



2024

VOLUME 24  
ISSUE 4

# Mobilisation

**Mobilisation Matters: Strategies for Efficient Patient Care,** *JJ Grunow, N Langer, N Daum, SJ Schaller*

**Early Mobilisation - When Evidence Comes to Single Patients,** *P Nydahl, L-S Fick, A Hillen, FT Scheffenbichler, SJ Schaller*

**Early Mobilisation, Delirium Prevention and Long-Term Cognitive Function,** *L Cabrini, O Saleh, G Spinazza, MA Belli*

**Early Mobilisation: Just a Fad?** *S Garcia-Manzanedo, B Lobo-Valbuena, F Gordo*

**Current Controversies in Early Mobilisation in the ICU,** *VR Jauregui-Gutiérrez, B Pérez-Martínez, AS Henales-Ocampo, RA Reyes-Monge, OR Pérez-Nieto, E Deloya-Tomas*

**Early Mobilisation in ICU: Current Practice and Areas for Improvement,** *R Suhail, SM Khorsand*

**Early Mobilisation: Movements, Barriers and Complications,** *N Canziani, R Cavallari, L D'Andrea, D Goumair*

**The ABCs of Physical Therapy for Solid Organ Transplant Patients,** *RA Jones Baro, MA Martínez Camacho, A Gómez González, J Delgado Camacho, A Melo Villalobos, DS Lugo García*

**Early Mobilisation in Critical Care: Beyond Traditional Limits,** *J López Fermín, IS Zamora Guevara, MTG Barragán Castañeda, A Flores Romero, K Vásquez Añas, M Martínez Rojas*



**Victor Raymundo Jauregui-Gutiérrez**  
Intensive Care Unit  
Hospital General San Juan del Rio  
Queretaro, Mexico  
raymundojauregui51@gmail.com



**Beatriz Pérez-Martínez**  
Head of Department of Physical Therapy and Rehabilitation  
Hospital General San Juan del Rio  
Queretaro, Mexico  
bettyulpa@gmail.com



**Alexis Stephano Henales-Ocampo**  
Universidad Autónoma de Queretaro  
Hospital General San Juan del Rio  
Queretaro, Mexico  
a.henales@gmail.com



**Rafael Alfonso Reyes-Monge**  
Intensive Care Unit  
Hospital General San Juan del Rio  
Queretaro, Mexico  
reyesraphael92@gmail.com



**Orlando Rubén Pérez-Nieto**  
Intensive Care Unit  
Hospital General San Juan del Rio  
Queretaro, Mexico  
orlando\_rpn@gmail.com



**Ernesto Deloya-Tomas**  
Head of Intensive Care Unit  
Hospital General San Juan del Rio  
Queretaro, Mexico  
deloyajmr@gmail.com

# Current Controversies in Early Mobilisation in the ICU

This article will address current and controversial topics regarding early mobilisation and respiratory therapy in critically ill patients in the Intensive Care Unit (ICU). We will explore the implications, challenges, and potential benefits related to these interventions, highlighting the need for ongoing research and discussion in this evolving field.

## Introduction

Holistic management in the ICU integrates physical therapy and rehabilitation to enhance the quality of life and functionality of the patients at discharge. Early mobilisation and respiratory therapy are routinely employed strategies in ICUs; however, recent studies have raised significant controversies that will be examined in this article.

## Intensity and Frequency of Early Mobilisation - Is Less More?

Early mobilisation in the ICU has emerged as a strategy to improve outcomes in critically ill patients. However, the dosing and frequency of these interventions are subject to debate. The central question arises: is it more beneficial to perform two or more mobilisation sessions per day compared to just one?

Evidence suggests that, although early mobilisation can reduce complications such as ICU-acquired weakness and prolonged stay, the intensity and frequency of these sessions should be carefully considered. Some studies indicate that a "less is more" approach could be more effective, suggesting that lower doses of mobilisation, guided by functional goals and a rigorous analysis of risks and benefits, could lead to better outcomes without increasing the incidence of adverse events. This approach highlights the need to individualise mobilisation according to patient characteristics and

clinical status, which might imply that one or two sessions a day, depending on the situation, could be more appropriate to optimise recovery and minimise risks.

