

# “Effectiveness of Progressive Mobility Protocols in ICU Patients: A Controlled Study”

Shubhangi Bankar<sup>1</sup>, Kashish Shah<sup>2</sup>, Ramsha Khan<sup>3</sup>, Ashwini Motekar<sup>4</sup>, Indrani Patil<sup>5</sup>

<sup>1,2,3,4</sup>Intern, MGM School of Physiotherapy, Chh. Sambhajinagar. A constituent unit of MGMIHS Navi Mumbai, Maharashtra.

<sup>5</sup>Final year MGM School of Physiotherapy, Chh. Sambhajinagar. A Constituent Unit Of MGMIHS Navi Mumbai, Maharashtra.

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## ABSTRACT

**Background:** Critically ill patients admitted to the Intensive Care Unit (ICU) often develop muscle weakness, reduced functional capacity, and prolonged immobilization, leading to delayed recovery. Early mobilization through structured progressive mobility protocols has been suggested to improve clinical and functional outcomes.

**Aim:** To evaluate the effectiveness of progressive mobility protocols on functional outcomes and clinical parameters in ICU patients.

**Materials and Methods:** A prospective controlled study was conducted on 30 ICU patients who were divided into experimental (n=15) and control (n=15) groups. The experimental group received a progressive mobility protocol, while the control group received conventional physiotherapy. Outcome measures included ICU Mobility Scale (IMS), MRC Muscle Strength Scale, and Functional Independence Measure (FIM). Duration of ICU stay and mechanical ventilation were also recorded. Data were analyzed using paired and unpaired t-tests, with  $p < 0.05$  considered statistically significant.

**Results:** The experimental group showed significant improvement in functional mobility, muscle strength, and functional independence compared to the control group ( $p < 0.05$ ). Additionally, a reduction in ICU length of stay and duration of mechanical ventilation was observed in the experimental group.

**Conclusion:** Progressive mobility protocols are effective in improving functional outcomes and reducing ICU-related complications. Their incorporation into routine ICU care can enhance patient recovery and overall clinical outcomes.

**Keywords:** Progressive mobility, ICU rehabilitation, early mobilization, muscle strength, functional independence

## INTRODUCTION

Critical illness often leads to significant physical deconditioning, muscle weakness, and functional decline, particularly in patients admitted to the Intensive Care Unit (ICU). Prolonged immobilization, sedation, and mechanical ventilation contribute to a condition known as ICU-acquired weakness (ICU-AW), which is associated with increased morbidity, delayed recovery, and reduced quality of life after discharge (1,2).

Early mobilization has emerged as a key intervention in mitigating the adverse effects of bed rest in critically ill patients. It includes a spectrum of activities ranging from passive range of motion exercises to active ambulation, depending on the patient's clinical stability (3). Evidence suggests that early physiotherapy interventions can improve muscle strength, reduce duration of mechanical ventilation, and enhance functional independence (4).

Progressive mobility protocols are structured, stepwise approaches designed to safely advance a patient's level of physical activity based on their tolerance and physiological stability. These protocols standardize rehabilitation practices in the ICU and promote interdisciplinary coordination among healthcare professionals (5). Implementation of such protocols has been shown to reduce ICU and hospital length of stay, improve functional outcomes, and decrease the incidence of complications such as deep vein thrombosis and pressure ulcers (6).

Despite growing evidence supporting early mobilization, variability exists in its implementation due to concerns regarding patient safety, hemodynamic instability, and resource limitations (7). Therefore, evaluating the effectiveness of progressive mobility protocols in ICU settings is essential to establish their clinical utility and encourage widespread adoption.

This study aims to assess the effectiveness of progressive mobility protocols in improving functional outcomes and reducing ICU-related complications in critically ill patients.

### **Aim of the Study**

To evaluate the effectiveness of progressive mobility protocols on functional outcomes and clinical parameters in patients admitted to the Intensive Care Unit (ICU).

### **Objectives**

#### **Primary Objective**

To assess the effect of progressive mobility protocols on functional mobility in ICU patients using standardized outcome measures (e.g., ICU Mobility Scale / Functional Independence Measure).

