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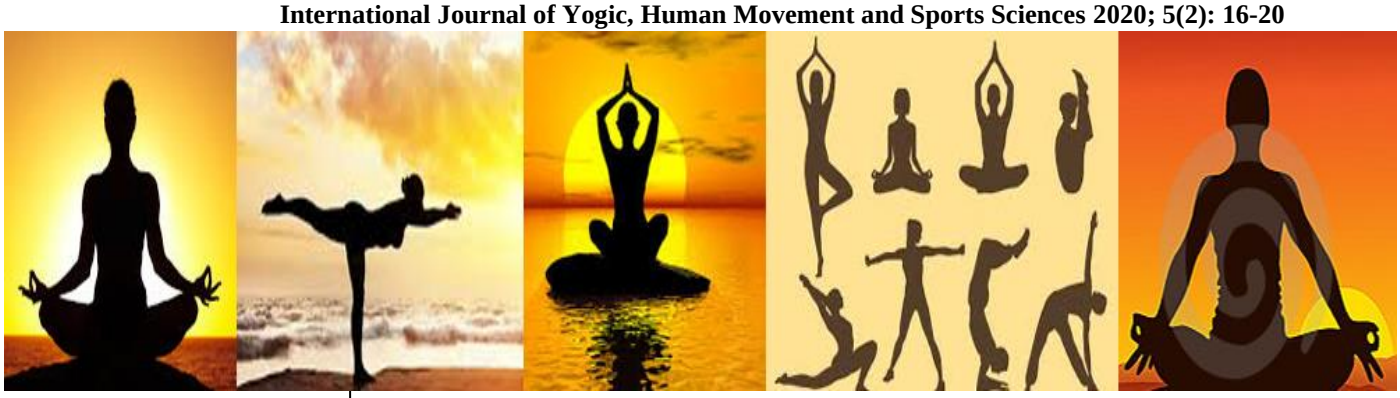

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Physiotherapy management for COVID-19 in hospital setting

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Abstract
The novel corona virus disease 2019 (COVID-19) presents an important and urgent threat to global health. COVID-19 is caused by SARS-CoV-2, a beta coronavirus. It is comprised of a single-stranded ribonucleic acid (RNA) structure that belongs to the Corona virinae subfamily, part of the Corona viridae family. In humans, coronaviruses were thought to cause mild respiratory infections until the identification of SARS-CoV and MERS coronavirus (MERS-CoV). Although the exact pathophysiological mechanisms underlying the emergence of SARS-CoV-2 are unknown (due to pending laboratory trials), genomic similarities to SARS-CoV could help to explain the resulting inflammatory response that may lead to the onset of severe pneumonia. This document has been prepared to provide information to physiotherapists and acute care healthcare facilities about the potential role of physiotherapy in the management of hospital admitted patients with confirmed and/or suspected COVID-19.

Keywords: COVID-19, Corona viruses, physiotherapy management

Introduction
The novel corona virus disease 2019 (COVID-19) presents an important and urgent threat to global health. Since the outbreak in early December 2019 in the Hubei province of the People's Republic of China, the number of patients confirmed to have the disease has exceeded 775 000 in more than 160 countries, and the number of people infected is probably much higher. More than 36 000 people have died from COVID-19 infection (up to 30 March 2020) [1].

The Coronavirus Disease 2019 (COVID-19) has led to a global pandemic affecting a large proportion of the countries of the world.

SARS-CoV-2 is highly contagious. It varies from other respiratory viruses in that it appears that human-to-human transmission occurs approximately 2 to 10 days prior to the individual becoming symptomatic [2, 3].

The virus is transmitted from person to person through respiratory secretions. Large droplets from coughing, sneezing, or a runny nose land on surfaces within two meters of the infected person. SARS-CoV-2 remains viable for at least 24 hours on hard surfaces and up to eight hours on soft surfaces. The virus is transferred to another person through hand contact on a contaminated surface then touching the mouth, nose, or eyes. Aerosol airborne infected particles created during a sneeze or cough remain viable in the air for at least three hours. These airborne particles of SARS-CoV-2 can then be inhaled by another person or land on the mucosal membranes of the eyes [4].

These airborne particles of SARS-CoV-2 can then be inhaled by another person or land on the mucosal membranes of the eyes. Individuals with COVID-19 can present with an influenza like illness and respiratory tract infection demonstrating fever (89%), cough (68%), fatigue (38%), sputum production (34%) and/or shortness of breath (19%) [3].

