

**ORIGINAL ARTICLE****Predictors of Prolonged Hospital Stay After Major Abdominal Surgery: An Observational Study**<sup>1</sup>Vivek Kanhere, <sup>2</sup>Sudhir Lokwani<sup>1,2</sup>Assistant Professor, Department of Surgery, Chirayu Medical College and Hospital, Bhopal, India**ABSTRACT:**

**Background:** Prolonged hospital stay after major abdominal surgery increases the risk of hospital-acquired complications, escalates healthcare costs, and limits bed availability in tertiary care centers. Identifying perioperative predictors of prolonged hospitalization is essential for risk stratification and targeted preventive strategies. **Aim:** To determine the predictors of prolonged hospital stay after major abdominal surgery in patients managed at a tertiary care hospital. **Materials and Methods:** This observational study included 85 adult patients undergoing major abdominal surgery (elective or emergency) under general anesthesia at a tertiary care hospital. Demographic variables, comorbidities, nutritional and physiological status (including serum albumin and ASA grade), intraoperative factors (surgical approach, duration, blood loss, transfusion, and intraoperative complications), and postoperative outcomes (ICU admission and postoperative complications) were recorded using a structured proforma and medical record review. Prolonged hospital stay was defined as length of stay exceeding the 75th percentile of the study population. Associations were assessed using appropriate tests for categorical and continuous variables. Variables significant on univariate analysis were entered into multivariate logistic regression to identify independent predictors. A p-value <0.05 was considered statistically significant. **Results:** Of 85 patients, 21 (24.71%) had prolonged hospital stay, while 64 (75.29%) had normal stay. Patients with prolonged stay were older ( $61.29 \pm 13.54$  vs  $49.73 \pm 13.88$  years;  $p=0.001$ ) and had higher rates of BMI  $\geq 25$  kg/m<sup>2</sup> (57.14% vs 32.81%;  $p=0.047$ ), diabetes mellitus (57.14% vs 29.69%;  $p=0.031$ ), hypoalbuminemia (57.14% vs 21.88%;  $p=0.004$ ), and ASA III–IV status (61.90% vs 29.69%;  $p=0.011$ ). Intraoperative factors significantly linked with prolonged stay included emergency surgery (57.14% vs 25.00%;  $p=0.009$ ), open surgery (90.48% vs 60.94%;  $p=0.012$ ), duration >3 hours (71.43% vs 32.81%;  $p=0.002$ ), and blood loss >500 mL (52.38% vs 20.31%;  $p=0.006$ ). Surgical site infection was strongly associated with prolonged stay (52.38% vs 10.94%;  $p<0.001$ ). On multivariate analysis, serum albumin <3.5 g/dL (AOR 3.84;  $p=0.015$ ), duration >3 hours (AOR 4.56;  $p=0.007$ ), surgical site infection (AOR 6.73;  $p=0.002$ ), and emergency surgery (AOR 2.91;  $p=0.048$ ) independently predicted prolonged hospitalization. **Conclusion:** Prolonged hospital stay after major abdominal surgery was primarily driven by hypoalbuminemia, longer operative duration, emergency surgery, and postoperative surgical site infection. Focused perioperative optimization and robust infection-prevention measures may reduce avoidable prolonged admissions in tertiary care settings.

**Keywords:** Major abdominal surgery; Prolonged hospital stay; Hypoalbuminemia; Surgical site infection; Emergency surgery

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**INTRODUCTION**

Major abdominal surgery remains a cornerstone of treatment for a wide range of gastrointestinal, hepatobiliary, pancreatic, and colorectal diseases. Despite advances in surgical technique, anesthesia, critical care, and perioperative pathways, recovery after these operations is often complex and highly variable. Length of hospital stay (LOS) is therefore widely used as a practical summary measure of postoperative recovery, resource utilization, and health-system performance. When LOS is prolonged, it increases exposure to hospital-acquired complications, delays functional rehabilitation, reduces bed availability, and amplifies direct and indirect costs for patients and institutions.<sup>1</sup> Prolonged hospital stay after major abdominal surgery is rarely explained by a single factor. Instead, it reflects an interaction between baseline patient risk, operative stress, and postoperative events. Patient-related factors such as older age, higher body mass index,

