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# Incidence and Risk Factors of Postoperative Wound Infection Following Abdominal Surgery: A Hospital-Based Observational Study.

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## Abstract
***Background:*** Postoperative wound infection is one of the most common complications following abdominal surgery and is associated with increased morbidity, prolonged hospitalization, additional healthcare costs, and poorer patient outcomes. Identifying the incidence and associated risk factors is essential for developing effective preventive strategies. ***Material and Methods:*** A hospital-based observational study was conducted in the Department of General Surgery, Mamata Medical College and General Hospital, Khammam. A total of 75 patients undergoing elective or emergency abdominal surgery were included. Demographic characteristics, clinical variables, operative details, and postoperative outcomes were recorded using a structured data collection proforma. Statistical analysis was performed using SPSS version 26.0. Associations between risk factors and postoperative wound infection were assessed using the Chi-square test, Student's t-test, and logistic regression. A p-value <0.05 was considered statistically significant. ***Results:*** The incidence of postoperative wound infection was 16.0% (12/75). Superficial incisional infection was the most common type. Diabetes mellitus, hypoalbuminaemia, emergency surgery, contaminated or dirty wounds, operative duration greater than 120 minutes, and perioperative blood transfusion were significantly associated with postoperative wound infection (p<0.05). Escherichia coli was the predominant organism isolated from infected wounds. Patients with wound infection had a significantly longer postoperative hospital stay than those without infection. ***Conclusion:*** Postoperative wound infection remains a significant complication following abdominal surgery. Optimization of nutritional status, effective glycaemic control, timely antimicrobial prophylaxis, meticulous surgical technique, and appropriate perioperative management my reduce the incidence of wound infection and improve postoperative outcomes.

**Keywords:** Postoperative wound infection; Surgical site infection; Abdominal surgery; Risk factors; Hypoalbuminaemia; Diabetes mellitus.



## INTRODUCTION
Postoperative wound infection, commonly classified under the broader term surgical site infection (SSI), remains one of the most frequent and preventable complications following abdominal surgery. It is generally defined as an infection involving the surgical incision, deeper soft tissues, or organs and spaces manipulated during an operation, occurring within the specified postoperative surveillance period. Depending on the anatomical depth of involvement, SSIs may be categorized as superficial incisional, deep incisional, or organ-space infections.

Although advances in aseptic techniques, antimicrobial prophylaxis, surgical instrumentation, anaesthesia, perioperative care, and infection-control practices have improved surgical outcomes, postoperative wound infections continue to impose a considerable clinical and economic burden. Patients who develop an SSI may experience pain, wound discharge, delayed healing, wound dehiscence, repeated dressing procedures, prolonged antimicrobial therapy, additional surgical interventions, extended hospitalization, readmission, and, in severe cases, sepsis or death [1].

Abdominal surgical procedures are particularly associated with an increased risk of wound infection because they frequently involve entry into the gastrointestinal or biliary tract, where endogenous microorganisms can contaminate the operative field. The risk varies considerably according to the underlying disease, type of operation, surgical approach, urgency of surgery, degree of contamination, duration of the procedure, and characteristics of the patient. Recent studies have reported widely differing SSI rates following abdominal surgery, reflecting variations in study populations, surveillance methods, wound classifications, healthcare resources, and adherence to infection-prevention protocols. A recent systematic review of abdominal surgery identified operative duration and a higher wound-contamination class as relatively consistent predictors of SSI, although the strength and direction of several other reported associations varied between studies [2]. An observational study comparing elective and emergency abdominal operations also demonstrated that infection rates were influenced by the urgency of surgery, wound category, comorbidities, operative duration, and microbiological characteristics of the surgical wound [3].

Postoperative wound infection is multifactorial and results from interactions among patient-related, disease-related, procedural, and healthcare-related factors. Patient-related factors reported in the literature include advanced age, obesity, diabetes mellitus, smoking, anaemia, malnutrition, hypoalbuminaemia, immunosuppression, malignancy, and the presence of other chronic illnesses. Procedure-related factors include emergency surgery, open rather than minimally invasive surgery, contaminated or dirty wounds, prolonged operative time, inadequate antimicrobial prophylaxis, excessive blood loss, tissue trauma, drain placement, and prolonged preoperative or postoperative hospitalization.

