

Early Rehabilitation in COVID-19 – Best Practice Recommendations for the Early Rehabilitation of Patients with COVID-19

Frühe Rehabilitation bei COVID-19 – Best Practice Empfehlungen für die frühe Rehabilitation von Patient/innen mit COVID-19

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ABSTRACT

The COVID-19 pandemic poses new challenges to physical medicine, physiotherapy, and acute care rehabilitation in rehabilitation clinics as well as in hospitals. We have to assume that COVID-19 patients may need early mobilization and acute care rehabilitation, despite of a possible scarcity of suitable facilities or services. It is the aim of this article to provide conceptual suggestions for the early rehabilitation of COVID-19, combining the existing experience in the acute care rehabilitation of patients with respiratory infections with the currently available sources and experience. These recommendations comprise a checklist of logistical and organisational preparations, aspects of infectivity and personal protective equipment, adjustment of the patients' surroundings, interprofessional team work and co-therapy, respiratory therapy, mobilisation, activating care, ADL training, training intensity, and psychosocial management.

ZUSAMMENFASSUNG

Während der COVID-19-Pandemie stehen Rehabilitationskliniken und Akutkliniken bezüglich physikalisch-medizinischer, physiotherapeutischer und frührehabilitativer Versorgung vor neuen Herausforderungen. In der Behandlung von COVID-19 ist von einer Notwendigkeit frühmobilisierender Maßnahmen

und frührehabitativer Behandlung auszugehen, auch wenn vorhandene Strukturen bislang nicht flächendeckend solche Komplexbehandlungen vorsahen. Aus den Erfahrungen aus der fachübergreifenden Frührehabilitation in der Behandlung von Patienten mit möglicherweise vergleichbaren Atemwegserkrankungen in Verbindung mit aktuell verfügbaren Quellen und Erfahrungen sollen therapeutisch-konzeptuelle Hinweise

für die Behandlung von Patient/innen mit COVID-19 abgeleitet werden. Die Empfehlungen betreffen: Logistische Vorbereitung (Mitarbeiterumgang und -schulungen), Infektiosität und persönliche Schutzausrüstung, Umgebungsanpassung, interprofessionelles Arbeiten und Co-Therapie, Atemtherapie, Mobilisierung, aktivierende Pflege und ADL, Trainingsintensität, psychosoziales Management.

Preliminary remarks

Due to the early phase of the pandemic (beginning of April 2020), scientific evidence of physical and rehabilitative medicine in patients with Covid-19 is sparse. These recommendations should therefore be seen as best practice based on the experience of early rehabilitation after pulmonary infectious diseases, especially acute respiratory distress syndrome (ARDS).

However, there are a number of recommendations for the early functional treatment of patients with COVID-19 up to now, including publications from the WHO, different scientific societies, and Chinese sources [1–9].

With increasing expertise and scientific evidence, continuous updates of this paper are necessary.

Target audiences

- Normal wards of hospitals treating COVID-19
- Early (sub-acute) rehabilitation and physiotherapy departments in hospitals
- Rehabilitation facilities treating COVID-19 patients

Background

During the pandemic, hospitals and rehabilitation facilities are facing completely new challenges with regard to physical medicine, physiotherapeutic and early rehabilitation care.

German legislation has also denominated rehabilitation facilities to serve as standby hospitals (in accordance with §22 Krankenhausgesetz) for the treatment of COVID-19.

Additionally, nursing homes will need safe protection strategies, with the consequence that only proven negative cases will be transferred there from hospitals. In some places there is even a complete admission ban. This can lead to a prolonged length of stay of COVID-19 patients in hospitals.

In the treatment of hospitalized COVID-19 patients, early mobilization and early rehabilitation are expected to be necessary. This poses new challenges if there are no adequate pre-existing structures for such treatments.

Rehabilitation clinics will most likely play a role in the early rehabilitation of patients with COVID-19 and in some cases also in the late acute phase of COVID-19 disease.

Departments for physical and rehabilitative medicine and for physiotherapy in hospitals are already required during acute treatment, especially in inter-professional cooperation in the intensive care sector, and must also develop ad hoc concepts for effective early mobilisation and rehabilitation of patients.

