



Early View

Original article

COVID-19: Interim Guidance on Rehabilitation in the Hospital and Post-Hospital Phase from a European Respiratory Society and American Thoracic Society-coordinated International Task Force

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COVID-19: Interim Guidance on Rehabilitation in the Hospital and Post-Hospital Phase from a European Respiratory Society and American Thoracic Society-coordinated International Task Force

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Abstract

Background. Patients with COVID-19 or post-COVID-19 will most probably have a need for rehabilitation during and directly after the hospitalization. Data on safety and efficacy are lacking. Healthcare professionals cannot wait for published randomized controlled trials before they can start these rehabilitative interventions in daily clinical practice, as the number of post-COVID-19 patients increases rapidly. The Convergence of Opinion on Recommendations and Evidence process was used to make interim recommendation for the rehabilitation in the hospital and post-hospital phase in COVID-19 and post-COVID-19 patients, respectively.

Methods. 93 experts were asked to fill out 13 multiple choice questions. Agreement of directionality was tabulated for each question. At least 70% agreement on directionality was necessary to make consensus suggestions.

Results. 76 experts (82%) reached consensus on all questions based upon indirect evidence and clinical experience on the need for early rehabilitation during the hospital admission, the screening for treatable traits with rehabilitation in all patients at discharge and 6-8 weeks after discharge, and around the content of rehabilitation for these patients. It advocates for assessment of oxygen needs at discharge and more comprehensive assessment of rehabilitation needs including physical as well as mental aspects 6-8 weeks after discharge. Based on the deficits identified multidisciplinary rehabilitation should be offered with attention for skeletal muscle and functional as well as mental restoration.

Conclusions. This multinational task force recommends early, bedside rehabilitation for patients affected by severe COVID-19. The model of pulmonary rehabilitation may suit as a framework, particularly in a subset of patients with long term respiratory consequences.

INTRODUCTION

Globally, millions of people are infected with the severe acute respiratory syndrome coronavirus 2, causing the coronavirus disease 19 (COVID-19) (1). A proportion of the of the confirmed COVID-19 patients are admitted to the hospital for acute care, due to severe respiratory symptoms and in some cases even acute respiratory distress requiring prolonged mechanical ventilation (2).

It is very likely that a proportion of the COVID-19 patients will have a need for rehabilitative interventions during and directly after the hospitalization (3-6). This approach is also recommended by the World Health Organization (7). However, data on safety and efficacy of rehabilitation during and/or after hospitalization in these patients are lacking. Equally, healthcare professionals cannot wait for well-designed randomized controlled trials to be published before they can start these rehabilitative interventions in daily clinical practice, as the number of COVID-19 patients increases rapidly every day.

Recently, Wilson and colleagues used the Convergence of Opinion on Recommendations and Evidence (CORE) process to make recommendations for the management of COVID-19 (8). The CORE process is a consensus-based approach to making clinical recommendations that has been shown to yield recommendations that are concordant with recommendations developed using Institute of Medicine-adherent methodology (9). The same methodology was used to develop interim guidance on rehabilitative interventions in the hospital and post-hospital phase in COVID-19 patients pending empirical evidence.

METHODS

An ad-hoc international Task Force was assembled, including the European Respiratory Society (ERS) and American Thoracic Society (ATS) key opinion leaders as well as key opinion leaders and clinical experts from other relevant societies in the field of pulmonary rehabilitation. Invitations were sent to 93 experts within the field of pulmonary rehabilitation, respiratory and critical care medicine of physical medicine and rehabilitation. Seventy-six agreed to participate (82%). As

described before (8), SurveyMonkey platform (SurveyMonkey, San Mateo, CA) was used to create 13-question multiple choice survey. Each question consisted of three parts: 1) presentation of the question in a modified PICO (Patient, Intervention, Comparator, Outcomes) format; 2) a multiple-choice question asking for strong or conditional recommendation for or against a course of action or no recommendation; and 3) a free text box for comments.

After publishing an initial web-based blog on April 3rd 2020 and seeking global input (10), the core team of experts (MAS, AEH, SJS, TT) put together a list of possible relevant questions, and during three teleconferences, consensus was reached amongst about which question to maintain.

Wording of the questions was adapted with input of ERS and ATS methodology teams to ensure unequivocal interpretation and consistency. The survey was not piloted in order to have more timely recommendations.

The survey was administered once from April 27 to May 11, 2020, including several reminders.

Agreement of directionality was tabulated for each multiple-choice question. At least 70% agreement on directionality was necessary to make consensus suggestions. The proportion of respondents per choice per question was calculated and expressed as a percentage of the total number of respondents. As more than 70% agreement on directionality was reached in all questions from the first round, no second round was necessary.

RESULTS

1. *The international Task Force suggests that hospitalized patients with COVID-19 should receive rehabilitation at/around the bedside (critical care and/or ward based) until safe for discharge to the home environment.*

Rationale. Whilst most people infected with the COVID-19 virus have mild disease (11), some have more severe symptoms requiring hospital admission, and 20% of those admitted may require intensive care (12). Hospitalised COVID-19 patients often have comorbidities, such as cardiovascular disease and diabetes (13) and may have prolonged hospital stays (14). Some

COVID-19 survivors have physical impairments that may be exacerbated by prolonged immobility, including muscle weakness, neurological impairment and/or nutritional disturbance (15). In-hospital rehabilitation could effectively address these problems (16). However there may be added challenges for rehabilitation delivery in the setting of COVID-19, related to infection prevention and changes to availability of existing rehabilitation services.

Results. Majority of the experts recommended strongly (55%) or conditionally (37%) for hospitalised patients with COVID-19 receiving rehabilitation at/around the bedside (critical care and/ or ward based) until safe discharge to the home environment (Figure 1A; Table 1).

Experts commented that patient-tailored early rehabilitative interventions similar to other critically ill patients should start after an assessment, including early mobilization and airway clearance. This may prevent and/or slow down the expected rapid deterioration in physical and emotional functioning. Some experts did express concerns about patients' safety, due to the limited understanding of underlying pathophysiology and the possible impact of rehabilitative interventions. For example, it is unclear if there is any "threshold of illness severity" or any particular features of illness, which pose greater risk of patients undertaking rehabilitative interventions during hospitalization, including pulmonary, cardiovascular and/or neurologic manifestations of COVID-19 infection, in particular, the risk of clotting (micro thrombosis and venous thromboembolism). Moreover, the importance of appropriate personal protective equipment for the healthcare professional was mentioned by multiple experts as clear safety issue.

- 2. The international Task Force suggests that prior to hospital discharge, hospitalised patients with COVID-19 should have an assessment of oxygen requirements at rest and during exertion.*

Rationale. Hypoxemia is common in hospitalised patients with COVID-19, with hypoxic respiratory failure a prominent feature of severe cases (17). Whilst supplemental oxygen requirements reduce over time, alongside improvements in the underlying lung pathology (18), it is likely that

some patients will have ongoing oxygen needs at hospital discharge. Moreover, some patients in the recovery phase may have oxygen desaturation on exertion, which is not associated with resting oxygen saturation, the degree of dyspnoea or feeling unwell.

Results. Majority of the experts recommended strongly (66%) or conditionally (26%) for hospitalised patients with COVID-19 having an assessment of oxygen requirements at rest and during exertion prior to hospital discharge (Figure 1B).

Experts commented that assessment of oxygen requirements during exertion may vary between hospitals. However, low oxygen saturation may be a reason for additional assessment for pulmonary and cardiovascular comorbidities. Moreover, some patients do show a severe oxygen desaturation during physical exercise of only moderate intensity. Assessment of oxygen requirement prior to hospital discharge is necessary to prepare the individual COVID-19 patient with the needed equipment upon discharge home. A follow-up assessment on the re-evaluation of oxygen requirement should also be scheduled following hospital discharge, as supplemental oxygen may no longer be needed as the underlying lung pathology resolves.

- 3. The international Task Force suggests that patients with COVID-19 should be encouraged to do regular daily activities in the first 6-8 weeks after hospital discharge.*

Rationale. Some patients with COVID-19 will resume daily activities without difficulty in the period following hospitalisation, but this may be more challenging in those who have had severe disease, prolonged hospital stays and/or persistent symptoms (19). About two-thirds of the survivors of other critical illnesses experience moderate-to-good recovery of physical function over the first two months (20). However recovery trajectories vary, with ongoing impairments most likely in older patients with longer ICU stays and greater sedation time (20).

Results. Majority of the experts recommended strongly (58%) or conditionally (34%) for encouraging patients with COVID-19 to do regular daily activities in the first 6-8 weeks after hospital discharge (Figure 1C).

Experts commented that recommencing daily physical activity as early as possible may positively affect functional recovery. However, patients may vary in physical, emotional and/or cognitive functioning. So, further assessment needs to be performed. Moreover, the encouragement to do regular daily activities should be in line with the local regulations for physical distancing and should go along with an advice to take time for recovery and rest periods, also taking an acceptable level of perceived exertion and dyspnoea and oxygen desaturation into consideration.

4. *The international Task Force suggests that patients with COVID-19 should be encouraged to do low/moderate intensity physical exercise at home (rather than high intensity physical exercise) in the first 6-8 weeks after hospital discharge, if a formal exercise assessment with measures of exertional desaturation has not been conducted.*

Rationale. COVID-19 infection is associated with a high inflammatory burden (21), which could persist beyond hospital discharge. Exertional desaturation may also persist, even in those without the requirement for supplemental oxygen at rest. Whilst moderate intensity exercise training is safe and feasible in survivors of critical illness (22), the safety of high intensity exercise in patients recovering from COVID-19 is unknown. During the early post hospital period it may not always be possible to conduct a robust exercise assessment or deliver supervised rehabilitation services, with uncertainties regarding the duration that patients remain infectious (23) and/or the need to maintain physical distancing.

Results. Majority of the experts recommended strongly (29%) or conditionally (55%) for encouraging patients with COVID-19 to do low/moderate intensity physical exercise at home (rather than high intensity physical exercise) in the first 6-8 weeks after hospital discharge, if a formal exercise assessment with measures of exertional desaturation has not been conducted. (Figure 1D).

Some experts stated that the potential benefits of low/moderate physical activity in preventing physical deterioration outweighed any perceived risks of undertaking such exercise without formal assessment. The low/moderate intensity physical exercises should be based on symptom

limitation and tailored to the individual needs and limitations of the patients, which may vary largely. In addition to oxygen desaturation on exertion, experts encouraged health professionals to be aware of other possible causes of caution, like cardiomyopathy and (post-)pulmonary embolism.

