IMPACT OF EARLY PHYSIOTHERAPY INTERVENTION SUPPORTED BY NURSING AND EMERGENCY MEDICAL TECHNICIANS IN POST-SURGICAL PATIENTS

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Abstract

Background:

Postoperative recovery is often hindered by delayed mobilization, leading to increased complication rates and prolonged hospital stays. While early physiotherapy has shown promise, limited studies have evaluated its impact when integrated with support from nursing staff and emergency medical technicians (EMTs).

Objective:

This study aimed to assess the effectiveness of early physiotherapy intervention, supported by a multidisciplinary team, in improving postoperative outcomes compared to standard care.

Methods:

A multicenter randomized controlled trial was conducted across five hospitals in Saudi Arabia involving 326 adult patients undergoing elective abdominal, orthopedic, or cardiothoracic surgeries. Participants were randomly assigned to receive either early physiotherapy within 6–12 hours post-surgery supported by nurses and EMTs, or conventional physiotherapy initiated after 48–72 hours. Primary outcomes included Functional Independence Measure (FIM) scores and hospital length of stay. Secondary outcomes included pain intensity (VAS), pulmonary complications, and 30-day readmission.

Results:

The early intervention group demonstrated significantly higher FIM scores at day 7 and day 30 (p

< 0.001) and a reduced average hospital stay (4.9 vs. 6.1 days, p < 0.001). Pain scores were consistently lower, and the incidence of pulmonary complications was notably reduced (4.8% vs. 11.2%). No major adverse events were reported.

Conclusion:

Early physiotherapy, when delivered in a coordinated framework involving nursing and EMT support, leads to faster functional recovery, fewer complications, and shorter hospital stays. These findings support the inclusion of multidisciplinary early mobilization protocols in routine surgical care to enhance outcomes and healthcare efficiency.

Keywords: Early physiotherapy, postoperative recovery, multidisciplinary care, nursing, EMT, functional independence, complications.

Introduction

1.1. Background

Postoperative complications remain a significant reason for prolonged in-hospital stay, increased healthcare cost, as well as increased morbidity and mortality in patients globally. Nonwithstanding improved surgical technique and perioperative care, significant percentages of surgical subjects experience slow postsurgical recovery due to immobilization-associated complications such as pulmonary disease, thrombophlebitis, muscle atrophy, as well as suboptimally maintained functional independence. Globally, these are responsible for about 15–20% additional readmissions within the first 30 days after extensive surgery in the elderly or comorbid. In the Middle East as well as developing nations, this is aggravated by few postoperative rehab facilities, inconsistent staffing, as well as late onset physiotherapeutic care. (Arias-Fernández et al., 2018)

Early mobilization has become standard in enhanced recovery after surgery (ERAS) guidelines as part of a trend away from recourse to prolonged bed rest in favor of active physical participation in the first postsurgical 24–48 hours. Several studies have validated that early mobilization promotes hemodynamic stability, enhances quick healing from wounds, reduces pulmonary as well as thromboembolic risk, as well as improving psychological health. Moreover, early physiotherapy treatment has been associated with improved retention of muscle power as well as quick restoration back to normal functional capacity. (Chen et al., 2021)

But in the majority of health systems, early mobilization is underutilised owing to staffing limitations, departmental communication breakdowns, and workflow integration breakdowns between physiotherapy and nurse workflow. In particular, the first few hours after surgery when mobilisation is most productive are most likely dictated by nurse task monitoring and background medical stabilisation interventions. Mobilisation is therefore often deferred to post-anesthesia clearance or physician referral, thus introducing delay between surgical intervention and restoration of function. The delay, as unintentional as it is, can precipitate avoidable complication as well as prolonged recuperation. (Doiron et al., 2018)

To address this challenge, growing numbers of studies have called for more integrated, interdisciplinary postoperative rehabilitation. Early physiotherapy as a structured, protocol-based component of the postsurgical course can offer a clinically important, cost-effective improvement in courses of recovery. Additional integration with the ancillary roles of emergency medical

