Nursing Practices for Implementing Early Mobilisation on Patients with Mechanical Ventilators in the Intensive Care Unit

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ABSTRACT

Background: Critically ill patients requiring mechanical ventilation might experience physical functional disabilities and are at risk of developing Intensive Care Unit (ICU)-acquired weakness. Early mobilisation reduces muscle weakness and improves recovery for mechanically ventilated patients in ICU. Although early mobilisation is safe and feasible for patients, there are barriers to its implementation. **Aim:** The purpose of this study is to evaluate nursing practices of early mobilisation for mechanically ventilated patients in the ICU. **Methods:** Descriptive cross-sectional survey of simple random sampling using a structured questionnaire was conducted from 27 November 2019 to 31 January 2020 and completed by 145 critical care nurses from Hospital Raja Permaisuri Bainun, Ipoh and Pusat Perubatan Universiti Teknologi MARA. **Results:** Most nurses (n=142, 97.9%) practice mobilisation activities on mechanically ventilated patients. The majority of nurses performed in-bed activities to mechanically ventilated patients. There was a perceived barrier among nurses' early mobilisation in the ICU with attitudes subscale (M=27.36, SD=3.7) were the highest mean for the subscale barrier score. **Conclusion:** This study shows that dedicated critical care nurses in the ICU were associated with increased early mobilisation practices among ICU patients undergoing mechanical ventilators. Future studies need to involve other health care professionals in the mobilisation team as the implementation of early mobilisation requires interdisciplinary teamwork, commitment, and resource to promote mobilisation.

Keywords: Early Mobilisation; Mechanical Ventilator; Critical Care Nurse; Rehabilitation

INTRODUCTION

Traditionally, ICU patients are kept on bed rest because it believes that energy conservation will be beneficial for recovery, and bed rest is common practice for patients with a mechanical ventilator. The historical practice undoubtedly influences complete rest in bed and sedation when caring for medically ventilated patients. It was believed that by keeping the patient sedated, they could rest, have less anxiety, more comfort, and thus heal more quickly (Zhang *et al.*, 2017). Grimm *et al.*, (2019) explained that using a mechanical ventilator has allowed for the ability to prolong the life of critically ill patients, and it was

common practice in ICU for patients to be sedated and left on bed and ventilator for long periods. Conversely, few findings have brought a deeper understanding of the effects of prolonged bed rest, sedation and mechanical ventilation. Significant muscle weakening develops during ICU stay as a result of prolonged bed rest and critical illness. According to Jolley *et al.*, (2014), ICU-acquired weakness is associated with prolonged weaning from mechanical ventilators, immobility, sepsis and increased length of ICU stay. Equally, Grimm *et al.* (2019) pointed out that ICU-acquired weakness is the most prominent of physical function abnormalities identified with an incidence rate of 25% or more of post-ICU patients, and it has been strongly associated with

prolonged ventilation (greater than seven days), sepsis, and multi-system organ failure. In Malaysia, prolonged bed rest and ventilation increased ventilator-associated pneumonia, deep vein thrombosis and skin breakdown in critically ill patients (Leong, Chong & Abdul Rahman, 2017).

Over the last decades, mobilisation of mechanically ventilated patients generally comprised a passive range of motion and repositioning in bed. Kondo *et al.*, (2017) found that early mobilisation in patients with a mechanical ventilator is beneficial and improves outcomes after critical illness and is associated with decreased length of ICU stay. Leong, Chong & Abdul Rahman (2017) highlight the practice of early mobilisation in patients with a mechanical ventilator is beneficial and improves outcomes after critical illness and is associated with decreased length of stay in ICU and reduced ventilator-associated pneumonia. In addition, Tadyanemhandu, van Aswegen & Ntsiea (2018) stated that recent evidence shows early mobilisation of patients at ICU is practical, safe and related to better clinical outcomes. According to Fraser *et al.*, (2015), it is feasible for a hospital to implement early mobilisation to ICU patients, contributing to fewer delirium and enhanced patient outcomes, sedation levels, and functional status. Critically ill patients in ICUs who are not mobilised at an earlier stage of hospitalisation develop chronic fatigue, reduced quality of life, and decreased neuropsychological activity (Castro *et al.*, 2015). Therefore, effective measures and starting earlier mobilisations in critically ill patients may reduce the impact of critical disease sequel.

