



# TIMELY AND EARLY RESPIRATORY REHABILITATION IN PATIENTS WITH COVID 19 PNEUMONIA IN A REFERRAL HOSPITAL

REHABILITACIÓN RESPIRATORIA OPORTUNA Y PRECOZ EN PACIENTES CON NEUMONÍA COVID-19 EN UN HOSPITAL REFERENCIAL

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## Mr. Editor

SARS-CoV-2 is a beta-coronavirus of the same subgenus as SARS and MERS viruses, they share the same gene binding receptor, angiotensin converting enzyme (ACE2)<sup>(1)</sup>. The spectrum of disease severity is varied, with the mild form being the most frequent (81%), and severe disease present in 14% of cases, with critical presentation being present in 5%, with a mortality of 2.3%<sup>(2)</sup>.

The post-pneumonia respiratory sequela caused by beta-Coronaviruses is diffuse alveolar damage with fibrotic lesions; the pathophysiological mechanism is multifactorial, which involves activation of transforming growth factor beta (TGF- $\beta$ )3, IL1, IL6, MCP1 and TNF- $\alpha$  secondary to epithelial injury and subsequent inflammation. In addition, exposure to high O<sub>2</sub> concentrations and effects of barotrauma, caused by advanced oxygen/ventilatory support, activate the pro-fibrotic TGF- $\beta$  pathway, resulting in aberrant repair characterized by exaggerated deposition of fibroblasts, myofibroblasts and collagen. Forty-seven percent and 25% of patients who survive moderate to severe COVID-19 pneumonia have decreased carbon monoxide diffusion and predicted total lung capacity, respectively<sup>(4)</sup>.

Respiratory rehabilitation is a tool used by the clinician to improve the physical and psychological condition and quality of life of people suffering from chronic respiratory disease. It is based on individualized management of the patient by applying muscle training, physiotherapy techniques, education, psychological and nutritional evaluation<sup>(5)</sup>. Respiratory rehabilitation applied in a timely and early manner reduces dyspnea, relieves anxiety and depression. In addition, it could reduce the occurrence of respiratory complications, improve pulmonary dysfunction and reduce the disability rate of hospitalized patients with a diagnosis of moderate to severe COVID-19 at the end of the acute phase.

For aerobic exercises, an extremity cycloergometer is used, with oxygen support to ensure an O<sub>2</sub> saturation (SatO<sub>2</sub>) greater than 95%, controlled according to the Borg scale and safety heart rate. In addition, it is suggested to use an incentive spirometer, by flow or volume, considering that the pulmonary sequelae are of restrictive pattern. As for the initial and follow-up evaluation parameters, it is suggested to use the one-minute standing-sitting test or the desaturation test with walking.

Our pulmonology team of a referral hospital for COVID-19 management suggests starting the post-COVID-19 respiratory rehabilitation program as follows (Table 1).

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**Cite as:** Antonio O. Morales Avalos, Félix K. Llanos Tejada, Juan A. Salas Lopez, Aldo R. Casanova Mendoza. Timely and early respiratory rehabilitation in patients with COVID 19 pneumonia in a referral hospital. Rev. Fac. Med. Hum. October 2021; 21(4):909-911. DOI 10.25176/RFMH.v21i4.3821



**Table 1.** Early Respiratory Rehabilitation of moderate to severe COVID-19 pneumonia.

Criteria for initiation of early respiratory rehabilitation	Prescription of early respiratory rehabilitation exercises COVID-19
<ul style="list-style-type: none"><li>• Basal FiO<sub>2</sub> requirement ≤ 40% (binasal cannula).</li><li>• Respiratory rate &lt; 25rpm</li><li>• Rhythmic heart rate &lt; 100lpm</li><li>• Temperature &lt; 38°C</li><li>• SatO<sub>2</sub> &gt; 94%.</li><li>• Systolic blood pressure &gt; 90mmHg</li><li>• Mean arterial blood pressure &gt; 70mmHg</li><li>• Time to onset of illness 10 - 14 days</li><li>• Borg resting scale &lt; 3 points</li></ul>	<ul style="list-style-type: none"><li>• Early sitting out of bed.</li><li>• 10 minutes warm-up with isotonic movements of limbs, torso and head; accompanied by diaphragmatic breathing and pursed lip.</li><li>• Beginning of the limb ergometer, monitoring the Borg scale (&lt;7 points) and maintaining the target heart rate (64% - 76% of the maximum HR value -defined as 220 - age of the patient-).</li><li>• For 30 minutes, continuous or intermittent (progressive objectives).</li><li>* Oxygen support for SatO<sub>2</sub>&gt; 94% (pre-during-post exercise).</li><li>• 10 minute cool down and rest.</li><li>• Incentive spirometer start (contraindicated in obstructive pattern): 20 inspirations 1 minute apart (progressive targets).</li><li>*PEP device, Threshold IMT as required.</li><li>*Duration 1 week in-hospital (reassessment), complete two months at home.</li><li>*Nutritional assessment</li><li>*Psychological evaluation</li></ul>
Completion criteria	
<ul style="list-style-type: none"><li>• Borg dyspnea scale&gt; 7 (total score: 10 points)</li><li>• Anterior chest tightness, dizziness, headache, palpitations, sweating, vertiginous syndrome.</li><li>• Sustained desaturation.</li><li>• SatO<sub>2</sub> decrease&gt; 4 points from baseline for more than 1 minute.</li><li>• O<sub>2</sub> decrease &lt;88% for more than 1 minute.</li></ul>	

FiO<sub>2</sub>: Inspired fraction of O<sub>2</sub>. SatO<sub>2</sub>: O<sub>2</sub> saturation. Maximum HR: Maximum heart rate. PEP: Positive expiratory pressure.



**Authorship contributions:** AMA, FLT, JSL y ACM have participated in the preparation of the letter to the editor and the approval of its final version.

**Financing:** Self-financed.

**Conflict of interest:** The authors declare that they have no conflict of interest.

**Received:** May 4, 2021

**Approved:** August 10, 2021

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