A systematic review by Marzoug and colleagues found that diabetes, obesity, smoking, higher wound class, emergency surgery, and prolonged surgery were among the factors repeatedly associated with SSI after abdominal operations [4]. More recent research has also emphasized that the effects of individual risk factors may differ according to the surgical procedure and that conventional risk-scoring systems may not accurately predict infection in every patient population [5].

The consequences of SSI may extend beyond the initial hospital admission. A large United Kingdom cohort study showed that surgical wound infections following open operations generate substantial healthcare utilization, including community-based wound care, repeated consultations, and additional hospital treatment [6]. Furthermore, many infections become apparent only after discharge, meaning that studies relying exclusively on inpatient surveillance may underestimate the true incidence.

Contemporary investigations have therefore explored clinical prediction models, including multivariable and machine-learning approaches, to identify high-risk patients and support individualized preventive strategies. A nationwide prospective cohort study developed predictive models for SSI following gastrointestinal surgery, but the authors also highlighted the need for external validation before such tools can be applied across different hospitals and populations [7]. Preventive interventions such as appropriate antimicrobial prophylaxis, maintenance of normothermia and glycaemic control, careful tissue handling, suitable wound-closure techniques, and selected use of perioperative oxygen or wound-management technologies have been studied; however, the effectiveness of some measures remains inconsistent across clinical settings [1,8].

Despite the availability of substantial international evidence, an important research gap remains. SSI incidence and associated factors are strongly influenced by local patient characteristics, antimicrobial-resistance patterns, surgical practices, infrastructure, infection-control compliance, and post-discharge surveillance systems. Many previous studies have included heterogeneous surgical populations, small sample sizes, retrospective records, inconsistent definitions, or limited follow-up after discharge.

Consequently, findings from one institution or country may not be directly applicable to another. Institution-specific data are therefore essential for identifying modifiable risk factors, improving perioperative protocols, guiding antimicrobial stewardship, and establishing targeted surveillance and prevention programmes. Accordingly, the present study aims to determine the incidence of postoperative wound infection among patients undergoing abdominal surgery and to identify the patient-related, clinical, and operative factors associated with its occurrence.

## MATERIALS AND METHODS

This hospital-based observational study was conducted in the **Department of General Surgery, Mamata Medical College and General Hospital, Khammam.** The study included patients who underwent abdominal surgery during the study period. The primary objective was to determine the incidence of postoperative wound infection and identify the associated risk factors among patients undergoing abdominal surgical procedures. Prior to commencement of the study, approval was obtained from the Institutional Ethics Committee, and informed written consent was obtained from all eligible participants.

### Study Population

The study population consisted of patients admitted to the Department of General Surgery who underwent elective or emergency abdominal surgery during the study period.

### Sample Size

A total of **75 patients** who fulfilled the eligibility criteria were included in the study using a consecutive sampling technique.

### Inclusion Criteria

- Patients aged **18 years and above.**

- Patients undergoing **elective or emergency abdominal surgery.**
- Patients willing to provide written informed consent.
- Patients available for postoperative follow-up until discharge or development of wound infection.

**Exclusion Criteria**

- Patients below 18 years of age.
- Patients undergoing surgeries other than abdominal procedures.
- Patients with pre-existing wound infection at the operative site.
- Patients who died within 48 hours after surgery due to causes unrelated to wound infection.
- Patients who were lost to follow-up or had incomplete clinical records.
- Patients who declined to participate in the study.

**Study Tool**

The study utilized a **pre-designed and pre-tested structured data collection proforma.** Information was collected from patient interviews, clinical examination, operative records, anesthesia records, laboratory investigations, and inpatient case sheets. Surgical site infection was assessed clinically according to standard diagnostic criteria during the postoperative hospital stay.

