

# Rehabilitation of Patients After COVID-19 Pandemic

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## ABSTRACT

After severe coronavirus disease 2019 (COVID-19), many patients will encounter a variety of issues with their normal functioning routine and will require rehabilitation services to overcome these issues. Rehabilitation will be needed for survivors of COVID-19, those who have become deconditioned as a result of movement restrictions or limited movement, social isolation and inability to access healthcare and many of whom are older, with underlying health problems. The principles of rehabilitation include a simple screening process, use of a multidisciplinary expert team and evidence-based classes of intervention. The purpose of rehabilitation in COVID-19 patients is to relieve anxiety, depression, reduce complications, minimize disability, preserve function, provide psychological support and improve quality of life. This article reviews the likely rehabilitation needs of people with moderate to acute COVID-19 and discusses strategies to deliver effective rehabilitation and implementation in a world with COVID-19.

**Keywords:** COVID-19, coronavirus, rehabilitation

In March 2020, World Health Organization (WHO) declared the outbreak of a novel coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and it has evolved into a pandemic.<sup>1</sup> Coronavirus causes a highly infectious respiratory sickness that prompts respiratory, physical and psychological dysfunction in patients. In most patients, COVID-19 infection confers mild illness with fever (88.7%), sore throat (57.6%) and dyspnea (45.6%). However, for a considerable number of patients, those aged >65 years with comorbidities such as hypertension and diabetes, the infection can have intense sequelae. Among patients requiring hospitalization, a relatively high percentage (20.3%) requires admission in the intensive care unit (ICU), often for acute respiratory distress syndrome (ARDS); these patients can likewise encounter multiorgan failure.<sup>2</sup>

Early intricacies of COVID-19 include ARDS, sepsis or septic shock, multiorgan failure, acute kidney injury and cardiac injury. In many cases, patients stay bedridden in the ICU for extended time periods in an

inclined situation, which can cause post-ICU dysphagia, muscle weakness, myopathy and neuropathy leading to critical illness, as well as reduced joint mobility, pain in the neck and shoulders, trouble standing and hindered balance and step, with consequent limitations in activities of daily living (ADL).<sup>3,4</sup> In addition, persistent mental health impairment is commonly manifested, with pooled estimates demonstrating a high prevalence of depression (29%).<sup>4</sup> The longer a patient remains in the ICU, the greater the risk of long-term physical, cognitive and emotional problems.<sup>5</sup>

Patients who were seriously ill with COVID-19 and have passed the critical phase of lung infection, and are discharged but have symptoms of pulmonary dysfunction, should be prescribed a rehabilitation program to restore wellness and reduce anxiety and depression.<sup>5,6</sup>

Rehabilitation is like medical aid, to make sure that patients do not deteriorate after discharge and need readmission. It begins with an assessment aiming to discover the patient's primary problems and concerns, and to understand how did it arise and how can it be ameliorated. Effective rehabilitation interventions fall into five categories that are the same across all conditions:<sup>7</sup>

- Everyday exercise to increase cardiorespiratory work

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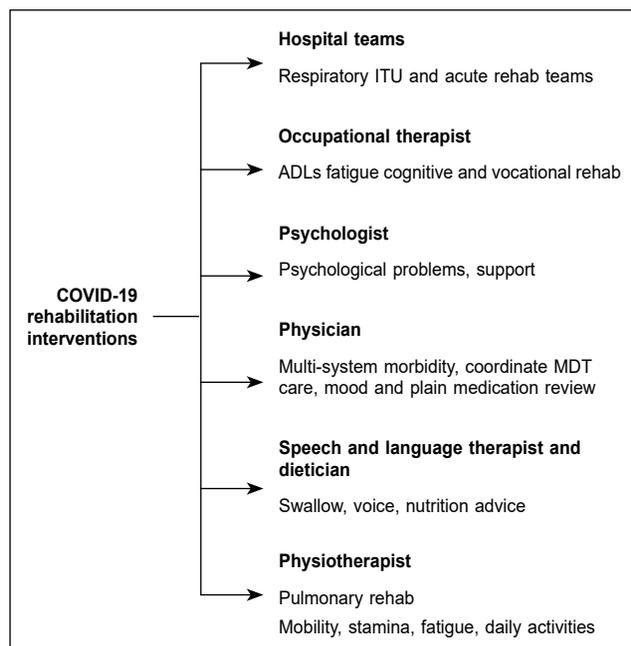
- Performing basic functional activities
- Psychosocial treatments
- Education with an emphasis upon self-management
- Set of specific actions custom-made to the patient's priorities, requirements and goals, covering all domains of the biopsychosocial model of illness, and being assessed routinely for their benefits and to decide if they should be continued, changed or relinquished (Fig. 1).

