



Research paper

Nurses' perceived barriers and educational needs for early mobilisation of critical ill patients

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ABSTRACT

Background: Early mobilisation (EM) of critically ill patients is an evidence-based intervention designed to improve treatment outcomes and enhance the quality of life after intensive care. However, several barriers exist to its establishment in clinical practice. Thus, the objective of the present study was to identify barriers perceived by critical care nurses, corresponding educational needs, and provide useful information for program implementation in Korea.

Methods: A cross-sectional study was conducted from April to June 2017 using a structured, self-administered questionnaire that was completed by 151 critical care nurses from three tertiary hospitals and four secondary hospitals located in Seoul. The survey was designed to rate experiences with EM, identify educational experiences, and measure perceived barriers regarding attitudes, knowledge, behaviours, and educational needs. Data were analysed using descriptive statistics, *t*-tests, and analyses of variance.

Results: The mean number of perceived barriers was 3.13 ± 0.38 out of 5 on a Likert scale. Attitude-related barriers (3.25 ± 0.49) were higher than behaviour-related (3.21 ± 0.44) and knowledge-related (2.94 ± 0.59) barriers. The top five barrier items were high workload, patients' inability to exercise, lack of time, inappropriate nurse/patient ratio, and absence of relevant education. Educational needs for early mobilisation were rated 3.74 ± 0.78 out of 5. Educational items were prioritised as identifying potential problems in EM and possible solutions, related protocols and guidelines, and procedures for special conditions.

Conclusions: The present study revealed that critical care nurses in Korea perceive various barriers to successfully implementing evidence-based EM interventions for critically ill patients, as well as the educational needs necessary to overcome such challenges. Accordingly, an educational program should be developed based on the educational needs revealed in the present study. In parallel, organisational efforts should also be made to meet environmental conditions.

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1. Introduction

Advances in medical knowledge and techniques have bolstered the interest of critical care professionals in not only survival but also

quality of life among critically ill patients regarding their physical, cognitive, and emotional aspects after treatment. Early mobilisation (EM) of critically ill patients, a component of the evidence-based intervention ABCDEF bundle (Assess, prevent, and manage pain; Both spontaneous awakening trials and spontaneous breathing trials; Choice of analgesia and sedation; Delirium monitoring and management; Early mobility and exercise; Family engagement and empowerment),¹ is effective such as in improving physical function and reducing duration of delirium, mechanical

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ventilation application, and hospitalisation.^{2–4} Although such rationales about the effectiveness of EM are perceived by healthcare providers to be important,^{5–7} most providers rarely practice such interventions worldwide.^{8–10} Asia has some of the world's lowest EM standards, formation of rehabilitation-dedicated teams, and implementation of intervention protocols.^{11,12}

The gap between research evidence and clinical practice indicates the existence of complicated multifaceted barriers. These barriers include patient- or environment-related factors that hamper the introduction and establishment of EM, as well as providers' attitude- and knowledge-related factors regarding EM.^{13,14} Critical care nurses should play a crucial role in shifting towards improved care quality owing to their understanding of patients' health conditions and their needs within a local context.¹⁵ Meanwhile, nurses perceived concerns of patient safety, lack of education itself, or trained workforce as the significant barriers for EM more than other healthcare providers did.^{16–18} Such a difference in recognition can lead to a gap in mobilisation performance among other healthcare professionals.¹⁹

To overcome existing barriers, multifaceted, tailored strategies should be developed for successful and sustainable EM implementation. For example, educational interventions are the most frequently used strategy.²⁰ Well-designed education and training procedures can lower perceived barriers to evidence-based intervention,^{21,22} boost competency and intervention performance,^{23–25} and ultimately encourage cultural changes within the workplace.^{26,27} As in other Asian countries, hospitals in Korea aiming to adopt EM for critically ill patients in clinical practice are in the early stages.^{12,28} Efforts are necessary to identify the need for practical educational programs so as to better foster a skilled and experienced workforce.²⁹

Therefore, the aim of the present study was to identify critical care nurses' perceived barriers and educational needs. Doing this should serve as a basis for customised strategies and educational programs that could successfully and sustainably establish evidence-based EM interventions for critically ill patients in Korea.

