



## Respiratory Physiotherapy in Patients with COVID19

Mandana Mashhadi Jafari<sup>1\*</sup>, Farhan Soyuer<sup>2</sup>

<sup>1</sup>Department of Echocardiography Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran.

<sup>2</sup>Antalya Bilim University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Turkey.

**\*Corresponding author:** Mandana Mashhadi Jafari, Department of Echocardiography Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran (E-mail: mandanajafari19@yahoo.com).

### Abstract

Respiratory physiotherapy has long been shown to help patients with respiratory diseases since it maximizes and maintains their lung function. Recently a new public health crises threatening the world has been emerged with the spread of 2019 novel coronavirus (2019-nCoV). Lung infection is one the most significant symptom observed in severe cases. Although applying respiratory physiotherapy has been shown to have positive effects and contribute to treatment plan, it is uncertain whether respiratory rehabilitation therapy could improve lung function in all patients with COVID19. Further research are required to determine whether respiratory physiotherapy is effective intervention for patients with COVID19.

**Keywords:** *Respiratory Physiotherapy, COVID19.*

### Introduction

Respiratory physiotherapy or chest physiotherapy aims to help patients with respiratory diseases to maximize and maintain their lung function. Variety of techniques including breathing exercises, huffing, positive expiratory pressure (PEP) devices, oscillating PEP, autogenic drainage, exercise and education are used in chest physiotherapy. A reduction in exercise tolerance and increased breathlessness with activity are common complaints in patients with lung diseases. Pulmonary rehabilitation programme can improve exercise tolerance and reduce breathlessness in these patients. Although the impact of regular physiotherapy on ventilation, gas exchange, work of breathing and incidence of infective exacerbations is uncertain, rehabilitation of chronic obstructive airways disease can improve exercise tolerance and mobility [1], [2].

Recently a new public health crises threatening the world has been emerged with the spread of 2019 novel coronavirus (2019-nCoV). As of February 19, 2020, the total number of confirmed cases rose significantly in China and countries outside China. Although infection is transmitted through large droplets generated during coughing and sneezing by symptomatic patients, it can also occur from asymptomatic people and before onset of symptoms [3]. Lung infection is one the most significant symptom observed in patients with COVID-19. Detection of lung infections from computed tomography (CT) images also offers a great potential to augment the traditional healthcare strategy for tackling COVID-19 [4]. Common symptoms include fever, cough, myalgia, and fatigue. Patients may initially present with diarrhea and nausea a few days before

developing a fever. A small number of patients can have headache. Lung infection and severe alveolar damage can be observed in infected patients and affected older men with comorbidities are more likely to have respiratory failure due to severe alveolar damage. Indeed, acute lung injury represents the most severe form of the viral infection sustained by COVID-19. During the viral infection, host factors trigger an immune response resulting in pulmonary tissue damage, functional impairment, and reduced lung capacity [5], [6]. Hypoxemia and acute respiratory failure are common symptoms observed in patients with COVID-19 having pulmonary infection. Chest CT scans of COVID-19 patients have also revealed structural damages in lungs [7].

Physiotherapy has long been shown to be imperative for improving patient's condition among ICU survivors [8]. However, the true benefit of chest physiotherapy in ICU remains controversial [9].

It has been reported that physiotherapists, mainly respiratory physiotherapists, are among the healthcare professionals involved in the management and care of these patients with COVID-19 having pulmonary infection and play a key role in the non-invasive support management [10]. Respiratory or chest physiotherapy is an intervention which is commonly used in many hospitals, clinics and emergency departments by physiotherapists for patients with airway diseases. Respiratory physiotherapy aims to facilitate secretion transport and thereby decrease secretion retention in the airways. It consists of a combination of forced expirations, postural drainage, percussion, and/or shaking so that improves mucus transport [11]. Chest physiotherapy is an integral part of the treatment of patients with lung diseases including cystic fibrosis [12]. Low pulmonary compliance is a significant outcome in patients with COVID19. Damage to lung function and hypoxemia and cardiovascular repercussions are also symptoms in severe cases of COVID19. These changes lead to the need for physiotherapy and the management of oxygen therapy in patients with COVID19. Severe cases of COVID-19 infection can lead to lung infection and respiratory failure, therefore, chest physiotherapy may be essential for improving outcomes. Figure 1 summarizes the physiotherapy techniques suggested by Genoa used in ICU for patients with COVID-19 [13].