### PHYSIOTHERAPY AND POST-ACUTE COVID-19 REHABILITATION PHASE

Physiotherapists are instrumental in the rehabilitation of patients as they transition from the acute phase to the post-acute phase.<sup>8</sup> The outcomes of COVID-19 will be narrowed down in each individual and their rehabilitation needs will be specific to these consequences such as:

- Long-term ventilation
- Immobilization
- Deconditioning
- Related impairments – respiratory, neurological and musculoskeletal.

COVID-19 patients will often present with pre-existing comorbidities and this must be considered within the rehabilitation plan for the patient.



**Figure 1.** Interventions for rehabilitation of COVID-19 patients.

ITU = Intensive treatment unit; ADLs = Activities of daily living; MDT = Multidisciplinary team.

### REHABILITATION FOR PATIENTS WITH MILD AND MODERATE COVID-19

Most patients with COVID-19 present with mild influenza like symptoms and may encounter fever, fatigue, cough, muscle pain and other indications. The principal interventions of respiratory rehabilitation include airway clearance, respiratory control, posture management, active work and exercise.<sup>9,10</sup> A diagnosis of COVID-19 may build a feeling of fear in patients<sup>11</sup> and psychological counseling is especially significant. Besides, these patients ought to zero in on making sure to do regular work and rest, have a balanced diet and stop smoking.<sup>9</sup> For patients with mild and moderate signs and symptoms of COVID-19, Traditional Chinese Medicine (TCM) and adjuvant therapy involving acupuncture, moxibustion, massage, cupping, acupoint application and aromatherapy are reported.<sup>12</sup>

### REHABILITATION FOR SEVERE AND CRITICALLY ILL COVID-19 PATIENTS WITH UNDERLYING COMORBIDITIES OR WHO ARE ELDERLY

Severe and critically ill patients with COVID-19 often develop respiratory distress and/or hypoxemia 1 week after onset, progressing to ARDS, septic shock, metabolic acidosis and even death.<sup>8,11,12</sup> For severe and critically ill patients, specialists from different nations have proposed that respiratory rehabilitation should be undertaken once a patient's condition is steady, but not start too early, to abstain from intensifying respiratory failure or unnecessary spreading of the virus through droplets.<sup>8,12</sup> Therefore, determining an exact recovery time is significant. Timely rehabilitation can reduce or even eliminate the occurrence of these complications and the negative effects on patients' everyday life.<sup>13,14</sup>

Early rehabilitation should be performed within a patient's resilience level, including posture management, rollover, active/passive joint activity, respiratory muscle training, sputum training, basic exercises for patients confined to their beds, mobility training, stand on support, standing independently and ADL training.<sup>8,15-18</sup> For patients with ventilator dependence, progressive resistance training of inspiratory muscles has been observed to be a feasible and viable treatment to improve inspiratory muscle strength and improve quality of life (QoL) after weaning.<sup>9,19</sup> It should be noted that in the early stage of severe illness, aerobic exercise should be avoided as much as possible, as it may cause respiratory failure in some patients.<sup>17</sup>

## REHABILITATION OF PATIENTS WITH COVID-19 WHO ENCOUNTER PSYCHOLOGICAL DISORDERS

Patients diagnosed with COVID-19 may experience outrage, fear, nervousness, depression, insomnia or hostility during the isolation treatment period, as well as psychological problems such as depression, loneliness, lack of cooperation or abandonment of treatment due to fear of the disease, which all negatively affect patient treatment and rehabilitation.<sup>3,4,17,20</sup> Patients in ICU have been found to have differing levels of nervousness, depression and post-traumatic stress disorder (PTSD),<sup>21-23</sup> and these conditions can prompt dyspnea, tachycardia, raised blood glucose levels, hyperlactacidemia and low blood pressure, thus influencing the adequacy of treatment.<sup>23</sup>