5. *The international Task Force suggests that patients with COVID-19 should have a formal assessment of physical and emotional functioning at 6-8 weeks following discharge, to identify unmet rehabilitation needs.*

Rationale. Whilst good recovery of physical function should be expected over the first 8 weeks in most COVID-19 survivors, it is highly likely that there will be some with ongoing impairments in physical functioning (20). The high prevalence of post-traumatic stress disorder, cognitive impairment, chronic pain, sleep disorders, fibromyalgia, and fatigue in survivors of critical illness have been well documented (24-26). The COVID-19 pandemic gives rise to new psychosocial and emotional stressors for recovering patients, including social isolation, physical distancing, loss of employment and uncertainties about the future.

Results. Majority of the experts recommended strongly (75%) or conditionally (22%) for patients with COVID-19 having a formal assessment of physical and emotional functioning at 6-8 weeks following discharge (Figure 1E).

Experts stated that post-hospitalization recovery may vary considerably between patients, which justifies a formal assessment (including physical, emotional and cognitive functioning, and return to work) to customize rehabilitation care. Some experts also proposed an evaluation at hospital discharge to ensure patients were discharged to the appropriate setting (e.g., home, rehabilitation centre, nursing home), and to do only a formal assessment in symptomatic patients with limitations in daily functioning.

6. *The international Task Force suggests that follow up of a hospitalised patient with COVID-19 should include the core outcomes set for survivors of acute respiratory failure at 6-8 weeks following hospital discharge.*

Rationale. Post-hospital outcomes of COVID-19 survivors are not yet understood. Assessment of physical and psychosocial outcomes following hospitalisation for COVID-19 will allow unmet rehabilitation needs to be addressed. A core outcome set allows essential outcomes to be consistently assessed using the same measurement instruments, so that data can be pooled and confident conclusions drawn. A core outcome set for survivors of acute respiratory failure has already been defined using a consensus process, and includes the EQ-5D, Hospital Anxiety and Depression Scale and Impact of Events Scale-Revised (27). The core outcome set does not include measures of cognition, muscle function, physical function or pulmonary function.

Results. A majority of the experts recommended strongly (63%) or conditionally (30%) for the follow up of a hospitalised patient with COVID-19 including the core outcomes set for survivors of acute respiratory failure at 6-8 weeks following hospital discharge (Figure 1F)

Experts recognized the importance of administering outcome measures that will help to identify the patients' need in order to direct, plan and devise appropriate interventions and resources to the patients and their caregivers. This may require multiple re-assessments at different time points (e.g., 3,6 and 12 months after hospital discharge). Individual experts suggested the addition of a tool to measure exertional breathlessness (e.g., the MRC dyspnoea grading scale) and cognitive screening (Montreal Cognitive Assessment) and alternative tools to assess the same domains as identified by Needham and colleagues (27) (e.g., Short-Form 36 to assess generic health status; the Primary Care Post-Traumatic Stress Syndrome (PTSD) questionnaire to assess symptoms of PTSD; Patient Health Questionnaire 9, General Anxiety Disorder 7, or the Depression Anxiety Stress Scale 21 to assess symptoms of anxiety and/or depression). Some experts believed that assessment at 6-8 weeks following hospital discharge is too soon, as some sequelae may manifest at later time points. Moreover, some experts indicated that community managed patients may also need a supported recovery programme.

7. *The international Task Force suggests that follow up of a hospitalised patient with COVID-19 should include measures of respiratory function at 6-8 weeks following hospital discharge.*

Rationale. High resolution CT scans of the chest in patients with COVID-19 infection have shown significant respiratory abnormalities including ground glass opacities, inter- and intralobular septal thickening and consolidation. These changes start to resolve after 14 days, but may persist past hospital discharge (18). Long term follow-up of survivors of other severe viral pneumonias (SARS-COV-1 and MERS-COV) suggests that many had normal respiratory function at 1-year, although impaired diffusing capacity was evident in a minority (28, 29). Respiratory function testing is necessary to document ongoing impairments and guide future management, but it is considered an aerosol-generating procedure, which may limit its availability in the COVID-19 era.

Results. A majority of the experts recommended strongly (45%) or conditionally (42%) for the follow up of a hospitalised patient with COVID-19 including measures of respiratory function at 6-8 weeks following hospital discharge (Figure 1G).

Experts recognized the importance of measuring respiratory function, as missing respiratory abnormalities are likely to lead to further decline and perhaps downstream new respiratory chronic disease. Experts emphasized to perform assessment only in patients with lingering respiratory symptoms and who were tested COVID negative in the post-hospitalization phase. Indeed, standard operating procedures need to be in place to prevent possible infection of other patients and/or the lung function technician. Some experts questioned whether local infection control protocols would allow measurements of respiratory function to be obtained.

8. *The international Task Force suggests that follow up of a hospitalised patient with COVID-19 should include measures of exercise capacity at 6-8 weeks following hospital discharge.*

Rationale. Whilst the long-term consequences of Covid-19 are not fully understood, we know that the impact of an ICU stay for acute respiratory distress syndrome (ARDS) has a significant impact

on physical function (30). Equally a protracted period of bed rest can have similar detrimental but partially reversible effects in chronic respiratory disease (31). There is some evidence that recovery in physical function is variable in ARDS survivors however the greatest recovery appeared to occur within the first two months (20). An objective measure of exercise capacity (31) is important to document the degree of disability, identify the limitations to exercise and form the foundation of a subsequent rehabilitation programme.

Results. Majority of the experts recommended strongly (61%) or conditionally (29%) for the follow up of a hospitalised patient with COVID-19 including measures of exercise capacity at 6-8 weeks following hospital discharge (Figure 1H).

Many experts considered the measurement of exercise capacity to be very important in COVID-19 survivors, but some experts believe that this measurement should be limited to patients who remain physically limited 6-8 weeks following hospital discharge and who are tested negative at the time testing the exercise capacity. Experts emphasized that assessors should be aware of the possible presence of cardiopulmonary sequelae. Some experts questioned whether local infection control protocols would allow measurements of exercise capacity to be obtained.

9. *The international Task Force suggests that COVID-19 survivors with a need for rehabilitative interventions at 6-8 weeks following hospital discharge (e.g., multiple treatable traits) should receive a comprehensive rehabilitation program, compared to no rehabilitation program.*

Rationale. Existing data from survivors of viral pneumonias indicates the wide range of challenges that patients face (20, 24, 25). It is unlikely that a unidimensional programme of physical training will meet the needs of the Covid-19 survivor as they will exhibit multiple treatable traits that a comprehensive rehabilitation programme has the potential to modify favourably. There is a limited evidence base for pulmonary rehabilitation post H1N1-ARDS (32). The programme will potentially be wider in scope than current pulmonary rehabilitation programmes (33) to meet the needs of these individuals and consider the additional burden placed upon survivors as a

consequence of this unique virus e.g. social isolation strategies and the associated emotional burden. Survivors may be of a different age group to the 'usual' pulmonary rehabilitation population and supporting a successful return to work will be important.

Results. Majority of the experts recommended strongly (70%) or conditionally (26%) for COVID-19 survivors with a need for rehabilitative interventions at 6-8 weeks following hospital discharge receiving a comprehensive rehabilitation programme (Figure 11).

Many experts commented on the diverse needs of COVID-19 survivors, such that not all survivors will need a comprehensive programme. Some experts commented that a comprehensive rehabilitation programme may not be available in all locations during the COVID-19 pandemic.

- 10. The international Task Force suggests that COVID-19 survivors with pre-existing/ongoing lung function impairment at 6-8 weeks following hospital discharge should receive a comprehensive pulmonary rehabilitation program consistent with established international standards, compared to no pulmonary rehabilitation program*

Rationale. For patients with COPD there is evidence to indicate that recovery after an admission is supported by a structured rehabilitation programme. We know this is both safe and clinically effective and is recommended in national and international guidelines (33, 34). The current guidance for routine post-exacerbation pulmonary rehabilitation is 4 weeks post discharge, however the recommendation to delay this until 6-8 weeks post discharge was based upon the following considerations; there is a lack of data about the decay of the levels of infection in the Covid-19 survivor, the data suggesting that at 2 months a proportion of physical recovery will have occurred (20) and we also know that is a challenge for services to recruit patients to a post exacerbation rehabilitation programme 4 weeks post discharge (35).

Results. Majority of the experts recommended strongly (70%) or conditionally (24%) for COVID-19 survivors with pre-existing/ongoing lung function impairment at 6-8 weeks following hospital

discharge receiving a comprehensive pulmonary rehabilitation program consistent with established international standards (Figure 1J).

Experts recommended taking patient's individual needs and preferences into consideration when decision regarding comprehensive pulmonary rehabilitation programs are made.

11. *The international Task Force suggests that COVID-19 survivors with loss of lower limb muscle mass and/or function at 6-8 weeks following hospital discharge should receive a muscle strengthening program, rather than no strengthening program.*

Rationale. For patients with ARDS, prolonged stay in the ICU (mostly including prolonged mechanical ventilation) is known to have significant impact on peripheral muscle function, reflected in a loss of muscle mass and power neuropathy and/or myopathy, that is better known as ICU-acquired muscle weakness (30), and occurs early on in the ICU stay (36). Equally, a prolonged period of bed rest can also have a significant effect in chronic respiratory disease (31). The lack of peripheral muscle strength can severely compromise functional ability and should be evaluated and treated as indicated (33).

Results. Majority of the experts recommended strongly (80%) or conditionally (18%) for COVID-19 survivors with loss of lower limb muscle mass and/or function at 6-8 weeks following hospital discharge receiving a muscle strengthening program (Figure 1K).

Experts agreed that a muscle strengthening program was important to optimise recovery.

Moreover, muscle strength needs to be assessed prior to commencement, to enable accurate prescription and tailoring of the strengthening program.

12. *The international Task Force suggests that COVID-19 survivors with loss of lower-limb muscle mass at 6-8 weeks following hospital discharge should receive nutritional support rather than no nutritional support.*

Rationale. It is well established that optimising caloric and protein intake is important to support recovery of functional muscle mass. The post-ICU COVID-19 survivor will face commonly reported

problems with nutrition (e.g., loss of appetite, swallowing disorders) and the additional symptom of loss of taste (ageusia) and smell (anosmia) are now recognised symptom of COVID-19 (37). In general, for those with chronic respiratory disease weight loss and wasting of muscle and bone tissue may be induced or accelerated during severe acute exacerbations of respiratory disease requiring hospitalisation, due to the combination of malnutrition, physical inactivity, hypoxia, systemic inflammation and/or systemic glucocorticoids (38), this is likely to be mirrored in the COVID patient.