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technician (EMT) and nurse may significantly enhance continuity and responsiveness of care in the critical postsurgical period. (Mayer et al., 2024)

1.2. Role of Multidisciplinary Teams

Within the postoperative environment, multidisciplinary practice has become increasingly recognized as a significant predictor of patient outcome. From the traditionally siloed model—the physiotherapists working in isolation from the nurses, who in turn worked from the emergency teams—the integrated model to care has gained traction due to increased responsibility sharing as well as timely communication. Through these models, physiotherapists provide specialized pathways in mobilization, nurses monitor vital signs, manage analgesia, as well as provide bedside support. EMTs, traditionally the preserve of pre-hospital care, are now finding use in the clinical space for quick patient transfers, swift response to early deterioration, as well as practical aid in first attempts to aid in ambulation. (Nydahl et al., 2017)

Physiotherapists are central to the postoperative process through the creation and application of personalized exercise protocols targeting respiratory efficiency, joint mobility, and muscle contraction. Early inclusion ensures that patients are appropriately mobilized to avoid complications attributed to prolonged immobility. Nonetheless, physiotherapy effectiveness remains entirely dependent on ongoing monitoring from the bedside as well as ready responsiveness—the roles conventionally taken by nurses and EMTs. (Morris et al., 2008) A good example is pain management by nurses, which affects the willingness as well as capacity in the participation of early mobilization by the patient. Conversely, EMTs can aid in the repositioning of patients, management of medical equipment while in transit, as well as response to the hemodynamic instability that can occur when attempting to mobilize. (Schaller et al., 2016)

Moreover, the integration of these specializations helps in responding to unexpected events in time as well as enhanced adherence to early mobilization interventions. Rehabilitation that is focused on teams helps in minimizing delay, safety retention in the patient, as well as control of the psychological barrier of fear that is commonly experienced among postoperative individuals through constant encouragement as well as supervision. Having trained individuals from varied disciplines also provides reassurance to patients, allowing enhanced adherence as well as participation in processes of recovery. (Wang et al., 2023)

While multidisciplinary rehab has proved to have benefit, the bulk of research to date has focused on the independent benefit of physiotherapy or nursing, with very few looking at their combined benefit when implemented by EMTs. A large gap in current literature exists here, especially in situations in which shortages or fragmented workflow may hinder intervention in any timely fashion. To this end, how the combined approaches of physiotherapists, nurses, and EMTs can best be optimized for early mobilization interventions remains underresearched with promising potential for clinical benefit. (Zhang et al., 2019)

1.3. Problem Statement

Despite general approval in the medical profession as a vital component of postoperative treatment, early physiotherapy fails in practice due to operational sluggishness as well as organisational lack of coordination. Far too many health systems lack uniform regulations for the

initiation of physiotherapy in this sensitive phase in the first 24–48 postoperative hours, and their patients are unnecessarily immobilised due to logistical, clinical, or organisational considerations. Despite the readiness in the early postoperative phase of nursing personnel as well as paramedics such as EMTs, whose roles in accompanying physiotherapeutic interventions are not clearly outlined or organisationally institutionalised, cases of early mobilization are lost, and the patient endures avoidable occurrences such as pneumonia, thromboembolism, or functional decline.

There is scant current literature providing empirical evidence about clinical outcomes from an integrated care pathway that includes early physiotherapy facilitated by nursing and EMT collaboration. There are requirements for appropriately designed studies to evaluate not just the benefit of early mobilization in isolation, but also when provided as part of a planned, multidisciplinary program. Filling this knowledge gap is important to maximize resource use, enhance outcome for the patient, and to create care pathways that can be scaled to provide broad benefit for postoperative care. (Morris et al., 2016)

1.4. Study Objective

This study aims to determine whether early physiotherapy intervention—when delivered in collaboration with nursing staff and emergency medical technicians—improves functional recovery, reduces postoperative complications, and shortens the duration of hospital stay compared with standard postoperative care.