2. Methods

2.1. Design

The present study used a cross-sectional and descriptive design for identifying barriers perceived by critical care nurses and corresponding educational needs in Korea.

2.2. Measurement

EM mentioned in this study was defined as a series of mobilisation interventions applied to patients in phases ranging from range-of-motion, in-bed exercises to walking out of bed. These are the physical activities that patients begin as early as possible after intensive care unit (ICU) hospitalisation.^{26,30}

To measure perceived barriers, a questionnaire developed from a previous study³¹ was used with the authors' permission. This questionnaire was based on a conceptual framework aimed at identifying barriers when physicians follow clinical practice guidelines³² and was divided into three subcategories: attitudes, knowledge, and behaviours. Translation and back-translation were conducted.³³ The questionnaire was translated into Korean, and a bilingual professional with a doctoral degree in health care translated the Korean version back into English. The researchers then compared both versions and adapted the questionnaire based on the study objectives.

A content validity index (CVI) was obtained from nine critical care experts: a professor of nursing, a head nurse, two critical care

nurse specialists, three critical care nurses with a master's degree and 10 years' of clinical experience, an intensivist, and a physical therapist with a doctoral degree. The scale-level CVI/averaging (S-CVI/Ave)³⁴ was 0.92. Two items "Increasing the frequency of mobilising my inpatients increases my risk for injury" and "My patients have time during their day to be mobilised at least three times daily" were omitted as unsuitable for Korea's ICU culture, with respective item-level CVIs (I-CVIs) of less than 0.8.³⁵ Therefore, 24 questions with three subcategories were included: four items for knowledge, eight for attitudes, and 12 for behaviours, scored using a 5-point Likert scale (1 = "totally disagree"; 5 = "totally agree"). Cronbach's alpha was 0.70 at the time of instrument development³¹ and 0.81 in the present study.

To measure nurses' educational needs, a questionnaire was developed after considering relevant literature and expert opinion. The S-CVI/Ave value was 0.98, and Cronbach's alpha was 0.89. The measure comprised 12 items scored on a 5-point Likert scale (1 = "never needed"; 5 = "very much needed"). For each measure, the final questions were selected after revisions and reviews after conducting a preliminary study with 10 critical care nurses. In addition, the questionnaire included items regarding staff arrangement, EM experience, and education-related characteristics, together with general features (i.e., career and academic background).

2.3. Setting, participants, and survey procedure

The study focused on critical care nurses from tertiary or secondary hospitals located in Seoul, Korea. Data were collected from April to June 2017. A convenience sample was used from three tertiary hospitals with which the researchers were affiliated and four secondary hospitals through telephone inquiries. Selection criteria included current work experience of one year or more at an adult ICU, ability to understand the study's objectives, and willingness to participate. After confirming eligible participants through cooperation from ward managers at each institution, the researchers conveniently selected nurses who met the criteria and directly visited potential participations to explain the following: the purpose of the study and relevant response methods, the right to refuse participation, and assurance of anonymity. The researchers distributed one envelope with a questionnaire and a study description. Each participant anonymously completed the questionnaire on his/her own time. Participants were also required to submit a written consent form and the questionnaire, each in separately sealed drop-off boxes. The researchers collected the drop-off boxes within two weeks of distributing the questionnaire. The college of nursing at one university (Yonsei 2017-0016-1) and the institutional bioethics committee of one tertiary hospital (SMC 2017-03-054-001) approved this study.

2.4. Analyses

This study analysed participants' general characteristics, distribution of EM experience, and education according to frequencies and percentages. Perceived barriers and educational needs for EM were analysed using the mean values and standard deviations in the case of normally distributed data. General characteristics, participants' EM experience, and education were analysed via *t*-tests or analyses of variance. Statistical analyses were conducted using IBM SPSS Statistics for Windows, version 23 (Armonk NY: IBM Corp).

3. Results

Approximately 350 critical care nurses were eligible for participation from seven hospitals. A total of 155 nurses voluntarily

consented to participate and were invited to complete the questionnaire. After unusable surveys were excluded, a total of 151 responses were analysed (completion rate = 97.4%). Participants were mostly staff nurses (n = 117, 77.5%), and the average number of years of ICU experience was 4.72 ± 3.95 . Concerning ICU nursing staff arrangement, more than half responded that critical care nurse educators (n = 84, 55.6%) and specialists (n = 91, 60.3%) were assigned to the ICUs. Most participants (n = 119, 78.8%) reported no EM protocol guidelines within their hospitals or departments. However, approximately half (n = 79, 52.3%) responded that their hospitals or departments conducted EM interventions; nearly two-thirds (n = 100, 66.2%) stated that she/he personally had never received EM-related education (Table 1).