Consecutively, the importance of early rehabilitation is not limited to the individual case, but contributes to increasing hospital capacities by reducing the length of stay in hospital. In the rehabilitation sector, mainly neurological rehabilitation clinics with phase-B early rehabilitation have the necessary expertise in early rehabilitation.

In Germany, there is no experience in the field of early post-treatment of COVID-19 until this date, but there is experience in the interdisciplinary early rehabilitation of patients, e. g. after complicated influenza pneumonia, who had a similar risk constellation of multimorbidity and acute respiratory distress syndrome and who had an indication for early rehabilitation after intensive care therapy, ventilation and often sepsis (in the context of bacterial superinfections) [10–13].

In the practice, rehabilitation will be necessary for patients with isolated COVID-19 disease, but also for patients with underlying multimorbidity. In this case, it may be necessary to react to different rehabilitation needs concerning their underlying conditions on the one hand and the Covid-19 rehabilitation on the other. First experiences of COVID-19 patients from the USA (Seattle) after ICU treatment show inpatient treatment courses of more than 14 days after transfer from intensive care [14].

Aim

To derive therapeutic concepts for the treatment of patients with COVID-19, based on the experience gained from the early rehabilitation in the treatment of patients with respiratory diseases in connection with currently available sources and experiences.

The following situations are not to be displayed here:

- the acute medical treatment of COVID-19
- physical therapy measures in the intensive care unit (prone positioning, respiratory therapy, early mobilization)
- the phase of post-acute rehabilitation (follow-up treatment, medical rehabilitation after hospital treatment)
- Aftercare and long-term rehabilitation
- community-based self-exercises for mild courses or after discharge from hospital or rehabilitation
- Palliative therapy

Rehabilitation needs after COVID-19

Functioning impairments result from

- Organ damage: primarily the pulmonary affection, also cardiac, central nervous, etc.
- Pre-existing conditions and a high age of the patients

- Consequences of immobilization, Post Intensive Care Syndrome (PICS): ulcers, contractures (especially foot drop), neuromuscular transition disorders with atrophy/CIP/CIM (critical illness polyneuropathy/myopathy), delirium etc., sequelae of prone positioning
- Increased incidence of complications due to lack of time and capacity for positioning and mobilization on ITS (in case of staff shortage)
- Psychosocial consequences

Recommendations

Logistical preparation (staff training)

- In-house training regarding prone positioning (factors to be considered: team structure, management by anaesthesiologists or intensivists, knowledge of the positioning materials as well as training of compromise solutions regarding the materials in case of emergency)
- All available physiotherapists should be trained
- Face-to-face hygiene training, including use of personal protective equipment (PPE) in an interdisciplinary team
- Create an open and critical working atmosphere for this, encourage mutual correction
- Returnees to the workplace must be continuously retrained, CAVE: shift work
- All trainings are confirmed with signature
- Obligatory daily information via the clinic's intranet, if necessary training in the use of this information, especially for non-native speakers
- Detection of risk groups within the staff
- For patients requiring oxygen: Staff needs to be trained in the use of portable oxygen bottles (hazardous material)

Infectivity and personal protective equipment

Infectivity

- Knowledge of the infectivity of the individual patient is important for the therapy team to adapt the necessary PPE
- If the indication for physical therapies is unclear, the PRM (physical and rehabilitation medicine) specialist should always be involved
- Aids (e. g. respiratory therapy devices) should be avoided during infectious phase of disease (surface persistence of the pathogens, presumably long aerosol persistence in ambient air)
- Please refer to the regularly updated CDC and RKI infectivity guidelines [15, 16].

Personal protective equipment (PPE)

- Therapists should wear adequate personal protective equipment (for potentially aerosol generating activities, adequate FFP masks, protective goggles, virus-proof gown; according to CDC or RKI recommendations)
- Surgical masks should also be worn by the (potentially) infectious patients during therapy, if tolerated.

