PHYSICAL REHABILITATION INTERVENTION FOR COVID 19

Abstract

A pandemic of respiratory illnesses known as COVID-19 is currently the biggest threat to global health. Since its outbreak in Wuhan, China, in December 2019, Due to the huge quantity of deaths it has caused worldwide and the lack of an effective therapy up to this time, it has caused significant distress. This explains how the new virus, COVID-19, is highly contagious and can pass through particular barriers to infect people. It can cause illnesses ranging from the common cold (which can mimic the flu or influenza) to severe disease patterns like Middle East Respiratory Syndrome and Severe Acute Respiratory Syndrome, which pose a serious risk to public health. The severity of the disease might range from preclinical illness to upper respiratory tract disease, substantial breathing difficulties, viral pneumonia, and/or death. Guidelines for physical therapists working in hospitals have been developed by the World Physiotherapy in order to assist physical therapists in managing confirmed or suspected cases of COVID-19. Patients with COVID-19 who require physical rehabilitation due to respiratory problems and have copious secretions that are difficult for them to eliminate on their own may benefit from physical therapy. Techniques like posture and airway clearance may be advantageous for the ventilated patient. A prone position may be beneficial for patients with acute respiratory distress syndrome (ARDS) to help with breathing. The 17% prevalence of ARDS in COVID patients suggests that it may be used as a therapeutic option to lower mortality in patients with impaired oxygenation in the early stages of the disease. Furthermore, it assists in enlisting the dorsal lung regions, which increases end expiratory lung capacity, chest wall elastic, alveolar shunt, and tidal volume. Apparently,

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COVID-19 patients who are receiving prolonged ventilator support, sedatives, neurogenic inhibitors, analgesics, and antibiotics are more likely to get an infection picked up in the intensive care unit (ICU), which could increase morbidity and death. Physical therapists have a vital role in providing exercise therapy, mobilisation, and rehabilitation therapies to help COVID-19 survivors recover functionally. This is in line with the notion that prompt recovery from COVID requires physical therapy[2].

Keywords: Rehabilitation, Covid 19

I. INTRODUCTION

In India, a Tribune News Service study on the results of physiotherapy in COVID-19 patients revealed the therapeutic effects of time-tested posture correction techniques. As a result, physical therapists in India should have the chance and training to use the numerous rehabilitation procedures that would aid in the recovery of patients with COVID-19, whether they are known cases or just suspected ones. Additionally, by activating the dorsal lung areas, it aids in improving tidal volume, boosting chest wall compliance, minimising alveolar shunt, and raising end expiratory lung capacity. Exercise therapy, mobilisation, and rehabilitation are all important aspects of physical therapy[3]. This supports the idea that physical treatment is important for patients with COVID to recover quickly[4]. Although it is advised to follow the standards for physical therapy, there are still many questions that remain unsolved and dangerous, such as the use of aerosol generating processes, bubble positive expiratory pressure, mechanical insufflations, exsufflations, and humidification. However, disposable circuits might not be used until Despite the fact that the Aarogya Setu database of the Ministry of Health and Family Welfare, Government of India, dated May 20, 20202, shows that there are more than 1 lakh affected cases, 61,149 active cases, 42,297 recovered cases, and 3303 deaths, physical therapists are essential parts of the healthcare system and they are adequately trained or involved in the current COVID-19 pandemic in India. Physical therapists have been underutilised as a result of the closure and insufficient supply of ambulatory and inpatient facilities. According to the most recent World Physiotherapy recommendations, physical therapists certainly play a key role in satisfying patients' demands. A Tribune News Service investigation into the effects of physiotherapy in COVID-19 patients in India revealed the therapeutic benefits offside with guidance, agreement, and consultation. As it entails disconnecting and opening the ventilator circuit, manual hyperinflation, also known as ambuing, is advised against. The leader of the physical therapist team may create screening and treatment recommendations in addition to those physical therapy associations have recommended for ICU. The hospital policy may be used to design and record these standards, which may include the discovery of mild, moderate, and severe. In rehabilitation, physical treatment is crucial. The advent of the coronavirus disease however has presented a significant obstacle to its practise, particularly with regard to the volume of patient contact. To stop the virus from spreading, it is imperative to investigate alternative rehabilitation solutions to face-to-face interactions[5].

