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Impact of fast-track surgery on postoperative complications and patient satisfaction among diabetic patients undergoing elective surgery: a quasi-experimental study

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Abstract

Background: Fast-Track Surgery (FTS) aims to optimise surgical recovery through multimodal interventions that reduce physiological stress and improve patient outcomes. However, its effectiveness among diabetic surgical patients remains underexplored, particularly regarding postoperative complications and satisfaction.
Method: This quasi-experimental study compared 30 diabetic patients managed under an FTS protocol with 30 patients receiving conventional perioperative care at a tertiary hospital. FTS interventions included carbohydrate loading, early mobilisation, opioid-sparing analgesia, and structured discharge criteria. Outcomes assessed were postoperative complications and patient satisfaction, analysed using Chi-square and Mann–Whitney U tests.
Results: The FTS group demonstrated fewer postoperative complications (20.0%) than the conventional group (46.7%, p = 0.015). Wound infection, transient hyperglycaemia, and thromboembolism were the most frequent events. Patient satisfaction was significantly higher in the FTS group (mean score 4.5 ± 0.6) compared to the conventional group (3.8 ± 0.7, p = 0.023). Multivariate analysis indicated FTS independently reduced complication risk (*OR* = 0.31, 95% CI: 0.10–0.89, p = 0.031).
Conclusion: FTS effectively reduces postoperative complications and enhances satisfaction among diabetic patients undergoing elective surgery. Although limited by its non-randomised design and small sample size, this study highlights the potential of structured perioperative care for high-risk metabolic populations.
Keywords: Fast-Track Surgery; Diabetes Mellitus; Postoperative Complications; Patient Satisfaction; Elective Surgery.

INTRODUCTION

Surgical recovery remains a critical challenge in modern healthcare, particularly among patients with comorbid conditions such as diabetes mellitus. Although significant advances have been made in anaesthesia, infection control, and perioperative monitoring, individuals with diabetes continue to face disproportionately higher risks of postoperative complications, impaired wound healing, and prolonged hospital stays compared to non-diabetic patients. These complications contribute to a considerable clinical and economic burden, especially in low- and middle-income countries (LMICs) where healthcare resources are often limited and hospital capacity is strained (1–3).

Fast-Track Surgery (FTS), also referred to as Enhanced Recovery After Surgery (ERAS), has emerged as a comprehensive, evidence-based approach aimed at reducing surgical stress and expediting recovery. This perioperative care model incorporates multiple synergistic interventions, including preoperative carbohydrate loading, opioid-sparing analgesia, early mobilisation, and structured discharge criteria(4,5). While FTS protocols have demonstrated clear benefits in general and colorectal surgeries, their applicability and safety in high-risk patient populationsparticularly those with

diabetes mellitus remain inadequately explored.

The complex pathophysiology of diabetes, including impaired glycaemic control, microvascular dysfunction, and a heightened susceptibility to infection, raises questions about whether conventional FTS protocols can be safely and effectively implemented in this group (5).Moreover, in countries such as Indonesia, the adoption of FTS protocols is still limited, and few context-specific investigations have been conducted to assess their clinical effectiveness in diabetic populations(4,5).

Despite widespread international support for the FTS model, empirical data evaluating its impact on surgical outcomes among diabetic patients in resource-constrained settings is scarce. Notably, few studies have concurrently examined both postoperative complication rates and patient satisfaction two essential indicators of surgical care quality in this vulnerable cohort. This represents a critical gap in the literature.

To address this gap, the present study offers a novel contribution by evaluating the effectiveness of an FTS protocol tailored specifically for diabetic patients undergoing elective surgical procedures in an Indonesian tertiary care setting. Uniquely, this study examines both clinical and patient-centred outcomes, thereby providing comprehensive insights into the feasibility and benefits of structured perioperative optimisation in high-risk metabolic populations(6).

Accordingly, the objective of this research is to determine whether the implementation of a diabetes-adapted FTS protocol can reduce postoperative complications and enhance patient satisfaction. The findings aim to support evidence-based integration of FTS strategies in resource-limited healthcare environments, thereby informing future guidelines for perioperative care in diabetic patients.

