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Review

The Role of Early Mobilization and Physiotherapy Interventions in the Recovery of Critically Ill Patients in the Intensive Care Unit

Enass Aboshoushah[1], Faris Alhefzi[2], Ahmed Alasiri[3], Fatimah AlMubali[4], Khalid Alqahtani[5], Abdullah Alshahrani[6], Ahmed Alqahtani[7], Saeed Al Qahtani[8], Majed Almuabbiri[9], Yasser Allehyani[9], Mohammed Alalawi[9]

[1] *Department of Intensive Care Unit, Al Thager Hospital, Jeddah, Saudi Arabia*
[2] *Rehabilitation & Physiotherapy, Aseer Central Hospital, Abha, Saudi Arabia*
[3]*Rehabilitation & Physiotherapy, Abha International Private Hospital, Abha, Saudi Arabia*
[4] *Department of Physiotherapy, Sharurah Armed Forces Hospital, Sharurah, Saudi Arabia*
[5] *Rehabilitation & Physiotherapy, Aseer Rehabilitation Center, Abha, Saudi Arabia*
[6] *College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia*
[7] *Rehabilitation & Physiotherapy, Ability Center for Physiotherapy, Abha, Saudi Arabia*
[8] *Department of Physiotherapy, Saudi German Hospital, Abha, Saudi Arabia*
[9] *Department of Internal Medicine, Al Noor Specialist Hospital, Mecca, Saudi Arabia*

Correspondence should be addressed to **Enass Aboshoushah**, Department of Intensive Care Unit, Al Thager Hospital, Jeddah, Saudi Arabia. Email: enass.farouk@yahoo.com

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Abstract

Early mobilization and physiotherapy (emp) interventions are valuable strategies to address the challenges faced by critically ill patients in the ICU. These interventions aim to minimize the negative consequences of immobility and promote recovery by targeting muscle weakness, joint stiffness, respiratory complications, and prolonged immobilization. By implementing a multidisciplinary approach and tailoring interventions to individual patient needs, emp interventions have shown promising outcomes. They can enhance physical function, prevent complications, shorten ICU and hospital stays, promote psychological well-being, and improve long-term outcomes. Key considerations for successful implementation include assessing patient eligibility, fostering multidisciplinary collaboration, developing individualized plans, initiating interventions early, gradually progressing the intensity, ensuring patient safety, involving caregivers, and maintaining comprehensive documentation. By addressing these factors, healthcare professionals can effectively implement emp interventions in the ICU, improving the overall rehabilitation and recovery of critically ill patients.

Keywords: *critical care, intensive care unit, exercise, physiotherapy, mobilization*

Introduction

Early mobilization and physiotherapy (EMP) interventions for critically ill patients in the ICU focus on minimizing the adverse effects of immobility and promoting recovery. These interventions involve a multidisciplinary approach and are typically initiated as soon as the patient's medical condition allows (1). The recovery of critically ill patients in the intensive care unit (ICU) presents significant challenges that extend beyond the immediate management of their life-threatening conditions. These patients often face a complex array of physical, psychological, and functional impairments that can profoundly impact their overall rehabilitation and long-term outcomes (2). Muscle weakness, joint contractures, respiratory complications, and prolonged immobility are common consequences of critical illness, imposing significant hurdles on the path to recovery (3). However, emerging evidence supports the implementation of interventions such as EMP as valuable approaches to address these problems and facilitate the rehabilitation process (4-6).

Critically ill patients frequently experience profound muscle weakness as a result of the catabolic effects of critical illness and prolonged immobility. Muscle wasting and weakness, known as intensive care unit-acquired weakness (ICUAW), can be severe and persistent, leading to significant functional impairments (7). The incidence rate of ICUAW in patients on mechanical ventilation for >7 days has been found to range from 25 to 60% (8-10). The loss of muscle mass and strength contribute to difficulties in performing activities of daily living (ADLs), compromising patients' independence and quality of life. Joint stiffness and contractures further exacerbate these challenges, limiting range of motion and impairing mobility (11).

Respiratory complications pose additional hurdles to the recovery of critically ill patients in the ICU (12). These respiratory impairments hinder weaning from mechanical ventilation and can prolong ICU stays and hospitalizations, thereby increasing the risk of complications and healthcare costs.