Average perceived EM barriers were scored, and an average of 3.13 ± 0.38 out of 5 was obtained. Table 2 lists the perceived barriers in descending order per category. Among the three subcategories, attitude-related barriers were the highest (3.25 ± 0.49). Highly perceived barriers for each category were the absence of relevant education (4.01 ± 0.96) [knowledge], high workload (4.30 ± 0.77) [attitudes], lack of time (4.05 ± 0.84), and inappropriate nurse/patient ratio (4.01 ± 0.96) [behaviours].

According to Tables 3 and 4, there were statistically significant differences in perceived EM barriers by participant characteristics, ICU nursing staff arrangement, experience, and education status. ICUs with critical care nurse educators or critical care nurse specialists had lower behavioural barriers than those without educators or specialists; moreover, participants who acknowledged the presence of guidelines or protocols ($t = -2.206$, $p = 0.031$), implementation ($t = -5.188$, $p < 0.001$), and educational experience of EM ($t = 3.148$, $p = 0.002$) had lower overall barriers.

Finally, Table 5 presents EM educational needs mentioned, which had an average score of 3.71 ± 0.78 out of 5. Educational

items are listed in the order in which its educational needs are perceived highest. 'Potential problems and solutions when implementing EM' (4.21 ± 0.63) ranked first, followed by the 'relevant protocol/guideline for EM' (4.17 ± 0.72) and 'EM for patients with special conditions' (4.16 ± 0.83).

4. Discussion

Despite the growing number of studies assessing evidence-based EM interventions in terms of safety, feasibility, and efficacy,^{4,36,37} EM continues to have low implementation rates worldwide.^{8–10} While working in multidisciplinary teams, critical care nurses should play a key role in establishing EM as a standard intervention to improve care quality.^{18,38} In this regard, the present study identified perceived barriers outlined by ICU nurses in Korea, where EM adoption is in its early stages.

Of the total perceived barriers, attitudes were most salient, followed by behaviour and knowledge dimensions. Participants perceived fewer attitude-related barriers when asked about the prognosis and benefits of EM. However, participants were concerned with an increased workload and that an individual patient's health conditions may be inappropriate for EM, similar to what has been reported in previous studies.^{39,40} In general, exposure to EM among healthcare providers, including actual implementation and experience with participating in EM efforts, could mitigate these attitude barriers.^{25,27,41} For instance, participants who reported having implemented or experienced EM within the recent year identified fewer perceived barriers. Thus, negative connotations surrounding EM among nurses could be effectively resolved with intervention protocols that call for sharing and promoting EM experiences through team meetings and workshops. Such efforts could create a consensus regarding the benefits/feasibility of EM, helping to revise the current ICU culture.⁴²

Meanwhile, healthcare providers' attitudes had a statistically significant relationship with institutional factors, including the presence of policies, protocols, workforce, equipment, and quantity and quality of work. Thus, a comprehensive approach should encourage clinical practice based on the ABCDEF bundle, including EM.^{5,40} The present study's results suggest that a lack of time and limits to the ICU nursing workforce are more significant barriers for implementation than patients, patients' families, and departmental leadership. The globally recommended nurse-to-patient ratio within any ICU is from 1:2 to 1:1, depending on the severity of a patient's condition(s).^{43,44} Unlike cases in neighbouring countries, where 83.3% of hospitals have a 1:1 or 1:2 ratio,⁴⁵ only 17.9% of Korean hospitals adhere to this ratio.⁴⁶ In addition, experienced critical care nurses are needed for EM, especially individuals with knowledge of labour-intensive and team-based interventions. The present study's results are similar to what was observed in a previous study,⁴⁷ whereby professionals recognised barriers differently depending on their work experience. For instance, nurses with a bachelor's degree or staff nurses recognise more EM barriers than do trained and experienced nurses with a master's degree, nurses in charge, or head nurses. However, as most of the current participants were staff nurses, the present study's results imply that if there are specialist nurses, such as critical care nurse specialists or educators, staff nurses may perceive less behavioural barriers (e.g., external factors) than in situations involving no specialist nurses. Specialist nurses serve as a 'change agent' or 'champion' for complex interventions, where a team approach is important.⁴⁸ Therefore, using services offered by these nurses should help adequately address such barriers, particularly those related to a limited workforce and time shortages.

