

# Role of Physiotherapist in Critical Care Situations: Recent Perspective

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## Abstract

Physiotherapy is part of a multidisciplinary team and plays an important role in the critical care unit to improve patients' quality of life. It is reported that a patient mechanically ventilated for more than a week shows muscular weakness approximately 25% and approximately 90% of patients have ongoing muscular weakness and poor quality of life. Physiotherapy in critical care units and high dependency units play a vital role to promote lung functions and early discharge. There are more ventilator-free days for patient with early physiotherapy in intensive care unit (ICU) compared with standard care. A large number of physical limitations are faced by patient and professionals in ICU and respiratory intermediate intensive care units. Declined pulmonary function, persistent muscle weakness, prolonged mechanical ventilation, and contracture are associated with poor quality of life and long-time staying in hospitals. Physiotherapy is a main component of patient management in critical care units and involves mobilization activities, functional positioning, passive- and active-assisted movements of extremities, sitting, bedside standing, walking with support, early mobilization, postural drainage, clear airway secretions, manual hyperinflation, percussion and vibration, assisted and resisted exercise, and electric stimulation.

## Keywords

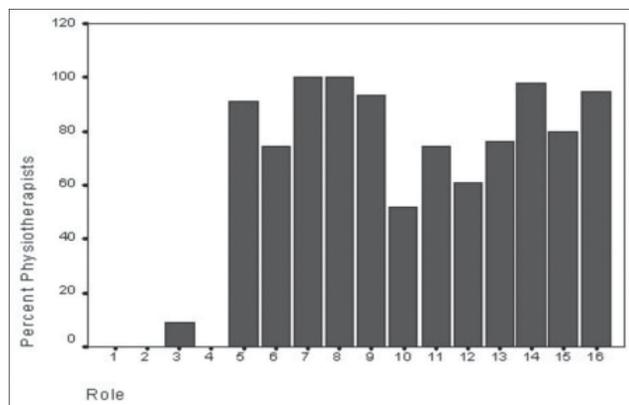
- ▶ breathing exercises
- ▶ early mobilization
- ▶ ICU
- ▶ physiotherapy

## Introduction

Physiotherapist is an important member of multidisciplinary team and plays an important role in critical care unit in improving the patient's quality of life.<sup>1,2</sup> It is reported that approximately 25% patients who have been mechanically ventilated for more than a week show muscular weakness, and approximately 50 to 90% of patients who had long-term stay in intensive care unit (ICU) had ongoing muscular weakness, poor quality of life, and functional decline with increased morbidity.<sup>3</sup> Physiotherapy expertise works for assessment and management of several musculoskeletal and physical complications in ICU.<sup>4</sup> Physiotherapy in respiratory conditions brings short-term as well as medium-term benefits for respiratory illness and patients needing extracorporeal membrane oxygenation (ECMO).

Physiotherapy treatment, such as positioning, percussion, postural drainage and suctioning, vibration, berating exercises, and mobilization (▶**Fig. 1**), in critical care units and

high-dependency units plays a vital role in promoting lung functions and early discharge from hospital and ICUs.<sup>5-8</sup>



**Fig. 1** Physiotherapy and physiotherapist role in intensive care units of India in different physical therapies.

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1—Percussion only, 2—vibration only, 3—percussion + vibration, 4—suctioning only, 5—chest manipulation (percussion + vibration + suctioning), 6—positioning, 7—mobilization, 8—breathing exercises, 9—incentive spirometry, 10—ambulation of tracheostomy patients in ICU, 11—ambulation of non-intubated patients in ICU, 12—counseling, 13—nebulization + humidification, 14—postural drainage, 15—forced expiratory technique, and 16—assisted coughing and huffing.<sup>7</sup>

It helps in decreasing the risk of ventilator-associated pneumonia and respiratory muscle weakness, improving lung volumes and capacities, and influencing or preventing physical impairments,<sup>9–16</sup> within the International Classification of Functioning (ICF) domains, regarding diagnostics and effective and safe physiotherapy treatment strategies aiming at early mobilization and physical activity for patients in an ICU.<sup>17–19</sup>

## Physiotherapy Rehabilitation

During critical illness to prevent and mitigate adverse effect of prolonged immobilization in ICU, physiotherapy plays an integral part. Physiotherapists deliver active or passive services and focus on early mobilization, which is beneficial for reducing the long staying time in ICU and add to quality of life. Lack of early progressive physiotherapy results in increased costs of health provision services, extensive period of rehabilitation, and long-term follow-up with residual disabilities. According to the National Institute of Health and Clinical excellence (NICE), European Respiratory Society, and ICU medicine, there are more ventilator-free days for patients with early physiotherapy in ICU compared with standard care.

## Problems and Physical Limitations in Intensive Care Unit Patients

A large number of physical limitations are faced in the ICU and respiratory intermediate ICUs (RIICUs) by patients and professionals. Declining pulmonary function, persisting muscle weakness, prolonged mechanical ventilation, and contracture are associated with poor quality of life and long-time staying in hospitals.<sup>20</sup> Lack or inadequate level of appropriate therapy is associated with deconditioning, recurrent symptoms, and muscle wasting. Almost half of the ICU patients with multiple organ failure or condition requiring prolonged mechanical ventilation show chronic critical illness, prolonged bed rest, and incontinence prevalences.<sup>20,21</sup>