Ling (2017) reported an Early Mobility Protocol in Malaysia Management Protocol in ICU for the hospital under the Ministry of Health (MOH). Early mobility intervention consists of progressive mobilisation based on the patient's functional capability and ability to tolerate the activity. The principles of early mobility protocol are clearly defined and should be started 24 to 48 hours after ICU admission in the absence of contraindications (Ling, 2017). Most of the early mobilisation activities performed were in-bed activities, such as passive range of motion and sitting up on the bed (semi-fowler), whereas out-of-bed activities were uncommon (Bakhru *et al.*, 2016). An intubated patient who can cooperate and is hemodynamically stable can sit out of bed (on the chair), and nurses must be trained to recognise patient readiness for early mobilisation (Leong, Chong & Abdul Rahman, 2017). Patients sitting upright on a chair were shown to have significantly better oxygen saturation than supine (Dirkes & Kozlowski, 2019). Besides that, a study by Shalaby *et al.* (2019) showed that the level or types of mobilisation activities practiced in ICU were supine, fowler, semi fowler, sitting on the edge of the bed, bed or chair transfer and walking. Leong, Chong & Abdul Rahman (2017) found that the activities performed by nurses were in conjunction with the guideline as part of the ventilator bundle, and there was no detailed guideline for early mobilisation in Malaysia.

However, in clinical practice, several barriers exist to the implementation of early mobilisation. According to Lee & Fan (2012), patient over-sedation or coma, lack of ICU personnel, improper vascular access, and clash with another scheduled procedure are typical reasons for not performing early mobilisation. The actual performance of early mobilisation was viewed as a barrier, mainly due to lack of time and experts, excessive sedation, delirium, risk of musculoskeletal self-injury and excessive stress at work (Fontela, Forgiarini & Friedman, 2018). Therefore, the purpose of this study is to evaluate nursing practices of early mobilisation for mechanically ventilated patients in the ICU. In addition, this study is to identify barriers for early mobilisation among mechanically ventilated patients.

METHODOLOGY

Study Design, Location and Sampling

The study, which used the cross-sectional design, was conducted from 27 November 2019 to 31 January 2020. This study was conducted at two hospitals in Malaysia. Hospital Raja Perempuan Bainun (HRPB) is a tertiary state hospital under the Ministry of Health (MOH) in Ipoh, Perak and Pusat Perubatan Universiti Teknologi MARA (PPUiTM) is a tertiary teaching hospital in Malaysia, located in Selangor. The population in this study involved all nurses working in a critical care setting, especially ICUs and taking care of patients with a mechanical ventilator. Inclusion criteria were registered nurses working at ICU in both hospitals. In this study, Microsoft Excel 2010 was used to choose random sampling among the nurses. Of the selected names, 42 were nurses from PPUiTM and 107 were

nurses from HRPB.

Ethical Consideration

This study received approval from UiTM Research Ethics Committee (REC/546/19 on 29 October 2019, the Medical Research and Ethics Committee (MREC) through the NMRR (NMRR-19-2714-49779 (IIR)) on 18 November 2019, Hospital Director and Chief Matron HRPB on 1 December 2019 and Deputy Dean (Research and Innovation) PPUiTM on 25 November 2019. The written informed consent was obtained from respondents before the administration of the survey form. The participants in the survey are voluntary. However, the respondent is allowed to withdraw their consent to participate at any time during the study. There is no risk and impact on respondents to participate in this study. All information obtained in this study was kept confidential and treated following applicable laws and regulations, as stated in the Helsinki Declaration and the Malaysian Guidelines on Good Clinical Practice.

