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Guidelines of physiotherapy management in acute care of COVID-19 at dedicated COVID center in Mumbai

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Abstract:

Coronavirus disease also referred to as COVID-19 is an infectious disease which is highly communicable. The World Health Organization has declared the COVID-19 outbreak as a pandemic. In India, Maharashtra is one of the worst impacted states and Mumbai has emerged as a hotspot. There is a nationwide lockdown imposed, and there are several containment zones in Mumbai to make sure that the virus does not spread any further. With increase in the number of admissions in intensive care unit, there is a need to define the role of a physiotherapist in the current scenario of a pandemic. The aim of this article is to provide guidelines for clinical practice, as well as to safeguard the health of COVID duty-assigned physiotherapists in acute care setup.

Keywords:

Coronavirus disease 2019, guidelines, physiotherapy

Introduction

India is in the mid of coronavirus pandemic, otherwise known as coronavirus disease 2019 (COVID-19), or SARS-CoV-2, which began in the late January 2020 when three Indian students traveled to the southern state of Kerala from Wuhan in China – the epicenter of the outbreak. As of June 11, 2020, there are 137,448 active cases in India of which 141,028 cases have recovered and 8102 deaths. Maharashtra ranks the highest among all the states, with 46,086 active cases, 44,515 cases cured, and 3438 deaths.[1] Mumbai is the worst affected metropolitan city which crossed 90,000 cases as of now. The pandemic has taken a toll on the healthcare delivery sector. Many buildings and open spaces have been transformed into intensive care units (ICUs) to cater to the need of increasing number of people affected by the virus.

Physiotherapists are an integral member of the ICU team and are involved in the noninvasive support management, postural changes, mobilization, as well as during the weaning from invasive mechanical ventilator support.

Our Institute, TN Medical College, is a medical and physiotherapy teaching institute attached to a tertiary care hospital, BYL Nair Ch Hospital, run by the Municipal Corporation of Greater Mumbai. It was declared COVID-dedicated hospital on April 19, 2020. The Physiotherapy Department was called in and our physiotherapists were

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deployed for their services toward these patients. It was a challenging experience to take up this responsibility, and hence, we would like to share the strategies followed before and after involving physiotherapy personnel into COVID service. The aim is to guide a physiotherapist to render their service to COVID-affected patients effectively and at the same time safeguard their health. It is expected that the demand for physiotherapy services will rise as is already seen. Hence, this is an attempt to provide them with a practical decision-making algorithm. With new information coming in, the guidelines can be updated periodically.

The draft of this manuscript was prepared by senior physiotherapy faculty members of our institute and external physiotherapy faculty who is an expert in intensive care management, from another municipal physiotherapy teaching institute, along with actual front-line physiotherapist and postgraduate (PG) students working in this COVID-dedicated hospital. It was further reviewed by senior intensivist, who is also in the task force of Maharashtra State Government for COVID, and Faculty of Medicine and Chest Medicine Department, who are in the core committee for the management of COVID patients in our Institute and who are well versed with the type of procedures involved in physiotherapy interventions. They are aware of the fact that any physiotherapy intervention, either chest physiotherapy or mobilization, is aerosol-generating procedure (AGP).

Thus, the aim of this paper is to share the information with other physiotherapist who will, sooner or later, be involved in these services for COVID-19 patients.

SARS-CoV-2 mainly involves respiratory system showing lower respiratory tract infection-related symptoms, including fever, dyspnea, dry cough, and loss of taste and smell. In addition, symptoms such as generalized weakness, headache, vomiting, and diarrhea have also been observed.[2] The main pathogenesis of COVID-19 infection is severe pneumonia with an incidence of ground-glass opacities and acute cardiac injuries. Significantly, high level of cytokines, chemokines, D-dimer, and C reactive protein is seen.[3] Dominant feature of COVID-19 is arterial hypoxemia greatly affecting the pulmonary mechanics. Hypoxemia with COVID is usually associated by an increase in alveolar-to-arterial oxygen gradient, signifying either a ventilation perfusion mismatch or an intrapulmonary shunt.[4]

At the time when the duty of COVID Physiotherapy was assigned to physiotherapy department, there was no physiotherapy guideline available from national/state governing body. The World Confederation of Physical Therapists (WCPT) guidelines were available. A task force was formed consisting of members from within and outside the department to form guidelines based on the WCPT guidelines. The clinical staff who would be treating COVID patients (front-liners) were identified. The head of the department made various committees for clinical as well as administration duties. The administration members performed the following tasks:

1. Designed the rotational duty cycle of clinical therapist and PG students with provision for their quarantine
2. Maintained record of the supplies and prudent use of personal protective equipment (PPE) along with N95 masks
3. Arranged for accommodation during COVID duty and quarantine
4. Arranged for transport facility of staff and students in view of lockdown
5. Took stock of nutritious food supplies for front-line physiotherapists
6. Planned treatment regimen based on clinical presentation.