Prevention or treatment of these clinical symptoms is likely to be of considerable benefit to patient recovery and ADL. Two studies detailed that clinical psychologists may assist patients to recover from their intense and unpleasant encounters. Clinical psychologists provide patients with interactive communication, stress management and personalized care. The findings of both studies showed that patient's vital signs improved and pain scores decreased and that anxiety, complication rates and sleep patterns all improved; notwithstanding, barely any examinations have straightforwardly measured the impacts of early mediations by clinical therapists for patients who are severely or critically ill.<sup>24,25</sup> Each patient's degree of

capacity to convey may vary; therefore, psychological treatment should be personalized. Patient education can improve understanding and reduce anxiety levels. This methodology has been shown to improve recuperation times and reduce pain, psychological stress and length of hospital stay.<sup>25</sup>

Relaxation exercises (e.g., progressive muscle relaxation, meditation and breathing exercises) have been reported to improve patient mood and vital signs. Moreover, these exercises have been found to reduce the incidence of complications, pain levels, fatigue, fear, use of sedatives and length of hospital stay and improve sleep quality.<sup>12</sup> Distraction methods (such as reading, engaging in dialogue and listening to music) have been found to improve patients' pain symptoms.<sup>12</sup> Similarly, hypnotic interventions can effectively relieve pain and reduce the use of analgesics.<sup>25</sup> One study demonstrated that acupuncture, massage and other TCM treatments can also reduce patient stress.<sup>26</sup> Music therapy is a widely used nonpharmaceutical intervention, which has been accounted to reduce stress, anxiety, pain, depression and feelings of isolation for patients.<sup>23,25</sup>

In spite of the fact that drug therapy is currently the main intervention to alleviate patients' anxiety and psychological distress, nonpharmacological interventions have gradually become widely acknowledged and implemented, benefiting many patients and reducing the risk of drug-related adverse reactions.<sup>23,27</sup>

### Rehabilitation Interventions at Different Phases of Care During COVID-19

#### Acute phase of care

Rehabilitation intervention:

- While patients with severe COVID-19 are receiving ventilator support, rehabilitation professionals may be engaged in supporting acute respiratory management,<sup>14</sup> and the maintenance and improvement of functioning to encourage early recovery.
- Specialized rehabilitation experts can provide interventions that help with improving oxygenation, airway secretion clearance and ventilation weaning,<sup>28,29</sup> and can likewise assume a function in promoting nutrition and preventing aspiration pneumonia, especially post-intubation and/or in patients with a tracheostomy.<sup>30</sup>

Typical delivery setting:

- Intensive and/or critical care units
- High dependency units (including in SARS centers).

#### Subacute phase of care

Rehabilitation intervention:

- In the early recuperation time frame, once patients have returned to a hospital ward or step-down facility, or for patients where illness severity did not warrant admission to an ICU, rehabilitation interventions may zero in on addressing ongoing impairments in mobility, respiratory capacity, cognition, swallow and nutrition, and communication.<sup>31,32</sup>
- Interventions during this period further aim to promote independence with activities of everyday living, and to give psychosocial support.<sup>33</sup>

Typical delivery setting:

- Hospital wards
- Step-down facilities (including in SARS centers).

**Long-term phase of care**

Rehabilitation intervention:

- Following discharge, rehabilitation experts can provide evaluated exercise, instruction on energy conservation and behavior modification, as well as rehabilitation for any specific individual impairment.
- During the long-term recovery of severe COVID-19, patients may benefit from pulmonary rehabilitative interventions, which target physical and respiratory impairments, and incorporate a combination of evaluated exercise, education, ADL and psychosocial support.
- In numerous specific situations, pandemic related constraints (physical distancing, limited human resources and limited public transport) and infection risks imply that telehealth is likely to be required following discharge.
- This could be reached out to incorporate remote exercise (e.g., virtual education and exercise) and peer-to-peer support from COVID-19 patients who have received the suitable training.<sup>34</sup>

Typical delivery setting:

- Rehabilitation centers
- Outpatient programs
- In-home services
- Mobile services
- Telehealth.

