

Perspectives and insights on physical therapy's function in COVID-19 rehabilitation

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Abstract. Physical treatment is useful in reducing the many COVID-19 problems, according to recent studies. The significance of physical therapy in the all-encompassing management of the new coronavirus has been brought to light. Physical therapy is the main body of rehabilitation therapy, including a wide range of techniques (such as sound, light, cold, heat, electricity, force (movement and pressure) and other physical factors for treatment, as well as breathing, muscle training, for local or systemic body dysfunction or lesions, The use of non-invasive, non-drug treatment, reinforcement strategy exercises, immediate relief of symptoms and overall improvement of the patient's physical function and restoration of the patient's original body physiological function. This integrated approach enables patients to return to their previous level of activity and quality of life by highlighting the entire context of treatment. Physiotherapy is not without its limitations, though. Physiotherapy requires patient-specific care, because there aren't enough doctors or patients during a pandemic. To ensure the provision of effective rehabilitation services, creative solutions are required to address issues including the shortage of specialists, the requirement for training units, and the return of telemedicine. Furthermore, further research efforts and interdisciplinary collaboration are required to establish effective practices and improve patient outcomes related to physical therapy engagement in COVID-19 recovery programs. As a result, the pandemic has brought attention to and strengthened an important shift in the role of physical therapy in the management of post-viral syndromes, opening the door for future advancements in the field of infectious disease medicine.

Keywords: Physical therapy, COVID-19 rehabilitation, Non-invasive treatments, Telemedicine, Interdisciplinary collaboration

1. Introduction

The SARS virus is causing a new coronavirus, which is causing an unprecedented global health crisis. This not only severely tests the world health system but also emphasizes how urgent it is to implement efficient recovery strategies. The majority of virus-infected individuals will show signs of long-term physical decline, including frailty, diminished lung capacity, mental health issues, severe respiratory symptoms necessitating intensive care, and others. In this regard, survivors' rehabilitation — physical treatment in particular — becomes very important since it builds a strong basis for their eventual recovery. Physical therapy is now a crucial component of the COVID-19 treatment protocol. Physical therapists use a range of techniques, such as breathing exercises, muscle strengthening exercises, and functional

training, to assist patients in improving their physical performance and quality of life. Each patient will have a customized treatment plan based on their unique needs, the severity of their ailment, and their general health. Physical therapy has been shown in recent research to expedite the healing process, reduce the chance of long-term impairment, and reduce hospital stays. Recovering from COVID-19 is not an easy task, though. Using telemedicine technologies, altering treatment plans to stop the virus from spreading, and giving medical workers specific training on infectious diseases are some of these obstacles. However, society's adaptability and resilience are pushing us to come up with creative ways to guarantee that essential services are offered in a sustainable manner. Our knowledge of the virus's impact on the human body and available treatments grows continuing research and clinical experience will be essential to improving recovery plans and COVID-19 survivor technology applications [1]. Therefore, physiotherapy is crucial for the quick recovery of individuals who have severe viral symptoms as well as for treating COVID-19 patients' long-term consequences and encouraging integrated rehabilitation management.

2. Physical Therapy Interventions in COVID-19 Rehabilitation

For COVID-19 patients to fully recover, physical therapy involvement is essential, particularly during the severe rehabilitation phase. The major objectives of these treatments are to improve respiratory function, increase muscle strength, and encourage the repair of damaged function. This section will examine particular treatments and how the rehabilitation process can employ them, based on clinical experience and current research findings.

2.1. Body Positioning

Through the use of a prone position, the physiotherapist can raise oxygenation levels considerably. By enhancing diaphragm movement, lowering lung tissue pressure, and redistributing lung perfusion, this approach raises the ventilation-perfusion (V/Q) ratio. According to a systematic study, prone positioning should be used as soon as possible for patients who need mechanical breathing since it can lower mortality and boost oxygenation levels [2].

