Effect of Physiotherapy For Severe Ill Ilpatients With COVID-19 in ICU

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Abstract-

Objective: *To find out the Effect of Physiotherapy techniques for severe ill patient with COVID-19 in ICU at Rama hospital and research centre.*

Material and Methods: *- one hundred fifty five patient received ICU physiotherapy service in ICU at Rama hospital and research centre. All Of these, patients were established for initiating physiotherapy intervention and sixty five patients were on mechanical ventilation during initial physiotherapy intervention. Both group received physiotherapy intervention in initial condition in ICU. Both groups was assessed using visual analogue scale (VAS) for breathlessness, Peak expiratory flow rates (PEFR) and Oxygen saturation level (SaO_2) before and after 2 weak treatment program.*

Result: *- Patient in both groups reported significant improvement after 2 weeks of treatment program compared to baseline on all outcome measure except PEFR that was not significantly improve in both group. Both groups showed more improvement on PEFR and on VAS for breathlessness but more improvement significantly seen in who received physiotherapy treatment along with medical treatment.*

Conclusion: *- physiotherapy techniques along with medical treatment are more effective in Covid-19 patient in intensive care unit. Patients who were outside previously established for initiating physiotherapy intervention were able to participate with physiotherapist and shows functional improvement. It's very necessary for clinical decision making physiotherapy practice while treating patients with covid-19 in the ICU.*

I. INTRODUCTION

Coronavisrus disease 2019 (COVID-19) is a contagious disease caused by a virus, the severe acute respiratory syndrome. The first known case was indentified in Wuhan, China, in December 2019.[1] The disease quickly spread worldwide, resulting in the COVID-19 pandemic. Symptoms of COVID-19 are variable, but often include fever[2], cough, headache[3], fatigue, breathing difficulties, loss of smell, and loss of tested.[4] [5] [6] Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms.[7] Of those people who develop symptoms noticeable enough to be classed as patient, most (81%) develop mild to moderate symptoms (up to pneumonia), while 14%develops severe symptoms (dyspnea, hypoxia, or more then 50% lung involvement on imaging), and 5% develop critical symptoms (respiratory failure, shock, or multiorgan dysfunction)[8] Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed.[9] Multi-year studies are underway to further investigate the long-term effects of the disease.[9]

COVID-19 transmits when people breathe air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these is highest when people are in close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated surfaces. People remain contagious for up to 20 days, and can spread the virus even if they do not develop symptoms.[10][11] COVID-19 testing methods to detect the virus's nucleic acid include real-time reverse transcription polymerase chain reaction (rRT-PCR),[12][13] transcription-mediated amplification, and reverse transcription loop-mediated isothermal amplification (RT-LAMP)[12][13] from a nasopharyngeal swab.[14]

Several COVID-19 vaccines have been approved and distributed in various countries, which *have initiated mass vaccination campaigns. Other preventive measures include physical or social distancing*, quarantining, ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmission. While work is underway to develop drugs that inhibit the virus, the primary treatment is symptomatic. Management involves the treatment of symptoms, supportive care, isolation, and experimental measures.

COVID-19 primarily affects the respiratory system and can cause a range of complication within the cardiovascular, neurological, and musculoskeletal system. This complication along with prolonged time in the intensive care unit (ICU), can contribute to reduce functional mobility and quality of life,[15] [16] increased mortality, and increased the risk for developing post intensive care syndrome and ICU acquired weakness[11][12]. Physiotherapist has an important role in addressing patient function and quality of life during after ICU admission. There are multiple published guidelines related to mobilizing patients in the ICU are proven to be safe and feasible [17] to diminished the consequence of post ICU syndrome and to decrease ICU and hospital length of stay. [21] Patient who participates with physiotherapist demonstrates better functional outcomes, is more likely to discharge home, and is more likely to return to an independent functional status. [17]

In the beginning of the COVID-19 pandemic, PT involvement seemed to be limited, especially in the ICU [18] [19]. After discussion with clinicians at other hospitals and reviewing the available literature, PT intervention seemed to primarily focus on proning, range of motion, and bed exercises.[18] [19] During physical therapy sessions, the authors observed that these patients could tolerate more mobility than anticipated. However, some of the patients were outside of our normal parameters for initiating PT intervention and continu ing mobility during physical therapy sessions. The authors realized that to adapt to this unique clinical situation, a new algorithm was needed to assist in the clinical decision-making process.

Multiple guidelines for PT intervention have been published throughout this pandemic.[28–30] Initial publications focus primarily on personal protective equipment, infection control procedures, airway clearance, and post acute care.[18][20] A few publications mention patients in the ICU; however, the information seems to focus on respiratory care, range of motion, and bed mobility with limited out-of-bed activity and ambulation.[18] [22] [23] published guidelines for physiotherapy management for patients with COVID-19 in the acute care setting, providing a general overview of basic concepts of patient management. The information about their experience with patients with COVID-19 in the ICU and reported no adverse events associated with PT intervention in the ICU, including during ambulation.