comorbidities (particularly diabetes and cardiopulmonary disease), poor functional capacity, anemia, and impaired nutritional reserve can reduce physiologic resilience and slow recovery.<sup>2</sup> Among these, poor nutritional status is especially relevant in abdominal surgery because it is associated with reduced wound healing capacity, impaired immune response, and vulnerability to sepsis and catabolism. Even when surgery is technically successful, patients with limited physiologic reserve may need more time to mobilize, tolerate oral feeding, and achieve discharge criteria, contributing to longer hospital stay. In day-to-day clinical practice, surgeons and anesthesiologists recognize this variability, but quantifying which factors most strongly predict prolonged stay within a specific hospital environment is essential for targeted optimization. Operative and perioperative care processes also influence LOS. Surgical approach (open versus minimally invasive), procedure complexity, operative duration, blood loss,

fluid shifts, and need for transfusion affect inflammatory response and recovery trajectory.<sup>3</sup> Longer operative duration often serves as a surrogate for technical complexity, adhesions, advanced disease, intraoperative challenges, or complications, and may be linked to higher postoperative pain burden, ileus, infections, or cardiopulmonary stress. The need for intraoperative transfusion may similarly reflect major blood loss or preoperative anemia and can be associated with immunomodulation and infection risk. In tertiary settings where complex resections and emergency operations are common, these intraoperative variables may become particularly important determinants of prolonged stay. Postoperative complications are among the most direct causes of extended hospitalization. Surgical site infection (SSI), pneumonia, anastomotic leak, intra-abdominal sepsis, postoperative ileus, and unplanned reoperation can delay oral intake, prolong antibiotic therapy, require drainage or reintervention, and increase ICU utilization.<sup>4</sup> Even “moderate” complications can lead to stepwise delays in discharge readiness, while major complications can produce prolonged immobility, nutritional deterioration, and readmission risk. Because many postoperative complications are potentially preventable or modifiable through protocolized care, identifying their contribution to prolonged LOS helps prioritize high-impact quality improvement interventions such as antimicrobial prophylaxis optimization, early mobilization, respiratory physiotherapy, glycemic control, and standardized feeding and analgesia pathways. Enhanced Recovery After Surgery (ERAS) programs were developed to reduce surgical stress and accelerate functional recovery through multimodal, evidence-based perioperative strategies. Key ERAS principles include preoperative counseling, minimal fasting with carbohydrate loading when appropriate, multimodal opioid-sparing analgesia, goal-directed fluid therapy, early enteral nutrition, early mobilization, and standardized discharge planning. In colorectal surgery and other major abdominal procedures, ERAS has been associated with shorter LOS without increasing readmissions when implemented effectively.<sup>5</sup> However, real-world outcomes vary, and protocol benefits depend heavily on adherence to core elements. Moreover, many tertiary care hospitals face barriers to consistent ERAS delivery, including heterogeneous surgical practices, high emergency caseloads, and limited physiotherapy or nutrition resources. Consequently, prolonged LOS continues to be observed even in institutions that have adopted parts of ERAS principles, highlighting the need for local data to identify the strongest predictors and the most feasible points of intervention. Emergency surgery warrants special attention. Compared with elective surgery, emergency operations often occur in physiologically compromised patients with sepsis, dehydration,

electrolyte disturbances, bowel obstruction or perforation, and limited time for optimization.<sup>6</sup>

## MATERIALS AND METHODS

This observational study was conducted at a tertiary care hospital to identify predictors of prolonged hospital stay among patients undergoing major abdominal surgery. The hospital is a high-volume referral center providing advanced surgical and critical care services. The study was designed to evaluate perioperative factors associated with extended hospitalization following major abdominal procedures. A total of 85 patients who underwent major abdominal surgery were included in the study. Eligible participants were adult patients of either gender who underwent elective or emergency major abdominal surgical procedures under general anesthesia. Major abdominal surgery was defined as procedures involving entry into the peritoneal cavity, including gastrointestinal, hepatobiliary, pancreatic, and colorectal surgeries. Patients undergoing minor procedures, laparoscopic diagnostic procedures without therapeutic intervention, day-care surgeries, or those discharged against medical advice were excluded from the study.

### Methodology

A consecutive sampling method was used, and all eligible patients meeting the inclusion criteria during the study period were enrolled until the required sample size of 85 patients was achieved. Data were collected using a structured proforma and review of medical records. Preoperative variables recorded included demographic characteristics (age, sex, body mass index), comorbidities (diabetes mellitus, hypertension, chronic kidney disease, chronic obstructive pulmonary disease, ischemic heart disease), smoking and alcohol history, nutritional status (serum albumin levels), American Society of Anesthesiologists (ASA) physical status classification, hemoglobin levels, and indication for surgery.

