

# Viral Infections in COVID-19 and Role of Chest Physical Therapy with Self - Protections Strategies for Physical Therapists; A Mini Review

Tahir Mahmood<sup>1</sup>, Rubab Naqvi<sup>2</sup>, Iqra Waseem<sup>3</sup>, Waqar Afzal<sup>4</sup>, Sara Khawar<sup>5</sup>

<sup>1</sup> Senior lecturer, Imran Idrees institute of rehabilitation Sciences, Lahore, Pakistan

<sup>2</sup> Senior Lecturer, Azra Naheed Medical College, Lahore Pakistan

<sup>3-5</sup> Assistant Professor, University Institute of Physical Therapy, University of Lahore, Pakistan

## Author's Contribution.

<sup>1-2</sup>Conception and design, Collection and assembly of data, <sup>2-5</sup>Analysis and interpretation of the data, <sup>3-4</sup>Critical revision of the article for important intellectual content, <sup>3-4</sup>Final approval and guarantor of the article.

## Article Info.

Received: February 18, 2022

Acceptance: August 27, 2022

Conflict of Interest: None

Funding Sources: None

## Address of Correspondence

Iqra Waseem

Email Id: iqra.waseem91@gmail.com

ORCID: 0000-0002-1487-7749

Cite this article as: Mahmood T, Naqvi R, Waseem I, Afzal W, Khawar S. Viral Infections in COVID-19 and Role of Chest Physical Therapy with Self - Protections Strategies for Physical Therapists; A Mini Review. JRCRS. 2022; 10(2):124-129.

<https://dx.doi.org/10.53389/JRCRS.202210215>

## A B S T R A C T

COVID-19 infection recently broke out around the world affecting more than 2 million people. This is written in the context of importance of physical therapy interventions for clearing the secretion in the lungs during viral infections. In the case of lower respiratory tract infection the volume of thick secretion increases, that compromise the airway functioning. Covid-19 had affected the elderly and individuals with compromised immune systems, previous respiratory diseases like COPD, chronic bronchitis, or mucous-related issues of increased or decreased secretions. These secretions can cause a decreased area of ventilation. Therefore, lungs should be drained to increase pulmonary functions with different techniques known as Airway Clearance Techniques (ACT). These techniques can be passive including percussion, vibrations, and postural drainage, and others include Autogenic drainage, positive pressure expiratory techniques, and active cycle of breathing (ACB). The lungs can be cleared using postural drainage techniques. These techniques are non-invasive procedures and can help to improve respiratory functions, gaseous exchange, increased pulmonary functions, and retained mucus removal. Early rehabilitation programs in acute phases of the disease are suggested to prevent such complications and promote early recovery. The working professionals who are treating victims should follow the infection control protocols and position themselves at maximum distance. The use of precautionary measures, including masks, gloves, fluid-resistant gowns, and face shields, should be followed.

**Keywords:** Autogenic Drainage, Chest physiotherapy, Corona Viruses, COVID-19.

## Introduction

Coronaviruses (CoVs) are enveloped, non-segmented, and single-stranded RNA viruses. Their size ranges between 26 to 32-kilo bases, making them the largest viral RNA genome. The coronavirus subfamily is serologically and genotypically classified into four classes (genera);  $\beta$ ,  $\gamma$ , and  $\delta$  CoVs. The  $\beta$ - coronavirus is further divided into four viral lineages, A-D. 30 well-recognized coronaviruses can infect mammals, fowl, other animals, and human beings. The  $\alpha$ - and  $\beta$ -CoVs cause infections in humans.<sup>1</sup> Coronavirus (COVID-19) began spreading during December 2019 and was noticed in January 2020. It spread in China in mid to late January. COVID-19 is first and foremost a humanitarian challenge. By March 24th, 2020 the coronavirus had caused the deaths of more than 16,600 people all over the world with more than 380,000 confirmed infected individuals.