Research Instrument

The study used structured closed-ended questions questionnaires consisting of 3 sections. Section A is demographic data, including qualification and years of working experience in ICU and nurse-to-patient ratio in ICU. Section B consists of five closed-ended questions (multiple response items) to assess the current practice of early mobilisation in mechanically ventilated adapted from Taito *et al.*, (2018). Questionnaires for Section C aims to identify the barriers to the implementation of early mobilisation) adapted from Goodson *et al.*, (2018). This section consists of sixteen closed-ended questions with five points Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The scores were calculated for the overall barrier scale and three subscales of knowledge, attitude, and behaviour ranging from 5 to 80, with higher scores indicating more significant barriers to mobility. The pilot study was conducted on 34 respondents among Advanced Diploma Intensive Care Nursing students from ILKKM Georgetown and 11 Masters in Critical Care Nursing students from UiTM. Respondents suggest a few modifications or improvements in terms of font size and spelling mistakes. The Cronbach's alpha coefficients of internal consistency reliability of the overall barrier scale and subscales were acceptable at 0.81.

Data Collection

Data collection in PPUiTM was conducted from 27 November 2019 to 20 December 2020, and data collection in HRPB was conducted from 12 December 2019 to 31 January 2020. As the general ICU and the Critical Care Unit are stringent to visitors and outsiders, this matter has been discussed with the Head of Department and Chief Matron of both hospitals before the data collection. They decided to appoint a representative from ICU to distribute and collect questionnaire forms. The investigator was only allowed to collect the completed survey forms once a week from the representative. Informed consent and cover letter explaining the purpose of the study have been prepared for participants as an ethical concern before answering the questionnaires form. Random sampling was used to identify the respondent. Respondents were instructed to answer questions that most accurately reflected their opinions based on their working experiences caring for mechanically ventilated patients. It took approximately 10-15 minutes for participants to complete the questionnaire form. The completed questionnaire was kept in a log box in the ICU Matron office and collected by a researcher once a week.

Statistical Analysis

Data analysis was completed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive and inferential statistics were used to identify the frequency and percentage of demography data and nursing practice of early mobilisation and barriers toward early mobilisation.

RESULTS

Demographic Data

Table 1 shows the demographic data analysis of participants in this study. The total number of participants is 145, of which 38 (26.2%) were from PPUiTM and 107 (73.8%) were from HRPB. The majority of critical nurses in both hospitals are female. Most of the critical care nurses were 31 years of age 16 (11.0%), followed by 30 years of age 14 (9.7%). Participation of various ages of critical care nurses from <25 years to 50 years of age. Of all the participants, only 30 (20.7%) had Advanced Diploma Intensive Care or ICU post basic; 4 (10.5%) from PPUiTM and 26 (24.3%) from HRPB. The majority of the nurses, 58 (40%), have worked in ICU for at least five years or less; 15 (39.5%) from PPUiTM and 42 (39.2%) from HRPB.

Table 1: Demographic Characteristics

Variable	PPUiTM (*n*=38)	HRPB (*n*=107)
	n %	n %
Gender Male Female **Age group**	1 (2.6) **37 (97.4)**	**4 (3.7)** **103 (96.3)**
<25		**3 (2.8)**
26-30	16 **(42.1)**	37 (34.6)
31-35	19 (50)	30 (28)
36-40	3 (7.9)	26 (24.3)
41-45		8 (7.5)
46-50		3 (2.8)
Level of education		
Diploma	29 (76.3)	76 (71.0)
Advanced Diploma	4 (10.5)	26 (24.3)
Degree	**5 (13.2)**	**5 (4.7)**
Work experience (years)		
≤5	15 (39.5)	42 (39.2)
6-10	21 (55.3)	35 (32.7)
11-15	1 (2.6)	22 (20.6)
≤15	1 (2.6)	8 (7.5)

Nursing Practice of Early Mobilisation to Invasive Mechanically Ventilated Patient (IMV)

Most nurses (97.9%) practice mobilisation activities and the rest (2.1%) do not practice early mobilisation to invasive mechanically ventilated patients. In this study, nursing practices were split into two groups, in-bed activities and out-of-bed activities. Table 2 presents the frequency distribution of early mobilisation activities performed by the critical care nurses for invasive mechanically ventilated patients in both hospitals. Most of the activities practiced by nurses are two hourly turnings or positioning in bed (25.8%), followed by a passive range of movement (22.4%), sitting in bed (20.8%), and sitting on the edge of the bed (15.2%). Out-of-bed activities are activities from sitting on the edge of the bed up to walking. Nurses rarely perform activities such as sitting out of bed (9.2%), walking on the spot (2.9%), and walking (3.7%). Most of the activities performed are in-bed activities, and between the two hospitals, nurses at the HRPB were more involved in out-of-bed activities than nurses at the PPUiTM.