**Recommendation for Discharging Patients<sup>35</sup>**

Rationale	Recommendation
<b>Exclusion criteria</b>	<ul style="list-style-type: none"> <li>• Heart rate &gt;100 beats/min</li> <li>• Blood pressure &lt;90/60 mmHg or &gt;140/90 mmHg</li> <li>• Blood oxygen saturation ≤95%</li> <li>• Other diseases where exercise is not suitable</li> </ul>
<b>Exercise termination criteria</b>	<ul style="list-style-type: none"> <li>• Fluctuations in body temperature &gt;37.2°C</li> <li>• Respiratory symptoms and fatigue deteriorate; not relieved after rest</li> <li>• Stop exercises promptly and counsel a specialist if the accompanying side effects happen: chest tightness/pain, breathing difficulty, severe cough, dizziness, headache, blurred vision, palpitations, sweating, trouble standing</li> </ul>
<b>Rehabilitation evaluation</b>	<p>Clinical assessment: Physical examination, imaging, laboratory, lung function, etc.</p> <p>Evaluation of activity and respiratory capacity:</p> <ul style="list-style-type: none"> <li>• Respiratory muscle strength: Maximum inspiratory pressure/maximum expiratory pressure</li> <li>• Muscle strength: Isokinetic muscle testing</li> <li>• Joint range of motion evaluation</li> <li>• Balance function evaluation using Berg Balance Scale</li> <li>• Aerobic exercise capacity evaluation: 6-minute walk test</li> <li>• Physical activity assessment: International Physical Activity Questionnaire, physical activity scale for the elderly, etc.</li> </ul> <p>ADL ability</p>
<b>Respiratory rehabilitation interventions</b>	<p>Patient education:</p> <ul style="list-style-type: none"> <li>• Manuals or videos to explain the significance of respiratory restoration</li> <li>• Healthy and sound lifestyle education</li> <li>• Motivate patients to participate in family and social activities</li> </ul> <p>Proposals for respiratory recovery:</p> <ul style="list-style-type: none"> <li>• Aerobic exercise: Walking, jogging, swimming, etc., starting from low intensity and gradually increasing the intensity and duration: 3-5 times/week for 20-30 minutes each time. Discontinuous exercise can be utilized in patients who are prone to fatigue.</li> <li>• Strength training: Progressive resistance training 2-3 times/week, with a training period of 1.5 months and a weekly increase of 5-10%.</li> </ul>

- Balance training: Patients with balance dysfunction ought to go through balance training, including hands-free training and balance training using a device, under the direction of a physiotherapist.
- Breathing training: In case of shortness of breath, wheezing, difficulty with sputum discharge, patient should start breathing and sputum training, adjusting breathing rhythm, thorax activity training and activating breathing muscle group participation.
- Sputum training: First, breathing techniques can be used to help reduce sputum and energy consumption in coughing. Then, patients should be assisted with positive expiratory pressure (PEP)/oscillatory PEP and other gear.

## ADL guidance:

- Basic ADL: Evaluate the patient's ability to perform day-to-day activities such as training transfer, grooming, toileting, bathing and provide rehabilitation guidance for daily life impediments.
- Instrumental ADL: Assess the ability of instrumental daily activities, distinguish obstacles in task participation, and conduct targeted intervention under the guidance of an occupational therapist.

## CONCLUSION

COVID-19 created an unprecedented situation in the entire world. It has tested all medical services, including rehabilitation, and will continue to do so for the next coming years. During hospitalization, patients with COVID-19 are basically affected by respiratory dysfunction. Rehabilitation intervention (including positioning and respiratory management, traditional herbal medicine, physiotherapy and psychological support) should be given along with routine treatment, which can decrease hospital length of stay and improve patient status and QoL. Ideal arrangement and insightful planning can assist with restricting any effect that emerges from this pandemic.

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### Over 20 Million People in the UK Receive First COVID-19 Vaccine Dose

Over 20 million individuals in Britain have been administered the first COVID-19 vaccine dose, reported recently. Prime Minister Boris Johnson stated that this was a big national achievement and urged all people to get the vaccination when called. "Every jab makes a difference in our battle against COVID," he said.

The United Kingdom has reported the highest death toll due to COVID-19 in Europe, which is currently at 1,22,849 deaths, and has suffered the greatest economic setback among rich countries. However, the speed with which the nationwide vaccination rollout is proceeding, it is expected that the current lockdown restrictions will gradually be lifted from now till June-end... (*Reuters*)

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