An introductory seminar was arranged involving the medical faculty who would refer COVID patients for physiotherapy. In the presence of the Dean of the Institute, queries of the participating physiotherapists were resolved. The physiotherapy faculty presented the physiotherapy guidelines provided by the American Association of Physical Therapists, WCPT, and other countries who have been involved in COVID care.

Training session on pathophysiology of COVID-19, strategies to contain it in the hospital setting, donning and doffing of PPE, hand wash regimen, and regimen to follow after going back home from work were conducted till all questions of the physiotherapy staff and PG students were answered. Introduction and encouragement by the head of the department boosted their moral to work in this situation.

The task force has come up with a set of guidelines for effective physiotherapy delivery to COVID patients with due consideration to safeguard the spread of virus among front-line physiotherapists. The guidelines are developed using existing medical guidelines (WCPT), relevant literature, and expert opinion to guide institutional policy.

Recommendations for physiotherapy in acute care are as follows:[5-7]

- Physical therapy examination and interventions should be provided only when there are clinical indications for need such as "mobilization, exercise,

and rehabilitation, e.g., in patients with comorbidities creating significant functional decline and/or (at risk) for ICU-acquired weakness"

- It is essential to assess oxygen status, cardiac stability (look at ECG, enzymes, and echo), and hemodynamic stability with activity before enrolling the patient of COVID-19 for physiotherapy
- Physiotherapists should not implement AGPs, including humidification or noninvasive ventilation (NIV), without first obtaining agreement with a "senior doctor"
- If AGPs are required, they should be conducted in a negative-pressure room, or at least in a single room with the door closed, with a minimum number of staff, all wearing PPE that includes an N95/P2 mask, fluid-resistant long-sleeve gown, goggles/face shield, gloves, hair cover, and shoes that are impermeable to liquids. Coming in and going out of the room should be minimized during the AGP
- Physiotherapists should take droplet and airborne precautions, including the use of a high filtration mask, when providing mobilization exercise, as there is a risk of the patient coughing or expectorating mucous
- Direct physical therapy interventions should be considered only when there are significant functional limitations.

Recommendations for Physiotherapy Workforce Planning

Allocation of duty

1. Physiotherapy graduate registered with the respective State/National Physiotherapy Council is eligible to give COVID physiotherapy service. Staff with advanced ICU physiotherapy skills should screen patients with COVID-19 in consultation with senior medical staff according to a referral guideline and provide junior ICU staff with appropriate supervision and support, particularly with decision-making for complex patients with COVID-19
2. The study material for eLearning and PPE training and hand washing should be made easily accessible to the staff involved in COVID physiotherapy
3. Staff who are judged to be of high risk should not enter the COVID-19 isolation area. This includes staff who are pregnant, have significant chronic respiratory illnesses, are immunosuppressed, are older, e.g., >55 years of age, have severe chronic health conditions such as heart disease, lung disease, and diabetes, and have immune deficiencies and conditions or treatments that produce immunodeficiency
4. Workforce planning should include consideration for additional workload from donning and doffing PPE
5. Consider debriefing and psychological support to the staff; staff morale may be adversely affected due to the increased workload and anxiety over safety issues.

Recommendations for who should physiotherapists treat?

1. Physiotherapists in consultation with senior medical staff should determine the indications for physiotherapy in patients with confirmed or suspected COVID-19 and screen according to the agreed guidelines [Tables 1 and 2].[5-7]

Exercise-induced fall in oxygen saturation

Unpublished data suggest that some patients with mild symptoms have normal pulse oximetry at rest, but their readings deteriorate on exertion. A fall of 3% or more in pulse oximetry reading on exercise is a cause of concern and if identified in symptomatic patients with normal saturation may prevent delay in management. The 1-min sit to stand test which is less demanding and correlates well with the validated 6-min walk test as a structured exercise has been found to be useful for the purpose. In patients whose pulse oximeter readings are <96%, then in them this test should not be performed.[8]

1. In adult patients with COVID-19 and severe Acute Respiratory Distress Syndrome, prone ventilation for 12–16 h per day is recommended. It requires sufficient human resources and expertise to prevent known complications, including pressure areas and airway dislodgment[9-11]
2. In nonintubated patients or those on NIV or high-flow nasal oxygen (HFNO) therapy, the "COVID awake repositioning proning protocol" (CARP) to be implemented on suitable patients on screening for indications and SpO_2 monitored with pulse oximeter [Table 3][12]
3. To minimize staff exposure to patients with COVID-19, physiotherapy interventions should only be provided when it is clinically indicated
4. Physiotherapy staff should not be routinely entering isolation rooms only to screen for referrals and where possible contactless therapy implemented
5. Use of metered dose inhalers/spacers is preferred where possible. If a nebulizer is required, liaise with local guidelines for directions to minimize aerosolization, e.g., use of a Pari sprint with inline viral filter.

