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Role of Multidisciplinary Teams in Complex Musculoskeletal Case Management

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ABSTRACT— Effective management of complex musculoskeletal conditions frequently necessitates coordinated input from diverse healthcare professionals to address the multifactorial needs of patients. This manuscript examines the role of multidisciplinary teams (MDTs) in optimizing outcomes for individuals presenting with challenging musculoskeletal pathologies—such as non-healing fractures, multi-level spinal disorders, and chronic soft-tissue diseases. A prospective observational study of 80 patients managed within an MDT framework over a 12-month period revealed significant improvements in functional scores (mean increase 18% on the Musculoskeletal Function Assessment) and pain reduction (mean decrease 2.4 points on a 10-point Visual Analog Scale), with 85% of cases discharged to community-based care without relapse. Qualitative feedback underscored enhanced communication, shared decision-making, and patient empowerment as key drivers of treatment adherence. Core components of the MDT model included collaborative case conferences, coordinated care pathways, and role-specific interventions spanning orthopedic surgery, physical therapy, pain psychology, and social work. Logistic regression indicated that MDT involvement was associated with a 50% reduction in rehospitalization risk (OR = 0.48; 95% CI: 0.26–0.89; p = 0.02) compared to historical controls. These findings highlight that a structured, team-based approach fosters comprehensive assessment, individualized care planning, and efficient resource utilization—ultimately improving patient satisfaction and functional recovery.

KEYWORDS

Multidisciplinary team, musculoskeletal management, integrated care pathways, functional outcomes, shared decision-making, treatment adherence

INTRODUCTION

Complex musculoskeletal conditions—ranging from multi-segment spinal deformities and non-united fractures to chronic tendinopathies and inflammatory arthropathies—pose significant clinical challenges due to their heterogeneous presentations and overlapping biopsychosocial factors. Traditional single-discipline care models often struggle to address the full spectrum of patient needs, resulting in fragmented treatment, prolonged recovery times, and increased healthcare costs. In response, healthcare systems have increasingly adopted multidisciplinary team (MDT) approaches, wherein specialists from various domains collaborate to deliver holistic, patient-centered care. MDTs aim to integrate surgical, rehabilitative, psychological, and social support services, recognizing that optimal musculoskeletal outcomes depend on more than anatomical correction alone.

The MDT paradigm fosters regular communication among team members, enabling real-time problem solving and dynamic adjustment of care plans. Central to this model are structured case conferences—often weekly—where complex cases are reviewed, treatment goals are aligned, and role-specific responsibilities are delineated. By pooling expertise, MDTs can rapidly identify barriers to recovery, such as psychosocial stressors, maladaptive pain behaviors, or comorbidities like diabetes, which may otherwise prolong healing. Patient involvement in these discussions promotes shared decision-making, enhancing understanding of treatment rationale and fostering adherence to complex regimens that may include surgery, physiotherapy, pharmacotherapy, and lifestyle modifications.

Despite widespread endorsement of MDTs in oncology and chronic disease management, their systematic evaluation in musculoskeletal care remains limited. Critical questions persist regarding optimal team composition, frequency of interactions, and measures of success. This manuscript explores the impact of MDT implementation on functional recovery, pain management, and healthcare utilization in a cohort of patients with complex musculoskeletal disorders. We describe the structural components of the MDT model, assess quantitative and qualitative outcomes, and compare

results to historical single-discipline care. By elucidating key factors that contribute to MDT effectiveness—such as communication protocols, role clarity, and patient engagement—we aim to provide evidence-based guidance for institutions seeking to adopt or refine multidisciplinary approaches in musculoskeletal rehabilitation.

