



Telerehabilitation in Musculoskeletal Disorders: Current Scenario and Future Perspectives

Shreya Trivedi PT*

Master of Physiotherapy, PhD Scholar, India

***Corresponding Author:** Shreya Trivedi PT, Master of Physiotherapy, PhD Scholar, India.

Received: September 24, 2025

Published: October 10, 2025

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Shreya Trivedi PT.

Abstract

Telerehabilitation (telerehab) - the delivery of rehabilitation services at a distance using information and communication technologies - has moved rapidly from an adjunctive option to a mainstream model in musculoskeletal (MSK) care. Driven by pandemic-era necessity, technological progress, and an expanding evidence base, telerehab now demonstrates comparable clinical outcomes to in-person care for many common MSK conditions, offers cost and access advantages, and is being integrated into formal clinical practice guidance. This article summarises the current evidence, outlines practical considerations for clinicians, and highlights promising future directions including AI, wearable sensors and immersive technologies.

Keywords: Musculoskeletal; Telerehabilitation

Current evidence and clinical effectiveness

A growing number of systematic reviews, meta-analyses and randomized controlled trials indicate that telerehab-especially exercise-based, education-focused, and self-management programmes-produces outcomes comparable to conventional face-to-face rehabilitation for many MSK problems (low back pain, knee osteoarthritis, chronic shoulder pain, postoperative physiotherapy follow-up). Several umbrella and overview reviews (2020-2024) conclude moderate improvements in pain, function and quality of life with telerehab, and most studies report no increase in adverse events. However, heterogeneity in intervention content, delivery platforms, therapist training and follow-up durations limits broad generalization and points to a need for higher-quality, longer-term trials. Professional bodies such as the APTA have developed guidelines for telerehabilitation, highlighting patient selection, safety,

privacy, documentation, and when to shift to in-person care. These guidelines also note research gaps, especially in long-term outcomes and specific MSK conditions. In practice, effective telerehab involves structured remote assessments, use of validated outcome measures, clear exercise demonstrations, regular virtual check-ins, and thorough documentation. Hybrid models, combining initial in-person evaluation with remote follow-up, are practical for cases requiring hands-on input, though caution is advised for complex or atypical presentations.

Barriers and equity issues

Despite promise, several barriers slow wider uptake: digital literacy and access inequities, variable broadband availability, privacy and data security concerns, inconsistent reimbursement and licensure frameworks across jurisdictions, and clinician skills gaps

in remote communication and technology use. Additionally, heterogeneity of study designs in the evidence base complicates policy decisions-standardized reporting of telerehab interventions and economic analyses would improve comparability. Addressing these system-level and technical barriers is essential to avoid worsening health disparities.

The future of telerehabilitation will be shaped by advancements in technology, personalization, and evidence. Artificial intelligence can analyze movement data and patient feedback to create tailored exercise plans, predict risks, and support clinician decisions. Wearable devices and smartphone sensors provide accurate monitoring of range of motion, movement quality, and adherence, allowing therapists to track progress remotely. Additionally, immersive tools such as virtual reality, augmented reality, and gamified platforms can enhance patient engagement and simulate real-life activities. While these innovations show promise, issues of cost, accessibility, and the need for rigorous clinical validation remain important considerations.

Conclusion

Telerehabilitation for musculoskeletal disorders has matured from emergency stopgap to evidence-backed modality, supported by systematic reviews and emerging clinical practice guidelines. For many common MSK conditions, tele rehab offers clinically comparable outcomes, better access, and potential cost savings. The path forward requires standardized reporting, completion of rigorous long-term trials, policies that ensure equitable access and reimbursement, and careful integration of wearables, AI and immersive technologies to enhance personalization and engagement. Clinicians and health systems that thoughtfully adopt hybrid tele rehab models-guided by evidence and patient-centred practice-are well positioned to improve access and outcomes for people with MSK disorders.