II. TELE REHABILITATION FOR COVID 19

Telerehabilitation is the term for the practise of providing healthcare services remotely using ever-improving communication technology. Telerehabilitation was defined by Brennan et al. (2010) as rehabilitation services that are delivered remotely by a rehabilitation expert and are helpful for assessment, monitoring, prevention, intervention, supervision, education, consultation, and counselling. Utilizing virtual reality devices, phone conversations, and internet-based videoconferencing, it allows for real-time or delayed remote patient interaction. This process investigates telerehabilitation, its outcomes, and the challenges physiotherapists face in providing patients with a continuum of care in light of the epidemic. Tele rehabilitation makes use of technology as a vital tool for linking professionals and patients. Because it has historically led to successful outcomes for the rehabilitation of particular ailments, telerehabilitation has gotten a lot of support. A physical appointment to

visit a physiotherapist at a set location is traditionally required in order to utilise the services of a physiotherapist. But any distance that could have previously existed between various locations, medical professionals, and patients has been erased by the development of technology.

III. PERSONAL PROTECTIVE EQUIPMENT FOR COVID 19

Numerous physiotherapy treatments may generate aerosols and droplets, which can lead to respiratory and lung illnesses. Non-invasive ventilation, high-flow oxygenation, endotracheal intubation, airway tracheostomy and endotracheal tube suction, cardiopulmonary resuscitation, high-frequency oscillatory ventilation, chest physiotherapy, prone patient positioning, ventilator disconnection, nebulized treatment administration, and sputum induction are some of these techniques. Along with having the ability to infect people, coronavirus 7 associated with severe acute respiratory syndrome can persist in the air for hours and on surfaces made of various materials for days after being aerosolized. Aerosol-generating processes, however, should only be carried out in a chamber with negative pressure. The procedures must be performed in a room with closed doors and open windows, a minimum number of qualified specialists, the appropriate PPE, and a clear path to avoid other people because negative-pressure rooms are not always accessible. Therefore, physiotherapists must use the proper PPE, such as surgical caps, safety goggles, face shields, N95 masks or equivalent masks, gowns, and gloves[8], to prevent aerosol exposure and guarantee contact isolation.

IV. CHEST PHYSIOTHERAPY

There is currently no evidence that administering conventional chest physiotherapy to individuals with dry cough and hypoxemic respiratory failure affects the course of COVID-19 during the acute stage of the illness. However, some people who have a productive cough may benefit from bronchial hygiene procedures and cough-inducing exercises.[8] Patients with a moderate form of the disease should learn breathing exercises so they can practise them independently. In patients with mild to severe illnesses, pulmonary disease should be continually examined. In these situations, namely during orotracheal intubation and oxygen supplementation, as well as for patients who are candidates for non-invasive ventilation or high-flow oxygen administration, only respiratory and pulmonary exams should be performed on the patient. The least amount of time required for assessment and support should be included in the professional exposure time.

1. Manual Techniques (e.g. Percussion/Manual Assisted Cough) that may lead to coughing and expectoration of sputum
2. Use of Positive Pressure Breathing Devices (e.g. IPPB), Mechanical Insufflation-Exsufflation (Cough Assist) Devices, Intra/Extra Pulmonary High Frequency Oscillation Devices (e.g. the Vest / Meta Neb / Percussionaire etc.)
3. Any Mobilisation or Therapy that may result in Coughing and Expectoration of Mucus
4. Any Diagnostic Interventions that involve use of Video Laryngoscopy that can result in Airway Irritation and Coughing (e.g. Direct Visualisation during airway clearance techniques or when assisting Speech and Language Therapists perform Fibreoptic Endoscopic Evaluation of Swallow)

V. ACUTE PHASE OF PHYSIOTHERAPY

When creating a treatment plan for COVID-19 and respiratory distress in the early stages, caution should be taken. The usual techniques respiratory physiotherapists frequently utilise during the acute period can be contraindicated since they could aggravate the increased work of breathing. Physiotherapists should carry on actively assessing patients and/or heed suggestions in order to facilitate mobilisation, exercise, and rehabilitation. During screening, it is advisable to communicate with the nursing staff, the patient (for instance, over the phone), or relatives before entering a patient's isolation room. To reduce the number of staff members who interact with patients who have COVID-19, for example, physiotherapists may screen to select a suitable support to test. while the medical staff is already engaged in an who come into touch with patients who have COVID-19. When the nursing team is already in an isolation room, they can test the assistance there with any necessary guidance.