SARS-CoV-2 infected patients have developed mild symptoms such as dry cough, sore throat, and fever. The majority of cases have spontaneously resolved. However, some have developed various fatal complications including organ failure, septic shock, pulmonary oedema, severe pneumonia, and Acute Respiratory Distress Syndrome (ARDS) [5].

COVID-19 Pathophysiology

COVID-19 is caused by SARS-CoV-2, a beta coronavirus. It is comprised of a single-stranded ribonucleic acid (RNA) structure that belongs to the Corona virinae subfamily, part of the Corona viridae family. Sequence analysis of SARS-CoV-2 has shown a structure typical to that of other coronaviruses (Fig. 1), and its genome has been likened to a previously identified coronavirus strain that caused the SARS outbreak in 2003 [6]. Structurally, the SARS coronavirus (SARS-CoV) has a well-defined composition comprising 14 binding residues that directly interact with human angiotensin-converting enzyme 2.Of these amino acids, 8 have been conserved in SARS-CoV-2. [7]. In humans, coronaviruses were thought to cause mild respiratory infections until the identification of SARS-CoV and MERS coronavirus (MERS-CoV). Although the exact pathophysiological mechanisms underlying the emergence of SARS-CoV-2 are unknown (due to pending laboratory trials), genomic similarities to SARS-CoV could help to explain the resulting inflammatory response that may lead to the onset of severe pneumonia [55].

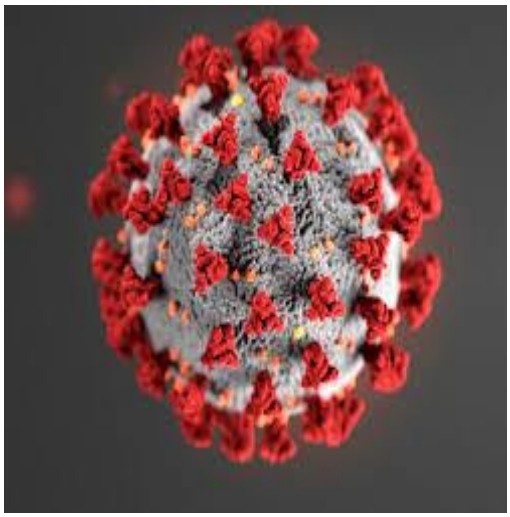

Fig 1: Illustration of the SARS-CoV-2virion

Purpose

This document has been prepared to provide information to physiotherapists and acute care healthcare facilities about the potential role of physiotherapy in the management of hospital admitted patients with confirmed and/or suspected COVID-19.

Physiotherapists who work in primary healthcare facilities are likely to have a role in the management of patients admitted to hospital with confirmed and/or suspected COVID-19. Physiotherapy is an established profession throughout the world. In India and overseas, physiotherapists often work in acute hospital wards and the ICU. In particular, cardio respiratory physiotherapy is focused on the management of acute and chronic respiratory conditions and aims to improve physical recovery following an acute illness

Physiotherapy may be beneficial in the respiratory treatment and physical rehabilitation of patients with COVID-19. Although a productive cough is a less common symptom (34%) [3], physiotherapy may be indicated if patients with COVID-19 present with copious airway secretions that they are unable to independently clear. This may be evaluated on a case by-case basis and interventions applied based on clinical indicators. High risk patients may Physiotherapy management for COVID-19. Patients with existing co morbidities that may be associated with hyper secretion or ineffective cough (e.g. neuromuscular disease, respiratory disease, cystic fibrosis etc). Physiotherapists who practice in the ICU environment may also provide airway clearance techniques for ventilated patients who show signs of inadequate airway clearance and they can assist in positioning patients with severe respiratory failure associated with COVID-19, including the use of prone position to optimize oxygenation [8].

Physiotherapy will have a role in providing exercise, chest physiotherapy, mobilization and rehabilitation interventions to survivors of critical illness associated with COVID-19 and make them mobile and independent as soon as possible.

Aims and objective

- Workforce planning and preparation including screening to determine indications for physiotherapy.
- Delivery of physiotherapy interventions including both respiratory and mobilisation / rehabilitation as well as PPE requirements.