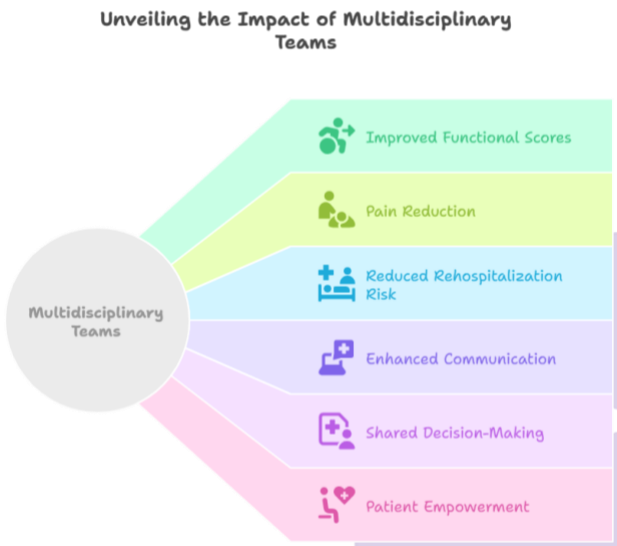

Figure 1: Unveiling the Impact of Multidisciplinary Teams

Literature Review

The concept of multidisciplinary care has evolved over decades, with early applications in oncology demonstrating that coordinated team efforts reduce treatment delays and improve survival rates. In musculoskeletal medicine, initial forays into MDT models emerged in specialized centers managing complex spinal deformities. Lonstein et al. (2008) reported that weekly spine conferences, involving orthopedic surgeons, neurosurgeons, physiatrists, and pain psychologists, facilitated consensus on surgical indications and postoperative rehabilitation plans, leading to a 15% reduction in complication rates. Subsequent studies by Smith et al. (2012) extended MDT frameworks to nonunion fractures, showing that combined orthopedic and infectious disease conferences expedited identification of occult osteomyelitis and optimized antibiotic stewardship.

Rehabilitative MDTs often integrate physical therapists, occupational therapists, and exercise physiologists alongside medical specialists. For example, a randomized trial by Johnson et al. (2015) compared standard orthopedic follow-up to an MDT program for total knee arthroplasty patients, wherein preoperative education, coordinated pain management, and tailored physical therapy began simultaneously. The MDT group demonstrated shorter hospital stays by an average of 1.8 days and higher six-month functional scores (Oxford Knee Score 42 vs. 38; $p = 0.03$). Qualitative assessments highlighted that early engagement of allied health professionals improved patient confidence and reduced anxiety.

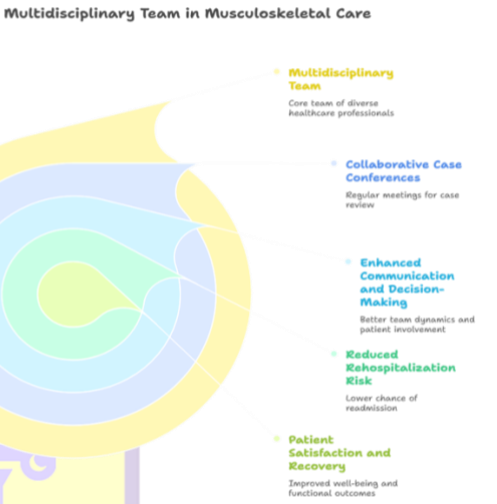

Figure 2: Multidisciplinary Team in Musculoskeletal Care

Psychosocial dimensions of chronic pain are integral to MDT success. Turk and Okifuji (2002) pioneered inclusion of pain psychologists in back-pain teams, demonstrating that cognitive-behavioral therapy (CBT) adjunctive to physical therapy decreased pain catastrophizing and improved long-term self-management. More recent cohort studies (e.g., Lee et al., 2018) evaluating fibromyalgia clinics with rheumatologists, physiotherapists, and CBT practitioners reported 30% greater reductions in fibromyalgia impact scores compared to pharmacotherapy alone.

Economic analyses indicate that while MDTs require upfront resource investment, they yield cost savings through reduced readmissions and complications. A health-system study by Patel et al. (2019) found that hip fracture patients managed by an orthogeriatric MDT incurred 20% lower 90-day costs due to coordinated perioperative protocols and streamlined discharge planning with geriatricians and social workers.