Results. Majority of the experts recommended strongly (43%) or conditionally (36%) for COVID-19 survivors with loss of lower-limb muscle mass at 6-8 weeks following hospital discharge receiving nutritional support (Figure 1L).

Experts stated that rebuilding muscle mass requires that nutritional support is combined with a training stimulus. Moreover, experts believed that nutritional support may be less well established in some centres and guidance may be needed from expert sources.

13. *The international Task Force suggests that COVID-19 survivors with symptoms of psychological distress (using questionnaires) at 6-8 weeks after discharge from the hospital should receive a formal psychological assessment.*

Rationale. Common symptoms reported one year later by ICU survivors, including patient with ARDS, include anxiety (34%), depression (33%) and post-traumatic stress disorder (19%) (39). This is compounded for the post COVID-19 survivor by the emotional stress associated with social isolation from family and friends for a protected period of time as a consequence of government lockdown policies. There are questionnaires recommended in the core outcome data set that cover these aspects of anxiety and depression, alongside PTSD (27). It is also acknowledged that the emotional burden of COVID-19 is likely to extend beyond the individual to family and friends (40).

Results. Majority of the experts recommended strongly (71%) or conditionally (24%) for COVID-19 survivors with symptoms of psychological distress at 6-8 weeks after discharge from the hospital receiving a formal psychological assessment (Figure 1M).

Experts believed that symptoms of anxiety, depression and PTSD occur commonly in persons after a major life event. Therefore, screening and monitoring of the course of symptoms of psychological distress is important. Experts also emphasized that those patients who show high level of anxiety or depressive symptoms needs to be referred to psychologist or psychiatrist for further assessment, and treatment may be indicated when symptoms continue to exist after 10-12 weeks. Psychological assessment and support for the family of the infected patient was also emphasised by the experts.

DISCUSSION

The present study provides consensus-based suggestions for the screening and the rehabilitation process during and after a hospital admission for severe COVID-19 infection. Experts reached consensus based upon indirect evidence and non-systematic clinical observations (i.e., clinical experience) on the need for early rehabilitation during the hospital admission, the screening for treatable traits with rehabilitation in all patients at discharge and 6-8 weeks after discharge, and around the content of rehabilitation for these patients. In absence of a formal evidence-based approach, these findings provide interim guidance for referral and multidisciplinary rehabilitation in a subgroup of patients after hospital admission. Altogether the data cast a strong claim on the need for screening and rehabilitation options for patients who were hospitalized. Besides lung function testing (e.g., spirometry, whole-body plethysmography and carbon monoxide transfer factor) (41, 42), this screening should also contain at least an exercise test (cardiopulmonary exercise test, 6-minute walk test or shuttle walk test), muscle strength testing and patient-reported outcome measures (19, 43-46). This cannot be ignored by health care systems organizing the care around this pandemic respiratory infection. It should be noted that several

experts identified that during the pandemic there has been an absence of rehabilitation options for patients that suffered from COVID-19 .

Early mobilisation and re-engagement in physical activity is important in the prevention of systemic consequences of a critical care and hospital admission. Whenever possible, patients should re-engage in physical exercise tailored to their possibilities. In patients suffering from COVID-19 such early interventions have to be balanced with the critical illness of the patient and the availability of personal protective equipment (PPE) for care givers engaged in the early mobilization protocols (5, 6, 47). Where rehabilitation staff are not available or cannot access PPE, some rehabilitation tasks at the bedside may be provided by other members of the multidisciplinary team, with appropriate instruction. At discharge from the hospital experts advise a first screening, particularly to investigate the need for oxygen supplementation, in order to guide the first weeks post discharge. Patients may still be infectious (48, 49), which may complicate testing outside the patient room. A one-minute sit-to-stand test has been proposed as a way to evaluate hypoxia on exertion in the patient's room as an alternative to a six minute walking test (50), but needs further validation.

After discharge, patients with COVID-19 should be encouraged to do low/moderate intensity physical exercise at home in the first 6 to 8 weeks. Usually, these tasks range between 1.5 and 6 metabolic equivalents. Please see Ainsworth and colleagues for numerous examples (51, 52).

Moreover, the guidance provided by the ATS/ERS statement on pulmonary rehabilitation (33) may serve as a good framework. In this statement, pulmonary rehabilitation is defined as : “... *a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies, which include, but are not limited to, exercise training, education, and behaviour change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence of health-enhancing behaviours.*” Experts seem to agree that this definition also applies to the patient that suffered from severe COVID-19. Clearly there is a need for physiologic (statements 2, 5, 7, 8, and 11), psychologic (statements 5, 6, and 13) and nutritional (statement 13) assessment. For some patients there is a need for an individually

tailored rehabilitation intervention (statement 9) and in the case of a pre-existing or remaining respiratory deficit, a pulmonary rehabilitation program (statement 10). Pulmonary rehabilitation programs are indeed well equipped to service this group of patients. Adaptations may need to be made to the rehabilitation program if the program typically deals with patients with obstructive lung disease to cater more to patients with gas exchange abnormalities. The self-management or education modules may also need to be adapted. It is expected that many patients that suffered from severe COVID-19 and particularly those with an ICU admission will have significant skeletal muscle weakness. Following muscle strength testing (46), specific skeletal muscle training programs, typically offered with resistance training, are advised by experts. This is also the case in conventional pulmonary rehabilitation (53).

To date no prospective studies exist in COVID-19 patients on the proportion of patients in need of some form of (multidisciplinary) rehabilitation. However, symptoms like fatigue and dyspnoea still occur frequently about 30 days after discharge from the hospital, and are accompanied by reduced quality of life in about 40% of the COVID-19 patients (19). In some cases, the program offered could be outside the pulmonary rehabilitation setting. Indeed, early studies from China and confirmed later (54) indicated that >30% of patients suffered from some neurologic and neuromuscular sequelae (55). It is yet unknown how much of this recovers spontaneously. The progression of functional, skeletal muscle and mental health status after an admission for COVID-19 is not yet well described yet. Nevertheless, observational studies after SARS (56) or MERS (57) report an impaired 6-minute walk distance in 18% of the patients, and 43.6% had psychologic comorbidity. Hence health systems need to prepare to accommodate an increased number of referrals.

The exact proportion of COVID-19 patients requiring rehabilitation are difficult to predict, but assuming that patients who received mechanical ventilation would be a minimum set of patients that require rehabilitation post discharge may provide a conservative estimate of the number of new rehabilitation cases. Taking the ISARIC, UK based database as an example, 10% of hospitalised patients required mechanical ventilation (58). In a US (New York) based cohort 23% of patients requiring mechanical ventilation (59). Unfortunately large proportions died in the ICU (e.g. up to

60% in a study from New York, similar numbers in the ISARIC cohort), still rendering 40% of patients admitted to ICU as minimal numbers of new candidates for multidisciplinary rehabilitation, representing 5 to 10% of patients referred to hospital. Likely, a fraction of patients not mechanically ventilated (also including patients on high-flow oxygen therapy) will need to be added, as some of these still have significant functional consequences of the hospital admission (*Belli et al. Under review ERJ; Paneroni et al. Under review ERJ*). We strongly encourage countries to take action to organize rehabilitation for this influx of patients, on top of the many patients with chronic respiratory disease who already qualify for pulmonary rehabilitation (60).

An issue not resolved, but of importance to the organisation of rehabilitation for these patients is the duration patients should be considered as infectious. There is currently no consensus on how long patients should be self-isolating. Local infection prevention recommendations should be followed and this may require significant adaptation of the rehabilitation program with for example the adoption of 'tele-rehabilitation' (61). The task force has adopted a 6-8 week time window for reassessment. At this time point (and likely even sooner) many patients will be considered non-infectious (48, 49, 62).

A last point of attention is that despite the robust opinion in favour of rehabilitation after severe COVID-19 disease, these patients may be difficult to reach. Unfortunately several factors may preclude referral or uptake of rehabilitation. An important element that may impair uptake of rehabilitation is that at a population level rehabilitation might be hampered by pre-infection risk factors to be admitted to hospital with COVID-19, which include: having obesity, smoking and living an inactive life style (63). Moreover, it is known that COVID-19 disproportionately affects disadvantaged communities (64), many of whom have poor access to rehabilitation (65). These factors are known to impair uptake of rehabilitation. The offer for rehabilitation therefore need to be made to patients in a personalised and targeted manner, to maximise the likelihood of acceptance.

Strengths and weaknesses

While the present expert opinion paper followed rigorous methodology to reach consensus, and consensus was reached on all questions, some remarks need to be taken into account. It would be good to offer respondents the option of no response, as respondents may feel that they do not have adequate expertise to respond to a question or they may not understand the question wording. Indeed, some experts stated that there were composite questions, combining a question about the content of care with a question about timing. Moreover, sometimes questions may not have been very specific (e.g. 'measures of respiratory function', 'measures of exercise capacity', 'comprehensive pulmonary rehabilitation program' or 'nutritional support'). Please see online Table 2 for all details. This may complicate interpretation of survey responses. We have taken, where possible written comments of the respondents into account. The current methodology also has strengths. It is fast and provides an interim guidance when randomized controlled studies are not yet available. Moreover, the current sample experts came from all over the world and had a diverse professional background, including medical but not limited to medical specialists, physiotherapists, nurses and psychologists.

To conclude, this multinational task force recommends early, bedside rehabilitation for patients affected by severe COVID-19. It advocates for assessment of oxygen needs at discharge and more comprehensive assessment of rehabilitation needs including physical as well as mental aspects 6-8 weeks after discharge. Based on the deficits identified multidisciplinary rehabilitation should be offered with attention for skeletal muscle and functional as well as mental restoration. The model of pulmonary rehabilitation may suit as a framework, particularly in a subset of patients with pre-existing or COVID-19-induced long-term respiratory consequences.

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DISCLAIMER

The goal of consensus guidance is to standardize care, thereby improving outcomes and facilitating research. The suggestions in this document do not constitute official positions of the American Thoracic Society, European Respiratory Society, or the institutions of the Task Force members. They should not be considered mandates as no suggestion can incorporate all potential clinical circumstances. The suggestions are interim guidance that should be reevaluated as evidence accumulates.