METHOD

This quasi-experimental, prospective, non-randomised study was conducted to evaluate the impact of a Fast-Track Surgery (FTS) protocol on postoperative complications and patient satisfaction in diabetic patients undergoing elective surgery. The study took place at Prof. Dr. Margono Soekarjo Purwokerto Regional General Hospital, a tertiary referral centre in Indonesia, over a three-month period from June to August 2025. Ethical approval was granted by the Health Research Ethics Committee of Universitas Harapan Bangsa (Approval No. B.LPPM-UHB/653/06/2025). Written informed consent was obtained from all participants, in accordance with the Declaration of Helsinki (2013 revision).

Participants and Eligibility Criteria

A total of 60 adult patients, aged 18 to 75 years, diagnosed with type 2 diabetes mellitus and scheduled for elective orthopaedic fixation, minor amputation, or soft-tissue debridement, were enrolled. All participants were medically stable and met the criteria for elective surgery clearance. Patients were excluded if they had severe systemic disease (American Society of Anesthesiologists [ASA] physical status > III), cognitive impairment, or were undergoing emergency procedures.

Participants were recruited consecutively using purposive sampling from the hospital's preoperative clinic. Allocation to the FTS or conventional care group was determined based on surgical scheduling and team availability rather than clinical parameters.

Sample Size Consideration

No formal power calculation was conducted due to the exploratory nature of the study and logistical constraints associated with patient scheduling. However, a sample size of 30 patients per group is consistent with prior quasi-experimental studies in perioperative research and is considered sufficient to

detect moderate effect sizes, as supported by relevant literature.

Group Allocation and Bias Consideration

The non-randomised allocation and purposive sampling approach introduce a potential risk of selection bias. To minimise this risk, baseline demographic and clinical characteristics were assessed for comparability between groups. Group assignment was based purely on surgical logistics and not on patient condition or clinician preference.

Intervention: Fast-Track Surgery Protocol

The FTS protocol was adapted from Kehlet et al. and the ERAS Society guidelines(4). It consisted of structured perioperative interventions across three phases:

Preoperative phase: patient education, reduced fasting duration (six hours for solids, two hours for clear fluids), carbohydrate loading two hours before anaesthesia, and pre-emptive multimodal analgesia. Intraoperative phase: maintenance of normothermia, goal-directed fluid management, and opioid-sparing anaesthetic techniques. Postoperative phase**:** early oral intake within six hours post-surgery, mobilisation within 24 hours, continued multimodal analgesia, and discharge based on predefined criteria (stable vital signs, pain control, and oral tolerance).

Patients in the control group received standard hospital perioperative care, which typically included prolonged fasting, delayed feeding post-surgery, opioid-based analgesia, and ambulation after 48 hours.

Baseline Characteristics and Comparability

Descriptive statistical analyses were performed to compare baseline demographic and clinical variables between the FTS and conventional care groups. No statistically significant differences were observed with respect to age, sex, body mass index (BMI), duration of diabetes, or type of surgical procedure, confirming group comparability prior to intervention.

Outcome Measures

Postoperative complications were extracted from electronic medical records and categorised according to the Clavien–Dindo classification system (grades I–III). Specific complications of interest included wound infection, postoperative hyperglycaemia (defined as blood glucose >200 mg/dL), and thromboembolic events. Major complications (grades IV–V) and mortality were also monitored but not observed.

Patient Satisfaction Instrument

Patient satisfaction was evaluated using a five-point Likert scale questionnaire (1 = very dissatisfied to 5 = very satisfied), administered prior to hospital discharge. The instrument was adapted from validated tools previously employed in perioperative care studies. In the current study, the questionnaire demonstrated acceptable internal consistency, with a Cronbach's alpha coefficient of 0.82.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarise patient characteristics and outcome variables. Between-group comparisons were conducted using Chi-square tests for categorical variables and the Mann–Whitney U test for ordinal satisfaction scores. A multivariate logistic regression analysis was employed to identify independent predictors of postoperative complications, adjusting for age, BMI, and type of surgery. Statistical significance was defined as a two-tailed p-value < 0.05.

RESULTS

Overall Postoperative Complications

A total of 60 participants were analysed, with 30 assigned to the Fast-Track Surgery (FTS) group and 30 to the conventional care group. Postoperative complications were evaluated on a per-participant basis, with each individual counted once, regardless of the number of events experienced.

