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Future pulmonary rehabilitation perspectives following coronavirus disease 2019 in China

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There is considerable evidence supporting the role of pulmonary rehabilitation as a safe and cost-effective component of integrated management in patients with chronic respiratory illness.[1] Despite extensive global guidelines endorsing pulmonary rehabilitation referral, a recent study in the United States revealed that only approximately 1.2% of patients with chronic obstructive pulmonary disease (COPD) have access to pulmonary rehabilitation services.[2] The reason cited by the authors for the low participation rate in pulmonary rehabilitation was an inadequate referral system. In China, pulmonary rehabilitation is in its infancy, and referral to a structured pulmonary rehabilitation program is less common compared with the developed countries.

The coronavirus disease 2019 (COVID-19) pandemic has increased the need for long-term rehabilitation of patients recovering from COVID-19 after hospital discharge. Many patients with COVID-19 have complex comorbidities and functional impairment in these patients is also a major concern. It has been reported that 30% of hospitalized patients with COVID-19 require acute respiratory care, and more than 20% of those patients require home care after discharge.[3] Due to the risk of re-infection and potential spread of the virus, the social isolation measures imposed on these patients have become a major hurdle to fulfilling follow-up arrangements and implementing rehabilitation programs.[4] In many countries, hospital-based rehabilitation plans have been postponed and patients who are currently receiving pulmonary rehabilitation have been forced to terminate their treatment because of the pandemic. The fear of deterioration and/or acute exacerbation of pre-existing conditions has resulted in a call to consider new models of rehabilitation delivery.[5] There is no better time than the present for pulmonary rehabilitation providers to explore and implement methods to improve or supplement existing programs.

This paper proposes the following clinical practice model of pulmonary rehabilitation for consideration.

Adoption of a Tele-rehabilitation and Home-based Rehabilitation Model

The traditional mode of pulmonary rehabilitation requires a patient to attend a hospital or rehabilitation center two to three times each week for six weeks.[1] However, issues of time and transportation severely impede the pulmonary rehabilitation uptake rate.

The COVID-19 pandemic has been and continues to be a huge challenge for medical institutions worldwide and has forced a series of major changes in healthcare at an unprecedented rate. Due to the increased staffing demands imposed on the healthcare system by the COVID-19 pandemic, other patients will have limited access to healthcare services. Changing the original pulmonary rehabilitation model is thus imperative.

Telehealth has rapidly replaced outpatient consultation in overseas countries during the COVID-19 pandemic. In these unprecedented circumstances, telehealth has enabled care to be delivered while maintaining physical distance,

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reducing disease transmission, and keeping vulnerable patients and essential staff safe.Telehealth uses information and communication technologies in the form of artificial intelligence, contactless and wearable devices, and personal computer or mobile phone applications. WeChat provides a safe solution for patients, family, and staff in the midst of COVID-19. Current software technology facilitates the essential components of a rehabilitation program, namely assessment, education, prescription, and monitoring of exercise programs; advice on medication, nutrition, and lifestyle modification; and program evaluation. Hansen *et al*[6] demonstrated that the participation rate of patients with COPD in "remote"/home-based pulmonary rehabilitation was significantly greater compared with a traditional hospital-centered program. Patients confined to social distancing at home rely heavily on advice from medical teams, and this tele-model not only alleviates patient anxiety, but it is also the future direction of pulmonary rehabilitation. Considering the pandemic characteristics of COVID-19, traditional Chinese exercise (Tai Chi and Baduanjin) has unique advantages, since physical movements are small and the space requirement is not substantial. Thus, such exercise is suitable for home practice during the COVID-19 pandemic. Rapid development of internet technology has provided the basis for remote monitoring and guidance.[7]

Building an Effective Multidisciplinary Team Model

Pulmonary and critical care medical (PCCM) practitioners to be team leaders: The majority of patients with COVID-19 have complex comorbidities, and many severe cases suffer the negative effects of long-term mechanical ventilation. These patients have complex impairments of the pulmonary and cardiovascular systems, including post-acute respiratory distress syndrome, pulmonary fibrosis, coagulopathy, and cardiac myopathy;[8] therefore, follow-up by a specialist with respiratory expertise is essential. PCCM practitioners are the most appropriate professionals to lead a tele-pulmonary rehabilitation program in China. PCCM practitioners are specially qualified to manage acute respiratory care in critical illness, and their care adheres to Chinese Thoracic Society/Chinese Association of Chest Physicians strategy guidelines. During the outbreak of COVID-19, there were thousands of PCCM practitioners providing first-hand care to severe and critical patients with COVID-19. These PCCM practitioners clearly had a thorough understanding of each patient's associated comorbidities. Medical follow-up of patients with COVID-19 by PCCM practitioners is essential.

Essential team members: Under the proposed model of pulmonary rehabilitation, nurses will assist in the coordination of patients and arrangement of appointments and essential laboratory investigations prescribed by PCCM practitioners. PCCM practitioners can refer patients to physical therapists, occupational therapists, speech therapists, dietitians, and psychologists, as necessary. Patient consultations are delivered by telecommunication. Patients are referred to physical therapists for assessment of respiratory function and physical function evaluation. Those who require structured pulmonary rehabilitation will be recruited to a physical therapist-led exercise program. The program will be prescribed and monitored via tele-mode, and a report of patient progression and program evaluation will be sent to the PCCM practitioner in charge. Patients with mild or common COVID-19 will be followed up by respective physical therapists at rehabilitation hospitals performing respiratory and functional assessment and individually tailored exercise programs, as necessary. Should these patients deteriorate or show any untoward respiratory impairment, a PCCM practitioner will be consulted.

For patients with respiratory dysfunction, appropriate pulmonary rehabilitation is as important as medical treatment. Patient-targeted exercise prescription and monitoring by cardiopulmonary physical therapists who have undergone professional training are fundamental elements to the success of a pulmonary rehabilitation program. From the point of view of improving symptoms, functional status, and promoting health-related quality of life, pulmonary rehabilitation has several advantages that cannot be replaced by medical treatment. However, appropriate and structured referral to pulmonary rehabilitation is vital.

It is very important to build an effective multidisciplinary team model. The starting points include multidisciplinary cooperation, integrated traditional Chinese and Western medicine, and international cooperation. On the basis of this multidisciplinary team model, PCCM practitioners are crucial in solving the clinical and scientific problems related to COVID-19.

Establishment of a structured, evidence-based pulmonary rehabilitation program led by PCCM practitioners and assisted by professional nurses and qualified cardiopulmonary physical therapists should be the future of pulmonary rehabilitation programs in China. Should the proposed home-based tele-pulmonary rehabilitation model for patients with COVID-19 be successfully implemented, this will be a comprehensive rehabilitation model for patients post-COVID-19 worldwide, and will also be a practical model for all pulmonary rehabilitation programs in China to follow.

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Conflicts of interest

None.

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