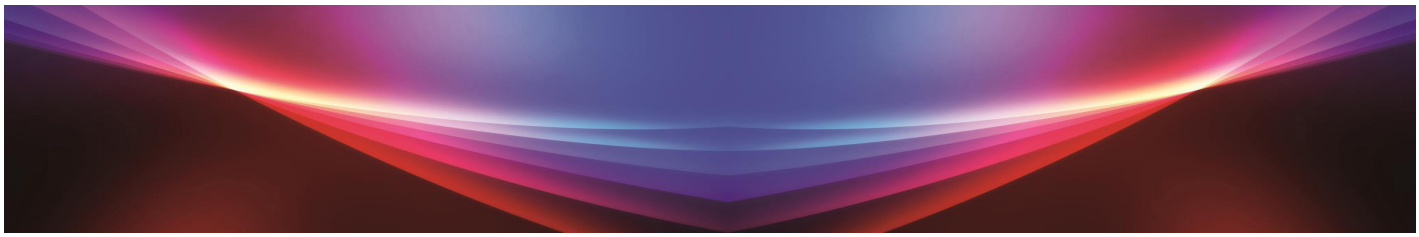

APPENDIX

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An Italian consensus on pulmonary rehabilitation in COVID-19 patients recovering from acute respiratory failure: results of a Delphi process

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Comments, justifications and highlights about each recommendation of authors and panelists.

Table 1. Suggestions for personal protection needs.

Suggestions	**Author's comments**	**Panelists' comments {*rating*}**
1.1 Healthcare professionals treating COVID-19 patients should wear appropriate personal protective equipment (PPE) and they should be trained in how to put on and take off PPE to avoid self-contamination	The actual standards according to the ISS of the Italian Minister of Health, the CDC are to wear the following Personal Protection needs: (respirator N95 or FFP2/FFP3 or equivalent standard, long-sleeved water-resistant gown, two pairs of gloves, eye protection (goggles or a face shield) (1-4)	The PPE should be modified for possibly or probably negative patients {6} After 2 months working in COVID-19 patients I have been negative in test, so I hope this good result is due to be well protected during my task even though I used FFP" for 1 week {9} I would suggest using googles AND face shield when aerosol generating procedures (AGPs) are used in hospital setting {9}
1.2 During the first 3 months after infection, also if patient has negative nasal/throat swabs, use eye and respiratory protections, gloves and if possible disposable gown when aerosol generating procedures (AGPs) are used.	This is necessary due to the high number of asymptomatic infected subjects	A variable could be linked to the time of finding the negativity (late) with respect to the date of onset of the disease {6} It is prudent to adopt a protective protocol; 3 months seems a long time, probably adequate {8} Nowadays in my department we are taking this care. In Pulmonary

		Function Lab, all professionals are using protection in any case {8} If the patient is truly asymptomatic with negative swab, PPE with mask/ face shield is likely satisfactory {7} Nasal/throat swabs are not sure method to evaluate negative patients, because they are operator dependent and more patients are infective for more than 60 days {7} I fully agree because, unfortunately, with the nasal/throat swabs we can have many false negatives (by the recent international reports even up to 40-45% of the cases) {9} I think that healthcare personnel have to wear this PPE also because of the impossibility to know if a patient has still a negative swab without other analysis {9} A post COVID-19 survivor with two negative swabs should not require

		full protection. A surgical mask is sufficient {3}
1.3 All patients should wear a medical mask, when possible, during treatment	This is necessary due to the high number of asymptomatic infected subjects	If treatment means medical visit then the mask does not need to be medical grade and can be a patient's own cloth mask (reduce expenditure of medical supplies) and should be accompanied by initial screening prior to visit/treatment. If treatment is a truly a procedure involved then additional safeguards such as COVID-19 testing 24-48 h prior and quarantine prior to treatment might be considered {9} This is valid for every people, not only patients, so it's even more valid in a healthcare ambient or situation {9}
1.4 Strategies to minimize dispersion of infected droplets and aerosol should be employed, during AGPs.	- For oxygen delivery and respiratory support, choose interfaces that allow less aerosol and droplets spread. - For oxygen therapy it is recommended the use face-mask. When using nasal cannula as in conventional oxygen therapy or HFNC (High flow nasal-cannula oxygen), the nasal cannula must be well-	Antimicrobial and antiviral filter for inhaler spacer use, too {9} I also suggest and if it's possible, to treat these patients in setting with more than 12 air changes per hour and with negative pressure via microfiltration of the extracted air. {9}

	positioned inside the nostrils and a surgical mask should be added over the nasal cannulas, covering patient mouth and nose. - For CPAP/NIV therapy, safest interfaces are helmet or non-vented face mask. It is preferable to combine it with a double circuit with an expiratory valve. Whenever it is necessary to combine a face mask with a single circuit, we suggest to use a circuit equipped with an integrated expiratory valve and not to use vented masks. In addition, an antimicrobial and antiviral filter should always be installed. - For inhaled therapy it is recommended choose dry powder inhalers instead of jet nebulizers. - For endotracheal suction, use close circuit - Surgical mask and antimicrobial and antiviral filter should be changed regularly (surgical mask changed at least every 6 to 8 h while filters at last every 12 h) (5,6)	For inhaled therapy I would recommend even MDI nebulizers, above all for patients that cannot use in the right way DPIs {8}

1.5 For outpatient consultation, the examination room should be aerated after each consultation and surfaces have to be sanitized. In waiting room ensure spatial distance between patients.	We suggest to use sodium hypochlorite 0.1 or 0.5%, ethanol 70% or hydrogen peroxide 0.5% (7)	To sanitize all surfaces in a room it will take a lot of time and the need for additional personnel to do it {9} That's what we are doing right now in our waiting room and the protocol we are using in the lab {9} Only surfaces involved. An untouched surface can be left alone {7} I agree with cleaning surfaces between patients; however, I am not clear what is meant by aerated- if it is a negative pressure room, this will take one hour depending on air exchange. If it is not a negative pressure room, it will take at least 2 hours- this time is not feasible for regular clinic/office visits and is likely not necessary if both patient and provider are masked and the patient is asymptomatic {6} Aeration of the room is very important {9} I think these are two separate decisions. I would strongly support

		spacing but not as strongly the idea of re-sanitization unless there is reason to suspect asymptomatic droplet spread {7}

Table 2. Which phenotype and candidate after acute event.

Suggestions	**Author's comments**	**Panelists' comments {rating}**
2.1 Days of contagious risk, need of PR, timing to start PR and predictors of recovery are unknown	For how much time patients are contagious, which proportion of post COVID-19 patients need rehabilitation and the predictors of recovery from disease are unknown. Two types of COVID-19 patients could benefit of rehabilitation programs: i) patient with nasal/throat swabs still positive for SARS-CoV-2 or patient negative but with symptoms or imaging suggestive for lung involvement where presence of virus in deep lung cannot be excluded; ii) patient surely negative. At the same time four possible patient phenotypes are expected: i) Healthy, young with fast recovery; ii) young/mid age, healthy or 1 comorbidity, with slow recovery, desaturation under effort; iii) middle age/elderly with 2 or more serious comorbidity, with slow recovery, residual disability, acute event risks, hypoxia at rest; iv) elderly with 4 or more comorbidity, with critical conditions, bedridden,	PR should be used as a dynamic and all-inclusive tool, based on an accurate evaluation, in order to promote faster recovery, limit sequalae, improve QoL. Paying attention to safety above all in acute settings, PR provides for several types of interventions (*e.g*. patient assessment, motivational interview, giving recommendations, physical rehabilitation programs, *etc*.) that can be beneficial for a large and varied group of patients. We still don't have enough data suggesting when to start and on which kind of phenotypes use PR precisely in COVID-19, but the experience on different respiratory diseases (*e.g*. IPF, COPD, CF) should be an encouraging base {6} We need also to set up a feedback designed to unveil disability after COVID-19 infection in order to select the right population in need of PR.

	unstable hypoxia, high O_2 flow need, low indication to rehab, high probability for exitus (8-10).	Likely this population will be very large (*i.e*. the majority of patients) after discharge from hospital, but we do not know the time-lapse of recovery {9} Post critic patients were involved in my daily task, and I recommend rehab in all patients as we should do in all respiratory OR cardiac patients, so with safety measures all are patients should be involved in PR programs, from critical to more stable patients {8} I agree that days of contagious risk and predictors of recovery are unknown, however, even at this early time in our understanding of COVID-19 infection and sequelae, it is highly likely that all post-infectious patients will need some degree of rehabilitative services and that early (when safe) initiation of rehabilitation will provide the highest likelihood of positive outcomes (this is been shown for non-COVID-19 critical illness) so I would not agree with

		keeping "need" or "timing" in this statement is such a declarative way {7} There are no data about PR in SARS-CoV-2 disease, but there are some experiences with SARS and MERS diseases. In these diseases 20-30% of patient have persistent lung injuries, and some degree of pulmonary disfunction. They are the candidates to pulmonary rehabilitation programs {7} In my opinion, also in this case, it's confirmed the general rule that early rehabilitation is always the best choice, if the patient can also join a low-intensity workload protocol. Who can in fact exclude a priori that early rehabilitation can also have positive effects on the main rehabilitation outcomes in these cases? {8} I think that, unfortunately, it may exist another type of patient that can present the same phenotype of the a and b example. Mostly at home,

		there are many patients that can present those characteristics, but they've never done a swab so their condition respect to diagnosis is unknown {8}
2.2 PR programs should be proposed to dyspneic, older, comorbid patients with long length of stay, ICU history, needing weaning from MV or tracheostomy cannula, reduced strength and exercise capacity, requiring oxygen at rest and during effort with lung function and psychological impairment.	The following symptoms and measures are conditions had to be monitored during the PR program: dyspnea, fatigue, oxygen saturation, respiratory rate, heart rate, speech ability, ADL, anxiety, depression, risk for acute complications and sudden death (10,11-17).	PR is a very adaptable tool, widely based on patient global assessment. On the other hand, in my personal experience COVID-19 showed as a particular condition affecting many patients in several ways. I agree with the traits described here and I believe that PR should be used even in less symptomatic patients with brief hospitalizations or pauci-symptomatic patients with positive nasal swabs requiring isolation at home to reduce the physical and psychological impact of the disease. Total agree with symptoms and measures {8} Surprisingly, these patients were very impaired in terms of muscle atrophy, in both legs and arms. Due to vascular problems skin injuries are present in these patients and this fact difficult the rehabilitation in

		these patients due to the pain their suffer {9} I would not group post ICU survivors with MV patients or tracheostomy patients. I think these are different groups and the second group is far more dangerous for staff because of aerosol generation {7} Frailty should be added to this statement I also hope that this statement is not misinterpreted to mean that PR should ONLY be proposed to this group of patients as there is likely even more importance on rehabilitation for the younger patients with critical COVID-19 illness {9} Several young patients just in oxygen therapy have reduced strength, balance problems and exercise capacity. Often subjects with COVID-19 don't feel dyspnea, but a maximal muscle effort {9}

		Recovery of the diaphragm functionality by ultrasound assessment before, during and at the end of PR program {9} I think that these patients represent the classic Pulmonary Rehabilitation candidates, so if the Pulmonary Rehabilitation Centers can afford to receive and manage them and Clinicians think that they can improve their conditions, they have to be involved in this type of programs {9}
2.3 Due to different conditions and patients' phenotypes, individualized programs should be proposed	In summary, PR programs should be proposed to: a) older than 60 years b) presence of more than 2 comorbidities c) long length of stay d) previous need of MV or tracheostomy e) Reduced strength f) Balance problems g) Reduced exercise capacity h) High required FiO2 during hospital stay i) Hypoxia at rest (SpO_2 <94%)	Phenotypes a) and b), alone, do not provide an indication for PR {6} Humbly, PR programs should be designed individually, because even patients younger than 60 years also presented high level of impairment and it IS MANDATORY to realize that all respiratory muscle test or function are nowadays very discouraged due to the aerosolization during the maneuvers, and we still must study if these devices are safe for use after these positive patients {8}

	j) Exercise induced desaturation k) Slow recovery in imaging l) VC <80% pred. m) Carbon monoxide diffusion capacity DLCO <60% pred. n) MIP/MEP <60% pred. o) Stability in cardiac problem (*e.g.*, arrhythmia, myocarditis) (10,14-16,19).	I strongly agree with the statement, however, I again have concerns with the comment supporting the recommendation as it sounds exclusionary. This patient population (>60 years) clearly has severe impairment due to COVID-19 illness on top of underlying age/comorbid factors, however, early evidence suggests similar significant pathophysiology in younger (<60 years) COVID-19 patients who will desperately need rehabilitation to return to work/child care, *etc.* {9} PR are always personalized {9} Often PR program should be important for young people without or with one comorbidity, too {9} I think that, if it's possible, PR programs should be offered to younger people too, even if they have 1 or no comorbidities. In many cases the clinical situation before the SARS-CoV-2 infection may be misunderstood so, only the clinical

		course due to COVID-19 can lead to the necessity and the decision to initiate a patient to a PR program {6}
2.4 The baseline assessment core set is not yet available	The following outcomes measures after rehabilitation programs could be welcomed: normalization of resting SaTO2, improvement in Barthel index, Barthel dyspnea, BORG dyspnea after ADL, BORG fatigue after ADL, SPPB test, 1 minute sit to stand or 6MWD, one breath counting test, MRC muscles scale, EuroQoL VAS or anxiety and depression scale (10,14-16,19-23).	You have forgot in your recommendation to mention VC and MIP/MEP/SNIP {9} Heart rate have been very important to check during physiotherapy in post critical patients in our ward. We should focus always in these patients to use tests not related to air mobilized in or out {9} Outcomes for patients with cognitive disorders should also be considered, little compliant and with reduced skills in the activities of daily life {9} Might also consider cognitive outcome measures as we are seeing central nervous system vascular complication with COVID-19 and long-term neurologic sequelae may arise {9}