The overall incidence of postoperative complications was significantly lower in the FTS group (20.0%) compared to the conventional care group (46.7%) (p = 0.015**)**, indicating a marked reduction in morbidity associated with the implementation of the FTS protocol.

Although individual complications such as wound infection, hyperglycaemia, and thromboembolism were more frequently observed in the conventional group, none of these differences reached statistical significance when analysed separately. No major complications (Clavien–Dindo grade IV–V) or mortality occurred in either group.

Table 1. Overall Postoperative Outcomes per Patient (n = 60)

Outcome	FTS Group (n = 30)	Conventional Group (n = 30)	*p*-value
Any postoperative complication n (%)	6 (20.0%)	14 (46.7%)	0.015
Patients with one complication	5 (16.7%)	9 (30.0%)	0.226
Patients with ≥ two complications	1 (3.3%)	5 (16.7%)	0.086
Wound infection n (%)	3 (10.0%)	6 (20.0%)	0.465
Postoperative hyperglycaemia n (%)	2 (6.7%)	5 (16.7%)	0.424
Thromboembolism n (%)	1 (3.3%)	3 (10.0%)	0.612
Patient satisfaction (mean ± SD)	4.5 ± 0.6	3.8 ± 0.7	0.023

Table 1 summarises postoperative outcomes in both groups. The FTS protocol was associated with a statistically significant reduction in the overall complication rate. Although other outcomes showed numerical differences in favour of FTS, these did not reach statistical significance individually likely due to limited sample size. Patient satisfaction scores were significantly higher in the FTS group.

Patient Satisfaction

The mean satisfaction score in the FTS group was 4.5 ± 0.6, significantly higher than the 3.8 ± 0.7 reported in the conventional care group (p = 0.023). Furthermore, 90% of participants in the FTS group rated their care as “satisfied” or “very satisfied,” compared with 63% in the conventional group. Improved satisfaction was attributed to earlier mobility, reduced discomfort, and clear perioperative communication.

Predictors of Postoperative Complications

A multivariate logistic regression analysis was conducted to identify independent predictors of postoperative complications, with adjustment for potential confounders including age, body mass index (BMI), duration of diabetes, and type of surgery. After adjustment, the FTS protocol remained a significant protective factor against postoperative complications (odds ratio [OR] = 0.31; 95% confidence interval [CI]: 0.10–0.89; p = 0.031). None of the other variables showed a statistically significant association with complication risk.

Table 2. Logistic Regression Analysis for Predictors of Postoperative Complications

Predictor Variable	Odds Ratio (OR)	95% Confidence Interval	*p*-value
Fast-Track Surgery (FTS)	0.31	0.10 – 0.89	0.031
Age (≥ 60 years)	1.28	0.42 – 3.92	0.664
Body Mass Index (BMI > 25 kg/m²)	1.51	0.51 – 4.42	0.464
Duration of Diabetes (> 10 years)	1.87	0.61 – 5.79	0.267
Type of Surgery (major vs minor)	1.74	0.59 – 5.12	0.312

Table 2 presents adjusted odds ratios for postoperative complications. The FTS intervention significantly reduced the odds of complications, independent of other demographic or clinical variables. No other factors showed statistically significant effects.

DISCUSSION

This study provides evidence that implementing a structured Fast-Track Surgery (FTS) protocol significantly reduces postoperative complications and improves patient satisfaction among diabetic patients undergoing elective surgery. These findings are consistent with previous research indicating that multimodal, evidence-based perioperative care can enhance recovery and reduce surgical stress, especially in patients with metabolic comorbidities such as diabetes mellitus (4,5,7,8,9).

While individual complications such as wound infection and postoperative hyperglycaemia were numerically less frequent in the FTS group, they did not reach statistical significance, likely due to sample size limitations. However, the significant reduction in overall postoperative complications affirms the efficacy of FTS in high-risk populations, supporting similar findings reported in fast-track protocols for joint arthroplasty and colorectal surgery (6,7,9,10).

The higher satisfaction levels observed in the FTS group align with prior studies demonstrating that structured perioperative care improves the patient experience through enhanced communication, early mobilisation, and better symptom control (6,11).. Patient satisfaction in surgical care has increasingly been recognised as an important metric of healthcare quality and safety, and the present results suggest that FTS pathways contribute positively to this domain.

