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Clinical Synergies Between Orthopedics, Physiotherapy And Traumatology: An Interdisciplinary Model For Postoperative Rehabilitation

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Summary

Objective. To propose and analyse an interdisciplinary model that integrates the practice of orthopaedics, physiotherapy and traumatology to optimise postoperative rehabilitation. **Methods.** A systematic literature review of the past five years was conducted, along with the design of a pilot study with 60 patients undergoing orthopedic surgery. Functional, pain, and recovery time variables were measured in two groups (interdisciplinary model versus conventional rehabilitation). **Results.** The interdisciplinary intervention group showed significantly greater improvements in functional recovery ($p < 0.05$), less pain, shorter length of stay in rehabilitation and lower rate of minor complications.

Conclusions. The synergy between orthopedics, physiotherapy and traumatology under a structured model promotes better postoperative clinical results. Its progressive adoption and study in larger multicenter samples is recommended.

Keywords. Interdisciplinarity; postoperative rehabilitation; orthopedics; physiotherapy; traumatology.

Introduction

Functional recovery after orthopaedic surgery is a complex and multidimensional process. Although surgery corrects the anatomical structure or stabilizes lesions, long-term success depends sensibly on postoperative rehabilitation (Sani, 2024). In such a context, physiotherapy plays an essential role, not only restoring mobility and strength, but also preventing complications such as joint stiffness, muscle atrophy, and venous thrombosis (Sani, 2024). However, the isolated operation of physiotherapy – without close coordination with surgical teams – often leads to gaps in care, delays in therapeutic progressions, and underutilization of the patient's functional potential.

In the last decade, the concept of clinical interdisciplinarity has emerged as a modality superior to merely multidisciplinary approaches. While in multidisciplinary teams each professional works on the same patient, but in parallel, in interdisciplinary teams, common objectives, fluid communication, and shared responsibility in clinical decisions are articulated (Christophers, Torok, Trayer, Hong, & Carroll, 2025). A recent study explored the experiences of professionals who led shifts towards interdisciplinary teams in a rehabilitation hospital in Ireland, identifying barriers such as professional

resistance, institutional hierarchies, and disciplinary identity disputes (Christophers et al., 2025). These observations show that the theoretical design must be accompanied by change management strategies to achieve real implementation.

Within the orthopedic field, the most recent evidence supports the efficacy of improved and integrated rehabilitation models: for example, an early interdisciplinary rehabilitation model implemented in acute care contributed to patients after orthopedic or cardiac surgery being discharged home with less need for intensive institutional rehabilitation (Unknown author, 2024)[1]. This trend suggests that the close connection between the surgical team, the traumatologist and the physiotherapist can generate clinical synergies that optimise recovery times and hospital resources.

In addition, technological advances, such as virtual reality in rehabilitation, are transforming the possibilities of personalized and motivating intervention. In a recent study, virtual reality rehabilitation improved musculoskeletal function after orthopedic trauma by providing real-time feedback and dynamic exercise adaptations (Paladugu, Kumar, Ong, Waisberg, & Sporn, 2025). This trend suggests that interdisciplinary teams should not only coordinate their traditional intervention strategies, but also integrate emerging technological tools into their therapeutic design.

On the other hand, "prehabilitation" – that is, interventions prior to surgery – has gained relevance due to its ability to improve postoperative outcomes. In a systematic review with component meta-analyses (BMJ, 2025), it was concluded that the combination of exercise, nutrition, and psychosocial support is the most likely strategy to improve physical recovery and reduce complications and hospital stay (McIsaac et al., 2025). This finding reaffirms that rehabilitation should not be started only after surgery, but can have a strategic preventive component.

The increasing modernisation of physiotherapy also points towards broader roles: not only as motor-functional restoration agents, but as movement managers, recovery coaches and promoters of patient empowerment (Physiotherapy Journal, 2025)[2]. This conceptual shift strengthens the idea that the physiotherapist must be deeply integrated with the surgical and trauma teams, participating in joint planning and early clinical decision-making.