2.2. Breathing Exercises

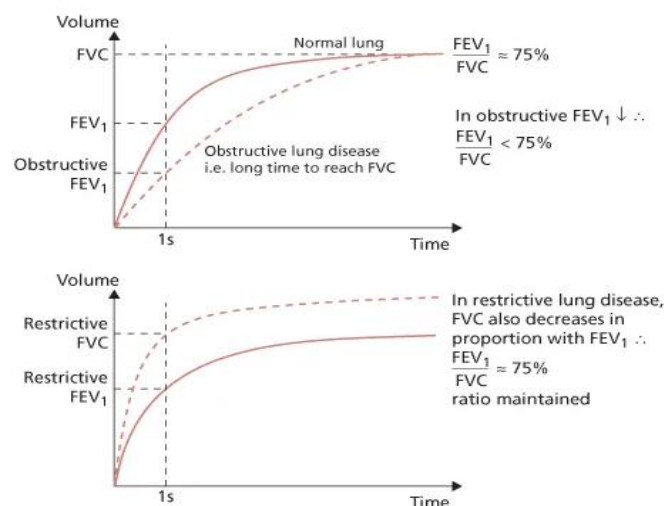


Figure 1. Measuring peak expiratory flow rate (Source: Basicmedical Key)

Breath control exercises are essential for the respiratory rehabilitation of COVID-19 survivors. These breathing methods—which include diaphragmatic breathing, zipped mouth breathing, and segmental breathing—are meant to increase lung capacity, boost the efficiency of breathing patterns, and make it easier for lung secretions to be expelled. Diaphragmatic breathing reduces the amount of effort needed

to breathe and promotes alveolar ventilation by encouraging the diaphragm to be used for breathing instead of the auxiliary respiratory muscles. Since zipped breathing helps to maintain positive airway pressure and minimizes airway collapse, it is especially important for those with obstructive lung disease [3]. A randomized controlled experiment found that patients who participated in a systematic breathing exercise program significantly improved on lung function tests, including forced expiratory flow (PEFR) and forced lung capacity (FVC). As shown in Figure 1.

2.3. Mobility Training

Preventing the physical discomfort that hospitalized COVID-19 patients often feel requires early activity and individualized activity training. When a patient's condition improves, physical therapists employ a progressive approach, progressively moving from passive range of motion to more active movement. Restoring muscle strength, enhancing joint flexibility, and enhancing general endurance are the goals of this metamorphosis. The patient's tolerance level determines whether technologies, such as bed exercise, standing to sitting transitions, and progressive walking training introduction, are used. Early activity beginning within the first week of ICU admission is linked to fewer ventilator days and a better functional prognosis after discharge, according to cohort research.

2.4. Integration of Multidisciplinary Approaches

A multidisciplinary approach is necessary for COVID-19 patients to recover well. This approach should include physical therapy, nutritional support, psychological counseling, and medicinal management. Physical therapists collaborate closely with the medical staff to develop therapy regimens that suit patients' various demands, take into account their obstacles, and guarantee a thorough healing process. Patients with chronic kidney disease (CKP) benefit greatly from targeted physical therapy, which can aid in the restoration of muscular strength, everyday functioning, and respiratory capacity [4]. Timely adaptation of these treatments is crucial to improving outcomes for COVID-19 survivors during their recovery, as new research continues to be discovered. Figure 2 shows the four most crucial steps in integrating multidisciplinary approaches for COVID-19 patient care.

