The majority of the COVID-19 infected cohort recover from mild and uncomplicated infection. 14% of the cohort develop severe acute respiratory infection (SARI) that might require admission to hospitals and oxygen support. 5% of the cohort will require ICU admission. Median ICU stay is 8 days. Rehabilitation is an important variable that has a positive effect on the health outcomes of severe cases of COVID-19. It helps the health system by: a. Improving health outcomes: High quality rehabilitation has the potential to reduce ICU associated conditions such as Post intensive care syndrome (PICS). Patient recovery is optimised and there is a significant reduction in the probability of disability. Severe COVID-19 has the potential to cause swallow impairments, physical impairments and cognitive impairments. High quality rehabilitation has the potential to address these consequences adequately. Rehabilitation also includes psychosocial support. Rehabilitation assumes heightened significance in the context of older patients and patients with pre-existing health conditions. These cohorts have a higher vulnerability to severe COVID illness and rehabilitation can be expected to play an especially important role in facilitating the recovery of these patients to their pre-illness independence levels. b. Optimal utilisation of hospital beds: A common feature of the pandemic has been a wide spread shortage of hospitals beds, especially ICU beds. Rehabilitation can play a vital role in decreasing the average length of stay of COVID patients by getting patients ready for discharge earlier than usual. Rehabilitation is also key in ensuring continuity of care. Rehabilitation can facilitate the smooth discharge of complicated cases as well. c. Reduction in COVID-19 hospital readmission rates: High quality rehabilitation can significantly reduce hospital readmission rates. It achieves this by ensuring that the clinical condition of patients does not worsen after discharge, thereby not necessitating readmission. This has a salutary effect on bed count.

**Key words:** Rehabilitation, COVID-19, pandemic
Rehabilitation professionals are responsible for Covid 19 care in severe cases. They are designated frontline health professionals. Severe cases have a significantly higher probability of experiencing the need for specialised care in multiple phases. It is imperative that rehabilitation as a discipline is offered and included in all phases of care: the acute phase, the sub-acute phase and the long term phase. The delivery of the acute phase is in the Intensive care units and the Critical care units. The delivery of the sub acute phase is in the wards or in stepdown facilities. The delivery of the long term phase is at home and in recovery. Some patient groups that are non covid 19 also receive essential care from rehabilitation professionals. The research suggests that withdrawal of rehabilitation or its non availability to some sections of patients can accentuate existing risks to them. It is therefore very essential that the provision of rehabilitation facilities for these patient sections is considered an essential service and is secured without any interruption for the entire duration of the pandemic. Health planning for the pandemic must include rehabilitation, which must be integrated in the deployment of Emergency Medical Teams. This integration must be facilitated with high quality technical inputs from professional bodies and experts in the field. One critical step in this would be the appointment of a nodal officer for rehabilitation in the national health administration and coordination frameworks. The central planning for rehabilitation must include covid 19 afflicted groups as well as non covid 19 high risk patient populations. Professional bodies of physiatry, physiotherapy, speech and language therapy and occupational therapy at both the local and global levels are generating evidence for the delivery of care in both Covid-19 and non Covid 19 contexts.

Rehabilitation needs in severe Covid 19.

Acute exacerbations of covid 19 need Oxygen support and hospital admission. ICU based invasive mechanical ventilation is a primary requirement in cases complicated by co morbidities such as Multi organ failure, ARDS and sepsis. With the Covid 19 pandemic being a constantly evolving situation, significant proportions of the short term and long term approaches to covid 19 are modelled on clinical experience garnered from the management of ARDS in critical care patients in the general population. Extended periods of bed rest, lack of mobilisation, sedation, ventilation by mechanical means and sedation can lead to decreased muscle power and a significant reduction in physical functioning. Other effects are a marked reduction in cognition, communication capabilities, swallowing, respiration and an increased propensity for delirium. In the long run, there exists the possibility of the manifestation of a decrease in capacity for exercise, a decrease in degree of independence in daily living activities and lower levels of health related quality of life, known clinically as post intensive care syndrome. Severe Covid 19 patients may not access mechanical ventilation for 2 reasons: One, the severity of the illness may not warrant it and two, the facility may not be available. This can lead to patients experiencing varying degrees of capacity reductions in respiratory, physical and psychosocial competencies in response to the illness and the associated hospitalisation. Rehabilitation requirements for patients afflicted with severe Covid 19 may be exacerbated by older age and underlying health conditions. Another important area for research is the impact on these patients of the isolation from established personal support networks as a fallout of the safety precaution protocols for Covid 19, although it is intuitive to infer that this isolation will only exacerbate the problems.