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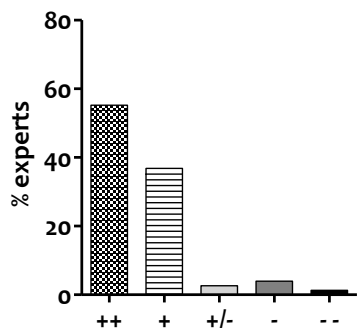
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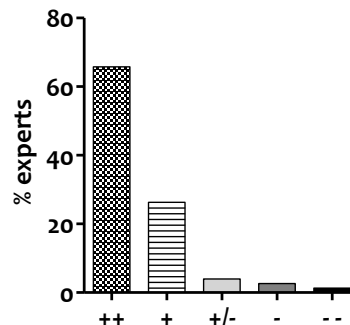
1. Table 1. Interim recommendations Hospitalised patients with COVID-19 should receive rehabilitation at/around the bedside/critical care and/or ward based, until safe for discharge to the home environment.
2. Prior to hospital discharge, hospitalised patients with COVID-19 should have an assessment of oxygen requirements at rest and during exertion.
3. Patients with COVID-19 should be encouraged to do regular daily activities in the first 6-8 weeks after hospital discharge
4. Patients with COVID-19 should be encouraged to do low/moderate intensity physical exercise at home (rather than high intensity physical exercise) in the first 6-8 weeks after hospital discharge, if a formal exercise assessment with measures of exertional desaturation has not been conducted.
5. Patients with COVID-19 should have a formal assessment of physical and emotional functioning at 6-8 weeks following discharge, to identify unmet rehabilitation needs.
6. Follow up of a hospitalised patient with COVID-19 should include the core outcomes set for survivors of acute respiratory failure at 6-8 weeks following hospital discharge.
7. Follow up of a hospitalised patient with COVID-19 should include measures of respiratory function at 6-8 weeks following hospital discharge
8. Follow up of a hospitalised patient with COVID-19 should include measures of exercise capacity at 6-8 weeks following hospital discharge
9. COVID-19 survivors with a need for rehabilitative interventions at 6-8 weeks following hospital discharge (e.g., multiple treatable traits) should receive a comprehensive rehabilitation program, compared to no rehabilitation program.
10. COVID-19 survivors with pre-existing/ongoing lung function impairment at 6-8 weeks following hospital discharge should receive a comprehensive pulmonary rehabilitation program consistent with established international standards, compared to no pulmonary rehabilitation program
11. COVID-19 survivors with loss of lower limb muscle mass and/or function at 6-8 weeks following hospital discharge should receive a muscle strengthening program, rather than no strengthening program
12. COVID-19 survivors with loss of lower-limb muscle mass at 6-8 weeks following hospital discharge should receive nutritional support rather than no nutritional support.
13. COVID-19 survivors with symptoms of psychological distress (using questionnaires) at 6-8 weeks after discharge from the hospital should receive a formal psychological assessment.

Figure 1. Experts' responses to the 13 questions

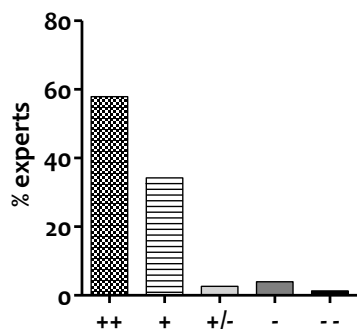
A. Q1. Should hospitalised patients with COVID-19 receive rehabilitation at/around the bedside (critical care and/or ward based) until safe for discharge to the home environment?



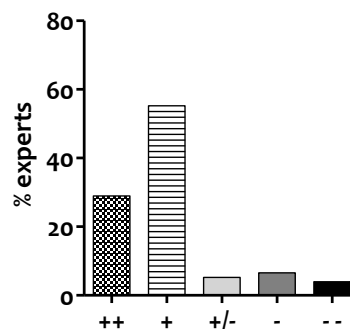
B. Q2. Prior to hospital discharge, should hospitalised patients with COVID-19 have an assessment of oxygen requirements at rest and during exertion?



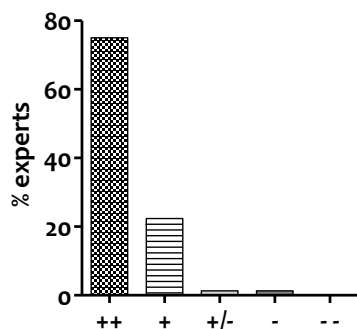
C. Q3. Should patients with COVID-19 be encouraged to do regular daily activities in the first 6-8 weeks after hospital discharge?



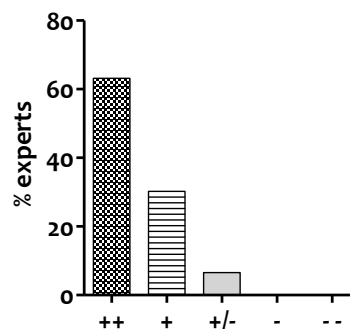
D. Q4. Should patients with COVID-19 be encouraged to do low/moderate intensity physical exercise at home (rather than high intensity physical exercise) in the first 6-8 weeks after hospital discharge, if a formal exercise assessment with measures of exertional desaturation has not been conducted?



E. Q5. Should patients with COVID-19 have a formal assessment of physical and emotional functioning at 6-8 weeks following discharge, to identify unmet rehabilitation needs?



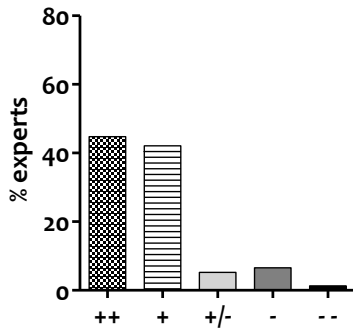
F. Q6. Should follow up of a hospitalised patient with COVID-19 include the core outcomes set (e.g., EQ-5D, Hospital Anxiety and Depression Scale, Impact of Events Scale-Revised, PMID: 28699762) for survivors of acute respiratory failure at 6-8 weeks following hospital discharge?



G. Q7. Should follow up of a hospitalised patient with COVID-19 include measures of respiratory function at 6-8 weeks following hospital

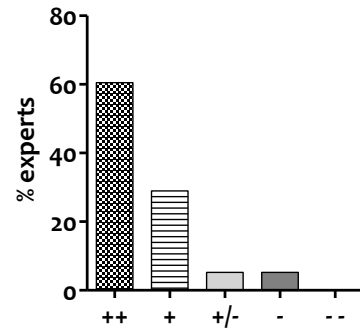
H. Q8. Should follow up of a hospitalised patient with COVID-19 include measures of exercise capacity at 6-8 weeks following hospital

discharge?

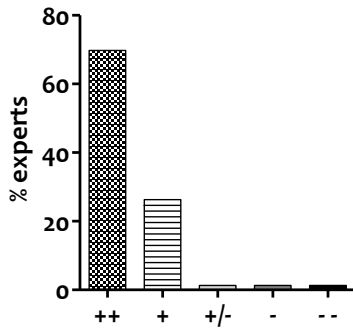


- I. Q9. Should COVID-19 survivors with a need for rehabilitative interventions at 6-8 weeks following hospital discharge (e.g., multiple treatable traits) receive a comprehensive rehabilitation program, compared to no rehabilitation program?

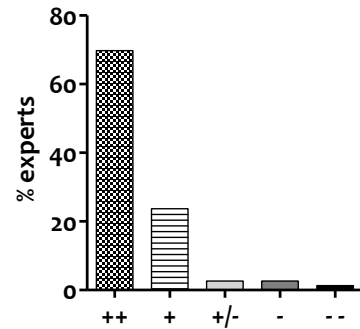
discharge?



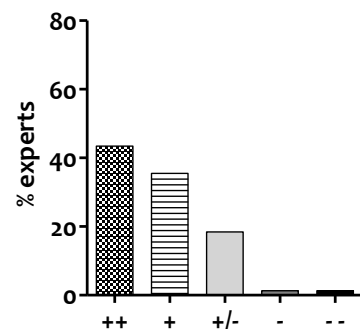
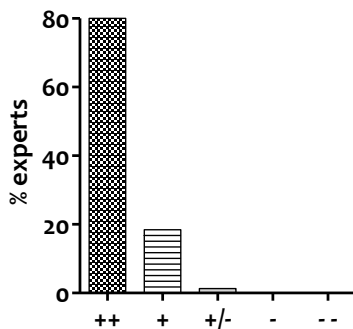
- J. Q10. Should COVID-19 survivors with pre-existing/ongoing lung function impairment at 6-8 weeks following hospital discharge receive a comprehensive pulmonary rehabilitation program consistent with established international standards, compared to no pulmonary rehabilitation program?



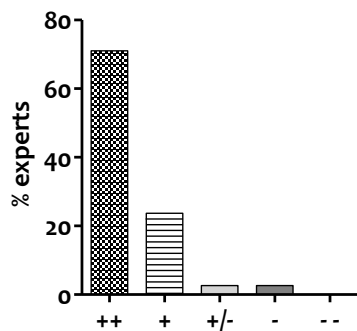
- K. Q11. Should COVID-19 survivors with loss of lower limb muscle mass and/or function at 6-8 weeks following hospital discharge receive a muscle strengthening program, rather than no strengthening program?



- L. Q12. Should COVID-19 survivors with loss of lower-limb muscle mass at 6-8 weeks following hospital discharge receive nutritional support rather than no nutritional support?



M. Q13. Should COVID-19 survivors with symptoms of psychological distress (using questionnaires) at 6-8 weeks after discharge from the hospital receive a formal psychological assessment?



Legend figure: ++ = Strong recommendation for ...; + = Conditional recommendation for ...; +/- = No recommendation for or against; - = Conditional recommendation against ...; -- = Strong recommendation against ...

