factors between elective and emergency surgeries showed that contaminated/dirty wounds were markedly higher in emergency surgeries 53 (54.6%) compared with elective surgeries 9 (8.7%), with OR 12.58 and p<0.001. Drain use was also higher in emergency surgeries 57 (58.8%) than elective surgeries 36 (35.0%), with OR 2.65 and p=0.001. Prolonged operative duration was more common in emergency surgeries 47 (48.5%) compared with elective surgeries 33 (32.0%), with p=0.018. These results are comparable with the findings of Jindal et al (2025),[8] who reported that emergency abdominal surgeries had higher SSI risk due to contamination, comorbidities, anemia, prolonged duration and perforation-related procedures. Sun et al (2025),[10] also observed significantly greater postoperative infection burden and complications among emergency colorectal surgery patients compared with elective cases.

Postoperative outcomes were also poorer in emergency surgeries. Wound dehiscence was higher in emergency surgeries 12 (12.4%) compared with elective surgeries 4 (3.9%), with OR 3.49 and p=0.027. Mean hospital stay was significantly longer in emergency surgeries 9.7 ± 3.4 days compared with elective surgeries 6.8 ± 2.1 days, with p<0.001. Mean duration of surgery was also significantly higher in emergency cases. Ejaz et al (2017),[9] and Sun et al

(2025),[10] reported that SSI increases hospital utilization, treatment cost and length of stay, which supports the present finding that infected and emergency surgery patients had poorer postoperative recovery.

CONCLUSION

The present study demonstrated that surgical site infection (SSI) remains a significant postoperative complication following abdominal surgeries, with an overall SSI incidence of 22.0%. Emergency abdominal surgeries showed a significantly higher rate of SSI compared with elective abdominal surgeries, indicating that surgical urgency plays an important role in postoperative wound infection. Patients undergoing emergency procedures had more than three times higher risk of developing SSI than those undergoing elective surgeries.

Among elective abdominal surgeries, diabetes mellitus, anemia, drain usage, and prolonged operative duration greater than 120 minutes were significantly associated with the development of SSI. In emergency abdominal surgeries, contaminated or dirty wounds, perforation/peritonitis, delayed surgical intervention, prolonged surgery, and drain usage were identified as major risk factors contributing to postoperative infection. Emergency surgeries were also associated with higher rates of wound dehiscence, longer duration of surgery, and prolonged hospital stay, reflecting poorer postoperative outcomes.

The findings of the present study emphasize the importance of strict infection-control practices, early surgical intervention, meticulous operative techniques, appropriate antibiotic prophylaxis, optimization of comorbid conditions, and careful postoperative wound care in reducing SSI rates. Identification and management of modifiable risk factors may help improve surgical outcomes, reduce hospital stay, decrease healthcare burden, and enhance patient recovery following abdominal surgeries.

Limitations of the Study

1. The study was conducted at a single tertiary care center, limiting the generalizability of the findings to other healthcare settings.
2. The sample size was relatively small for subgroup analysis of different abdominal surgical procedures.
3. Being a cross-sectional observational study, causal relationships between risk factors and SSI could not be definitively established.
4. Long-term postoperative follow-up after discharge was not performed in all patients, which may have underestimated late-onset SSI cases.
5. Variations in surgeon experience and operative techniques were not separately analyzed.
6. Microbiological profile and antibiotic resistance patterns were not evaluated in detail for all SSI cases.
7. Nutritional status and socioeconomic factors influencing wound healing were not comprehensively assessed.
8. Some emergency surgery patients had multiple overlapping risk factors, making independent assessment difficult.
9. The impact of perioperative antibiotic timing and compliance with infection-control protocols was not specifically analyzed.
10. Different types of abdominal surgeries with varying contamination levels were included together, which may have influenced SSI incidence rates.

REFERENCES

1. Jadoon SK, Khan RM, Khan TA, Akhtar N, Qayyum Y, Kumar K, Kumar RR, Shahab R, Asghar MS. Comparative study of wound infection between elective and emergency abdominal surgeries: A retrospective cohort study. Annals of Medicine and Surgery. 2023 May 1;85(5):1490-5.
2. Jatoliya H, Pipal RK, Pipal DK, Biswas P, Pipal VR, Yadav S, Verma B, Vardhan V. Surgical site infections in elective and emergency abdominal surgeries: a prospective observational study about incidence, risk factors, pathogens, and antibiotic sensitivity at a government tertiary care teaching hospital in India. Cureus. 2023 Oct 31;15(10).
3. 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. Canadian journal of surgery. 2019 Apr;62(2):111.
4. Chadhary SM, Desai RP, Pandya JV. Assessment of surgical site infections and their risk factors in abdominal surgeries. European Journal of Cardiovascular Medicine. 2025 Apr 9;15:227-30.
5. Aga E, Keinan-Boker L, Eithan A, Mais T, Rabinovich A, Nassar F. Surgical site infections after abdominal surgery: incidence and risk factors. A prospective cohort study. Infectious Diseases. 2015 Nov 2;47(11):761-7.
6. Sriranjani KS, Rajeshwara KV. A comparative study of the incidence and severity of surgical site infection following emergency and elective abdominal surgeries. Journal of Evolution of medical and Dental Sciences. 2021 Feb 15;10(7):404-8.
7. Saad DA, Alla MK, ABDELZAHER MA. Surgical site infection after emergency and elective abdominal surgery: incidence and risk factors. Zagazig University Medical Journal. 2024 Jan 1;30(1):211-7.
8. Jindal P, Jindal A, Sumedha RB. Prospective evaluation of surgical site infections following emergency versus elective abdominal surgeries. Int J Acad Med Pharm. 2025;7(3):1047-51.
9. Ejaz A, Schmidt C, Johnston FM, Frank SM, Pawlik TM. Risk factors and prediction model for inpatient surgical site infection after major abdominal surgery. Journal of Surgical Research. 2017 Sep 1;217:153-9.
10. Sun K, Wang CC, Geiger TM, Smith MC, Lee H, Younan SA, Khan A. Increasing differences in surgical site infections after emergency and elective colorectal surgery. Journal of Surgical Research. 2025 Oct 1;314:261-72.