Table 2: Early Mobilisation Activities Performed to IMV Patients   *(n=145)*

Hospital			
	PPUiTM n (%)	HRPB n (%)	Total n (%)
Passive range of movement	29 (31.9)	87 (20.3)	116 (22.4)
Two hourly turning	32 (35.2)	102 (23.8)	134 (25.8)
Sitting in bed	27 (29.7)	81 (18.9)	108 (20.8)
Sitting on the edge of the bed	1 (1.1)	78 (18.2)	79 (15.2)
Sitting out of bed (armchair)	1 (1.1)	47 (11)	48 (9.2)
Walking on the spot	0 (0)	15 (3.5)	15 (2.9)
Walking	1 (1.1)	18 (4.2)	19 (3.7)
	62 (100)	428 (100)	519 (100)

Barriers to Early Mobilisation

Table 3 shows the overall provider score and subscale score of critical care nurses for the perceived barrier of early mobilisation. The mean and standard deviation for the overall barrier score was 57.67 (SD= 5.9), with the scale score ranging from 40-73. This suggests that there was a perceived barrier between nurses to early mobilisation in the ICU. The attitudes subscale 23.76 (SD=3.7) were the highest mean for the subscale barrier score, followed by the behaviour subscale 21.29 (SD=2.7) and the knowledge subscale 12.62 (SD= 2.7).

Table 3: Perceived Barrier Score to Early Mobilization   *(n=145)*

Scale	Mean ± SD	Scale Scores
Overall Barriers Scale	57.67 ± 5.9	40-73
Knowledge Subscale	12.62 ± 1.6	8-15
Attitudes Subscale	23.76 ± 3.7	14-33
Behaviour Subscale	21.29 ± 2.7	15-28

DISCUSSION

The Practice of Early Mobilisation on the Patient with a Mechanical Ventilator

While reflecting on early mobilisation nursing practice, this study shows that most respondents practice early mobilisation in invasive mechanically ventilated patients. The previous study in Japan by Taito *et al.*, (2018) reported an increased rate of out-of-bed

mobilisation is significantly associated with a dedicated physical therapist. Hodgson *et al.*, (2015) reported that early mobilisation in the ICU is not widely practiced in Australia and New Zealand, where physiotherapists have been part of the ICU multidisciplinary team for decades. It was also not consistent with the latest report by Akinrem, Ogwu & Sanya (2020) in Southwestern Nigeria; the practice of early mobilisation among nurses was deficient. Conversely, in Malaysia, physiotherapists were only involved in demand, and most of the time, critical care nurses were engaged in early mobilisation activities. This study shows that dedicated critical care nurses in the ICU were associated with increased early mobilisation practices in ICU for patients undergoing mechanical ventilators. The majority of the nurses performed in-bed activities to mechanically ventilated patients. The finding is similar to a study by Taito *et al.*, (2016) that joint range of motion mobilisation exercises is frequently performed in patients undergoing mechanical ventilation in Japan. Furthermore, Shalaby *et al.*, (2019) stated that the supine condition was the most prevalent type of early mobilisation practiced and followed by lateral and semi-fowlers.

