Research Article *Cuestiones de Fisioterapia* Medicine

THE IMPACT OF POSTOPERATIVE COMPLICATIONS ON 30-DAY READMISSION AFTER GENERAL SURGERY

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Abstract

In this prospective cohort study, unplanned 30-day readmission following general surgical procedures occurred in 12% of patients, highlighting a substantial burden on both healthcare resources and patient outcomes. The analysis demonstrated that postoperative complications during the index admission were the strongest predictors of readmission, increasing the likelihood of rehospitalization by more than threefold. Surgical-site infection emerged as another major determinant, emphasizing the ongoing impact of wound-related complications on postoperative recovery. Patients undergoing emergency surgery were also at elevated risk, likely reflecting greater disease severity, limited opportunities for preoperative optimization, and higher rates of postoperative morbidity. Similarly, prolonged index hospital stay was independently associated with readmission, suggesting that extended hospitalization may serve as a marker of clinical complexity and unresolved recovery issues. Diabetes mellitus contributed significantly to readmission risk, consistent with its known effects on wound healing, infection susceptibility, and postoperative recovery. Wound-related and gastrointestinal complications represented the most common reasons for readmission, indicating key targets for preventive interventions. These findings underscore the importance of comprehensive perioperative care strategies that extend beyond the initial hospital stay. Enhanced infection-prevention measures, meticulous postoperative monitoring, optimized glycaemic control, and early recognition of complications may substantially reduce readmission rates. Furthermore, structured discharge planning, patient education regarding warning symptoms, medication reconciliation, and timely post-discharge follow-up could facilitate earlier intervention and prevent avoidable rehospitalizations. The study supports the use of risk-based discharge pathways that prioritize high-risk patients, particularly those with postoperative complications, diabetes, emergency surgical admissions, and prolonged hospital stays. Future multicentre studies are warranted to validate these findings and evaluate targeted interventions designed to reduce readmission and improve long-term surgical outcomes.

Keywords: *Hospital readmission; General surgery; Surgical-site infection; Postoperative complications; Risk factors.*

Introduction

Unplanned hospital readmission following surgery is increasingly recognized as an important indicator of healthcare quality, patient safety, and the effectiveness of perioperative care. Readmissions place a significant burden on healthcare systems through increased resource utilization, prolonged treatment costs, and reduced hospital efficiency. For patients and their families, readmission is often associated with

physical discomfort, psychological distress, disruption of recovery, and diminished quality of life. Consequently, 30-day readmission rates have been adopted by many healthcare organizations and regulatory bodies as a benchmark for evaluating surgical outcomes and institutional performance [1,2]. In several healthcare systems, excessive readmission rates may also result in financial penalties, further highlighting the importance of understanding and reducing avoidable rehospitalizations. General surgical patients are particularly vulnerable to readmission because postoperative recovery is influenced by a complex interaction of patient-related, disease-related, operative, and healthcare-system factors. Previous studies have demonstrated that a considerable proportion of postoperative readmissions may be preventable through timely recognition and management of complications, improved discharge planning, and enhanced continuity of care [3]. Identifying modifiable risk factors is therefore essential for developing effective strategies aimed at reducing readmission and improving patient outcomes. The causes of readmission after general surgery are diverse, although postoperative complications remain the predominant contributors. Surgical-site infections (SSIs) represent one of the most frequently reported reasons for rehospitalization, often leading to wound breakdown, abscess formation, delayed healing, and the need for additional procedures [4]. Gastrointestinal complications, including ileus, bowel obstruction, nausea, vomiting, and dehydration, are also common causes of return to hospital. Furthermore, wound-related problems, pain, and complications associated with underlying comorbid conditions may contribute substantially to postoperative readmissions [5]. The occurrence of these complications not only prolongs recovery but also increases the risk of morbidity and healthcare expenditure. Several patient and procedural factors have been associated with an increased likelihood of readmission. Advanced age, diabetes mellitus, cardiovascular disease, poor nutritional status, and other chronic illnesses may impair recovery and increase susceptibility to complications. Emergency surgical procedures, which are often performed in patients with more severe disease and limited opportunities for preoperative optimization, have consistently been linked to higher readmission rates. Likewise, prolonged index hospitalization may indicate greater clinical complexity and unresolved postoperative issues that predispose patients to subsequent rehospitalization [6]. Recognition of patients at elevated risk provides an opportunity for targeted interventions. Evidence suggests that infection-prevention measures, standardized discharge protocols, comprehensive patient education, medication reconciliation, and early post-discharge follow-up can reduce avoidable readmissions and improve recovery outcomes [7]. However, the relative contribution of risk factors may vary across institutions due to differences in patient populations, surgical case mix, and local care pathways. Therefore, institution-specific data are essential to inform quality-improvement initiatives and optimize postoperative care. The present prospective cohort study was undertaken to identify factors associated with 30-day unplanned readmission following general surgical procedures and to characterize the principal reasons for readmission in a contemporary surgical population.