		Same outcomes are predominant in disease: dyspnea measure, resting $SatO_2$ and during exercise {9}
2.5 In case of tracheostomy, standardized protocols for cannula removal, swallowing impairment, tracheal aspirations and decannulation are welcomed	In the presence of tracheostomy, standardized protocols for tracheostomy cannula removal should be applied as for evaluation of swallowing impairment. The number of tracheal aspirations over 24 hours should be considered reason for not-decannulation as assessment of protective reflexes, effective cough with reduction in and/or ability to self-manage secretions. Assessment of vocal cord mobility and tracheal patency by fibro-bronchoscopy should be indicated as assessment of absence of obstruction of the upper respiratory tract should be indicated (24).	Weaning from tracheal cannula should be a patient tailored intervention and, in the same time, a strongly measure-supported practice. Cough effectiveness and swallowing efficacy are key factors: MEP measure (25) could be supported by PEF, PCF, PEF/PCF, VC and FVC measures, with an eye at new weaning strategies involving NIV (25-27). As concerns number of tracheal aspirations: "this criterion was sensitive and specific. It is, however, too subjective because it is dependent on the healthcare professionals and caregivers who are responsible for the patient. In addition, there are now methods of mechanical and manual cough assist that are designed to remove secretions, so it seems that computing the number of tracheal-suctions is not an essential

		evaluation for decannulation decisions" (28) To conclude, a deeper review of literature would be recommended {8} Guidelines / protocols are welcome as long as this does not limit the customization of the weaning program remember that removing the cannula reduces the production of secretions, improves swallowing and that there are tools such as the cough assistant that can be used in a non-invasive way {9} Early decannulation of tracheostomized COVID-19 patients with the aim to reduce burden of virus spread in the hospital is to avoid {9} All these patients before to decannulation point, we tested: swallowing test, number of aspirations, ability to cough, secretions to the mouth event, the cannula, tolerance of 24 h with occluded cannula {9}

		Agree. This is a problem for COVID-19 but also for non COVID-19 patients {9} In my opinion, the following are also important: a) exclude in FBS the presence of tracheomalacia, trachea-esophageal fistulas, granulomas for decubitus tracheal cannula on the posterior wall obstructing the lumen itself; b) assess hemodynamic stability (BP), cardiac activity (HR / min) and the percentage of oxygen necessary to maintain arterial saturation (ABGC) during SBT above 90% after 2 h of use of the speech valve; c) MIP / MEP measured by a pressure gauge at the tracheal cannula greater than 30 and 40 cm HO respectively; d) at least 1 methylene blue test per day for 3 consecutive days or more, to exclude dysphagia after 15 min by suctioning or esophageal reflux by suctioning after 30 min {9}

		Yes, but we are assuming (not stated in the question) full PPE during procedures {9}

Table 3. Are frailty measurements important?

Suggestions	Author's comments	Panelists' comments {rating}
3.1 It is reasonable that patients with frailty are the most vulnerable to COVID-19	The definite epidemiology and natural history of frail patients affected by COVID-19 are not clear. There are no clear indications on the number and level of frailty of hospitalized patients for COVID-19 outbreak. The effect size of COVID-19 in determining new onset of frailty, the optimal tool and timing for diagnosis, the impact of frailty on pulmonary rehabilitation outcome, the role of rehabilitation in reversing frailty and improving prognosis after COVID-19 is not clear. Again, it is not clear whether and what correlations exists between clinical frailty and disability and mortality from COVID-19. It is reasonable that patients with frailty are the most vulnerable to COVID-19, patients with frailty could be affected by COVID-19 more seriously and developed a poor prognosis, introduction of frailty measurements could identify the frailty risk, guide intervention strategies and care plan and provide targeted intervention (exercise program). Frailty patients, surviving from COVID-19, could show high rates of disability, rehabilitation needs and barriers to rehabilitation. Frailty assessments could be	I would not like that all these "negative" statements of frailty and rehab could give a false impression on the potential of rehab in frail patients. Today's lack of evidence is coupled with the fact that rehab is probably the only therapeutic approach that can help frail patients (subjects) to climb back at least some steps of their frailty/disability vicious circle {9} Frailty alone does not always make the patient more vulnerable. The level of vulnerability is determined by the coexistence of other aspects such as type of treatments, LOS, setting {7} Even frail patients postcritical rehabilitation have been good responders to the early

	used for critical care management decisions during the COVID-19 pandemic (29-32)	rehabilitation programs even though the sequelae {9} This is a very important point. these COVID-19 patients experienced extreme isolation during admission which might have prolonged recovery and prognosis as well {9} Sometimes COVID-19 is "a comorbidity" for frail subjects and not a disease (a lot of older people are asymptomatic) {9}
3.2 Patients with frailty could be affected by COVID-19 more seriously and developed a poor prognosis	Frailty should be early recognized before setting up the PR program, to reduce risk for poor COVID-19 outcomes. The recognition of frailty should be part of the routine assessment particularly in patients aged >65 years. PR programs should be tailored according to the results of frailty evaluation. The choice of frailty assessment tool should be done according to literature evidence and local expertise, with preference to those targeting residential patients with respiratory disease. The Fried frailty phenotype (FFP) scale should be considered as the first tool to assess frailty in patients with COVID-19. The frailty	I believe that the statement is appropriate but that we should also remember that "specific" disability (*e.g*. respiratory) has to be taken into account at least as much as a "global" perspective. the difficult task is to combine both points of view {9} As I mentioned before, our experience in our post critical ward we got quite good results in the 70% of patients in terms of functional capacity (from

	assessment obtained by FFP could be integrated by other easily applicable tests. Minnesota Leisure-Time Physical Questionnaire and Center for Epidemiologic Studies-Depression [CES-D] questionnaire could be a part of frailty assessment in patients with COVID-19. Frailty measurements should be integrated by multidimensional evaluation focusing on global exercise capacity (mainly strength, followed by aerobic, flexibility, balance, and coordination), nutritional, and psychosocial status (33-37)	myopathic to walking situation) {9} Frailty is important, but in my experience, it is not so closed to prognosis {9}
3.3 Frailty should be early recognized before setting up the PR program, to reduce risk for poor COVID-19 outcomes	Frailty should be included among the outcome measures of rehabilitation program. Frailty as an outcome measure of rehabilitation program should be evaluated both as a omni-comprehensive score (depending on the tool adopted) and as specific domains (e.g. cognitive function, sureness of movement, gait speed, etc.) The determination of frailty-related outcomes should be performed after appropriate time window from the beginning of intervention, depending on considered domains. Frailty measure should be correlated with the adherence of treatment in PR program. The presence of tracheostomy or its recent weaning should be considered as a modulator	It should be obvious at the time of patient assessment. Frailty scales fifer as does the definition of frailty {9}

	of the frailty status and should be systematically evaluated at the beginning, ongoing, and at the end the rehabilitation program. When considering home-rehabilitation in the frail COVID-19 patient, a valid recognition of domestic environment and support by caregivers should be implemented for efficacy and safety reasons (33,34,36)	
3.4 Frailty measurements should be integrated by multidimensional evaluation focusing on global exercise capacity, strength, balance, coordination, nutritional and psychosocial status.	The discharge ward must guarantee 24-h telephone availability, monitoring of symptoms and clinical conditions, adherence to pharmacological therapy and rehabilitation home program and burnout of the caregivers (29,30,32,38).	To support these h24/d365 programs we need funding {9} No idea why the supporting comments address monitoring - all items relevant but do not belong to the frailty question {9} It would be very difficult for the ward to guarantee this availability. Maybe it would be easier to check at 1 week and at 1, 3 and 6 months these symptoms and to address them to specific specialists {9} The comment does not seem to be relevant to the

		recommendation but it is a valid one {9} The comment has little to do with the question {9}

Table 4. Timing of Pulmonary Rehabilitation (PR) start.

Suggestions	**Author's comments**	**Panelists' comments {rating}**
4.1 There is currently no clear scientific evidence for the timing of PR	There is currently no clear scientific evidence for the timing of PR (15,39,42,45).	If we consider that patients have an acute interstitial pneumonia with associated respiratory failure in some cases evolving into ARDS, the timing for PR is in the acute phase, *i.e*. in the critically ill patient. This is in analogy to similar non-COVID-19 clinical pictures {9} As I mentioned before our experience was very good, we had physiotherapy 7/7 ratio 1 respiratory physiotherapist for maximum 9 patients {9} Agree but you can infer that early is better given the prolonged course of many COVID-19 patients and the benefits of early rehab in other populations including the critically ill. Of course, this will need to be balanced with proper infection control practices {9}

		Physiotherapy should begin in the acute inpatient setting and continue after transfer to inpatient rehabilitation. Early mobilization should include frequent posture changes, bed mobility, sit-to-stand, simple bed exercises, and ADLs, while respecting the patient's respiratory and hemodynamic states. Active limb exercises should be accompanied by progressive muscle strengthening (suggested program: 8-12 repetition-maximum load for 8-12 repetitions, 1 to 3 sets with 2 min rest between sets, 3 sessions a week for 6 weeks). Neuromuscular electrical stimulation can be used to assist with strengthening. Aerobic reconditioning can be accomplished with overland walking, cycle or arm ergometry, or a NuStep cross trainer. Initially, aerobic activity should be kept to less than 3 metabolic equivalents of task. Later, progressive aerobic exercise should be increased to 20-30 min, 3-5 times a week. Balance work should be incorporated. Studies on the effectiveness of exercise interventions after SARS showed benefits for

		endurance, maximum oxygen consumption, and strength (49) {7}
4.2 PR must start early in the course of hospital treatment	RR must start early in the course of hospital treatment (12,40-44,46)	PR in COVID-19 patients is for sure a useful intervention and should tailored on patient's needs considering safety criteria: COVID-19 patients often presents an hypoxemic status with different levels of criticality: a correct assessment and a multidisciplinary evaluation is needed to plan an adequate intervention not affecting oxygenation and WOB {8} Existing recommendations for diseases requiring treatments similar to those used for COVID-19, seem to suggest early rehabilitation (acquired disability after ICU or after LOS, *etc*.) {9} One assumes-but the definition of PR is quite different depending on the setting {9} COVID-19 disease evolution is very variable, PR is not always needed {9} With stable and awake patients. Doubts in first acute phase {9}

4.3 A PR must start already in the ICU to obtain the maximum benefits	PR must start early in the course of hospital treatment as in the ICU to obtain the maximum benefits (39)	Even in my hospital physiotherapist start working in the ICU quite late, after 2 weeks of the start point in COVID-19 patients {9} yes - you mean mobilization {9} Agree. In both ICU and Respiratory intermediate ICU during supine and prone positioning {9}
4.4 Pulmonologist expert in rehabilitation field should coordinate the multidisciplinary team	Many papers show that a multidisciplinary team is needed to manage COVID-19 patients (15,45)	Multidisciplinary team is essential to define and achieve goals in rehab that is an extended and complex subject. We should consider to assemble the team on the base of the patients' needs, building a fluent communication with different specialists, basing on the setting {9} As it is for PR in general {9} Expert in rehab. field should coordinate the multidisciplinary team, based on the main functional impairment and local organization {9} Pulmonologists expert in rehab are rare in the acute hospital setting.