Prolonged immobility is a ubiquitous problem faced by critically ill patients in the ICU. Factors such as sedation, bed rest, and immobilization devices are often necessary for patient safety and comfort but can lead to significant functional decline (13). The consequences of immobilization extend beyond muscle weakness and respiratory complications to encompass a range of systemic effects, including cardiovascular deconditioning, bone loss, and impaired metabolic function (14). These systemic effects can further impede the recovery process and increase the risk of long-term disabilities.

However, interventions such as EMP have emerged as promising strategies to mitigate the problems associated with the recovery of critically ill ICU patients. Early mobilization refers to the initiation of progressive physical activity and ambulation as soon as feasible, aims to counteract the negative effects of immobility and promote functional recovery (15). Physiotherapy interventions encompass a range of techniques, including exercises, respiratory therapy, and functional training, tailored to the individual patient's needs and capabilities (16). These interventions aim to preserve muscle strength, improve joint mobility, optimize respiratory function, and enhance overall physical and functional capacity.

Methodology

This study is based on a comprehensive literature search conducted on May 14, 2023, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the role of early mobilization and physiotherapy interventions in the recovery of critically ill patients in the intensive care unit. There were no restrictions on date, language, participant age, or type of publication.

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Discussion

EMP interventions play a crucial role in the recovery of critically ill patients in the ICU. These interventions aim to prevent and minimize the adverse effects of prolonged immobility and bed rest, enhance physical function, and promote overall well-being. Kayambu et al. published a systematic review and meta-analysis reviewing the evidence base for physical therapy in critically ill patients and observed a significant positive effect in favour of physical therapy with respect to improvement in quality of life (Hedges *g* effect size [*g*] = 0.40, 95% confidence interval [CI] 0.08, 0.71), physical function (g=0.46, 95% CI 0.13, 0.78), peripheral muscle strength (*g*=0.27, 95% CI 0.02, 0.52), and respiratory muscle strength (*g*=0.51, 95% CI 0.12, 0.52) (17).

EMP interventions require adequate planning and preparation prior to implementation. This includes patient assessment and planning, by means of which the patient's medical team, including physicians, physiotherapists, and nurses, assesses the patient's condition, functional abilities, and any limitations or precautions (18). An individualized plan is then developed based on the patient's needs and goals.

Role of EMP interventions in ICU patient recovery

Prevention of complications

Delayed mobilization and a lack of physiotherapy can lead to longer ICU and hospital stays. Patients who remain bedridden for extended periods may require more time to regain their physical function and independence. Prolonged bed rest in the ICU can lead to various complications, such as muscle weakness, joint stiffness, pressure ulcers, respiratory complications, and reduced cardiovascular function (19). EMP interventions help mitigate these complications by promoting muscle strength, joint mobility, and cardiovascular fitness (20).

Respiratory function improvement

Critically ill patients often experience respiratory issues due to prolonged immobility and mechanical ventilation. Patients who are not actively engaged in EMP interventions may experience prolonged mechanical ventilation dependence. Immobility can contribute to respiratory complications such as atelectasis, pneumonia, and ventilator-associated pneumonia (21). Physiotherapy interventions, including deep breathing exercises, incentive spirometry, airway clearance techniques, and chest physiotherapy, can improve lung function, and clearance of secretions, promote efficient breathing, and reduce the risk of respiratory infections (22).

Muscle strength and function

ICUAW is a common complication resulting from muscle wasting and weakness during critical illness. Prolonged immobility and bed rest can lead to rapid muscle wasting and weakness in critically ill patients. Delayed mobilization and lack of physiotherapy exacerbate this issue, resulting in significant muscle deconditioning, loss of muscle mass, and reduced functional capacity (23). This muscle weakness can prolong recovery time, delay weaning from mechanical ventilation, and hinder overall physical rehabilitation (24). A meta-analysis conducted by Zang et al. indicated that early mobilization is effective in the prevention of ICUAW, decreasing the length of ICU stay and hospitalization as well as enhancing functional mobility (25). EMP interventions, such as active range of motion exercises, resistance training, and ambulation, help prevent and counteract ICUAW by preserving muscle strength and function (19). Initially, in cases where patients are unable to actively participate, passive range of motion exercises are performed by the physiotherapist (18). These exercises involve gently moving the patient's limbs and joints through a full range of motion to maintain flexibility and prevent contractures. Progressive resistance exercises are incorporated to improve muscle strength and function (26). The physiotherapist may use resistance bands, weights, or specialized equipment to target specific muscle groups and gradually increase the intensity of the exercises. The physiotherapist monitors the patient's response to the interventions and progressively increases the intensity and duration of activities.

