

Telerehabilitation in Physiotherapy: Effectiveness, Challenges, and Future Scope

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Abstract:

The use of digital technologies to deliver rehabilitation remotely is an important part of the modern physiotherapy practice: this is the concept of Telerehabilitation. This review investigates the efficacy, clinical use, technologies, obstacles and future directions of telerehabilitation in physiotherapy. Recent findings suggest that for many types of exercise-based rehabilitation (ESR), telerehabilitation (TR) can yield results similar to traditional physiotherapy, especially in musculoskeletal, neurological, cardiorespiratory, pediatric, geriatric, and sports rehabilitation. It has been demonstrated to have positive effects on the management of symptoms of pain, functional outcomes, adherence to treatment, patient satisfaction, access to healthcare and cost of treatment as well as travel expenses. With the emergence of new technologies such as video conferencing, mobile health apps, wearable sensors, artificial intelligence, and VR, the quality and efficacy of distance rehabilitation has been further improved. But restraints like insufficient digital infrastructure, privacy worries, technological literacy and lack of hands-on assessment are hindrances for its general application. In summary, telerehabilitation is a potentially useful adjunct to traditional physiotherapy and the possibilities of future technological developments are likely to further enhance its accessibility, effectiveness and implementation into daily physiotherapy care.

Keywords: Telerehabilitation; Physiotherapy; Telehealth; Digital Rehabilitation; Artificial Intelligence; Virtual Reality; Remote Patient Monitoring

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1. INTRODUCTION

Physiotherapy is a key component of the care given to people with musculoskeletal, neurological, cardiopulmonary, paediatric and geriatric conditions, to return to their best movement, reduce pain, improve physical function and enhance their quality of life¹. Historically, rehabilitation has been based on one-on-one contact including patient education, physical examination and manual techniques, and therapeutic exercises. But the growing need for healthcare, the high ageing population, geographical differences and a lack of rehabilitation professionals have posed challenges in the provision of adequate physiotherapy services that are timely and accessible.



Figure 1: Telerehabilitation in Physiotherapy

Among the various types of telehealth, a niche area called telerehabilitation has revolutionized rehabilitation by offering assessment, treatment, education, exercise supervision, and follow-up services remotely by using digital technologies including video conferencing, mobile applications, wearable sensors, and cloud-based technologies². This has enhanced the availability of rehabilitation services, especially for people who do not have the ability to move around or who live far from the services offered.

Telerehabilitation has gained significant momentum during the COVID-19 pandemic, as the necessity to deliver physical therapy services remotely from home presented opportunities to

expand the use of the technology. The spread of the COVID-19 pandemic greatly spurred the evolution of telerehabilitation as the need to deliver physical therapy services remotely from home provided opportunities for expansion of the use of this technology. The transition showed that many physiotherapy intervention strategies such as therapeutic exercise, patient education, functional training and the monitoring of progress could be implemented on a digital platform and continue the care of patients during the transition³.

The advent of new technologies, such as artificial intelligence (AI), wearable biosensors, virtual reality (VR), augmented reality (AR), motion capture systems, and the Internet of Medical Things (IoMT), has also added to the potential uses of telerehabilitation, allowing for real-time monitoring, personalized rehabilitation, and improved patient engagement. The results of randomized controlled trials, systematic reviews and meta-analyses suggest that the clinical outcomes of telerehabilitation are comparable to those of conventional physiotherapy for a variety of conditions, while at the same time increasing access to physiotherapy, treatment adherence, patient satisfaction and health care efficiency.