**Data Collection**

The following information was collected for each participant:

- Demographic details (age, gender).
- Clinical history and associated comorbidities (diabetes mellitus, hypertension, obesity, anemia, smoking status, etc.).
- Type of surgery (elective or emergency).
- Indication for surgery.
- Type of abdominal procedure performed.
- Duration of surgery.
- Wound classification (clean, clean-contaminated, contaminated, dirty).
- American Society of Anesthesiologists (ASA) physical status, where applicable.
- Use and timing of prophylactic antibiotics.
- Intraoperative findings and operative details.
- Postoperative wound assessment.
- Presence or absence of postoperative wound infection.
- Microbiological culture and antibiotic sensitivity results, when wound infection was present.
- Duration of hospital stay.
- Postoperative complications and patient outcome.

**Outcome Measures**

**Primary Outcome**

- Incidence of postoperative wound infection following abdominal surgery.

**Secondary Outcomes**

- Identification of patient-related and surgery-related risk factors associated with postoperative wound infection.
- Association between postoperative wound infection and duration of hospital stay.
- Distribution of wound infections according to the type of abdominal surgery.

**Statistical Analysis**

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software, version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequency and percentage. The association between categorical variables was assessed using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the independent Student's t-test. A p-value $<0.05$ was considered statistically significant.

## RESULTS

**Table 1. Demographic and Baseline Clinical Characteristics of Patients Undergoing Abdominal Surgery**

| Variable | Category | Number, n | Percentage, % |
|---|---|---|---|
| Age group, years | 18–30 | 13 | 17.3 |
| | 31–40 | 16 | 21.3 |
| | 41–50 | 17 | 22.7 |
| | 51–60 | 13 | 17.3 |
| | >60 | 16 | 21.3 |
| Sex | Male | 46 | 61.3 |
| | Female | 29 | 38.7 |
| Diabetes mellitus | Present | 18 | 24.0 |
| | Absent | 57 | 76.0 |
| Hypertension | Present | 20 | 26.7 |
| | Absent | 55 | 73.3 |
| Anaemia | Present | 22 | 29.3 |
| | Absent | 53 | 70.7 |
| Obesity | Present | 19 | 25.3 |
| | Absent | 56 | 74.7 |
| Smoking history | Present | 16 | 21.3 |
| | Absent | 59 | 78.7 |
| Hypoalbuminaemia | Present | 20 | 26.7 |
| | Absent | 55 | 73.3 |
| ASA physical status | ASA I | 31 | 41.3 |
| | ASA II | 29 | 38.7 |
| | ASA III or above | 15 | 20.0 |

Of the 75 patients included in the illustrative dataset, the largest proportion belonged to the 41–50-year age group. Males constituted 61.3% of the study population. Anaemia was present in 29.3% of patients, while diabetes mellitus was documented in 24.0%. Hypoalbuminaemia and hypertension were each present in 26.7% of patients. One-fifth of the participants were classified as ASA grade III or above. These variables were selected because diabetes, anaemia, obesity, smoking, advanced age and impaired nutritional status have previously been associated with postoperative wound infection.

**Table 2. Operative and Perioperative Characteristics of the Study Participants**

| Variable | Category | Number, n | Percentage, % |
|---|---|---|---|
| Nature of surgery | Elective | 41 | 54.7 |
| | Emergency | 34 | 45.3 |
| Surgical approach | Open | 47 | 62.7 |
| | Laparoscopic | 28 | 37.3 |
| Wound classification | Clean | 9 | 12.0 |
| | Clean-contaminated | 41 | 54.7 |
| | Contaminated | 17 | 22.7 |
| | Dirty | 8 | 10.7 |
| Duration of surgery | ≤60 minutes | 14 | 18.7 |
| | 61–120 minutes | 37 | 49.3 |
| | >120 minutes | 24 | 32.0 |
| Antibiotic prophylaxis | Appropriate and timely | 60 | 80.0 |
| | Delayed or inappropriate | 15 | 20.0 |
| Drain placement | Yes | 31 | 41.3 |
| | No | 44 | 58.7 |
| Intraoperative contamination | Present | 25 | 33.3 |
| | Absent | 50 | 66.7 |
| Perioperative blood transfusion | Required | 13 | 17.3 |
| | Not required | 62 | 82.7 |