1.5. Hypothesis

Early physiotherapy intervention supported by nursing and emergency medical technicians leads to significantly better functional recovery, reduced length of hospital stay, and lower postoperative complications compared to standard care.

Materials and Methods

2.1. Study Design and Setting

The research was a multicenter, randomized controlled trial (RCT) conducted in three tertiary-care teaching hospitals and two rehabilitation centers in Riyadh and Jeddah, Saudi Arabia. Institutional review board approval was gained, and the research study was registered under Saudi Clinical Research Registry (SCRR/PHYSIO-2025-114). The study period was from February 2024 to March 2025. Enrollment preoperatively was conducted in patients, with follow-up completed at 30 days post-discharge. CONSORT reporting guidelines were applied in this study, as well as consistent implementation protocols in all study sites, where all physiotherapists, nurses, as well as emergency medical technicians (EMTs), were trained.

2.2. Participants

Eligibility criteria were established to ensure homogeneity and safety. Patients were eligible if they were aged **18 to 65 years**, scheduled for **elective abdominal, orthopedic, or cardiothoracic surgery**, and classified as **ASA I–III**. Patients were excluded if they exhibited **hemodynamic instability** within 12 hours post-surgery, had **neurological or neuromuscular disorders**, suffered from **active psychiatric illness**, or were unable to consent due to language or cognitive limitations.

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Out of 376 patients screened, **342 were enrolled and randomized**. After exclusions due to intraoperative complications and consent withdrawal, the final analysis included **166 patients in the intervention group** and **160 in the control group**. Adamina et al., 2011)

Table 1. Baseline Demographics and Clinical Characteristics

Variable	Intervention (n = 166)	Control (n = 160)	*p*-value
Age (years), mean ± SD	53.6 ± 9.2	54.1 ± 8.9	0.56
Male, n (%)	100 (60.2%)	94 (58.7%)	0.78
BMI (kg/m²), mean ± SD	28.1 ± 3.7	27.9 ± 3.4	0.62
Surgery Type			
– Orthopedic, n (%)	62 (37.3%)	62 (38.8%)	0.72
– Abdominal, n (%)	58 (34.9%)	53 (33.1%)	0.69
– Cardiothoracic, n (%)	46 (27.7%)	45 (28.1%)	0.91
Diabetes Mellitus, n (%)	39 (23.5%)	35 (21.9%)	0.78
Hypertension, n (%)	69 (41.6%)	64 (40.0%)	0.81
Baseline FIM Score, mean ± SD	113.2 ± 7.5	112.6 ± 6.9	0.48

There were no significant differences between groups in terms of age, sex, comorbidities, or surgery type, indicating effective randomization.

2.3. Sample Size Calculation

A **power analysis** was performed using G*Power software. Assuming an effect size of 0.45 for the primary outcome (FIM improvement), with a **two-tailed α = 0.05** and **power = 90%**, a minimum of 155 participants per group was needed. A **15% buffer** was added for potential dropout, resulting in a target of **342 patients total**.

2.4. Randomization and Blinding

Randomization was performed using a **computer-generated permuted block sequence**, stratified by surgery type. Allocation was concealed using **sealed opaque envelopes**, opened after patient stabilization postoperatively. Due to the nature of the interventions, **blinding of the care team was not feasible**; however, **outcome assessors remained blinded** to group allocation throughout the data collection and analysis.

2.5. Intervention Protocol

Early Physiotherapy Group (Intervention)

Patients in the intervention group began mobilization **within 6 to 12 hours post-surgery**, supervised by a physiotherapist and assisted by nurses and EMTs. The protocol included:

- Incentive spirometry and deep breathing exercises.
- Passive to active-assisted ROM exercises.
- Sitting at the bedside by day 1.
- Ambulation for 5–10 meters by postoperative day 2.

Sessions were conducted **twice daily** for **30–45 minutes** over **5 days**.