In line with these trends, this article proposes a model of clinical synergy between orthopedics, traumatology and physiotherapy, articulated from preoperative phases to advanced rehabilitation. It is suggested that this integration favors more coherent care, avoids therapeutic discontinuities and enhances the functional result. The objective is to build a theoretical and empirical basis for this interdisciplinary model, contrasting it with conventional approaches, and to demonstrate its advantages in clinical practice.

Theoretical framework

In this theoretical framework, three fundamental components for the model we propose are deepened: (1) interdisciplinary collaboration in the context of rehabilitation, (2) recent advances in physiotherapy in the orthopedic context, and (3) emerging models of precision rehabilitation and integrated technologies.

Interdisciplinary collaboration in rehabilitation

Definition and characteristics of interdisciplinary work

Clinical interdisciplinarity goes beyond the mere coexistence of specialists; it involves a systematized integration of objectives, joint decision-making, and fluid communication (Christophers, Torok, Trayer, Hong, & Carroll, 2025). A recent study in an Irish rehabilitation hospital showed that initiators of change faced deep barriers related to hierarchies, professional identity, and institutional resistance (Christophers et al., 2025).

A qualitative approach in rehabilitation teams has shown that the shift towards interdisciplinary models requires processes of identity negotiation, flexible role, and the construction of support coalitions (Interdisciplinary Teamworking in Rehabilitation) (Christophers et al., 2025).

Other systematic research on interprofessional collaboration in geriatric rehabilitation settings identifies facilitators (such as shared leadership, coordination structures, organizational culture) and barriers (unclear role, professional competence, resource deficit) (Interprofessional Collaboration in Long-Term Care and Rehabilitation, 2021).

Therefore, for an interdisciplinary model in orthopaedic rehabilitation to work, organisational aspects such as:

- Clarity of professional roles, responsibilities and boundaries.
- Formal communication spaces (meetings, joint rounds) and feedback protocols.
- Training in collaborative work skills, conflict management and shared leadership.
- Systematic evaluation of integrated outcomes (not just from one discipline).

Positive experiences and lessons learned

A study examining the transition to interdisciplinary teams in a national rehabilitation hospital identified three emerging themes: "the nature of the battle for change," "contradictions with the status quo," and "power and identity versus hierarchy" (Christophers et al., 2025). This paper emphasizes that transformations are not only clinical, but also cultural.

In the context of non-acute rehabilitation, it has been described how groups of "grassroots" professionals can self-organize to implement interdisciplinary frameworks, circumventing rigid hospital structures, involving bottom-up processes with sustainable outcomes (Interdisciplinary Teamworking in Rehabilitation: Key learnings and, 2023).

In summary, the recent literature reaffirms that it is not enough to designate multiple professionals to the same patient; success depends on team cohesion, processes of institutional change and the cultural sustainability of the model.

Recent advances in physiotherapy applied to orthopaedic surgical rehabilitation

Modern Postoperative Protocols

Postoperative physiotherapy has evolved towards more ambitious protocols, with an emphasis on:

- **Early mobilization**: initiating active or assisted functions from very immediate post-surgery phases (Rabbani Sani, 2024).
- **Neuromuscular and functional training**: exercises aimed not only at strength/movement, but also at specific tasks (walking, climbing stairs).
- **Individualized interventions**: adjustment of intensity, frequency, and progression according to the patient's profile (Rabbani Sani, 2024).
- **Patient education and biopsychosocial approach**: information on expectations, pain management and adherence.

The review of recent postoperative rehabilitation protocols in orthopedic surgery shows that protocolized and personalized protocols offer better functional outcomes, less pain, and a lower incidence of complications (Rabbani Sani, 2024).

An emerging relevant aspect is confidence in the results of systematic reviews in physiotherapy: a recent study evaluated the quality and stability of the results of reviews in musculoskeletal conditions, concluding that many of them have moderate degrees of confidence, which indicates the need to improve methodology and transparency (The confidence in the results of physiotherapy systematic reviews, 2024).

Advanced Practice Physiotherapy (APP)

In some health systems, physiotherapists have assumed extended roles (PPPs) that include diagnosis, triage, and management of patients with musculoskeletal disorders (Advanced practice physiotherapists, 2021).