Among these infected individuals, 10,000 were critical. It currently affects 184 out of the 195 countries in the world. Latest report suggested over 409 million confirmed cases of corona virus and over 5.8 million deaths have been reported globally.<sup>1</sup> This public health crisis has affected many countries and communities in different ways including economic, socio-psychological, and international affairs. In Pakistan 1530235cases were confirmed, 3440 found active and 30379 death were reported. But the ratio of recovered cases was 1496482, 29th may 2022 (<https://covid.gov.pk/stats/pakistan>). We have searched the data based on recent studies related to COVID-19, physical therapy, chest physical therapy, suction techniques, viral infections, respiratory diseases, and precautions during epidemic outbreaks. All these studies were screened for having in variables of interest as mentioned above

were included in review.<sup>2</sup> On March 11th, 2020 the coronavirus outbreak is declared as a pandemic by World Health Organization (WHO). Such outbreaks are always accompanied by some kind of tsunami of information and are also likely to have some misinformation and rumors. "We are not just fighting an epidemic, we are fighting an info-demic," said the World Health Organization (WHO) on February 15th, 2020. WHO has declared COVID-19 as a Public Health Emergency of International Concern (PHEIC). With the advances in social media, this phenomenon is amplified going faster and further in the same way viruses travel with people. So, one of the new challenge is the timing because you have to make good efforts to create awareness among people, so they will be able to take right decision to control such kind of emergency So, it is important to make sure that people are informed to act appropriately.<sup>3</sup> The virus is transmitted through droplets and fomite contacts. The most common route is aerosol transmission where large diameter (10-100 Um) aerosol droplets can transmit to a new host at < 0.9 m, while small diameter (10 Um) can affect new hosts at > 1.8 m.<sup>4</sup> The viral is transmitted from one another person with respiratory droplets, while the saliva is reported as a reservoir for this novel coronavirus.<sup>5</sup> These small droplets can also be produced by sneezing, coughing, and other aerosol producing methods. These are transmitted more easily at high humidity and low temperature which is the reason why clinicians are advised to be careful with self-protection strategies.<sup>6</sup> It is most commonly transmitted by respiratory droplets of a person suffering from the corona infection when he/she coughs and sneezes within a short distance. The virus also spreads when one comes into contact with a contaminated surface or object touched by infectious droplets nearby the carrier. Then, if the person touches his or her hands on his or her face, eyes, and mouth. The virus can get into the human body through the mucous membrane of the nose and rarely through the conjunctiva. Average incubation time in human beings is usually 4 to 6 days.<sup>7</sup> The studies conducted in China conclude that during the outbreak, 11.2 % of children have a cough while 37.5% of adults have a cough.<sup>8</sup> Symptoms of the infection by COVID-19 are fever, myalgia, Fatigue, shortness of breath sore throat, and cough and sputum production.<sup>9-10</sup> This viral attack can damage the heart, central nervous system and Lungs.<sup>11</sup> Gastrointestinal tract problems which may include nausea, vomiting, and diarrhea are also reported in some patients. Chronic medical conditions like cardiovascular diseases, cerebrovascular problems (with hypertension being the most common) followed by Diabetes mellitus, are considered secondary risks. There is a more increased risk for the immune-compromised, already having respiratory diseases like COPD, chronic obstructive asthma, chronic bronchitis, or mucous-related issues of increased or decreased secretion. The

children and age 65 years is also a risk factor with Environmental factors including smoking exposure, pollution, weather conditions, and several family members cause spread of viral infection like influenza.<sup>12-13</sup> Respiratory infections are considered a burden on the economy and their hazards lead to emergency visits to hospitals in young and adult patients. The annual 1.4 million to 7.1 million cases of hospitalization flu in USA viral infection is dominant cause among them.<sup>14</sup> This viral infectious disease, like other diseases, needs a special protocol intended to facilitate emotional, mental, and physical recovery after the exposure. The scope of the rehabilitation team including physiotherapists, physicians, and other staff members is to play their role in such disasters to serve the public and work for the welfare of mankind. But, in current situations when an outbreak is going to affect the world for a couple of months, rehabilitation teams should focus on self-precautionary measures as well as to prevent further complications from these viral infections. In 2016, WHO protocols for minimal technical standards for response in any emergency stated that the capacity should be demonstrated on part of the rehabilitation team.<sup>15</sup>