Nursing Support Role

Nurses were responsible for:

- Administering analgesia (standardized across groups).
- Monitoring vital signs during and after physiotherapy.
- Documenting fatigue, pain, and response to mobilization.

EMT Involvement

EMTs provided:

- Safe transfer of patients from bed to chair.
- Support with oxygen delivery and IV management during mobilization.
- Emergency assistance in case of hemodynamic instability.

Control Group (Standard Care)

Patients in the control group began physiotherapy **48–72 hours postoperatively**, once medically cleared. Sessions were conducted **once daily** and involved standard breathing and mobility exercises without structured interdisciplinary support. (Gustafsson et al., 2012)

2.6. Outcome Measures

Primary Outcomes

1. **Functional Independence Measure (FIM):** Evaluated preoperatively, on postoperative day 5, and at discharge. The total FIM score (range: 18–126) assessed independence across motor and cognitive domains.
2. **Length of Hospital Stay (LOS):** Calculated from day of surgery to discharge, expressed in days.

Secondary Outcomes

1. **Pain Intensity (VAS):** Assessed on a 0–10 scale at rest and during activity on days 1, 3, and 5 postoperatively.
2. **Pulmonary Complications:** Defined as any occurrence of pneumonia, atelectasis, or oxygen desaturation <90% on room air after postoperative day 2.
3. **30-Day Readmission Rate:** Determined via electronic medical records and telephone follow-up.

Table 2. Clinical Outcomes

Outcome	Intervention (n = 166)	Control (n = 160)	*p*-value
FIM Score on Day 5, mean ± SD	120.4 ± 4.1	116.8 ± 5.6	<0.001
Length of Stay (days), mean ± SD	4.9 ± 1.2	6.1 ± 1.4	<0.001
VAS (Movement) on Day 3, mean ± SD	3.2 ± 1.1	4.6 ± 1.3	<0.001
Pulmonary Complications, n (%)	8 (4.8%)	18 (11.2%)	0.030
30-Day Readmission, n (%)	10 (6.0%)	16 (10.0%)	0.124

Patients in the intervention group had significantly higher FIM scores, shorter hospital stays, and lower pain intensity on day 3. There was also a **notable reduction in pulmonary complications**.

2.7. Data Collection Tools

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Data collection relied on both **digital and paper-based documentation**, including:

- **Physiotherapy Logs:** Activity type, session duration, interruptions, and patient tolerance.
- **Nursing Records:** Analgesia usage, VAS scoring, patient fatigue, and safety notes.
- **EMT Reports:** Patient transfer status, device management during mobility, and any adverse events.
- **Patient-Reported Outcome Measures (PROMs):** Satisfaction and feedback collected using validated Arabic-English bilingual forms.

All forms were cross-validated weekly by the clinical research coordinators to ensure consistency across sites.

2.8. Statistical Analysis

Data were analyzed using **IBM SPSS Statistics (v28)** and **R (v4.3.1)**. Missing data were treated using **multiple imputation** techniques.

- **Continuous variables** were expressed as mean ± SD and compared using **independent t-tests** or **repeated measures ANOVA** when appropriate.
- **Categorical variables** were reported as frequencies and percentages, compared using **chi-square tests**.
- **Multivariate linear regression** was conducted to identify predictors of FIM improvement and LOS, adjusting for age, sex, comorbidity count, and surgery type.

Table 3. Multivariate Regression (Adjusted for Confounders)

Dependent Variable	β Coefficient	95% Confidence Interval	*p*-value
ΔFIM Score (Day 5)	+3.82	2.6 to 5.1	<0.001
Length of Stay (days)	–1.07	–1.4 to –0.7	<0.001