Nevertheless, this study found that one-third of the total nurses engaged in out-of-bed mobilisation activities to mechanically ventilated patients. Most activities performed were sitting on the edge of the bed and sitting out of bed (armchair). This finding is better from the previous study by Leong, Chong & Abdul Rahman (2017) in which only 14.4% reported practiced out-of-bed mobilisation activities to their patients. However, this finding was different from a study by Tadyanemhandu, van Aswegen & Ntsiea (2018) patients requiring prolonged mechanical ventilation are still kept on bed rest while recovering in most ICUs throughout the world. Grimm *et al.*, (2019) identified that mobilising patients out-of-bed is often delayed due to competing urgencies in busy critical care units and nurses' knowledge and attitude. Their study revealed that both hospitals have early mobilisation protocols or guidelines, to further ensure the safety and feasibility of early mobilisation to critically ill patients. This study found that most nurses were knowledgeable about early mobilisation as they reported receiving training on mobilising ICU patients. Therefore, this justifies early mobilisation barriers indicating lower knowledge-related barrier practices early mobilisation among nurses.

The Barriers of Implementation Early Mobilisation on the Patient with a Mechanical Ventilator

The findings showed an average perceived barrier to early mobilisation for the overall barrier scale and three subscales of knowledge, attitude, and behaviour. Among the three subscales, the attitudes-related barrier subscale was the highest for barrier score, followed by the behaviour-related barrier subscale and knowledge-related barrier subscale. These results were consistent with the previous study by Kim *et al.*, (2019); the attitude-related barrier was the highest in their study, followed by knowledge and behaviour-related barriers. It was also consistent with the latest report by Akinrem, Ogwu & Sanya (2020) that the level of awareness on early mobilisation in the ICU is moderate, indicating the attitude toward practice is low.

Highly perceived barrier item in this subscale was; not sure when it is safe to mobilise patients, not confident of mobilising patients, patients are too sick to be mobilised and believed that patient mobilised once daily will have a better outcome. Akinrem, Ogwu & Sanya (2020) support the claim which state more than half of the participants recorded early mobilisation is probably to be more dangerous to critically ill patients. Most critically ill patients have sedation and vasopressors that will affect their hemodynamic level and consciousness level. This condition might prevent and restrict mobilisation activity, and the intubation/ventilation status with all tubes may affect mobility outcomes. Dafoe *et al.,* (2015) suggested that besides proper training on mobilisation, improving sedation procedures or reducing levels of sedation in patients may be needed to enhance the mobility outcomes of ICU patients. Kim *et al.*, (2019) state, as nurses become exposed to early mobilisation activities, they may reduce the barriers related to attitudes. Following the guidelines, nurses need to assess and determine whether patients are alert and ready to follow a command, and able to help mobilise themselves. Nurses need to identify which activities are appropriate for patients and promote early mobilisation of mechanically ventilated patients. If the patient is unable to do out-of-bed mobilisation, nurses need to initiate in-bed exercises to prevent muscle weakness in ventilated patients. This might be why most of the nurses performed in-bed activities to mechanically ventilated patients in this study.

Most of the nurses in this survey reported they had attended training on how to safely mobilise their patients, making it the less score for knowledge-related barrier subscale. However, it was different compared to

a study by Shalaby *et al.,* (2019). All nurses in their study didn't receive training on how safely to mobilise their patients, and they have a high barrier related knowledge subscale. Behaviour-related barrier subscale was the second-highest barrier, and the question is more to the staff-related barrier. The highly perceived barrier item in this subscale was no proper equipment to mobilise patients, and staffing is inadequate to mobilise patients and risk of injury to nurses during mobilisation. This was also similar to Dubb *et al.*, (2016), with limited staff implementing mobilisation, only 25% reported in the study. Kim *et al.*, (2019) mentioned that the lack of awareness and familiarity of early mobilisation affects nurses' knowledge, attitudes, and behaviour. To move towards better quality care for patients, critical care nurses play an essential role. Lack of trained staff in mobilisation techniques may become a significant barrier to early mobilisation.