Online Table 1. The following experts have filled out the survey and agreed to be mentioned in this overview (alphabetical by country)

Name	Background	Country
Jacqui Kay	Physiotherapist	Australia
	Physical Medicine &	
Jane Malone	Rehabilitation	Australia
Kimberley Haines	Physiotherapist	Australia
Narelle Cox	Physiotherapist	Australia
	Physical Medicine &	
Steven Faux	Rehabilitation	Australia
Sue Berney	Physiotherapist	Australia
Ralf Harun Zwick	Pulmonologist	Austria
Andreas von Leupoldt	Psychologist	Belgium
Chris Burtin	Physiotherapist	Belgium
Daniel Langer	Physiotherapist	Belgium
Grégory Reychler	Physiotherapist	Belgium
Heleen Demeyer	Physiotherapist	Belgium
Fabio Pitta	Physiotherapist	Brazil
Fernanda Lanza	Physiotherapist	Brazil
Vinicius Maldaner	Physiotherapist	Brazil
Diana Hopkins-Rosseel	Physiotherapist	Canada
Didier Saey	Physiotherapist	Canada
	Physical Medicine &	
Natalja Tchajkova	Rehabilitation	Canada
Roger Goldstein	Pulmonologist	Canada
Rodrigo Torres	Physiotherapist	Chile
Homer Yu	Pulmonologist	China

Weili Wei	Pulmonologist	China
Jhonatan Betancourt-Pena	Physiotherapist	Colombia
Vicente Benavides	Physiotherapist	Colombia
Katerina Neumannova	Pulmonologist	Czech Republic
Henrik Hansen	Physiotherapist	Denmark
Maurice Hayot	Pulmonologist	France
Rainer Gloeckl	Sport scientist	Germany
Rembert Koczulla	Pulmonologist	Germany
Janos Varga	Pulmonologist	Hungary
Bruno Balbi	Pulmonologist	Italy
Enrico Clini	Pulmonologist	Italy
Guido Vaghegini	Pulmonologist	Italy
Mara Paneroni	Physiotherapist	Italy
Michele Vitacca	Pulmonologist	Italy
Stefano Belli	Physiotherapist	Italy
Atsuyoshi Kawagoshi	Physiotherapist	Japan
Tetsuao Miyagawa	Physiotherapist	Japan
Yutaro Oki	Physiotherapist	Japan
Alex van 't Hul	Physiotherapist	Netherlands
Anne-Loes van der Valk	Physiotherapist	Netherlands
Daisy Janssen	Elderly care specialist	Netherlands
Marike van der Schaaf	Physiotherapist	Netherlands
Anita Grongstad	Physiotherapist	Norway
Anne Edvardsen	Physiotherapist	Norway
Bente Frisk	Physiotherapist	Norway
Alda Marques	Physiotherapist	Portugal
Paulo Abreu	Physiotherapist	Portugal
Antonio Rios	Physiotherapist	Spain

Elena Gimenos-Santos	Physiotherapist/psychologists	Spain
Andre Nyberg	Physiotherapist	Sweden
Karin Wadell	Physiotherapist	Sweden
Malin Nygren-Bonnier	Physiotherapist	Sweden
Isabelle Fresard	Pulmonologist	Switzerland
Deniz Inal-Ince	Physiotherapist	Turkey
Melda Saglam	Physiotherapist	Turkey
Anne-Marie Doyle	Psychologists	UK
Arietta Spinou	Physiotherapist	UK
Claire Nolan	Physiotherapist	UK
Enya Daynes	Physiotherapist	UK
Ioannis Vogiatzis	Exercise physiologist	UK
Joy Conway	Physiotherapist	UK
Linzy Houchen	Physiotherapist	UK
Matthew Maddocks	Physiotherapist	UK
Rachael Evans	Pulmonologist	UK
Will Man	Pulmonologist	UK
Abebaw Yohannes	Physiotherapist	US
Angela Campbell	Physiotherapist	US
Carolyn Rochester	Pulmonologist/critical care specialist	US
Chris Garvey	Nurse	US
Chris Wells	Physiotherapist	US
Dale Needham	Pulmonologist/critical care specialist	US
Linda Nici	Pulmonologist/critical care specialist	US
Melissa Bednarek	Physiotherapist	US

Rebecca Crouch	Physiotherapist	US
	Pulmonologist/critical care	
Surya Bhatt	specialist	US

Online Table 2. All comments by the members of the expert panel

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should hospitalised patients with COVID-19 receive rehabilitation at/around the bedside (critical care and/or ward based) until safe for discharge to the home environment?

Comments

Rehab (or part) should be installed as soon as possible to prevent avoidable impact of physical inactivity.

Recommendation similar to other critically ill patients

as long as possible to do in a safe manner for the rehab professional

As the acute pathology of these patients continues to be elucidated, I would be cautious regarding the amount and intensity of any exercise intervention in the acute setting. I am primarily thinking of the findings of significant vascular compromise both in the lungs and in other end-organs including the brain- these patients may behave much more like our pulm HTN patients and therefore recognition and ability to treat and react to decompensation will be crucial authors need to define rehabilitation and state of patient

Case-by-case decision balancing severity of symptom presentation with safety in the form of appropriate PPE available for the caregiver.

Currently available research supports early intervention for mobilization of critically ill patients to avoid progressive muscle weakness, loss of bone density, and facilitate airway clearance and breathing mechanics.

Depending on the rehabilitation. Passive mobilization for sedated patients seems not recommended but all the other rehabilitation are strongly recommended

Depends on the definition of 'rehabilitation'. All patients should have assessments of their function and have appropriate physiotherapy with the aim of discharge (including early mobilisation in critical care).

If this is referring to exercise training then there isn't a positive evidence base to support this in other conditions. It would be reasonable to discuss a discharge recovery programme.

Factors limiting strong recommendation are limited understanding of manifestations and effective management of this disorder and variable resources and guidelines for effective and safe clinical care.

For critical care COVID19 cohorts - the evidence-based care of these patients within ICU/wards should be informed by the existing critical care rehabilitation literature for acute respiratory failure and general critical care rehabilitation literature (although some existing trials are negative, neutral, inconclusive). See this example:

<https://jamanetwork.com/journals/jama/article-abstract/2530536>

Other examples:

<https://www.sciencedirect.com/science/article/pii/S0003999310000341>

<https://www.sciencedirect.com/science/article/abs/pii/S1036731420300552>

<https://www.atsjournals.org/doi/full/10.1513/AnnalsATS.201606-484OC>

There are decades of critical care research in ARF and ARDS that should inform care of COVID19 cohorts (given they can present to ICU with ARF and ARDS).

High risk for disease transmission, especially in settings of limited PPE.

I agree only if the therapist is sufficiently safe from infection.

If you do not activate those patients at/around the bedside, it would be critical to discharge them safe and quick to home environment. If those patients get home, they have to do more than they were used in the hospital.

Individually adjusted

It is important to evaluate each patient and devise a treatment plan that is according to their need. As the evidence for specific intervention for the COVID-19 patients is not entirely clear at this stage.

Lack of any rehabilitation poses dire risk of severe decline in functional status for hospitalized patients; those who require ICU care; especially those who require prolonged sedation, mechanical ventilation and/or neuromuscular blockade and/or who receive systemic corticosteroids are at major risk of critical illness neuromyopathy. As such, provision of rehabilitation as able during the hospital stay is of major importance.

The basis of my conditional recommendation for hospital based rehab pertains to safety issues for patients and staff:

Issues are:

1. adequate PPE is needed for provision of rehabilitation to patients infected with COVID 19 and there is as yet no clear data to guide the level of risk to healthcare workers of acquiring COVID-19 from delivering PT to these persons
2. adequate testing should be available for healthcare professionals who do provide rehab to patients infected with COVID
3. safety of providing rehab to people with severe respiratory involvement (pneumonia and/or ARDS) from COVID with severe hypoxemia and/or other cardiovascular or neurologic manifestations of COVID is not clear--in particular, the risk of clotting (micro thrombosis and venous thromboembolism) is a concern (in terms of PE, MI, stroke and limb ischemia risk). Important that we DO NO HARM, and the risks of rehab in this population as compared with risks for non-COVID hospitalized patients is unclear at present.
4. Also unclear if there is any "threshold of illness severity" or any particular features of illness

related to COVID which poses greater risk of patients undertaking rehab during hospitalization

Rehabilitation is recommended only when the patient tolerates the activities and exercises that are administered, mainly in symptoms and physiological variables.

Severely or critically ill patients should not receive ICU pulmonary rehabilitation, <https://pubmed.ncbi.nlm.nih.gov/32251002/>. In addition, an increase in biomarkers of cardiac injury has been documented <https://pubmed.ncbi.nlm.nih.gov/32252591/>.

Activities such as positioning and early mobilization would be recommended depending on the stability of the patient

Some patients would benefit from specialised equipment that would require them to leave their bedside.

The rehab has to be applied safely.

There are some definition issues here as to what constitutes PR in this location. I think a modified program is of value. The issue of course is PPE for staff and to what extent patients are treated individually versus in a class.

Use of personal protective equipment is an absolute necessity for direct patient care. Acute care may be limited to prone positioning, and passive and active early mobilization if the patient is hemodynamically stable, and the level of sedation permit to apply. Acute care include direct patient contact.

For relatively less ill patients who are relatively active, are able to perform self care activities, being active and mobilization may be adequate. Those patients may do light activities in and around the bed under supervision, if possible using in hospital tele-health options, and leaflets may be given.

We have sepsis data

WBV seems to be safe

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Prior to hospital discharge, should hospitalised patients with COVID-19 have an assessment of oxygen requirements at rest and during exertion?

Comments

early insights indicate that an oxygen transport deficiency is present in many patients in the recovery phase and is not always accompanied by dyspnea. Some patients show severe desaturation during exercise of only moderate intensity

In my opinion NOT ALL patients should be assessed of Oxygen requirements at rest and during exertion. Only on indication

Will split response 1) all patients should have a daily assessment of resting oxygen saturation prior to discharge

Pre-discharge ambulatory oxygen assessments are a difficult issue where practice varies internationally even in COPD.

Many hospitalised patients with COVID19 will have exertional hypoxaemia pre discharge even if resting oxygen saturation is reasonable (and many clinicians have lowered reasonable to be 92-94% on air) but this will likely recover. More important that this is reassessed after discharge.

My personal opinion is that post-hospital ambulatory oxygen should only be prescribed where symptoms (exertional breathlessness) are preventing discharge (not degree of exertional hypoxaemia - where events related to hypoxaemia are extremely low) and supplemental oxygen appears to help. Another caveat would be if there is an underlying condition which is complicated by the hypoxaemia such as angina or cardiac arrhythmia.

Again some qualification is needed about 'assessment' - I am assuming this is referring to a standardised walking test on and off oxygen.

evidence that patient do not report feeling unwell despite having low sats and there is an increase in the incidence of VTE in covid

Assuming the patient presented with pulmonary symptoms.

There needs to be a distinction between those patients with underlying chronic respiratory diseases and those patients without the disease who contracted COVID-19. If those patients with chronic respiratory disease before admission had long term oxygen therapy then it is important to reassess their need for oxygen therapy. The re-assessment before discharge will help to increase or decrease their oxygen need. Those without respiratory disease, if they recover from the COVID-19, condition is stable they might not need an in-depth investigation.

People from ICU suffer from sarcopenia, critical illness polyneuropathia and respiratory insufficiency-

Although a reassessment will likely be necessary after 1 month.

I believe that step test is a good way to determine the assessment of O₂.

NOTT and BMR trials support supplemental oxygen for hypoxemic patients at rest. Supplemental oxygen is also recommended (and reimbursed by Medicare in the USA) for those patients who desaturate with activity below 85-88% SpO₂.

This must be assessed prior to hospital discharge to prepare the COVID patient with needed equipment upon discharge home.