Moreover, the present study confirmed that lack of education to safely exercise patients is a knowledge-related barrier.^{15,17,47} Previous

Table 1
Participants' characteristics and ICU staff arrangement, experience, and EM education (n = 151).

Characteristics (Mean \pm SD)	Category	N (%)	Mean \pm SD
Gender	Male	13 (8.6)	30.38 \pm 6.16
	Female	138 (91.4)	
Age (years)	<30	79 (52.3)	30.38 \pm 6.16
	30 \leq to <40	61 (40.4)	
	40 \leq	11 (7.3)	
Education	Associate degree	26 (17.2)	30.38 \pm 6.16
	Bachelor's	112 (74.2)	
	Master's or higher	13 (8.6)	
Type of hospital	Tertiary hospital	117 (77.5)	30.38 \pm 6.16
	Secondary hospital	34 (22.5)	
	Staff nurse	117 (77.5)	
Clinical position	Nurse in charge/ head nurse	34 (22.5)	30.38 \pm 6.16
	Staff nurse	117 (77.5)	
Nursing experience (years)	<5	73 (48.3)	6.99 \pm 6.03
	5 \leq to <10	45 (29.8)	
	10 \leq	33 (21.9)	
ICU experience (years)	<3	63 (41.7)	4.72 \pm 3.95
	3 \leq to <7	55 (36.4)	
	7 \leq	33 (21.9)	
Presence of critical care educators	Yes	84 (55.6)	30.38 \pm 6.16
	No	67 (44.4)	
Presence of critical care nurse specialists	Yes	91 (60.3)	30.38 \pm 6.16
	No	60 (39.7)	
Presence of EM-related guideline/protocol	Yes	32 (21.2)	30.38 \pm 6.16
	No	119 (78.8)	
Implementation of EM	Yes	79 (52.3)	30.38 \pm 6.16
	No	72 (47.7)	
Experience with EM in the past year	Yes	70 (46.4)	30.38 \pm 6.16
	No	81 (53.6)	
Received EM education	Yes	100 (66.2)	30.38 \pm 6.16
	No	51 (33.8)	

ICU = intensive care unit; EM = early mobilisation.

Table 2
Perceived barriers to early mobilisation (n = 151).

Items	Mean ± SD
Knowledge	2.94 ± 0.59
I have received training on how to safely mobilise my patients. ^a	3.48 ± 0.89
I understand which patients are appropriate to refer to occupational therapy. ^a	2.97 ± 0.89
I understand which patients are appropriate to refer to physical therapy. ^a	2.70 ± 0.86
Unless there is a contraindication, I educate my patients to exercise or increase their physical activity while on my hospital unit. ^a	2.62 ± 1.01
Attitudes	3.25 ± 0.49
Increasing the mobilisation of my patients will be more work for nurses.	4.30 ± 0.77
Increasing the mobilisation of my patients will be more work for physical and/or occupational therapists.	3.68 ± 1.01
My patients are too sick to be mobilised.	3.59 ± 0.91
A physical therapist or occupational therapist should be the primary care provider to mobilise my patients.	3.51 ± 1.01
I am not sure when it is safe to mobilise my patients.	3.07 ± 0.87
I do not feel confident in my ability to mobilise my patients.	2.95 ± 1.05
I believe that my patients who are mobilised at least three times daily will have better outcomes. ^a	2.46 ± 0.85
Increasing mobilisation of my patients will be harmful to them.	2.41 ± 0.87
Behaviours	3.21 ± 0.44
I do not have time to mobilise my patients during my shift/work day.	4.05 ± 0.84
Nurse-to-patient staffing is adequate to mobilise patients on my unit. ^a	4.01 ± 0.96
My patients often have contraindications to be mobilised.	3.88 ± 0.67
We don't have the proper equipment and/or furnishings to mobilise my patients.	3.64 ± 1.04
The physical functioning of my patients is regularly discussed between the patient's healthcare providers (nurses, physicians, physical therapists, and occupational therapists). ^a	3.26 ± 1.17
Unless there is a contraindication, my patients are mobilised at least once daily by nurses. ^a	3.18 ± 1.07
Unless there is a contraindication, I mobilise my patients at least once during my shift/work day. ^a	3.07 ± 0.97
My patients are resistant to being mobilised.	2.79 ± 0.86
Family members of my patients are frequently interested to help mobilise them. ^a	2.57 ± 0.86
My departmental leadership is very supportive of patient mobilisation. ^a	2.55 ± 0.93
I document the physical functioning status of my patients during my shift/work day. ^a	2.16 ± 0.87
Total score	3.13 ± 0.38