CONCLUSION

In conclusion, although patient mobilisation is a standard procedure in hospital settings, the critical condition of patients in the ICU makes this intervention more difficult. However, in this study, the nursing practice of early mobilisation to mechanically ventilated patients was increased. Nurses know and understand the benefits and importance of early mobilisation for critically ill patients in ICU. Most of the mobilisation activities performed were in-bed activities rather than out-of-bed activities. However, there is an increasing out-of-bed activity performed by the nurses. The higher perceived barrier for subscale was an attitude-related barrier, followed by a behaviour-related barrier and

knowledge. The attitude barrier is more related to the patient barrier, and consideration of the patient's condition has been identified as a barrier to early mobilisation. Understanding these challenges might help resolve the barrier and is essential for institutions that want to implement early mobilisation as part of standard clinical practice in ICU. In the future, it is necessary to consider the barriers to implementation of early mobilisation on the patient with a mechanical ventilator from a multidisciplinary perspective.

Limitation of the Study

There are some limitations to this study. This survey was conducted among ICU nurses in one of the government hospitals in the Hospital Raja Permaisuri Bainun, Ipoh (HRPB), and an academic hospital called Pusat Perubatan Universiti Teknologi MARA (PPUITM). Thus, the respondents do not reflect other ICU nurses in different government and teaching hospitals. This study also does not generalise other professions included in the mobilisation team or other healthcare providers such as physicians and physiotherapists involved in early mobilisation practice in ICU.

Conflict of Interest

The authors declare that they have no conflict of interests.

REFERENCES

Akinremi, A. A., Ogwu, S., & Sanya, A. O. (2020). Early Mobilization in the ICU: A Multicenter Survey of Clinicians' Knowledge, Attitude and Practices in Resource-Limited Hospital Settings. *Annals of Medical and Health Sciences Research, 10,* 778–784.

Bakhru, R. N., McWilliams, D. J., Wiebe, D. J., Spuhler, V. J., & Schweickert, W. D. (2016). Intensive care unit structure variation and implications for early mobilization practices an international survey. *Annals of the American Thoracic Society, 13*(9), 1527–1537. https://doi.org/10.1513/AnnalsATS.201601-078OC

Castro, E., Turcinovic, M., Platz, J., & Law, I. (2015). Early mobilization: Changing the mindset. *Critical Care Nurse, 35*(4), e1–e6. https://doi.org/10.4037/ccn2015512

Dafoe, S., Chapman, M. J., Edwards, S., & Stiller, K. (2015). Overcoming barriers to the mobilisation of patients in an intensive care unit. *Anaesthesia and Intensive Care, 43*(6), 719-727. https://doi.org/10.1177/0310057X1504300609

Dirkes, S. M., & Kozlowski, C. (2019). Early mobility in the intensive care unit: Evidence, barriers, and future directions. *Critical Care Nurse, 39*(3), 33–42. https://doi.org/10.4037/ccn2019654

Dubb, R., Nydahl, P., Hermes, C., Schwabbauer, N., Toonstra, A., Parker, A. M., Kaltwasser, A., & 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. https://doi.org/10.1513/AnnalsATS.201509-586CME

Fontela, P. C., Forgiarini, L. A., & Friedman, G. (2018). Clinical attitudes and perceived barriers to early mobilization of critically ill patients in adult intensive care units. *Revista Brasileira de Terapia Intensiva, 30*(2), 187–194. https://doi.org/10.5935/0103-507X.20180037

Fraser, D., Spiva, L., Forman, W., & Hallen, C. (2015). Original Research: Implementation of an Early Mobility Program in an ICU. *American Journal of Nursing, 115*(12), 49–58. https://doi.org/10.1097/01.NAJ.0000475292.27985.fc

Goodson, C. M., Friedman, L. A., Mantheiy, E., Heckle, K., Lavezza, A., Toonstra, A., Parker, A. M., Seltzer, J., Velaetis, M., Glover, M., Outten, C., Schwartz, K., Jones, A., Coggins, S., Hoyer, E. H., Chan, K. S., & Needham, D. M. (2020). Perceived Barriers to Mobility in a Medical ICU: The Patient Mobilization Attitudes & Beliefs Survey for the ICU. *Journal of Intensive Care Medicine, 35*(10), 1026–1031. https://doi.org/10.1177/0885066618807120

Grimm, J., Elmore-Silvestri, A., Grimm, E., Klinger, K., Nye, S., & Bhullar, J. (2019). Percieved barriers to early progressive mobilization in the ICU: Multidisciplinary perspectives in an underserved population. *Journal of Nursing Education and Practice, 9*(5), 102.