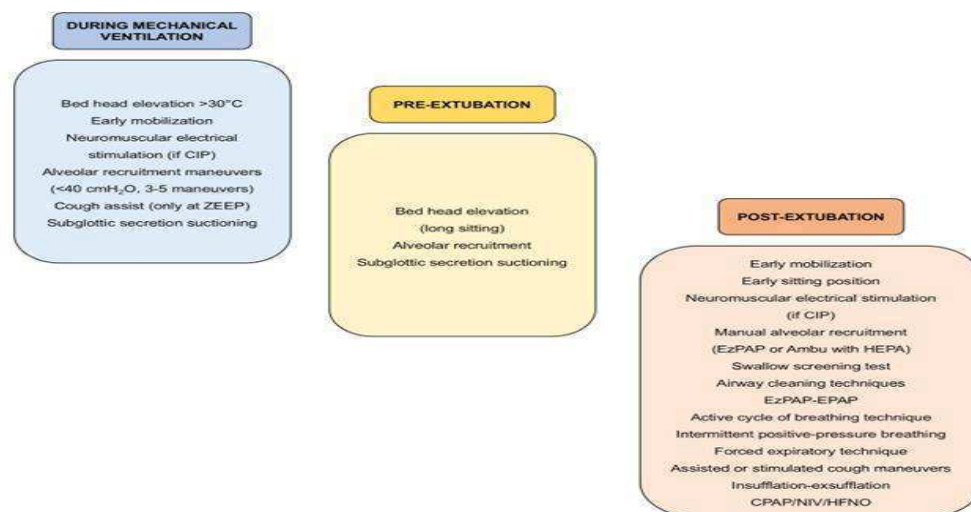


Fig. 1. Genoa-COVID-19 algorithm for respiratory physiotherapy [13].



We have also shown that respiratory physiotherapy exercises significantly improve the functional capacity and thus lung function [14], indicating that applying respiratory physiotherapy exercises in patients with COVID19 who have lung viral infection can contribute to the treatment. Although a productive cough is a less common symptom in patients with COVID19, physiotherapists may provide airway clearance techniques for ventilated patients who show signs of inadequate airway clearance [15]. Not all COVID-19 positive patients develop high secretion loads, so respiratory physiotherapy is indicated only for selected patients, however, those patients who have pre-existing respiratory conditions require personalized physiotherapy treatments which may include mechanical airway clearance or use of oscillating devices [16]. During COVID-19 outbreak, some respiratory rehabilitation departments have been used to host patients with COVID-19 and respiratory physiotherapists have been involved in oxygen therapy management in patients. The results show that respiratory physiotherapy can improve the condition of patients with COVID19 [17]. Although findings mostly indicate that respiratory physiotherapy can improve lung function in patients with respiratory diseases, a systematic review results show that it is uncertain whether respiratory rehabilitation therapy could improve lung function in all patients with COVID19 [18].

## Conclusion

due to limitations of research, we are uncertain about the efficacy of respiratory physiotherapy in all patients with COVID19. Further research are required to clarify whether patients with COVID19 can benefit from respiratory physiotherapy in hospitals or care centres.