		Consultations within different teams should be ensured {6}
4.5 PR programs in outpatients and telemedicine should be considered for mild COVID-19 patients and patients discharged from hospitals	There is evidence on PR programs in outpatients and telemedicine for mild COVID-19 patients and for patients discharged from hospitals that will be implemented during pandemics (42,46-48).	I think it is problematic to link 'mild COVID-19' and 'pts discharged' in the same question. If a patient had mild COVID-19 illness- they are much more likely to have little to no functional impairments, therefore PR would not be indicated. However, discharged patients are likely to have been much sicker as they were hospitalized, therefore, they would be more likely to need PR {5} It is not clear to me if the mild COVID-19 means those patients who have been treated at home because asymptomatic. For those discharged from hospital it does not matter the grade of diseases involvement? if this is the case for both then the rate of agreement for me would be higher {6} Telemedicine is certainly an excellent opportunity to continue following patients by reducing travel for the patient and reducing the risk of contagion for operators {8}

		From the 4 quoted papers I would not say that there is "evidence" on PR Programs in telemedicine. The quoted papers refer to clinical experience and/or on hypothesis. Paper #10 is to me completely wrong in the background. They state "The first consideration is that patients with severe and critical COVID-19 are potentially very unstable and have very low exercise tolerance, even in the younger population. Therefore, the role of physical therapy in acute-care units and ICUs is limited". I reply that rehab in ICU is evidence based. Provided that the M.D. and Physiotherapists know what they are doing. Authors continue: "The transfer to a rehabilitation setting should be performed only if the referring clinician in the acute-care unit is reasonably sure that the patient's condition will not worsen and the patient will not need to return back to the ICU or acute-care setting. From clinical experience, our recommendations for transferring patients to rehabilitation are to avoid direct transfer from the ICU. Patients

		with severe forms in acute care should be transferred to PMR only if they have stable $SatO_2$ and RR and radiological progression of the disease has been ruled out. When the patient is stabilized for at least 3 days (no recurrence of fever; both RR and $SatO_2$ stable), they can be transferred to PMR settings". I think that if we exclude from rehab patients because are too severe, we perform "cosmetic" rehab. The rehab team (starting from the M.D.s) should be able to manage the clinical problems as other clinicians do in the hospital. In addition, if the severe patient has to wait to be less severe to go on rehab, he/she will stay longer in the acute hospital ward, loose physical function, increases the risk of complications, etc. etc. They also state: "We strongly advise implementing tele-consultation and tele-rehabilitation devices, minimizing exposure risk and implementing communication technologies to help patients and families reduce barriers imposed by isolation". This is a wish, a hypothesis that is reasonable but to me has no

		evidence as of today. And for this reason, we need to build the evidence that telemedicine or telerehabilitation is useful in post-COVID19 patients {3} Mainly in those patients who suffer dyspnea during exercise {8} Evidence on telemedicine is still inconclusive {2}

Table 5. Assessment.

Suggestions	**Author's comments**	**Panelists' comments {rating}**
5.1 The ability to predict discharge outcomes following COVID-19 is unknown.	To now, factors associated with lower odds of discharge are not completely clear. What is the role of the assessment of viral clearance before discharge and what the suitable setting depending on clearance status, what is the role of comorbidities, severity of imaging features, laboratory data, in view of a successful discharge are unknown. Information on how long a COVID-19 patient remains infective and what evidence is required before an infected, and subsequently recovered, person can go back to his/her normal life and work is not clear. The ability to predict discharge outcomes following COVID-19 is poor (50)	In our experience patients with comorbidity like cerebral infarction were the once with more long/difficult recovering time {6} Review also this article (58)
5.2 A complete resolution of the damage due to COVID-19 is probably possible for the most part of the patients, but it is not known how many patients will have irreversible of progressive damage	Particular challenging could be the rehabilitation of: i) patients who develop a fibrotic damage of the lung ii); patients who develop pulmonary hypertension or heart failure due to severe respiratory failure and pulmonary embolism during the acute phase of the disease; iii) patients with persistent mood, cognitive or neurological disorders	That's why we mended a follow-up program, this also to be designed empirically {9} Not able to give information {4} Data are available for SARS and MERS, that are similar in evolution {6}

5.3 The role of comorbidities, severity of imaging features, laboratory data, in view of a successful discharge are unknown	It is not known if the control of the frequent comorbidities, in particular Systemic hypertension and diabetes, could be a protective factor for COVID-19	Looks like cerebral vascular damage could be important, and also suggesting interstitial lung image in the chest X-ray could suggest oxygen therapy {7} Diabetes and hypertension are associated with poor prognosis {8} I agree about comorbidities like hypertension and diabetes, a little less for severity of imaging feature like CT scan and laboratory data like ABGC and DLCO or some scores like PF {5}
5.4 Symptoms scales, infectious disease/immunological status, hematological data, imaging, cardiorespiratory function, pulmonary function tests, respiratory muscle strength, nutritional status, comorbidities should be assessed	Blood tests (Blood count, Hb1Ac, biochemistry, TSH, BNP), chest X-ray or CT the presence of cardiac problems and/or peripheral vascular thrombosis, BMI and nutritional aspect, echocardiography should be considered as an outcome measure. Pulmonary function tests and respiratory muscle strength may be useful for patient stratification but have been associated with an increasing risk of COVID-19 transmission among patients/subjects and medical staffs (50-52) Charlson Comorbidity Index (CCI) (53)	Spirometry and measurement of MIP and MEP could still be measured by using the correct DPI and adequate disinfection procedures (at least in post-COVID-19 patients) {9} Surrogate tests should be used based on the time from the infection {9} I think it is premature to be measuring cardiorespiratory exercise-it is also not without risk {6}

		I agree with the recommendations but am unclear why the testing mentioned in the first part of the comments would be considered "outcomes"- to me, these would be considered part of an assessment of the patient prior to rehab to fully understand impairment, as also the CCI would be {9} There are no data on Pulmonary function in COVID-19 {6}
5.5 Neurological and psychological disorders (anxiety, depression) and frailty should be assessed		Add also cognitive impairment and delirium (particularly in those after ICU stay) {9} Sleep quality should also be investigated. Anxiety can affect sleep, and in turn disturbed sleep can affect daytime functioning {7}
5.6 Exercise tolerance, functional status and physical performance, presence of critical illness neuromyopathy and ICU acquired weakness should be considered as an outcome measure	The desaturation observed in the patients with chronic lung disease in the brief exercise tests are likely to be more marked in those with COVID-19. For this reason, even a small desaturation on exercise should alert the clinician and a drop of 4% should be cause for serious concern, regardless of the amount of exercise needed to produce it. Pulmonary function tests and respiratory muscle strength	Should be evaluated, not only the degree of desaturation, but also the recovery time to return to the initial saturation {9} Not really-they are discriminative measures useful initially. Some are not evaluative and may not serve well as outcomes {6}

	may be useful for patient stratification but have been associated with an increasing risk of COVID-19 transmission among patients/subjects and medical staffs (51,52) Exercise tolerance could be assessed by 6MWT with SpO_2 value at rest and during 6MWT, dyspnea value by Borg Scale (0-10) at rest and during 6 MWT. 6MWT is the gold standard tests of exertion in lung disease and is design to ensure an accurate assessment of oxygen desaturation and to provide a clinically useful oxygen titration. However, 6MWT has been hampered by the need for large spaces (30-m hallway) and the test may require an examiner to walk with the patient to increase safety, in addition COVID-19 patient frequently can't go out of room in hospital setting. We found no published literature describing validation of exertional desaturation tests in COVID-19. Two tests have potential utility: **a**) 6-minute and 3-minute step tests (step up and down on a 25 cm platform as fast as possible) may constitute a practical method for assessing effort tolerance and exercise	I think you should also mention CPET - while there will be challenges to performing testing in some patients, this gold standard can provide additional (and very important) information on cardiac limitations to exercise which is a significant concern in this patient population {9} In my experience patients are not able to do 6 or 3MST. 6MWT is not possible in COVID-19 ward {8}

	related oxyhemoglobin desaturation. 6 or 3 MST are a practical, reliable, valid, and responsive alternative for measuring exercise capacity, particularly where space and time are limited. 6MST provided reliable and reproducible estimates of exercise capacity and exercise-related oxyhemoglobin desaturation in stable interstitial lung disease (54). However, 6MST correlation with the gold standard 6-minute walk test did not yet be investigated and we know that they are not interchangeable, and the 6MST requires more energy than the 6MWT. **b**) 1-minute sit-to-stand test (patient stands up fully and sits down as many times as they can in one minute did no assess of exertional desaturation. If the 1MSTS is used, it should be followed by monitoring for at least one minute to observe for desaturation (55). The latter is less demanding (hence safer), but is less sensitive to desaturation. When doing more strenuous exertion tests, carefully observe the patient and also make a clinical judgement based on severe fatigue and tachypnoea (55).	

	Functional status and physical performance could be assessed by SPPB, 1-minute sit to stand, TUG. Presence of critical illness neuromyopathy and ICU acquired weakness could be assessed by Medical Research Council sum score and Handgrip dynamometry. About this last test, a force value of less than 11 kg-force for males and less than 7 kg-force for females resulted in the maximum combination of sensitivity and specificity for the diagnosis of ICUAW (52,54-57)	
5.7 Activities of daily living (ADL), baseline functional impairment due to dyspnea and how breathlessness affects patient's mobility should be considered as an outcome measure	Barthel dyspnea Index or Barthel Index or FIM performance in activities of daily living (ADL) (23)	Daily life activity (ADL), basal functional impairment also seems to be due to muscle fatigue {5} I think fatigue is the main symptom more than dyspnea. It should be evaluated during ADL in quantitative and qualitative terms. FIM and Barthel Index alone cannot always measure the patient's condition and its evolution {6}
5.8 Role of caregiver, the availability of internet, the presence of tele-rehabilitation platform		OK for caregiver, as for other disabling conditions, we still need to do more studies for Tele-surveillance and tele-rehab in COVID-19 patients {9}

and the availability of rehabilitative home service should be assessed before discharge		In my Unit we have been working with telemedicine since 2014 and nowadays the paradigm changed. Patients are much more ready to tele-rehab {7} Would be cautious with the recommendation for tele-rehabilitation and home rehab as these are evolving areas of investigation and the actual format and delivery can be quite variable and may not be intense enough to deliver positive outcomes {7}

Table 6. Which diagnostic imaging is informative to individualize the program?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
6.1 Early changes of lung imaging by CT scan toward consolidation are described within 15 days from admission	The long-term fibrotic sequela (reticulation, interlobular septal thickening, and traction bronchiectasis) are not described and only can be supposed (59,60)	The evolution of the clinical, pathological and imaging picture of coves pulmonary infection is still not well understood {9} Unclear of the meaning of this recommendation or comment. Imaging is crucial for acute treatment but this recommendation might better discuss the potential role for follow-up imaging to assess for long term lung parenchymal changes that may impact lung function in recovery {7} In my opinion is a good strategy to do in the symptomatic patient hospitalized, after the first radiological examination upon entering the hospital, and already in the third, fourth day, a deepening by CT scan, which can give us interesting and early information about the lung's parenchyma damages {5}
6.2 Chest X-ray may be useful to target individual interventions, but not a good outcome measure for the PR program		If possible, I prefer a CT scan in particular in case of ground glass imagine in previous CT scan {8} Presumably, not sure, there is no evidence for this, is a new area {9}

		I would also consider to perform CT scan in those patients with early lung consolidations (during admission or within 1 month post discharge) within 6 to 8 months follow up {5} This follow-up is recommended by BTS guidelines {8} I do not see how a chest x-ray would alter the approach to PR nor change with PR {9} I think that the choice should be depending on the grade on disease; therefore ,at least a CXR but for many patients with mild to severe Acute Respiratory failure a CT scan should be documented {5} Image test should be performed before to start a PR program to evaluate level of impairment {7} Tc scan is better {7} Chest X-ray can be used as an outcome measure in several conditions, talking about rehabilitation and physiotherapy in general as well. As concerns COVID-19 and the

		peculiar chest imaging presentation of this disease, I can't say if chest X-ray could be that useful as an outcome measure, also considering the low (but possible) risk of chest x-ray administration. Considering other concurrent conditions (*e.g*. atelectasis, hypersecretion signs, *etc*...) chest X-ray is still a favorable tool but for PR in COVID-19 I assume we should count on other outcome measures {4} Chest X ray don't change with rehabilitation {9} Wording recommendation: "Chest X-ray may be documented before the onset of PR" Mandatory documentation of chest X-ray may limit the number of patients enrolling to PR {8}
6.3 Chest X-ray should be performed early (3-5 months) in the follow-up		I would consider this as part of clinical care of the patient post any respiratory insult, but I don't see how it impacts PR. My answer reflects clinical care, NOT PR {7} As for the previous question. If the grade of the lung damage involvement is severe, then may be a CT scan at 6 months follow up would be better than a chest X-ray {5}