Aerosol-generating procedures

It includes tracheostomy, cardiopulmonary resuscitation before intubation, intubation, extubation, bronchoscopy, HFNO use (negative pressure rooms are preferable), NIV, respiratory support via HFNO (limiting the flow rate to not >30 L/min to reduce potential viral transmission), open suctioning (closed inline suction catheters are recommended), and oxygen therapy.

- Oxygen therapy targets may vary depending on the clinical status of the patient.
  a. For patients with presenting with severe respiratory distress, hypoxemia, or shock, SpO_2 >94% is targeted

Table 1: Recommendations for respiratory physiotherapy interventions

COVID-19 patient presentation (confirmed or suspected)	Physiotherapy referral?
Mild symptoms without significant respiratory compromise, e.g., fever, dry cough, no chest X-ray changes	Physiotherapy interventions are not indicated for airway clearance or sputum samples No physiotherapy contact with patient
Pneumonia presenting with features: A low-level oxygen requirement (e.g., oxygen flow ≤5 L/min for SpO2 ≥90%) Nonproductive cough or patient coughing and able to clear secretions independently	Physiotherapy interventions are not Indicated for airway clearance or sputum samples No physiotherapy contact with patient
Mild symptoms and/or pneumonia AND coexisting respiratory or neuromuscular comorbidity AND current or anticipated difficulties with secretion clearance	Physiotherapy referral for airway clearance Staff use airborne precautions Where possible, patients should wear an N95 mask during any physiotherapy
Mild symptoms and/or pneumonia AND evidence of exudative consolidation with difficulty clearing or inability to clear secretions independently, e.g., weak, ineffective, and moist sounding cough, tactile fremitus on chest wall, moist/wet sounding voice, audible transmitted sounds	Physiotherapy referral for airway clearance Staff use airborne precautions Where possible, patients should wear an N95 mask during any physiotherapy
Severe symptoms suggestive of pneumonia/lower respiratory tract infection, e.g., increasing oxygen requirements, fever, difficulty breathing, frequent, severe or productive coughing episodes, chest X-ray/CT/lung ultrasound changes consistent with consolidation	Consider physiotherapy referral for airway clearance Physiotherapy may be indicated, if weak cough, productive, and/or evidence of pneumonia on imaging and/or secretion retention Staff use airborne precautions Where possible, patients should wear an N95 mask during any physiotherapy
PPE: It is strongly recommended that airborne precautions are utilized. Cough etiquette should be followed by both, the patient and therapist. They must turn the head away during cough and expectoration. Physiotherapist should position themselves ≥2 m from the patient and out of the "blast zone" or line of cough (work from behind the patient). Not more than 8–10 min as required should be spent with each COVID-19 patient to minimize exposure to treating physiotherapists. Where respiratory equipment is used, whenever possible use single patient use or disposable options. Physiotherapists should advise on positioning requirements for postural drainage and improving ventilation perfusion matching	

PPE=Personal protective equipment, CT=Computed tomography

Table 2: Recommendations for physiotherapy mobilization, exercise, and rehabilitation interventions

COVID-19 patient presentation (confirmed or suspected)	
For any patient at significant risk of developing or with evidence of significant functional limitations E.g., Patients who are frail or have multiple comorbidities impacting on their independence E.g., Mobilization, exercise, and rehabilitation in ICU patients with significant functional decline and/or (at risk for) ICU-acquired weakness	Physiotherapy referral Use droplet precautions Use airborne precautions if close Contact required or possible AGPs If not ventilated, patients should wear N95 mask during any Physiotherapy whenever possible [Figure 1: Algorithm]

1. PPE: Droplet precautions should be appropriate for the provision of mobilization, exercise and rehabilitation. Mobilization and exercise may also result in the patient coughing or expectorating mucous, generating aerosol
2. Direct physiotherapy interventions should be considered only in those patients with significant functional limitations (e.g., ICU-acquired weakness, frailty, multiple comorbidities, or advanced age)
3. The patient should be encouraged for early and safe mobilization and maintaining function as much as possible in the ward. E.g. Sit out of bed, perform simple exercises and activities of daily living. Charts for the same should be displayed so that they are easily visible
4. Mobilization and exercise prescription should involve careful consideration for stable clinical presentation with stable respiratory and hemodynamic function
5. Use Theraband rather than distributing hand weights to ensure it is single patient use. Larger equipment (e.g., mobility aids, ergometers, chairs, tilt tables) must be easily decontaminated if at all used
6. When mobilization, exercise or rehabilitation interventions are indicated in ventilated patients or patients with a tracheostomy, it has to be well planned and airway security should be ensured and maintained, e.g., dedicated airway person to prevent inadvertent disconnection of ventilator connections/tubing is recommended
7. Decline in SpO2 by 3% after 6MWT or 1 MSTS test indicates inadequate oxygenation, and it should be brought to the notice of the attending physician. If the 1 MSTS test is used, it should be followed by monitoring for at least 1 min to observe for desaturation
8. Patients can be referred for tele-rehabilitation after discharge