## Physiotherapy Recommendations

Scientific society has recommended physiotherapy as a main component of patient management in critical care units or patient with critical illness. Traditional physiotherapy strategies involve mobilization activities in progressive manner such as positioning or decubitus change, functional positioning,

passive and active assisted movements of extremities, sitting, bedside standing, and walking with support. Now there is a paradigm shifting toward early physiotherapy or aimed to improve patients' quality of life and decrease ICU-related complications such as respiratory distress or prolonged stay in patients with ECMO. Starting of early mobilization not more than 1 and 2 days after is beneficial to prevent ICU-related complications. Along with mobilization, strengthening of respiratory muscle improves respiratory functional outcomes and stability of the patient. Every patient should be screened for the red flags or contraindications for risks and benefits before and during every physiotherapy treatment session. To improve range of motion for joint contractures and muscle tone in unconscious patients, passive joint movements should be monitored daily.<sup>22–24</sup> In patients who already have joint contractures, stretching, splinting, or passive movements with continuous passive motion (CPM) should be applied for 20 minutes daily.<sup>21,25</sup>

A new paradigm in physiotherapy involves early mobilization, postural drainage, clear airway secretions, manual hyperinflation, percussion and vibration, and assisted and resisted exercises.

## Early Mobilization Physiotherapy Role

Due to inactivity, inflammation in patients in ICU presents with muscular weakness. Pain treatment and management devices such as endotracheal tube, catheters, and thoracotomy tubes further contribute to muscular weakness or disuse atrophy. It involves changing position hourly or frequently in conscious or unconscious patients. Only short-term effects are available for positioning. Evidences are available for selecting appropriate treatment and suitable patient for mobilization. Early mobilization is helpful in sitting, standing, and walking with assistive aids (►Fig. 2). Sitting, standing, and walking with aids increases gaseous exchange while prolonged bedrest increases the risk of deep vein thrombosis, improve chest wall strength, gaseous exchange and functional residual capacities.<sup>26–28</sup>



**Fig. 2** Mobilization (standing and walking) with walking aid in intensive care unit.



Fig. 3 (A) Position of patient for postural drainage. (B) Percussion in side lying.

## Postural Drainage

This technique is beneficial to drain out secretions with the help of gravity effect. Patient is positioned in different positions (►Fig. 3A) according to lung lobes from which secretion needs to be drained out with the help of pillows or adjustable beds in ICU. It includes different techniques such as percussion (►Fig. 3B), shaking, or vibration coughing to move secretions toward upper airway. The collected secretion is suctioned out from the upper airway.

Positioning of patient with 30% head elevation decreases the risk of aspiration and ventilator-associated pneumonia. Chest physiotherapy helps in improving gas exchange and mucus clearance.

In a randomized control study, the authors concluded that the patients who were mechanically ventilated in ICU resulted with improved lung collapse and prevented ventilator-associated pneumonia after chest physiotherapy and postural drainage.<sup>29-32</sup>

## Manual Hyperinflation

The patient with mechanical ventilation airway secretions is moved out to large respiratory tract with the help of manual hyperinflation with inflation bag (►Fig. 4) and amount of secretions accumulated in large respiratory tract are suctioned out. It can improve the oxygenation and lung compliances. This is a very effective technique to use in ICU patients.<sup>33-36</sup> Self-inflating bag is used to deliver a 50% greater volume of gas than tidal volume via an endotracheal or tracheostomy tube which have potential advantages in different conditions such as reversal of acute lobar atelectasis, alveolar recruitment via channels of collateral ventilation, improvement in PaO<sub>2</sub>, and improved static lung compliance.

## Electric Stimulation (TENS)

This is used in conscious patient for extremity pain management. Small trials recorded benefits for muscular strengthening and muscle mass.<sup>37</sup>



Fig. 4 Ambu bag used for manual hyperinflation in intensive care unit.

## Breathing Exercises

Early addition of breathing exercises such as forced expiration (►Fig. 5), deep breathing, and incentive spirometry techniques (►Fig. 6) include increasing chest expansion and involve voluntary increase in lung volumes greater than lung capacity. It will also help to clear the airway secretions via strengthening the respiratory muscles which undergo weakness during rest period and result in failure forceful coughing.<sup>5,6,38</sup>

## Role of Physiotherapist in ICU

In ICU, physiotherapists are involved in the prevention and treatment of pulmonary, circulatory, and musculoskeletal system and integumentary complications, by regular chest physiotherapy, graded mobilization, and proper positioning of patients. The role of physiotherapists as stated by Kathy Stiller in the ICU are positioning, mobilization, manual hyperinflation, percussion, vibration, coughing, suctioning, various breathing exercises, and limb exercises. Colin F. Mackenzie stated the role of physiotherapists in ICU as positioning, postural drainage, percussion, vibration, manual lung inflation, coughing, tracheal suctioning, breathing exercises, patient mobilization and application of aerosol,



Fig. 5 Spirometry breathing exercises.



Fig. 6 Forced expiration breathing exercise for lower lobe.

humidification, incentive spirometry, forced expiratory techniques, bronchodilators, and mucolytic agents.

Indian ICU physiotherapists perform the roles of both chest physiotherapy and mobilization. Apart from the roles mentioned in a telephonic interview, therapists are also involved in application of noninvasive ventilation, proprioceptive neuromuscular facilitation in respiration, bedsores management, active cycle of breathing techniques, and autogenic drainage. Therapists in ICU are not only involved in chest physiotherapy techniques, but also are reported to have a very active role in mobilization and positioning.<sup>39</sup>

## Conclusion

Early implementation of physiotherapy treatment in ICU patient plays a significant role to prevent the mechanical ventilator complications, decreased muscle strength, and respiratory complications. With the help of new physiotherapy paradigm, there is improvement in quality of life of patients and also decrease in the cost of hospital stay.

## Conflict of Interest

None.

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