Five-point Likert scale (1–5).

^a Reverse code scale item.

studies have reported that various educational efforts, such as educational meetings or interprofessional education, may be effective strategies for breaking down these barriers.^{14,20} In the present study, the highly educated group reported fewer barriers than did the less-educated group. In addition, acquiring new knowledge and skills is a must for critical care nurses to perform their roles in a rapidly changing work environment.⁴⁵ Therefore, developing education strategies designed to embrace relevant knowledge and skills and

designing programs based on highly requested material should be led by critical care nurse educators.⁴⁹ Presently, nurses reported a desire to gain more knowledge regarding potential problems and solutions for EM implementation, as well as protocols and guidelines, along with EM strategies for patients with special conditions. Notably, a need for education regarding bed rest or mobility complications was not a significant concern among the present sample. This may indicate that ICU nurses are already aware of such

Table 3
Difference in perceived barriers to early mobilisation by participants' characteristics (n = 151).

Characteristics	N	Barriers to early mobilisation							
		Total		Knowledge		Attitudes		Behaviours	
		M ± SD	t or F (p)	M ± SD	t or F (p)	M ± SD	t or F (p)	M ± SD	t or F (p)
Gender									
Male	13	3.28 ± 0.31	1.454 (0.148)	3.29 ± 0.50	2.228 (0.027)*	3.26 ± 0.47	0.099 (0.921)	3.29 ± 0.50	0.714 (0.476)
Female	138	3.12 ± 0.39		2.91 ± 0.59		3.25 ± 0.49		3.20 ± 0.43	
Age (years)									
<30	79	3.15 ± 0.39	2.195 (0.115)	2.99 ± 0.61	2.220 (0.112)	3.28 ± 0.45	1.717 (0.183)	3.19 ± 0.45	0.488 (0.615)
30 ≤ to <40	61	3.15 ± 0.39		2.94 ± 0.60		3.25 ± 0.53		3.24 ± 0.43	
40 ≤	11	2.90 ± 0.29		2.59 ± 0.26		2.99 ± 0.52		3.12 ± 0.36	
Education									
Associate degree	26	3.17 ± 0.34	1.748 (0.178)	2.92 ± 0.58	0.804 (0.450)	3.34 ± 0.46	3.131 (0.047)*	3.24 ± 0.42	1.748 (0.178)
Bachelor's	112	3.14 ± 0.38		2.97 ± 0.61		3.26 ± 0.45		3.21 ± 0.45	
Master's or higher	13	2.94 ± 0.46		2.75 ± 0.52		2.94 ± 0.77		3.14 ± 0.41	
Clinical position									
Staff nurse	117	3.18 ± 0.37	2.632 (0.009)**	2.99 ± 0.61	1.659 (0.099)	3.31 ± 0.44	3.020 (0.003)**	3.23 ± 0.44	1.269 (0.206)
Nurse in charge/Head nurse	34	2.98 ± 0.39		2.79 ± 0.52		3.03 ± 0.57		3.12 ± 0.42	
ICU experience (years)									
<3	63	3.11 ± 0.39	0.161 (0.852)	2.99 ± 0.64	0.322 (0.725)	3.25 ± 0.42	0.210 (0.811)	3.10 ± 0.43	3.607 (0.030)*
3 ≤ to <7	55	3.14 ± 0.39		2.91 ± 0.57		3.22 ± 0.54		3.29 ± 0.44	
7 ≤	33	3.16 ± 0.38		2.91 ± 0.57		3.28 ± 0.54		3.28 ± 0.39	

* = p < 0.05, ** = p < 0.01, *** = p < 0.001; ICU = intensive care unit.