Aim: To identify risk factors for 30-day readmission following general surgical procedures.

Primary objective: To determine factors independently associated with 30-day unplanned readmission.

Secondary objectives: (i) To describe the principal reasons for readmission; (ii) to quantify the contribution of index complications.

Hypotheses: Null (H_0) — the studied factors are not associated with readmission. Alternative (H_1) — index complications, infection, and higher-risk patient/operative factors are associated with readmission.

This study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies.

MATERIALS AND METHODS

Study Design and Setting

A prospective cohort study was carried out in the Department of General Surgery, [Institution Name], over a period of [study period]. Consecutive adult patients undergoing general surgical procedures were enrolled and followed from hospital admission through 30 days after discharge. Follow-up was performed through outpatient visits, telephone interviews, and review of hospital records to identify unplanned readmissions occurring within the study period.

Ethical Considerations

The study protocol was reviewed and approved .Written informed consent was obtained from all participants prior to enrollment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and subsequent amendments.

Study Participants

Adult patients (≥18 years) who underwent general surgical procedures and were discharged alive from the hospital were eligible for inclusion. Both elective and emergency surgical cases were considered. Patients were excluded if they had a planned readmission for staged surgical procedures or postoperative treatment, died during the index hospitalization, were transferred to another healthcare facility, or were lost to follow-up before completion of the 30-day observation period.

Outcome Measures and Study Variables

The primary outcome was unplanned hospital readmission within 30 days of discharge following the index surgical admission. Readmission was defined as any unexpected hospitalization related to the patient's surgical condition or postoperative recovery occurring within the specified follow-up period. Potential predictors evaluated included demographic characteristics (age and sex), clinical variables (diabetes mellitus and other comorbidities), American Society of Anesthesiologists (ASA) physical status classification, type of surgery (elective or emergency), postoperative complications during the index admission classified according to the Clavien–Dindo grading system, occurrence of surgical-site infection (SSI), and length of hospital stay during the index admission. Reasons for readmission were categorized into wound-related, gastrointestinal, medical, and other causes.

Sample Size Estimation

Based on an anticipated 30-day readmission rate of approximately 12% and the requirement of at least 10 outcome events per predictor variable in multivariable logistic regression, a minimum sample size of approximately 320 patients was calculated to provide adequate statistical power for evaluating eight predictor variables.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version. Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate, while categorical variables were presented as frequencies and percentages. Comparisons between readmitted and non-readmitted patients were performed using the independent-samples t-test or Mann–Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. Variables with a univariable p-value <0.10 and those considered clinically relevant were entered into a multivariable logistic regression model to identify independent predictors of readmission. Results

were reported as adjusted odds ratios (aORs) with 95% confidence intervals (CIs). Reasons for readmission were summarized descriptively. All statistical tests were two-sided, and a p-value <0.05 was considered statistically significant.

RESULTS

Cohort characteristics and readmission rate

A total of 320 patients who underwent general surgical procedures and were discharged alive were included in the final analysis. During the 30-day follow-up period, 38 patients experienced an unplanned hospital readmission, corresponding to an overall readmission rate of 12% (38/320). Comparisons between patients who were readmitted and those who were not revealed several significant differences in baseline and perioperative characteristics. Readmitted patients were older, with a mean age of 59 ± 14 years compared with 52 ± 15 years among non-readmitted patients ($p < 0.001$). Emergency surgical procedures were more frequent in the readmitted group (42% vs. 22%, $p < 0.01$). Likewise, postoperative complications during the index admission occurred substantially more often among patients who were subsequently readmitted (55% vs. 17%, $p < 0.001$). Surgical-site infection (SSI) was also markedly more prevalent in the readmitted cohort, affecting 34% of patients compared with only 7% among those not readmitted ($p < 0.001$). Diabetes mellitus was significantly more common among readmitted patients (37% vs. 21%, $p = 0.01$). Detailed patient characteristics according to readmission status are presented in Table 1.

Table 1: Characteristics by readmission status.