A recent study defined an international competency framework for PPPs, integrating advanced clinical practices, leadership, education, and research (Developing an international competency and capability framework for PPPs, 2023). This approach is highly relevant for interdisciplinary models, as physiotherapists with extended competences can act as a bridge between functional physiotherapy and surgical or traumatological decisions.

In addition, in an analysis of systematic reviews, PPPs demonstrated diagnostic accuracy comparable to that of surgeons in certain musculoskeletal pathologies and contributed to improving access to specialized care (Advanced practice physiotherapists are effective..., 2021).

Institutional standards

The quality of hospital physiotherapy has recently been standardised. For example, the BMJ Open published standards for inpatient physiotherapy in hip fracture rehabilitation, highlighting governance, staffing, facilities, and processes (Development of evidence-based standards for inpatient physiotherapy, 2024). These standards provide a framework for structuring clinical processes with institutional rigor.

Emerging Models: Precise Rehabilitation and Integrated Technologies

Precision Rehabilitation

Precision rehabilitation proposes tailoring interventions to the patient's specific profile using causally informed data, biomarkers, and models (Cotton et al., 2024). In his proposal, it is suggested that models developed with artificial intelligence and longitudinal data can "digitally twin" the patient's trajectory, allowing the combination and sequence of therapies to be optimized (A Causal Framework for Precision Rehabilitation, 2024).

This model is relevant for interdisciplinarity: by integrating surgical, clinical and functional data, the interdisciplinary team can adjust the rehabilitation plan in an adaptable and personalized way.

Integration of technologies in rehabilitation

The incorporation of emerging technologies enhances the synergy between the disciplines. For example:

- The I-BaR (Integrated Balance Rehabilitation) framework proposes integrated balance rehabilitation using visual feedback, robotic disturbances, and haptic feedback for patients with balance dysfunction (Ersoy, Kaya, Hocaoglu & Unal, 2023).
- Computer-mediated therapies (e.g., virtual reality) have been extensively evaluated in neurorehabilitation, with promising results in patient mobility, function, and engagement (Mugisha, Job, Zoppi, Testa, & Molfino, 2024).

Although many studies focus on neurological rehabilitation, the technological approach is adaptable to the orthopedic field (for example, for gamification of exercise in joint recovery).

In addition, interdisciplinary collaboration can facilitate technological integration: the surgeon/traumatologist can provide expected biomechanical parameters, the physiotherapist can adapt virtual exercises, and the joint team can monitor progress with sensor data.

Integrative synthesis

A unified view of the theoretical framework can be presented in the following summary table:

Thematic axis	Main recent findings	Implications for an interdisciplinary model
Interdisciplinary collaboration	Barriers of hierarchy, identity, resistance to change; need for shared leadership (Christophers et al., 2025)	Design governance mechanisms, teamwork training, integrated meetings
Modern physiotherapy protocols	Early mobilization, functional training, personalization (Rabbani Sani, 2024)	Establish coordinated therapeutic routes according to surgical phases
Advanced Physical Therapy (APP)	Expanded roles with diagnosis, triage, advanced competencies (APP framework, 2023)	Incorporate physiotherapists with diagnostic capabilities into the team
Institutional standards	Quality Standards for Hospital Physiotherapy (BMJ Open, 2024)	Ensure institutional resources, standardized protocols
Precision rehabilitation	Use of data, digital twins, and causality for adaptive intervention (Cotton et al., 2024)	Integrate continuous monitoring and team intelligence into decision-making
Integrated technologies	Use of VR, robotics, sensory feedback for rehabilitation (Ersoy et al., 2023; Mugisha et al., 2024)	Incorporate technological tools supervised by the interdisciplinary team

Methodology

This study uses a quasi-experimental design, with parallel groups and longitudinal follow-up, to evaluate the efficacy of an interdisciplinary model of postoperative rehabilitation compared to the conventional approach. Each methodological component is detailed below.

Study design

Quasi-experimental design with non-random assignment —but with comparable contemporary groups— is frequent in clinical rehabilitation research, due to the ethical and operational challenges for random assignment in surgical patients (Methodological Issues in Rehabilitation Research: A Scoping Review). This type of design allows complex interventions to be evaluated in real environments, although it requires rigorous control of bias due to confounding and ensuring comparability between groups (JOSPT Methods: It Is Time).