#### **Secondary Objectives**

**To evaluate the impact of progressive mobility protocols on:**

- Duration of ICU stay
- Duration of mechanical ventilation
- Muscle strength (using MRC scale)
- Incidence of ICU-acquired weakness
- Functional independence at discharge

**To compare the outcomes between:**

- Experimental group (progressive mobility protocol)
- Control group (conventional physiotherapy)

### **Hypothesis**

#### **Null Hypothesis ( $H_0$ )**

There will be no significant difference in functional outcomes and clinical parameters between ICU patients receiving progressive mobility protocols and those receiving conventional physiotherapy.

#### **Alternative Hypothesis ( $H_1$ )**

There will be a significant improvement in functional outcomes and clinical parameters in ICU patients receiving progressive mobility protocols compared to those receiving conventional physiotherapy.

## METHODOLOGY

A prospective controlled study was conducted in the ICU of a tertiary care hospital. A total of 30 patients were included and divided into two groups: experimental (n=15) and control (n=15) using convenient sampling with random allocation.

Patients aged 18–65 years, with ICU stay  $\geq 48$  hours and who were hemodynamically stable were included. Patients with unstable vital parameters, severe cognitive impairment, or contraindications to mobilization were excluded.

Baseline assessment was done using ICU Mobility Scale (IMS), MRC Muscle Strength Scale, and Functional Independence Measure (FIM).

The experimental group received a progressive mobility protocol consisting of stepwise progression from range of motion exercises to sitting, standing, and ambulation. The control group received conventional physiotherapy. Interventions were given 1–2 sessions per day until ICU discharge.

Post-intervention assessment was performed using the same outcome measures. Duration of ICU stay and mechanical ventilation were also recorded.

Data were analyzed using paired and unpaired t-tests, and  $p < 0.05$  was considered statistically significant.

## RESULTS

A total of 30 patients completed the study, with 15 patients in each group. Both groups were comparable at baseline with no significant differences in age, gender, or initial outcome scores ( $p > 0.05$ ).

After intervention, the **experimental group showed significant improvement** in functional mobility, muscle strength, and functional independence compared to the control group.

- **ICU Mobility Scale (IMS):**

The experimental group demonstrated a greater increase in IMS scores compared to the control group ( $p < 0.05$ ).

- **Muscle Strength (MRC Scale):**

Significant improvement in muscle strength was observed in the experimental group, while the control group showed minimal improvement ( $p < 0.05$ ).

- **Functional Independence (FIM):**

The experimental group achieved higher FIM scores at discharge compared to the control group ( $p < 0.05$ ).

- **ICU Length of Stay:**

The duration of ICU stay was reduced in the experimental group compared to the control group.

- **Duration of Mechanical Ventilation:**

Patients in the experimental group had a shorter duration of mechanical ventilation.

Overall, progressive mobility protocols were found to be more effective than conventional physiotherapy in improving functional outcomes in ICU patients.

## DISCUSSION

The present study demonstrated that progressive mobility protocols significantly improved functional mobility, muscle strength, and independence in ICU patients compared to conventional physiotherapy.

Early and structured mobilization helps in preventing ICU-acquired weakness by maintaining muscle activity and reducing the effects of prolonged immobilization. The stepwise progression used in this study ensured safe advancement of activity levels according to patient tolerance, which may explain the superior outcomes observed in the experimental group.

Improvement in IMS and FIM scores indicates enhanced functional recovery and early return to independence. These findings are consistent with previous studies, which reported that early mobilization in ICU settings leads to better physical outcomes and reduced disability.

The reduction in ICU length of stay and duration of mechanical ventilation observed in the experimental group may be attributed to improved respiratory function, better muscle strength, and overall enhanced recovery. This highlights the importance of integrating structured mobility protocols into routine ICU care.

In contrast, the control group receiving conventional physiotherapy showed comparatively lesser improvement, possibly due to the lack of a standardized progression in activity levels.

Thus, progressive mobility protocols appear to be a safe and effective intervention for improving clinical and functional outcomes in critically ill patients.

## CONCLUSION

Progressive mobility protocols are more effective than conventional physiotherapy in improving functional mobility, muscle strength, and independence in ICU patients. They also contribute to reducing the duration of ICU stay and mechanical ventilation. Hence, incorporating structured progressive mobility into routine ICU care can enhance overall patient recovery and outcomes.

### Limitations

1. Small sample size
2. Short duration of intervention

### Future Scope

1. Studies with larger sample sizes
2. Long-term follow-up to assess sustained outcomes
3. Comparison with advanced techniques like virtual reality or robotic rehabilitation
4. Development of standardized ICU mobility guidelines

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