Whitepaper IC-MOVE 2022

Literature review: Barriers to early mobilization

Early mobilization in the intensive care unit (ICU) has received much attention over the past 10 years with more than 15 randomized controlled trials (RCT's) published amongst which several high impact publications (Hodgson, et al. 2018). The growing body of evidence suggests that early mobilization and acute rehabilitation are safe and feasible interventions. Early mobilization improves muscle strength and mobility status at ICU discharge and increases the probability of walking without assistance at hospital discharge (Sibilla, et al. 2020). However, translating the available knowledge into clinical practice remains challenging. Recent point prevalence studies found rates of early mobilization of ventilated patients up to 24% and for non-ventilated patients at 60% (Sibilla, et al. 2020). Due to the complex nature of the ICU, many factors hinder early mobilization of patients. The factors are categorized into organization-, practitioner- and patient-based. The available literature on the barriers to early mobilization has been reviewed and will be elaborated on below.

ORGANIZATION-BASED BARRIERS TO EARLY MOBILIZATION

Currently ICU's worldwide have a shortage of resources to facilitate early mobilization. The shortage of resources not only includes funds available for rehabilitation equipment but also a shortage of staff, including physiotherapists and nurses. Anekwe et al. (2019) sent a cross-sectional survey to 138 ICU professionals in Montreal, Canada to evaluate the perceived barriers to early mobilization. The study identified a limited number of physiotherapists and nurses. Only one-third of physiotherapists were solely dedicated to the ICU while two-thirds covered other hospital units as well. Furthermore, the survey showed that nurses did not perceive early mobilization as a top priority in their schedules, most likely due to the large burden of responsibility and workload experienced in the critical care environment.

PRACTITIONER-BASED BARRIERS TO EARLY MOBILIZATION

The study from Anekwe et al. (2019) also highlighted the differences in perceived barriers to mobilization per clinical profession. Hashem, Parker & Needham (2016) support this finding by identifying insufficient coordination, timing conflicts and competing patient priorities throughout the multi-disciplinary team as barriers to early mobilization. This supports the notion that multi-disciplinary teams that complement each other are needed to overcome the multiple barriers of early mobilization in the ICU environment. Furthermore, nurses perceived safety concerns as one of the biggest barriers to mobilization. This potentially leads to later mobilization of patients in ICU. Studies show the most benefit from early mobilization when it is initiated earlier (1.5 days after admission) rather than later (5 - 7 days after admission), suggesting that timing of mobilization plays an important role (Anekwe et al. 2019). Safety concerns for patients are also in part due to clinicians' perception of having a limited skill set for mobilizing patients on mechanical ventilation. However, very few safety incidents occur during early mobilization, rendering it a safe intervention.

PATIENT-BASED BARRIERS TO EARLY MOBILIZATION

Multiple studies reported physiological instability as a common patient-related barrier to mobilization (Hodgson et al., 2017)(Dubb et al., 2016)(Parry et al., 2017)(Sibilla et al., 2020). Factors such as haemodynamic instability, low Glascow Coma Scale score, agitation and delirium influenced by sedation, vascular access devices and tubes are reported as patient-related barriers to mobilization. However, patient-personal factors also limit mobilization. Sibilla et al. (2020) reported the most common safety event while actively mobilizing patients was cognitive-emotional disturbances, which include anxiety and confusion. Physiotherapists identified patient anxiety, fear, lack of motivation, confidence and patient lack of knowledge of ICU-acquired weakness (ICUAW) as factors limiting early mobilization (Parry et al., 2017 Furthermore, fatigue and patient refusal are common reasons for early cessation and lack of physical activity. Parry et al. (2017) also identified patient weakness as a barrier to early mobilization.

CONCLUSION

Patients admitted to hospital spend 87% - 100% of their time sitting or lying in bed. Nevertheless, physical inactivity is often not due to medical reasons (KNGF, 2021). Connelly et al. (2019) supports these findings by reporting that ICU patients spend 100% of the day located in bed with no or minimal activity for 99% of the day. The study indicated the need for a shift in ICU culture toward providing patients with, and engaging them in, a multidisciplinary environment that enhances overall physical activity levels.The complex and dynamic nature of the ICU gives rise to many challenges for early mobilization. Currently, early mobilization is performed as an optional intervention against the backdrop of large-scale sedentary behaviour (Connelly et al., 2019). However, the large body of research on this subject opens the door for creative and innovative solutions to overcome the barriers to early mobilization

PROPOSAL FOR INTERVENTION

Appropriate implementation of early mobilization programs requires the use of scarce resources, both human and technical. Technology can contribute to overcome these barriers (Ferre, 2021). The IC-Move project aims to promote early mobilization of patients in the ICU. The project is centred around developing a computer system, consisting of hardware and software specialized for rehabilitation in the ICU environment. IC-Move promotes mobilization by allowing patients to play games while performing movements. The games on the system are custom designed

from movements identified by physiotherapists as being most relevant to early active mobilization. Considering the innovative approach, the IC-move project can contribute in many ways to the incidence and frequency of early active mobilization. It can also contribute to overcoming the barriers to early mobilization as mentioned above.