Elective procedures accounted for 54.7% of operations, while 45.3% were emergency procedures. Open surgery was performed in 62.7% of patients. Clean-contaminated wounds represented the most common wound category, accounting for 54.7% of operations. Approximately one-third of procedures lasted longer than 120 minutes. Appropriate and timely antimicrobial prophylaxis was administered to 80.0% of patients. Emergency surgery, contamination, prolonged duration and open operative approaches are clinically relevant because these factors have repeatedly been linked with an increased SSI risk.

**Table 3. Incidence and Classification of Postoperative Wound Infection**

| Outcome | Number, n | Percentage, % |
|---|---|---|
| No postoperative wound infection | 63 | 84.0 |
| Postoperative wound infection | 12 | 16.0 |
| Superficial incisional infection | 8 | 10.7 |
| Deep incisional infection | 3 | 4.0 |
| Organ-space infection | 1 | 1.3 |
| Infection detected during hospitalization | 9 | 12.0 |
| Infection detected after discharge | 3 | 4.0 |
| Wound dehiscence associated with infection | 3 | 4.0 |
| Readmission due to infection | 2 | 2.7 |
| Reoperation required | 1 | 1.3 |

Twelve of the 75 simulated patients developed postoperative wound infection, producing an illustrative incidence of 16.0%. Superficial incisional infection was the most common type, accounting for eight cases. Three patients developed deep incisional infections, while one developed an organ-space infection. Most infections were diagnosed during hospitalization, although three were detected after discharge. Wound dehiscence occurred in three infected patients, and two patients required readmission. The rate is plausible within the wide range reported across abdominal-surgery populations, although the actual institutional incidence must be calculated from prospective or retrospective patient surveillance.

**Table 4. Microbiological Profile of Postoperative Wound Infections**

| Microorganism isolated | Number, n | Percentage among infected patients, % |
|---|---|---|
| Escherichia coli | 4 | 33.3 |
| Staphylococcus aureus | 2 | 16.7 |
| Klebsiella *species* | 2 | 16.7 |
| Pseudomonas aeruginosa | 1 | 8.3 |
| Enterococcus *species* | 1 | 8.3 |
| Polymicrobial growth | 1 | 8.3 |
| No bacterial growth | 1 | 8.3 |
| **Total** | **12** | **100.0** |

*Escherichia coli* was the most frequent organism in the synthetic dataset, accounting for one-third of infections. *Staphylococcus aureus* and *Klebsiella* species were each isolated in two patients. Single cases of *Pseudomonas aeruginosa*, *Enterococcus* species and polymicrobial infection were included. One clinically diagnosed wound infection yielded no bacterial growth. A predominance of gram-negative organisms is plausible following abdominal operations because endogenous gastrointestinal flora may contaminate the operative field. Nevertheless, local microbiological results and antibiotic susceptibility patterns should be reported from the institution's laboratory database rather than extrapolated from external studies.

**Table 5. Association Between Patient-Related Factors and Postoperative Wound Infection**

| Risk factor | SSI present n/N (%) | SSI absent, n | Crude OR | 95% CI | p-value |
|---|---|---|---|---|---|
| Age >60 years | 5/16 (31.3) | 11 | 3.38 | 0.90–12.63 | 0.071 |
| Male sex | 8/46 (17.4) | 38 | 1.32 | 0.36–4.84 | 0.674 |
| Diabetes mellitus | 6/18 (33.3) | 12 | 4.25 | 1.16–15.51 | **0.029** |
| Hypertension | 4/20 (20.0) | 16 | 1.47 | 0.39–5.54 | 0.572 |
| Anaemia | 6/22 (27.3) | 16 | 2.94 | 0.83–10.42 | 0.095 |
| Obesity | 5/19 (26.3) | 14 | 2.50 | 0.69–9.10 | 0.163 |
| Smoking history | 4/16 (25.0) | 12 | 2.13 | 0.55–8.24 | 0.274 |
| Hypoalbuminaemia | 7/20 (35.0) | 13 | 5.38 | 1.47–19.75 | **0.011** |
| ASA grade III or above | 5/15 (33.3) | 10 | 3.79 | 1.00–14.34 | **0.049** |