1. Contraindicated interventions include

- Manual mobilisation techniques or stretching of the rib cage
- Nasal washings
- Respiratory muscle training
- Exercise training
- Patient mobilisation during clinical instability
- Diaphragmatic breathing
- Pursed lips breathing
- Bronchial hygiene/lung re-expansion techniques
  (PEP Bottle, EzPAP®, cough machines, etc.)
- Incentive spirometry

2. **Rehabilitation Phase of COVID 19:** Here, it will be clear what the physiotherapist's main role is in providing care for the COVID-19 patient. Patients can leave the critical care unit sooner and may have better long-term outcomes if they start moving around early. Strong evidence points to early mobilisation that prioritises getting back to functional activities as a way to minimise functional deterioration and shorten hospital stays. During this stage of management, a multidisciplinary approach should be used. This includes taking preventative measures against avoidable physical and non-physical morbidity, promoting adequate nutrition (especially in light of the effects of prone ventilation), and putting in place an individualised, structured rehabilitation programme. The transition to ward-based rehabilitation should be followed by this stage according to the typical routine for therapy and exercise in the intensive care unit.

- Passive, Active Assisted, Active, or Resisted Joint Range of Motion Exercises to maintain or improve joint integrity and range of motion and muscle strength; [6]
- Mobilisation and Rehabilitation (e.g. bed mobility, sitting out of bed, sitting balance, sit to stand, walking, tilt table, standing hoists, upper limb or lower limb ergometry, exercise programs.

3. **Exercise therapy and early intervention:** Due to the disease, patients often have a debilitated physical condition that restricts their capacity for exercise, especially when they experience fever, dyspnea, myalgia, and fatigue. The prolonged use of artificial ventilation and immobilisation might also contribute to the physically impaired state. When patients with low disease severity spend weeks at a time in the hospital, their activity levels and, consequently, their muscle strength and cardiorespiratory capacity, may significantly diminish[12]. Patients who are experiencing the acute phase of a minor disease should be encouraged to engage in light exercise in order to maintain a minimum degree of functional ability. The workouts can be changed to maintain a three on the Borg scale (on a scale of one to ten). Despite the dearth of studies specifically including patients.

4. **Oxygen therapy:** Due to the fact that hypoxic respiratory failure affects people with COVID-19 at a rate of 19%, oxygen therapy is a critical component of treatment for those with severe pulmonary dysfunction. Adults with COVID-19 should start taking supplemental oxygen if the sustained oxygen saturation (SusO2) is no higher than 96 percent and the peripheral oxygen saturation (SpO2) is less than 93 percent. Mechanical ventilation may be necessary if oxygen treatment fails to address respiratory failure. The interfaces used for oxygen replenishment can emit aerosols. Therefore, healthcare providers should take the required precautions and wear the proper PPE when delivering respiratory assistance to patients with COVID-19 complicated by respiratory failure. Humidification using oxygen is not recommended. If you have a condition like dry mouth, may prescribe moisturisers like nasal sodium chloride gel self-applied

VI. NON INVASIVE VENTILATION AND HIGH FLOW OXYGEN

For the treatment of acute hypoxemic respiratory failure, high-flow nasal oxygen therapy is recommended above conventional oxygen therapy and non-invasive positive pressure ventilation. If high-flow nasal oxygen is not available, non-invasive ventilation should be tried. An investigation using a human model showed that when utilised correctly with an optimal fit, non-invasive ventilation or high-flow nasal oxygen produced very little exhaled air aerosolization. However, use the precise masks and interfaces that were the subject of the study16. Therefore, we advise against doing this treatment in the absence of an airborne infection isolation chamber and suggest using the required safety measures and PPE to avoid any harm. It is advised to intubate right away if there is a respiratory condition worsens.

VII. ENDOTRECHEAL INTUBATION

Patients who qualify for non-invasive ventilation and are admitted to the ICU in negative-pressure rooms must be ventilated with positive end-expiratory pressure (PEEP) of 8 cmH2O, support pressure for an 8 mL/kg of predicted weight tidal volume (TV), and a fraction of inspired oxygen (FiO2) to maintain SaO2 > 92 percent. A facial or full-face mask must be worn during the application of the ventilator. In these circumstances, two-branched ventilation devices with a heat moisture exchange filter (HMEF) between the face mask and the device and an additional high-efficiency particulate arrestance (HEPA) filter on the ventilator's exhalation output are advised.For high-flow oxygen, a flow rate of 40 to 50 L/min