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This gradual approach minimizes the risk of complications and ensures patient safety.

Functional independence

Delayed mobilization and lack of physiotherapy interventions can negatively affect patients' quality of life and functional independence. The loss of physical function and prolonged recovery time can impede patients' ability to perform daily activities and participate in social roles and responsibilities, which may have long-term implications on their overall well-being and community reintegration (27). EMP aim to enhance patients' ability to perform ADLs independently. As the patient's condition allows during the course of treatment, the physiotherapist assists in facilitating bed mobility, such as turning from side to side, sitting up in bed, and transferring to a chair. These activities help improve circulation, relieve pressure, and stimulate the musculoskeletal system. Progression to sitting and standing is an important step in early mobilization (28). The physiotherapist helps the patient sit on the edge of the bed, use a chair or commode, and gradually bear weight on their lower extremities. These activities promote balance, stability, and muscle activation. Walking is a critical aspect of early mobilization (28). The physiotherapist, along with other healthcare professionals, assists the patient in walking, initially with support and then gradually increasing independence. Ambulation helps restore functional mobility, enhance cardiovascular fitness, and prevent deconditioning (29). By focusing on functional goals and progressively increasing patients' activity levels, physiotherapists help patients regain independence and facilitate their transition from the ICU to the general ward and eventually to home.

Psychological well-being

Prolonged immobility and a lack of activity can have a detrimental impact on the psychological well-being and cognitive function of critically ill patients (30). Additionally, immobility-related delirium and cognitive decline can be more pronounced in patients who are not actively engaged in early mobilization and cognitive stimulation provided by physiotherapy interventions (31). Being critically ill and confined to the ICU can have a significant psychological impact on patients, including anxiety, depression, and post-traumatic stress disorder (PTSD). Engaging patients in EMP interventions not only promote physical recovery but also provides a sense of purpose, empowerment, and engagement, positively impacting their psychological well-being (32).

Shortening ICU and hospital stays

Delayed mobilization and a lack of physiotherapy can lead to longer ICU and hospital stays. Patients who remain bedridden for extended periods may require more time to regain their physical function and independence. Prolonged stays in the ICU and hospital not only increase healthcare costs but also expose patients to the risks of healthcare-associated infections and other hospital-related complications. EMP interventions have been associated with shorter lengths of ICU and hospital stays (25). By optimizing patients' physical function and reducing complications, these interventions can facilitate the transition from critical care to less intensive levels of care, leading to faster recovery and earlier discharge (33). On the population level, the absence of EMP interventions in critically ill ICU patients results in increased healthcare costs. Prolonged ICU and hospital stays, additional treatments for complications, and the need for long-term rehabilitation services contribute to higher healthcare expenditures (34). They burden the healthcare community, not only requiring financial resources but also the attention and time of medical and allied health professionals, which may otherwise benefit other patients if EMP interventions are implemented appropriately.

Long-term outcomes

Evidence suggests that EMP interventions in the ICU can have positive effects on long-term outcomes. Patients who receive early rehabilitation during their ICU stay are more likely to have improved physical function and quality of life, and return to their pre-illness level of activity (20).

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Burtin et al. conducted a randomized controlled trial investigating early exercise using a bedside bicycle ergometer in critically ill patients with prolonged ICU stays (35). The intervention group received cycling exercise sessions five days per week, resulting in significantly higher outcomes at hospital discharge compared to the control group. The intervention group had a higher 6-minute walk distance (196m vs. 143m, $p<.05$), improved physical function score on the 36-item Short Form Health Survey (21 vs. 15, $p<.05$), and better quadriceps force (2.37 N/kg vs. 2.03 N/kg, $p<.05$). Importantly, no serious adverse events were reported during the 425 cycling sessions conducted in the study. It's important to note that EMP interventions should be tailored to each patient's individual needs, taking into account their medical condition, level of sedation, and overall stability (36). Multidisciplinary collaboration among healthcare professionals, including physiotherapists, nurses, respiratory therapists, and physicians, is crucial for the safe and effective implementation of these interventions in the ICU setting. Physiotherapists play a crucial role in educating patients and their caregivers about the importance of early mobilization and physical therapy. They provide instructions on exercises, activity modifications, and self-management strategies that can be continued after discharge.