---

## Role of Chest Physical Therapy

---

Physical therapists who are serving in primary health care departments have an important role for such patients. Physical therapy is a well-recognized profession all over the world that can play a potential role in this global emergency. Physical therapists working in acute hospital settings and ICUs, especially cardiorespiratory therapists focus on the management of acute as well as chronic respiratory syndromes aiming to enhance the recovery in these patients. This is written in the context of the need for viral infections and the importance of physical therapy interventions for clearing the secretion in the lungs resulting in increased lung functions. The role of chest physical therapy is well understood for its effectiveness in clearing sections with different methods. Physical therapy, like other medical professions, can play a vital role in the management of hospitalized patients who are confirmed cases or suspected of coronavirus infections. Respiratory treatments including chest physical therapy positioning and suctioning techniques could be very beneficial. In COVID-19 patients, though sputum production is a less common symptom, physical therapy can still be prescribed if they present with a large number of airway secretions that will not clear independently. Physical therapists working in ICUs can provide patients having severe respiratory distress airway clearance techniques and positioning to optimize their oxygenation. ICU patients are at high risk for developing ICU-related weakness and pressure ulcers, therefore it is very essential to start early rehabilitation

programs after the acute phase of the disease to prevent such complications and to promote recovery. Physical therapy treatment has key role with its techniques including exercises, mobilization, and rehabilitation interventions to those individuals who are survivors of COVID-19 and would help them to a better functional return.<sup>16</sup> Lower respiratory tract infections can increase the volume and sections become thick which can obstruct the airway. Lungs should be drained to increase pulmonary functions and secretions can be drained by the use of physiotherapy techniques known as Airway Clearance Techniques (ACT). These techniques can be passive including percussion, vibrations, and postural drainage. Passive techniques include Autogenic drainage, positive pressure expiratory techniques, and active cycle of breathing (ACB).<sup>17</sup>

The lungs can also be cleared using postural drainage techniques for ease of lung functions. These techniques are non-invasive procedures and can help to improve respiratory functions, gaseous exchange, increased pulmonary functions, and retained mucus removal. These secretions will directly remove secretions that can cause a decreased area of ventilation. The major classification of chest clearance methods are available Invasive and Non-invasive ventilatory support.

Invasive-ventilatory support includes Endotracheal tube suction (ETTS) and postural drainage. Endo-tracheal suction-closecircuit suction, control by using thumbs and adjust vacuum CSS (Closed Suction System), Holding C S S suction with non-dominant hand to avoid artificial airwayremoval. By grasping with right thumb and index finger 3-4 inches away fromconnection of airways then slowly progress the tip it inside. Feeling of resistance will be stop point with and unlock the thumb forsuction (for intermittent alternatively press and leave). Start taking it outside of mouth as indicating by black ring mark thatcatheter is now out of airway. Then irrigate with use normal saline ampule attached to the tube. <sup>18</sup> The Postural Changes is performed in every 12-16 hours in a day, 72 hours can be preferred during end trachealintubation. Effectiveness of these positions will lead to repetition of Pao<sub>2</sub>/FiO<sub>2</sub> ratio (P/F<sub>2</sub>≥150 mmHg with PEEP ≤ 10 cm H<sub>2</sub>o and then Fio<sub>2</sub>≤ 0.60 for a time of 4 hours after supine position (Avoid effects of prone position).<sup>19</sup>

In Non -Invasive Ventilatory Support Mask with Conventional O<sub>2</sub>, Face mask with O<sub>2</sub> Flow 5L/Min10 L/min O<sub>2</sub> with Reservoir Mask 60% FiO<sub>2</sub> using Venturi Mask.<sup>20</sup> High Flow Nasal Oxygen with Flow at 50 L/Min and FiO<sub>2</sub> at 60%, for open mouth, Tube can be connected to improve SIO<sub>2</sub>.<sup>21</sup> Continues Positive airway pressure with one time Support in an hour (otherwise use invasive method).<sup>22</sup>

Postural Changes in extended semi sitting or simple sitting but avoid slumped position.<sup>23</sup> In gravity-assisted drainage the Lowering of the chest concerning Hips (Lying with pillows or cushions placed below hips). Alternatively head can be down tilted at 15 to 30 degrees. The studies proved that regarding chest physical therapy postural drainage and ACBT are effective techniques to clear the lungs to work efficiently. Postural drainage can be also use to clear chest for ease of ventilatory exchange.

Upper Lobe, Apical bronchus in upright sitting, posterior bronchus for right, lying on left side in horizontal direction at 45o is recommended and for left lying on right side with pillows that lift shoulder more than 1 feet. For Middle Lobe which lateral and medial bronchus, lateral bronchus can be cleared in supine lying 1/4<sup>th</sup> of body is turned to left with pillow underright side and Medial Bronchus at 15° tilting for chest is compulsory.