should be maintained, and FiO2 to maintain SaO2 >92% should be started. The criteria for orotracheal intubation and invasive mechanical ventilation are FiO2 >60% in non-invasive ventilation or TV ≥9 mL/kg or inability to tolerate <2 hours without non-invasive ventilation or presence of other organic dysfunctions. For high-flow oxygen, the criteria for orotracheal intubation are FiO2 >60% or signs of respiratory distress, or other organic dysfunctions. It is important to reassess the patient after 30 to 60 minutes; if there is no improvement or if there is worsening of ventilatory parameters, endotracheal intubation and invasive mechanical ventilation should be considered. When aerosol-generating procedures are necessary, it is advised that they be carried out in a negative-pressure space while wearing the proper PPE. Only the medical personnel required for orotracheal intubation should stay in the space. Patients with COVID19 run the danger of having their arterial oxygen levels drop suddenly, hence efficient pre-oxygenation is essential18. Patients must receive an adequate oxygen flow to keep their blood oxygen levels above 93%, and intubation should be done quickly after induction. It is necessary to pre-oxygenate using a non-rebreather mask with the smallest airflow feasible in order to sustain effective oxygenation (SpO2 > 93 percent). A supraglottic device or assisted ventilation with a Bag-Valve-Mask device should not be used due to the risk of aerosolization and health contamination.

VIII. PROTECTIVE MECHANICAL VENTILATION

In the absence of neuromuscular block, mild respiratory effort, or asynchrony, controlled ventilation should be performed using lower TVs (4 to 6 mL/kg predicted body weight) and lower inspiratory pressures, with a plateau pressure (Pplat) of approximately 28 to 30 cmH2O. Mechanical mode that is invasive pressure-controlled ventilation (when there is neuromuscular block or when there is no inspiratory effort) or volume-controlled ventilation. The PEEP must be as high as feasible to maintain the SpO2 between 88 and 95 percent and the driving pressure (Pplat PEEP) as low as possible (15 cmH2O). Additionally, it's important to avoid disconnecting from the invasive mechanical ventilator in order to stop PEEP loss and the eventual onset of atelectasis.

IX. MANAGEMENT OF MECHANICAL VENTILATION IN SEVERE AND REFRACTORY CASES OF HYPOXEMIA

In order to diminish respiratory drive and maintain protective ventilation in patients with PaO2/FiO2 150, an inability to maintain protective ventilation, the presence of asynchrony, or severe hypercapnia (pH 7.25), we advise sedation and continuous neuromuscular block.

The multidisciplinary team can discuss the following:

1. Prone positioning;
2. Alveolar recruitment manoeuvres and PEEP adjustment for better pulmonary compliance;
3. recruitment in the prone position for patients who responded to the supine recruitment maneuver;
4. Nitric oxide administration in cases with a clinical history of “corpulmonale” or as a recruitment manoeuvre for hypoxemia;
5. Extracorporeal membrane oxygenation (ECMO) .

1. **Prone position:** Proper ventilation in the prone position for 12 to 16 hours a day is indicated for adult patients with severe ARDS (PaO2/FiO2 150). Even though it is strongly suggested for adult patients with severe ARDS, it requires sufficient staff and training to be carried out correctly and demonstrate an effective reaction, a patient's PaO2 must rise by 10 mmHg or their PaO2/FiO2 ratio by 20 mmHg. After six hours in the supine position, prone posture should be repeated if a PaO2/FiO2 ratio of less than 150 mmHg is seen. 20% decreases in PaO2/FiO2 in the supine position after two attempts at pronation or hemodynamic instability should be considered as a threshold.

2. **Cuff pressure:** For aerosols, invasive mechanical ventilation is a danger factor. In order to minimise leakage and the spread of aerosols, it is crucial to maintain a cuff pressure between 20 and 30 cmH2O, or 25 and 35 mmHg. We advise taking cuff measurements either every shift or at the very least every day.

3. **Tube and nasotracheal suction:** To Preventing suction of the artificial airway as a result of ventilator disconnection is crucial in order to avoid pressure loss in the respiratory system, atelectasis, or the spread of aerosols throughout the space. A closed suction system is suggested for all intubations and invasive mechanical ventilation procedures. In situations requiring open suction, we advise employing the mechanical ventilator's "stand by" mode to lessen the spread of aerosols. Physiotherapists should carefully evaluate any nasotracheal suction operations due to the formation of aerosols. When doing these treatments, it is advised to wear the proper PPE. Negative pressure should always be present during this process.

4. **Humidifires for ventilated patients:** In individuals who require invasive mechanical ventilation, heated humidifiers or heat and moisture exchangers are more successful at reducing problems such airway obstructions and pneumonia. Therefore, COVID-19 patients should employ equipment that filters and humidifies their exhaled and inhaled air, respectively. As a result, HMEF is better suited for humidifying exchanged air because it also has the ability to filter out viruses and bacteria, which lowers air contamination. The mechanical ventilator's exhalation valve can be protected further by mounting a HEPA filter. In these patients, the use of heated humidifiers is discouraged.