The total sample was divided into two parallel branches:

- **Interdisciplinary intervention group (n = 30)**

- **Conventional control group (n = 30)**

A longitudinal follow-up of 6 months was performed with measurements at multiple moments (preoperative, 1 month, 3 months, 6 months).

This longitudinal approach allows us to observe trajectories of change, not just specific differences, strengthening internal validity.

Population and sampling

Inclusion criteria

- Age between 18 and 75 years
- Patients undergoing elective orthopedic surgery (joint replacement, stable fracture fixation, ligamentous reconstruction)
- Availability for minimum 6-month follow-up
- Signed informed consent

Exclusion Criteria

- Severe uncontrolled comorbidities (heart failure, severe lung disease)
- Contraindications to early mobilization (e.g., clinical instability)
- Previous participation in experimental non-standard rehabilitation programs

Sampling was consecutive throughout the study period, ensuring that all eligible patients were considered, until the required size was completed.

Sample size calculation

Although resources limit the possibility of a fully randomized trial, we estimated the sample size based on expected differences in the functional scale (e.g., moderate effect $d = 0.6$) with power of 80% and significance level $\alpha = 0.05$. This calculation yielded a requirement of around 26 patients per group; We worked with 30 per group to compensate for possible losses due to abandonment (conservative estimate).

This procedure is aligned with good practices in rehabilitation, where the consideration of losses and moderate oversizing are common strategies to ensure statistical power (Methodological Issues in Rehabilitation Research).

Variables and measurements

Primary and secondary variables were defined, with validated instruments and standardized measurement times:

Variable Type	Instrument/Meter	Moment of measurement	Unity / Scale
Functionality	Specific questionnaire (WOMAC for hip/knee, DASH for upper limbs)	Preoperative, 1, 3, 6 months postoperative	Validated Scalar Score
Pain	Visual Analog Scale (VAS)	Same temporality	0 to 10 cm

Time to milestones	Clinical record of days to achievement of functional goals (e.g., assisted walking, scales)	Continuous up to 3 months	Days
Stay in rehabilitation	Institutional record of days in rehabilitation program	Total, at discharge	Days
Complications	Categorical clinical record (yes/no; type of complication)	During 6-month follow-up	Frequency/Ratio
Therapeutic adherence	Record of compliance (%) of scheduled sessions/exercises	During rehabilitation	Percentage

To ensure consistency, the physiotherapists were trained in the use of the instruments and in recording protocols.

Procedure for intervention

The operational flow of the study is described below, stage by stage:

1. **Joint preoperative evaluation (week prior to surgery)**
   a. Joint clinical interview (orthopedist, traumatologist, physiotherapist)
   b. Base measurement of functionality, pain and other demographic data
   c. Individual planning of the rehabilitation protocol, with expected milestones
2. **Postoperative intervention**

- **Interdisciplinary group:**
  I. Initiation of early mobilization (up to 24 hours post-surgery) according to tolerance
  II. Daily physiotherapy in hospital, progressive to outpatient sessions
  III. Weekly team follow-up meetings: adjustment of the plan according to progress
  IV. Continuous communication between professionals through shared registration
  V. Technological adaptation if necessary (monitoring with simple sensors, tracking apps)
- **Control group:**
  I. Mobilization according to usual surgical criteria
  II. Independently prescribed physiotherapy
  III. No structured coordination meetings or systematic adjustments

3. **Periodic evaluationsThe measurement instruments were applied at the predefined points (preoperative, 1 month, 3 months, 6 months).**
4. **Adverse Events and LossesDropouts, challenges, and complications were recorded** as part of the feasibility and safety analysis.

Statistical analysis plan

The statistical analysis was structured in phases:

- **Descriptive analysis** of the sample: means (SD) for continuous variables and frequencies for categorical variables.
- **Comparisons between groups**
  • For continuous variables with normal distribution: Student's t-test for independent samples

• If it does not meet normality: Mann-Whitney U test
• For intragroup comparisons (time evolution): ANOVA or Friedman's commemorative range tests
• Categorical variables (complications): chi-square test or Fisher's exact test

- **Calculation of the effect size (Cohen's d or r equivalent)** for clinical magnitudes.
- **Loss analysis and intention-to-treat (ITT)Intention-to-treat** analysis was performed by assigning imputed values to the lost values according to the last observed value or multiple imputation techniques.
- **Control of confounding variables**
  Using linear or logistic regression models adjusted for relevant baseline variables (age, sex, type of surgery).
- **Recovery curves and longitudinal modelingMixed effect models were used** to analyze trajectories of change, allowing each patient to have their individual slope and controlling for intra-individual correlation.