Guideline development process

This guideline is the result of a combination of systematic evidence search, subsequent critical evaluation of retrieved evidence and consensus process. An expert panel of physiotherapists with profound experience in the field of critical care practice was created. Multiple feedback rounds were used before finalizing this guideline. The agreed recommendations were integrated into a physiotherapy clinical reasoning algorithm and submitted for final approval.

a) Acute Care Physiotherapy COVID-19 Patient Management Algorithm (COVID-PTM Algorithm)

'Acute Care Physiotherapy COVID-19 Patient Management Algorithm' was designed to recommend the optimal physiotherapy care for the suspected and confirmed COVID-19 cases admitted in an acute care facility.

This COVID-PTM algorithm outlines the physiotherapy management for COVID-19 in the acute hospital setting based on the acuity, severity and mobility of the patients. It classifies the suspected and confirmed COVID patients into various categories, recommending appropriate care and optimizing workforce planning and preparation. The algorithm can be used as a screening tool for determining the requirement of physiotherapy, recommendations of optimal physiotherapy management and infection control procedures. The algorithm is based on international consensus and designed to minimize the staff exposure and risk (thus reducing the probability of spreading the infection and preventing the risk of high numbers of staff being unavailable for duty) while maintaining adequate levels of service to minimize the adverse effects of immobility.

Target audience: Physiotherapists and other relevant stakeholders (Multi-disciplinary team) in the acute care setting caring for adult patients with suspected and/or confirmed COVID-19

Target setting: All COVID hospitals or any acute care facility handling adult patients with suspected and/or confirmed COVID-19

B. Best Practice Recommendations

Section 1: Physiotherapy referral, screening and management considerations

- Physiotherapy referral Follow the guidelines and policies of your hospital regarding physiotherapy referral for patients admitted in an acute care setting seeking physiotherapy
- Screening and categorization of referred patients

- Physiotherapist should carry out a thorough case evaluation remotely through the electronic documentation system.
- Patients should be categorized according to the 'Acute Care Physiotherapy COVID 19 Patient Management Algorithm (COVID–PTM algorithm)'
- Patients admitted without any respiratory symptoms should follow routine physiotherapy care following standard infection control precautions.
- Patients admitted without any respiratory symptoms, but with suspicion of COVID-19 (under quarantine) should be considered as 'suspected COVID 19' as per COVID–PTM algorithm until at least two sets of lab report test negative. [Refer to Institutional policies]
- Patients admitted with any other causes (Cardiac, trauma, orthopedic or Neurological) and with respiratory symptoms must categorize as 'suspected COVID 19' as per COVID–PTM algorithm until at least two sets of lab report test negative. [Refer to Institutional policies]
- Patients admitted with respiratory conditions (e.g. shortness of breath, cough, fever, sputum production) must be categorized as 'suspected COVID 19' as per COVID–PTM algorithm until at least two sets of lab report test negative. [Refer to Institutional policies]

Physiotherapy management considerations

All suspected or confirmed cases should be reported to the supervisor/ manager through the team leader with regular updates so that it can be recorded in a COVID physiotherapy tracker/ database, accessible to all physiotherapy managers.

COVID-19 suspected or positive cases should be 'delegated to' the 'COVID-19 Physiotherapy team' to continue the care. This will help to minimize/prevent the spread of infection while providing optimal care.

Section 2: Physiotherapy management categories

Category A: Ventilated, sedated/ paralyzed patients

- Includes patients who are critically ill, sedated, paralyzed and maybe in a prone position.
- Patients on ECMO (Extra Corporeal Membrane Oxygenation) device: patient on ECMO device will be categorized based on their level of sedation and paralysis.
- The main goals of Physiotherapy intervention at this stage are
- To minimize the complications of the prolonged recumbent position
- To facilitate oxygenation
- Physiotherapy management may include (but not limited to) passive range of motion (ROM) exercises and therapeutic positioning. (Evidence is limited regarding the use of a passive range of motion exercises in the prevention of ICU acquired muscle weakness).
- Physiotherapists must minimize/limit the exposure to these patients to prevent unnecessary usage of PPE and risk of cross-contamination.
- Collaborate with MDT for therapeutic positioning and joint protection techniques to minimize or limit the exposure.
- Decision of rendering Physiotherapy management should depend upon the rehabilitation potential of the patient and considering risk vs. benefits.
- Regular communication with MDT regarding physiotherapy management.