		Chest X-ray may be one of the tests to be performed in follow up together with CT, ultrasound; how much these tests influence the individualization of the program has yet to be verified {5} We have no data. What is the hypothesis? Chest X-ray are useful to identify patients that in the mid-term still have lung sequelae? If so, I would recommend much more than Chest X-ray clinical, physiological (including 6MWT) and, in analogy with other interstitial lung diseases, HRCT scan of the chest {3} To check the evolution should be considered {7} Instead of chest X-ray, TC scan could be more useful especially in patients who had a previous TC scan {8}

Table 7 : When and how to assess gas exchanges? what are the best informative indexes?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
7.1 Blood gas analysis (ABG) with the PaO2/FiO2 values are the gold standard to measure gas exchanges	The pathophysiologic mechanism of disrupted gas exchange induced by SARS CoV2 could include: a) Endothelial damage, microvascular clotting, alveolo-capillary membrane failure (61); b) Disruption of afferent and efferent connections between the nucleus of the solitary tract and mechanoreceptors and chemoreceptors of lung and respiratory tract (62)	Also consider paO_2 (A-a), an index of the gas diffusion capacity {9}
7.2 ABG is mandatory at admission and discharge with supplementary controls in case of severe dyspnea or fever		No evidence. It depends on the previous ABGs performed before PR and the trend of the patient. ABG is also an invasive procedure so I would not make it mandatory {4} On admission, but for many patients, oximetry is adequate for ongoing monitoring {5} The use of ABG is a clinical decision and is guiding by the acuity and severity of signs and symptoms of COVID-19 infection. While I would not disagree with ABGs in the acute critical illness, I am not sure that ABG at discharge is necessary is SaO2 is

		normal and home oxygen assessment is done {5}
7.3 Pulse oximetry (PO) and SaO2/FiO2 values are fundamental instrument for monitoring clinical situation at rest and during effort	Pulse oximetry had to be monitored every 8 h for patients on non-invasive ventilation and oxygen therapy, every 12 hours for patients on spontaneous breathing with oxygen or HFNC, every 24 hours for all other patients; supplementary controls in case of dyspnea or fever.	Together with clinical and symptom monitoring {9} Pulse oximeter is important in follow-up but not in acute phase {7}
7.4 Pulse oximetry device during self-managed at home is recommended	Pulse oximetry device during self-managed or remote controlled (tele-rehabilitation) sessions is recommended. Measurements should be done at the beginning, at peak effort and at the end of the sessions.	Probably but no evidence on schedule, characteristics of patients, *etc*. {9} It must be individually assessed {6} Of limited value {6} At least initially {9}

Table 8. When e which lung function tests?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
8.1 Lung function tests may be proposed when safe to perform by operators and patients	Pulmonary function tests have been associated with an increasing risk of COVID-19 transmission among patients/subjects and medical staffs	Invaluable information; all PFT labs should make a concerted effort to provide a safe environment; partition between technician and patient, negative pressure on patient side, etc {9} After 3-4 months {9}
8.2 Spirometry and diffusion capacity (DLCO) should be the gold standard being abnormal in 15% and 50% of cases	The impact of COVID-19 infection on lung function, the long-term impact is still unclear. According to the functional alterations of SARS and ARDS, the study of diffusion capacity (DLCO) seems reasonable (63). One-hundred and ten discharged cases were recruited, which included 24 cases of mild illness, 67 cases of pneumonia and 19 cases of severe pneumonia Forty-four (40%) patients had at least one underlying comorbidity, of which 23.6% had hypertension and 8.2% had diabetes. Only 3 patients (2.7%) were reported having chronic respiratory diseases (one patient with asthma, one with chronic bronchitis and one with bronchiectasis. Anomalies	Global Spirometry *i.e*. plethysmography {9} Too much reliance on PF tests. Depends on reason and clinical situation {6} Also, small airways measure is useful to evaluate evolution of ground glass lesions {9}

	were noted in DLCO% in 51 cases (47.2%), total lung capacity (TLC)% in 27 (25.0%), forced expiratory volume in the first second (FEV1)% in 15 (13.6%), forced vital capacity (FVC) % in 10 (9.1%), FEV1/FVC in 5 (4.5%), and small airway function in 8 (7.3%). Impaired diffusing-capacity among the different groups of severity, which accounted for 30.4% in mild illness, 42.4% in pneumonia and 84.2% in severe pneumonia, respectively ($p<0.05$) (64)	
8.3 Severe impairment should not be considered as a contraindication for pulmonary rehabilitation (PR)		
8.4 Lung function tests are not outcome measures of PR program	Lung function tests should be performed before PR program while lung function tests should not be included in the outcome measures of PR program	As for other categories of patients undergoing PR {9} Lung function test should be useful as predictive outcomes (morbidity, mortality, *etc*.) {4} This is true for traditional disease; however, I do not think we can say this with certainty (yet) for this disease where so much is unknown {8}

		In SARS patients, PR have improved lung function tests {9} In this case, I believe that DLCO test can have some importance {5}

Table 9. Functional evaluation (static and dynamic) – exercise capacity tests – muscles measures tests.

Suggestions	**Author's comments**	**Panelists' comments {rating}**
9.1 Before starting the rehabilitation program and at hospital discharge an assessment of physical performance and ADL autonomy is recommended; if abnormal values are found, further specific measures should be administered to quantify single limitations; these measures could be also used as rehabilitative outcome measure.	Physical performance and disability are areas we expected to be impaired after COVID-19 infection and principal outcome measures of Pulmonary Rehabilitation. Baseline assessment could be performed by simple and fast tests in order to find presence of impairment. This screening could be performed through SPPB (Short Physical Performance Battery) and/or disability scales (*i.e*. Barthel index). If physical performance impairment or disability is detected, further measures are mandatory in order to better define rehabilitative problems to be treated. Exercise tolerance could be assessed by fields test such as 6Minute Walking Test (6MWT) or surrogate (1-minute STS, 6-minute step-test). Peripheral muscle strength could be assessed by dynamometry of principal arm and leg muscles. Balance function could be assessed by stability board or dedicated scale such as Tinetti scale (65-70)	This point needs to be clarified. When you write "hospital discharge" you mean the Acute General Hospital or the Rehab Hospital? In my place, patients are discharged from General Hospitals and transferred to the rehab hospital. The two have completely different missions, culture, procedures, staff and as a consequence evaluation processes at admission and discharge {5} Sensitive scales for assessing balance are long enough to administer. Fatigue may limit its administration {9}
9.2 Standard maximal Cardiopulmonary Exercise Test (CPET) is not	Baseline Cardiopulmonary Exercise Test is recommended only after at least 6-8 weeks of acute hospital discharge, due to infectious	I'll wait much more time, perhaps 3 months especially in case of symptoms (*i.e*. chest pain) during the

recommended in the first 6-8 weeks after acute hospital discharge due to unknown cardiorespiratory and muscle involvement and infectious risk	risk and potential patient's risks due to unknow cardiorespiratory and muscle involvement	field tests (or ADL and so on) and if the performance is very low yet. In this case I'd prefer to continue with the effort re-adaptation until the symptoms are less severe {5} Agree but again is a presumption, we have no data {9} It could still be distorted by convalescence even if it is expected after an acute event in many pathologies {6} I believe this is unknown and 6-8 weeks is rather arbitrary.{5} I can agree with this statement, but I have not found any evidence to confirm this {7}
9.3 The assessment of exercise-induced oxygen desaturation is mandatory during the execution of exercise tolerance tests calculating the in change in SpO2 during test (mean exercise – basal level)		For two reasons: to prescribe oxygen supplementation if needed and to assess residual disease and associated disability {9} Should be performed with 6MWT {8}

9.4 During exercise tests and exercise sessions, fatigue and dyspnea should be assessed though psychometric scale (*i.e*. BORG scale or Visual Analytic Scale)		Done routinely {9}
9.5 Because we expected different trajectory of exercise performance recovery, the monitoring of physical performance should be routinely included in the follow-up assessment	Long term prevalence, severity and trajectory of physical impairment after COVID-19 infection are unknown. For this reason, it is strongly recommended to include physical performance tests during follow -up visits. MMG should be aware of the possibility to found disabled patients after COVID-19 infection, in particular in long term ICU stay, post-ARDS patients or in frail patients. During home rehabilitation, at least one test of physical performance test must be included as outcome measure and we strongly recommended the use only of validated field tests so as to have repeatable measures (71,72)	Agree but we need to come up with a proposed schedule {9}

Table 10. Respiratory muscle assessment?

Suggestions	Author's comments	Panelists' comments {rating}
10.1 Prevalence, severity and recovery of respiratory muscle weakness due to COVID-19 are unknown, as well as their impact on symptoms and disability	At present, no studies describe the prevalence and severity of respiratory muscle weakness in COVID-19. However, reduced respiratory muscle strength or endurance may exist, particularly in patients who had severe acute respiratory failure or ARDS, with the need for prolonged mechanical ventilation or prolonged weaning, or in case of critical illness, or in presence of comorbidities. In this case, MIP and MEP should be performed as soon as possible (73-75). Future studies should address the prevalence and severity of respiratory muscle weakness, both in terms of strength reduction and endurance impairment. It has been suggested that COVID-19 disease may produce damage in muscle fibers, but it is unknown whether this damage may involve the respiratory muscles. Future studies should also investigate the possibility of a complete recovery of respiratory muscle strength and endurance, and the possible impact on symptoms, disability, and quality of life. (82)	SNIP test and Peak cough flow would add important info in terms of diaphragm weakness and strength to cough respectively {8}

10.2 Standard MIP/MEP measures are not recommended in the first phase (6-8 weeks) due to infectious risk. When performed, special PPE should be worn and antiviral filter should be placed between mouth/tracheostomy and devices, in order to limit contamination	As advised by the European Respiratory Society, standard measurement of MIP/MEP should be avoided in the first few months, due to the presence of an infectious risk (16,76)	To remember that also the environment in which the measurements are made must be dedicated (patient room?) and it is necessary that it is sanitized between one patient and another {9} It could modify the results, due to the filter. And we should be sure there is negative pressure in the room, but we are not measuring MIP and MEP during neither after pandemic. Snip test should be considered. Also, with a filter {3} This is arbitrary and unknown {5}
10.3 In infectious patients, alternative modalities for MIP/MEP measurements using disposable devices, or alternative tests (*i.e*. Single Breath Counting) could be used	If disposable devices for MIP/MEP measurements are not yet available, the validity of alternative procedures for respiratory muscle strength estimation should be investigated. As an alternative, a reduction of vital capacity may be suggestive of respiratory muscle weakness. Alternative measures of vital capacity may be done for example with incentive spirometry or by using the Single Breath Counting test (validated in children's asthma) (77)	Could be used, not mandatory {9} The VC measured with graduated incentive spirometry is simpler but more expensive than the single breath count test. This is quick and cheap but not all patients manage to do it correctly {7} In my experience none respiratory muscle weakness was present in this

		post critical patients. All of them with tracheostomized {5} I express doubts about the use of alternative tests to replace punctual measures {6}
10.4 MIP/MEP or surrogate measures may be used to set up a respiratory muscle-training program when respiratory muscle weakness is speculated	Specific cases in which respiratory muscle weakness should be documented are patients with a history of severe acute respiratory failure, long-term ICU staying, prolonged weaning, critical illness, or in persistence of resting or exercise-induced dyspnea, or in presence of chronic hypercapnia. MIP/MEP or surrogate may be used to set up a respiratory muscle-training program when weakness is found. As an improvement of respiratory muscle strength is expected, MIP/MEP or surrogate may also be part of the outcome's measures for pulmonary rehabilitation (73,74, 76)	
10.5 During the weaning of mechanical ventilation and/or tracheo-cannula, respiratory muscles strength tests (MIP, MEP) are recommended. The measurements should preferably be performed at the cannula (highest value).	In tracheostomized patients, it should be considered that the measurements performed at the cannula stoma are higher than those performed on the mouth.(79-81)	This valid statement does not take into account the patient's previous MIP / MEP: for example, there could be cases of neuromuscular patients who, even with reduced forces, can live without a cannula. Furthermore, the diameter of the cannula could

		influence the outcome of the measurement {8} With viral filters. How about peak cough flow both in tracheotomized and non-patients? {6}
10.6 In mechanical ventilated patients, the estimation of inspiratory muscle strength may be performed through ventilator using Pimax and P0.1 assessment	When the patient is still in mechanical ventilation, a measure of P0.1 or Pimax may be performed using some ventilators and this may be strongly recommended in candidates to weaning or cannula removal (79)	