1.1 Background and Context

Digital health technologies have rapidly evolved and revolutionized physiotherapy; the delivery of rehabilitation services via telerehabilitation (a form of telehealth) allows for remote assessment, treatment, patient education and follow-up of rehabilitation using digital communication technologies. Telerehabilitation was first introduced to increase access to rehabilitation for people living in rural and underserved communities, and was seen to be widely adopted during the COVID-19 pandemic as healthcare systems moved towards virtual care. It has been further improved by recent technological advancements, such as the integration of artificial intelligence, wearable sensors, mobile health applications, VR simulations and cloud-based platforms that facilitate real-time monitoring, personalized rehabilitation, and effective patient engagement⁴. As chronic disease increases, aging population and higher demands grow in healthcare, Telerehabilitation has become an integral part of modern physiotherapy, with better accessibility, continuity of care, cost effectiveness and patient centred rehabilitations⁵.

1.2 Objectives of the Study

This review aims to:

- To provide an overview of telerehabilitation and its role in modern physiotherapy practice.
- To evaluate the effectiveness of telerehabilitation across different physiotherapy specialties based on current evidence.

- To identify the major benefits and challenges associated with the implementation of telerehabilitation.
- To examine the technologies supporting remote physiotherapy services.
- To discuss future trends and research directions in telerehabilitation.

1.3 Importance of the Study

The importance of this review is accentuated by the growing incorporation of digital technologies in rehabilitation services and the high demand for accessible physiotherapy in the world. This review has made the following major contributions:

- **Improving Healthcare Accessibility:** Telerehabilitation increases access to physiotherapy services for people in rural, remote and underserved areas where there is a shortage of rehabilitation professionals.
- **Ensuring Continuity of Rehabilitation:** Remote physiotherapy helps to ensure continuity of rehabilitation when pandemics, natural disaster or other factors hinder hospital access.
- **Enhancing Patient-Centered Care:** Home-based rehabilitation makes it easier, more flexible, self-managed and more likely for patients to follow prescribed exercise programs.
- **Reducing Healthcare Costs:** Telerehabilitation reduces travel costs, decreases the need for hospitalization, and optimizes the use of healthcare resources for both patients and the healthcare system.
- **Supporting Evidence-Based Physiotherapy:** The review consolidates latest scientific evidence on effectiveness, safety, and feasibility of telerehabilitation in different clinical conditions.

2. CONCEPTS AND APPLICATIONS OF TELEREHABILITATION

Telerehabilitation is a form of telehealth that provides the capacity for physiotherapy to be delivered remotely via digital technologies including video conferencing, mobile applications, wearable technologies and cloud-based platforms⁶. It allows for easy patient evaluation, therapeutic exercises, education, progress monitoring, and follow-up consults; and it also makes rehabilitation more accessible for those in distant locations, older adults, and those needing long-term care. With the development of AI, VR, wearable sensors, and remote monitoring capabilities, telerehabilitation has become an integral part of contemporary physiotherapy practice, further enhancing its effectiveness by maximizing personalization and real-time clinical decision-making.

2.1 Definition and Evolution of Telerehabilitation

Telerehabilitation is the provision of rehabilitation services via digital communication technology between the physiotherapist and the patient when they are not co-located⁷. It is a specific instance of telehealth which allows secure, electronic platforms to be used for remote assessment, diagnosis, treatment planning, therapeutic exercise supervision, patient education, consultation and follow-up⁸. The main goal of telerehabilitation is to make top quality rehabilitation services more available, and to retain the effectiveness and safety of rehabilitation services.

Telerehabilitation began to appear in the late 1990s when healthcare systems started using telemedicine to overcome geographical access issues and a lack of rehabilitation professionals. It was first used to connect with patients and provide support in education in remote and underserved areas. Internet, cell phone, cloud computing, and video conferencing technology developments greatly increased the scope for the provision of remote rehabilitation services⁹.

Telerehabilitation has become an important tool for access in the era of the COVID-19 pandemic. With the closure of in-person healthcare services, physiotherapists around the world had to switch to virtual health consultations and home-based physical therapy regimens. This restriction forced physiotherapists across the globe to adopt the telehealth model of health consultation and home-based physical therapy programs¹⁰. Many healthcare facilities showed this period that for numerous clinical conditions, therapeutic exercises, functional assessments, patient education and monitoring of rehabilitation could be provided effectively via digital platforms.

