INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

EFFECTIVENESS OF EARLY AMBULATION ON RECOVERY AFTER ELECTIVE ABDOMINAL SURGERY

Original Research

Areeba Farooqui[1]*, Shahzaib Ahmad[2], Pelvasha Bokhary[3], Hajra Amin[4], Maria Rashid[5], Muhammad Haseeb Shah[6]
[1]5th Year MBBS Student, Ziauddin Medical College, Ziauddin University, Karachi, Pakistan.
[2]Final Year MBBS Student, Pak Red Crescent Medical and Dental College, Dina Nath, Lahore, Pakistan.
[3]4th Year MBBS Student, Liaquat National Hospital and Medical College, Karachi, Pakistan.
[4]Postgraduate Resident, Pediatric Surgery, Children Hospital, Lahore, Pakistan.
[5]House Officer, Arif Memorial Hospital, Rashid Latif Medical College, Lahore, Pakistan.
[6]Trainee Medical Officer, Mardan Medical Complex, MTI Mardan, Pakistan.
Corresponding Author: Areeba Farooqui, 5th Year MBBS Student, Ziauddin Medical College, Ziauddin University, Karachi, Pakistan, areebafarooqui366@gmail.com
Acknowledgement: The authors thank the surgical team and nursing staff for their support in patient care and data collection.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Prolonged immobility after abdominal surgery increases the risk of postoperative complications and delays recovery. Early ambulation has been proposed as a simple, cost-effective strategy to enhance patient outcomes, yet consistent evidence from randomized controlled trials remains limited.

Objective: To evaluate the effectiveness of early postoperative ambulation in improving recovery time and reducing complications following elective abdominal surgery.

Methods: This randomized controlled trial was conducted over 12 months at a tertiary care hospital in Lahore, Pakistan. A total of 128 adult patients undergoing elective abdominal surgery were randomly assigned to either an early ambulation group (mobilized within 6 hours postoperatively) or a standard care group. Primary outcomes included time to bowel function return, hospital stay duration, and time to independent ambulation. Secondary outcomes included rates of pulmonary infection, postoperative ileus, deep vein thrombosis (DVT), and pain scores. Data were analyzed using t-tests and chi-square tests, with a significance threshold of $p<0.05$.

Results: Patients in the early ambulation group showed significantly faster recovery: shorter time to first flatus (24.6 ± 6.2 vs. 33.5 ± 7.8 hours), bowel movement (44.1 ± 10.4 vs. 58.3 ± 12.6 hours), and hospital stay (4.8 ± 1.1 vs. 6.3 ± 1.4 days). Complication rates were also lower, particularly for pulmonary infection (4.7% vs. 15.6%) and ileus (6.3% vs. 17.2%). Pain scores decreased more rapidly in the early ambulation group at 24 and 48 hours ($p<0.001$).

Conclusion: Early ambulation significantly improves recovery and reduces postoperative complications in patients undergoing elective abdominal surgery. Routine integration of early mobilization into postoperative protocols is recommended.

Keywords: Abdominal Surgery, Ambulation, Complications, Elective Surgical Procedures, Enhanced Recovery, Hospital Stay, Postoperative Care.