Table 11. Is secretion encumbrance a typical problem? how to assess the need for intervention?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
11.1 Assessment of mucus encumbrance or expectoration difficulties should be considered in all patient reporting pre-existing hyper-secretive condition, those after extubating or weaning from mechanical ventilation, those reporting phlegm or sticky mucus and productive cough	The ciliated cells are the primary cells infected in the conducting airways; the virus propagates and migrates down the respiratory tract along the conducting airways; elderly and patient with chronic lung condition can have reduced mucociliary clearance, and this may allow the virus to spread to the gas exchange units of the lung more readily; in the gas exchange units COVID-19 infects alveolar type II cells causing pulmonary infiltrates, mostly in peripheral and subpleural areas; non-uniformity in surfactant production and in lung compliance; many alveolar cells undergo apoptosis and die; recovery will require a vigorous innate and acquired immune response and epithelial regeneration; the aberrant wound healing may lead to more severe scaring and fibrosis than other forms of ARDS and the elderly individuals are particularly at risk because of their diminished immune response and reduced ability to repair the damaged epithelium. Positive pressure mechanical ventilation or artificial airways (orotracheal or tracheostomy tube) can temporary reduce the efficacy of mucociliary system and in general the mucus airway clearance (86-90)	It is important to assess the mucus plug but the health care professionals have to use the correct DPI {8} As always, a forgotten filed for PR {9}

11.2 Anamnestic data, quantity and quality of expectorated mucus, lung sound auscultation and reported symptoms should be considered to assess the need for an airway clearance augmentation strategy	Phlegm is not a main symptom in COVID-19 infection, however less frequent thick mucus from coughs (sputum) is present. Sticky secretion could also occur in case of prolonged immobilization in hospital. In case of pre-existent chronic hyper-secretive pulmonary diseases, patient could experience more sticky secretions (83-85)	Also, the need for antibiotic treatment and microbiological evidence of colonization/infection of the airways {9}
11.3 SpO2 measure is not directly related to airway obstruction and mucus encumbrance, however could be an adjunctive informative measure to test the efficacy of airway clearance maneuvers.		
11.4 Recent Chest X-ray, CT-scan or lung ultrasound are not a direct measure for mucus encumbrance, but could be informative about areas at risk of airway clearance impairment		

Table 12. How the nutritional status can affect functional recovery?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
12.1 It is relevant to evaluate the nutritional status of patients hospitalized for moderate, severe and very severe COVID-19 infection	Only a few data are available about nutritional status and COVID-19 infection. However, the consequences of a hyper-catabolic state secondary to inflammation are known (91,92).	
12.2 The severe inflammation, the resulting hypercatabolic state and the drastic reduction of food intake makes these patients at risk of malnutrition	The consequences of malnutrition on the prognosis of patients who are invasively or not invasively ventilated are also known. It necessary to quickly identify the patients at risk of malnutrition through simple and rapid screening tools. In this situation of emergency, Nutrition Societies have recommended to use Nutritional Risk Screening (NRS-2002). Nutritional status evaluation has to include, BMI, blood chemistry parameters (serum albumin, transferrin) and, if possible, hand grip for strength evaluation. All the patient with pneumonia are at risk of malnutrition: the risk is higher when age is >70 yrs, or weight loss >5% in the last 3 months or BMI <20.5 or there is reduction of food intake in the last week. Currently there are no evidence-based guidelines for nutritional management of COVID-19 patients (93-96)	

12.3 Dysphagia screening has to be implemented at the same time as nutritional screening		Dysphagia screening is also simply the observation of the patient whiles/he is having a meal. Non-medical staff is more used to spot patients with ab ingests problems {9} Implemented only in selected, at risk patients {5}
12.4 It is important to implement a prompt and adequate nutritional assistance in COVID-19 patients	Currently there are no evidence-based guidelines for nutritional management of COVID-19 patients It's important to ensure an adequate nutritional intake and eventual additional protein intake (fortified meals) in rehabilitation patients Select the most suitable and safest feeding modality based on patient's clinical problems (NIV and/or oxygen therapy, tracheostomy) (97)	Evidence-based and rational nutritional treatment plays a critical role in the recovery and prognosis of patients with severe COVID-19. COVID-19 can progress to ARDS owing to infection, fever, and other causes, which places patients in a high catabolic state and leads to nutritional metabolic disorders. For nutritional risk assessment of patients with COVID-19, the Nutrition Risk Screening (NRS-2002) or modified Nutrition Risk in the Critically Ill (NUTRIC) scoring tool should be used {9}

12.5 If dysphagia occurs, it must be promptly treated	If dysphagia is present, it must be promptly treated with the intervention of the speech therapist and using specially prepared foods. At discharge from hospital a personalized nutritional program should be proposed to every patient based on in-hospital nutritional evaluation for home patients, nutritional intervention aims to increase energy density of home preparations and suggests how to resolve problems related to dysphagia, dysgeusia and anosmia. The care giver must be informed and instructed on the nutritional plan recommended to the patient and on the precautions to be put in place for dysphagia Remote intervention by speech therapists may be agreed. In presence of Tracheostomy specific screening test (Modified Evan's blue dye test) + clinical non instrumental evaluation of dysphagia must be performed. If the evaluation for dysphagia is positive, consider FEES (fiber endoscopic evaluation swallowing) to set logopedic rehabilitation program Select the most suitable and safest feeding modality based on patient's clinical problems and diet programs for different levels based on patient's ability to swallow fluids and foods (97-99)	Dysphagia screening is also simply the observation of the patient whiles/he is having a meal. Non-medical staff is more used to spot patients with ab ingests problems {9} Implemented only in selected, at risk patients {9} In case of severe malnutrition, first I would resort to the nasogastric tube to improve health conditions (or peg for a long time) and then I will introduce swallowing rehabilitation. I'm not agree to avoid instrumental evaluation (video-fluoroscopy). I think it is much safer than FEES (less droplets) {9}

Table 13. How to assess quality of life (QoL) and participation during social distancing, quarantine and isolation?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
13.1 To evaluate the QoL it would be appropriate to test the presence of psychopathological disorders (in particular anxiety, depression, sleep disturbance, post-traumatic stress disorder)	In the specific case of COVID-19, the quality of life seems to be strongly conditioned by the need for social distancing and / or quarantine which can favor the onset of isolation and depressive experiences. During this period the quality of life in the post-acute patient suffers so much from the lack of contact with the relatives. The condition of isolation in the hospital environment increases experiences of anxiety, anguish and depression. The evaluation of the QoL must therefore take into account three main aspects: presence of psychopathology, level of autonomy, quality of family support (in the hospital setting we refer to the possibility of activating contact, even if only by telephone, with the family). In order to diagnose a post-traumatic stress disorder, it is necessary that a month has passed since the traumatic event which in this case we identify as the ARDS Acute Respiratory Distress Syndrome (100,102-106,109)	Time is crucial for the use of the appropriate tool. QoL should be assessed after COVID-19 infection, in the acute phase is more a burden of disease weight than a QoL assessment {9} The recommendation is correct but the implication that QoL depends on these psychopath assessments is not necessarily true as well validated measures will take these into account inherently {6}
13.2 It is appropriate to evaluate the patient's level of autonomy	The complete self-sufficiency of the person is necessary to live independently at home without external assistance, increasing self-esteem and affecting the quality of life (107,108)	

13.3 It is appropriate to evaluate the quality of the support network (communication possibilities of the patient, stress of the caregiver)	(101)	Psychologist and Social worker main task {9}
13.4 It is appropriate to have a global measurement of the patient's perceived QoL level	(100, 102-106)	Depends on timing (see above) {9} QoL level is important, but it is difficult to correctly evaluate {9}

Table 14. How to identify emotional aspects influencing participation to PR program?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
14.1 A neuropsychological assessment should be performed at baseline and after PR	The long-term psychological implications of infectious diseases should not be ignored Better understanding of how the intense systemic immune response to SARS-CoV-2 infection affects mental health and neurological symptoms The longer-term research priorities are to unders the mechanisms by which SARS-CoV-2 might en the brain (neurotoxic and neurotropic properties the virus) Indicators of vulnerability (such as pre-existing physical or psychological conditions) should be considered Understand the psychological (*e.g.*, coping), physiological (*e.g.*, sleep and nutrition), and structural (*e.g.*, work shifts and daily routines) factors that protect or adversely affect mental health (110-114)	Not mandatory {7} Only in selected subjects, based on initial evaluation (relief of signs and symptoms) {9} Simple history {3} This may be impractical for many programs without expertise in this area {7} Not at baseline, in particular cases {9}
14.2 Psychosocial effects (such as depression, anxiety, psychosomatic preoccupations, insomnia) should be measured	It is relevant understand how to enhance motivation, self-efficacy and self-care; understand how we optimize positive social resources and enhance resilience in the face of stress; determine the efficacy of mechanistically based digital and non-digital interventions and evaluate optimal model(s) of implementation; develop novel interventions to	Not mandatory, on a clinical basis {7}

	protect mental wellbeing, including those based on positive mechanistically based components, such as altruism and prosocial behavior and understanding of online life Neuropsychological functions should be monitored and retested after PR Mental health services should be provided in the context of patient isolation, which highlights the role of telehealth (through videoconference, e-mail, telephone, or smartphone apps) even if the efficacy of the telemedicine interventions in case of COVID-19 has yet to be proven (115-118)	
14.3 Symptoms of Post-Traumatic Stress Disorder (PTSD) should be considered	Before and after PR program all these aspects should be considered and/or measured Psychosocial effects (*e.g*. depression, anxiety, psychosomatic preoccupations, insomnia) Symptoms of Post-Traumatic Stress Disorder (PTSD) (116)	Not mandatory if not in a protocol, no evidence that this improves care after hospitalization. We would need an "integrated care program" across different health care settings (primary care, hospital, rehab, back home, *etc*.) that is not in place for COVID-19 and not even for COPD, *etc*. {7}
14.4 The long-term psychological and psychosocial implications of infectious diseases should not be ignored	(120-122)	We need studies {9}

14.5 A peculiar attention should be played to caregiver and family of those in quarantine because affected by COVID-19	Safety, social isolation and well- being of all individuals (causing, for example, insecurity, confusion, emotional isolation, and stigma) Caregiver and family's burden, worry and fears should be explored. Safety, social isolation and well- being of all individuals (causing, for example, insecurity, confusion, emotional isolation, and stigma) Caregiver and family's burden, worry and fears should be explored (123)	

Table 15. How to manage oxygen-therapy and interface? how to dose and scale oxygen at rest and during physical activity?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
15.1 Oxygen need at rest, during effort and sleep should be assessed before setting up the PR program	Oxygen need at rest and during effort should be reassessed after the PR program and oxygen need during sleep should be considered in the follow up	
15.2 Suitable interface (in term of efficacy and patient tolerance) should be tested before setting up the PR program	Suitable interface (in term of efficacy and patient tolerance) should be tested before setting up the PR program Treatment targets may vary depending on the presentation of the patient. Once a patient is stable, SpO2 target is >90% in non-pregnant adults and 92% to 95% in pregnant patients. In adults with COVID-19 and acute hypoxemic respiratory failure, the SpO2 target should not be maintained >96%. High flow oxygen therapy (HFOT) could be an additional tool to dose oxygen during stationary exercise	And titration should be done with 6mwt using interface and modality of device is going to be prescribed to the patient {9}
15.3 Oxygen need during effort should be assessed through standardized tests (6-minute walk test or other field tests) and reassessed during the PR program based on exercise progression	Blood gas analysis should be performed before PR program and during the follow up. Oxygen saturation measurement should be performed at rest, during exercise and at the end of each PR session by pulse oximeter. Oxygen saturation trend should be recorded during PR program (at home keep a diary). Use an auricular or forehead SpO2 sensor	Not necessary for 6MW test to be used for oxygen assessment. Shorter time is fine {7}

	when finger access is not reliable, *i.e*. in case of vascular disease (124)	
1**5.4** Specific precautions about the exhaled air dispersion distance should be taken into account during oxygen administration	Specific precautions about the exhaled air dispersion distance should be taken into account during oxygen administration (1)	Among the precautions we can remember that the patient has to wear well cannula/mask and always wear the surgical mask {9}

Table 16. Which FITT for exercise programs.