Considerations for implementing EMP interventions

When implementing early mobilization and physiotherapy interventions for critically ill patients in the intensive care unit (ICU), several important considerations should be taken into account to ensure patient safety and optimize outcomes. It is essential to assess patient eligibility and suitability for EMP interventions. Factors such as the patient's medical stability, hemodynamic status, respiratory support requirements, level of consciousness, musculoskeletal stability, and presence of contraindications or precautions need to be considered prior to the initiation of interventions (37). Further, EMP interventions require a multidisciplinary approach involving physiotherapists, nurses, physicians, respiratory therapists, and other healthcare professionals (18). Collaboration and clear communication among team members is essential to ensuring coordinated care, patient safety, and optimal outcomes. Interventions need to be targeted to the patient's specific needs, goals, and abilities. Their baseline functional status, comorbidities, cognitive function, and psychological factors should be considered. The intensity, duration, and progression of interventions should be adjusted based on individual response and tolerance (38). Mobilization and physiotherapy interventions should be initiated as soon as the patient's medical condition allows. The concept of "early" may vary based on patient factors and critical illness severity, but initiating interventions as soon as feasible has been associated with better outcomes. The intervention should ideally begin with gentle and basic movements, with the physiotherapist gradually increasing the intensity, complexity, and duration based on the patient's tolerance and progress. Gradual progression helps prevent complications, minimizes patient discomfort, and optimizes functional gains. The healthcare team should continuously monitor the patient's response during interventions, including vital signs, hemodynamic stability, respiratory status, and pain levels (34). Regular assessments of physical function, strength, mobility, and respiratory parameters help guide treatment planning and identify any adverse effects or limitations. Importantly, patient safety should be ensured by implementing appropriate safety measures. This includes proper equipment use, supervision during ambulation or transfers, fall prevention strategies, and precautions related to lines, tubes, or devices (27). Regular risk assessments and safety checks are essential components of EMP interventions. Pain and sedation levels should be assessed and managed to optimize patient comfort and cooperation during interventions. Adequate pain control and optimal sedation strategies contribute to the patient's ability to actively participate in mobility exercises and physiotherapy (39). Furthermore, the healthcare staff must educate and involve the patient's caregivers in the EMP process (40). This also

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involves providing instructions on safe techniques, equipment use, and home exercise programs to promote continuity of care and support patient recovery after discharge (41). The healthcare team should maintain thorough and accurate documentation of interventions, patient responses, progress, and any complications or adverse events, and regularly evaluate the effectiveness of interventions, modify the treatment plan as needed, and track outcomes to inform future practice and quality improvement initiatives. By considering these key factors, healthcare professionals can effectively implement EMP interventions in the ICU.

Conclusion

EMP interventions play a crucial role in addressing the challenges faced by critically ill patients in the ICU. By targeting muscle weakness, joint stiffness, respiratory complications, and prolonged immobility, these interventions optimize patient outcomes, enhance functional recovery, and improve overall well-being. Overcoming barriers and implementing standardized protocols are essential to ensure the successful integration of these interventions and provide comprehensive care for critically ill ICU patients. Through ongoing research and evidence-based practices, we can continue to advance the field of physical rehabilitation, ultimately improving the recovery journey and quality of life for these patients.

Disclosure

Conflict of interest

There is no conflict of interest

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Ethical consideration

Non applicable

Data availability

Data that support the findings of this study are embedded within the manuscript.

Author contribution

All authors contributed to conceptualizing, data drafting, collection and final writing of the manuscript.

References

1. Hashem MD, Nelliot A, Needham DM. Early mobilization and rehabilitation in the ICU: moving back to the future. Respiratory care. 2016;61(7):971-9.

2. Svenningsen H, Langhorn L, Ågård AS, Dreyer P. Post-ICU symptoms, consequences, and follow-up: an integrative review. Nursing in critical care. 2017;22(4):212-20.