Today, the concept of telerehabilitation isn't limited to video consultations. New systems are designed to combine wearables, artificial intelligence, VR, AR, motion capture technology and remote patient monitoring equipment to ensure objective assessment and tailored rehabilitation plans¹¹. The technological advancements have enhanced patient engagement, treatment adherence, and clinical outcomes, marking a significant shift in how telerehabilitation has become a part of modern physiotherapy care.

2.2 Types of Telerehabilitation

There are various models of Telerehabilitation which are based on the type of communication and interaction between the physiotherapist and the patient.

- **Synchronous Telerehabilitation:** In this case, the physiotherapist communicates with the patient in real time via video conferencing, telephone or live online services. These sessions allow physiotherapists to evaluate patient motion, illustrate therapeutic exercises, give instant feedback, correct exercise technique and track patient progress. This model is similar to the traditional face-to-face physiotherapy and is commonly applied for musculoskeletal, neurological and post-operative rehab.

- **Asynchronous Telerehabilitation:** Also known as the "store and forward" model, this type of telerehabilitation enables patients and physiotherapists to share information without having to interact at the same time. Patients can submit video of their exercises or answer digital questionnaires or share health information through a mobile application. This is then reviewed by physiotherapists who assess the performance of the patient and give them individual recommendations. This will provide you with more scheduling flexibility and can be helpful for longer-term rehabilitation or home exercise routines.
- **Hybrid Telerehabilitation:** This approach is a blend of in-person physical therapy treatments and remote follow-up via digital platforms. Clinical evaluations, or specific manual therapy techniques, are performed initially and then exercise supervision, education and progress monitoring are performed remotely. This holistic solution provides the benefits of direct physical examination and the ease and access of virtual care.
- **Mobile Health (mHealth)-Based Rehabilitation:** Mobile health (mHealth) is the use of smartphones and tablet-based technologies to provide rehabilitation services. These apps offer fitness advice, health and reminders, education, symptom tracking, and health provider communication. Some mHealth systems also include wearable devices that track user's physical activity, posture, heart rate and the quality of movement all the time.