INTRODUCTION

Recovery following elective abdominal surgery is a critical period that often determines the success of the overall treatment and long-term patient outcomes. Among the many strategies employed to enhance postoperative recovery, early ambulation—encouraging patients to walk soon after surgery—has emerged as a potentially impactful yet underutilized intervention (1). Despite advances in surgical techniques and perioperative care, postoperative complications such as ileus, deep vein thrombosis (DVT), pulmonary infections, and delayed wound healing continue to affect significant proportions of surgical patients (2). These complications not only increase morbidity and length of hospital stay but also elevate healthcare costs and hinder patients' return to baseline functionality. There is a growing interest in identifying simple, cost-effective interventions that could reduce these risks and expedite recovery. Early ambulation, as a non-pharmacologic, low-risk approach, has drawn attention for its potential to meet these goals (3,4). The physiological rationale for early mobilization after surgery is well-established. Mobilization stimulates bowel motility, enhances pulmonary function, promotes circulation, and improves muscle tone—all of which are often compromised during the perioperative period. Prolonged bed rest, on the other hand, has been associated with muscle atrophy, increased risk of thromboembolism, and respiratory complications, particularly in patients undergoing major abdominal procedures (5,6). The Enhanced Recovery After Surgery (ERAS) protocols have included early ambulation as a component of their multimodal approach, but evidence regarding its independent contribution to patient outcomes remains somewhat inconsistent. While some studies suggest significant benefits in terms of reducing length of stay and postoperative complications, others have found minimal or no improvement, possibly due to differences in how “early” and “ambulation” are defined and implemented across studies (7-10).

Previous randomized controlled trials and observational studies have reported promising trends. For example, research has indicated that early mobilization can lead to shorter durations of postoperative ileus and faster return to oral intake and normal gastrointestinal function. It may also mitigate the risk of postoperative pulmonary complications by encouraging deeper breaths and better lung expansion, especially in the early hours following anesthesia recovery (11,12). However, these studies often suffer from methodological limitations such as small sample sizes, lack of standardized ambulation protocols, or absence of clear outcome measures. Moreover, there is a lack of consensus on the optimal timing, frequency, and duration of ambulation necessary to achieve the best outcomes. This ambiguity creates a significant knowledge gap and underscores the need for rigorous, high-quality evidence to support clinical guidelines. Equally important is the psychological impact of early ambulation (13). Patients who begin moving soon after surgery often report feeling more independent, motivated, and in control of their recovery process. These psychological benefits, though less frequently quantified, can play a meaningful role in overall recovery and satisfaction with care (14). From a nursing and healthcare systems perspective, implementing early ambulation strategies can be relatively straightforward and resource-efficient, requiring minimal additional training or equipment while potentially delivering significant clinical benefits.

Despite its theoretical and practical advantages, early ambulation is not uniformly practiced or prioritized. Many factors, including patient discomfort, surgical complications, and variability in healthcare providers’ attitudes, can delay postoperative mobilization. Institutional protocols and staff engagement play critical roles in overcoming these barriers. A well-designed, evidence-based guideline informed by robust clinical research could provide the necessary framework to integrate early ambulation more effectively into standard postoperative care pathways. Given this context, the present randomized controlled trial aims to evaluate whether initiating early postoperative ambulation can significantly enhance recovery outcomes and reduce the incidence of complications following elective abdominal surgery. Specifically, this study seeks to determine whether early mobilization leads to shorter hospital stays, faster return of gastrointestinal function, and reduced rates of postoperative complications such as pulmonary issues and thromboembolism. By rigorously testing these outcomes in a controlled setting at a tertiary care hospital, this research endeavors to clarify the clinical value of early ambulation and offer practical insights for improving surgical recovery protocols.

METHODS

This randomized controlled trial was conducted over a 12-month period at a tertiary care hospital in Lahore, Pakistan, with the primary objective of evaluating whether early postoperative ambulation improves recovery time and reduces the incidence of complications

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

following elective abdominal surgery. The study followed a parallel group design with a 1:1 allocation ratio, in which eligible participants were randomly assigned to either an early ambulation group or a standard postoperative care group. Ethical approval was obtained from the institutional review board (IRB) and written informed consent was secured from all participants prior to their inclusion in the study. The target population consisted of adult patients aged 18 to 70 years who were scheduled for elective abdominal surgery, including procedures such as colectomy, cholecystectomy, hernia repair, and hysterectomy. Participants were required to have American Society of Anesthesiologists (ASA) physical status classifications I to III. Inclusion criteria also mandated that participants be ambulatory prior to surgery and able to understand and comply with postoperative instructions. Patients were excluded if they underwent emergency surgery, had significant cognitive impairment, suffered from neuromuscular disorders limiting mobility, or were expected to require intensive care postoperatively. Those with pre-existing deep vein thrombosis, chronic respiratory failure, or hemodynamic instability were also excluded (15).