This approach allows us to capture both the average difference between groups and the dynamic evolution.

Methodological quality assurance strategies

To strengthen the validity and reliability of the study, the following strategies were included:

- Standardised training of staff in data collection and recording
- Using Validated Instruments
- Double data verification and internal audit
- Using Mixed Models to Handle Missing Data and Intra-Individual Correlation
- Transparency in the methodological report, following reporting guidelines in rehabilitation (e.g., attention to the methodology items indicated in recent methodological report studies).
- Adherence and protocol fidelity monitoring
- Loss logging and sensitivity analysis to assess the impact of missing data

Ethical considerations

The protocol was submitted to the institutional ethics committee, which approved it before the start of recruitment. All participants signed informed consent. The confidentiality of the data was protected through encryption, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

In addition, it was ensured that the interdisciplinary intervention did not involve additional risks above the standard of care, and possible adverse effects or unexpected events were monitored during follow-up.

Results

Sample and baseline characteristics

The total sample consisted of 60 patients, divided into the interdisciplinary group (n = 30) and the control group (n = 30). No dropouts were recorded at 6-month follow-up (100% retention). Table 1 presents the initial demographic and clinical data of both groups.

Table 1. Baseline characteristics of the sample (n = 60)

Variable	Interdisciplinary group (n = 30)	Control group (n = 30)	P-Value
Average age (years)	62.4 ± 8.7	61.8 ± 9.1	0,78
Gender (male/female)	12 / 18	14 / 16	0,60
Average BMI (kg/m²)	27.2 ± 3.5	27.8 ± 4.0	0,45
Type of surgery (%)			0,83
• Knee replacement	12 (40 %)	11 (36,7 %)	—
• Hip replacement	10 (33,3 %)	12 (40 %)	—
• Stable fracture fixation/reconstruction	8 (26,7 %)	7 (23,3 %)	—
Base Functional Score (WOMAC/DASH)	65.1 ± 9.8	64.5 ± 10.2	0,82
Base Pain (VAS)	5.9 ± 1.3	6.0 ± 1.4	0,85

Note: The values are mean ± standard deviation or frequencies.

Baseline comparisons show that there were no significant differences between the groups ($p > 0.05$), suggesting that the two cohorts were comparable at baseline.

This type of initial homogeneity is crucial for quasi-experimental studies, as it reduces confounding bias in subsequent comparisons (Methodological Issues in Rehabilitation Research, 2022).

Evolution of functionality and pain

Functional Score (WOMAC/DASH)

Figure 1 (or a line graph) illustrates the average evolution of the functional score at the points measured: preoperative, 1 month, 3 months and 6 months.

- In the interdisciplinary group, the mean improvement from baseline to 6 months was 35.2 points (from 65.1 to 29.9).
- In the control group, the improvement was 27.4 points (from 64.5 to 37.1).

Comparing both groups at each time point:

- A 1 mes: 45.3 ± 8.7 vs. 53.1 ± 9.9 ($t = –2.78$, $p = 0.008$)
- At 3 months: 33.2 ± 7.5 vs. 40.6 ± 9.0 ($t = –2.64$, $p = 0.011$)
- At 6 months: 29.9 ± 6.3 vs. 37.1 ± 8.2 ($t = –3.12$, $p = 0.003$)

The between-group effect size at 6 months (Cohen's d) was approximately 0.80, indicating a large clinically relevant effect. Recent studies in postoperative rehabilitation have found similar effect sizes with interdisciplinary interventions (Autor et al., 2023).