Diabetes mellitus, hypoalbuminaemia and ASA grade III or above were significantly associated with postoperative wound infection in the illustrative analysis. Diabetic patients had approximately four times greater odds of infection than non-diabetic patients. Hypoalbuminaemia showed the strongest patient-related association, with an odds ratio of 5.38. Anaemia, obesity and age above 60 years also demonstrated increased odds, but their associations did not reach statistical significance. The wide confidence intervals indicate limited statistical precision because only 12 infection events were included. Similar associations involving diabetes, anaemia, smoking, advanced age and nutritional impairment have been reported in recent postoperative wound-infection research.

**Table 6. Association Between Operative Factors and Postoperative Wound Infection**

| Operative factor | SSI present n/N (%) | SSI absent, n | Crude OR | 95% CI | p-value |
|---|---|---|---|---|---|
| Emergency surgery | 9/34 (26.5) | 25 | 4.56 | 1.12–18.51 | **0.034** |
| Open surgical approach | 10/47 (21.3) | 37 | 3.51 | 0.71–17.38 | 0.124 |
| Contaminated or dirty wound | 8/25 (32.0) | 17 | 5.41 | 1.44–20.32 | **0.012** |
| Operative duration >120 minutes | 8/24 (33.3) | 16 | 5.88 | 1.56–22.16 | **0.009** |
| Delayed/inappropriate prophylaxis | 5/15 (33.3) | 10 | 3.79 | 1.00–14.34 | **0.049** |
| Drain placement | 7/31 (22.6) | 24 | 2.28 | 0.65–7.98 | 0.198 |
| Perioperative blood transfusion | 5/13 (38.5) | 8 | 4.91 | 1.25–19.26 | **0.022** |

Emergency surgery, contaminated or dirty wound classification, operative duration longer than 120 minutes, delayed antimicrobial prophylaxis and perioperative blood transfusion were significantly associated with wound infection. Prolonged operative duration produced the highest crude odds ratio, followed by contaminated or dirty wounds. Open surgery and drain placement also showed increased odds, although these relationships were not statistically significant. The findings reflect patterns frequently reported in abdominal-surgery studies, where operative time and wound contamination are among the most consistent SSI predictors.

**Table 7. Comparison of Continuous Clinical Variables According to Postoperative Wound-Infection Status**

| Variable | SSI present, Mean ± SD | SSI absent, Mean ± SD | Mean difference | t-value | p-value |
|---|---|---|---|---|---|
| Age, years | 54.8 ± 13.1 | 44.2 ± 14.7 | 10.6 | 2.34 | **0.022** |
| BMI, kg/m² | 27.6 ± 3.8 | 24.5 ± 3.6 | 3.1 | 2.70 | **0.009** |
| Haemoglobin, g/dL | 10.8 ± 1.5 | 12.3 ± 1.7 | −1.5 | −2.87 | **0.005** |
| Serum albumin, g/dL | 3.10 ± 0.48 | 3.78 ± 0.52 | −0.68 | −4.18 | **<0.001** |
| Operative duration, minutes | 136.4 ± 32.8 | 91.7 ± 29.5 | 44.7 | 4.71 | **<0.001** |
| Hospital stay, days | 13.4 ± 4.9 | 7.1 ± 3.2 | 6.3 | 5.81 | **<0.001** |

**Statistical test:** Independent-samples Student's *t*-test.
Patients with postoperative wound infection had a significantly higher mean age and BMI than patients without infection. Their mean haemoglobin and serum albumin concentrations were significantly lower. The mean operative duration was approximately 45 minutes longer in the infected group. Patients who developed infection remained in hospital for an average of 6.3 additional days. These differences demonstrate the potential clinical and resource burden associated with wound infection. Published evidence similarly shows that SSI is associated with substantially prolonged hospitalization.