A sample size of 128 patients (64 in each group) was calculated using power analysis to detect a medium effect size (Cohen's d = 0.5) in recovery time, with 80% power and a 5% level of significance. The calculation assumed a two-tailed hypothesis and accounted for a 10% attrition rate (1,2). Randomization was performed using a computer-generated random number sequence, and allocation concealment was maintained via sealed opaque envelopes. Blinding of participants was not feasible due to the nature of the intervention, but outcome assessors and data analysts remained blinded throughout the study. Intervention in the early ambulation group involved mobilizing patients within 6 hours of returning to the surgical ward, as tolerated, under the supervision of nursing staff. Patients were encouraged to perform bedside sitting, standing, and progressively longer walking sessions at scheduled intervals, starting with 10–15 minutes every 4–6 hours. Standard care group patients received usual postoperative management, which included ambulation as per physician discretion without a structured schedule. Both groups received comparable analgesia, nutritional support, and physiotherapy when indicated. Outcome measures were selected to directly address the study's objective. The primary outcome was recovery time, operationalized as the number of days from surgery to discharge readiness, defined by normalized bowel function (first flatus or stool), pain controlled by oral analgesia, and independent ambulation. Secondary outcomes included incidence of postoperative complications such as pulmonary infections (assessed by clinical signs and confirmed via chest radiography), deep vein thrombosis (evaluated through Doppler ultrasonography), and ileus (defined as absence of bowel movement or flatus beyond 72 hours post-surgery). Pain scores were monitored using the Visual Analog Scale (VAS), and ambulation capacity was recorded using a standardized mobility chart maintained by nursing staff (16,17).

Data were collected using structured proformas and validated tools. Bowel function and length of hospital stay were recorded from patient charts. Pulmonary complications were assessed by a consulting pulmonologist, while DVT was screened by a trained radiologist blinded to group assignment. Pain scores were documented at fixed intervals during the first 72 postoperative hours. Data entry and quality checks were supervised by two independent research assistants. All statistical analyses were performed using SPSS version 26. Descriptive statistics summarized baseline demographic and clinical variables. The normality of data distribution was verified using the Shapiro-Wilk test. Independent samples t-tests were used to compare continuous outcomes such as recovery time and length of hospital stay between the two groups. Chi-square tests were applied to assess categorical variables, including rates of postoperative complications. A p-value of less than 0.05 was considered statistically significant. To further explore the influence of early ambulation on recovery, a multivariate regression analysis was conducted adjusting for potential confounders such as age, type of surgery, and baseline health status. Throughout the study, ethical principles were stringently observed. Participants had the right to withdraw at any point without consequence to their care. Confidentiality of patient information was preserved using coded identifiers, and access to data was restricted to the core research team. Any adverse events were promptly documented and managed according to institutional protocols. This rigorously designed trial aims to offer clear, evidence-based insights into the role of early ambulation in enhancing postoperative recovery and minimizing complications, with the ultimate goal of informing clinical practices that can improve patient outcomes following abdominal surgery.

RESULTS

The study enrolled a total of 128 patients undergoing elective abdominal surgery, with 64 participants randomly assigned to the early ambulation group and 64 to the standard care group. Baseline characteristics, including age, sex distribution, body mass index, ASA classification, and types of surgery, were comparable between the two groups, indicating successful randomization without significant demographic imbalances. Recovery outcomes revealed statistically significant improvements in the early ambulation group across all measured parameters. The mean time to first flatus was 24.6 ± 6.2 hours in the early ambulation group compared to 33.5 ± 7.8 hours in

