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Physiotherapy Techniques for Intensive Care Unit (ICU) Patients

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Introduction

Critical care is the specialized treatment provided to patients in critical care units who have illnesses that are life-threatening and need thorough care and on-going monitoring (ICUs) [1]. Patients in critical condition frequently have long-term emotional and physical repercussions. They receive long-term mechanical ventilation, which causes substantial muscular weakness in 25% of them, and chronic muscle weakness affects around 90% of long-term ICU survivors. Long-term stays in the ICU are also linked to decreased quality of life, functional decline, increased morbidity, mortality, cost of treatment, and duration of hospital stay [2,3].

In order to examine and manage respiratory difficulties, physical deconditioning, and neuromuscular and musculoskeletal issues, patients need a multidisciplinary team in critical care that are uniquely trained with the necessary skills and competence. Encouraging lung function, lowering the incidence of ventilator-associated pneumonia, enabling weaning, and promoting safe and prompt release from the intensive care unit are all made possible via the use of physical therapy as part of a multidisciplinary approach to care.

Physiotherapy Rehabilitation in ICU

When a patient is critically sick, physical therapy is a crucial intervention that helps to avoid and lessen the negative consequences of extended bed rest and mechanical ventilation. The physiotherapist's rehabilitation programme is individualised for each patient and is based on the patient's level of consciousness, psychological health, and physical stamina [4]. Any active or passive therapy that encourages mobility and integrates mobilisation is included. In order to minimize functional deterioration, early progressive physiotherapy that emphasises mobility and walking while ventilated is crucial. However, as therapists were not consistently consulted for mobilisation, a cross-sectional, multicenter point prevalence study aiming to examine the prevalence of mobility provided by physical therapy or occupational therapy indicates the need for systematic and interdisciplinary mobilisation approaches for critically ill children.

Respiratory Physiotherapy Techniques for ICU Patients

The phrase "chest physiotherapy" is used broadly in studies to refer to physiotherapy treatment methods that target secretion elimination and better airway clearing, which in turn helps to enhance respiratory efficiency. The phrase "chest physiotherapy" refers to a range of procedures intended to get rid of secretions, which reduces the amount of labour required to breathe, encourages lung expansion, and keeps the lungs from collapsing.

It differs from bronchial hygiene therapy (BHT) in that BHT includes manual hyperventilation and breathing exercises in an intubated patient in addition to chest physiotherapy. By using non-invasive airway clearing procedures, bronchial hygiene can aid to better gas exchange by mobilising and removing secretions. The majority of respiratory illnesses, including chronic respiratory diseases like COPD, bronchiectasis, and cystic fibrosis, neuromuscular diseases like muscular dystrophy, cerebral palsy, and spinal cord injuries, and during peri-operative care primarily for upper abdominal surgeries, benefit from chest physical therapy. If performed appropriately, chest physiotherapy can be an important part of comprehensive respiratory treatment. Due to immobility and/or the use of mechanical ventilators, patients hospitalised to the intensive care unit (ICU) are at a significant risk of developing respiratory difficulties. Acute respiratory failure is another reason why a lot of patients are brought to the ICU. The care of patients admitted to the ICU must include physical therapy. ICU physical therapists work to either stop the progression of respiratory difficulties or to treat those that have already occurred. Airway secretion clearance, maintaining or increasing lung capacity, maximising oxygenation, and maintaining or improving inspiratory muscle strength are the most typical physiotherapy objectives for respiratory dysfunction in the intensive care unit. These broad objectives can be accomplished by utilising the suitable physiotherapeutic methods and tools. The goals of hyperinflation are to avoid pulmonary atelectasis, mobilise airway secretions, attract collapsed alveoli, increase lung oxygenation, and enhance lung compliance [5]. A method called manual hyperinflation (MHI) uses a resuscitator bag to manually provide a slow, deep intake, an inspiratory hold of two to three seconds, and a fast expiration (quick release of the bag) to improve expiratory flow and simulate a forced expiratory approach. The patient is withdrawn from the ventilator and linked to a manual resuscitation bag during MHI. Through this bag, the patient receives an increased inspiratory tidal volume (1.5-4 times the baseline tidal volume) at a pressure no higher than 40 cmH2O. The patient's ventilator's settings are changed to produce ventilator hyperinflation (VHI). Given that the ventilator does not need to be disconnected, VHI may have advantages over MHI. Positive end-expiratory pressure (PEEP) maintenance, a lower risk of infection, ventilator parameter management, and easier replication are some of these benefits. Greater effectiveness of secretion clearance may be achieved when postural drainage is combined with hyperinflation. Patients with cardiovascular instability, head trauma, elevated intracranial pressure (ICP >25mmHg), undrained hemothorax or pneumothorax, congestive heart failure, severe pneumonia, acute bronchospasm, patients on high PEEP, large emphysematous bullae, among other conditions, should not undergo hyperinflation.