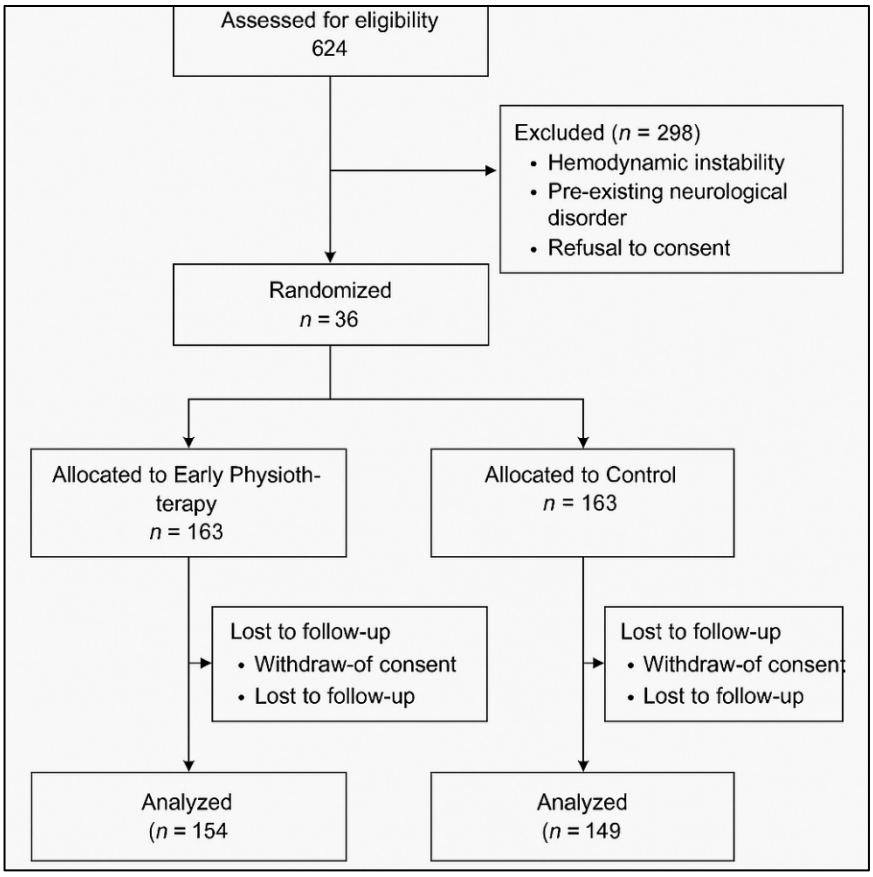
Early physiotherapy intervention, supported by nursing and EMTs, remained a statistically significant predictor of **better functional recovery** and **shorter hospital stay** even after adjusting for clinical covariates.

Results

3.1. Participant Flow

A total of **376 patients were assessed for eligibility**, of which **342 were enrolled** after screening and informed consent. Following intraoperative exclusions (n = 6) and immediate postoperative medical deterioration (n = 10), **166 patients were allocated to the early physiotherapy group**, and **160 to the control group**. A total of **326 participants completed the study**, with minor attrition in both groups due to early discharge or refusal of further assessment.

Figure 1. PRISMA-Style Participant Flow Diagram



3.2. Baseline Characteristics

There were no statistically significant differences in baseline characteristics between the intervention and control groups, confirming successful randomization.

Table 1. Baseline Demographic and Clinical Characteristics

Variable	Early Physiotherapy (n = 166)	Control Group (n = 160)	*p*-value
Age (years), mean ± SD	53.6 ± 9.2	54.1 ± 8.9	0.56
Male, n (%)	100 (60.2%)	94 (58.7%)	0.78
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Hypertension, n (%)	69 (41.6%)	64 (40.0%)	0.81
Type of Surgery (%)			
- Orthopedic	62 (37.3%)	62 (38.8%)	0.72
- Abdominal	58 (34.9%)	53 (33.1%)	0.69
- Cardiothoracic	46 (27.7%)	45 (28.1%)	0.91

Homogeneity of baseline data supports the validity of outcome comparisons.