Intraoperative variables included type of surgery (elective or emergency), surgical specialty, duration of surgery, estimated blood loss, need for intraoperative blood transfusion, surgical approach (open or laparoscopic), intraoperative complications, and requirement for vasopressor support.

Postoperative parameters recorded were admission to intensive care unit (ICU), duration of ICU stay, postoperative complications (surgical site infection, anastomotic leak, pneumonia, urinary tract infection, sepsis, postoperative ileus), need for reoperation, need for postoperative blood transfusion, duration of drain placement, and time to return of bowel function.

The primary outcome was prolonged hospital stay, defined as a length of hospital stay exceeding the 75th percentile of the total hospital stay among the study population. Length of hospital stay was calculated from the date of surgery to the date of discharge.

Patients were categorized into two groups: normal hospital stay and prolonged hospital stay.

### Statistical Analysis

Data were entered and analyzed using appropriate statistical software. Continuous variables were expressed as mean  $\pm$  standard deviation or median with interquartile range, depending on data distribution. Categorical variables were presented as frequencies and percentages. The association between independent variables and prolonged hospital stay was assessed using the chi-square test or Fisher's exact test for categorical variables and independent t-test or Mann-Whitney U test for continuous variables. Variables showing statistical significance in univariate analysis were included in multivariate logistic regression analysis to identify independent predictors of prolonged hospital stay. A p-value of less than 0.05 was considered statistically significant.

### RESULTS

A total of 85 patients were analyzed in this study. The mean age of the study population was  $52.84 \pm 14.62$  years. Based on the 75th percentile cut-off for hospital stay, 21 patients (24.71%) were classified as having prolonged hospital stay, while 64 patients (75.29%) had a normal duration of hospitalization.

#### Table 1: Baseline Demographic and Clinical Characteristics

Analysis of baseline characteristics demonstrated that advanced age was significantly associated with prolonged hospital stay. Among patients aged  $\geq 60$  years, 57.14% were in the prolonged stay group compared to 26.56% in the normal stay group ( $p = 0.018$ ). Similarly, higher body mass index ( $BMI \geq 25$  kg/m<sup>2</sup>) was significantly more common in patients with prolonged hospitalization (57.14%) than in those with normal stay (32.81%) ( $p = 0.047$ ).

Diabetes mellitus showed a statistically significant association with prolonged stay, being present in 57.14% of patients in the prolonged group compared to 29.69% in the normal group ( $p = 0.031$ ). Hypoalbuminemia (serum albumin  $< 3.5$  g/dL) was strongly associated with extended hospitalization, observed in 57.14% of prolonged stay patients versus 21.88% in normal stay patients ( $p = 0.004$ ). Additionally, higher ASA grade (III-IV) was significantly more frequent in the prolonged stay group (61.90%) compared to the normal stay group (29.69%) ( $p = 0.011$ ), indicating that patients with greater preoperative systemic illness had longer hospitalizations.

Although male gender and hypertension were more frequent in the prolonged stay group (66.67% and 42.86%, respectively) compared to the normal stay group (54.69% and 28.13%), these differences were not statistically significant ( $p = 0.339$  and  $p = 0.209$ , respectively).

#### Table 2: Intraoperative Variables and Association with Prolonged Hospital Stay

Emergency surgery was significantly associated with prolonged hospitalization. Among patients undergoing emergency procedures, 57.14% experienced prolonged stay compared to 25.00% in the normal stay group ( $p = 0.009$ ). Open surgical approach was also significantly related to extended hospital stay, with 90.48% of prolonged stay patients undergoing open surgery versus 60.94% in the normal stay group ( $p = 0.012$ ).

Operative duration greater than 3 hours showed a strong association with prolonged hospitalization, occurring in 71.43% of patients in the prolonged group compared to 32.81% in the normal group ( $p = 0.002$ ). Significant intraoperative blood loss ( $> 500$  mL) was also more common in prolonged stay patients (52.38%) than in normal stay patients (20.31%) ( $p = 0.006$ ).

Similarly, the need for intraoperative blood transfusion was significantly higher in the prolonged group (47.62%) compared to the normal group (18.75%) ( $p = 0.014$ ). Intraoperative complications were observed in 38.10% of patients with prolonged stay versus 10.94% in the normal stay group, demonstrating a statistically significant association ( $p = 0.005$ ). These findings indicate that surgical complexity and intraoperative adverse events significantly contributed to extended hospitalization.