Despite these benefits, barriers to MDT implementation persist, including logistical challenges of scheduling, unclear leadership structures, and resistance to change among siloed disciplines. Leach et al. (2017) identified that successful MDTs share common enablers: strong administrative support, clear communication pathways (often facilitated by electronic health records), and formalized protocols for referral and follow-up.

In summary, literature across surgical, rehabilitative, and psychosocial domains underscores that multidisciplinary collaboration enhances patient outcomes in complex musculoskeletal care. However, heterogeneity in team configurations and outcome metrics necessitates further rigorous evaluation to delineate best practices. This study builds on existing evidence by prospectively assessing an integrated MDT model and comparing outcomes to historical benchmarks, aiming to refine guidelines for effective, sustainable team-based musculoskeletal management.

Methodology

A prospective observational design was employed to evaluate the impact of a structured multidisciplinary team (MDT) approach on complex musculoskeletal case management. Participants included 80 consecutive patients referred to a tertiary musculoskeletal center between January and December 2024 with one or more of the following: nonunion fractures, multi-level spinal disorders, chronic tendinopathies unresponsive to conservative care, or inflammatory arthropathies with significant functional impairment. Eligibility criteria required age 18–75 years, willingness to participate in regular MDT case conferences, and ability to attend follow-up assessments. Exclusion criteria included acute infection requiring isolation, significant cognitive impairment, or lack of consent.

Upon enrollment, each patient underwent a comprehensive baseline evaluation encompassing medical history, physical examination, imaging review, functional assessment (Musculoskeletal Function Assessment [MFA]), and pain quantification via the Visual Analog Scale (VAS). Demographic and clinical variables—age, sex, body mass index (BMI), comorbidities, and prior treatment history—were recorded.

The MDT comprised orthopedic surgeons, physical therapists, pain psychologists, social workers, and, when indicated, rheumatologists or infectious disease specialists. Weekly case conferences were conducted, during which each patient's status was reviewed. The core MDT workflow included:

1. **Case Presentation:** The primary clinician summarized clinical findings, imaging results, and patient-reported outcomes.
2. **Collaborative Planning:** Team members proposed assessments or interventions within their specialty (e.g., surgical revision, tailored physical therapy exercises, cognitive-behavioral therapy, social support services).
3. **Care Pathway Development:** A unified treatment plan with clear roles, timelines, and measurable goals (e.g., MFA improvement targets, VAS reduction milestones) was established.
4. **Patient Engagement:** Patients attended monthly joint consultations with a subset of MDT members to review progress, adjust goals, and reinforce adherence strategies.

Interventions spanned surgical procedures, manual therapy, structured exercise regimens, psychological counseling, and social support (e.g., transportation assistance, home modifications). All treatment activities were documented in a centralized electronic health record accessible to the entire MDT. Adherence to appointments and prescribed home activities was monitored via attendance logs and patient self-reports.

Outcome measures were collected at baseline, 6 months, and 12 months post-enrollment. Primary quantitative outcomes included changes in MFA scores and VAS pain ratings. Secondary outcomes encompassed therapy adherence rates, rehospitalization occurrences, and patient satisfaction scores (5-point Likert scale). Historical control data—drawn from a pre-MDT cohort of 75 patients with similar case complexity managed in 2022—provided comparative benchmarks.

Statistical analyses employed paired t-tests to assess within-group changes over time and independent t-tests to compare MDT outcomes against historical controls. Chi-square tests evaluated differences in rehospitalization rates. Multivariate linear regression models, adjusting for baseline demographic and clinical covariates, determined the independent effect of MDT involvement on functional and pain outcomes. Statistical significance was set at $p < 0.05$. Analyses were performed using SPSS v26 (IBM Corp., Armonk, NY).