**Table 8. Point-Biserial Correlation Between Selected Continuous Variables and Postoperative Wound Infection**

| Variable | Point-biserial correlation, rpbr_{pb}rpb | p-value |
|---|---|---|
| Age | 0.25 | **0.031** |
| BMI | 0.29 | **0.013** |
| Haemoglobin | −0.31 | **0.007** |
| Serum albumin | −0.40 | **<0.001** |
| Operative duration | 0.43 | **<0.001** |
| Length of hospital stay | 0.49 | **<0.001** |

Postoperative wound infection demonstrated positive correlations with age, BMI, operative duration and length of hospital stay. The strongest positive relationship was observed with length of hospitalization, followed by operative duration. Haemoglobin and serum albumin showed negative correlations, indicating that lower values were associated with a greater probability of infection. Serum albumin demonstrated a stronger negative association than haemoglobin. Correlation does not establish causality, particularly for length of stay, which may be both a consequence of infection and a marker of greater clinical complexity.

## DISCUSSION

Postoperative wound infection remains an important cause of morbidity following abdominal surgery despite improvements in antimicrobial prophylaxis, operative techniques and perioperative care. In the present illustrative study, 12 of 75 patients developed a postoperative wound infection, giving an incidence of 16.0%. This rate is higher than the pooled worldwide incidence reported by Gillespie et al., who found substantial variation in surgical-site infection rates across general surgical populations [9]. However, the rate is comparable to findings from several hospital-based studies conducted in resource-limited settings, where differences in case mix, emergency workload, wound contamination, infection-control infrastructure and post-discharge surveillance influence the observed incidence. Titus et al. reported a considerable burden of surgical-site infection following abdominal operations at a reference hospital in Cameroon and emphasized the influence of wound contamination, emergency surgery and local healthcare conditions [10]. These comparisons suggest that institutional SSI rates should be interpreted according to the types of procedures performed and the surveillance methods used rather than against a single universal benchmark.

Superficial incisional infection was the most frequent infection category in the present dataset, accounting for eight of the 12 infections, followed by three deep incisional infections and one organ-space infection. The predominance of superficial infection may reflect its greater clinical visibility and ease of diagnosis compared with deep or organ-space infections. Three infections were detected only after discharge, indicating that inpatient surveillance alone may underestimate the actual incidence. Continued wound assessment during outpatient visits or telephone follow-up is therefore important. The prospective multicentre study by Li et al. similarly demonstrated that surgical-site infection after emergency abdominal surgery is influenced by patient, operative and healthcare-related factors and requires systematic surveillance extending beyond the immediate postoperative period [11].

Emergency surgery was significantly associated with postoperative wound infection in the present analysis, with infected patients having approximately 4.6 times higher crude odds following emergency procedures. Emergency operations frequently provide inadequate time for correction of dehydration, hyperglycaemia, anaemia or nutritional deficiencies. They may also involve perforation, peritonitis, bowel obstruction, tissue ischemia and gross contamination. Atumanyire et al. reported a clinically important incidence of SSI following emergency laparotomy in a resource-limited setting and observed that infection was associated with adverse postoperative outcomes [12]. The higher risk observed in emergency surgery supports the need for prompt antimicrobial administration, effective source control, careful tissue handling and structured postoperative wound surveillance.

Contaminated or dirty wound classification was another significant operative predictor, with an odds ratio of 5.41. This finding is biologically plausible because increasing wound class reflects greater bacterial contamination of the operative field. Intra-abdominal pus, gastrointestinal spillage, perforated viscera and devitalized tissue increase the microbial load and reduce the ability of local host defences to prevent infection. Meena et al. observed a relationship between surgical wound class, NNIS risk category and SSI occurrence in patients undergoing elective and emergency procedures [13]. Wound classification should therefore be documented consistently and used to stratify patients for enhanced preventive measures and follow-up.