## Active mobilisation versus usual mobilisation

Recently, Hodgson et al. (2022) compared two strategies for early mobilisation in patients on mechanical ventilation. The first group, referred to as the active mobilisation group, implemented measures such as assisted standing with an average of 20.8 minutes of activity, compared to the second group, which received an average of 8.8 minutes of activity without the aforementioned measures. The authors demonstrated that there were no significant differences in mortality between the two groups ( $p=0.62$ ). However, significant differences were found in the incidence of complications in the active mobilisation group compared to usual mobilisation (9.2% vs 4.1%,  $p=0.005$ ), including arrhythmias ( $p=0.03$ ) and oxygen desaturation ( $p=0.02$ ).

A systematic review with meta-analysis evaluating short- and medium-term mortality showed that the pooled mean difference was an increase of 4.28 days alive and out of hospital by day 180 in those patients who received early active mobilisation (95% confidence interval, -24.46 to 13.03;  $I^2 = 41\%$ ). Nevertheless, a Bayesian analysis demonstrated a 95.1% probability of improved physical function, measured through a patient-reported outcome at six months (standardised mean

difference, 0.2; 95% CI, 0.09 to 0.32;  $I^2 = 50\%$ ) (Paton et al. 2023).

### Systematic mobilisation versus usual mobilisation

A systematic review demonstrated that early systematic mobilisation in patients with invasive mechanical ventilation, combined with occupational therapy aimed at muscle activation and initiated within seven days of ICU admission, defined by a specific protocol, along with neurocognitive intervention and speech therapy, did not show benefits in terms of improvements in functionality, strength, or incidence of ICU-acquired weakness, compared to usual mobilisation (Menges et al. 2021).

### Early cycle ergometry in mechanically ventilated patients

A randomised controlled trial aimed at evaluating outcomes by comparing the early use of 30 minutes of cycle ergometry versus usual physiotherapy in mechanically ventilated patients found no improvement in physical functionality after discharge from the ICU (absolute difference, 0.23 points; 95% CI,  $-0.19$  to  $0.65$ ;  $p = 0.29$ ). No serious adverse events occurred in either group.

The discussion on the frequency and intensity of mobilisation sessions becomes a fundamental aspect of clinical practice in the ICU (Martínez et al. 2023). The aspects to consider when deciding on the intensity of mobilisation are:

#### *Patient safety and tolerance*

Mobilisation in critically ill patients must be carefully monitored. Recent studies suggest that a single mobilisation session may be sufficient to avoid fatigue and stress in compromised patients (Zhang et al. 2019). Excessive mobilisation can lead to complications such as haemodynamic instability or oxygen desaturation (Ding et al. 2019).

#### *Effectiveness of mobilisation*

The quality of mobilisation may be more important than the quantity. A well-structured session, adapted to the patient's capabilities, can provide significant benefits

without the risk associated with multiple sessions. This is particularly relevant in patients with severe muscle weakness or those requiring mechanical ventilation (Cuello-García et al. 2021).

#### *Functional outcomes*

Recent research indicates that one mobilisation session per day may suffice to improve functional outcomes without needing multiple sessions. This can be particularly true in critically ill patient populations where fatigue and stress can be detrimental (Martínez-Camacho 2020).

#### *Impact on recovery*

Daily mobilisation has proven effective in reducing complications associated with ICU stay, such as ICU-acquired weakness and ventilator-associated pneumonia. This suggests that a well-planned session may suffice to achieve positive recovery outcomes (Mejía et al. 2021).

A focus on quality over quantity is essential, as mobilisation should be high-quality and tailored to the patient's individual needs. Instead of performing multiple mobilisation sessions per day, a well-planned and executed session may be more effective in promoting recovery and minimising the risk of complications (Martínez et al. 2023).