#### Table 3: Postoperative Complications and Hospital Stay

Postoperative factors showed a strong correlation with prolonged hospital stay. ICU admission was significantly higher in the prolonged group (61.90%) compared to the normal stay group (26.56%) ( $p = 0.004$ ).

Surgical site infection (SSI) demonstrated the strongest association, occurring in 52.38% of patients with prolonged stay compared to only 10.94% in the normal stay group ( $p < 0.001$ ). Postoperative pneumonia was also significantly associated with prolonged hospitalization, seen in 28.57% of prolonged stay patients versus 6.25% of normal stay patients ( $p = 0.008$ ).

Anastomotic leak was markedly higher in the prolonged group (23.81%) compared to 1.56% in the normal stay group ( $p = 0.001$ ). Postoperative ileus occurred in 38.10% of prolonged stay patients compared to 9.38% in normal stay patients ( $p = 0.003$ ). Sepsis was observed in 28.57% of prolonged stay patients versus 4.69% in the normal stay group ( $p = 0.002$ ). Reoperation was also significantly more frequent in patients with prolonged hospitalization (23.81%) compared to 3.13% in the normal group ( $p = 0.004$ ).

These results highlight that postoperative complications were major contributors to extended hospital stay.

**Table 4: Comparison of Continuous Variables**

Continuous variable analysis further reinforced the association between perioperative factors and prolonged hospitalization. The mean age was significantly higher in the prolonged stay group (61.29 ± 13.54 years) compared to the normal stay group (49.73 ± 13.88 years) (p = 0.001).

The mean duration of surgery was significantly longer in patients with prolonged stay (3.96 ± 1.08 hours) than in those with normal stay (2.74 ± 0.91 hours) (p < 0.001). Mean intraoperative blood loss was substantially higher in the prolonged group (688.10 ± 240.45 mL) compared to the normal group (412.50 ± 188.62 mL) (p < 0.001).

ICU stay was significantly prolonged among patients with extended hospitalization (3.76 ± 1.42 days) versus those with normal stay (1.18 ± 0.94 days) (p < 0.001). As expected, total hospital stay was significantly greater in the prolonged group (18.62 ± 4.35 days) compared to the normal group (8.46 ± 2.11 days) (p < 0.001).

**Table 5: Multivariate Logistic Regression Analysis**

On multivariate logistic regression analysis, several variables emerged as independent predictors of prolonged hospital stay. Hypoalbuminemia (serum albumin <3.5 g/dL) increased the odds of prolonged hospitalization by 3.84 times (AOR 3.84; 95% CI 1.29–11.42; p = 0.015). Operative duration greater than 3 hours independently increased the risk by 4.56 times (AOR 4.56; 95% CI 1.52–13.68; p = 0.007). Surgical site infection was the strongest independent predictor, increasing the likelihood of prolonged hospital stay by 6.73 times (AOR 6.73; 95% CI 2.01–22.48; p = 0.002). Emergency surgery also independently predicted prolonged hospitalization, with nearly threefold increased odds (AOR 2.91; 95% CI 1.01–8.36; p = 0.048).

A total of 85 patients were included in the study. The mean age of the study population was 52.84 ± 14.62 years. Based on the 75th percentile cut-off for length of hospital stay, 21 patients (24.71%) were categorized into the prolonged hospital stay group, while 64 patients (75.29%) had a normal hospital stay.

**Table 1: Baseline Demographic and Clinical Characteristics**

Variable	Total (n=85)	Normal Stay (n=64)	Prolonged Stay (n=21)	p-value
Age ≥60 years	29 (34.12%)	17 (26.56%)	12 (57.14%)	0.018
Male	49 (57.65%)	35 (54.69%)	14 (66.67%)	0.339
BMI ≥25 kg/m <sup>2</sup>	33 (38.82%)	21 (32.81%)	12 (57.14%)	0.047
Diabetes Mellitus	31 (36.47%)	19 (29.69%)	12 (57.14%)	0.031
Hypertension	27 (31.76%)	18 (28.13%)	9 (42.86%)	0.209
Serum Albumin <3.5 g/dL	26 (30.59%)	14 (21.88%)	12 (57.14%)	0.004
ASA Grade III–IV	32 (37.65%)	19 (29.69%)	13 (61.90%)	0.011

