Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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EDITORIAL

Two years of COVID-19: Trends in rehabilitation

Rehabilitation is an important therapeutic strategy for patients who are exposed to COVID-19-related complications and particularly for those at risk of prolonged hospitalisation. Two years ago we had a paucity of information on dealing with such an unprecedented situation except for general recommendations.[1] Among these, in April 2020 an Italian position paper considering different phases of the disease and organisational issues, has furnished detailed recommendations that have substantially contributed to the development of safe and appropriate rehabilitative interventions particularly for the provision of respiratory physiotherapy.[2] The information released in that document is still valid and consistent after two years. As already pointed out, from the COVID-19 pandemic we have learned that physiotherapists already substantially contributed to implementing appropriate procedures and treatments at the beginning of the SARS-CoV-2 outbreak.[3] However, at the time of writing, we have now more data available, and we can infer additional details about rehabilitation for patients with COVID-19 at different stages of the disease.

COVID-19 has several extrapulmonary manifestations of rehabilitative interest, including neurological, physical, and functional limitations[4-7] which can last even months after the acute illness phase.[8,9] Over time, an increasing number of studies have been published reporting data about rehabilitative therapies adopted and implemented in COVID-19 settings. Observational studies are confirmed to be particularly helpful during this COVID-19 pandemic since they allow researchers to understand better different characteristics of the disease and related rehabilitative treatments to be implemented accordingly.[10]

During the first pandemic wave, one of the most worrying concerns was represented by hypercoagulability, a relevant factor in the pathogenesis of COVID-19 complications, with potential repercussions on the rehabilitative treatment.[11]

The surge in cases around the globe has stimulated easing administrative procedures to transfer hospitalised COVID-19 patients from acute COVID-19 hospitals to inpatient rehabilitation facilities producing positive effects on availability of beds.[12] In addition, rehabilitation has played a crucial role in facilitating patients' activity and mobility, a timely discharge, and the possibility of being discharged home or to "Covid hotels" from acute hospitals.[13] Several studies of acute inpatient rehabilitation conducted during the first pandemic wave, have demonstrated that an early rehabilitative approach was effective at improving outcomes and facilitating discharge to home.[14-18] Nevertheless, the same efficacy was not confirmed when considering mortality; while in some studies rehabilitation was associated with reduced mortality,[19] in others patients had a longer duration of invasive mechanical ventilation, a longer ICU stay, a more extended hospital stay and higher mortality rates.[20] It could be speculated that such differences are probably correlated to pre-existing comorbidities and patient selection.

From data available in the literature, the rehabilitative treatment provided in acute and subacute hospital settings seems to commence within the first 3-10 days after hospital admission, to be constituted by 15/30-minute sessions having heterogeneous frequencies ranging from twice a week to a daily schedule.[14-21]

Another aspect emerging from different clinical experiences is the use of assisted techniques implemented with rehabilitation such as muscle electrical stimulation and in-bed ergometry, showing they are feasible and contribute to reducing personnel exposure and saving personal protective equipment (PPE).[15,22] Indeed, the availability of PPE was a primary concern during the first pandemic wave. Although at the time of writing it seems there are no critical limitations to obtaining sufficient quantities of PPE, their uninterrupted use during the personnel shifts continues to be a cause of fatigue and attention, particularly regarding undressing and correct usage procedures.[23] In addition, high-risk interventions such as patient pronation, oxygen therapy, noninvasive ventilation, and chest physiotherapy, continue to be a matter of attention regarding personnel exposure. At the same time, manufacturers have been encouraged to develop a new generation of respiratory devices taking into consideration safety issues related to ventilation in critical settings dedicated to patients with respiratory viruses.[24] To reduce personnel exposure and save

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medical resources, other authors have implemented a belt-type muscle electrical stimulation protocol consisting of three 50-minute daily sessions to counteract muscle loss and the onset of ICU-acquired weakness in patients subjected to intensive organ support.[15]

There are no doubts about the challenges the COVID-19 pandemic has posed in managing an unparalleled volume of hospital admissions because of severe complications caused by the disease. However, the most critical concern has been and still is —at the time of writing— avoiding pressure on health care systems worldwide. In doing this, it is evident that expediting patient flow from acute to step-down units is a solution to making more beds available for those needing care. Such an approach might be facilitated by treating patients as soon as they are hospitalised, sharing a culture of mobility within the care settings. In this context, acute inpatient rehabilitation is a valuable means of accomplishing the mission to have patients participate in motor activities as much as possible and be able to execute respiratory exercises, even under challenging clinical conditions.[25]

The principal barriers to developing these abilities are often represented by the lack of human resources and the absence of a mobility culture within the teams. Nevertheless, these concerns can be addressed and observed from three perspectives: patient, organisational structure, and professionals. For the patient, pre-existing daily autonomy, care complexity and comorbidities are predictors of compliance with the therapeutic measures and clinical outcomes. It is well known that appropriate staffing, skill mix, training strategies, and turnover of human resources can influence the determination of the time reserved for patient assistance and the quality of multidisciplinary integration and communicative strategies between hospital settings. Furthermore, the effective management of the patients' clinical information contributes to enhancing the continuity of care from acute to step-down units as well as from hospitals to territorial rehabilitative facilities.

Eventually, from the professional's point of view, sharing common schemes for preserving motor, respiratory, swallowing functions should be implemented within the teams because they will influence the patients' journey to home or post-acute rehabilitative structures and expected outcomes. Patients who do not require further hospitalisation in out-patient settings, but are still in need of care, can be discharged home and continue to follow a specific rehabilitative protocol via telerehabilitation. The COVID-19 pandemic has contributed to the development of telemedicine strategies that are proving of crucial importance for reducing the risk of infection and responding to the need of care for patients who, during the first pandemic wave, had no access due to the contraction of healthcare services. Initial experiences of telerehabilitation have demonstrated that it is feasible and produces positive effects on functional capacity, exercise tolerance and dyspnoea.[26]

However, one of the most positive aspects of the rehabilitative pathway within critical settings is the capacity of sharing different tasks among health care professionals, involving various rehabilitation disciplines. In addition, COVID-19 has highlighted the ability of team members to cooperate, producing a virtuous circle of multidisciplinarity.[27,28] Last, but not least the published studies did not on average report a high level of contamination among the rehabilitative staff, even in those exposed to aerosol-generating procedures.[29] Indeed, a comprehensive and multidisciplinary approach is crucial to reducing the burden of care for families and caregivers, expediting patients' return to social and working contexts, thus mitigating costs.

After two years of COVID-19, we are observing that rehabilitation has several components that are fit to address different phases of the disease. An early rehabilitative approach in ICUs and sub-intensive settings has been demonstrated to be safe and feasible; to the same extent, patients developing long-COVID syndrome have found a prompt response which is further implemented by telerehabilitation.

Wave after wave, the COVID-19 pandemic demonstrates that health care systems are facing the same problems and difficulties worldwide. Nevertheless, rehabilitation professionals providing care in different settings contribute to establishing a rehabilitative regimen for patients with COVID-19, paving the way for further advancements.

Consent to publish data

Not applicable.

Conflicts of interest

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