IMPROVING CARE WITHIN THE MULTI-DISCIPLINARY TEAM

Practitioner-based barriers to mobilization are deep-rooted in the ICU culture with a lack of communication and coordination of the multidisciplinary team playing a central role in hindering mobilization. Furthermore, a lack of full-time ICU physiotherapists and high workload for nurses contributes to the problem. Transcending the perceived risks and safety concerns for early mobilization is no easy task.

However, the IC-Move system proposes improving the accessibility and decreasing the risks perceived by clinicians involved with early mobilization. By providing mobilizing exercises with a low threshold, safety concerns are mitigated and mobilization can be commenced earlier. Enabling multiple healthcare providers to take part in mobilization will improve the communication within the multidisciplinary team, leading to increased patient-centred care.

INVOLVING THE PATIENT IN REHABILITATION

Factors such as anxiety, confusion, lack of motivation and confidence have been classified in the literature as patient-based barriers to mobilization. The visualizations in the IC-Move games can provide respite from the strenuous ICU environment and provide motivation for a life beyond the hospital. In a healthy population, exercising with a game has been proven to improve the duration of training (Geelan, et al. 2018). This could combat the high levels of sedentary behaviour found in the ICU.

The IC-Move system can be a valuable addition to the ICU as it welcomes not only members of the multidisciplinary team to become involved in early mobilization but also stimulates the patient to get involved in rehabilitation. This leads to higher activity levels in the ICU and motivated patients.

LITERATURE

Anekwe, D.E., Kin-Yea Koo, K., de Marchie, M., Jayaraman, D., & Spahija, J. (2019). Interprofessional survey of perceived barriers and facilitators to early mobilization of critically ill patients in Montreal, *Canada. Journal of Intensive Care Medicine*, 34(3), 218 - 226.

Connolly, B.A., Mortimore, J.L., Douiri, A., Rose, J.W., Hart, N., & Berney, S.C. (2019). Low levels of physical activity during critical illness and weaning: the evidence-reality gap. *Journal of Intensive Care Medicine*, 34(10), 818 - 827.

Dubb, R., Nydahl, P., Hermes, C., Schwabbauer, N., Toonstra, A., Parker, A.M., ...Needham, D.M. (2016). Barriers and strategies for early mobilization of patients in intensive care units. *Annals of the American Thoracic Society*, 13(5), 724 - 730.

Ferre, M., Batista, E., Solanas, A., Martinez-Ballesté, A. (2021). Smart health-enhanced early mobilization in intensive care units. *Sensors*, 21(5408), 1 - 17.

Geelan, B., Zulkifly, A, Smith, A., Cauchi-Saunders, A., de Salas, K., Lewis, I. (2016). Augmented exergaming: increasing exercise duration in novices. Proceedings of the 28 th Australian Conference on computer-human interaction, 542 – 551.

Hashem, M.D., Parker, A.M., & Needham, D.M. (2016). Early mobilization and rehabilitation of patients who are critically ill. *Chest*, 150(3), 722 - 731.

Hodgson, C.L., Capell, E. & Tipping, C.J. (2018). Early mobilization of patients in intensive care: organization, communication and safety factors that influence transition into clinical practice. *Critical Care*, 22(77), 1 - 7.

Koninklijk Nederlands Genootschap voor Fysiotherapie. (2021). Beweegziekenhuizen (KNGF-Standpunt No. 1). Ministerie van Volksgezondheid, Sport en Welzijn. https://www.kngf.nl/binaries/content/assets/kngf/onbeveiligd/ik-ben/fysiotherapeut/kngf-standpunt-beweegziekenhuizen.pdf

Parry, S.M., Knight, L.D., Connolly, B., Baldwin, C., Puthucheary, Z., Morris, P., ...Granger, C.L. (2017). Factors influencing physical activity and rehabilitation in survivors of critical illness: a systematic review of quantitative and qualitative studies. *Journal of Intensive Care Medicine*, 43(2017), 531 - 542.

Sibilla, A., Nydahl, P., Greco, N., Mungo, G., Ott, N., Unger, I.,...Kudchadkar, S.R. (2020). Mobilization of mechanically ventilated patients in Switzerland. *Journal of Intensive Care Medicine*, 35(1), 55 - 62.