3. Heygood J, Olexa K. Rehabilitation for Trauma and Critical Care. Trauma: CRC Press; 2007. p. 1241-58.

4. Fuest K, Schaller SJ. Recent evidence on early mobilization in critical-Ill patients. Current opinion in anaesthesiology. 2018;31(2):144-50.

5. Engel HJ, Needham DM, Morris PE, Gropper MA. ICU early mobilization: from recommendation to implementation at three medical centers. Critical care medicine. 2013;41(9):S69-S80.

6. Phelan S, Lin F, Mitchell M, Chaboyer W. Implementing early mobilisation in the intensive care unit: an integrative review. International journal of nursing studies. 2018;77:91-105.

7. Hermans G, Van den Berghe G. Clinical review: intensive care unit acquired weakness. Critical care. 2015;19(1):1-9.

8. Nordon-Craft A, Moss M, Quan D, Schenkman M. Intensive care unit–acquired weakness: implications for physical therapist management. Physical therapy. 2012;92(12):1494-506.

9. de Jonghe B, Lacherade J-C, Sharshar T, Outin H. Intensive care unit-acquired weakness: risk factors and prevention. Critical care medicine. 2009;37(10):S309-S15.

10. Saxena MK, Hodgson CL. Intensive care unit acquired weakness. Anaesthesia & Intensive Care Medicine. 2012;13(4):145-7.

http://dx.doi.org/10.52533/JOHS.2023.30603

11. Schefold JC, Bierbrauer J, Weber-Carstens S. Intensive care unit—acquired weakness (ICUAW) and muscle wasting in critically ill patients with severe sepsis and septic shock. Journal of cachexia, sarcopenia and muscle. 2010;1:147-57.

12. Desai SV, Law TJ, Needham DM. Long-term complications of critical care. Critical care medicine. 2011;39(2):371-9.

13. Fan E, Zanni JM, Dennison CR, Lepre SJ, Needham DM. Critical illness neuromyopathy and muscle weakness in patients in the intensive care unit. AACN advanced critical care. 2009;20(3):243-53.

14. Parry SM, Puthucheary ZA. The impact of extended bed rest on the musculoskeletal system in the critical care environment. Extreme physiology & medicine. 2015;4(1):1-8.

15. Cameron S, Ball I, Cepinskas G, Choong K, Doherty TJ, Ellis CG, et al. Early mobilization in the critical care unit: A review of adult and pediatric literature. Journal of critical care. 2015;30(4):664-72.

16. Zeppos L, Patman S, Berney S, Adsett JA, Bridson JM, Paratz JD. Physiotherapy intervention in intensive care is safe: an observational study. Australian Journal of physiotherapy. 2007;53(4):279-83.

17. Kayambu G, Boots R, Paratz J. Physical therapy for the critically ill in the ICU: a systematic review and meta-analysis. Critical care medicine. 2013;41(6):1543-54.

18. Green M, Marzano V, Leditschke IA, Mitchell I, Bissett B. Mobilization of intensive care patients: a multidisciplinary practical guide for clinicians. Journal of multidisciplinary healthcare. 2016:247-56.

19. Alaparthi GK, Gatty A, Samuel SR, Amaravadi SK. Effectiveness, safety, and barriers to early mobilization in the intensive care unit. Critical Care Research and Practice. 2020;2020.

20. Zhang L, Hu W, Cai Z, Liu J, Wu J, Deng Y, et al. Early mobilization of critically ill patients in the intensive care unit: A systematic review and meta-analysis. PloS one. 2019;14(10):e0223185.

21. Cook DJ, Walter SD, Cook RJ, Griffith LE, Guyatt GH, Leasa D, et al. Incidence of and risk factors for ventilator-associated pneumonia in critically ill patients. Annals of internal medicine. 1998;129(6):433-40.

22. Dantas CM, Silva PFdS, Siqueira FHTd, Pinto RMF, Matias S, Maciel C, et al. Influence of early mobilization on respiratory and peripheral muscle strength in critically ill patients. Revista Brasileira de terapia intensiva. 2012;24:173-8.

23. Wang T-H. Early mobilization on patients with mechanical ventilation in the ICU. Physical Therapy Effectiveness. 2020:193-211.