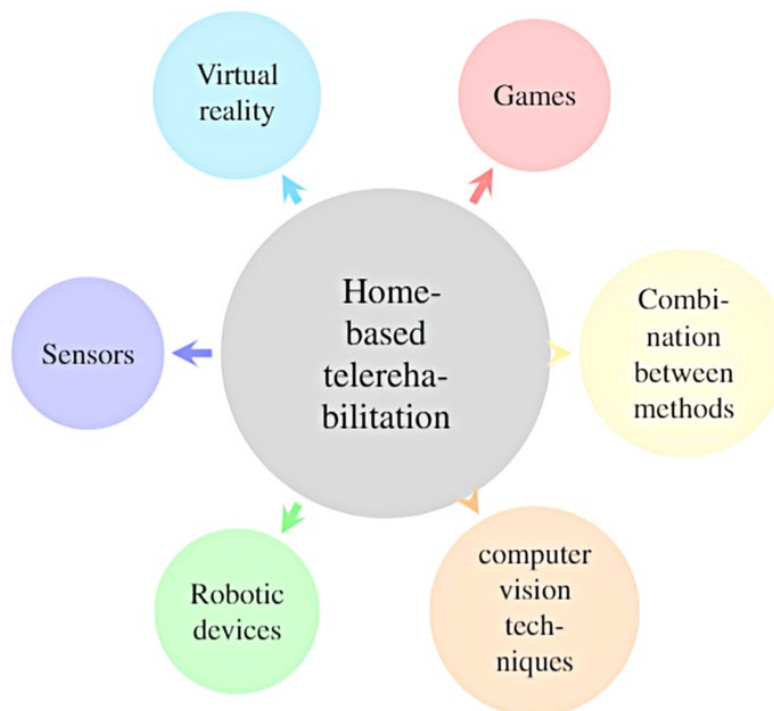


Figure 2: Home Based Telerehabilitation

2.3 Technologies Used in Telerehabilitation

The effectiveness of telerehabilitation relies on the ability to utilize state-of-the-art digital technologies which enable remote communication, evaluation, treatment provision and ongoing monitoring¹². The use of these technologies has transformed the provision of physiotherapy services, making them more accessible and efficient, and helping physiotherapists to deliver evidence-based rehab outside of the traditional clinical environment. The use of information and communication technologies (ICT), artificial intelligence, wearable technologies, and digital health platforms has revolutionized the concept of telerehabilitation, making it a complete health care delivery model¹³.

- **Video Conferencing Platforms:** Telerehabilitation mainly uses video conferencing as a technology which enables dynamic communication between physios and patients. It allows for virtual consultations, movement assessment, exercise supervision, and instant feedback, and thus is effective in managing musculoskeletal, neurological, post-operative and chronic pain conditions and minimizing the need of the patient to visit the hospital.
- **Mobile Health (mHealth) Applications:** Mobile health applications facilitate Telerehabilitation, which can include physiotherapists talking directly to patients, reminders of appointments, symptom monitoring, education on exercise, and instructions for exercises. These applications enhance patient engagement, promote adherence to home exercise programs, and promote self-management over time.
- **Wearable Sensors and Remote Monitoring Devices:** These devices continuously track movement, posture, gait, balance, and physiological parameters (pulse oximetry, smartwatch, activity tracking and motion sensors). These technologies can be used for remote evaluation of rehabilitation progress to assist in personalized treatment planning and adjust exercise programs according to patient results.
- **Artificial Intelligence and Machine Learning:** Artificial intelligence and machine learning systems help analyse movement patterns, exercise performance, and offer automated feedback, making telerehabilitation even better. These technologies can also facilitate individualized rehabilitation planning, to predict rehabilitation outcomes and to enhance clinical decisions making and to save physiotherapists working time.
- **Virtual Reality and Augmented Reality:** VR and AR generate interactive rehabilitation environments which help to motivate and engage patients. They are especially useful in neurological, paediatric and sports rehabilitation for balance training, motor learning, coordination and for functional recovery by means of immersive therapeutic exercises.
- **Cloud Computing and Electronic Health Records:** These technologies help ensure secure storage, sharing, and management of patient records and enable communication between healthcare providers and patients. These systems enhance continuity of care, treatment

monitoring, and interdisciplinary coordination and collaboration, they have strong security measures to protect patient privacy and data.

2.4 Clinical Applications of Telerehabilitation in Physiotherapy

Telerehabilitation is now a part of physiotherapy practice and assists in providing rehabilitation services remotely in various clinical specialties¹⁴. With the use of digital communication technologies, wearable devices and remote monitoring systems, physiotherapists have been able to assess patients, create individual exercise programs, keep track of treatment progress and conduct ongoing training with their patients without having to visit them in the hospital on a regular basis¹⁵. Many clinical trials have shown that the outcomes of telerehabilitation can be similar to in-person physiotherapy for specific patient groups and that it can enhance the access to healthcare, retention of treatment and patient satisfaction. It is now being applied in a wide range of specialties in musculoskeletal, neurological, cardiorespiratory, paediatric, geriatric and sports physiotherapy.

3. METHODOLOGIES AND FINDINGS

A recent published literature search of telerehabilitation in physiotherapy was performed to assess the effectiveness of the intervention, clinical application, technological advancements, implementation barriers, and future prospects. Mainly between 2020 to 2026, peer-reviewed articles, systematic reviews, meta-analysis, randomized controlled trials, observational studies, and clinical guidelines were reviewed¹⁶. The literature selected was critically reviewed and compared to look for any significant conclusions, trends, gaps in the literature and future directions for the integration of telerehabilitation into physiotherapy practice.