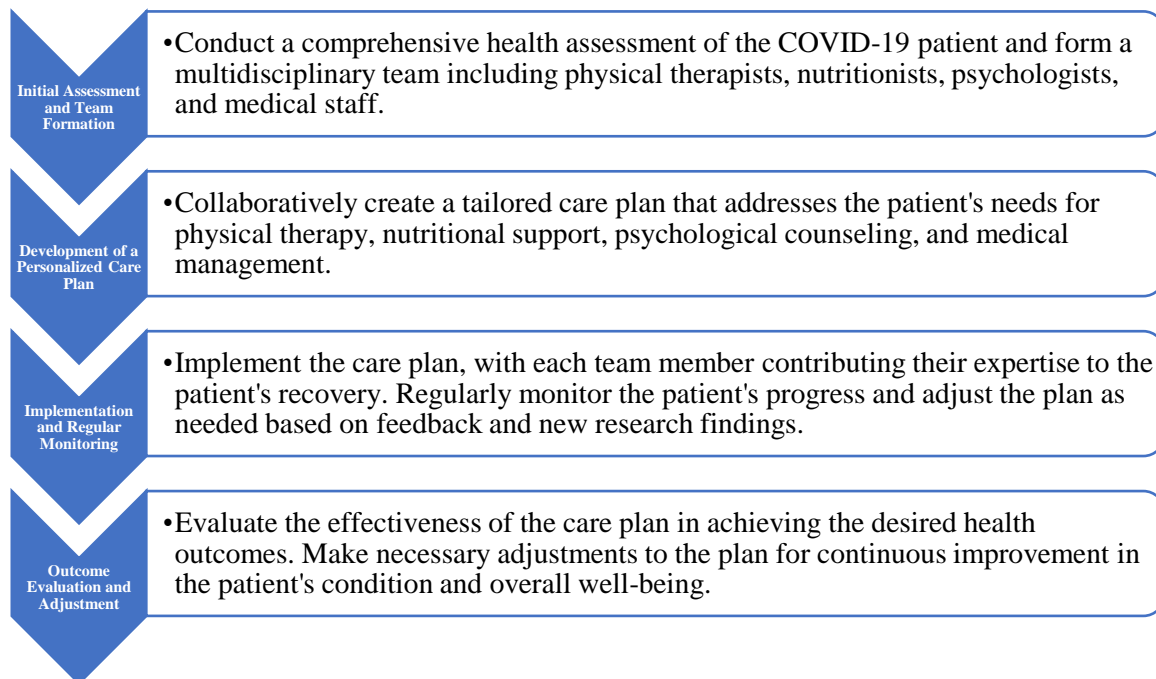


Figure 2. Four-Step Process for Integrating Multidisciplinary Care in COVID-19 Recovery

3. Challenges and Considerations

Apart from the typical challenges associated with rehabilitation, the COVID-19 pandemic poses distinct challenges in the application of physical therapy interventions. These difficulties are made worse by the various ways in which the virus spreads, the varying degrees of physical injury experienced by victims, and the disease's psychological effects. Along with going into greater detail about these challenges, this section will offer the tactics and elements needed for physiotherapy to be successful in this specific situation.

3.1. Infection Control Measures

Physical therapy interventions were difficult to conduct during the COVID-19 epidemic in 2019 in addition to the usual problems of rehabilitation. These challenges are made much more difficult by the distinct ways in which the virus spreads, the differing degrees of physical injury that victims sustain, and the psychological and social ramifications of the illness [5]. This section will go into more detail about these difficulties and offer the tactics and factors that are required for physical therapy to be successful in this extraordinary circumstance.

3.2. Addressing Physical and Psychological Strain

COVID-19 patients, especially those recovering from serious illnesses, often suffer from severe physical dysfunction, muscle weakness, and respiratory complications. The rehabilitation training for such patients is centralized, and careful planning is necessary to avoid worsening the existing condition [6]. At the same time, the psychological impact of COVID-19 on patients is characterized by increased anxiety, depression, and post-traumatic stress disorder (PTSD), which increases the complexity of the rehabilitation process. In order to address the psychological needs of patients, physical therapists need to use techniques such as mindfulness and cognitive behavioral strategies, and adopt a multi perspective approach of psychological health support.

3.3. Individualized Treatment Plans

The clinical symptoms of COVID-19 are diverse, therefore personalized rehabilitation plans are needed. When formulating these plans, it is necessary to closely consider factors such as the patient's age, comorbidities, severity of COVID-19 infection, and existing functional status. This individualized approach requires a comprehensive assessment of the physical and cognitive abilities of each patient, continuous monitoring of the progression of the condition, and flexibility in adjusting intervention measures based on changes in the patient's condition. There is evidence to suggest that personalized rehabilitation plans developed through multi occupational collaboration can significantly improve outcomes by addressing the specific needs and goals of each patient.

3.4. Flexible and Adaptive Rehabilitation Approaches

The prevalence of COVID-19 is dynamic, and physical therapists need to maintain adaptability and continuously update treatment based on the latest evidence and guidelines. This means transitioning from face-to-face treatment to remote treatment sessions, adjusting treatment goals based on changes in the patient's condition, and preparing to adopt newly confirmed effective treatment methods. Recent research has emphasized the role of technology in promoting remote rehabilitation services, by effectively utilizing digital platforms to provide personalized exercise for patients and monitoring the progression of their condition, providing psychological support. To address the issue of COVID-19 physical therapy, it is necessary to have a profound understanding of the disease, be committed to patient-centered care, and have a desire for innovation. Physical therapists respond to the diverse needs of COVID-19 patients through personalized, flexible, and evidence-based rehabilitation strategies, thereby promoting rehabilitation and improving the quality of life of people affected by influenza. Play an important role in it. As the situation develops, continuous research and interdisciplinary cooperation will be essential to improve and expand effective rehabilitation methods for COVID-19 patients. Table 1 shows the numerical values of physical therapy adapted during the COVID-19 pandemic [7].