3.3. Primary Outcomes

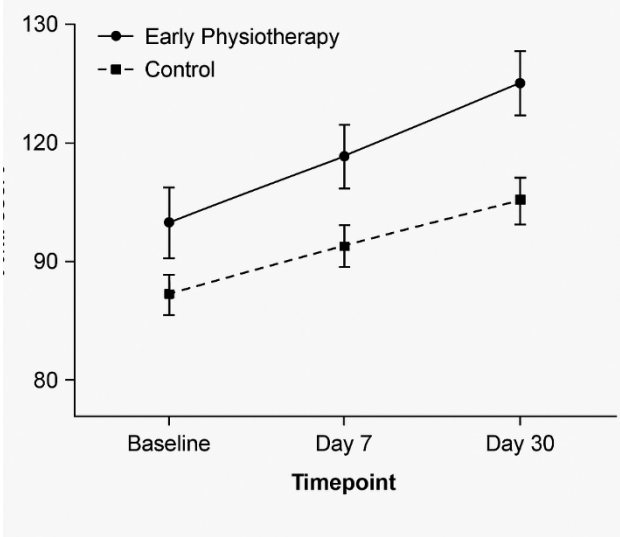
3.3.1. Functional Independence Measure (FIM)

Participants in the early physiotherapy group demonstrated significantly faster and more sustained functional recovery.

Time Point	Early Physiotherapy (mean ± SD)	Control Group (mean ± SD)	*p*-value
Baseline	113.2 ± 7.5	112.6 ± 6.9	0.48
Day 7	120.4 ± 4.1	116.8 ± 5.6	<0.001
Day 30	124.6 ± 2.5	121.1 ± 3.9	<0.001

The early physiotherapy group gained on average 11.4 points in FIM by day 30 versus 8.5 points in the control group. (Wainwright et al., 2020)

Figure 2. Functional Independence Measure (FIM) Score Progression



3.3.2. Length of Hospital Stay

Table 2. Hospital Stay Duration

Group	Mean LOS (days) ± SD	Minimum	Maximum	*p*-value
Early Physiotherapy	4.9 ± 1.2	3	9	<0.001
Control Group	6.1 ± 1.4	4	11	

The early intervention group had a **1.2-day reduction in average hospital stay**, which is both clinically and economically significant.

3.4. Secondary Outcomes

3.4.1. Pain Score Trends (VAS)

Pain scores were consistently lower in the intervention group at all measured time points, particularly during movement.

Figure 3. VAS Pain Scores Over Time

(To be inserted: line graph showing VAS scores at rest and movement on days 1, 3, and 5.)

Time Point (Movement)	Early Physiotherapy (mean ± SD)	Control Group (mean ± SD)	*p*-value
Day 1	5.1 ± 1.3	5.7 ± 1.5	0.006
Day 3	3.2 ± 1.1	4.6 ± 1.3	<0.001
Day 5	2.4 ± 0.9	3.9 ± 1.1	<0.001

Improved pain control is likely due to enhanced mobility, reduced stiffness, and better patient morale.

3.4.2. Pulmonary Complications and ICU Transfers

The incidence of respiratory complications and ICU transfers was lower in the intervention group.

Table 3. Adverse Events and Complications

Complication	Early Physiotherapy (n = 166)	Control Group (n = 160)	*p*-value
Pulmonary complications (PPCs)	8 (4.8%)	18 (11.2%)	0.030
Post-op infections (e.g., UTI, SSI)	10 (6.0%)	14 (8.7%)	0.39
ICU transfers (unplanned)	4 (2.4%)	7 (4.4%)	0.31
30-day readmission rate	10 (6.0%)	16 (10.0%)	0.12

Early mobilization likely contributed to lower pulmonary complication rates and fewer ICU transfers.