Contact minimization and distancing rules

- Contact minimization is indicated within the rehabilitation team (where there is usually a high contact frequency among the staff), this requires good daily therapy planning
- Implement distancing regulations between patients, also supply surgical masks for patients in therapy
- Positioning during therapy measures in the area of the coughing impulse should be avoided
- Avoid unnecessary team meetings and conduct comprehensive team meetings with distance control and adequate protective measures or as video conferences
- Form stable teams, avoid fluctuations
- Introduce digital PRM (physical and rehabilitative medicine) where possible
 - if necessary, also integrate smartphones, tablets of the patients in therapies (media-based self-exercise program, also video therapy instructions)
 - to reduce the consequences of restricted rehabilitative treatment, i. e. the stop of group treatments (applies to rehabilitation clinics)

Adapting the patients' environment

- Provide aids in the patient's room, a chair or wheelchair by the bed
- If necessary a toilet chair in the room
- Therapy resources for self-exercise programme
- Nutritional aspects (protein-rich nutrition for training/deconditioning)
- Personal protective equipment
- Oxygen
- Means of telecommunication and telerehabilitation
- If possible, ensure good ventilation of the rooms

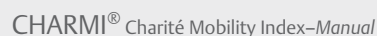
Interprofessional work and co-therapy

- Activating care and ADL training through nursing staff and occupational therapy, if necessary mutual interprofessional training
- Immobile patients usually require more than one therapist for transfer and mobilisation, co-therapy as distance regulations between staff cannot be fulfilled has to be documented

Early rehabilitation assessments and goals

- Perform a functioning-oriented assessment at admission to the early rehabilitation unit to be able to work out goal-oriented therapies
- Identify the premorbid functional status
- Identify risk constellations for relevant functional deficits, in particular
 - Frailty
 - Multimorbidity
 - Deconditioning due to prolonged immobility (e. g. ICU-acquired weakness, post intensive care syndrome PICS)

- Use patient-centered assessments that can be performed quickly and easily – if necessary, also post hoc or without additional patient contact
 - monitor COVID-19 symptoms (cough, fever, dyspnoea, loss of consciousness, loss of smell and taste, stuffy nose, sore throat, headache, abdominal pain, vomiting, nausea, loss of appetite, diarrhoea, conjunctivitis, skin changes, anxiety, general deconditioning)
 - assessment of independent mobility (e.g. Charité Mobility Index, freely available, ► **Fig. 1**) [17–19].
 - assessment of ADL (e.g. Barthel Index)
 - Indication-related application of basic psychological scores: emotion, stress, depression (e.g. PHQ-9, or PHQ-4 for screening)
 - Standardized monitoring of pain as well as CNS and cardiac status
 - Training intensity: Borg Dyspnoea Scale
 - Define realistic main goals together with the patients (early communication of expected limited functions is important for coping strategies)



- 1 Count the best mobility item that can be performed without assistance
- 2 Aids may be used
- 3 Count wheelchair mobility separately (e.g. 4W)

- | | | |
|----|----------------------------|---|
| 0 | Complete immobility | |
| 1 | Transfers in bed | turning from back to side |
| 2 | Sitting on edge of bed | sit ≥ 30 s, transfer may need help |
| 3 | Transfer to edge of bed | transfer into sitting position |
| 4 | Transfer from bed to chair | |
| 5 | Standing up | with standing for ≥ 30 s |
| 6 | Walking < 10 m | e.g. within a room |
| 7 | Walking 10 – 50 m | e.g. within a ward or apartment |
| 8 | Walking > 50 m | with mobility or gait speed limitation |
| 9 | Climbing stairs | \geq one flight of stairs |
| 10 | Full mobility | |
| W | Wheelchair mobility | independent use of wheelchair |

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Charité Mobility Index

- | | |
|----|----------------------------|
| 0 | Complete immobility |
| 1 | Transfers in bed |
| 2 | Sitting on edge of bed |
| 3 | Transfer to edge of bed |
| 4 | Transfer from bed to chair |
| 5 | Standing up |
| 6 | Walking < 10 m |
| 7 | Walking 10 – 50 m |
| 8 | Walking > 50 m |
| 9 | Climbing stairs |
| 10 | Full mobility |
| W | Wheelchair mobility |

[illegible]

► **Fig. 1** The Charité Mobility Index assesses independent mobility functions based on ICF items: Mini manual and grid.