Suggestions	Author's comments	Panelists' comments {rating}
16.1 Rehabilitation in post-acute COVID-19 could improve symptoms, functional capacity and quality of life; however, the best exercise program is still unknown	COVID-19 produces impairment of exercise tolerance, muscle weakness, dyspnea, and fatigue. As it happens in other pulmonary diseases, rehabilitation is expected to improve symptoms, functional capacity and quality of life. Therefore, the main aims of rehabilitation should include the improvement of patient's ability to sustain physical activity, reducing exercise-induced dyspnea and fatigue (125) Given that in SARS a reduction of exercise capacity had been documented in the long-term after infection, it should be investigated also in COVID-19 whether long-term performance impairment may exist, and its impact on patients' quality of life. Persistent disabilities may remain in COVID-19 survivors, but the prevalence, severity, and impact of these disabilities should be also investigated. Future studies should establish the expected improvement of exercise tolerance and whether it is comparable to that observed in other chronic respiratory diseases. The response of COVID-19 subjects to moderate-to-high intensity exercise training, as well as	This is true also for many other not-newly-emerged (as COVID-19 is) conditions {9} Active limb exercises should be accompanied by progressive muscle strengthening (suggested program: 8-12 repetition-maximum load for 8-12 repetitions, 1 to 3 sets with 2 min rest between sets, 3 sessions a week for 6 weeks). Neuromuscular electrical stimulation can be used to assist with strengthening. Aerobic reconditioning can be accomplished with overland walking, cycle or arm ergometry, or a NuStep cross trainer. Initially, aerobic activity should be kept to less than 3 metabolic equivalents of task. Later, progressive aerobic exercise should be increased to 20-30 min, 3-5 times a week. Balance work should be incorporated. Studies on the effectiveness of exercise interventions after SARS showed

	the response to alternative types of training (ie. Interval training) should be investigated. Future studies should define the long-term impact of exercise performance impairment on quality of life, as well as the prevalence and extent of remaining permanent disabilities in COVID-19 survivors (133,134)	benefits for endurance, maximum oxygen consumption, and strength. (135) The intensity of daily exercise should be maintained between rest [1.0 metabolic equivalents (METs)] and light physical activity (<3.0 METs) with a duration of 15−45 min; intermittent exercise can also be performed (49) Aerobic exercises are customized according to the patient's underlying disease and residual dysfunction. These exercises include walking, brisk walking, slow jogging, and swimming, and begin at a low intensity before progressively increasing in intensity and duration. A total of 3–5 sessions are carried out per week, and each session lasts for 20–30 min. Patients who are prone to fatigue should perform intermittent exercises. Strength training: progressive resistance training is recommended for strength training. The training load for each target muscle group is 8–

		12 repetitions maximum (RM); i.e., each group will repeat 8–12 movements, 1–3 sets/time, with 2-minute rest intervals between sets, with a frequency of 2–3 sessions/week for 6 weeks. Approximately 5%–10% is increased per week. Balance training: balance training should be carried out in patients with comorbid balance disorders, including hands-free balance training under the guidance of the rehabilitation therapist and balance trainer (136) {7}
16.2 The exercise training principles used in patients with chronic lung diseases can be considered in post-COVID-19 patients	COVID-19 produces impairment of exercise tolerance, muscle weakness, dyspnea, and fatigue. As it happens in other pulmonary diseases, rehabilitation is expected to improve symptoms, functional capacity and quality of life. Therefore, the main aims of rehabilitation should include the improvement of patient's ability to sustain physical activity, reducing exercise-induced dyspnea and fatigue (125,16)	As a first step {9} Adequate exercise training must be defined {6}
16.3 Aerobic exercise <3.0 METs with progressive increase of intensity based on	In the first few weeks of infection, in case of mild/moderate disease, the aim of physical activity interventions is maintaining a normal	

symptoms (BORG fatigue and/or dyspnea below the score of 3) is recommended in patients with mild or no disability (SPPB >10; Barthel index >70) in order to restore a normal physical function.	physical function. Therefore, only low-intensity exercise is recommended in this phase. Due to the presence to both exercise fatigue and muscle weakness/pain, an intervention targeted to both endurance capacity and muscle strengthening is advised. Once the survivor to COVID-19 is no longer infectious, already existing principles for exercise training in the adult population should be followed. In the domiciliary context, it is not known whether unsupervised exercise should be advised, as well as what are the best indications on exercise intensity, frequency, duration, monitoring needs, and progression of the workload. In absence of previous formal assessment that allows producing a specific exercise prescription, low-intensity exercise is recommended for at least the first 6-8 weeks in patient's home (126-128)	
16.4 Patients with moderate or severe disability (SPPB <10; Barthel index <70) need a comprehensive pulmonary rehabilitation program in order to improve autonomy, peripheral and respiratory muscle strength,	When infected patients have moderate/severe disability, both due to COVID-19 itself or to concomitant/preexisting conditions, a personalized rehabilitation program aiming to recover functional autonomy, walking ability, balance and strength is recommended, according to an initial complete and multidimensional baseline assessment.	I am not sure it is "safe" to make distinction between physiotherapy for mild patients and comprehensive PR program for moderate to severe. It makes confusion and can be used to dismantle the evidence for rehab as a whole {5}

balance, walking ability, symptoms and quality of life	In case of critical illness, the intervention of physical activity has the aim of preventing the consequences (both physical and cognitive) of prolonged immobilization. Already existing indications on early mobilization should be considered, as well as existing algorithms for progressive mobilization dedicated to the critically ill, to weaned patients, and to those with prolonged weaning (129,130)	
16.5 The exercise program should include aerobic exercises (cycling, treadmill, free walking) and resistance strength training	Considering their potentially dangerous consequences, inactivity and sedentary time should be avoided also in COVID-19 survivors. Advices on how and when to perform physical activity should be given to both hospitalized and discharged home patients, adapting the indications to each specific infective status and personal context (131)	Potential environmental contamination during aerobic exercises need to be considered. (distancing between patients, aeration of the rooms, *etc*.) {7}
16.6 SpO_2 monitoring during exercise is mandatory and subsequent oxygen supplementation could be prescribed when SpO_2<93%, being aware of potential environmental contamination	As a consistent portion of COVID-19 survivors shows exercise-induced desaturation, exercise and physical activity should be performed with SpO_2 monitoring. Oxygen supplementation is advised in case of SpO_2 <0% (16,126)	I'm agree but I think the SpO2 cut off could be lower (not 93% but 90%) {7} Oxygen supplementation could be prescribed when SpO_2 <90% {7}

		Not for each session-that is a waste of time. Stop monitoring as patient becomes stable {3} I am not clear that <93% is a universal criterion. In US, SpO_2 <89% qualifies for supplemental O_2 {4}
16.7 NIV during exercise training should be used with specific cautions to avoid the risk of environmental contamination	Specific recommendations are given in case of infectious patients, in order to limit/prevent environmental contamination. NIV and oxygen produced droplet dispersion, so the use of NIV is discouraged, and oxygen supplementation must be managed with caution (see specific indications) (132)	Even considering environmental contamination a primary matter, if a patient needs NIV to perform exercise compromises should be considered: if the patient is in home isolation after discharge the contamination risk could be less important. Specific infective status and personal context should be investigated to avoid limitation in PR {4} I think it could be possible to use NIMV if we avoid humidification and we use non-vented oral-nasal mask+ antiviral filter between mask and whisper {6} If the patient is at his own home and he is isolated from other

		people, may be this recommendation has not to be followed {7}
16.8 In case of tracheostomy, the use of speaking valve during exercise should be preferred to open HME filters	In case of tracheostomy, the use of speaking valve during exercise should be preferred to open HME filters even though it may produce further dyspnea or fatigue. A balance between the infectious risk and the possibility to exacerbate respiratory muscle fatigue should be considered (132)	I'm agree only if the patient is wearing a surgical mask {8} Should add why you are making the recommendation (for infection control purposes) to the statement {6}

Table 17. When and which lung recruitment exercises? which strategies and devices?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
17.1 Individualized recruitment strategies such as chest expansion breathing control exercises associated to posture positioning should be considered as part of PR program	Chest expansion breathing control exercises i.e. slow inspiration until the higher volume tolerated, tele-inspiratory pause, slow expiration also with a slight resistance; posture positioning i.e. lateral position with upper arm elevated, sustained prone position, forward leaning. In the gas exchange units, COVID-19 infects alveolar type II cells causing pulmonary infiltrates, mostly in peripheral and subpleural areas; but the long-term fibrotic sequalae (reticulation, interlobular septal thickening, and traction bronchiectasis) are not described and only can be supposed (60,83). Actually, there is few data about mid- and long-term effects on lung and chest compliance after COVID-19 acute phase. The lung damage of COVID-19 lead to the impairment of alveolar air exchange: during the acute phase lungs shows an impressive compliance non-uniformity (8). Fatigue, chest tightness, dyspnea, low VT, need to yawn with the impossibility to reach a deep breath are reported from some post-acute COVID-19 patients after discharge. Severe fatigue is highly prevalent in ILD patients and is associated with dyspnea (137). Breathing exercises (breathing control) appears to complement exercise training towards improved	Unclear benefit in the post-acute setting {5}

	dyspnea and HRQL in patients with IPF (138). Several mechanisms used in ACTs optimize ventilation to obstructed lung units. Moving a patient into different positions affects ventilation in two different ways. First, a change in body position alters regional ventilation as noted above. Second, by increasing the mobility of a patient, oxygen demand increases, resulting in a corresponding increase in minute ventilation and lung volumes. The resultant increase in ventilation allows air to move into obstructed lung units by interdependence and collateral ventilation (139). Forward leaning might optimize pulmonary mechanics (140)	
17.2 Posture positioning should be chosen in according to chest X-ray/CT scan (if any), auscultation, SpO_2 change and patient reported symptoms		Can be chosen {7} Is this in the acute setting? {5}
17.3 Continuous or temporary positive expiratory pressure (PEP, TPEP) devices, also including visual or	The breathing pattern is altered during PEP breathing. PEP have been shown to increase VT and decrease respiratory frequency by an increase in both inspiratory and expiratory muscle activity. A temporary increase in FRC has been shown,	Always under prescription or supervision of the Respiratory Physiotherapist {9} Risk or aerosolization {4}

acoustic feedback, should be considered, alone or in combination with posture	with a progressive increase in FRC with increasing PEP. The role of the collateral airways is unclear but has been suggested to be a possible part of the explanation of reinflation of collapsed airways. Increased lung volumes and gas exchange and decreased atelectasis have been reported after PEP breathing in healthy subjects, in patients undergoing surgery, in patients with cystic fibrosis (CF), with pulmonary disease or neuromuscular disease. In clinical practice, the instruction to the spontaneously breathing patient how to use an expiratory resistance is of major importance since it varies. Different breathing patterns during PEP increase or reduce expiratory flow, result in movement of EPP centrally or peripherally and can increase or decrease lung volume. It is therefore necessary to give the right instructions to obtain the desired effects. As the different PEP techniques are being used by diverse patient groups it is not possible to give standard instructions. Based on the information given in this article the instructions have to be adjusted to give the optimal effect in the specific context (141). A little increase in expiratory pressure during the respiratory cycle may improve the distribution of	Is this in the acute setting? {5}

	alveolar ventilation without mechanical stress injury in the bronchial tree or lung itself. Preliminary data suggest that temporary positive expiratory pressure improves lung volumes and speeds up the improvement of bronchial encumbrance in patients with lung diseases and hypersecretion (142-144)	
17.4 An inspiratory flow-dependent resistance can be used to slow down inspiratory flow and to increase inspiratory time, enhancing pleural traction on peripheral lung regions	This technique should be used carefully in weaker patients and not with the purpose of inspiratory muscle training. Threshold resistance is less tolerated and should be avoided for this purpose Resistive inspiratory maneuver may increase inspiratory airflow to more peripheral airways. This leads to an extended inspiratory time secondary to the reduced airflow at the mouth (145)	Expiratory time and expiratory pressure should also take into account. Due to the effect on opening airways and the effect on gas exchange {5} Not necessary {5} That is a true statement but unclear relationship to the rehab setting {5}