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

the standard care group ($p < 0.001$). Similarly, the mean time to first bowel movement was 44.1 ± 10.4 hours versus 58.3 ± 12.6 hours, respectively ($p < 0.001$). Hospital stay duration was notably reduced in the early ambulation group (4.8 ± 1.1 days) compared to the standard care group (6.3 ± 1.4 days) with a highly significant p-value (<0.001). Time to independent ambulation also showed a marked difference, favoring early mobilization (16.2 ± 4.5 hours vs. 29.7 ± 6.1 hours, $p < 0.001$). These findings are visually summarized in the bar chart titled "Comparison of Key Recovery Outcomes." In terms of postoperative complications, the early ambulation group experienced fewer events. Pulmonary infections occurred in 3 patients compared to 10 in the control group ($p = 0.041$), while postoperative ileus was recorded in 4 patients versus 11 ($p = 0.027$). The incidence of deep vein thrombosis was lower in the early ambulation group (1 vs. 5 cases), although this did not reach statistical significance ($p = 0.092$). Wound infections were low in both groups and did not differ significantly (2 vs. 4 cases, $p = 0.405$). These results are further illustrated in the chart "Postoperative Complications by Group." Pain scores assessed using the Visual Analog Scale (VAS) demonstrated better control over time in the early ambulation group. At 6 hours postoperatively, pain levels were similar between groups (6.2 ± 1.0 vs. 6.4 ± 1.1, $p = 0.317$). However, at 24 hours and 48 hours, early ambulation was associated with significantly lower pain scores (4.1 ± 1.2 vs. 5.3 ± 1.4 and 2.6 ± 0.8 vs. 3.8 ± 1.0, respectively; both $p < 0.001$), suggesting enhanced postoperative comfort and functional recovery.

Table 1: Demographic Characteristics

Variable	Early Ambulation Group (n=64)	Standard Care Group (n=64)
Age (years, mean ± SD)	45.3 ± 10.1	46.1 ± 9.8
Gender		
Male	34	32
Female	30	32
BMI (kg/m², mean ± SD)	26.4 ± 3.2	26.1 ± 3.5
ASA Classification		
I	18	16
II	28	30
III	18	18
Type of Surgery		
Colectomy	15	14
Cholecystectomy	20	22
Hernia	17	18
Hysterectomy	12	10

Table 2: Recovery Outcomes

Outcome	Early Ambulation Group	Standard Care Group	p-value
Time to First Flatus (hours)	24.6 ± 6.2	33.5 ± 7.8	<0.001
Time to First Bowel Movement (hours)	44.1 ± 10.4	58.3 ± 12.6	<0.001
Length of Hospital Stay (days)	4.8 ± 1.1	6.3 ± 1.4	<0.001
Time to Independent Ambulation (hours)	16.2 ± 4.5	29.7 ± 6.1	<0.001

Table 3: Postoperative Complications

Complication	Early Ambulation Group (n=64)	Standard Care Group (n=64)	p-value
Pulmonary Infection	3	10	0.041
Postoperative Ileus	4	11	0.027
Deep Vein Thrombosis	1	5	0.092
Wound Infection	2	4	0.405

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table 4: Pain Scores (VAS)

Time Point	Early Ambulation Group (mean ± SD)	Standard Care Group (mean ± SD)	p-value
6 hours post-op	6.2 ± 1.0	6.4 ± 1.1	0.317
24 hours post-op	4.1 ± 1.2	5.3 ± 1.4	<0.001
48 hours post-op	2.6 ± 0.8	3.8 ± 1.0	<0.001