Mobilisation should be individualised. Protocols emphasising daily mobilisation, rather than multiple sessions, may be more effective in certain clinical contexts. This allows physiotherapists and medical teams to adjust mobilisation according to patient response, potentially more beneficial than a "one-size-fits-all" approach (Leditschke et al. 2022).

### Acute conditions with no benefit from early mobilisation in first 24 hours

Early mobilisation in the ICU is a strategy that, while offering numerous benefits, is not always suitable for all patients within the first 24 hours. Certain pathologies, such as acute stroke, acute myocardial infarction, and severe exacerbations of respiratory diseases, might make immediate mobilisation unadvisable due to

haemodynamic instability or the need for intensive medical management. In these cases, it is crucial to carefully assess the patient's condition before implementing any mobilisation programme, prioritising their safety and well-being.

### Acute myocardial infarction (AMI)

Recent studies have indicated that although early mobilisation may be beneficial, continuous monitoring and individualised assessment are essential to minimise risks. Early mobilisation in post-myocardial infarction patients has demonstrated that, despite an increase in heart rate, blood pressure, and serum lactate, it does not appear to have significant associated adverse effects (Munir et al. 2020); however, early mobilisation in patients with acute myocardial infarction did not demonstrate a reduction in mortality in a systematic review of randomised controlled trials and quasi-randomised studies (RR 0.85, 95% CI 0.68-1.05) (Cortes et al. 2009).

Early mobilisation can be psychologically stressful for patients who are already dealing with the trauma of a heart attack, potentially compromising reperfusion or contributing to additional myocardial injury (Ferdinandy et al. 2023). Moreover, the associated anxiety and stress can further exacerbate a poor prognosis, as this psychological strain may adversely affect recovery in patients with acute myocardial infarction (Horne et al. 2020). Conversely, a small randomised controlled trial demonstrated a significant reduction in the incidence of depression in post-myocardial infarction patients following early mobilisation (Asgari et al. 2014).

### Exacerbated chronic obstructive pulmonary disease (COPD)

Patients with exacerbated COPD may present with significant hypoxaemia and shortness of breath. Mobilisation can increase oxygen demand and respiratory workload, potentially worsening respiratory function and increasing complications such as bronchospasm and atelectasis. The GOLD guidelines suggest the initiation of pulmonary rehabilitation 2-4 weeks after patient stabilisation (GOLD 2024).

However, a systematic review with meta-analysis aimed at evaluating the effects of early rehabilitation showed a reduction in the incidence of hospitalisation due to COPD exacerbation (RR 0.56, 95% CI 0.36 – 0.86), as well as an increase in submaximal cardiovascular capacity (SMD 0.73, 95% CI 0.48-0.99) (Meneses et al. 2023).

### Respiratory instability

Patients with exacerbated COPD often present with hypoxaemia and significant

breathing difficulties. Mobilisation can increase oxygen demand and respiratory workload, potentially worsening respiratory function and increasing the risk of complications such as bronchospasm and atelectasis (GOLD et al. 2024).

### Muscle fatigue

Muscle weakness is a frequent issue in COPD patients, especially during exacerbations. Early mobilisation may produce excessive muscle fatigue, leading to decreased functional capacity and increased risk of

falls and injuries. However, recent studies have shown that, when conducted in a controlled manner, early mobilisation can improve muscle strength and functional capacity without significantly increasing the risk of fatigue or injuries (Moecke et al. 2022).

### Haemodynamic instability

Many patients with exacerbated COPD may exhibit haemodynamic instability, and ensuring haemodynamic stability is a criterion for initiating rehabilitation interventions. Failing to assess this can lead to dangerous changes in blood pressure and heart rate (Chou et al. 2019).

### Need for intensive monitoring

Mobilisation of COPD patients requires careful and continuous monitoring to detect any signs of deterioration. During the first 24 hours, the medical staff might focus more on patient stabilisation, limiting the ability to implement a mobilisation programme. Nevertheless, recent studies have demonstrated that early mobilisation, even in the early stages of care, can be safe and beneficial, provided there is adequate monitoring (Schweickert et al. 2021).