Table 18. How to manage aerosol-therapy and devices? how to use them safely?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
18.1 Aerosol/Nebulizer treatment administration is NOT recommended	SARS-CoV-2 is transmitted *via* respiratory droplets. Nebulization enhance droplets dispersion and generate aerosol increasing the risk of infection transmission. How we can administer aerosol therapy to patients that need it, minimizing the risk of spreading infected material, is unknow (146,147)	Aerosol/nebulizer treatments, where strictly necessary, should be administrated with carefulness {3} The aerosol can be administered in many ways, perhaps more compatible with the reduction of the infectious disease risk {6}
18.2 If patient is mechanically ventilated, inhalation therapy should be administered during mechanical ventilation, using metered-dose inhalers (MDI) or ultrasonic nebulizers connected to the mechanical ventilator in a closed circuit is recommended, without removing the antimicrobial filter on the expiratory branch of the circuit		It's hard to determine the quantity of medication that can actually reach the target area considering: humidification system where provided, dispersion in the circuit, variability of flow and regional ventilation. On the other hand, bypassing upper airway and prolong the time of administration could partially balance the situation {4} In special conditions (*e.g*. may be necessary to use nebulized aerosols even if the patients are not mechanically ventilated. If you cannot avoid them, it may be

		useful to know the following data and indications. Unlike inhalers, nebulizers can deliver a variety of drug formulations that may be needed for patients with COVID-19. Although conventional jet nebulizers are commonly used to deliver aerosolized medications, they may also spew 2/3 of the emitted aerosol into the ambient environment. In this case, healthcare providers are exposed not only the inhaled medications but also to the droplets from the patient's airways and lungs. In addition, the driving gas up to 10 L/min can increase the dispersion of both medical and bioaerosols. If aerosols generated with nebulizers carry the virus during exhalation and transmit it to the hospital environment, health care providers and other patients are under the risk of infection. Recently, some companies manufacturing jet nebulizers provided filters to use with their device in the treatment of patients

		with COVID-19. While the placement of a filter to the nebulizer was 93% effective in capturing exhaled aerosol droplets and will reduce second hand exposure of aerosol medication to health care professionals, the efficiency of these filters in preventing the transmission and the magnitude of the risk acquiring coronavirus through filtered nebulizers are not fully known. Also, current publications on fugitive emissions are based on in vitro studies that may not be a true representative of a real exhalation in coronavirus infected patients. Using the high-efficiency particulate air (HEPA) filters with nebulizers might be a good option during aerosol drug delivery to patients with COVID-19. Due to a greater surface of filtration, they are more effective in collecting droplets compared to other bacterial filters available on the market. However, their bulky designs and requirement to use

		various adapters to attach them to nebulizers make it difficult to use them compared to low volume bacteria filters. Interface selection is as important as device selection in aerosol therapy. Using a facemask is not recommended for aerosol therapy in the treatment of coronavirus infected patients. When a jet nebulizer is combined with a facemask, the airflow of jet nebulizer will force aerosol out of the device during expiration and breath-hold. McGrath *et al*. showed that the face mask had the highest-time averaged fugitively emitted aerosol concentration when a jet nebulizer was combined with a facemask. They also reported that placing a filter on the exhalation port of the mouthpiece lead to the lowest concentration (151). Therefore, the jet nebulizers need to be used with the mouthpiece, and clinicians should attach filters or one-way valves to the large bore tubing of the nebulizer to prevent fugitive

		emissions during aerosol therapy. Another option would be to use a mesh nebulizer combined with the mouthpiece in patients with COVID-19. In this case, clinicians should add a filter to the other end of the mouthpiece to eliminate the release of aerosols to the environment. Therefore, delivering aerosolized medications via jet nebulizer or MDI will not be appropriate due to the breakage of the circuits for the placement of the device on the ventilator circuit before aerosol therapy. A recently published Chinese guideline suggests using the mesh nebulizer in critically ill patients with COVID-19 receiving ventilator support. Mesh nebulizers can stay in-line for up to 28 days, and reservoir design allows adding medication without requiring the ventilator circuit to be broken for aerosol drug delivery. Unlike jet nebulizer, the medication reservoir of mesh nebulizers is isolated from the breathing circuit that eliminates the nebulization of

		contaminated fluids. Also, placing the mesh or jet nebulizer prior to the humidifier can improve the efficiency of the treatment and further reduce retrograde contamination from the patient. So, these are some practical strategies for aerosol drug delivery to intensive-care patients with COVID-19 and so to the mechanically ventilated ones. **1.**Do not use jet nebulizer or MDI aerosol delivery to ventilator-dependent patients with COVID-19 due to the breakage of the circuits for the placement of the device before therapy. **2.**Use mesh nebulizers in critically ill patients with COVID-19 receiving ventilator support as they can stay in-line for up to 28 days, and reservoir design allows adding medication without requiring the ventilator circuit to be broken for aerosol drug delivery. Unlike jet nebulizer, the medication reservoir of mesh nebulizers is isolated from the breathing circuit that eliminates the nebulization of

		contaminated fluids. **3.**Place the mesh nebulizer prior to the humidifier can improve the efficiency of the treatment and further reduce retrograde contamination from the patient. **4.**Attach a HEPA filter to the expiratory limb of the ventilator to reduce second hand aerosol exposure and prevent the transmission of infectious droplet nuclei through the ventilators. (151) {6}
18.3 To deliver inhaled therapy during mechanical ventilation, the use metered-dose inhalers (MDI) or ultrasonic nebulizers connected to the mechanical ventilator in a closed circuit is recommended, without removing the antimicrobial filter on the expiratory limb of the circuit	If patients are mechanically ventilated, deliver inhaled therapy during mechanical ventilation, using dry inhalers or ultrasonic nebulizers connected to the mechanical ventilator in a closed circuit, without removing the antimicrobial filter on the expiratory branch of the circuit (148)	If the patient is ventilated with a monotube circuit with a NV mask, put the nebulizers device between the mask and the filter {9} I surely do not know how to use DPI's during mechanical ventilation so I cannot recommend this type of inhalation technique {6}

18.4 If bronchodilation is needed, metered-dose inhalers (MDI) with spacer or dry powder inhaler (DPI) should be considered	(149,150)	With an antibacterial filter {9} In mild-patients with COVID-19 who are awake and can perform specific breathing techniques with inhalers, clinicians should consider using pressurized metered-dose inhalers (pMDIs) and dry powder inhalers (DPIs) for aerosol drug delivery instead of nebulizers. It is essential to use a valved-holding chamber with pMDIs during treatment. Also, priming before first use, pMDI actuation at the beginning of inspiration, hand breath coordination, inhalation with low inspiratory flows, and breath-hold is vital for the efficiency of MDI. Since DPIs are breath-actuated inhalers, clinicians should emphasize the specific inspiratory flow needed to draw medication from the device and disperse the particles. Thus, patients can operate the DPI correctly and receive therapeutic benefit from the drug. However, patients with acute respiratory failure may not

		generate the adequate inspiratory flow needed for the specific DPI used for treatment. In addition, if the inhaler increases cough, other alternatives should be pursued. Using nebulizers with a mouthpiece or high flow nasal cannula should be considered in such cases (151) {3}
18.5 DPIs are preferred if patient's inspiratory capacity is sufficient to activate the inhaler	150)	

Table 19. When and which strategies and devices for bronchial hygiene?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
19.1 Airway clearance augmentation strategies and techniques (ACTs) should be continued, with adaptation if needed, in chronic hypersecretive patients and should be considered for subject experiencing phlegm and/or productive cough	Although no firm conclusions can be drawn regarding the role of ACT's in their management, this intervention improved the yield of specimens for microbial analysis and facilitated pathogen-directed antimicrobial therapy. These findings suggest that a systematic physiotherapy approach including optimization of airway clearance can benefit patients with parenchymal lung disease (152)	Add if you agree also the vacuum system for tracheostomized patients to reduce rate of invasive aspirations (156) {9}
19.2 In hypersecretive patients, the use of continuous or temporary positive expiratory pressure devices, with or without oscillation, (PEP, TPEP, OPEP) should be considered, alone or in combination with lung expansion strategies, to enhance lung volume recruitment, to better control the expiration flow and to facilitate peripheral	Methods of utilizing expiratory airflow to enhance secretion removal. Increasing the velocity of the expiratory airflow in such a way as to create high shearing forces at the airway walls, and high kinetic energy that enhances the cephalad movement of secretions is a second key mechanism to mobilize airway secretions. […] in clinical practice, the instruction to the spontaneously breathing patient how to use an expiratory resistance is of major importance since it varies. Different breathing patterns during PEP increase or reduce expiratory flow, result in movement of EPP centrally or peripherally and can increase or decrease lung volume. It is therefore	

and proximal mucus mobilization	necessary to give the right instructions to obtain the desired effects (141)	
19.3 Flow-dependent low resistance PEP systems, with an antibacterial filter on expiration circuit, are more tolerated and should be preferred to high resistance and threshold-PEP, mostly in weaker or symptomatic patients	One of the other ways of removing excess sputum from the airways is by increasing airflow along the airways. During normal tidal breathing the airflow can be artificially increased by applying a venturi effect within a breathing circuit, and this increase in the velocity of the air can enhance the movement of sputum. This is achieved because the movement of air above a layer of mucus develops a shearing force over the surface of this liquid layer. When the shearing force exceeds the surface tension in the mucous layer, the mucus starts to move in the direction of the air flow (153)	
19.4 Since cough is one of the most annoying symptoms in COVID-19 lung involvement and can cause dyspnea or chest pain, forced expiratory flows (Huffs) should be preferred to expectorate	As the mucus moves up the bronchial tree, it will eventually be swallowed. Importantly, this effect can be achieved with minimal discomfort and without the need to cough. Where a patient's clinical condition is deteriorating and they have fatigued muscles, the cough PEF may well be reduced to the extent that clearing secretions is inhibited significantly. A device that removes excessive airway secretions only under tidal breathing conditions would obviate the need for cough (153)	

19.5 Among ACTs, those that enable patient to auto-treatment should be preferred	The selection of the techniques/devices can be influenced by the clinical experience and confidence of the pulmonary rehabilitation clinician, so a trial can be performed to identify the best strategy for an individual patient, considering subjective and objective improvements (145,154)	
19.6 Jet/mesh nebulizer (with filters on the exhalation port and mouthpiece) and humidification should be considered in association to airway clearance intervention	Jet/mesh nebulizer (with filters on the exhalation port and mouthpiece) and humidification should be considered in association to airway clearance intervention.	Usually humidification is the best choice {7}
19.7 During invasive mechanical ventilation suctioning should be performed with a closed suction system and an in-line viral filter	(6,155)	

Table 20. Have respiratory muscle training a role in the program?

Suggestions	Author's comments	Panelists' comments {rating}
20.1 Respiratory muscle training is not recommended routinely, but it should be administered whenever respiratory muscle weakness is detected, particularly in patients candidate to decannulation or persistent dyspnea	Respiratory muscle training should be dedicated to those patients in whom respiratory muscle weakness is found or at least suspected. It may cover an important role in decannulation and weaning from mechanical ventilation (73,74,157,158)	I did not find these patients in my experience {6}
20.2 The type, efficacy and duration of respiratory muscle training in COVID-19, either in the post-acute phase or in the long-term at patient's home, has still to be investigated	Recommended training programs dedicated to COVID-19 have not been studied yet, and future studies should define the best FITT. Generally, two types of respiratory muscle training are possible: inspiratory muscle training (IMT) with resistive load devices, or isocapnic hyperpnea. When MIP/MEP measurement is available, standard training protocols for inspiratory muscle training starting at an intensity of 30% of MIP should be administered. (159) Regarding the role of domiciliary respiratory muscle training, it may be performed with the same recommendations of modalities and monitoring. As the prevalence of respiratory	

	muscle impairment, as well as its possible recovery, are unknown, it is not possible to establish definitely whether respiratory muscle training should be recommended or not in the long-term. It is advisable that the monitoring and training of respiratory muscles should be continued at home until strength, endurance, or symptoms, are normalized. Future studies should investigate the appropriateness and efficacy of domiciliary respiratory muscle training, as well as the need for supervision and monitoring.	
20.3 The Inspiratory Muscle raining should be started at low intensity. The progression must be guided by dyspnea/fatigue and by the monitoring of vital signs	When specific measures of respiratory muscle strength are not available, we have suggested to start at low intensity (i.e. at 30% MIP or at the level where the patient can perform 10 breaths with low dyspnea / fatigue) and progressing it according to symptoms. Moderate dyspnea/fatigue has been suggested as target for training in this case. The progression must be guided by dyspnea / fatigue and by the monitoring of vital signs. The need for monitoring the respiratory muscle training session is unknown. We suggested the monitoring of standard vital signs (SpO2, heart rate, respiratory rate), symptoms (dyspnea and fatigue), and any sign of respiratory distress. We recommend also stopping the	I agree only when IMT is indicated {9}

	session of respiratory muscle training in case of severe fatigue or dyspnea, or protectively when SpO2 drops under 92% (159)	
20.4 MIP/MEP or surrogate measures should be considered as main outcome measures for respiratory muscle training	As respiratory muscle training has the aim of improving respiratory muscle strength or endurance, the measure of MIP/MEP or surrogate is recommended as main outcome measures. The impact on exercise-induced dyspnea measured during field exercise tests is also recommended, to establish whether the improvement of strength translated in an improvement of perceived symptoms (160)	And this is a limiting factor {9} Before to treat respiratory muscle, we should of course, evaluate them. (161) {7} Recommend against IMT {1}
20.5 Respiratory muscle training should be performed using disposable dedicated devices	Due to infectious risks, the respiratory muscle training should be performed using disposable dedicated devices. For this reason, as no disposable devices are available for respiratory muscle endurance training, we do not recommend any endurance training program in infectious patients (78)	If used, we always should think in protect the device and the air.{7} Recommend against IMT {7}