## References

- [1]. Sutton PP, Pavia D, Bateman JR, Clarke SW. Chest physiotherapy: a review. *European journal of respiratory diseases*. 1982 May 1;63(3):188-201.
- [2]. Tang CY, Taylor NF, Blackstock FC. Chest physiotherapy for patients admitted to hospital with an acute exacerbation of chronic obstructive pulmonary disease (COPD): a systematic review. *Physiotherapy*. 2010 Mar 1;96(1):1-3.
- [3]. Singhal T. A review of coronavirus disease-2019 (COVID-19). *The Indian Journal of Pediatrics*. 2020 Mar 13:1-6.
- [4]. Fan DP, Zhou T, Ji GP, Zhou Y, Chen G, Fu H, et al. Inf-Net: Automatic COVID-19 Lung Infection Segmentation from CT Images. *IEEE Transactions on Medical Imaging*. 2020 Aug;39(8):2626-2637.
- [5]. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, et al. Coronavirus disease 2019 (COVID-19): a perspective from China. *Radiology*. 2020 Feb 21:200490.
- [6]. Gallelli L, Zhang L, Wang T, Fu F. Severe Acute Lung Injury Related to COVID-19 Infection: A Review and the Possible Role for Escin. *The Journal of Clinical Pharmacology*. 2020 May 22.
- [7]. Y. Li, L. Xia. Coronavirus disease 2019 (COVID-19): role of chest CT in diagnosis and management. *AJR Am. J. Roentgenol.*, 214 (2020), pp. 1280-1286



- [8]. E. Calvo-Ayala, B.A. Khan, M.O. Farber, E. Wesley Ely, M.A. Boustani Interventions to improve the physical function of ICU survivors: a systematic review *Chest*. 2013 Nov;144(5):1469-1480.
- [9]. Thomas P, Baldwin C, Bissett B, Boden I, Gosselink R, Granger CL, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. *J Physiother*. 2020 Apr;66(2):73-82.
- [10]. Lazzeri M, Lanza A, Bellini R, Bellofiore A, Cecchetto S, Colombo A, et al. Respiratory physiotherapy in patients with COVID-19 infection in acute setting: a Position Paper of the Italian Association of Respiratory Physiotherapists (ARIR). *Monaldi Archives for Chest Disease*. Monaldi Arch Chest Dis. 2020 Mar 26;90(1).
- [11]. van der Schans CP. Conventional chest physical therapy for obstructive lung disease. *Respiratory care*. 2007 Sep 1;52(9):1198-209.
- [12]. Fauroux B, Boulé M, Lofaso F, Zérah F, Clément A, Harf A, et al. Chest physiotherapy in cystic fibrosis: improved tolerance with nasal pressure support ventilation. *Pediatrics*. 1999 Mar 1;103(3):e32-.
- [13]. Battaglini D, Robba C, Caiffa S, Ball L, Brunetti I, Loconte M, et al. Chest physiotherapy: an important adjuvant in critically ill mechanically ventilated patients with COVID-19. *Respiratory Physiology & Neurobiology*. 2020 Aug 17:103529.
- [14]. Mashhadi Jafari M, Taghavi S. The Effects of Respiratory Training on Improving of Respiratory Function in Patients Undergoing Mitral Valve Surgery. *International Conference on BioMedical Sciences (ICBMS19)*. September 27-28, 2019 Istanbul (Turkey). Conference Book. ISBN 978-600-98459-5-8
- [15]. Thomas P. Physiotherapy management for COVID-19 in the acute hospital setting. *ΠINEΥΜΩΝ*. 2020 Jan;33(1):35.
- [16]. Singh S, Goel H, Singh S, Tiwary AK. Understanding COVID-19: origin, symptoms and current treatment guidelines. *Physiotherapy-The Journal of Indian Association of Physiotherapists*. 2020 Jan 1;14(1):5.
- [17]. Simonelli C, Paneroni M, Fokom AG, Saleri M, Speltoni I, Favero I, et al. How the COVID-19 infection tsunami revolutionized the work of respiratory physiotherapists: an experience from Northern Italy. *Monaldi Archives for Chest Disease*. 2020 May 19;90(2).
- [18]. Zhu F, Zhang M, Gao M, Zeng C, Wang D, Hong Q, et al. Protocol: Effects of respiratory rehabilitation on patients with novel coronavirus (COVID-19) pneumonia in the rehabilitation phase: protocol for a systematic review and meta-analysis. *BMJ Open*. 2020;10(7).