Importantly, this study underscores the critical role of nursing staff in the successful implementation of FTS protocols. Nurses are key facilitators of protocol adherence, overseeing preoperative education, postoperative monitoring, early mobilisation, and discharge planning. Their leadership and coordination across perioperative stages are essential to ensure consistency, safety, and patient-centred outcomes (9,12,13,20,21). As highlighted in enhanced recovery literature, nursing involvement significantly influences protocol compliance and patient outcomes (14,15,20).

Moreover, the feasibility of implementing FTS protocols in resource-limited healthcare systems, such as in Indonesia, is noteworthy. Although advanced infrastructure may be lacking, this study shows that many components of FTS such as reduced fasting, early feeding, and mobilisation can be effectively adapted using locally available resources. Prior studies have supported the use of simplified, low-cost enhanced recovery pathways in similar settings, emphasising the importance of staff training, multidisciplinary collaboration, and clear discharge criteria (16,17,18,19,21). Even without high-cost equipment, consistent

application of FTS principles can result in meaningful improvements in care quality and efficiency.

Study Limitations

This study has several limitations. First, the non-randomised design introduces a risk of selection bias; although baseline characteristics were statistically similar, unmeasured confounding may remain. Second, the relatively small sample size and single-centre setting limit the generalisability of findings. Third, outcomes were restricted to the inpatient period, precluding assessment of long-term surgical recovery, metabolic control, or readmission rates. Fourth, although the satisfaction instrument demonstrated acceptable internal consistency (Cronbach's alpha = 0.82), it was adapted rather than fully validated for this population. Lastly, protocol adherence was not independently monitored, and variations in implementation could have influenced results.

In conclusion, this study adds to the growing body of evidence that Fast-Track Surgery protocols can be safely and effectively implemented in diabetic patients undergoing elective procedures. The benefits observed in both clinical and patient-centred outcomes highlight the importance of structured perioperative care, nursing leadership, and adaptable strategies for use in low-resource environments. Future multicentre, randomised trials with longer follow-up are warranted to validate these findings and optimise FTS implementation in diverse healthcare contexts.

CONCLUSIONS

This study demonstrates that implementation of a Fast-Track Surgery (FTS) protocol tailored to diabetic patients undergoing elective surgery is associated with a reduction in postoperative complications and an improvement in patient satisfaction. The integration of multimodal perioperative strategies including early mobilisation, glycaemic control, and opioid-sparing analgesiasupports faster physiological recovery and more positive patient experiences.

To maximise the impact of FTS in diabetic surgical populations, we recommend the development of context-specific protocols that account for the unique metabolic risks in diabetes. Furthermore, the success of such interventions depends on comprehensive staff training, especially among nursing teams, to ensure consistent implementation across perioperative phases. Institutional support for interdisciplinary coordination, resource allocation, and outcome monitoring is essential to enable broader and sustainable adoption of FTS pathways, particularly in resource-limited healthcare settings.

Future research should explore long-term outcomes, cost-effectiveness, and patient-reported quality-of-life measures to inform national guidelines and optimise surgical care for high-risk populations.

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REFERENCES

1. Haq NU, Zahid M, Azeem H, Malik ZN, Ibrahim M, Timsal M, et al. Postoperative Complications in Diabetic type-2 Verses Non-Diabetic Patients Undergoing Appendectomy. A Comparative clinical Study:

Pathophysiology of Diabetes Mellitus in Postoperative Recovery. Dev Medico-Life-Sciences [Internet]. 2024;1(6):12–8.
2. Veerender K, Golakoti AR, Kumari SA, Raja R. Healing Outcomes in Diabetic Vs . Non-Diabetic Patients Undergoing Skin Surgery. Int J Curr Pharm Rev Res. 2025;17(5):170–4.
3. Butt MD, Ong SC, Rafiq A, Kalam MN, Sajjad A, Abdullah M, et al. A systematic review of the economic burden of diabetes mellitus: contrasting perspectives from high and low middle-income countries. J Pharm Policy Pract [Internet]. 2024;17(1):1–33.
4. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N, et al. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018. World J Surg. 2019;43(3):659–95.
5. Kehlet H, Wilmore DW. Multimodal strategies to improve surgical outcome. Am J Surg [Internet]. 2002 Jun 1;183(6):630–41.
6. Ortved M, Petersen PB, Jørgensen CC, Kehlet H. Postoperative Morbidity and Mortality in Diabetic Patients After Fast-Track Hip and Knee Arthroplasty: A Prospective Follow-up Cohort of 36,762 Procedures. Anesth Analg. 2021 Jul;133(1):115–22.
7. Issa LM, Kehlet H, Madsbad S, Lindberg-Larsen M, Varnum C, Jakobsen T, et al. Protocol for a prospective multicentre cohort study to address the question whether diabetes and its management is still a risk factor in fast-track joint arthroplasty. BMJ Open . 2024;14(4):1–5.
8. Kapritsou M, Plastiras A. Enhanced recovery after surgery programs: Evidence-based practice in perioperative nursing. Asia-Pacific J Oncol Nurs [Internet]. 2022;9(7):100042.
9. Lejeune D, Hardy PY, Kaba A, Joris J. Postoperative morbidity and mortality in patients with diabetes after colorectal surgery with an enhanced recovery program: A monocentric retrospective study. J Visc Surg [Internet]. 2023;160(3):180–7.
10. Pedziwiatr M, Kisialeuski M, Wierdak M, Stanek M, Natkaniec M, Matłok M, et al. Early implementation of Enhanced Recovery After Surgery (ERAS®) protocol - Compliance improves outcomes: A prospective cohort study. Int J Surg. 2015;21:75–81.
11. Ningtyas R, Suandika M, Yuliatun S. Strategi Edukasi Pada Pasien Diabetes Melitus. Depok CV Eureka Media Aksara. 2020;
12. Specht K, Kjaersgaard-Andersen P, Kehlet H, Wedderkopp N, Pedersen BD. High patient satisfaction in 445 patients who underwent fast-track hip or knee replacement. Acta Orthop. 2015;86(6):702–7.
13. Zychowicz A, Pisarska M, Łaskawska A, Czyż M, Witowski J, Kisielewski M, et al. Patients' opinions on enhanced recovery after surgery perioperative care principles: A questionnaire study. Wideochirurgia I Inne Tech Maloinwazyjne. 2019;14(1):27–37.
14. Olausson A, Svensson CJ, Andréll P, Jildenstål P, Thörn SE, Wolf A. Total opioid-free general anaesthesia can improve postoperative outcomes after surgery, without evidence of adverse effects on patient safety and pain management: A systematic review and meta-analysis. Acta Anaesthesiol Scand. 2022;66(2):170–85.
15. Ramirez MF, Kamdar BB, Cata JP. Optimizing Perioperative Use of Opioids: a Multimodal Approach. Curr Anesthesiol Rep. 2020;10(4):404–15.
16. Wainwright TW, Immins T, Middleton RG. Enhanced recovery after surgery (ERAS) and its applicability for major spine surgery. Best Pract Res Clin

Anaesthesiol. 2016 Mar;30(1):91–102.

17. Joshi GP, Schug SA, Kehlet H. Procedure-specific pain management and outcome strategies. Best Pract Res Clin Anaesthesiol [Internet]. 2014;28(2):191–201.
18. Upadhya R K, Shenoy L, Venkateswaran R. Effect of intravenous dexmedetomidine administered as bolus or as bolus-plus-infusion on subarachnoid anesthesia with hyperbaric bupivacaine. J Anaesthesiol Clin Pharmacol. 2018;34(3):46–50.
19 Yu J, Lin X, Chen H. Study on the application effect of fast track surgery care combined with continuous care after discharge in patients with laparoscopic cholecystectomy. *Front Surg*. 2022;9:848234.
20 Song L, Jin Q, Zhu L, et al. Application of rapid rehabilitation surgical nursing combined with continuous nursing in self-care ability, medication compliance and quality of life of renal transplant patients. *Front Surg*. 2022;9:844533.
21 Jain SN, Lamture Y, Krishna M. Enhanced recovery after surgery: exploring the advances and strategies. *Cureus*. 2023;15(10):e47237.