Table 21. Is tele-coaching/tele-monitoring/telerehabilitation possible, effective and safe for these patients?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
21.1 Tele-rehabilitation (TR) could represents the appropriate response in the post-acute phase by combining need of PR with need for social distancing	The ideal candidate to refer to TR, duration of the rehabilitation intervention, demonstration of efficacy equivalent to traditional rehabilitation, as demonstrated for COPD, Rehabilitation program (FITT) to be applied and Cost-effectiveness is unknown. The newly discovered Coronavirus (COVID-19) and social distancing has put telehealth (tele-coaching/tele-monitoring/telerehabilitation) on the front lines. There are two main components of TR services: rehabilitation service (clinical application) and telecommunication/information technology. The support of wireless sensors, computers, software and communications systems (such as videoconferencing, email, apps, web-based communication, and wearable technology) are needed to develop a telerehabilitation service	I agree on the good background but we need studies on COVID-19 patients {9} Must be stressed that data is lacking and integrity with significant oversight of these programs must be maintained for positive outcomes {7}
21.2 TR may allow to increase the accessibility of PR eliminating issues of transport, travel, their associated costs and weather	(162-165)	Accessibility is also related to reimbursement for tele rehab programs and staff dedicated {9}

21.3 TR should be adopted in patients with mild to moderate disabilities needs for frequent monitoring, with residual disability after PR residing in isolated areas or without availability of standard PR program	Monitoring should be done through wearable technology and wireless devices. Vital parameters as SpO2, FC, PA, FR should be recorded before the start of the telerehabilitation intervention and then monitored daily, in rest conditions and during exercise. Symptoms by dedicated psychometric scale (*i.e*. BORG scale or VAS) could be used to tailor exercise. ECG is recommended in patients with concomitant cardiac disease before the start of the rehabilitation process. At least a weekly contact by videocall or phone in order to verify patient's adherence to rehabilitation sessions and quality of signals is needed (166-168)	An individualized program with TR can be valid as a PR {6} I think you are confusing telerehabilitation with telemonitoring- monitoring is important but w/o structured exercise and increasing intensity it is not rehab {2}
21.4 Vital parameters (SpO2, FC, PA, FR) as symptoms should be recorded before the start of the telerehabilitation intervention and then monitored daily	Dyspnea (*i.e*. BARTHEL dyspnea Index), ADL assessment (*i.e.* BARTHEL Index), physical performance (*i.e*. SPPB), effort tolerance (*i.e*. 6-min walking test), quality of life (*i.e*. EuroQoL) and anxiety/depression scale (HADS scale) should be recorded before the start of the telerehabilitation intervention and at 3 and 6 months after the end of TR program.	Daily or as needed {9} Not necessary to over-record data. Time consuming to staff as the data must also be interpreted in real time. {3}
21.5 Proper training of health professionals involved and the verification of the technological requirements, especially at		

the patient's home, are required		
21.6 Adequate caregiver support could be necessary in case of residual disability or for technological setting up		

Table 22. When and what kind of re-assessment is recommended? when a multidisciplinary follow-up is required? in which setting?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
22.1 The reassessment should be performed at the end of the post-acute phase, before the transfer to another location (rehabilitation institute for intensive respiratory rehabilitation or home) and therefore every 3 months for 1 year in more severe cases	The reassessment should be performed at the end of the post-acute phase, before the transfer to another location (rehabilitation institute for intensive respiratory rehabilitation or home) It must include an assessment of: oxygen requirements and ventilatory support; swallowing and speech skills; motor skills and autonomy in daily life activities; comorbidities (*e.g.* cardiovascular, psychiatric, neuropsychological); nutritional status. In this context, the role of rehabilitation specialists is crucial. Lung function test may be performed no earlier than 2 months. The setting should be chosen based on the characteristics of the patients: an hospital setting (rehabilitation institute for intensive rehabilitation) can be indicated in patients who after the post-acute phase have: 1) tracheostomy, CPAP or BIPAP, oxygen therapy at rest in order to assess their need for long-term continuation; 2) extra-pulmonary comorbidities (*e.g*. cardiovascular, psychiatric, neuropsychological) or severe disability with lack of autonomy in the activities of daily life, to allow their correct classification	it is a good working hypothesis {9} I agree with this recommendation b think that people sent to home have continue to monitor their Vital signs and subjective symptoms in order t contact their clinicians as soon as possible, if necessary {7}

	and treatment and restore the best degree of autonomy in the activities of daily life. A home setting can be indicated in patients who after the post-acute phase have: sufficient autonomy, adequate home support, mild disability, one or no comorbidity, no need for monitoring The availability of telemonitoring systems can allow the re-evaluation at home of even more serious patients, provided that home support is guaranteed In the post-acute phase, the patient can still be positive for the swab, therefore the choice of the setting must also take this aspect into consideration. It is not clear optimal duration and interval of follow-up to monitor patients over time Follow-up by a multidisciplinary team is recommended in patients with comorbidities, new or past or developed during follow up (16,169,71)	
22.2 The setting after the post-acute phase have should be chosen based on the characteristics of the patients. An hospital setting (rehabilitation institute for intensive rehabilitation) can be indicated in patients with	(166,170)	Agree provided that rehab program at home is existing and not "cosmetic" (*i.e*. 1 h/a week) {9} If possible, I recommend even for people discharged at home a minimum level of monitoring, even self-monitoring if it’s the

1) tracheostomy, CPAP or BIPAP therapy, oxygen therapy at rest 2) extra-pulmonary comorbidities or severe disability with lack of autonomy in the activities of daily life. A home setting can be indicated in patients with sufficient autonomy, adequate home support, mild disability, one or no comorbidity, no need for monitoring		only way but not without nothing. This can be useful to empower self-efficacy and auto-rehabilitation in order to came back to the situation prior to the infection or even a better one {8}
22.3 Follow-up by a multidisciplinary team is recommended in patients with critical and severe disease, extrapulmonary manifestations of COVID-19 and in those with past disabilities, in order to evaluate their evolution over time	To verify the effectiveness of PR program dyspnea (i.e. BARTHEL dyspnea Index), ADL assessment (i.e. BARTHEL Index), physical performance (i.e. SPPB), effort tolerance (i.e. 6-min walking test), quality of life (i.e. EuroQoL) and anxiety/depression scale (HADS scale) must be re-evaluated When tracheostomy is present the patient must be evaluated by a multidisciplinary team	PR is made by pulmonary physicians and respiratory physiotherapists. Consultants are needed when other components of disability are relevant {9} May not need the whole MDT probably MD and PT for most instances {7}

Table 23. What are the risks and benefits of exercise training in COVID-19 patients with cardiovascular complications?

Suggestions	**Author's comments**	**Panelists' comments {rating}**
23.1 During exercise training ECG, automatic blood pressure and pulse oxygen saturation monitoring is recommended	Absence of documentation that allows us to understand in detail the changes with respect to the exercise capacity of patients with cardiovascular complications from COVID-19. The level of monitoring depends on the clinical condition, hemodynamic reestablishment and the resulting rehabilitation profile of each patient (171,172). During the initial physiotherapy and exercise sessions, patients should be constantly monitored to avoid major complications such as death, cardiac arrest, myocardial infarction or serious injuries, which are, however, very unusual (173,174).)During therapy, this monitoring can be reduced depending on hemodynamic stability and clinical and cardiovascular risk profile (171). It is also important to investigate the symptoms reported by the patients during the exercise, for example by using BORG for dyspnea and Rate of Perceived Exertion scale. RPE administration is also useful for monitoring the exercise intensity (173)	Only pulse oxygen saturation is mandatory in most patients {4} Heart rate to easy and fast interpretation also should be considered in more stable patients. {8} I am not sure of this recommendation- we do not routinely monitor ECG or BP for PR however; this population may indeed be different- might qualify this a bit {5}
23.2 Supplementary monitoring for symptom check (BORG for dyspnea and Rate of Perceived Exertion scale RPE) are useful	The following parameters may be useful as outcomes parameters: 6 Minute Walking Test (to assess exercise capacity), Short Physical Performance Battery (SPPB) (to assess balance, gait speed, and lower limb lifting, force), Hand Grip Strength Test (HGST) (to assess grip strength),	

	Assessment of Activity of Daily Living (ADL), and Instrumental ADL (IADL) (using performance-based measures such as the Katz Index of Independence, in ADLs or Barthel ADL Index), catalase (to assess systemic antioxidant response), Oxidant/antioxidant, balance (to assess the inflammatory state generated by virus), Finger Plethysmography (to assess endothelial function with peripheral arterial tonometry)	
23.3 Effort tolerance, strength measurements, activity of Daily Living, inflammatory indices are useful outcomes parameters	Before starting the physiotherapy treatment of patients with cardiovascular diseases, it is necessary to carry out a functional assessment, especially to define exercise capacity (6MWT), physical function (SPPB), strength (HGST), and identify existing impairments in basic activities of daily living (ADL) and instrumental activities of daily living (IADL) (175,176). Of great importance is also, to investigate the coagulative profile of patients (177), as this may lead to greater attention by the physiotherapist in the patient's mobilization, or in the possibility of using rehabilitation aids. Since the virus appears to have effects on endothelial function (178,179) and systemic inflammatory state (180,181), evaluation of catalase levels, oxidant/antioxidant balance, and endothelium dependent vasodilation may be helpful. Exercise training is the tool that allows us to recover physical and endothelial function. In a first phase, we	Good hypothesis but we need data {9}

	propose to COVID-19 patients with cardiovascular complications, exercises at intensity of 2-3 METs, in interval training, since cardiovascular changes, recovery of exercise capacity, and modification of endothelial function are also relevant after interval training compared to endurance training. According to some authors, these adaptations may be even greater in interval mode (182-184). In addition, it is possible to recommend endurance exercise training with the use of a bedside cyclo-ergometer for both upper and lower limbs (185), and physiotherapist assisted walking progressively increasing the duration and speed of the walk, always in order to achieve improvements in endothelial function (186-188)	
23.4 If home programs are proposed a hybrid administration where the evaluation is carried out in person, and supervision of the exercise training program remotely may be the optimal solution	When home rehabilitation is proposed the requested patients, monitoring is related to: ECG monitoring also in remote, remote blood pressure and pulse monitoring, remote Oxygen saturation monitoring, symptom check (BORG for dyspnea and Rate of Perceived Exertion scale). Presence of the physiotherapist at the patient's home, remote based intervention (platforms, telephone, specific devices) and or hybrid intervention (remote + in presence of the physiotherapist) may be a possible solution to rehab access. The level of monitoring depends on the clinical condition, hemodynamic reestablishment and the resulting rehabilitation profile of each	Another good hypothesis to be tested in a study {9}

	patient (171,172). The control of vital parameters can be done in person by the physiotherapist who goes to the patient's home, and who may therefore decide to vary the level of monitoring according to the patient's condition; if, on the other hand, the parameters are remotely controlled, a complete monitoring is certainly safer for the patient (189,190). Exercise training, in the same way, can be administered in person by physiotherapists at the patient's home, or alternatively supervised remotely by using platforms, telephone or specific devices (191). The optimal solution, however, is a hybrid administration where the evaluation is carried out in person, and supervision of the exercise training program remotely. The proposed outcomes for home rehabilitation programs are: 1) Feasibility and acceptance, based on the patient’s satisfaction 2) Efficacy of the intervention (functional recovery and improvement of exercise capacity estimated with distance at 6 MWT, autonomy in ADL and IADL) 3) Safety, based on intervention-related adverse events and mortality 4) improvement in Health-Related Quality of Life (SF-36) Patient satisfaction, which can usually be assessed as adherence and persistence to the cardiological rehabilitation program, appears very high in-home setting in relation to the higher flexibility in terms of	

	time, also allowing patients to leave a more strictly medicalized path (192,193). The use of appropriate monitoring systems ensures that exercise at home is adequately safe even for high-risk patients (192), with the advantage of increasing the level of patient confidence regarding the non-damaging nature of the exercise, with a consequent increase in autonomy in Activity of Daily Living (ADL), which can be evaluated using scale like Barthel Index or Katz Index (193). Increased autonomy in ADL, together with functional recovery, are generally accompanied by an improvement in the quality of life, which can be assessed through scales such as SF-36. Focusing now on functional recovery, if the patient has been discharged from the hospital, he has probably had a 6MWT, which provide essential information in order to understand exercise capacity and to adapt the physiotherapy treatment to each patient (193); if, on the other hand, the patient is in a primitive home setting, and it is in no way possible to carry out a 6MWT, we can think of using autonomy in ADL as a parameter for the evaluation of exercise capacity	

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