Regarding Lower lobe, apical bronchus drainage can be performed in lying prone and with a pillow placed under abdomen but lying on right side with 20° chest tilting downwards will help in Medial Basal Bronchus. For anterior basalbronchus Knee should be flexed while lying supine and chest tilt at 20°. Lateral basal bronchus clearance effective in lying on opposite side and chest tilting at 20° and Posterior basal Bronchus Prone lying with pillow at hips level and chest tilt at 20°

Lingular Superior bronchus postural drainage is carried out in supine with lying 1/4<sup>th</sup> of body turned on right side with thehelp of pillow from shoulder to the level of hip but for inferior bronchus. Chest should be tilted at 15°. <sup>24</sup>

In another study subjects were given 2 sessions/day for 14 days and significant improvement in subjects regarding for forced vital capacity, Dyspnea, arterial blood gases, and spirometry. <sup>25</sup> The suctioning is of two types: open suction and closed suctioning. Regarding the closed suction methods, applying 200 mmHg suctioning pressure applied in patients on Mechanical ventilation if trachea bronchial suctioning is required in such patients. The reason behind this is the almost complete clearance of secretions in most subjects. <sup>26</sup> The persons, health care providers in long-term facilities providing care to them also facilitate the transmission of these viral infections. The working professionals should follow infection control protocols to avoid such outbreaks. All basic precautionary measures should be strictly followed to keep society, environments, and community.<sup>27</sup>

---

## Recommendations during Chest Physiotherapy

---

1. These are based on findings by the Italian Association of Physiotherapists includes:
2. Be careful while applying chest physical therapy techniques and don't be bound to a single method and its effectiveness. Use a multidisciplinary approach during teamwork
3. During different breathing patterns, be careful about the change of position as it can cause a change in gaseous exchange.
4. Avoid un-important maneuvers at the time to avoid risk for the decreased effect of PEEP (Positive end Expiratory Pressure) and risk of atelectasis and chance of lungs derecruitment can be increased.
5. Effects of Immobilization and Skin Lesions can be avoided with the use of proper support and bed Mobilization techniques.
6. Use precautionary measures to avoid droplets, use masks and filters during NIV/CPAP (Non-Invasive Ventilation /Continuous positive airway pressure) to decrease the risk of air contamination.<sup>28</sup>
7. The early approaches towards such critical patients can increase the likelihood of improvement and complications can be avoided.<sup>29</sup>
8. The instrument cleansing is recommended with chlorine-based antiseptics or with alcohol (70%).<sup>30</sup>

---

## Precautionary Measures

---

The health care providers should focus more on a hygienic environment positioning themselves 1>m from the patient. Droplet precautionary measures including wearing masks, gloves, fluid-resistant gowns, and face shields should be implemented in suspected or confirmed cases.<sup>31</sup> For Air Born Precautions adding N-95 Masks or P2 should be used when aerosol-generating cases are dealt with.<sup>32</sup> Avoid sharing equipment during procedures. Wear extra protective clothing if suspected of extra fluid exposure.<sup>33</sup> During techniques cough should be in sleeves or tissues. The wearing of shoes and hair covers are also recommended working with aerosol cases (Avoid repeated use of such covers). On the other side the training of staff is also a key factor in the implementation of it.<sup>34, 35</sup> Despite the literature supporting the use of chest physical therapy techniques but it is still controversial because aerosols can be a source of further spread<sup>36</sup>, Renato Fraga also reported same

about personal care and preventing the further risk of infection.<sup>37</sup> This review was limited to respiratory complications regarding viral infections and conservative management.

---

## Conclusion

---

This review highlighted the component which needs to be addressed in the present pandemic situations of COVID-19. The role of Chest physical therapy with its different modes including Endotracheal tube suction postural drainage are invasive but non-invasive including simple and venturi mask with O2, continuous positive airway and lobe specific drainage of chest secretion clearance are effective methods in viral infections effective but depending upon case severity.