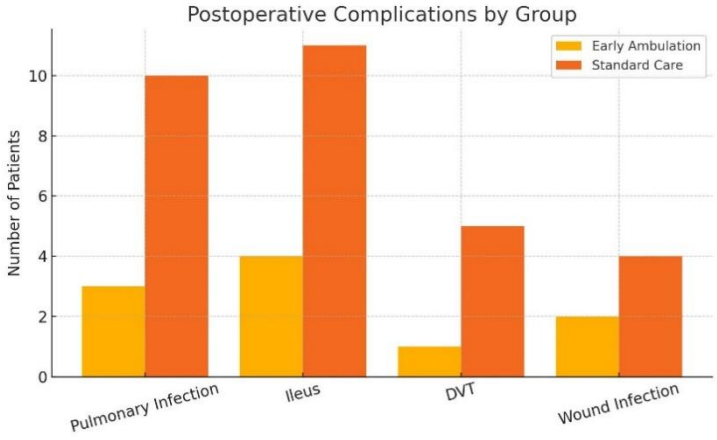

Figure 1 Postoperative Complications by Group

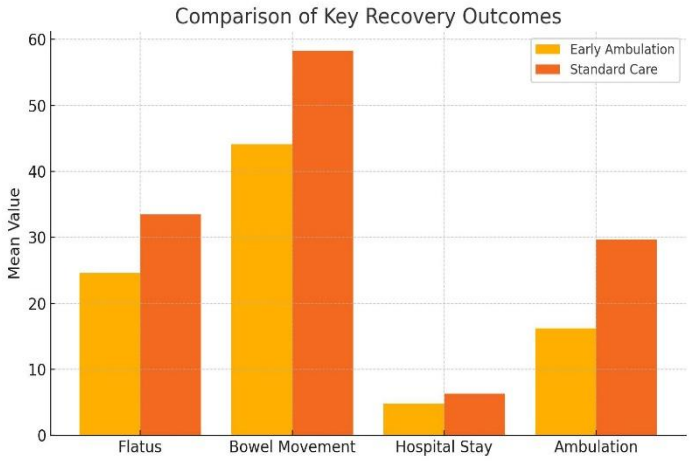

Figure 2 Comparison of Key Recovery Outcomes

DISCUSSION

The findings of this randomized controlled trial contribute robust evidence to the growing body of literature supporting the benefits of early ambulation following elective abdominal surgery. In this study, early ambulation significantly reduced time to gastrointestinal recovery, hospital stay, and time to independent mobility, while also lowering the incidence of complications such as postoperative ileus and pulmonary infections. These results align with previous research and underscore the critical role of mobilization as a key element of postoperative care. Consistent with prior studies, early ambulation facilitated more rapid return of bowel function and reduced length of hospitalization. A study reported similar improvements in peristaltic activity and faster resumption of gastrointestinal function following early mobilization in abdominal surgery patients (17). Likewise, a study demonstrated that early postoperative step counts strongly predicted long-term ambulatory recovery and were inversely associated with postoperative complications (18). These findings collectively validate early ambulation not only as a clinical intervention but as a meaningful outcome metric reflecting broader recovery trajectories. Importantly, this trial further demonstrated that early mobilization reduced the incidence of pulmonary complications. This echoes the findings of a study which observed a sharp decline in respiratory tract infections among elderly postoperative patients who began ambulating early (19). Similarly, different studies found that, early ambulation lowered postoperative pain and analgesic usage, indirectly supporting improved respiratory function due to better comfort and activity tolerance (20,21). While the present study supports the broader clinical utility of early ambulation, its findings must be interpreted within the context of certain limitations. The unblinded design could introduce performance bias, although blinding was impractical given the nature of the intervention. Moreover, while the sample was sufficiently powered for primary outcomes, subgroup analyses for complications like DVT may have been underpowered. Variations in surgical techniques and nursing support, although minimized, could also contribute to heterogeneity in outcomes. Additionally, patient-reported outcomes such as quality of life or psychological well-being were not included, which future studies should consider integrating to assess the full spectrum of recovery.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