### Ischaemic stroke

Very early mobilisation in patients who have suffered an ischaemic stroke might not be beneficial due to several clinical and physiological factors that need to be considered. During the first 24 hours post-stroke, patients may experience fluctuations in their neurological status, improving neurological instability. In a pragmatic, prospective, multicentre, international randomised controlled trial, very early mobilisation that includes activities such as standing up, sitting out of bed, and walking, compared to usual care, was associated with poorer functional outcomes (46 vs 50%, OR 0.73, 95% CI 0.59-0.90,  $p=0.004$ ) (Avert et al. 2017).

Very early mobilisation can increase the risk of complications, such as blood pressure drops and oxygen desaturation, which heighten the risk of secondary complications. Early mobilisation without



Figure 1. Early mobilisation in a critically ill patient on mechanical ventilation

proper evaluation can increase these risks, especially if the patient exhibits significant weakness or consciousness alterations. High-dose and very early mobilisation within 24 hours of stroke onset results in less favourable outcomes at three months (Powers et al. 2019).

### Haemorrhagic stroke

Similarly, patients with haemorrhagic brain injuries initiating early mobilisation within the first 24 hours may face numerous risks and potential issues, such as new or increased bleeding, increased intracranial pressure, hypertension, clinical instability, and monitoring challenges. A randomised controlled trial demonstrated higher mortality in patients with haemorrhagic stroke subjected to very early mobilisation within the first 24 hours of the stroke compared to usual care (OR 4.17, 95% CI 1.06-16.43) (Bernhardt et al. 2021). On

the other hand, a randomised controlled trial demonstrated that early mobilisation during the first 24 to 72 hours was associated with improvements in motor function ( $p=0.004$ ), better functionality at two weeks ( $p=0.033$ ) and four weeks ( $p=0.011$ ), and a shorter length of stay in a stroke unit ( $p=0.004$ ) (Yen et al. 2020). Early mobilisation has also been associated with improved posture, enhanced self-care, and a quicker return to normal activities (Marek et al. 2024).

In summary, it is recommended that the optimal time to initiate early rehabilitation in patients with acute stroke is after 24 hours, based on criteria for haemodynamic stability and safety. The recommended duration of mobilisation is between 15 and 45 minutes per session, divided into one to three times per day; however, these recommendations are not based on strong evidence (Aquino-Miranda et al. 2021).

### Conclusion

Early mobilisation is a trending strategy in many ICUs. Based on the best available evidence to date, we cannot recommend very early and intensive mobilisation; instead, it is a better strategy to initiate mobilisation after 24 hours of ICU admission, taking into consideration patient safety and haemodynamic criteria, in order to achieve better functional outcomes and avoid significant complications (Figure 1). Further studies are needed on different intensities and frequencies of sessions in specific populations.

### Conflict of Interest

None.