---

## References

---

1. Li G, Fan Y, Lai Y, Han T, Li Z, Zhou P, et al. Coronavirus infections and immune responses. *Journal of medical virology*. 2020 Apr; 92(4):424-32.
2. Hua J, Shaw R. Corona Virus (COVID-19) "Infodemic" and Emerging Issues through a Data Lens: The Case of China. *International Journal of Environmental Research and Public Health*. 2020 Jan;17(7):2309.
3. Zarocostas J. How to fight an infodemic. *The Lancet*. 2020 Feb 29;395(10225):676.
4. Hall CB. 2007. The spread of influenza and other respiratory viruses: complexities and conjectures. *Clin Infect Dis* 45:353–359. <https://doi.org/10.1086/519433>.
5. Lal A, Khawaja M, Ahmed N. Saliva as a Diagnostic Tool for Detection of Coronavirus - A Review. *J Islamabad Med Dental Coll*. 2020; 9(3): 225-232.
6. Tamerius JD, Shaman J, Alonso WJ, Bloom-Feshbach K, Uejio CK, Comrie A, Viboud C. 2013. Environmental predictors of seasonal influenza epidemics across temperate and tropical climates. *PLoS Pathog* 9:e1003194. <https://doi.org/10.1371/journal.ppat.1003194>.
7. Siukan Law Albert, Wingnang Leung Chuanshan Xu, Severe Acute Respiratory Syndrome (SARS) and Coronavirus disease-2019 (COVID-19): From Causes to Preventions in Hong Kong, *Int J Infect Dis* April 03, 2020 DOI:<https://doi.org/10.1016/j.ijid.2020.03.059>
8. Su L, Ma X, Yu H, Zhang Z, Bian P, Han Y, et al The different clinical characteristics of corona virus disease cases between children and their families in China - the character of children with COVID-19 *Emerg Microbes Infect*. 2020 Dec;9(1):707-713. doi:10.1080/22221751.2020.1744483.
9. Lai CC, Liu YH, Wang CY, Wang YH, Hsueh SC, Yen MY, Ko WC, Hsueh PR. Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARSCoV-2): Facts and myths. *J Microbiol Immunol*. 2020 Mar 4.
10. Malik J, Khurram M, Mughal AM, Chaudhary NA, Aziz Q, Khan MM, Manzoor MS. Symptom Analysis of Confirmed