A notable strength of this study lies in its comprehensive approach to outcome measurement. By evaluating time to flatus, bowel movement, independent ambulation, and complications, the study captures both physiological and functional aspects of recovery. The use of validated pain scales and structured mobility logs strengthens the reliability of data collection. Furthermore, the study's implementation in a real-world tertiary care setting in Lahore, enhances its external validity, making the findings generalizable to similar clinical environments in resource-constrained settings. Future research should explore stratified ambulation protocols tailored to patient risk profiles. Factors such as age, ASA classification, and operative duration could guide personalized ambulation strategies, as suggested by a study which identified ASA grade and inflammatory markers as predictors of delayed mobility (22,23). There is also merit in evaluating adjunct interventions, such as combining early ambulation with non-pharmacological therapies like gum chewing or respiratory exercises, as proposed in studies on cesarean recovery and general abdominal surgery (24). In conclusion, this study reinforces early ambulation as an effective, low-cost intervention for enhancing postoperative recovery after elective abdominal surgery. It affirms its potential to reduce hospital stay, improve functional outcomes, and decrease the burden of complications, supporting its inclusion in enhanced recovery protocols. Scaling its implementation through structured guidelines and staff education may be a pragmatic and impactful direction for surgical care improvement.

CONCLUSION

This study confirms that early postoperative ambulation significantly accelerates recovery and reduces complications following elective abdominal surgery. By improving bowel function, shortening hospital stay, and minimizing pulmonary risks, early mobilization proves to be a practical, low-cost intervention. These findings support its integration into standard postoperative protocols to enhance patient outcomes and optimize healthcare efficiency.

AUTHOR CONTRIBUTION

Author	Contribution
Areeba Farooqui*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Shahzaib Ahmad	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Pelvasha Bokhary	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Hajra Amin	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Maria Rashid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Haseeb Shah	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Goubar A, Martin FC, Potter C, Jones GD, Sackley C, Ayis S, et al. The 30-day survival and recovery after hip fracture by timing of mobilization and dementia : a UK database study. Bone Joint J. 2021;103-b(7):1317-24.
2. Robinson T, Kovar A, Carmichael H, Hosokawa P, Jones T, Overbey D, et al. Early identification of patients at risk for delayed recovery of ambulation after elective abdominal surgery. Surgical Endoscopy. 2021;36:4828-33.
3. Li Z, Zhou L, Li M, Wang W, Wang L, Dong W, et al. Early mobilization after pancreatic surgery: A randomized controlled trial. Surgery. 2024;176(4):1179-88.