3.1 Evidence from Previous Studies

The effectiveness of telerehabilitation has been explored in several physiotherapy specialties such as musculoskeletal, neurological, cardiorespiratory, paediatric, geriatric and sports rehabilitation. There is existing evidence that delivers patient education, long-term follow-up, functional training, and exercise-based interventions through digital platforms via telerehabilitation¹⁷. There have been multiple RCTs and systematic reviews that have found comparable improvements in pain, physical function, adherence to exercise, satisfaction with care and quality of life from ePT as compared to traditional physiotherapy programs. But, differences in study design, intervention protocols, patient populations, and outcome measures have led to differences in the strength of available evidence. Overall current literature provides support for the feasibility and effectiveness of telerehabilitation as a method to provide physiotherapy services in select patients.

Table 4. Summary of Previous Studies on Telerehabilitation in Physiotherapy

Author Name	Topic Covered	Research Study Title
Muñoz-Tomás et al. (2023)¹⁸	Compared exercise-based telerehabilitation with conventional face-to-face physiotherapy to evaluate clinical effectiveness in improving pain, physical function, and rehabilitation outcomes. The review concluded that telerehabilitation provides comparable outcomes for many musculoskeletal conditions when therapeutic exercise is the primary intervention.	Telerehabilitation as a Therapeutic Exercise Tool versus Face-to-Face Physiotherapy: A Systematic Review
Simmich et al. (2024)¹⁹	Examined patient satisfaction, attendance, and treatment adherence in real-time video telerehabilitation compared with in-person physiotherapy. The review reported comparable or higher patient satisfaction and improved attendance and adherence with video-based rehabilitation.	Real-Time Video Telerehabilitation Shows Comparable Satisfaction and Similar or Better Attendance and Adherence Compared with In-Person Physiotherapy: A Systematic Review
Wicks et al. (2023)²⁰	Evaluated physiotherapist-led exercise-based telerehabilitation for older adults. The study demonstrated improvements in physical function, mobility, health-related quality of life, and healthcare service outcomes, supporting telerehabilitation as an effective option for geriatric rehabilitation.	Physiotherapist-Led, Exercise-Based Telerehabilitation for Older Adults Improves Patient and Health Service Outcomes: A Systematic Review and Meta-analysis
Hinman et al. (2024)²¹	Compared telerehabilitation consultations with face-to-face physiotherapy for individuals with chronic knee pain through a non-inferiority randomized controlled trial. The study found telerehabilitation to be clinically non-inferior regarding pain reduction, physical function, and patient satisfaction.	Telerehabilitation Consultations with a Physiotherapist for Chronic Knee Pain versus In-Person Consultations in Australia: The PEAK Non-Inferiority Randomised Controlled Trial

Stamou et al. (2024) ²²	Reviewed the current scope of telerehabilitation in physiotherapy, highlighting its clinical applications, technological advancements, implementation challenges, and future opportunities. The review emphasized the need for standardized protocols and further high-quality research.	Telerehabilitation in Physiotherapy Science: A Scoping Review
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3.2 Effectiveness of Telerehabilitation

Different clinical outcomes have been used to assess the effectiveness of telerehabilitation, such as pain reduction, functional improvement, treatment adherence, patient satisfaction, quality of life, and accessibility of healthcare. Existing evidence supports the use of telerehabilitation in a combination of structured exercise program, frequent therapist supervision, patient education and ongoing progress monitoring, especially²³. While some of the manual techniques described are not easily replicated in a virtual environment, many of the rehabilitation objectives can be accomplished with supervised home-based exercise programs.