**Table 2: Intraoperative Variables and Association with Prolonged Hospital Stay**

Variable	Total (n=85)	Normal Stay (n=64)	Prolonged Stay (n=21)	p-value
Emergency Surgery	28 (32.94%)	16 (25.00%)	12 (57.14%)	0.009
Open Surgery	58 (68.24%)	39 (60.94%)	19 (90.48%)	0.012
Duration >3 hours	36 (42.35%)	21 (32.81%)	15 (71.43%)	0.002
Blood Loss >500 mL	24 (28.24%)	13 (20.31%)	11 (52.38%)	0.006
Intraoperative Transfusion	22 (25.88%)	12 (18.75%)	10 (47.62%)	0.014
Intraoperative Complications	15 (17.65%)	7 (10.94%)	8 (38.10%)	0.005

**Table 3: Postoperative Complications and Hospital Stay**

Variable	Total (n=85)	Normal Stay (n=64)	Prolonged Stay (n=21)	p-value
ICU Admission	30 (35.29%)	17 (26.56%)	13 (61.90%)	0.004
Surgical Site Infection	18 (21.18%)	7 (10.94%)	11 (52.38%)	<0.001
Pneumonia	10 (11.76%)	4 (6.25%)	6 (28.57%)	0.008
Anastomotic Leak	6 (7.06%)	1 (1.56%)	5 (23.81%)	0.001
Postoperative Ileus	14 (16.47%)	6 (9.38%)	8 (38.10%)	0.003
Sepsis	9 (10.59%)	3 (4.69%)	6 (28.57%)	0.002
Reoperation	7 (8.24%)	2 (3.13%)	5 (23.81%)	0.004

**Table 4: Comparison of Continuous Variables**

Variable	Normal Stay (n=64) Mean ± SD	Prolonged Stay (n=21) Mean ± SD	p-value
Age (years)	49.73 ± 13.88	61.29 ± 13.54	0.001
Duration of Surgery (hours)	2.74 ± 0.91	3.96 ± 1.08	<0.001
Blood Loss (mL)	412.50 ± 188.62	688.10 ± 240.45	<0.001
ICU Stay (days)	1.18 ± 0.94	3.76 ± 1.42	<0.001
Total Hospital Stay (days)	8.46 ± 2.11	18.62 ± 4.35	<0.001

**Table 5: Multivariate Logistic Regression Analysis for Independent Predictors of Prolonged Hospital Stay**

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Serum Albumin <3.5 g/dL	3.84	1.29–11.42	0.015
Duration of Surgery >3 hours	4.56	1.52–13.68	0.007
Surgical Site Infection	6.73	2.01–22.48	0.002
Emergency Surgery	2.91	1.01–8.36	0.048

## DISCUSSION

In this tertiary-care cohort (n=85), 24.71% (21/85) had prolonged hospital stay (PHS) using the 75th percentile cut-off, with a marked separation in mean LOS between the normal and PHS groups (8.46 ± 2.11 vs 18.62 ± 4.35 days). This proportion of extended admission is comparable to the broad resource use reported in large emergency intra-abdominal surgery datasets; for example, Shapter et al. (2012) reported substantial postoperative bed utilization after emergency laparotomy with a median hospital stay around two weeks (commonly reported near ~13 days), highlighting how case-mix and acuity at referral centers can push LOS beyond routine postoperative pathways.<sup>7</sup>

Age showed a clear gradient in our study: patients aged ≥60 years were significantly more represented in the PHS group (57.14% vs 26.56%, p=0.018), and the PHS group had a higher mean age (61.29 ± 13.54 vs 49.73 ± 13.88 years, p=0.001). Similar age-related prolongation has been demonstrated in emergency abdominal surgery populations; Stonelake et al. (2013) described longer median LOS in older patients (with LOS commonly extending well beyond that of younger groups), supporting the plausibility that frailty, comorbidity burden, and slower functional recovery contribute to extended hospitalization—consistent with our observed 10-day absolute LOS gap between groups.<sup>8</sup>

In our cohort, BMI ≥25 kg/m<sup>2</sup> was more frequent among PHS patients (57.14% vs 32.81%, p=0.047), suggesting that overweight/obesity may contribute to delayed recovery, wound issues, or reduced mobilization after major abdominal surgery. However, large multi-procedure analyses have shown that the relationship between BMI and LOS is not always linear; Sood et al. (2015), using ACS-NSQIP across major operations, reported procedure-specific effects where overweight/obese categories were not uniformly associated with prolonged LOS and, in some procedures, even showed lower odds of prolonged LOS compared with normal BMI—contrasting with our abdominal-surgery-focused signal.<sup>9</sup>