If possible should oxygen requirements both at rest and during exertion be assessed. There is at the moment no standardised follow up plan in Norway and it may take quite a long time before especially exercise desaturation could be found. As far as I know has oxygen requirement at exertion not been performed. Maybe should the choice be "strong"..
If exercise not contraindicated

This is more likely to occur throughout the hospital stay through regular nursing and physiotherapy assessments, rather than a specific assessment prior to hospital discharge. There will be patients however who need to have an assessment of oxygen requirements as a result of their COVID-19 diagnosis.
assessment at rest: yes

assessment during exertion: not standard

The evaluation of oxygenation at rest and during exercise should be applied in patients who had complications or ICU admission, it has been documented interlobular septal thickening and air bronchus sign as well as consolidation, fibrosis and air trapping: pubmed.ncbi.nlm.nih.gov/32272262/.

For evaluation of oxygen during exertion, field tests to avoid the risk of cross infection should be avoided and tests such as Sit To Stand performed in the same patient room should be tried.

This does not need to be formalized testing but can be part of basic activities that RN engages patient. If functional status is at question for safe discharge than a PT/OT consult would be appropriate. They can complete the O2 assessment

Yes to the extent that it is possible to assess patients' exertional needs safely; It is important to know what the O2 requirements are before discharge

I am not sure to perform a six minute walk test or a similar test at this stage to assess exercise oxygen requirements.

Absolutely necessary since it depends on achieving medium-term goals and being able to perform pulmonary rehabilitation with orientations to the needs of each patient. On the other hand, the information provided could be a predictor of morbidity and mortality, as in some cases of pulmonary fibrosis or pulmonary interstitial disease.

Suggest to assess if they respond to oxygen during exertion. Those who respond positive may be discharged with oxygen to use during exertion. However, close monitoring is needed to assess whether the patient may have requirements of supplemental oxygen.

A follow-up assessment on the re-evaluation of oxygen requirement should also be scheduled with Hospital discharge because it might be assumed that many COVID patients might need supplemental oxygen only on the short-term but not on the Long-term.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should patients with COVID-19 be encouraged to do regular daily activities in the first 6-8 weeks after hospital discharge?

Comments

Restart physical activity as early as possible may positively affect functional recovery. A problem in this respect is however the frequently observed desaturain on exertion of even moderate intensity. Therefore, patients should be given good personalized advise on discharge from the hospital on the intensity of the activities.

Advice to slowly regain regular daily activities are recommended but this should go along with the advice to take time for recovery and rest periods
hall mark for pulm rehab once safe to be sent home

assists in clearing of the lungs, quality of life and endurance and function

With physical distancing.

I agree there is evidence from the published literature regular daily activities e.g. regular walking has potential benefits for patients with chronic respiratory diseases.

Rule out that cardiac problems occurred
Question way too vague to complete this item.

Too many variables:

Disease severity

Definition of regular daily activities -- depends on patient's usual, occupation demands etc.

Borg level three of exertion , therefore unlikely to return to complete normal activity but need a routine program

Yes modified to enhance mobilization-

COVID-19 delivers a significant insult to the pulmonary system. Research has shown a benefit for comprehensive Rehabilitation following an acute injury to the lungs or exacerbation of known lung disease.

Strongly need of FITT definition and monitor control

Our experience so far is that the patients differ significantly in functional (both physical and psychological) status after hospital discharge - with a lot of patients with confusion. Therefore the conditional recommendation before further assessment has been performed.

I agree only if the therapist is sufficiently safe from infection.

No data available

Important to teach them about acceptable level of perceived exertion or dyspnea, for example Borg's RPE and Borg's CR-10

But it is important that we monitor the patient with oxygen measurement in rest and daily activities, Borg-score at daily activities

We need to improve peripheral muscle function and metabolism.

based on the individual situation and abilities

Because the functional recovery of a critically ill patient can take months, there is still no consistent evidence on the contribution of rehabilitation in the first six weeks; and being an infectious disease with risk of reinfection, a home rehabilitation plan should be first for a subsequent evaluation and admission to pulmonary rehabilitation

<https://pubmed.ncbi.nlm.nih.gov/28463657>

<https://pubmed.ncbi.nlm.nih.gov/24413580/>.

However, these patients could scale in the execution of activities of daily living in their first days after hospitalization, with general recommendations and supervision.

This will depend on the functional status at time of discharge, degree of ability to perform ADLs independently or with assistance in the home, and on whether there are ongoing problems with oxygenation, and/or any limiting cardiocirculatory and/or neurologic factors. Also, beyond deconditioning, we do not yet know what the muscle manifestations of COVID-19 are. Many patients experience muscle pain as a manifestation of their infection. We do not yet know whether activity (and what level of it) may be beneficial for recovery, versus potentially leading to some longer term harm (this also is relevant to conditional recommendation for hospital-based rehab in question 1).

Patients should be encouraged to do light activities.

It should be encouraged only if the patient has had a previous evaluation. That includes, use of medications, use of oxygen, comorbidities, functional limitations and aerobic capacity.

only low intensity

A caveat might be guidance on SaO₂ monitoring as well as HR initially

Individually adjusted at a moderate intensity assessed by a symptom scale. Close monitoring will be needed to assure that worsened respiratory symptoms are detected.

Probably some safety limits should be included like "regular physical activities with respect to the individuals limitation" or similar

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should patients with COVID-19 be encouraged to do low/moderate intensity physical exercise at home (rather than high intensity physical exercise) in the first 6-8 weeks after hospital discharge, if a formal exercise assessment with measures of exertional desaturation has not been conducted?

Comments

Patients recovery from covid-19 show marked heterogeneity in the exercise capacity and pulmonary impairments. This precludes a one-size fits all advice with respect to exercise intensity.

Similar to Q2 - there is too much concern about complications from exertional hypoxaemia which are rare. The individuals underlying complications from COVID19 need to be understood i.e cardiomyopathy, pulmonary emboli where caution would be advised. I expect cardiac instability is the greater cause for caution.

It maybe that high intensity exercise is not achievable due to post-COVID muscle fatigue etc, but I wouldn't make the caution about high intensity to be around hypoxaemia.

For clarity, agree with recommendation about low/moderate exercise during recovery until safety assessment (it is the issue about exertional desaturation driving my recommendation 'against')

only if too frail or old to sweat effiently

The risk of deterioration is greater without low to moderate exercise than it is to do the exercise without formal assessment. Symptom-limited recommended.

Should Be Seen at least by GP in advance

Again - vague question. Need to define intensity. We are finding very high perceived exertion levels (one measure of intensity) at low MET levels with some patients (another measure of intensity).

More evidence for benefit versus not

We might be placing an unnecessarily high value on formal assessments especially at this point. If the initial goals are improvements in peripheral muscle function as well as general mobilization I would be comfortable proceeding with exercising to symptom limitation-provided the therapist had experience in PR. However, there is no reason not to provide the patient with a simple finger pulse oximeter to know baseline and exercise saturation profiles. This might be more important post COVID because of the oxygenation profile.

Considering the virus dissemination and the social restriction, I believe that they have to wait more than a month after hospital discharge to start exercise at home.

All patients need guidance about the intensity, frequency, and type of exercise to do at home following discharge from the hospital after a major pulmonary insult. Without professional guidance and parameters, patients are often afraid to proceed with activity; consequently, weakness, sedentarism, and a risk of hospital readmission may occur.

Needs of suggestion for training progression

This depends on the status of the patient. Even after hospital discharge the severity and impairment vary largely among COVID-19 patients. Some have been in the intensive-care unit for weeks and are highly impaired while some are in relative good status. For the latter, low/moderate-intensity physical exercise could be done without measures of exceptional desaturation. However, in more severe patients information on desaturation during exercise is more important.

It's difficult to recommend either or, the intensity needs to be individualized.

I agree only if the therapist is sufficiently safe from infection. If possible, we should consider the introduction of remote pulmonary rehabilitation.

Using Borg's CR-10 or Borg's RPE

Formal exercise assessment should be done even if from remote

Only if the daily activities are going well. If not, do not give the recommendation.

Depending on age, severity of COVID-19, and past medical history.

The patient need a continuous process.

The sequelae of the disease are not yet well documented, the compromise of the cardiovascular and pulmonary systems are a challenge for professionals who prescribe exercise, It is necessary to identify oxygenation at rest and in effort in order to establish goals or risks

to subjective tolerance and monitoring when equipment is available.

would not recommend formalized physical exercise routine without an exercise and safety assessment with assessment of O2 saturation

Very essential in order to determine exercise tolerance during rehabilitation.

I don't think it would be prudent to prescribe any exercise w/o assessing oxygen requirements

I have not enough knowledge to say if 6-8 week is a correct time frame.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should patients with COVID-19 have a formal assessment of physical and emotional functioning at 6-8 weeks following discharge, to identify unmet rehabilitation needs?

Comments

What we have learned in our hospital is the spectacular range in clinical functioning of patients in the recovery phase. Some patients although hospitalized but without (very) severe oxygen transport deficiency during the acute phase show marked functional limitations in the recovery. The opposite may be true as well. These insights hold a strong plea to assess health status some time after the acute phase to enable customized rehabilitation care

Besides screening for physical and emotional/psychological impairments in functioning, in patients who have been admitted to an Intensive Care Unit Cognitive functions should also be assessed.

Depends upon the severity of the illness and the premorbid condition of the patient e.g. if elderly and already have significant mobility limitations there will be little likely gain from formal evaluation of physical function

This would seem a sensible time frame to balance natural recovery but not leaving things too long before intervention to intervene where needed. However, by formal assessment I would advice standardised phonecall first to understand ongoing symptoms, mental health issues, lifestyle issues etc as a triage and then 'formal' assessment for those where a deficit in physical or emotional functioning is detected.

This is a composite question. The first part is about need for formal assessment and the second is about timing. This may complicate interpretation of responses to this survey. Some may agree with formal assessment, but not agree with the proposed timing.

The impact of COVID-19 on patients with chronic respiratory diseases could be detrimental especially coping aftermath (admitted to the hospital). We know from the published literature COPD patients experience high level of anxiety and depressive symptoms during hospital admission. Thus, it is important to assess their psychological, emotional, cognitive, and psychosocial needs in their daily activities. This is particularly important for COVID-19 patients.

Assess other aspects that may have been missed early (emotional , cognitive , fatigue , myalgia etc)

Definitely. Based on earlier post ICU studies (Recover Program NEJM) we can expect both to be affected. We tend towards the easier for us -namely physical dysfunction but should be equally available for the emotional needs.

After a this time, I believe that we need to assess functional capacity and determine the exercise intensity for supervised or non supervision rehab.