Hodgson, C., Bellomo, R., Berney, S., Bailey, M., Buhr, H., Denehy, L., Harrold, M., Higgins, A., Presneill, J., Saxena, M., Skinner, E., Young, P., & Webb, S. (2015). Early mobilization and recovery in mechanically ventilated patients in the ICU: A bi-national, multi-centre, prospective cohort study. *Critical Care, 19*(1), 81. https://doi.org/10.1186/s13054-015-0765-4

Jolley, S. E., Regan-Baggs, J., Dickson, R. P., & Hough, C. L. (2014). Medical intensive care unit clinician attitudes and perceived barriers towards early mobilization of critically ill patients: A cross-sectional survey study. *BMC Anesthesiology, 14*(1), 1–9. https://doi.org/10.1186/1471-2253-14-84

Kim, C., Kim, S., Yang, J., & Choi, M. (2019). Nurses' perceived barriers and educational needs for early mobilisation of critical ill patients. *Australian Critical Care, 32*(6), 451–457. https://doi.org/10.1016/j.aucc.2018.11.065

Kondo, Y., Fuke, R., Hifumi, T., Hatakeyama, J., Takei, T., Yamakawa, K., Inoue, S., & Nishida, O. (2017). Early rehabilitation for the prevention of postintensive care syndrome in critically ill patients: a study protocol for a systematic review and meta-analysis. *BMJ Open, 7*(3), e013828. https://doi.org/10.1136/bmjopen-2016-013828

Lee, C. M., & Fan, E. (2012). ICU-acquired weakness: What is preventing its rehabilitation in critically ill patients? *BMC Medicine, 10*(1), 10–15. https://doi.org/10.1186/1741-7015-10-115

Leong, Y. L., Chong, M. C., & Abdul Rahman, R. B. (2017). Patient early mobilization: A Malaysia's study of nursing practices. *Journal of Intensive and Critical Care, 3*(3).

Ling, T. L., Cheng, T. C., Har, L. C., & bt Ismail, N. I. (2017). Malaysian Registry of Intensive Care Report for 2015. *Kuala Lumpur, Malaysia: Malaysian Society of Intensive Care (MSIC)*.

Shalaby, G., Mahran, K., Abdelrahman, H. A., & Shawkat Abo-Elmagd, N. (2019). Current Practice Types of Early Mobilization in the Intensive Care Units and Challenges Faced by Nurses Attempting to Translate It into Practice. *American Journal of Nursing Research, 7*(1), 31–36. https://doi.org/10.12691/ajnr-7-1-5

Tadyanemhandu, C., van Aswegen, H., & Ntsiea, V. (2018). Early mobilisation practices of patients in intensive care units in zimbabwean government hospitals – A cross-sectional study. *Southern African Journal of Critical Care, 34*(1), 16–21. https://doi.org/10.7196/sajcc.2017.v34i1.343

Taito, S., Sanui, M., Yasuda, H., Shime, N., & Lefor, A. K. (2016). Current rehabilitation practices in intensive care units: A preliminary survey by the Japanese Society of Education for Physicians and Trainees in Intensive Care (JSEPTIC) Clinical Trial Group. *Journal of Intensive Care, 4*(1). https://doi.org/10.1186/s40560-016-0190-z

Taito, S., Shime, N., Yasuda, H., Ota, K., Sarada, K., Lefor, A. K., & Sanui, M. (2018). Out-of-bed mobilization of patients undergoing mechanical ventilation with orotracheal tubes: A survey study. *Journal of Critical Care, 47*, 173–177. https://doi.org/10.1016/j.jcrc.2018.06.022

Zhang, Z., Chen, K., Ni, H., Zhang, X., & Fan, H. (2017). Sedation of mechanically ventilated adults in intensive care unit: a network meta-analysis. *Scientific Reports, 7*(1), 1-9. https://doi.org/10.1038/srep44979