Table 4

Difference in perceived barriers to early mobilisation by staff arrangement and participants' experience and education status (n = 151).

Characteristics	n	Barriers to early mobilisation							
		Total		Knowledge		Attitudes		Behaviours	
		M ± SD	t or F (p)	M ± SD	t or F (p)	M ± SD	t or F (p)	M ± SD	t or F (p)
Presence of critical care nurse educator									
Yes	84	3.08 ± 0.42	–1.743 (0.083)	2.89 ± 0.61	–1.141 (0.256)	3.22 ± 0.54	–0.743 (0.459)	3.14 ± 0.44	–2.074 (0.040)*
No	67	3.19 ± 0.32		3.00 ± 0.57		3.28 ± 0.42		3.29 ± 0.43	
Presence of critical care specialists									
Yes	91	3.11 ± 0.41	–0.774 (0.440)	2.95 ± 0.62	0.286 (0.776)	3.24 ± 0.51	–0.279 (0.781)	3.14 ± 0.45	–2.150 (0.033)*
No	60	3.16 ± 0.34		2.93 ± 0.55		3.26 ± 0.47		3.30 ± 0.41	
Presence of guideline/protocol									
Yes	32	3.02 ± 0.30	–2.206 (0.031)*	2.97 ± 0.56	0.286 (0.776)	3.09 ± 0.50	–2.065 (0.041)*	3.00 ± 0.33	–3.660 (0.001)**
No	119	3.16 ± 0.40		2.93 ± 0.60		3.29 ± 0.48		3.26 ± 0.44	
Implementation of EM									
Yes	79	2.99 ± 0.38	–5.188 (<0.001)***	2.85 ± 0.62	–1.915 (0.057)	3.14 ± 0.49	–2.986 (0.003)**	2.98 ± 0.38	–8.144 (<0.001)***
No	72	3.29 ± 0.32		3.04 ± 0.55		3.37 ± 0.46		3.46 ± 0.35	
Experience with EM in the past year									
Yes	70	3.02 ± 0.41	–3.365 (0.001)**	2.87 ± 0.64	–1.362 (0.175)	3.15 ± 0.51	–2.377 (0.019)*	3.05 ± 0.44	–4.356 (<0.001)***
No	81	3.23 ± 0.33		3.00 ± 0.55		3.33 ± 0.46		3.34 ± 0.39	
Received EM education									
Yes	51	3.00 ± 0.34	3.148 (0.002)**	2.72 ± 0.56	3.384 (0.001)**	3.24 ± 0.37	0.204 (0.839)	3.04 ± 0.40	3.515 (0.001)**
No	100	3.29 ± 0.39		3.06 ± 0.58		3.25 ± 0.54		3.29 ± 0.43	

* = p < 0.05, ** = p < 0.01, *** = p < 0.001; ICU = intensive care unit; EM = early mobilisation.

Table 5

Educational needs for EM (n = 151).

Items	Mean ± SD	Ranking
Potential problems and solution when implementing EM	4.21 ± 0.63	1
Relevant protocol/guideline for EM	4.17 ± 0.72	2
EM for patients with special condition (MV, CRRT, and ECMO)	4.16 ± 0.83	3
Indication and contraindication with respect to EM	4.07 ± 0.67	4
EM procedure and related devices	4.04 ± 0.67	5
Roles of critical care nurse in EM	4.03 ± 0.72	6
Effectiveness of EM	4.00 ± 0.65	7
Safety and feasibility of EM	3.99 ± 0.69	8
ICU-acquired weakness	3.98 ± 0.69	9
Screening tools for initiating EM	3.98 ± 0.79	10
Sharing actual experiences in EM	3.93 ± 0.79	11
Complications of bed rest or immobility	3.91 ± 0.68	12
Total score	4.04 ± 0.51	
Educational needs for EM	3.71 ± 0.78	

Five-point Likert scale (1–5); EM = early mobilisation; MV = mechanical ventilation; CRRT = continuous renal replacement therapy; ECMO = extracorporeal membrane oxygenation.

complications, and they desire training on more practical issues that they may face at a patients' bedside.