At this point, patients who have had guidance to initiate low to moderate level activity during the first 6 weeks following hospitalization, are usually ready to increase the intensity of a supervised exercise program. This program should include education, assessment of psychosocial status, and monitored strengthening, flexibility, and aerobic exercise.

I think it should be better also a quick evaluation at hospital discharge (before the 6-8 weeks) in order to address patients to right setting (home or rehabilitative enviroment)

It is highly important to have a thorough assessment in order to individualize rehabilitation needs

This does not routinely occur for post-ICU cohorts but may be an important part of post-ICU care - but again I'm not sure COVID19 patients ought to be treated differently from other ICU survivors because there is a risk of losing all the valuable research that has occurred in this setting. Based on this prior literature (e.g. Post-Intensive Care Syndrome), there may also be other important domains for assessment at 6-8wks e.g. cognitive function, return to work etc.

We need to identify at discharge the patients Who need this assesment at 6-8 weeks

Recommend 6-8 week (telephone/video) review to screen / triage, then more structured physical, functional and psychological review at 12 weeks.

Only an assessment if they say that they still have physical of emotional problems. Or if the physiotherapist of doctor thinks it is necessary.

The evidence for other like-conditions indicates long term physical and emotional issues as a result of the illness - this could be improved for COVID-19 if these assessments took place.

We need to have measure to evaluate the effectiveness of the COVID-19 rehabilitation and it is important for the longitudinal follow-up, also.

The recommendation will depend on the conditions of the pandemic in each country, and the mobility and safety restrictions for patients; During the first few weeks there could be a risk of complications if the patient had a prolonged ICU stay (as shown with COVID patients). If the conditions are met patients with clinical or imaging evidence of sequelae should be prioritized <https://pubmed.ncbi.nlm.nih.gov/32227758/>.

Telephone strategies should be taken into account for those that still showing deficits, functional limitation and or tolerance

Given the existing literature and evidence base regarding prolonged manifestations of critical illness, I think survivors of COVID 19, particularly those who have had illness severe enough to receive care in the ICU (with or without mechanical ventilation), are likely to have some quite prolonged changes in physical, emotional and/or cognitive function; it will be important to routinely assess this to guide optimal strategies for rehabilitation.

There may be some restrictions related to activity level at this stage. If there is a possibility for close contact use of personal protective equipment may be required. Assessments requiring light efforts may be performed.

Absolutely necessary.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should follow up of a hospitalised patient with COVID-19 include the core outcomes set (e.g., EQ-5D, Hospital Anxiety and Depression Scale, Impact of Events Scale-Revised, PMID: 28699762) for survivors of acute respiratory failure at 6-8 weeks following hospital discharge?

Comments

I'm not an expert, but my feeling is that a more generic instrument on physical functioning for example SF-36 together with the EQ-5D could give a more comprehensive picture of the consequences.

Instead of the IES-R, the PC-PTSD-5 , a brief screening questionnaire should be used to evaluate symptoms of PTSS

6-8 weeks may be too soon for IESr as PTSD often does not show early so it can be done at this time point but should also be done at 12 months. HADS is important and I would echo thoughts for EQ-5D as above - repeat at 6 and 12 months Public healthy questionnaire 9 is recommended by mental health professionals to replace HADS

EQ-5D - yes

Need an assessment of exertional breathlessness - MRC dyspnoea scale as a minimum

I don't have experience with the impact of events scale

(aware of COMET)

mood disorder and ptsd is common (occurs up to 1/3) in patient in critical cre

This comment is from Dale Needham who is first author of the paper mentioned below.

I think we need to separate out the recommendation for type of outcome assessment and the timing. For instance, some people may agree with the measurement instrument, but not with the proposed timing. This question is worded as a composite recommendation which generally should be avoided in these types of consensus/survey questions.

Moreover, i think you are trying to cite the Core Outcome Measurement Set paper in AJRCCM, but i tihnk that the PMID, above, is not correct. Don't you mean: PMID: 28537429 American Journal of Respiratory and Critical Care Medicine, 31 Oct 2017, 196(9):1122-1130

DOI: 10.1164/rccm.201702-0372OC PMID: 28537429 PMCID: PMC5694837
<https://www.atsjournals.org/doi/10.1164/rccm.201702-0372OC>

I agree with the suggestion to use outcome measures proposed to use in the follow-up patients at 6-8 weeks. I also wonder to include a scale that include 'fear' and 'stress' for patients with respiratory diseases. These are big problems often overlooked by healthcare professionals. I know the Depression Anxiety Stress Scale (DASS-21) measure has been used in patients with respiratory disease e.g. COPD. This might be a potential scale to include in the recommendation. Administering these outcome measures will help to identify the patients' need in order to direct, plan and devise appropriate interventions and resources to the patients and their caregivers especially for older people

Outcomes are important. The exact choice of which represent "core" will vary and should be allowed to do so, with local modification of test selection based on experience and data collection..

For sure!

This was rigorously conducted research so yes, important to use this research and avoid research waste!

Again is the assesment at discharge that drives the following steps

Yes recommend bit at 12 weeks.

Yes EQ-5D and measures for anxiety, depression and post traumatic stress, in UK often use GAD-7 and PHQ-9. Recommend PTSS-14 or IES-R (or equivalent). Also need cognitive screen if relevant e.g. MoCA.

More suggestions:

- RAND-36 (Orwelius 2018).
- International Physical Activity Questionnaire-Short Form (IPAQ). (Ekelund et al., 2006)
- Cognitive function, The Montreal Cognitive Assessment MOCA eller The Rowland Universal Dementia Assessment Scale RUDAS) (Nasreddine et al 2005). ICU memory Tool (Jones et al 2000).
- Fatigue (Mental Fatigue Scale, MFS) (Johansson et al 2010)
- Clinical Frailty Score (CFS) (Dalhousie University)
- Patient Health Questionnaire-9 (PHQ-9). S Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med*, 16(9), 606-613..
- Generalised Anxiety Disorder 7-item scale (GAD-7). (Spitzer, 2006).
- The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *J Trauma Stress*, 28(6), 489-498. doi:10.1002/jts.22059
- The Short Health Anxiety Inventory (SHAI). S (Salkovskis, Rimes, Warwick & Clark, 2002).

The follow up can be done by the hospital or by the other medical care providers. Not every patient with COVID-19 was hospitalised.

It is very useful.

it would be necessary to consider the execution of self-directed questionnaires

also need objective physical measures as well to fully understand recovery

This is a likely useful starting point to assess patients who have survived acute respiratory failure. Additional, novel outcomes may also be important to add given the spectrum of manifestations of COVID-19 and the potential for unique challenges related to rehabilitation for and recovery from it.

Absolutely necessary

I believe this should also be done further out to 3/6/12 mo

If those measurements are of relevance for this Group of patients.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should follow up of a hospitalised patient with COVID-19 include measures of respiratory function at 6-8 weeks following hospital discharge?

Comments

The first reports of long-term consequences from Italy and China of COVID-19 have learned that in many patients there is a lasting impact on the respiratory tract.

Probably too soon to understand long term sequelae.

Currently no definite support that 100% safe to do - seek virology advice

to exclude permanent affects on lung elasticity unless there is radiological/lung function evidence of same

Not sure what 'respiratory function' consists of or what those assessments would be. Having said this, missing any negative respiratory findings are likely to lead to decline or rehospitalization.

There is not enough information for me to respond to this question. "Measures of respiratory function" seems a bit too vague - do we mean spirometry or do we mean a patient survey or either?

We know that lung function does not change significantly in those who are stable with optimal medical treatment especially those with COPD etc. In my view, if the patient has lingering respiratory symptoms it is important to repeat the lung function test to determine the severity of the disease where appropriate.

Suggest defining "respiratory function" before I could better answer.

yes assuming COVID negative tested.

We don't know yet about how many days the virus stays at respiratory systems, so, I am not sure about to assess the lung function in these patients.

This would be a good time to assess the residual lung damage that occurred as a result of COVID as well as monitor the recovery process.

Not sure about infective risk (dedicated filter? sanification of device?)

Yes, to get an indication of the natural recovery in respiratory function

I agree only if the therapist is sufficiently safe from infection.

Including KCO and 6 MWT

Spirometry and maximal inspiratory and expiratory pressure

Not for every patient. Only if there are still problems and you suggest that the problem is based on respiratory dysfunction.

It is very important because of the impairment of the lung parenchyma and chest wall.

The performance of pulmonary function tests should be subject to the urgent need to make therapeutic decisions, especially in countries where there is a considerable increase in cases.

<https://www.thoracic.org/professionals/clinical-resources/disease-related-resources/pulmonary-function-laboratories.php>

However it should be necessary to do a PCR assessment with a negative result.

Yes this is desirable provided that:

1. it is felt to be safe for the patient (ie no contraindications to performing testing)
2. pulmonary function testing can be performed with adequate protection for staff--we do not really know anything about when it is safe to reopen pulmonary function laboratories and whether there could be any delayed transmission of covid from performing testing on COVID survivors (ie ? any potential for transmission of lingering COVID)

There may be risk of equipment contamination.

absolutely necessary, biosafety protocols must be taken into account to avoid cross contamination.

it is unclear if equipment will be available at this time to perform a full assessment of respiratory function

I think this is too soon

If it can be conducted safely.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should follow up of a hospitalised patient with COVID-19 include measures of exercise capacity at 6-8 weeks following hospital discharge?

Comments

Exercise capacity should not be assessed in all patients that were hospitalized; only on indication .

As per prior question not for elderly patients who have pre-morbid limitations
Baseline ECG

Need to ensure team are aware of any risk of cardiomyopathy/pe's from the admission or where there's ongoing breathlessness where full medical review hasn't yet been undertaken. This is unlike most other rehabilitation situations where the medical sided of things are optimised first.

Ongoing investigations for cardiac, renal, respiratory impairment likely to occur 3 months or beyond to give time for triage of those naturally recovered vs. on going symptoms/radiological findings.
allows assessment of diablity

The answer to this question may vary, considerably, based on the severity of illness for the patient. The work place of the respondent may lead to assumptions about this, since the severity was not specified. For instance, those working in an intensive care unit, may presume that we mean patients from an ICU. We have had more than 1200 COVID-19 patients at my hospital, alone, and some may only stay for a couple of days, on the regular medical floor, and then be discharged to home. My response will highly vary based on the severity of the patient illness as was specified in question 6.

Agree, it is very important to do so.

After ruling out cardiac problems

Depends on definition of exercise capacity. A measure of exercise is valuable at this time but formal incremental laboratory based exercise may not be essential.

For sure, to determine exercise intensity and to follow up functional capacity.

A simple exercise test, such as a 6 minute walk test, would guide continued activity recommendations.