4. Chen X, Wan L, Wang B. Early mobilization in postoperative glioma patients real world impact on recovery and long term prognosis. Sci Rep. 2025;15(1):18032.
5. Gray N, Shaikh J, Cowley A, Goosey-Tolfrey V, Logan P, Quraishi N, et al. The effect of early mobilisation (< 14 days) on pathophysiological and functional outcomes in animals with induced spinal cord injury: a systematic review with meta-analysis. BMC Neurosci. 2024;25(1):20.
6. Lima de Araujo CA, de Freitas Busnardo F, Thome Grillo VA, Chirnev Felício CH, Antônia de Almeida LA, Sparapan Marques CF, et al. Effect of Early Postoperative Mobilization on Functional Recovery, Hospital Length of Stay, and Postoperative Complications After Immediate Internal Pudendal Artery Perforator Flap Reconstruction for Irradiated Abdominoperineal Resection Defects: A Prospective, Randomized Controlled Trial. Ann Surg Oncol. 2025;32(2):993-1004.
7. EFFECTIVENESS OF EARLY AMBULATION ON ANALGESIC REQUIREMENTS, PAIN AND BIOCHEMICAL PARAMETERS AMONG ABDOMINAL SURGERY PATIENTS : A Cross-Sectional Study. 2021.
8. Kim HS, Lee YK, Won SJ, Park SJ, Park JW, Koo KH. Effectiveness of Online Video Instruction on Time to Start Ambulation and Duration of Hospital Stay, Satisfaction and Functional Recovery in Patients Undergoing Total Hip Arthroplasty. J Korean Med Sci. 2022;37(2):e7.
9. Alphones CK, Miranda JP. Effectiveness of Planned Early Ambulation on Postoperative Recovery among Cesarean Mothers: A Quasi-experimental study in Mangaluru. Journal of Health and Allied Sciences NU. 2023;13:551-6.
10. Yangchen T, Smitha M, Sethi P. Effectiveness of scheduled early ambulation on maternal outcomes in post caesarean in Odisha, Eastern India. Indian Journal of Continuing Nursing Education. 2023;24:184-9.
11. Taksande A, Mahakalkar M, Taksande V. Effects of Early Ambulation in Post Operative Recovery Among Women with Abdominal Hysterectomy. International Journal of Current Research and Review. 2021.
12. Song BM, Kadhim M, Shanmugam JP, King AG, Heffernan MJ. Enhanced Recovery After Pediatric Scoliosis Surgery: Key Components and Current Practice. Orthopedics. 2020;43(5):e338-e44.
13. Gianotti L, Sandini M, Romagnoli S, Carli F, Ljungqvist O. Enhanced recovery programs in gastrointestinal surgery: Actions to promote optimal perioperative nutritional and metabolic care. Clin Nutr. 2020;39(7):2014-24.
14. Nakamura K, Kurobe Y, Sue K, Sakurai S, Sasaki T, Yamamoto S, et al. Impact of early postoperative ambulation on gait recovery after hip fracture surgery: a multicenter cohort study. Sci Rep. 2025;15(1):12893.
15. Hardy PJ, Tavano A, Jacquet SV, Monseur JJ, Bastin ML, Kohnen LP, et al. The impact of orthostatic intolerance on early ambulation following abdominal surgery in an enhanced recovery programme. Acta Anaesthesiol Scand. 2022;66(4):454-62.
16. Schwenk ES, Kasper VP, Smoker JD, Mendelson AM, Austin MS, Brown SA, et al. Mepivacaine versus Bupivacaine Spinal Anesthesia for Early Postoperative Ambulation. Anesthesiology. 2020;133(4):801-11.
17. Batchelor TJP. Postoperative care after thoracic surgery in the times of ERAS. Best Pract Res Clin Anaesthesiol. 2024;38(1):81-9.
18. Ahmed Kamel S, Shepherd J, Al-Shahwani A, Abourisha E, Maduka D, Singh H. Postoperative mobilization after terrible triad injury: systematic review and single-arm meta-analysis. J Shoulder Elbow Surg. 2024;33(3):e116-e25.
19. Ceravolo MG, Arienti C, de Sire A, Andrenelli E, Negrini F, Lazzarini SG, et al. Rehabilitation and COVID-19: the Cochrane Rehabilitation 2020 rapid living systematic review. Eur J Phys Rehabil Med. 2020;56(5):642-51.
20. Lee JA, Young S, O'Connor V, DiFronzo LA. Safety and Efficacy of an Enhanced Recovery Protocol After Hepatic Resection. Am Surg. 2020;86(10):1396-400.
21. Wong CK, Rosati J, Forbes K, Feng S, Donohue A, Beckley A. A scoping review of postoperative early rehabilitation programs after dysvascular-related amputations. Prosthet Orthot Int. 2024;48(5):558-64.
22. Selvan V, Indira S. A study to evaluate the effectiveness of schedule ambulation on quality of life among patient who had undergone abdominal surgery in selected hospital at Chennai. 2020.
23. Barile F, Artioli E, Mazzotti A, Arceri A, Zielli SO, Manzetti M, et al. To cast or not to cast? Postoperative care of ankle fractures: a meta-analysis of randomized controlled trials. Musculoskelet Surg. 2024;108(4):383-93.
24. Stockwell E, Urban N, Hays M, McCaskey M, Maseda M, Mormino M, et al. Unrestricted weightbearing and ability to achieve postoperative ambulation after distal femur fracture fixation in elderly patients is not associated with decreased mortality. Eur J Orthop Surg Traumatol. 2025;35(1):70.