AGP=Aerosol-generating procedures, PPE=Personal protective equipment, ICU=Intensive care unit, 6MWT=6-min walk test, MSTS=Min sit to stand

b. Once a patient is stable, the target is >90% in nonpregnant adults and 92%–95% in pregnant patients

c. In adults with COVID-19 and acute hypoxemic respiratory failure, the SpO_2 target should not be maintained higher than 96%

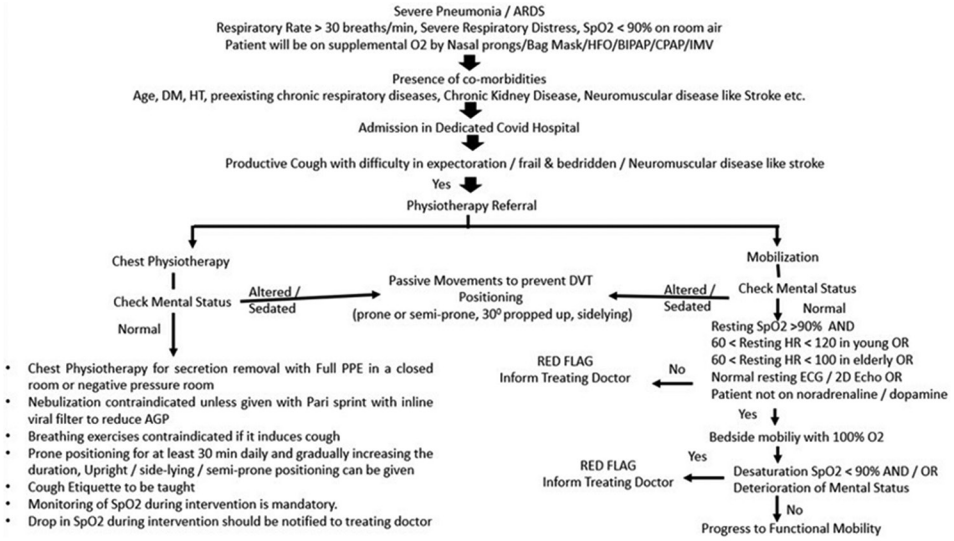

Figure 1: Algorithm of guidelines for physiotherapy management in acute care setup

Table 3: COVID awake repositioning prone protocol (CARP) (adopted from Intensive Care Society Guidelines 2020)

If patient fulfills criteria for proning ask the patient to switch positions as follows. Monitor oxygen saturations 15 min after each position change to ensure oxygen saturation has not decreased. Continue to monitor oxygen saturations
30 min to 2 h lying fully prone (bed flat)
30 min to 2 h lying on right side (bed flat)
30 min to 2 h sitting up (30–600) by adjusting head of the bed
30 min to 2 h lying on left side (bed flat)
30 min to 2 h lying prone again
Continue to repeat the cycle

Where AGPs are indicated and considered essential, they should be undertaken in a negative-pressure room, if available, or in a single room with the door closed. Only the minimum number of required staff should be present, and they must all wear PPE as described. Entry and exit from the room should be minimized during the procedure. Mask should be removed after coming out of patient room and closing the door behind.

Personal protective equipment recommendations for physiotherapists

All staff to be trained in correct step-by-step donning and doffing of PPE. A record of staff who have completed PPE education and fit checking should be maintained.

1. Staff with beards should be encouraged to remove facial hair to ensure good mask fit
2. For all suspected and confirmed cases, at a minimum droplet, precautions are implemented. Staff will wear full PPE as mentioned before
3. PPE must remain in place and be worn correctly for the duration of exposure to potentially contaminated areas. PPE, particularly masks, should not be adjusted during patient care. Bowel and bladder should be emptied before wearing PPE
4. All personal items should be removed before entering clinical areas and donning PPE. This includes earrings, watches, mobile phones, and pen.
5. Stethoscope use should be minimized. If required, using a dedicated
6. Stethoscope within isolation areas is recommended
7. If patients are cohorted into a ward with open rooms, staff working within the confines of the ICU ward but not directly involved in patient care should also wear complete PPE.

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Conflicts of interest

There are no conflicts of interest.

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