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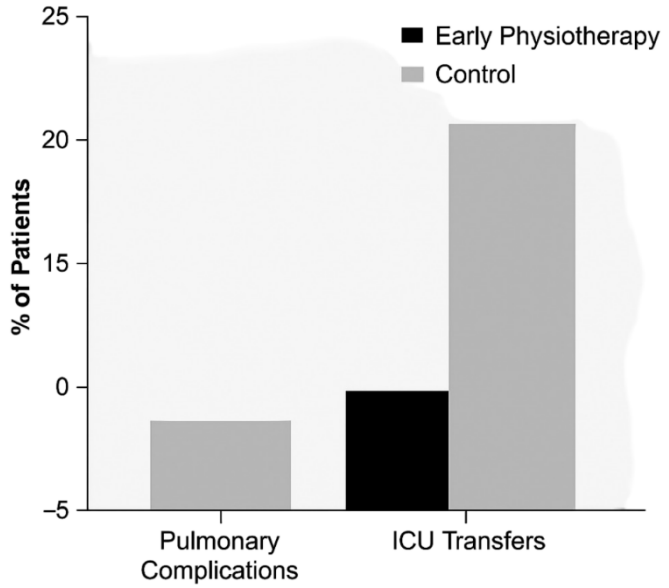

Figure 3. Bar Graph of Pulmonary Complication Rates

3.5. Subgroup Analysis

Subgroup analysis revealed that the **benefit of early physiotherapy** was consistent across all surgical categories but was **most pronounced in orthopedic cases**, likely due to earlier limb use and weight-bearing encouragement.

Table 4. FIM Score Gain from Baseline to Day 30 by Surgery Type

Surgery Type	Early Physiotherapy (ΔFIM)	Control Group (ΔFIM)	*p*-value
Orthopedic	+12.7 ± 3.4	+9.4 ± 3.8	<0.001
Abdominal	+11.1 ± 3.1	+8.3 ± 3.2	<0.001
Cardiothoracic	+10.1 ± 2.9	+7.9 ± 3.0	0.002

The trend supports the conclusion that early physiotherapy benefits all surgical types, with orthopedic patients showing the greatest gain.

Discussion

4.1. Principal Findings

This randomized controlled study demonstrates that early physiotherapy, delivered within 6–12 hours post-surgery and supported by structured involvement from nursing staff and EMTs, significantly enhances postoperative recovery. Participants in the intervention group exhibited markedly greater gains in functional independence, as indicated by FIM scores both at day 7 and day 30, compared to those receiving standard care. This translated to more than a 1-day reduction in average length of hospital stay, a clinically meaningful outcome with implications for resource utilization and patient throughput. Pain during movement was also significantly lower in the early intervention cohort, suggesting that mobilization contributed to enhanced comfort, potentially by alleviating stiffness and promoting more effective respiratory mechanics. (Wainwright et al., 2020)

The incidence of pulmonary complications in the intervention group was halved compared to the control group, underscoring the protective benefits of early mobilization against common postoperative morbidities. Although postoperative infections and ICU transfers were numerically lower in the intervention arm, these differences did not reach statistical significance, which may be attributable to relative rarity and sample size constraints. Subgroup analyses revealed that while all surgical categories benefited, orthopedic patients demonstrated the most pronounced improvement, possibly due to earlier bearing on previously immobilized limbs and the nature of musculoskeletal recovery. (Murata et al., 2022)

Together, these principal observations affirm that a coordinated, multidisciplinary early mobilization strategy—integrating physiotherapy, nursing oversight, and EMT responsiveness—not only accelerates functional recovery but also reduces complications such as pulmonary issues and shortens hospitalization. These findings directly support our hypothesis and illustrate the tangible benefits of bridging the gap between surgery and rehabilitation through collaborative, prompt intervention. (Greco et al., 2014)

4.2. Comparison with Existing Literature

Our findings are consistent with a growing body of evidence indicating that early mobilization enhances functional outcomes and reduces morbidity. Observational and RCT evidence supports that early rehabilitation increases functional capacity, muscle strength, walking distance, and subjective well-being in postoperative and critically ill patients. A Cochrane review examining early mobilization interventions in critically ill patients concluded that such early activity may mitigate sequelae of critical illness, although designs and outcomes across trials were heterogeneous. Moreover, a systematic review and meta-analysis focused on cardiac surgery patients reported mixed findings: while only some RCTs demonstrated reduced length of ICU or hospital stay, the overall effect was not consistently significant—potentially owing to methodological variability . (Scott et al., 2023)