Variable	Not readmitted	Readmitted	p
Age (years), mean ± SD	52 ± 15	59 ± 14	<0.001
Emergency surgery, n (%)	62 (22)	16 (42)	<0.01
Index complication, n (%)	48 (17)	21 (55)	<0.001
Surgical-site infection, n (%)	20 (7)	13 (34)	<0.001
Diabetes, n (%)	59 (21)	14 (37)	0.01

Independent predictors

Variables demonstrating clinical relevance and significant univariable associations were entered into a multivariable logistic regression model. Postoperative complications during the index admission emerged as the strongest independent predictor of readmission, increasing the odds of rehospitalization by approximately threefold (aOR 3.1, 95% CI 2.1–4.6, $p < 0.001$). Surgical-site infection was also independently associated with a significantly elevated risk of readmission (aOR 2.7, 95% CI 1.7–4.2, $p < 0.001$). Patients with prolonged index hospital stays had twice the likelihood of readmission compared with those with shorter stays (aOR 2.0, 95% CI 1.3–3.0, $p < 0.01$). Emergency surgery remained a significant predictor (aOR 1.9, 95% CI 1.3–2.8, $p < 0.01$), while diabetes mellitus independently increased the risk by approximately 70% (aOR 1.7, 95% CI 1.2–2.5, $p = 0.01$).

Table 2: Independent predictors of 30-day readmission.

Predictor	aOR	95% CI	p
Index complication	3.1	2.1–4.6	<0.001
Surgical-site infection	2.7	1.7–4.2	<0.001

Prolonged index stay	2.0	1.3–3.0	<0.01
Emergency surgery	1.9	1.3–2.8	<0.01
Diabetes mellitus	1.7	1.2–2.5	0.01

Reasons for readmission

Analysis of the causes of rehospitalization demonstrated that wound-related complications and surgical-site infections constituted the largest proportion of readmissions. Gastrointestinal causes, including postoperative ileus, bowel dysfunction, dehydration, and abdominal symptoms requiring further evaluation, represented the second most common category. Other causes included medical complications related to underlying comorbidities, pain management issues, and miscellaneous postoperative concerns. Collectively, wound and gastrointestinal complications accounted for the majority of unplanned readmissions within 30 days following surgery, emphasizing the importance of postoperative surveillance, infection prevention, and structured follow-up strategies aimed at reducing avoidable rehospitalization.

Figure 1. Adjusted odds ratios for 30-day readmission after general surgery

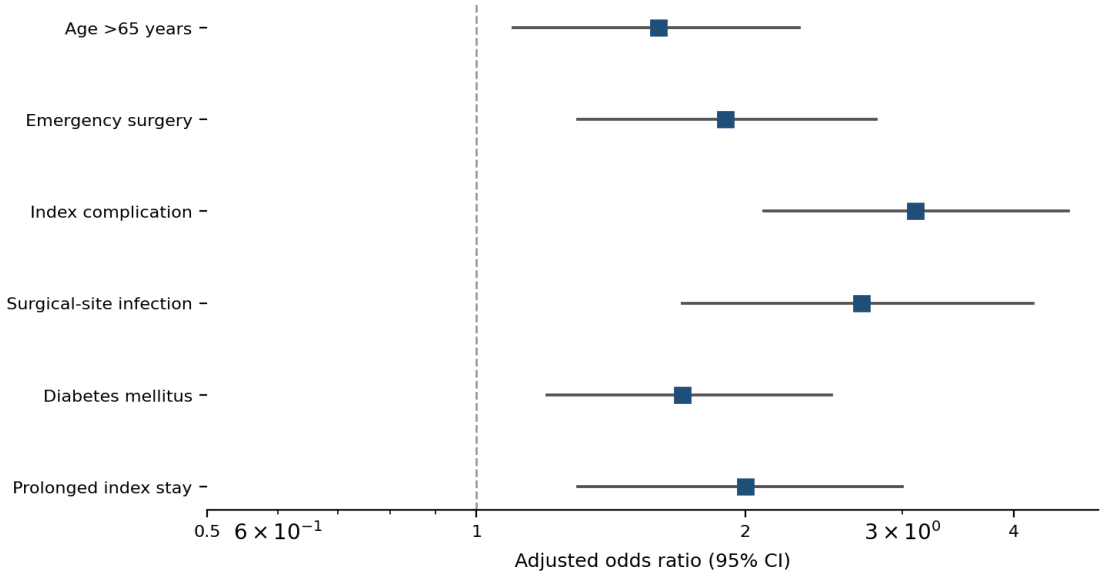

Figure 1: Adjusted odds ratios (95% CI) for 30-day readmission.