- Covid-19 Patients at Allied Hospitals of Rawalpindi Medical University, Pakistan. *J Islamabad Med Dental Coll.* 2020; 9(4): 235-241. Doi: 10.35787/jimdc.v9i4.607.
11. Hayat AQ, Akash MS. Effect of Novel COVID-19 Infection on Different Organs of Human Body: A Narrative Review. *J Islamabad Med Dental Coll.* 2020; 9(4): 303-306. Doi: 10.35787/jimdc.v9i4.532
  12. Oliveira-Santos M, Santos JA, Soares J, Dias A, Quaresma M. 2016. Influence of meteorological conditions on RSV infection in Portugal. *Int J Biometeorol* <https://doi.org/10.1007/s00484-016-1168-1>.
  13. Simoes EA, Carbonell-Estrany X. 2003. Impact of severe disease caused by respiratory syncytial virus in children living in developed countries. *Pediatr Infect Dis J* 22:S13–S18. <https://doi.org/10.1097/01.inf.0000053881.47279.d9>.
  14. Martin LJ, Im C, Dong H, Lee BE, Talbot J, Meurer DP, Mukhi SN, Drews SJ, Yasui Y. 2016. Influenza-like illness-related emergency department visits: Christmas and New Year holiday peaks and relationships with laboratory-confirmed respiratory virus detections, Edmonton, Alberta, 2004–2014. *Influenza Other Respir Viruses* <https://doi.org/10.1111/irv.12416>
  15. World Health Organization (WHO). WHO launches rehabilitation standards for emergency medical teams [Internet]. Geneva: WHO; 2016 [cited 2020 Mar 2].
  16. Thomas P, Baldwin C, Bissett B, Boden I, Gosselink R, Granger CL, Hodgson C, Jones AY, Kho ME, Moses R, Ntounenopoulos G. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. *Journal of Physiotherapy.* 2020 Mar 30.
  17. Morrow BM Airway clearance therapy in acute paediatric respiratory illness: A state-of-the-art review. *S Afr J Physiother.* 2019; 75(1):1295. doi: 10.4102/sajp.v76i1.1367
  18. Pruitt B. Clear the air with closed suctioning. *Nursing* 2019. 2005 Jul 1;35(7):44-5.
  19. Guérin C, Reignier J, Richard JC, et al. Prone positioning in severe acute respiratory distress syndrome. *NEJM.* 2013;368:2159-68.
  20. Hui DS, Chow BK, Chu L, et al. Exhaled air dispersion and removal is influenced by isolation room size and ventilation settings during oxygen delivery via nasal cannula. *Respirology* 2011;16:1005-13. doi: 10.1111/j.1440-1843.2011.01995.x
  21. Leung CCH, Joynt GM, Gomersall CD, et al. Comparison of high-flow nasal cannula versus oxygen face mask for environmental bacterial contamination in critically ill pneumonia patients: a randomized controlled crossover trial. *J Hosp Infect* 2019;101:84-7. doi: 10.1016/j.jhin.2018.10.007.
  22. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult in patients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet* 2020. pii: S0140-6736(20)30566-3. doi: 10.1016/S0140-6736(20)30566-3
  23. Ding L, Wang L, Ma W, He H. Efficacy and safety of early prone positioning combined with HFNC or NIV in moderate to severe ARDS: a multi-center prospective cohort study. *Crit Care* 2020;24:28. doi: 10.1186/s13054-020-2738-5.
  24. Pryor J and Prasad S (eds) (2008): *Physiotherapy for Respiratory and Cardiac Problems* (4th ed). Edinburgh: Churchill Livingstone, p-167.
  25. AbdelHalim HA, AboElNaga HH, Fathy KA. Comparison between active cycles of breathing with postural drainage versus conventional chest physiotherapy in subjects with bronchiectasis. *Egyptian Journal of Chest Diseases and Tuberculosis.* 2016 Jan 1;65(1):157-65.
  26. Yazdannik A, Saghaei M, Haghghat S, Eghbali-Babadi M. Efficacy of closed endotracheal suctioning in critically ill patients: A clinical trial of comparing two levels of negative suctioning pressure. *Nursing Practice Today.* 2019 Apr 6;6(2):60-7.
  27. Spires SS, Talbot HK, Pope CA, Talbot TR. 2017. Paramyxovirus outbreak in a long-term care facility: the challenges of implementing infection control practices in a congregate setting. *Infect Control Hosp Epidemiol* 38:399–404. <https://doi.org/10.1017/ice.2016.316>
  28. Marta Lazzeri Andrea Lanza Raffaella Bellini, Angela Bellofiore, Simone Cecchetto, Alessia Colombo 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* 2020; 90:1285 P-163-168 doi: 10.4081/monaldi.2020.1285.
  29. Rauf R, Mahmood T , Afzal W , Role of Exercise and Positioning in Acute Respiratory Complications in COVID-19 A Review. *JIMC* 2021 16(1) P-42-46
  30. Alhazzani W, Moller M, Arabi Y, Loeb M, Gong M, Fan E, et al. Surviving sepsis campaign: Guidelines of the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID- 19). *Crit Care Med.* 2020. EPub Ahead of Print.
  31. Interim infection prevention and control guidelines for the management of COVID-19 in healthcare settings - Version 1.10: 27 March2020 <https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/novel-coronavirusqld-clinicians>.
  32. Dafoe S, Chapman MJ, Edwards S, Stiller K. Overcoming barriers to the mobilization of patients in an intensive care unit. *Anaesthesia and intensive care.* 2015 Nov;43(6):719-27. (doi.org/10.1177/0310057X1504300609)
  33. Australian and New Zealand Intensive Care Society. ANZICS COVID-19 Guidelines, 2020. Melbourne: ANZICS; 2020
  34. Battaglini D, Robba C, Caiffa S, Ball L, Brunetti I, Loconte M, Giacobbe DR, Vena A, Patroniti N, Bassetti M, Torres A. Chest physiotherapy: an important adjuvant in critically ill mechanically ventilated patients with COVID-19. *Respiratory physiology & neurobiology.* 2020 Aug 17:103529.
  35. Abdullahi, Auwal. "Safety and Efficacy of Chest Physiotherapy in Patients With COVID-19: A Critical Review." *Frontiers in medicine* vol. 7 454. 21 Jul. 2020, doi:10.3389/fmed.2020.00454.

36. Righetti RF, Onoue MA, Politi FV, Teixeira DT, Souza PN, Kondo CS, Moderno EV, Moraes IG, Maida AL, Pastore Junior L, Silva FD. Physiotherapy care of patients with

coronavirus disease 2019 (covid-19)-a Brazilian experience. Clinics. 2020;75.

#### **Copyright Policy**

All Articles are made available under a Creative Commons "**Attribution-NonCommercial 4.0 International**" license. (<https://creativecommons.org/licenses/by-nc/4.0/>). Copyrights on any open access article published by *Journal Riphah college of Rehabilitation Science (JRCRS)* are retained by the author(s). Authors retain the rights of free downloading/unlimited e-print of full text and sharing/disseminating the article without any restriction, by any means; provided the article is correctly cited. JRCRS does not allow commercial use of the articles published. All articles published represent the view of the authors and do not reflect the official policy of JRCRS.