Nutritional and physiological reserve were strongly linked to PHS in our results. Hypoalbuminemia (<3.5 g/dL) was present in 57.14% of the PHS group vs 21.88% of the normal stay group (p=0.004) and remained an independent predictor (AOR 3.84; p=0.015). This aligns with classic surgical risk evidence: Gibbs et al. (1999) demonstrated an exponential rise in adverse outcomes with decreasing

albumin, with morbidity increasing from roughly 10% at higher albumin levels to as high as ~65% at very low levels—supporting the mechanism by which malnutrition/inflammation predisposes to infections and sepsis that lengthen hospitalization, similar to the complication-driven LOS expansion observed in our PHS group.<sup>10</sup>

Operative complexity markers were consistently associated with PHS in this study: duration >3 hours (71.43% vs 32.81%, p=0.002), higher blood loss >500 mL (52.38% vs 20.31%, p=0.006), and intraoperative complications (38.10% vs 10.94%, p=0.005), with operative duration >3 hours remaining independently predictive (AOR 4.56; p=0.007). Broad surgical outcomes research supports this pattern—Procter et al. (2010) reported that increasing operative duration was independently associated with higher infectious complication rates and increased LOS after adjustment for multiple patient and procedural factors, consistent with our finding that longer operations (mean 3.96 ± 1.08 h in PHS vs 2.74 ± 0.91 h) accompany substantially longer hospitalization.<sup>11</sup>

Transfusion and hemorrhage proxies in our cohort were also associated with PHS (intraoperative transfusion: 47.62% vs 18.75%, p=0.014; blood loss higher by ~276 mL on average). Evidence from colorectal surgery populations demonstrates that transfusion is linked to longer hospitalization; Halabi et al. (2013) reported increased LOS associated with perioperative transfusion in colorectal resections (with LOS differences commonly reported in the range of several additional days), supporting our observation that hemodynamic instability/physiologic stress and transfusion-related immunomodulation may contribute to infection, ileus, and delayed discharge in major abdominal operations.<sup>12</sup>

Postoperative complications were the dominant drivers of extended admission in our data, particularly surgical site infection (SSI), which occurred in 52.38% of the PHS group vs 10.94% of the normal group (p<0.001) and was the strongest independent predictor (AOR 6.73; p=0.002). This magnitude is biologically and operationally coherent with classic SSI burden literature: Kirkland et al. (1999) demonstrated that SSI substantially increases postoperative LOS compared with uninfected patients (often by several days) and markedly increases resource use, mirroring our finding that complications cluster in the PHS group and coincide with an ~10-day longer mean hospital stay.<sup>13</sup>

Among specific complications, anastomotic leak was rare overall (7.06%) but concentrated in PHS patients

(23.81% vs 1.56%,  $p=0.001$ ), reflecting the well-known high-penalty effect of leak on recovery. The scale of LOS prolongation observed in our cohort is comparable to colorectal cancer surgery data reported by Kim et al. (2015), where the leak group had a mean hospital stay of about 30 days versus 13 days in the non-leak group ( $p<0.001$ ), consistent with our PHS mean LOS of 18.62 days and the need for ICU, antibiotics, drainage, or reoperation in leak scenarios.<sup>14</sup>

Functional recovery complications also meaningfully contributed to prolonged admission in our cohort—postoperative ileus (38.10% vs 9.38%,  $p=0.003$ ), pneumonia (28.57% vs 6.25%,  $p=0.008$ ), sepsis (28.57% vs 4.69%,  $p=0.002$ ), and reoperation (23.81% vs 3.13%,  $p=0.004$ ), alongside longer ICU stay ( $3.76 \pm 1.42$  vs  $1.18 \pm 0.94$  days). Large colectomy analyses have similarly shown that ileus is associated with worse postoperative trajectories; Tevis et al. (2015) reported that patients with ileus had substantially higher adverse outcome rates (about 59% vs 25% without ileus) and longer LOS, supporting our interpretation that preventing/treating ileus and pulmonary/infectious complications is central to reducing prolonged hospitalization after major abdominal surgery.<sup>15</sup>

## CONCLUSION

Prolonged hospital stay occurred in 24.71% of patients after major abdominal surgery and was strongly influenced by both perioperative risk factors and postoperative complications. Hypoalbuminemia, longer operative duration (>3 hours), surgical site infection, and emergency surgery were independent predictors of prolonged hospitalization. These findings emphasize the importance of preoperative nutritional optimization, meticulous operative planning to reduce operative time and blood loss, and strict strategies for prevention and early management of postoperative infections. Targeted risk stratification and complication-prevention bundles may help reduce avoidable prolonged stays and improve surgical outcomes in tertiary care settings.

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