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EDITORIAL

Will the COVID tsunami be able to impose tele-rehabilitation as a system opportunity?

We accept with enthusiasm the call by Jacome et al. published in this issue of Pulmonology.[1] Pulmonary rehabilitation may be used for a wide range of purposes and may include decreasing hospital care services, reducing the cost of care, improving adherence to physical activities, training and correcting life styles, improving accessibility, extending services to remote locations, improving self-monitoring, better understanding of prescribed treatments, improving adherence and better communication with health professionals.[2]

Tele-health has been defined as the use of information and communication technologies to deliver health care services and transmit medical data over long and short distances.[3] It encompasses a wide variety of technologies such as videoconferencing, internet platforms, store-and-forward devices, streaming media, and ground and wireless communication. Tele-rehabilitation works to address a basic question: how to improve access to rehabilitation services for patients, in an efficacious, cost-effective, and safe manner? It may provide an ideal opportunity to either improve access to pulmonary rehabilitation (PR) and/or help maintain positive results following a traditional program. Tele-rehabilitation reduces barriers such as insufficient programs and inadequate numbers of qualified health professionals, particularly in rural and regional areas, reduces problems of transportation, accessible parking, as well as walking distance from parking to the hospital. An emerging area of application of technology refers to the use of wearable sensors to facilitate the implementation of home-based rehabilitation interventions. Systems that aim to facilitate the implementation of rehabilitation exercise programs often leverage the combination of sensing technology and interactive gaming or virtual reality (VR) environments.[4]

Previous studies illustrated the potential of tele-health to facilitate the delivery of PR to patients with chronic obstructive pulmonary disease in their home, as well as to remote settings without the benefits of an established program.[5,6] The Coronavirus (COVID-19) pandemic ''day after'' is coming and people, who suffered from mild to severe pneumonia up to hypoxemic respiratory failure, might be at risk of long-term impairment and disability.[7]

Like all patients who have undergone critical illnesses, COVID-19 patients can present dyspnoea and fatigue at rest and during activities of daily living, disability, exercise intolerance, reduction in peripheral muscle function and in nutritional status with significant weight loss. In particular, they may be at risk of residual or worsening parenchymal damage with respiratory muscle function impairment. Furthermore, the infection can negatively affect also other organs like heart, kidneys, muscles and brain, with significant health impacts that may persist. Additionally, people requiring intensive care are at increased risk of post-traumatic stress disorder, anxiety, and depression.[8,9]

The newly discovered Coronavirus (COVID-19) and the rigorous request for social distancing has put tele-health (tele-coaching/tele-monitoring/telerehabilitation) in the front line. Tele-rehabilitation may represent the most appropriate response in the post-acute COVID phase by combining need for rehabilitation with need for social distancing.[10] It should be adopted in post COVID patients with mild to moderate disabilities, who need frequent monitoring, reside in isolated areas or are not available to participate in standard programs. Our recent experience in this field in a subgroup of post COVID patients (unpublished data) with reduced exercise tolerance, exercise induced desaturation, mild restrictive ventilatory pattern and persistent pathological lung imaging, has given promising results: average adherence to a 30-day program was 88% with improvement in exercise tolerance, dyspnoea and muscle fatigue. Strong monitoring should be maintained through wireless devices and when available wearable technology. Contacts by video-call or phone in order to verify patient adherence to rehabilitation sessions and quality of signals are needed. Despite this preliminary observation, the ideal post COVID candidate, duration of intervention, demonstration of efficacy equivalent to a traditional rehabilitation program to be applied and cost effectiveness are still unknown. Many patients who attend rehabilitation programs are older and may not be using, or have

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the capacity to use the technology required to delivery tele-rehabilitation. These factors may influence the tele-rehabilitation care environment, and as a consequence, the health outcomes. Patient empowerment and digital health literacy are essential for successful e-Health deployment. Another uncertainty in post COVID patients is the aim that is expected: a substitute for standard programs? purely reinforcement? maintenance program? a modality to improve access? Lack of different modalities of supervision is a crucial point: how to evaluate frequency, intensity, types and timing and how to monitor patients' adherence remain an unsolved question. Also the time required from staff as well as the amount of data to be interpreted in real time need to be elucidated. Proper training of health professionals and checking the technological requirements, especially in the patient's home, are also required. Adequate caregiver support may be necessary in cases of residual disability or for technological setting up. Legal problems associated with tele-rehabilitation are still controversial. The patient must be fully aware of the characteristics of the service, the potential risks, the precautions to reduce them and to ensure the confidentiality of the information.[11] The associated safety issues are complex and include not only apprehension about malfunctioning equipment, but also concerns regarding potential adverse effects on patient management decisions through delayed or missing information, misunderstood advice, or inaccurate findings.[12] Last but not least, the type of equipment used could represent a different per-patient cost, while currently there is insufficient evidence to properly advise about cost-effectiveness. How to perform quality control and modality of reimbursement remains a challenge.

The use of tele-health technology promises to address some major barriers for pulmonary rehabilitation delivery in that it allows for distribution of healthcare services and exchange of information between a healthcare provider and a patient in different geographical locations and therefore can provide an important resource to reach people who live in remote communities or have difficulty accessing traditional centres. National governments should promote common, ethical, legal, regulatory, technical, administrative standards for remote rehabilitation providing safe and effective services. The potential of Tele-rehabilitation has the enticing potential of reducing barriers and improving care. However, much of the research to date has not explored the impact of its introduction at a systems level, incorporating data beyond efficacy in the planning and implementation.

In conclusion we join the international call,[1] looking towards wider participation and operative actions.

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Conflict of interest

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