Rehabilitation interventions for patients with severe COVID-19

Acute phase of care is provided in High dependency units, Critical care units, Intensive care units and Severe acute respiratory infection (SARI) centres. Severe Covid 19 patients require ventilatory support. Rehabilitation professionals support acute respiratory management. They are also extensively involved in the maintenance and enhancement of functioning for an early recovery. Professionals with specialised training in rehabilitation execute interventions that facilitate oxygenation, clearance of secretions in the airway, weaning off
ventilation\textsuperscript{30,31}, nutrition promotion and the prevention of aspiration pneumonia, particularly in patients after intubation and tracheostomy.\textsuperscript{33}

Subacute care is provided in hospital wards and stepdown facilities including SARI centres. This type of care is provided in the early recovery period. The recipients of subacute care are patients who have returned to the ward or step down facility from an ICU/CCU/HDU and also those in the ward who were never shifted to an ICU/CCU/HDU. Rehabilitation efforts in this period will aim to address quality of respiratory function, cognitive abilities, mobility impairments and quality of communication.\textsuperscript{34,35} These interventions are aimed at enhancing independence in daily activities as well as the provision of extensive psychosocial support. The planning and preparation for discharge can be an especially complex process in elderly patients and in patients with comorbid conditions.\textsuperscript{36}

Long term care is provided in rehabilitation centres, outpatient settings, in home services, teleservices and mobile health services. Post discharge, rehabilitation professionals can facilitate the provision of high quality education on modification of behaviour, education of conservation of energy, graded exercises, alteration of living spaces and rehabilitation for specific disabilities. Long term care includes pulmonary rehabilitative interventions for respiratory and physical disabilities. This includes a scientific regimen of psychosocial support, education, graded physical exercise and other activities of daily living.\textsuperscript{37} The pandemic brings with it the constraints of limited public transportation facilities, a decreased availability of human resources and the disabling requirement of physical distancing. These constraints coupled with the risk of infection can be overcome with the induction and operationalisation of telehealth after the discharge of the patient. Telehealth is the utilisation of virtual technology and telecommunications for healthcare delivery. With expert help and scientific planning, this can include rehabilitation through remote exercise and peer support from appropriately trained Covid 19 patients. Remote exercises include virtual group education and exercises. The evidence strongly suggests that rehabilitation services that are located inside communities provide the best possible long term care.

**Continuity of rehabilitation for non covid 19 patients**

The COVID-19 outbreak and its impact on health systems mean that health planners need to make decisions on the extent to which rehabilitation services continue to operate and how rehabilitation service continuity can be maximized. These decisions need to reflect the risks associated with a cessation or reduction of services for different patient groups and for health service delivery. Infection risks must also be considered, along with local factors that impact the feasibility and appropriateness of alternative modes of service delivery, such as telehealth.

**Risks for infection that rehabilitation professionals and patients face**

Understandably, face to face rehabilitation comes with its attendant risks of infection. There is a need for an objective balancing of these risks to patient outcomes and to healthcare offerings that have a direct role in reducing or ceasing rehabilitation. Of particular concern is decision planning concerning the delivery of rehabilitation services in the outbreak. Service delivery must aim to reduce patient exposure to the maximum extent possible, with a special focus on sub populations at higher risk of experiencing severe disease either due to age or due to underlying health conditions. It is equally important to minimise exposure of rehabilitation professionals also. Risk assessments will have to take into account infection control measures in place and the availability of personal protective equipment (PPE). Both of these are variables that can see considerable variation across service delivery settings. It is imperative that in the event of a decision being taken to continue service delivery, the prevention and control of infection are operationalised based on WHO and PAHO protocols. The approach must carefully consider the possibility of implementation of all options of delivery of rehabilitation services. This includes telehealth which is particularly suitable for rehabilitation services based on advice and education. Rehabilitation services provision through telehealth is dependent on the quality of the telecommunications infrastructure in the service areas, and cost and therefore affordability of internet data for patients and providers.