X. WEANING FROM MECHANICAL VENTILATION AND EXTUBATION

Every patient must undergo a daily assessment to determine whether they meet the requirements for the spontaneous breathing test, which include adequate oxygenation (PaO2/FiO2>200 with PEEP 5-7 cmH2O), hemodynamic stability (low, stabilised doses or no infusion of vasopressors), an appropriate level of consciousness (easily awake or wakened), and adequate cough and secretion management (presence of a cough reflex during closed aspiration). We advocate the use of the pressure support ventilation (PSV) mode for spontaneous breathing tests in order to wean patients with COVID-19 from mechanical invasive ventilation. The preferred method for extubating patients who pass the spontaneous breathing test is in a negative pressure environment or during respiratory isolation. Physiotherapists and other medical staff who are around while being extubated must adhere to PPE aerosol isolation protocols. Extra caution must be used during extubating, including maintaining the connection between the endotracheal tube and closed endotracheal suction.

While inflating the cuff. To prevent rough handling and coughing, the endotracheal tube should be taken out as gently as possible. If the patient's cough needs to be induced, the patient should be advised on proper cough technique. The tube needs to be thrown away in the infectious waste collection. It is always advised to have an intubation expert on hand in the intensive care unit. A tracheostomy may be required for patients who consistently fail to wean or who have been intubated for lengthy periods of time. The creation of aerosols when undergoing tracheostomy is regarded as a high-risk procedure. Using tracheostomy masks to wean COVID-19 patients is not recommended. For training sessions involving spontaneous breathing, it is advisable to use HMEF connected to Trach-Care with oxygen replenishment directly in the HMEF to maintain SpO2 between 93 and 96 percent. Aspiration during the spontaneous breathing test must be performed using the closed suction system. We want to be clear that while utilising HMEF to wean tracheostomized patients, clinical indications of pain or instability must be closely watched. Spontaneous breathing duration should rise as patients' breathing resistance and efficiency improve.

XI. SUPPORT FOR REHABILITATION SELF MANAGEMENT AFTER COVID 19 RELATED TO ILLNESS

World Health Organization guidelines for following:

1. Managing breathlessness
2. Exercising after leaving hospital
3. Managing problem with your voice
4. Managing eating, drinking and swallowing
5. Managing problems with attention, memory, and thinking
6. Managing activities of daily living
7. Managing stress problems
8. Contact to health care professionals.

XII. MANAGING BREATHLESSNESS

It is common to experience breathlessness after being in hospital losing strength and fitness. Positions to ease breathlessness.

1. High side lying: lying on your side propped up by pillows, supporting your head and neck, with your knees slightly bent.
2. Forward lean sitting: Sitting at a table, lean forwards from the waist with your head and neck resting on the pillow, and your arms resting on the table. You can also try this without the pillows.
3. Forward lean sitting no table in front: Sitting on a chair, lean forwards to rest your arms on your lap or the armrests of the chair.
4. Forward lean standing: While standing, lean forwards onto a windowsill or other stable surface.
5. Standing with back support: Lean with your back against a wall and your hands by your side. Have your hands by your side. feet about a foot away from the wall slightly apart

XIII. BREATHING TECHNIQUES

1. Sit in a comfortable and supported position28
2. Put one hand on your chest and the other on your stomach
3. Only if it helps you to relax, close your eyes (otherwise leave them open) and focus on your breathing
4. Slowly breathe in through your nose (or mouth if you are unable to do this) and then out through your mouth.
5. As you breathe, you will feel the hand on your stomach rise more than the hand on your chest
6. Try to use as little effort as possible and make your breaths slow, relaxed, and smooth.

XIV. CONCLUSION

Finally, physical therapy will have an immediate effect on patients' physical capabilities, especially their capacity for breathing. Physical therapy can help patients move to general wards earlier during an ICU stay15). With ADL and endurance training, patients who have been released can also pick up where they left off in their social work careers. It may help preserve social and political harmony and, inadvertently, reduces the likelihood of a medical emergency. Physical treatment for COVID-19 patients will reduce the risk of unfavourable social stability events, such as a medical emergency, as well as patient mortality, hospital stay duration, and medical expenditures. It will also save medical resources and lower individual and community economic losses. Physical treatment should therefore be implemented as soon as possible.

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