Table 1. Quantitative Analysis of Physical Therapy Adaptations During the COVID-19 Pandemic

	Aspect	Description	Implementation Rate (%)	Patient Satisfaction (%)
1	Session Type	Flexibility to switch between in-person and remote sessions	75	90
2	Therapy Goal Adjustments	Adjust goals based on patient's changing status	60	85
3	New Therapeutic Modalities	Incorporate validated new therapeutic techniques	50	80
4	Technology for Remote Services	Utilize digital platforms for exercise delivery and support	85	95
5	Patient Monitoring	Regular monitoring of patient progress remotely	80	90
6	Psychological Support	Provision of psychological support through digital means	70	88

4. Future Directions

After the COVID-19 pandemic, the role of physical therapy in managing post acute sequelae and improving patient recovery cannot be overemphasized in further development. The unprecedented challenges brought about by the pandemic have exposed the shortcomings of the current rehabilitation framework and emphasized the need for evidence-based methods for physical therapy of infectious diseases. This section provides a detailed introduction to the main areas of future COVID-19 rehabilitation therapy research and development, and emphasizes the importance of technological innovation, integration, and international cooperation.

4.1. Development of Comprehensive, Evidence-based Guidelines

The diversity of COVID-19 symptoms and the lack of standardized rehabilitation protocols emphasize the urgent need to develop a comprehensive, evidence-based guideline for the rehabilitation of COVID-19 survivors. Future research should prioritize collecting large-scale multicenter data to clearly understand the effectiveness of various physical therapy interventions for different patient populations and disease severity. A meta-analysis and systematic review of current rehabilitation practices will help identify the best practices and areas that require further research. In addition, the expert consensus of the Delphi study will promote the development of general guidelines for addressing respiratory and musculoskeletal complications associated with COVID-19.

4.2. Investigating the Long-term Effects of Physical Therapy Interventions

In order to continue addressing the long-term effects of COVID-19 (including the new phenomenon of "long COVID"), it is essential to explore the sustained effects of physical therapy interventions on patient rehabilitation and quality of life. A longitudinal study focusing on the rehabilitation trajectory from months to years after infection provides valuable information on the sustained effectiveness of rehabilitation treatment and the possibility of functional decline. In order to fully understand the impact of physical therapy on long-term health status and functionality, it is necessary to study various outcomes such as respiratory function, cardiovascular, musculoskeletal system strength, and mental well-being.

4.3. Fostering Global Collaboration and Knowledge Sharing

The global nature of the COVID-19 pandemic requires unprecedented cooperation across borders, fields, and departments. Future efforts should be to establish international alliances and networks dedicated to rehabilitation research, promoting the sharing of knowledge, resources, and best practices. Collaborative research projects and clinical trials involving different groups and environments will enhance the universality of results and accelerate the development of effective rehabilitation strategies. In addition,

the global registration of rehabilitation outcomes following COVID-19 will provide valuable information for subsequent research and policy formulation.

In the rehabilitation treatment of COVID-19, the path that physical therapy should take is the opportunity for technological innovation, the need for evidence-based practice, and the possibility of bringing revolutionary technologies to patient care. Through selfless research, development, and collaboration, committed to these future development directions, the field of physical therapy will make a huge contribution to the rehabilitation of COVID-19 survivors and the preparation for future health crises, and even improve global health outcomes.

5. Conclusion

Physical therapy has now become a key element in the comprehensive rehabilitation of COVID-19 patients. Because it helps to significantly improve their respiratory function, physical strength, and overall health for those affected by the pandemic, the contribution of the physiotherapist profession is extremely important. Long-term impact in the central role of physiotherapists face unprecedented challenges, including strict infection control measures, physical and mental stress of therapists and patients, and the need for highly personalized treatment planning, adaptability, creativity. Pandemic has led to the reassessment and development of physical therapy practices, to meet the complex and diverse needs of COVID-19 survivors. Telehealth health innovation allows continuous treatment during isolation and isolation, ensure that patients receive the necessary support for rehabilitation in addition, interdisciplinary collaboration is a key strategy to address the impact of various forms of the virus, not only include physical injuries, and psychological distress when we go beyond this epidemic and begin to surpass it. The importance of physical therapy in continuing studies, education and innovation are becoming increasingly apparent in the urgent need to develop and improve evidence-based practices specifically for the rehabilitation of COVID-19 patients which includes the exploration of new therapeutic techniques, to assess the effectiveness of the telemedicine services, and understand the long-term consequences of the virus by increasing our knowledge and competence in these areas. Physical therapy will continue to play a key role in improving patient treatment outcomes, enhance the quality of life, facilitate the rehabilitation of patients affected by COVID-19.

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