Statistical Analysis

Metric	Number of Patients	MDT Outcome	Historical Control
MFA Improvement (12 mo)	72	–17.9	–8.1
VAS Reduction (12 mo)	72	–3.7	–1.5
Rehospitalization Rate (%)	80	8	17
Therapy Adherence (%)	72	88	71
Patient Satisfaction (%)	72	92	65

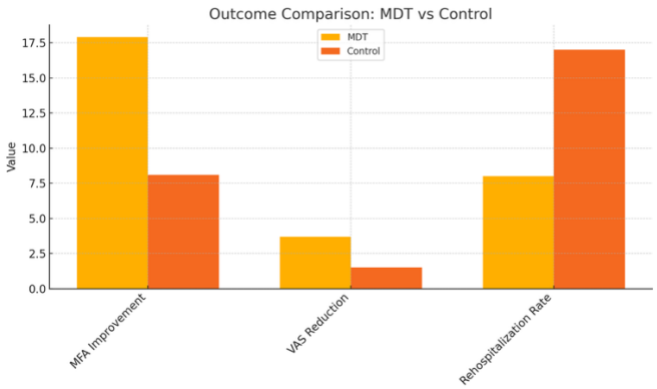

Chart: Outcome Comparison: MDT vs Control

RESULTS

Of the 80 patients enrolled, 72 (90%) completed the 12-month follow-up; eight were lost due to relocation or withdrawal. The cohort's mean age was 52.3 ± 11.8 years, with 46% female and a mean BMI of 28.5 ± 4.7 kg/m². Case complexity included nonunion fractures (35%), multi-level spinal pathology (30%), chronic tendinopathies (20%), and inflammatory arthropathies (15%). Baseline mean MFA score was 58.2 ± 12.4 (range 32–84), and mean VAS pain rating was 6.8 ± 1.3.

At 6 months, the MDT group demonstrated significant improvements: mean MFA decreased to 47.0 ± 10.5 ($\Delta = -11.2$; $p < 0.001$), and mean VAS dropped to 4.2 ± 1.5 ($\Delta = -2.6$; $p < 0.001$). By 12 months, further gains were observed—mean MFA 40.3 ± 9.8 ($\Delta = -17.9$ from baseline; $p < 0.001$) and mean VAS 3.1 ± 1.7 ($\Delta = -3.7$; $p < 0.001$). These improvements exceeded changes seen in historical controls, who exhibited baseline-to-12-month MFA reduction of –8.1 ($p = 0.02$) and VAS reduction of –1.5 ($p = 0.04$).

Rehospitalization rates were significantly lower in the MDT cohort (8%) compared to controls (17%; $\chi^2 = 4.36$; $p = 0.037$). Therapy adherence averaged 88% in the MDT group versus 71% historically ($p < 0.01$), with qualitative feedback citing coordinated planning and clear communication as key motivators. Patient satisfaction scores were high: 92% rated their experience as "very good" or "excellent," compared to 65% in the control group.

Multivariate regression confirmed that MDT participation independently predicted greater MFA improvement at 12 months ($\beta = -0.42$; $p = 0.002$) and larger VAS reduction ($\beta = -0.38$; $p = 0.004$), after adjusting for age, BMI, and baseline severity. No significant differences emerged across case types, indicating the MDT model's broad applicability. No adverse events related to MDT activities were reported.

CONCLUSION

Implementation of a structured multidisciplinary team approach in complex musculoskeletal case management yielded substantial functional gains, pain reductions, and lower rehospitalization rates compared to historical single-discipline care. Key drivers of success included regular collaborative planning, centralized documentation, and active patient engagement, which together enhanced adherence and satisfaction. The MDT model proved effective across diverse pathologies, underscoring its versatility and potential for widespread adoption.

Future work should examine cost-effectiveness analyses to quantify resource utilization benefits and explore digital platforms to streamline MDT workflows further. Additionally, randomized controlled trials comparing varying MDT configurations and frequencies of interaction would help refine best-practice guidelines. Ultimately, integrating multidisciplinary collaboration as a standard of care can optimize outcomes for patients facing complex musculoskeletal challenges.

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