Assisted transfers	Sitting on edge of bed/in wheelchair	Assisted standing, Active participation in transfers	Assisted steps (aid, therapist/nurse)	Assisted Walking
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► **Fig. 2** shows an exemplary course of mobilization with stepwise rehabilitation goals

- The admission assessment is the very beginning of the discharge planning: foreseeable home care and support needs should be identified at an early stage and the social services should be involved
- The transfer or dismissal planning may have to be adjusted to the infection status. It is necessary to demand that “COVID-19 rehabilitation clinics” be defined in order to achieve a cohorting of the still infectious patients and to avert transfer delays.

Respiratory therapy

- Consider the indications and contraindications of respiratory therapy [20–24].
- In the acute phase of COVID-19 in severe or critical cases, respiratory therapy measures that increase the total respiratory work should be avoided.
- In mild cases or pneumonia with a dry cough, no respiratory secretion management is indicated. Instruct patients for self-exercise
- Measures designed to increase the respiratory volume are not indicated in the acute phase due to the risk of cardiac decompensation and cough provocation
- Respiratory therapy may be indicated e. g. in exudative coughing, in hypersecretion or limited secretion clearance, in weakened respiratory muscles, morphological imaging correlates for secretion retention, or general weakness.
- Teach self-exercise programmes as soon as possible
- Combine respiratory therapy and mobilisation/transfer training; mobilisation and “verticalisation” are fundamental for lung function
- if sitting at the edge of the bed have the patient use floor contact to train proprioception
- in immobility: passive breathing training and therapeutic positioning:
 - Stretching position
 - Drainage position
 - Prone position
 - 130° position
 - mucus mobilization
 - Distal breathing stimuli
 - Passive breathing stimuli
 - Thermal stimuli
- Manual therapy (detonation techniques) of the diaphragma thoracis to optimize breathing
- CAVE aerosol-generating techniques. Respiratory therapy should be carried out without aids when possible (aerosol formation and virus persistence on surfaces), as long as the patient is infectious

Mobilization

The main goal in all mobilization phases is the “verticalization” of the upper body

- Mobilisation with graded therapy goals (► Fig. 2)
- Assisted transfers
- Seat at the edge of the bed/wheelchair
- Assisted standing, Active participation in transfers
- Independent steps with support or aids

- Walking with support
- Coordination and balance training
- Submax isometrics and trunk muscle stabilization exercises
- Active movement and resistance exercises

Activating care and ADL

- activate and train activities of daily life
- inter-professional activities by occupational therapy and nursing staff

Training intensity

- Strictly avoid overload in the acute phase CAVE cardio-respiratory decompensation
- Monitor training intensity with Borg Dyspnoea Scale
 - NRS 0–10
 - 0 = no shortness of breath, 3 = moderate shortness of breath, 10 = maximum shortness of breath
 - Range for desired training intensity not exceeding 3
- No training with fever, O₂ saturation below 95 %, hypotension/hypertension (<90/60 or >140/90), current worsening of the disease, in severe respiratory distress, AP symptoms, orthostasis [20].
- **Supply of aids (incl. long-term oxygen therapy)**
- The supply of aids should be initiated at an early stage within the framework of discharge management (walking aids, home oxygen therapy)
- Most frequently prescribed aids in ARDS patients [own data]: Walking frame, rollator, wheelchair, home oxygen (LTOT), shower stool, bathtub board, toilet chair, hospital bed/care bed
- Check indication for long-term oxygen therapy (LTOT) in persisting hypoxemia or exertional hypoxemia with improvement under O₂ application [25, 26].

Psychosocial Management

The treatment of Covid-19 patients is a considerable burden for staff, patients and relatives. Uncertainty and fears exist regarding health, consequences for the relatives/family, problems with isolation. An increased need for co-treatment of these psychosocial factors has to be expected.

- Psychological and social service staff must be trained to meet the requirements of Covid-19
- Create of psychosocial treatment concept for affected patients and staff according to the required treatment level
- Contact persons and areas of responsibility must be defined
- Relatives should be involved at an early stage
- Check whether pastoral care in hospitals should be included
- Establish contacts for need of emergency psychosocial care
- Mandatory coaching or supervision for staff should be established

Conflict of Interest

The authors declare that they have no conflict of interest.

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