### References

- Bernhardt J, Borschmann K, Collier JM et al. [2021] Fatal and Nonfatal Events Within 14 days After Early, Intensive Mobilization Poststroke. *Neurology*. 96(8):e1156-e1166.
- Chou W, Lai CC, Cheng KC et al. [2019] Effectiveness of early rehabilitation on patients with chronic obstructive lung disease and acute respiratory failure in intensive care units: A case-control study. *Chron Respir Dis*. 16:1479973118820310.
- Cuello-García CA, Pérez-Gaxiola G, Reed K [2021] Early mobilization in critically ill children: a systematic review. *J Pediatr*. 203:25-33.e6.
- Ding N, Zhang Y, Liu Y et al. [2019] What is the optimum time for initiation of early mobilization in mechanically ventilated patients? A network meta-analysis. *PLoS One*. 14(10):e0223151.
- Ferdinandy P, Danser AHJ, Heusch G [2023] Multitargeted approaches to cardioprotection: A review. *Pharmacol Rev*. 75(1):159-216.
- Global Initiative for Chronic Obstructive Lung Disease [GOLD] [2024] Global Strategy for the Diagnosis, Management, and Prevention of COPD. Report.
- Horne BD, Thomas D, Rosamond W [2020] Psychological Stress and Early Mobilization in Acute Myocardial Infarction. *Am J Cardiol*.
- Langhorne P, Wu O, Rodgers H, Ashburn A, Bernhardt J [2017] A Very Early Rehabilitation Trial after stroke [AVERT]: a Phase III, multicentre, randomised controlled trial. *Health Technol Assess*. 21(54):1-120.
- Leditschke AI, Green M, Irvine J, Bissett B [2022] Barriers to mobilizing intensive care patients: A systematic review. *Cardiopulm Phys Ther J*. 33(1):26-29.
- Manning L, Hirakawa Y, Arima H et al. [2014] Blood pressure variability and outcome after acute intracerebral haemorrhage: a post-hoc analysis of INTERACT2, a randomised controlled trial. *Lancet Neurol*. 13(4):364-373.
- Marek K, Zielińska-Nowak E, Redlicka J et al. [2024] Intracranial Hemorrhage—Is Very Early Rehabilitation Safe? A Narrative Review. *Journal of Clinical Medicine*. 13(13):3776.
- Mariana de Aquino Miranda J, Mendes Borges V, Bazan R et al. [2023] Early mobilization in acute stroke phase: a systematic review. *Top Stroke Rehabil*. 30(2):157-168.
- Martínez CMA, Herrera D, González T et al. [2020] El fisioterapeuta en la Unidad de Cuidados Intensivos: ¿un profesional necesario? *Acta Medica*. 18(1):104-105.
- Martínez CMÁ, Lugo GDS, Gómez GA, Jones BRA [2023] Menos es más en movilización temprana en la Unidad de Cuidados Intensivos? *Acta Med GA*. 21(4):393-394.
- Mejía AAC, Rodríguez MMJ, López GE et al. [2021] Movilización temprana como prevención y tratamiento para la debilidad adquirida en la Unidad de Cuidados Intensivos en pacientes en ventilación mecánica. *Eur Sci J*. 17(21):19-30.
- Meneses-Echavez JF, Chavez Guapo N, Loaiza-Betancur AF et al. [2023] Pulmonary rehabilitation for acute exacerbations of COPD: A systematic review. *Respir Med*. 219:107425.
- Menges D, Seiler B, Tomonaga Y et al. [2021] Systematic early versus late mobilization or standard early mobilization in mechanically ventilated adult ICU patients: systematic review and meta-analysis. *Crit Care*. 25:16.
- Moecke HE, Faber-Langendoen M, Puhan MA et al. [2023] Safety and efficacy of inpatient pulmonary rehabilitation for patients hospitalized with an acute exacerbation of chronic obstructive pulmonary disease: a systematic review and meta-analysis. *Ann Am Thorac Soc*. 20(2):308-318.
- Munir H, Fromowitz J, Goldfarb M [2020] Early mobilization post-myocardial infarction: A scoping review. *PLOS ONE*. 15(8):e0237866.
- Paton M, Chan S, Tipping CJ et al. [2023] The Effect of Mobilization at 6 Months after Critical Illness - Meta-Analysis. *NEJM Evid*. 2(2):EVID0a2200234.
- Powers WJ, Rabinstein AA, Ackerson T et al. [2019] Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 50(12):e344-e418.
- Schweickert WD, Pohlman MC, Pohlman AS et al. [2021] Early mobilization in the intensive care unit: A systematic review. *Crit Care Med*. 49(1):1-10.
- TEAM Study Investigators, ANZICS Clinical Trials Group [2022] Early active mobilisation during mechanical ventilation in the ICU. *N Engl J Med*. 387(19):1747-1758.
- Yen HC, Jeng JS, Chen WS et al. [2019] Early mobilization of mild-moderate intracerebral hemorrhage patients in a stroke center: A randomized controlled trial. *Neurorehabil Neural Repair*. 33(1):73-81.



ICU

MANAGEMENT & PRACTICE



[icu-management.org](http://icu-management.org)  @ICU\_Management