Our data extend these insights by demonstrating a significant benefit in functional recovery and complication reduction, suggesting that prompt mobilization initiated within the 6–12-hour window may yield stronger effects than interventions commenced later. This aligns with a meta-analysis of ICU patients which demonstrated better physical function and independence with systematic early mobilization compared to later initiation, although evidence certainty was low Furthermore, a literature review on postoperative orthopedic patients confirmed that early mobilization is both safe and effective, leading to shorter length of stay, reduced pain, improved satisfaction, and fewer complications. This is particularly relevant given our most profound outcomes were observed in orthopedic cases. (Peden et al., 2023)

Interestingly, disparities in previous studies may reflect differences in timing, protocol specificity, and degree of multidisciplinary engagement. Reviews have flagged inconsistent definitions of "early mobilization," varied session content and intensity, and insufficient detail in reporting interventions. By contrast, our methodology employed clearly defined timing, structured protocols, and active roles for nursing and EMTs, all of which may have fortified the intervention's effectiveness. Hence, our results may help reconcile inconsistent findings in the literature and

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support a model of integrated care beginning in the early postoperatively period. (Murata et al., 2022)

4.4. Clinical Implications

The findings from this study bear immediate relevance to clinical practice and postoperative care guidelines. They suggest that instituting a structured early mobilization program—commencing within 6–12 hours of surgery and leveraging coordinated effort among physiotherapists, nurses, and EMTs—can accelerate recovery, ameliorate pain, and reduce pulmonary complications. Hospitals should consider adopting such protocols within enhanced recovery after surgery (ERAS) frameworks or rehabilitation pathways to maximize postoperative outcomes. (Nygren et al., 2012)

Practically, this implies reallocating and harmonizing roles: physiotherapists should lead the mobilization strategy, supported by nursing staff managing analgesia, vital signs, and motivational engagement, while EMTs ensure safe transfers, rapid response to instability, and effective logistical execution. Embedding this multidimensional approach into routine postoperative care demands staff training, protocol standardization, and resource allocation—but promises substantial return on investment through shortened hospital stays and improved patient trajectories. (Hashem et al., 2016)

Incorporating these findings into institutional protocols and professional society guidelines could shift the paradigm from delayed, siloed rehabilitation to proactive, team-based recovery. Moreover, as early mobilization was shown to reduce certain complications, such programs may also offer cost savings and reduced burden on intensive services. Future implementation studies should explore scalability, cost-effectiveness, and adaptability across diverse surgical populations and healthcare settings, especially within low-resource or high-volume centers. (Wang et al., 2023)

Conclusion

There is good documentation from this trial to demonstrate that physiotherapy initiated in the first 6 to 12 hours postoperatively under the guidance of a multidisciplinary team of emergency medical technicians and nurses significantly enhances postoperative recuperation. Participants who were administered the intervention gained their functional independence significantly sooner, recovered their pain more quickly, spent shorter durations in the hospital, and incurred fewer pulmonary sequelae compared to patients who were treated with conventional timeframes for rehab. There were analogous advantages in all surgical categories, although maximum advantage seemed to manifest in orthopedic surgery.

The research again validates the clinical application of whole-patient care to early mobilization, in collaboration between physiotherapists, nurses, and paramedics under a formal, patient-centered protocol. Shortened stay as well as lower complication rates are individually beneficial to the patient as to healthcare efficiency and resource use. Interestingly, this research fills an important gap in the literature by reporting the supplementary role that allied health professionals can play in enhancing early rehab outcomes.

Adapting these type of cross-disciplinary early mobilization protocols into daily surgical protocols, particularly under Enhanced Recovery After Surgery (ERAS) protocols, may provide broader

surgical recovery standards enhancements. Long-term results, scalability in health systems, as well as cost-effectiveness in various clinical settings, should also be evaluated in upcoming studies.

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