Not sure about the time of first evaluation (why not before ?)

Choice of strategy to assess exercise capacity needs to be individualized

6-min walk test and 30 sek chair stands test, handgrip strength (JAMAR) and SPPB

Yes.

Maximal exercise capacity and physical activity are very important.

Functional exercise capacity

The carrying out of exercise capacity tests should be subject to the state of the countries; however, in optimal conditions of safety for patients and professionals, it is necessary to have evaluations of exercise capacity in patients with clinical or imaging evidence of sequelae

However it should be necessary to do a PCR assessment with a negative result.

Yes, but the measures used will depend on the functional status of patient. For many this may mean simple things such as sit to stand testing, 6 min walk (as able), dowel lifting. Many patients may not be ready for incremental exercise testing such as incremental shuttle or CPET

I am not sure about six minute walk test or similar test, or less demanding tests.

Highly recommended

it is unclear if equipment will be available at this time to perform a full assessment of exercise capacity

This might be a bit early but this assessment is crucial

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should COVID-19 survivors with a need for rehabilitative interventions at 6-8 weeks following hospital discharge (e.g., multiple treatable traits) receive a comprehensive rehabilitation program, compared to no rehabilitation program?

Comments

In my opinion, should all patients reporting dysfunction 6-8 weeks after discharge receive an assessment enabling to provide individualised rehabilitation. The first clinical experiences show a marked diversity in needs. Individually tailored based on need -agree. Not all survivors will need a comprehensive programme.

Stratify by severity of acute illness - all ICU, all higher respiratory support ... triage everyone else?

duty of care as well as strongly supported by international guidelines

Depends on community prevalence of COVID.

It seems logical- evidence is pending

Research has supported Pulmonary Rehabilitation as an affective intervention for lung disease.

Our experience is that Covid-19 patients who are very heterogeneous having both psychological and physiological needs.

I think it's depend on the patient's conditions(like age, comorbidities, severity etc).

I agree only if the therapist is sufficiently safe from infection. If possible, we should consider the introduction of remote pulmonary rehabilitation.

Similarly to other patients

Recommend follow up in dedicated critical care clinic with integrated respiratory review and multi disciplinary input with referral to further specialist services as required e.g. community physio, neuro rehab, pulmonary rehab etc.

If there is a need for a rehabilitation programme, because the patient physical and/or emotional and/or cognitive problems. It is better to treat the patient in rehabilitation programme with different medicale care providers.

In compliance with safety requirements and inclusion criteria, patients should receive pulmonary rehabilitation.

Sure, however it is important take into account the different situation in each country regarding the lockdown and the availability of services such as tele-rehabilitation or similar.

Individualization of rehabilitation intervention will be as important as ever, and additional safeguards may prove to be needed, above those delivered typically in post-hospitalization rehabilitation, eg depending on what effects the virus has had on the patients' heart, lungs, muscles etc

Intensity may need revision for the active components.

Perform as long as the no treatment group with pulmonary rehabilitation can then benefit from the intervention.

again, it is unclear if rehabilitation program will be available at this time to perform a full , and save conventional program, but strategies must be put in place to cover the needs

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should COVID-19 survivors with pre-existing/ongoing lung function impairment at 6-8 weeks following hospital discharge receive a comprehensive pulmonary rehabilitation program consistent with established international standards, compared to no pulmonary rehabilitation program?

Comments

Depending on patient preferences and needs established international standards are for a totally different disease

symptoms / mental health/ lifestyle should drive the assessment not spirometry

even to assess lung function transfer factor likely to be a better assessment of respiratory impairment as the infiltrates are alveolar based not a large airways disease (there may be small airways disease of course but spiro may miss those too).

Would depend on the extent of any pulmonary findings or limitations.

Depends on community prevalence.

Pulmonary Rehabilitation, including supervised and monitored strengthening/flexibility/and endurance exercise and education is an affective treatment for lung impairment. PR is recognized by the American Thoracic Society, European Respiratory Society, and in the USA Medicare national health care system as a recommended intervention for lung impairments.

A rehab program for this group need to be individualized.

I agree only if the therapist is sufficiently safe from infection.

Yes, after lung function measurements.

We need it because of functional impairments.

Patients should return to their pulmonary rehabilitation activities, as the exercise prescription and activities needed by these patients must be organized by a comprehensive rehabilitation program.

yes, but with same caveats as noted for question 9

The patients may be more fragile than a typical acute exacerbation. The intensity of the active components and outcomes may need revision

Perform as long as the no treatment group with pulmonary rehabilitation can then benefit from the intervention.

I think that some patients could not be able to do a pulmonary rehabilitation program following the international guidelines.

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should COVID-19 survivors with loss of lower limb muscle mass and/or function at 6-8 weeks following hospital discharge receive a muscle strengthening program, rather than no strengthening program?

Comments

On indication and depending on pts needs and preferences

It would be good to offer respondents, the option of No Response- this is a "norm" for consensus process given that some respondents may feel that they don't have adequate expertise to respond to a question or they may not understand the question wording.

Depends on community prevalence.

This needs to be supported with the available literature especially to the major muscle groups. A significant older COPD patients experience falls and it is important to focus on exercises that improve muscle strength and balance in patients with COVID-19.

The muscle strength assessment has to be performed before start the program.

Over the past 9 decades, physical Therapy has been shown to assist with the rehabilitation and recovery of weak muscles, ambulatory impairments, independent self-care, and resumption of physical function in patients with cardiopulmonary, neuromuscular, and musculoskeletal impairments.

I agree only if the therapist is sufficiently safe from infection. If possible, we should consider the introduction of remote pulmonary rehabilitation.

No recovery without strengthening program.

We need to focus on muscle strength.

It has been documented that patients with prolonged stays in the ICU have musculoskeletal sequelae, especially in the lower limbs.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6525229/>.

Assessments should be conducted after an adaptation period
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4234392/>

Optimal intensity and duration to be determined--again need to ensure we are not causing any further harm to muscles

Light workloads may be required to use. Monitorization of perceived effort, level of dyspnea and cough may be advised. Absolutely necessary.

Maybe it should be differentiated if COVID-19 survivors perceive also Limitations in their activities of daily living (this might be more important than "just" measuring muscle strength)

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should COVID-19 survivors with loss of lower-limb muscle mass at 6-8 weeks following hospital discharge receive nutritional support rather than no nutritional support?

Comments

Rebuilding muscle mass requires a training stimulus and the right nutrients

I would recommend to screen all pts that were hospitalized on nutritional status. We use the Snaq in the Netherlands. In our experience, around 80% of pts that were admitted to an ICU are malnourished after hospital discharge.

Refer tot dietician on indication.
Others are more expert in this area to advise.

Practical advice regarding protein intake and healthy eating would seem reasonable - thought there was only limited evidence for any specific nutritional supplementation in other 'chronic diseases'? Don't think we understand the deficit enough yet to be more

Obesity is the major issues we've seen in inpatients (might be another question coming up).

Definitely focusing on lifestyle factors smoking cessation, physical activity, sleep would seem sensible
dietitian review required

This question is a bit too vague for me to respond.

I agree to have appropriate guidance and evaluation about their nutritional need from a dietician, especially those who are undernourished.

De Bendette describes advantages with Q10 and creatine in COPD

"Nutritional support" should be defined. Do you mean "should receive consultation of a medical-based registered/licensed dietician"? If so, my answer is conditional rec "for"

Depends on their nutritional status. Nutritional support-in the form of a clinical assessment could be useful but supporting all patients as a routine might be a lot less so.

Specially for the patients who had sepsis during ICU stay.

Other assessments need to be done to assess if nutritional support are required. Cant be based only on the loss of lower-limb muscle mass.

I agree only if the therapist is sufficiently safe from infection. If possible, we should consider the introduction of remote nutritional advice.

No data available

It is always good the check de nutrional intake. If you analyse that the proteins are to low, it is a recommendation for nutritional support. Otherwise you can give the patient strength training, but the effect is to small. Look at the guidelines of sarcopenia.

Nutrition is very important in this field.

Patients with COVID, who have malnutrition are more at risk of complications

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7138149/>; and as it is well known that patients with chronic lung disease must have a well-applied nutritional regimen, COVID survivors must have an energy substrate to carry out activities involving metabolic increase

would provide nutritional support to those with loss of muscle mass and other features to suggest nutritional depletion such as low serum albumin level, and as complementary intervention to other aspects of rehabilitation

There is not much evidence in other types of pathologies

I think this may be a bit less well established in most centers and guidance would be needed from expert sources

COVID-19: Interim Guidance on Rehabilitative Interventions in the Post-Hospital Phase Pending Empirical Evidence

Should COVID-19 survivors with symptoms of psychological distress (using questionnaires) at 6-8 weeks after discharge from the hospital receive a formal psychological assessment?

Comments

Some degree of psychological distress after going through a serious illness seems normal to me. I do not feel like an expert to indicate when it would require specific intervention

Symptoms of anxiety, depression and PTSD are considered to be normal in persons after a major life event. Screening and monitoring of the course of symptoms is important. Treatment is indicated when symptoms continue to exist after 10-12 wks. Follow existing guidance for mental health

Expect this will be very prevalent in COVID19 for a variety of reasons

This is paramount, given the mounting evidence for PTSD/PTSS following critical care stays.

This recommendation needs to be qualified as follows: 1) The first thing is to administer a screening tool such as the HAD scale or PHQ-9 etc. 2) Those who showed high level of anxiety or depressive symptoms needs to be referred to psychologist or psychiatrist for further assessment. 3) If there are no resources or expertise available, it is important to monitor the patients psychological status, periodically by the therapist or healthcare professionals .

We saw a lot of patients with psychological problems after Covid-

Perfusion defects (NEJM) in frontal and temporal Brain parts could Be an explanation

Depends on who is assessing and at what level of sophistication. The issue is that any assessment should preseed management and the necessary skills should be accessible.

For sure!

This is outside of my competence whether a formal psychological assessment is required if COVID-19 survivors have symptoms of psychological distress. For me, it depends on the degree of symptoms.

Yes - if able to resource

I think that psychological assessment for the family of the infected patient is also necessary.

Recommend this at 12 weeks. Steep recovery over first 6 months, aim to support recovery and self management with good information to help patients and families understand the normal constellation of acquired problems associated with severe / critical illness and impact on family.

You see in the clinical setting that a lot of COVID-19 patients have symptoms of anxiety, depression and stress.

Psychological support is very important in this severe disease.

Interventions are necessary, especially in this crisis that is completely new and devastating for many

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7153528/>

Ideally yes, but patient preference will need to play a role, as not all people with symptoms of psychological distress may wish a formal assessment

Absolutely necessary