24. Perme C, Chandrashekar R. Early mobility and walking program for patients in intensive care units: creating a standard of care. American Journal of Critical Care. 2009;18(3):212-21.

25. Zang K, Chen B, Wang M, Chen D, Hui L, Guo S, et al. The effect of early mobilization in critically ill patients: a meta-analysis. Nursing in critical care. 2020;25(6):360-7.

26. Laurent H, Aubreton S, Richard R, Gorce Y, Caron E, Vallat A, et al. Systematic review of early exercise in intensive care: a qualitative approach. Anaesthesia Critical Care & Pain Medicine. 2016;35(2):133-49.

27. Jacob P, Gupta P, Shiju S, Omar AS, Ansari S, Mathew G, et al. Multidisciplinary, early mobility approach to enhance functional independence in patients admitted to a cardiothoracic intensive care unit: a quality improvement programme. BMJ open quality. 2021;10(3):e001256.

28. Zheng Y, Yan C, Shi H, Niu Q, Liu Q, Lu S, et al. Time Window for Ischemic Stroke First Mobilization Effectiveness: Protocol for an Investigator-Initiated Prospective Multicenter Randomized 3-Arm Clinical Trial. Physical therapy. 2021;101(5):pzab038.

29. Perme CS, Southard RE, Joyce DL, Noon GP, Loebe M. Early mobilization of LVAD recipients

 http://dx.doi.org/10.52533/JOHS.2023.30603

who require prolonged mechanical ventilation. Texas Heart Institute Journal. 2006;33(2).

30. Gosselink R, Bott J, Johnson M, Dean E, Nava S, Norrenberg M, et al. Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society of Intensive Care Medicine Task Force on physiotherapy for critically ill patients. Intensive care medicine. 2008;34:1188-99.

31. Patel S. Implementing the Hodgson Red Yellow Green Mobilization Consensus Recommendations in a Medical and Surgical ICU: A Retrospective Study Exploring the Effectiveness of an Early Mobilization Decision Protocol in ICU: Seton Hall University; 2020.

32. Ramsay P, Salisbury LG, Merriweather JL, Huby G, Rattray JE, Hull AM, et al. A rehabilitation intervention to promote physical recovery following intensive care. 2014.

33. Ronnebaum JA, Weir JP, Hilsabeck TA. Earlier Mobilization Decreases the Length of Stay in the Intensive Care Unit. Journal of Acute Care Physical Therapy. 2012;3(2):204-10.

34. Adler J, Malone D. Early mobilization in the intensive care unit: a systematic review. Cardiopulmonary physical therapy journal. 2012;23(1):5.

35. Burtin C, Clerckx B, Robbeets C, Ferdinande P, Langer D, Troosters T, et al. Early exercise in critically ill patients enhances short-term functional recovery. Critical care medicine. 2009;37(9):2499-505.

36. Holdsworth C, Haines KJ, Francis JJ, Marshall A, O'Connor D, Skinner EH. Mobilization of ventilated patients in the intensive care unit: an elicitation study using the theory of planned behavior. Journal of critical care. 2015;30(6):1243-50.

37. Stiller K. Safety issues that should be considered when mobilizing critically ill patients. Critical care clinics. 2007;23(1):35-53.

38. Doiron KA, Hoffmann TC, Beller EM. Early intervention (mobilization or active exercise) for critically ill adults in the intensive care unit. Cochrane Database of Systematic Reviews. 2018(3).

39. Davidson JE, Harvey MA, Bemis-Dougherty A, Smith JM, Hopkins RO. Implementation of the Pain, Agitation, and Delirium Clinical Practice Guidelines and promoting patient mobility to prevent post-intensive care syndrome. Critical care medicine. 2013;41(9):S136-S45.

40. Noone CE, Franck LS, Staveski SL, Rehm RS. Barriers and facilitators to early mobilization programmes in the paediatric intensive care unit: A scoping literature review. Nursing in critical care. 2023.

41. Gustafson O, Vollam S, Morgan L, Watkinson P. A human factors analysis of missed mobilisation after discharge from intensive care: a competition for care? Physiotherapy. 2021;113:131-7.

http://dx.doi.org/10.52533/JOHS.2023.30603