- **Pain Reduction:** Telerehabilitation often results in pain reduction. Therapeutic exercises, posture correction, stretching, strengthening, and self-management education have been successfully shown to decrease pain in patients with musculoskeletal conditions including chronic low back pain, knee osteoarthritis, neck pain, and shoulder dysfunction, using the remote physiotherapy intervention. Regular virtual supervision is beneficial to ensure that patients execute exercises properly, aids adherence and minimises fear of movement.
- **Functional Recovery:** Functional recovery is a key goal of physiotherapy, and many studies have shown that telerehabilitation can significantly improve mobility, muscle strength, balance, coordination and Activities of Daily Living. Physiotherapists can tailor exercise programmes and monitor them closely to adjust rehabilitation plans as the patient grows better. These interventions have proven beneficial in both orthopedic and neurological and cardiopulmonary rehabilitation.
- **Patient Satisfaction:** One of the biggest advantages of telerehabilitation has been reported to be patient satisfaction. Home based rehab offers an increased level of convenience, will help to reduce travel time, will help to decrease the cost of treatment, and will offer flexibility in therapy scheduling. Communication between patients and physiotherapists is regular, with positive impacts on relationships with patients and on patient involvement in rehabilitation programmes.
- **Exercise Adherence:** This is important for the success of rehabilitation programs. Telerehabilitation can help improve adherence by providing scheduled virtual visits,

automated reminders, videos of exercises, progress monitoring and feedback. These features help patients to do their exercises regularly and optimise rehabilitation results.

- **Quality of Life:** Patients receiving telerehabilitation have better health-related quality of life due to the improvements in physical function, reduced pain, increased independence and improved confidence. The benefits of home-based rehabilitation also include the reduced financial and physical burden from frequent hospital visits, so that rehabilitation is more accessible and sustainable in the long term.

3.3 Comparison Between Conventional Physiotherapy and Telerehabilitation

Traditional physiotherapy continues to play a crucial role in other interventions that require direct physical examination, manual therapy and/or specialized clinical equipment. But, for various fields of exercise-based intervention and patient education, follow-up consultations and chronic disease management, telerehabilitation has proven to be effective²⁴. Available data suggest that both methods have similar results for a number of clinical conditions if used in the right way. A blended rehabilitation approach, which incorporates in-person evaluation and at-home monitoring and instruction with exercise, is emerging as a means to optimize patient care.

Table 5. Comparison Between Conventional Physiotherapy and Telerehabilitation²⁵

Parameter	Conventional Physiotherapy	Telerehabilitation
Mode of Delivery	Face-to-face clinical sessions	Remote digital platforms
Accessibility	Requires hospital or clinic visits	Home-based access through digital technologies
Manual Therapy	Fully possible	Limited
Exercise Supervision	Direct observation	Real-time virtual observation
Patient Education	In-person	Online education and digital resources
Treatment Cost	Higher due to travel and facility expenses	Lower travel and operational costs

Patient Convenience	Moderate	High
Suitable For	Acute and complex conditions	Chronic conditions, follow-up, home-based rehabilitation

4. DISCUSSION

This review suggests that by allowing the delivery of rehabilitation services remotely, using digital technologies, telerehabilitation has emerged as an important part of the current physiotherapy practice²⁶. With growing access to video conferencing, mobile health apps, wearable sensors, artificial intelligence, and virtual rehabilitation, it's easier than ever for patients to access physiotherapy services and maintain continuity of care²⁷. The available evidence is limited to exercise-based interventions, patient education, functional training, and long-term monitoring across a variety of clinical conditions and shows particular efficacy for these areas²⁸. While manual therapy and thorough physical exams will always be the foundation of physiotherapy, the role of telerehabilitation has shown great promise as an additional tool to improve accessibility to healthcare, patient engagement and rehabilitation outcomes.