Category B: Ventilated-minimally sedated/ on sedation vacation patients

- Develop an individualized treatment plan based on the patient's conscious level, level of cooperation and hemodynamic status.
- The main goals of Physiotherapy interventions intervention at this stage are
- To minimize the complications of the prolonged recumbent position
- To facilitate oxygenation
- To improve functional independence
- Physiotherapy management may include therapeutic positioning, ROM exercises and progressive mobilization.
- Limit or minimize the aerosol-generating procedures, and Physiotherapists should weigh up the risk versus benefit for initiating these procedures. If necessary, extreme precautions should be followed while performing these procedures.

Category C: Non- mechanically ventilated patients

These patients are divided into 3 categories depending on a conscious level, and functional independence.

- The main goals of Physiotherapy interventions are
- To reduce the work of breathing
- To improve lung capacity
- To facilitate oxygenation
- To improve functional capacity

Section 3: Therapeutic best practice recommendations

Recommendations on respiratory interventions

- Respiratory interventions like postural drainage, breathing exercises techniques, and secretions clearance techniques are potentially aerosol generating procedures. (No evidence for incentive spirometry in patients with COVID-19 is available).
- Avoid/ minimize these interventions and physiotherapists should weigh up the risk versus benefit to initiate these interventions.
- Airborne precautions should be followed while performing respiratory interventions. Personal protective equipment like headcover, N95 respirator mask, disposable scrub suit, disposable gowns, Protective eyewear (goggles or face shield), gloves and shoe covers should be worn before entering the patient room. The N95 respirator must fit the user's face snugly (i.e., create a seal) to minimize the number of particles that bypass the filter through gaps between the user's skin and the respirator seal.
- The respirator must be put on (donned) and taken off (doffed) correctly before and worn throughout the exposure.
- Appropriate doffing and donning techniques should be followed for all personnel protective equipment (PPE) as per the infection control policies.
- Physiotherapists should follow (if possible) posterior approach while mobilizing the patients and should position themselves ≥ 2m from the patient (if possible) to be out of the "blast zone" or line of cough.
- In acute hypoxemic patients, dyspnea may persist even with the administration of oxygen >10-15 L/min with a reservoir mask. (29) In this scenario, the use of High-Flow Nasal Oxygen (HFNO) or Continuous Positive Airways Pressure (CPAP) or Non-Invasive Ventilation

(NIV) may be beneficial during any Physiotherapy procedures.
- While mobilizing the patients with HFNO/NIV, consider the potential environmental diffusion of aerosol particles of the virus [9].
- Face mask/reservoir mask is preferable over the nasal cannula while mobilizing a patient (face mask with oxygen flow up to 5 L/min, a reservoir mask up to 10 L/min of O2 or a Venturi mask up to 60% of FiO2) to minimize the dispersion of droplets, with a surgical mask covering the patient face over it. If this mask is soiled it should be discarded immediately as per the infection control policies and wear a new mask [10].
- If a nasal cannula is the only option, it should be well-positioned inside the nostrils and a surgical mask should be added over the cannula. The same rule is applicable if the patient uses HFNO therapy.
- If the patient is on noninvasive ventilation (CPAP/BIPAP), ensure that there is no air leak before starting any physiotherapy exercise session. Also, care should be taken to avoid the disconnection of the machine connection circuit.
- A NIV mask connected by T-tube to the circuit can be used for patients who are open-mouth breathers as a way to improve the oxygen saturation during the exercise session.
- Limit or avoid the use of mechanical devices like incentive spirometer, PEEP, flutter, chest vest as these techniques can potentially generate aerosol and increase the work of breathing.
- Only closed-circuit suctioning is recommended in tracheostomized and mechanically ventilated patients if necessary. Bronchial suction maneuvers can only be carried out on strict indications.
- Positioning to improve oxygenation: The patient can be better placed in a semi-sitting or sitting position while avoiding slumped sitting. Alternations of lateral decubitus, semi-prone or prone positions might be beneficial as far as the oxygenation is concerned [11]. The positions should be
- Passive to reduce muscular activity and to relax the accessory muscle to facilitate the ventilation/perfusion ratio. Cushions/pillows can be used to attain the optimum (passive) resting positions.