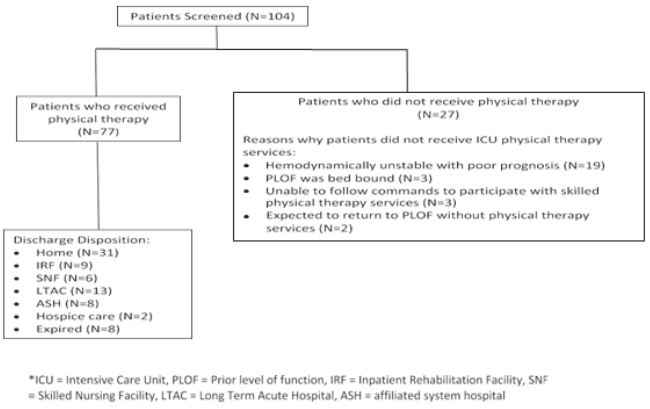
Physiotherapy involvement in the care of patients with COVID-19 in the authors' ICUs.[23] Also, the publications mentioned above provide limited information to assist clinicians with the clinical decision-making process required at the bedside to safely and effectively provide PT intervention and mobilize patients in ICU.

To fill this gap in the literature, the authors created a clinical decision-making algorithm to assist with identify- ing appropriate patients and timing for intervention for patients with COVID-19 in the ICU. The aim of this study is to describe our Physiotherapy practice for patients with critical illness due to COVID-19 at a tertiary hospital; and describe a novel clinical decision-making and its use in enhancing clinical practice for patients with COVID-19 in the ICU.

II. METHODS

This study is a retrospective chart review that was taken from Rama Hospital and research centre In Kanpur. The medical records of patients admitted ICU with a physical therapy consult were screened from August to December 2021 (Fig. 1). Inclusion criteria required patients to have a positive COVID-19 test during their hospital admission, have a referral for physical therapy while in the ICU, be able to actively participate with physical therapy, and have acceptable medical stability. Patients who were expected to recover without skilled PT intervention, bedbound at baseline, unable to follow commands or hemodynamically unstable with poor medical prognosis were screened and discharged physiotherapy clinical and demographic data and all patient physiotherapy encounters were collected by medical record.

There is a large body of evidence regarding mobilizing patients who are critically ill, on mechanical ventilation, with acute respiratory distress syndrome (ARDS), sepsis, or other causes of respiratory failure. As a result of the COVID-19 pandemic, health care professionals have been challenged to adjust best practices. For the establishment a standard of Physiotherapy practice and decision-making for patients with COVID-19 in the ICU. This evolved from the current clinical decision-making process, along with new information from published research and clinical experience gained during the pandemic.



The clinical decision-making considers the patients cognitive, hemodynamic, and respiratory stability to help guide mobilization of patients. Physiotherapy intervention was initiated using the response dependent progression of mobility. [24] Additional supplemental oxygen or ventilator support was given as needed after consultation with the medical team and order was received for target oxygen saturation (SpO2) levels to be maintained during activity for individual patients.

The Activity Measure for Post-Acute Care was assessed during all physiotherapy encounters. The ICU Mobility Score (Perme Score), Medical Research Council Sum Score (MRC-SS), were performed during all ICU physiotherapy initial evaluations and re-evaluations. Because of frequent in- tubation and encephalopathy causing limited communication ability, the Barthel Index (BI) was included during this pandemic to provide an objective assessment of prior level of function. The BI measures activities of daily living and function. The score ranges from 0 to 100 with higher scores indicating more independence. Although it has not been validated as a tool to formally measure a patient's prior level of function, this pandemic has challenged clinicians to adjust their practice and become creative. The BI is simple to perform and easy to use with patients at the bedside.

The Perme Score is used to objectively assess a patient's functional mobility in any ICU at a specific moment in time. It begins with assessing mental status and ends in the distance walked in 2 minutes. The score ranges from 0 to 32 and is derived from 15 items grouped into 7 categories. It has been shown to have high inter-rater reliability and validity. The MRC-SS uses a 6-point scale ranging from 0 to 60 to measure muscle strength. The ability to follow commands is initially assessed followed by measuring the strength of 3 muscle groups in all 4 limbs. The MRC-SS was shown to have good-to-excellent inter observer agreement and is most commonly used as a diagnostic tool for ICUAW. The RASS is a structured assessment of sedation and agitation used for patients who are critically ill. It ranges from 25 to 14, with negative numbers correlating to degree of sedation and positive numbers correlating to degree of agitation. It was found to have high reliability and validity in adult ICU patients. [25]

TABLE 1
Patient Characteristics (N 5 77)