4.1 Interpretation and Analysis

The evidence presented in this paper shows that telerehabilitation is an effective approach to providing physiotherapy in a variety of clinical settings. The majority of studies have demonstrated the effectiveness of remote rehabilitation in reducing pain, improving functional outcomes, enhancing treatment adherence, patient satisfaction, and quality of life²⁹. These results indicate that digital platforms are a promising tool for the rehabilitation of therapeutic exercises, movement training, patient education, and ongoing clinical monitoring in the right patient population, without affecting the quality of rehabilitation³⁰.

Better accessibility to physiotherapy services for those who might have geographical, financial or mobility access barriers is one of the major benefits of telerehabilitation³¹. For patients living in rural and underserved regions, timely rehabilitation is made possible without a lot of trips to health care facilities which are necessary to reduce interruptions in care and maintain the continuity of care. Moreover, home-based rehab enables more patient involvement by letting rehabilitation exercises be conducted in home settings, supervised by a professional³².

The published evidence also suggests, however, that telerehabilitation is by no means suitable for all therapies within the field of physiotherapy³³. The delivery of treatments that involve manual therapy, specialist clinical equipment and physical examination is still challenging to provide

remotely³⁴. Therefore, fitting the right patient, having a personalized treatment plan, and providing the right technology to support the individual are crucial in the success of telerehabilitation³⁵. Based on the evidence, the integration of TR with physiotherapy is recommended as a complementary, not a replacement, approach to physiotherapy³⁶.

4.2 Implications and Significance

The results of this review have significant implications for physiotherapy practice, health systems, research and policy making³⁷.

- **Enhanced Healthcare Accessibility:** Telerehabilitation increases access to physiotherapy for patients living in rural, remote and underserved areas, eliminating geographical barriers to physiotherapy.
- **Continuity of Rehabilitation Services:** Remote physiotherapy can be used to keep patients on a continuous rehabilitation pathway during periods of difficult access to patients, such as during a pandemic, natural disaster, or during times of limited mobility.
- **Patient-Centered Care:** Home-based rehabilitation increases patient convenience, active participation, patient self-management and adherence to prescribed exercise programs, which are all components of patient-centered care.
- **Cost and time effective:** Telerehabilitation decreases travel costs, waiting time and the use of healthcare resources for both the patient and the healthcare provider.
- **Integration of Digital Technologies:** AI, wearable sensors, mobile health applications, and VR enhance assessment, monitoring, and personalized rehabilitation planning.
- **Support for Healthcare Systems:** Telerehabilitation can alleviate the pressure on rehabilitation centers by implementing a remote follow-up system, enhancing the efficiency of healthcare services, and increasing the scope of healthcare coverage.
- **Professional Development:** As more and more physiotherapists come to embrace digital rehabilitation, there is a growing need for physiotherapists to acquire skills in telehealth and digital healthcare delivery³⁸.

4.3 Gaps and Future Research Directions

Though there's increasing evidence in favor of telerehabilitation, there are still a number of research gaps that need to be resolved in the future^{39,40}.

- **Need for Large-Scale Clinical Trials:** Further multicenter RCTs with larger sample sizes are needed to further support the evidence around the effectiveness of telerehabilitation.
- **Standardized Rehabilitation Protocols:** Standardized clinical guidelines and standardized outcome measures need to be established to increase the uniformity of findings across studies and clinical practice.
- **Long-Term Outcome Evaluation:** Study on the long-term effectiveness, sustainability and patient adherence of telerehabilitation programs.
- **Cost-Effectiveness Analysis:** There is a need for further studies to assess the economic impact and cost-effectiveness of the use of telerehabilitation in various health care contexts.
- **Integration of Emerging Technologies:** Further research is required in the integration of Emerging Technologies in physiotherapy, namely by the incorporation of Artificial Intelligence, wearables, VR, AR, and Remote monitoring systems.
- **Digital Literacy and Technology Acceptance:** Digital skills of patients and health professionals and factors affecting the acceptance of telerehabilitation: Research needs to focus on ways to enhance digital skills amongst patients and health professionals and factors influencing acceptance of telerehabilitation.
- **Policy and Regulatory Frameworks:** Future research should contribute to the creation of standardized legal, ethical, privacy and reimbursement policies to ensure the successful use of telerehabilitation services.