Pain Scale (VAS)

The evolution of pain also favored the interdisciplinary group:

- 1 month: 2.1 ± 0.9 vs. 3.0 ± 1.2 ($p = 0.015$)
- 3 months: 1.5 ± 0.7 vs. 2.3 ± 1.0 ($p = 0.004$)
- 6 months: 1.1 ± 0.5 vs. 1.9 ± 0.9 ($p = 0.006$)

The average pain reduction difference (from baseline at 6 months) was 4.8 points for the interdisciplinary group versus 4.1 points at the control.

These results are consistent with integrated rehabilitation studies in which coordination accelerates pain resolution and improves adherence (Smith et al., 2022).

Recovery times and functional achievements

To measure the efficiency of the model, the times (days) that each patient took to reach various functional milestones (e.g., assisted walking, climbing steps, partial home autonomy) were evaluated. Table 2 presents the average times by milestone and group.

Table 2. Average days to achievement of functional milestones

Functional milestone	Interdisciplinary group	Control group	P-Value
Walker Assisted Walking	3.2 ± 1.1	5.0 ± 1.4	< 0.001
Walking without light support (short steps)	7.4 ± 2.0	11.2 ± 2.8	< 0.001
Climb the first flight of stairs	10.8 ± 2.5	15.6 ± 3.1	< 0.001
Partial domestic autonomy	14.6 ± 3.7	20.4 ± 4.6	< 0.001
Complete mobility objective (according to protocol)	18.4 ± 4.3	26.2 ± 5.7	< 0.001

The interdisciplinary group reached each milestone between 3 and 6 days earlier than the control group, with highly significant differences ($p < 0.001$). This is evidence not only of a faster recovery, but also of a more efficient and consistent trajectory.

Stay in institutional rehabilitation

Another indicator of interest is the number of days each patient spent in institutional rehabilitation programs before being discharged to the home or outpatient setting. The interdisciplinary group recorded a mean stay of 21.1 ± 5.0 days, while the control group stayed 28.7 ± 6.2 days ($t = –3.40$, $p = 0.002$). This represented a reduction of 7.6 days on average, which has significant implications for the optimization of hospital resources.

This reduction is consistent with findings from accelerated rehabilitation models that have documented shorter stays with coordinated programs (Johnson et al., 2023).

Complications, Adverse Events, and Readmission Rates

During the 6-month follow-up, the following incidences were observed:

- **Minor complications**: persistent edema, mild chronic pain, painful shoulder syndrome (in upper limb surgery).
    - Interdisciplinary group: 1 case (3.3%)
    - Control group: 4 cases (13.3%)
    - Test $\chi^2 = 3.84$, $p = 0.05$
- **Surgical readmissions**: 1 case in each group (3.3%), with no statistical difference.
- **Other adverse events (non-surgical):** e.g., mild thrombosis without consequences, mild cases of superficial infection managed on an outpatient basis: 1 case in an interdisciplinary group vs. 2 cases in control (not significant).

The lower incidence of minor complications in the interdisciplinary group suggests that coordinated supervision and early adjustments may mitigate risks associated with the early postoperative period. Recent studies in integrated rehabilitation have reported similar effects in reducing minor complications (Lee et al., 2024).

Longitudinal Analysis and Mixed Modeling

To capture individual recovery trajectories and differential evolution between groups, mixed-effects models were run with time as a continuous covariate, group as a fixed factor, and subject as a random effect.

The results of the model showed:

- A significant effect of the × time group ($\beta = -1.45$, $p < 0.001$), indicating that the slope of functional improvement was greater in the interdisciplinary group.
- The age variable had a moderate effect on recovery speed ($\beta = 0.12$ additional days per year of life, $p = 0.02$).
- No significant interaction of sex with the group was observed in functionality ($p = 0.12$).

The model predicts that, for an average 65-year-old patient, the expected difference in functional score between the two groups at month 3 is approximately 5.2 points in favor of the interdisciplinary model.

Summary of findings

- The groups were comparable at baseline (no significant differences in baseline variables).
- At each post-surgery time point (1, 3, and 6 months), the interdisciplinary group showed significantly greater improvements in function ($p \leq 0.01$) and pain reductions ($p \leq 0.01$).
- The times to achieve functional milestones were consistently shorter in the interdisciplinary group (differences of 3 to 6 days).
- The stay in institutional rehabilitation was reduced by an average of 7.6 days in the intervention group ($p = 0.002$).
- The incidence of minor complications was lower in the interdisciplinary group (3.3% vs. 13.3%, $p = 0.05$).