Recommendations on mobilization interventions
- Mobilization should be considered as an aerosol generating procedure as it leads to coughing or the expectoration of secretions. It also necessitates a close contact of physiotherapists with the patients. So, strict caution while performing these techniques should be taken and follow airborne precautions.
- While mobilizing mechanically ventilated patients, extreme care should be taken to maintain the ventilator circuit during mobilization.
- If the patient is on noninvasive ventilation (CPAP/BIPAP), ensure that there is no air leak before starting any physiotherapy exercise session. Also, care should be taken to maintain the machine connection circuit.
- Non-mechanically ventilated patients should wear a mask during the physiotherapy sessions. If this mask is soiled it should be discarded immediately as per the infection control policies and wear a new mask.
- Ensure appropriate resources (manpower as well as equipment like mobility aids) before initiating mobilization.
- Avoid the sharing of equipment between the patients.

Recommendations on Infection control practices
- Review and follow hospital infection control policies
- Remove all personal equipment/items which include but not limited to ear rings, watches, lanyards, hand phones, bleeps, and pens before entering the clinical area.
- Reusable personnel protective equipment must be cleaned and disinfected prior to use.
- To limit cross-contamination, it is recommended a direct entry to the treatment area and home-based documentation.
- Physiotherapists treating COVID 19 patients are advised to wear scrub suits or change into disposable scrub suits each day before commencing the treatment.
- Female therapists should tie their hair back and male therapists are advised to remove facial hair.
- All Physiotherapists should undergo N95 'fit test' to determine the correct size of the mask.
- All Physiotherapists should complete the competency of 'donning and doffing' of PPE and hand hygiene.

Procedures that should be used with extreme caution during the acute phase
- It is essential that physiotherapy procedures do not cause increased stress on the work of breathing, leading the patient to an increased risk of respiratory distress [12].
- Common physiotherapy procedures less recommended for the acute phase of COVID-19 infection
- Deep and diaphragmatic breathing exercise
- Pursed lips breathing
- Bronchial hygiene/lung re-expansion techniques (PEP Bottle, cough machines, etc.)
- Incentive spirometer
- Respiratory muscle training /manual mobilization/stretching of the rib cage
- Exercise training & mobilization when clinically unstable

Summary

The current epidemiological situation is a huge challenge for all medical professionals. (26) It is estimated today that approximately 15-20 percent of patients with COVID-19 require hospitalization and 5-6 percent require intensive care for a longer duration. 4 As is often the case during this type of pandemic, medical staff members themselves are particularly exposed to infection and need to take adequate measures to counteract that. Physiotherapists are an integral part of the Multidisciplinary team of acute hospital wards and ICUs. Early rehabilitation after the acute phase of respiratory distress can limit the immobility associated complications thereby promoting rapid functional recovery. The intention of this best practice recommendation is to streamline and optimize the physiotherapy care delivery for acute care COVID patients, while at the same time stressing the need to uphold clearly established safety guidelines.

References

1. Dong E, Du H, Gardner LJT Lid. An interactive web-based dashboard to track COVID-19 in real time, 2020.
2. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A *et al*. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19), 2020.

3. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J *et al*. China Medical Treatment Expert Group for COVID-19, 2019.
4. Ajimsha M, Neeraj Gampawar M, Surendran PJ, Jacob P, Vasileios Karpouzis M, Haneef M *et al*. Acute Care Physiotherapy Management of COVID-19 Patients in Qatar: Consensus-Based Recommendations, 2020.
5. Chen LJYF, Zhang TJ. Han, 2001.
6. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H *et al*. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. 2020; 395(10224):565-74.
7. Fehr AR, Perlman S. Coronaviruses: an overview of their replication and pathogenesis. Coronaviruses: Springer, 2015, 1-23.
8. Sundaram M, Ravikumar N, Bansal A, Nallasamy K, Basavaraja G, Lodha R *et al*. Novel Coronavirus 2019 (2019-nCoV) Infection: Part II-Respiratory Support in the Pediatric Intensive Care Unit in Resource-limited Settings. 2020; 57:335-42.
9. Seto W, Tsang D, Yung R, Ching T, Ng T, Ho M *et al*. Advisors of Expert SARS group of Hospital Authority. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). 2003; 361(9368):1519-20.
10. Hui DS, Ip M, Tang JW, Wong AL, Chan MT, Hall SD *et al*. Airflows around oxygen masks: A potential source of infection. 2006; 130(3):822-6.
11. Ding L, Wang L, Ma W, He HJCC. Efficacy and safety of early prone positioning combined with HFNC or NIV in moderate to severe ARDS: a multi-center prospective cohort study. 2020; 24(1):28.
12. 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), 2020, 90(1).