**The impact on patient outcomes of reduction or cessation of rehabilitation**

The evidence indicates that some rehabilitation services for non covid 19 patients must be classified as essential services and continued without a break in the outbreak. These services are particularly critical in cases of stroke, myocardial infarction, burn injuries, major surgery, fractures, traumatic brain injury and spinal cord trauma. When patient groups like these experience a decrease or stoppage of rehabilitation, health outcome indicators can be seriously compromised with an increase in patient morbidity and mortality.\textsuperscript{5,6,7,8,9} In situations where facilities
temporarily stop or reduce rehabilitation services, it is absolutely essential that facility heads conduct an in depth prioritisation of patients that will assess risks to them if care is withdrawn. This exercise must help identify patients suitable for any of the following options: 1. Discharge from requirement of institutional rehabilitation. Transfer of patient to appropriately designed home programme. Patient educated comprehensively on potential complications and indications for follow up. 2. Continuing rehabilitation services through inpatient services, outpatient services and telehealth services or home based services. Telehealth or home based services are often modified. 3. Under extenuating circumstances, services can be stopped temporarily. This must be followed up with an education and home programme. Planning must be done for the establishment of a systematic method for follow up after resumption of rehabilitation services. 4. Over time, resumption of rehabilitation services may become possible for high risk patients who have recovered from or are cleared of Covid 19. This will be more feasible in smaller rehabilitation centres outside the bigger hospitals.

**The impact on health service delivery of a decrease or stoppage of rehabilitation.**

All efforts must be made to keep rehabilitation services available to those who need it, especially in the context of ensuring safe and undelayed discharges from hospitals. This applies to both patients with and without Covid 19. This facet assumes critical significance in the wake of the acute need for enhancing the surge capacity of hospitals. This need requires that patients are moved quickly and safely through the system. Decreased access or a reduction in access to rehabilitation services can result in avoidable delays in discharge and increases in lengths of stay. This will in turn impact other related clinical and administrative indicators negatively. Low quality planning and coordination in rehabilitation efforts can be a leading cause of readmissions and preventable complications. It is also necessary to ensure availability and accessibility of follow up rehabilitation facilities for patients to be discharged safely and on time. This makes it necessary to have access to a comprehensive assessment of availability and accessibility of services across community settings before taking any decision on decreasing or closing down any rehabilitation services. This is of particular significance to patient groups most likely to need follow up. These patient groups are at a significantly higher risk of suboptimal treatment outcomes. The pandemic will lead to a shift in the epidemiology of rehabilitation services required. This shift might linger for a substantial period of time even after the pandemic tapers off. This shift will see a fall in the demand for elective surgery driven rehabilitation services. There will be an increase in rehabilitation service needs driven by worsening of co morbidities because of a decrease in or stoppage of access to healthcare arising from measures to control covid 19. There is also the spectre of the creation of a backlog of unprovided rehabilitation care because of the reduction and cessation of rehabilitation services in various geographies. This backlog will have to be serviced as pandemic containment measures ease. Covid 19 response plans will need to account for these diverse needs.

### 1. ROLE OF GOVERNMENTS

Governments will have to play an active role in ensuring that rehabilitation facilities for both Covid 19 and non Covid 19 patients are not compromised. Regulatory bodies will need to be proactive and responsive to the constantly evolving pandemic environment. Nodal agencies for healthcare will need to take proactive ownership of the development and implementation of Standard operating protocols for physiotherapy and rehabilitation of patients. In geographies with weak health systems, provision of high quality care might not be possible without the help of NGOs, civil society organisations and volunteers. In these circumstances, high quality coordination can be a game changer. The involvement of technical and professional bodies in both the formulation and the implementation of SOPs can enhance ownership of the processes needed to drive high quality outcomes. Simplification of reporting structures and cutting out of unnecessary bureaucratic red tape will go a long way in building high quality, sustainable pandemic response measures.

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[www.turkjphysiotherrehabil.org](http://www.turkjphysiotherrehabil.org)