An operative duration greater than 120 minutes was associated with almost sixfold higher odds of postoperative wound infection. Longer procedures increase the duration of tissue exposure, bacterial contamination and handling of the wound. They may also be markers of technically difficult surgery, greater blood loss, advanced disease or intraoperative complications. Operative duration demonstrated a moderate positive correlation with infection in the present analysis. Although procedure complexity cannot always be reduced, unnecessary delays, efficient theatre preparation, experienced surgical assistance and appropriate redosing of prophylactic antibiotics during prolonged procedures may help reduce infection risk.

Diabetes mellitus was significantly associated with wound infection, with diabetic patients having approximately fourfold higher odds than patients without diabetes. Hyperglycaemia can impair neutrophil function, microvascular circulation, collagen synthesis and wound healing. Perioperative glucose assessment and control should therefore form part of infection-prevention protocols. Anaemia, obesity and smoking also showed elevated odds of infection, although the associations were not statistically significant. The absence of statistical significance may be explained by the small sample size and limited number of infection events rather than a genuine absence of clinical effect.

Hypoalbuminaemia was the strongest patient-related factor identified, with an unadjusted odds ratio of 5.38 and an adjusted odds ratio of 4.10. Mean serum albumin was also significantly lower in infected patients. Albumin may reflect nutritional status, systemic inflammation and physiological reserve. Poor nutritional status can impair collagen production, immune function and tissue repair. Mostafa et al., in a systematic review and meta-analysis of surgical patients, found that hypoalbuminaemia was associated with an increased risk of superficial and deep surgical-site infection [14]. Although their population involved fracture surgery, the underlying relationship between impaired nutritional reserve and wound healing remains relevant. Preoperative nutritional screening and correction of reversible deficiencies may consequently be beneficial, particularly before elective abdominal surgery.

Perioperative blood transfusion was significantly associated with postoperative infection. This association may reflect blood loss, prolonged surgery, severe disease and greater operative complexity rather than a direct causal effect of transfusion. Delayed or inappropriate antibiotic prophylaxis also showed an elevated infection risk. Antibiotic prophylaxis should be selected according to the expected organisms and local susceptibility patterns and administered early enough to achieve effective tissue concentrations at incision.

Escherichia coli was the most commonly isolated organism, followed by Staphylococcus aureus and Klebsiella species. This pattern is compatible with the endogenous gastrointestinal source of contamination in abdominal surgery. Salmanov et al. also identified a substantial burden of gram-negative and antimicrobial-resistant organisms among abdominal-surgery SSIs, highlighting the importance of local microbiological surveillance [15]. Empirical treatment should therefore be based on institutional antibiograms and subsequently modified according to culture and susceptibility findings.

Patients with infection had a markedly longer mean hospital stay than those without infection. However, the observed correlation should not be interpreted as proof that prolonged hospitalization caused infection, because SSI itself commonly delays discharge. The small sample size, single-centre design, heterogeneous abdominal procedures and limited number of infection events would restrict the precision and generalizability of the findings. Moreover, a multivariable model based on only 12 events is susceptible to overfitting and should be regarded as exploratory.

## CONCLUSION

The illustrative findings indicate that postoperative wound infection continues to represent an important complication of abdominal surgery. Emergency surgery, contaminated or dirty wounds, prolonged operative duration, diabetes mellitus, hypoalbuminaemia, delayed antimicrobial prophylaxis and perioperative blood transfusion were associated with an increased infection risk. Escherichia coli was the predominant organism, and infected patients experienced longer hospitalization. Careful preoperative optimization, timely antibiotic prophylaxis, nutritional assessment, glycaemic control, strict aseptic practices and structured post-discharge surveillance may help reduce the burden of infection. Larger prospective studies using standardized definitions and adequate follow-up are required to confirm independent predictors in the local population.

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