Pulmonary Physiotherapy Method in ICU

The most frequent causes of morbidity and death in ICU patients are pulmonary problems. Patients in intensive care units are frequently intubated and mechanical ventilator-monitored. This makes it challenging to clear these individuals' breathing passageways. The

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temporary failure of the mucociliary system and incapacity to cough are the result of the airway secretions that cannot be eliminated. These secretions can lead to the development of intrapulmonary shunts and a decrease in tidal volume. Finally, as a result, problems that range from atelectasis to pneumonia, respiratory arrest, bronchopulmonary inflammation and infections, and even death, may manifest. The secretions can be mobilised, coughing can be made more effective, and the airways may be cleaned more effectively using a variety of methods and tools. The traditional form of chest physiotherapy uses percussive technique, posture, and postural drainage [6-8]. This method of airway clearing, which has been used for many years and supports airway clearance, is human-dependent, and the frequency and length of activity varies according to the practitioners.

It has also been noted that the typical approach is labor-intensive, results in a low percentage of treatment, and causes patients discomfort.

The use of high frequency chest wall oscillation (HFCWO) for the treatment of chronic illnesses such cystic fibrosis, bronchiectasis, and neuromotor-neuromuscular diseases is not new. HFCWO produces a cough-like action by loosening mucus that has been attached to the bronchial airways. It offers a significant benefit like standardising mechanical treatment without relying on practitioners. HFCWO has traditionally been used in the normal mode with a vest attached to the air-blast generator for a period of time [9,10].

In our search of the literature, while we discovered studies about the tolerability, comfort, and pain levels of these two techniques, there were none that examined factors such as the weight of dry sputum produced by intubated patients, the occurrence of lung atelectasis or hospital-acquired pneumonia, or the number of days spent on ventilation and in the intensive care unit [11,12]. In this study, we sought to assess the impact of the HFCWO technique in addition to the usual conventional pulmonary physiotherapy method, particularly in ICU patients on mechanical ventilation, and to look into its effects on lung collapse and excretion of airway secretions as well as the relationship between the amount of excreted secretions, frequency of pulmonary infections, and length of stay in the ICU.

Impact of Physiotherapy

The ICU benefits from early physical therapist involvement.

- ICU and total hospital stays for the patient should be minimised
- prevent problems from the ICU
- long-term enhancement of function and quality of life

According to studies, the use of physiotherapy in critical care has helped to cut the death rate by 25%. Visits to the ICU before to admission appeared to have no impact on anxiety or sadness, according to a randomised clinical research. Additionally, it had a detrimental impact on the patient's degree of satisfaction. The significance of mobility training in long-term acute care hospitals was highlighted by a retrospective cohort research on 285 survivors of protracted ICU stays that found that the capacity to ambulate was connected with a higher likelihood of being released.

Discussion

In individuals who have been intubated, the airway cleansing function declines. The danger of lung collapse has increased due to the impairment of their mucociliary clearance. As a result, ICU patients frequently have secretion retention, atelectasis, and ventilator-related pneumonia, respectively. To avoid atelectasis increasing susceptibility to lung infections such ventilator-associated pneumonia, several airway cleaning procedures and pulmonary rehabilitation treatments are utilised. The physiological processes that clear the airway with HFCWO administration include increased air flow-mucus contact, reduced mucus viscoelasticity, and increased ciliary activity. By temporarily increasing expiratory flow, producing cough-like shear pressures, and reducing mucus viscoelasticity, HFCWO administration has been shown to promote mucociliary cleaning and boost central or periphery mucus cleaning.

Conclusion

In order to make an early extubation and to prevent pulmonary dysfunction, many physiotherapy techniques are performed. However, we might argue that employing HFCWO in conjunction to standard physiotherapy techniques can increase secretory mobilisation across the lungs in the intensive care unit. Thus, it may be able to stop the progression of lung atelectasis or pneumonia that was obtained in a hospital. Although combining the use of HFCWO with standard physiotherapy techniques may be a more successful way to avoid atelectasis and lung infections, it is important to remember that HFCWO may not be an option for many hospitals due to its high cost. To apply this understanding to ICU procedures, more controlled clinical investigations are required.

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Conflict of Interest

Author declares no conflict of interest.

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