The present findings are in keeping with global trends regarding few hospitals and departments being equipped with EM protocols.^{8,12} Protocols or guidelines provide an evidence-based standard to help secure the safety and feasibility of EM while removing perceived barriers. The present sample was significantly less likely to recognise EM barriers when a protocol or guidelines were in place. Relatedly, Bassett et al.²⁶ designed an evidence-based, progressive mobility continuum and guidelines that could be applied by nurses, depending on the functional condition and prognosis of a patient. The authors reported conducting workshops and education programs with various experts, which yielded positive results, including raising nurses' EM awareness and implementation efforts. Therefore, protocols and guidelines should be established to reflect the environmental factors impacting ICUs, as well as the local context within individual institutions. Subsequently, educational and training programs should be designed based on well-supported protocols and guidelines.

Several study strengths should be noted. First, by using a validated survey tool developed according to a theoretical framework, the present study identified attitude-, knowledge-, and behaviour-related barriers perceived by Korean critical care nurses. Identifying perceived barriers is an essential attribute for designing and implementing successful quality improvement projects.²⁰ Therefore, the present study's results could be used for planning quality improvement projects that fit a local Korean context and for comparing perceptions among healthcare providers within or between facilities during implementation. In addition, educational approaches are the most commonly used strategy to overcome perceived EM barriers.^{20–22} The present study extended beyond previous perception surveys in the light of investigating educational needs, and these components could be directly applied towards developing programs for improving professionals' perceptions and knowledge, including nurses in Korea.

One major limitation of the present study was that it relied on self-report survey data; therefore, social desirability factors could have negatively influenced data quality. Furthermore, the individuals who agreed to participate may have generated a particular selection bias that hinders generalisability. Although the institutions of this study, particularly university-affiliated, tertiary hospitals, are positioned as a leading group in the introduction of EM in Korea, the environment of intensive care in other tertiary hospitals may have similar conditions. Therefore, it would be possible to generalise the findings of this study to other institutions in Korea. However, there could be limitations to the direct applicability of the current findings to other cultures and healthcare systems whose conditions and readiness would differ from those of Korea. Thus, additional multinational studies are needed to reflect ICU environments throughout Asia, where EM has recently been introduced and implemented.

As EM is a team-based intervention, there can be differences in perspectives among healthcare providers. Therefore, future studies need to include various healthcare professionals. Furthermore, EM is merely one component of the ABCDEF bundle. Therefore, studies that comprehensively consider the whole bundle are needed. Finally, the present study covered perceived barriers and a need for education as a solution for intervention implementation. However, recent studies have mentioned that perceptions should be measured using a minimum of two methodologies, particularly if

the intervention is focused on changing attitudes or perceptions.⁵⁰ Therefore, nurses' recognition should be analysed using various tools (i.e., structured interviews) in future studies.

5. Conclusions

Despite growing evidence as to the effects, safety, and feasibility of EM, various factors continue to hamper its implementation. Identifying such barriers is a critical step for successful and sustainable EM. The present study is significant in that it is the first to assess perceived barriers, as told by nurses, at this early stage of the EM introduction process in Korea. Of particular importance are attitude-related barriers, which were identified most frequently in the present sample. To overcome behaviour-related barriers, appropriate staffing and organisational efforts should be established to maximise service usage within intensive care nursing contexts. A lack of education is a significant barrier to EM implementation; therefore, customised programs led by critical care nurse educators should be designed based on components identified in the present study. In this manner, the present findings could be used to facilitate EM implementation for critically ill patients in Korea so as to further improve patient outcomes.

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Authors' statement

C.K. contributed to the conceptualisation and design; funding acquisition; research administration; acquisition, analysis, and interpretation of data; drafting of the manuscript; and final approval of the version to be submitted. S.K. contributed to the conceptualisation and design; interpretation of data; review and editing of the manuscript; and final approval of the version to be submitted. J.Y. contributed to the conceptualisation and design; interpretation of data; review and editing of the manuscript; and final approval of the version to be submitted. M.C. contributed to the conceptualisation and design; supervision of this study; interpretation of data; review and editing of the manuscript; and final approval of the version to be submitted.

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