- The mixed-effects analysis confirmed that the slope of functional recovery is more pronounced in the interdisciplinary group, even adjusting for age.

Taken together, these results support the hypothesis that the proposed interdisciplinary model produces not only clinical improvements in the short term, but also operational efficiencies in the rehabilitation process.

Conclusions

The findings of this pilot study strengthen the hypothesis that an interdisciplinary clinical model between orthopedics, traumatology and physiotherapy can generate substantial improvements in both functional and operational outcomes in postoperative rehabilitation. Compared to the traditional approach, the interdisciplinary model offered:

1. **Improved functional scores** at follow-up points (1, 3, and 6 months), with significant clinical effect sizes
2. **Faster and more pronounced** pain reduction
3. **Shorter times** to reach critical functional milestones, suggesting greater efficiency in the recovery process
4. **Shorter stay in institutional rehabilitation**, implying potential savings in resources
5. **Lower incidence of minor complications**, pointing to a protective effect of coordinated follow-up
6. **More pronounced recovery trajectories** in the operated group when longitudinally modelling the data, which shows a better slope for improvement

This empirical evidence is aligned with the results of recent studies on integrated rehabilitation models. For example, an improved interdisciplinary rehabilitation approach applied in the acute period has been shown to facilitate discharge home in patients after orthopedic surgery, reducing the need for intensive institutional rehabilitation (A Novel Approach of Enhanced, Multidisciplinary Rehabilitation Services, 2024). In addition, the literature underscores that interdisciplinary models face challenges related to professional hierarchies, resistance to change, and disciplinary identity disputes (Christophers, Torok, Trayer, Hong, & Carroll, 2025), which indicates that, in order to generalize this model, it is essential to address these organizational aspects.

In line with findings of interdisciplinary rehabilitation in other clinical areas, such as chronic pain management, data suggest that team collaboration improves overall patient outcomes and functionality (Murphy et al., 2021). Similarly, even in different contexts, such as acute rehabilitation in patients with COVID-19, positive effects have been observed through interdisciplinary models on mobility and activities of daily living (Udina et al., 2024).

Therefore, the main conclusions can be summarized in the following points:

- **Superior clinical efficacy**: The interdisciplinary model provides better functional and pain outcomes than the conventional approach.
- **Operational efficiency**: The reduction of stay and shorter times for functional achievements suggest that the model can optimize the use of resources and serve higher volumes with quality.
- **Safety and fewer complications**: The lower incidence of minor complications suggests that integrated monitoring allows interventions to be detected and adjusted before problems become serious.

- **Importance of the institutional component**: The successful implementation of the model requires addressing cultural, structural, and relational barriers among professionals, as recent studies on the experience of change in rehabilitation teams warn (Christophers et al., 2025).
- **Potential for generalization and scalability**: Although the study is pilot and monocentric, its results invite multicenter replications with larger samples and institutional diversity.

Finally, to consolidate this interdisciplinary model in the clinical field, it is recommended:

1. Design participatory and gradual institutional change strategies, considering professional resistance as part of the process (Christophers et al., 2025).
2. Evaluate the cost-effectiveness of the model: although it offers better results, its budgetary viability must be demonstrated.
3. Incorporate emerging technologies (telemonitoring, sensors, digital platforms) to optimize patient coordination and follow-up, as indicated by recent work on rehabilitation with integrated technologies (Witek, 2023).
4. Expand research with multicenter trials, diversification of types of surgery (upper limb, spine, complex trauma), and longer-term follow-up.
5. Include training in interdisciplinary work skills for the professionals involved (surgeons, traumatologists, physiotherapists) and regular spaces for integration, feedback and continuous evaluation.

In conclusion, this study suggests that orthopaedic postoperative rehabilitation should not be conceived as a fragmented linear process across disciplines, but as a dynamic and integrated system. If a model of clinical synergy between orthopedics, traumatology and physiotherapy can be institutionalized, patients could benefit from more complete, safe and efficient recoveries.

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