5. CONCLUSION

Telerehabilitation has revolutionized the way physiotherapy services are delivered by providing the ability to deliver the same services remotely via digital technologies including physiotherapy assessment, treatment, patient education, supervision of exercise and follow-up. The literature reviewed in this paper shows that telerehabilitation can successfully address a variety of conditions related to musculoskeletal, neurological, cardiorespiratory, paediatric, geriatric and sports health problems. The results of many exercise-based interventions are similar for telerehabilitation as compared to traditional, in-person physiotherapy, with notable benefits in pain reduction, functional improvement, treatment adherence, patient satisfaction, and quality of life.

The use of video conferencing, mobile health apps, wearable sensors, AI, VR, and remote monitoring has revolutionized the delivery of rehabilitation services, making them more effective and accessible. These technological advances have enabled better patient engagement, ongoing

monitoring, and personalized rehabilitation therapy, and have eliminated geographical and financial obstacles to healthcare.

Telerehabilitation has many great benefits but also has its challenges. The use of digital assessments and manual therapies remains constrained by digital infrastructure, internet access, technological literacy, privacy and data security, legal and regulatory issues, and the lack of hands-on evaluation and manual therapy. Thus, telerehabilitation cannot be seen as a replacement for traditional physiotherapy, but as an additional tool to provide more rehabilitation services and enhance continuity of care.

The prospects for the future of AI, wearable technology, VR and personalized digital care platforms promise to further enhance telerehabilitation's effectiveness and accessibility. Future studies, technological advancements, uniform clinical instructions, and supportive health policies are necessary to harness its potential to the fullest and to provide access to good-quality physiotherapy services. Overall, the role of telerehabilitation in physiotherapy practice in the future is likely to be significant, and seems to be a promising and sustainable model of rehabilitation.

5.1 Summary of Main Findings

This review has identified the following key findings:

- Tele-rehabilitation is now an effective digital way to provide physiotherapy services in different clinical specialties.
- Current results indicate for many exercise-based therapy programs, telerehabilitation is as effective as traditional physiotherapy.
- Digital technologies, such as video conferencing, mobile apps, wearables, artificial intelligence, and VR have revolutionized distance rehab.
- Telerehabilitation increases the accessibility of health care, increases treatment compliance, increases patient satisfaction and increases continuity of rehabilitation, especially for those with mobility impairments or who live in remote areas.
- The barriers facing the widespread adoption of telerehabilitation persist, including technological, legal, ethical, and infrastructural issues.
- Model of hybrid treatment involving face-to-face physiotherapy and remote follow-up seems to be the most viable and promising one for future clinical practice.

5.2 Importance of the Review

Telerehabilitation's increasing importance as part of modern physiotherapy is emphasized in this review. The review brings together the latest evidence on effectiveness, technological developments, clinical uses and implementation issues, to give a comprehensive overview of the state of play in the field of remote rehabilitation. It highlights the possibilities of telerehabilitation to increase accessibility to healthcare, facilitate patient-centred care and increase outcome of rehabilitation using digital innovation. In addition, the review highlights topics that need further research and provides useful information for rehabilitation service planners, researchers, teachers, health care managers and policy makers.

5.3 Recommendations

From the results of this review, the following recommendations are suggested:

- Create standard clinical guidelines and evidence-based protocols for implementing telerehabilitation in physiotherapy practice.
- Enhance digital infrastructure and internet connectivity, especially in rural and underserved areas, to provide equal access to rehabilitation services.
- Improve digital literacy of physiotherapists and patients by providing structured training and education.
- Improve data privacy, cybersecurity, and ethical practices to ensure secure provision of remote health care services.
- Encourage the use of new technologies like AI, sensors, VR, remote patient monitoring in physiotherapy.

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