Age, median (IQR)	58 (46.5–70.5)
Sex—female, n (%)	36 (46.8)
BMI, median (IQR)	30.6 (26.5–36.3)
Hospital LOS—days, median (IQR)	18 (13–25)
ICU LOS—days, median (IQR)	13 (7–18.5)
Days on ventilator, median (IQR)	10 (5–17)
P/F Ratio on evaluation, median (IQR)	280 (203–403.8)
FiO_2 on evaluation, median (IQR)	40 (35–50)
PEEP on evaluation, median (IQR)	8 (5–10)
Number of PT visits during admission , median (IQR)	6(4-6)
Duration of PT visits during admission , min, median (IQR)	31.2 (20-40)
AM-PAC Score on evaluation, Median (IQR)	9 (5-14)
Perme Score on evaluation, median	12 (6-23)
BARTHEL Index	80 (80-100)

The following data were collected at the initial physical therapy evaluation: oxygen delivery method, PEEP, FiO_2, heart rate, mean arterial pressure, SpO2, P/F ratio, BI, MRC-SS, AM-PAC, Perme Score, RASS. During all physiotherapy sessions, the patient's highest level of mobility was recorded using a 5-point scale. A score of 1 indicates the patient performed bed level activity, 2: sitting side of bed, 3: Standing at bedside, 4: ambulating up to five feet, and 5: ambulating more than 5 feet.

Data extracted from the medical record were reviewed by members of the research team to ensure accuracy and prevent any form of potential bias. Data were entered by sub investigators into a password protected, secured computer. Descriptive results are presented as frequencies, percentages, medians, and inter quartile ranges. Because the data did not meet assumptions of normality, nonparametric tests were used to compare groups and to identify relationships between clinical variables.

III. RESULT

One hundred fifty five patients with COVID-19 were admitted to ICU in Rama Hospital and Research centre

between March and May 2020. Seventy eight patients received a physical therapy consult and 52 of these patients received ICU physical therapy services. Twenty-five patients were deemed inappropriate for physiotherapy services for the reasons identified in of the patients who received ICU physiotherapy. Of the patients who received ICU physiotherapy 7.8% received ECMO support during their ICU admission. A median of 2 weeks passed between ICU admission and the initial physical therapy evaluation.

The median BI score to indicate the patient's prior level of function was 100. During the initial physical therapy evaluation, the median AM-PAC score was 8 and the median Perme score was 10). As seen, 16.9% of patients stood at the bedside, 20.8% of patients ambulated #5 feet and 13.0% of patients ambulated 5 feet during the initial evaluation. There was a statistically significant improvement between AM-PAC scores on the initial physical therapy evaluation and the last physical therapy note before ICU discharge.

At the time of hospital discharge, 65 (70.1%) patients had multiple new complications present, 12 patients had only pulmonary complications, 7 patients had only musculoskeletal complications, 4 patients (1.3%) had only cognitive impairments, 3 patients (1.2%) had only neurological impairments, and 14 patients had no complications.

Patients on Mechanical Ventilation in ICU

Of the 52 patients who received ICU physical therapy services, 32 patients were receiving mechanical ventilation support via endotracheal tube on the initial physiotherapy evaluation. The median highest level of mobility for these patients during the initial physiotherapy evaluation was 2 to 3. Fifty-point six percent of these patients had a RASS Score of 0 and 29.8% had a score of 21. The highest level of mobility shows no relationship with the mechanical ventilation settings of PEEP sessions. Our data shows that during the initial physiotherapy evaluation, this critically ill patient population was able to progress past bed exercises and passive mobility, with more than one-third of these patients standing or ambulating. Between the initial physiotherapy evaluation and ICU discharge, there was a statistically significant improvement in all aspect. Without this novel algorithm, these patients may not have received PT intervention while in the ICU or intervention may have been delayed based on our previous guidelines. In addition, as the number of patient admissions increased with subsequent surges, this algorithm was used as a teaching tool for other physiotherapist who did not primarily work in the ICU. This improved the consistency of clinical decision-making across all physiotherapists working with this patient population in the ICU.

Thirty two patients were on mechanical ventilation during the initial physical therapy evaluation. Per the ICU Liberation illustrated in our results, a majority of our patients had 2 or more new complications at the time of hospital discharge, primarily pulmonary and cardiovascular. This is in line with the recent literature published on the adverse effects of COVID-19 along with current literature on the complications of critical illness, including delirium.

This study is one of the studies to describe physiotherapy practice for severe ill patients in ICU with COVID-19, with and without MV. Second, therapy sessions were progressed to a maximal level of mobility within physio-logical tolerance allowing for various types of intervention (eg, resistance exercise, standing, gait, etc). Third, the clinical decision-making algorithm provides a step-by-step process that may translate to other patient diagnoses and ICU settings.

IV. CONCLUSION

Physiotherapy intervention is an integral component of a patient's course for recovery during and after severe illness due to COVID-19. This algorithm allowed us to provide PT intervention for patients who may not have been seen or for whom intervention may have been delayed based on our previous guidelines. This algorithm can assist clinicians with identifying patients who are appropriate for PT intervention and determining an appropriate time to intervene to maximize the benefits of early mobility in patients with COVID-19 in the ICU.

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