Figure 2. Principal reasons for 30-day readmission

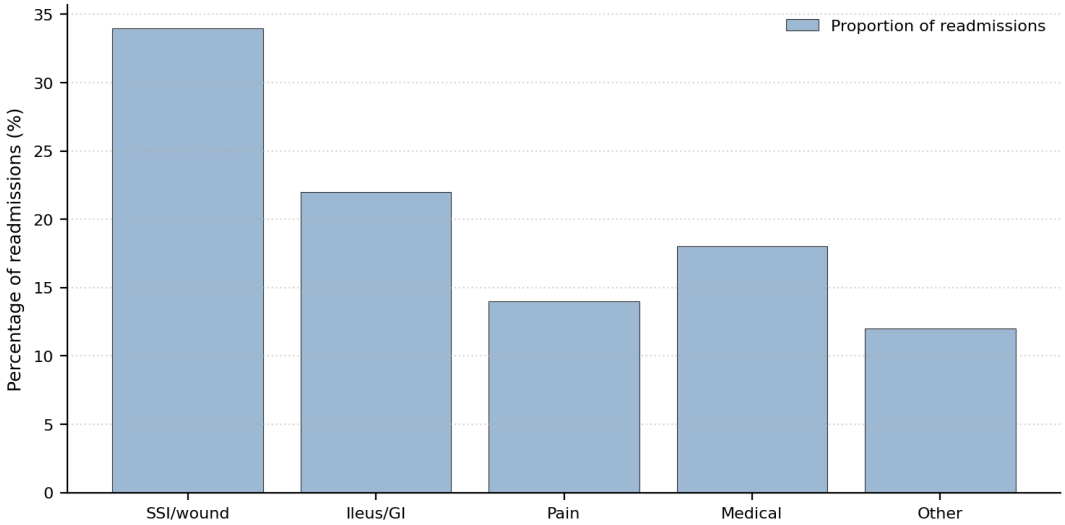

Figure 2: Principal reasons for 30-day readmission.

DISCUSSION

In this prospective cohort study, the overall 30-day unplanned readmission rate following general surgical procedures was 12%, with postoperative complications during the index admission emerging as the strongest independent predictor of readmission (8). Surgical-site infection (SSI), prolonged index hospital stay, emergency surgery, and diabetes mellitus were also independently associated with an increased likelihood of rehospitalization (9). Analysis of readmission causes demonstrated that wound-related complications and gastrointestinal disorders accounted for the majority of return admissions. These findings highlight the continuing importance of postoperative complications as key determinants of healthcare utilization and patient outcomes after surgery (10). The strong association between index postoperative complications and subsequent readmission is consistent with previous studies demonstrating that the quality and course of the initial hospitalization have a major influence on post-discharge outcomes. Patients who experience complications often require additional interventions, prolonged recovery, and closer monitoring, all of which increase the risk of deterioration after discharge (11). Similarly, the significant impact of SSI observed in this study reinforces the central role of infection in driving postoperative morbidity and healthcare resource utilization. Surgical-site infections may lead to wound breakdown, abscess formation, delayed healing, and the need for further treatment, making them one of the most preventable causes of readmission. Consequently, adherence to evidence-based infection-prevention strategies, including perioperative antibiotic stewardship, meticulous surgical technique, and standardized wound-care protocols, may contribute substantially to reducing readmission rates (12). Emergency surgery was another important predictor of readmission, likely reflecting the greater severity of illness, limited preoperative optimization, and higher complication rates associated with urgent procedures. Likewise, prolonged index hospitalization may serve as a surrogate marker for increased clinical complexity and unresolved postoperative issues. The association between diabetes mellitus and readmission is biologically plausible, given the adverse effects of hyperglycaemia on immune function, wound healing, and susceptibility to infection. The findings support the implementation of risk-stratified discharge planning. Patients with postoperative complications, SSI, diabetes, emergency surgical admissions, or prolonged hospital stays may benefit from enhanced discharge counselling, structured wound surveillance, medication review, and early post-discharge follow-up. Such targeted interventions have the potential to identify complications at

an earlier stage and reduce avoidable rehospitalizations. Strengths of this study include its prospective design, standardized assessment of postoperative complications, and multivariable adjustment for potential confounders. Nevertheless, several limitations should be acknowledged. The single-centre setting may limit the generalizability of the findings, and readmissions to other healthcare facilities may not have been fully captured. Furthermore, the inclusion of a heterogeneous range of surgical procedures introduces case-mix variation, and some identified risk factors are inherently non-modifiable. Future multicentre studies with larger and more diverse patient populations are warranted to validate these findings and evaluate the effectiveness of targeted discharge planning, infection-prevention programs, and early follow-up strategies in reducing postoperative readmission rates and improving surgical outcomes.

CONCLUSION

Readmission within 30 days following general surgical procedures was primarily associated with postoperative complications during the index admission and the occurrence of surgical-site infection. Additional independent risk factors included emergency surgery, prolonged index hospital stay, and diabetes mellitus. Wound-related and gastrointestinal complications were the leading causes of rehospitalization. These findings emphasize the importance of optimizing perioperative care through effective infection-prevention strategies, comprehensive discharge planning, patient education, and timely post-discharge follow-up, particularly for high-risk patients. Implementation of targeted risk-based interventions may reduce avoidable readmissions, improve patient outcomes, and decrease healthcare utilization. Further multicentre prospective studies are warranted to validate these findings and assess the effectiveness of structured discharge and follow-up programs in reducing postoperative readmission rates.

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