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Questionnaires to Assess Facilitators and Barriers of Early Mobilization in Critically Ill Patients; Which One to Choose? A Systematic Review

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Abstract

Implementing and performing early mobilization is a complex process requiring multidisciplinary input and cooperation. To gain insight in its facilitators and barriers, various surveys have been developed. A systematic review was conducted, to identify the psychometric properties, feasibility and suitability of questionnaires to assess facilitators and barriers of early mobilization in critically ill patients. Data were extracted regarding a.o. definition of early mobilization, development, psychometric properties, content and themes, question format. The search identified 537 publications of which 13 unique questionnaires were included. The questionnaires showed wide variation in extensiveness of development. Only six questionnaires actually assessed validity and reliability. Which questionnaire to choose depends on the aim of its use, required level of detail and specifics of the ICU, though three questionnaires were recommended as their definition of early mobilization covered a broad range of activities, including nursing related mobility activities. International consensus on what constitutes early mobilization is desirable.

Keywords

intensive care, early mobilization, early ambulation, exercise, facilitators and barriers, perceptions, attitudes, survey

Introduction

In earlier days, bed rest was the standard prescription for critically ill patients, as this approach was thought to maximally facilitate healing processes. About two decades ago however, views started to change considerably as more and more evidence emerged that prolonged bed rest has many harmful effects (Brower, 2009; Knight et al., 2009). As a result, numerous mobilization programs for critically ill patients were developed and implemented in intensive care units (ICUs) all over the world (Zhang et al., 2019). By now such programs are accepted as a therapeutic intervention and studies showed that early mobilization can be applied safely (Liu et al., 2018; Nydahl et al., 2017). Evaluations showed that they were cost-effective by shortening the length of hospital stay (Engel et al., 2013; Higgins et al., 2019; Morris et al., 2008). Moreover, and more importantly, evidence was found that early mobilization programs resulted in individual improvement related to functioning such as less delirium, less ICU acquired muscle weakness and limited mental dysfunction (Kayambu et al., 2015; Schaller et al., 2016; Schweickert et al., 2009).

Taking all above into consideration, one would argue for implementing early mobilization programs for all ICU

patients in all ICUs, but this is not that simple; implementing early mobilization in an ICU is a complex process that requires, among other things, comprehensive patient coordination, as well as intensive training and multidisciplinary team cooperation (Gosselink et al., 2008; Hickmann et al., 2016). Additionally, the promotion and implementation of early mobilization necessitates insight in current procedures and opinions (Krupp et al., 2018). Above mentioned aspects go along with facilitators and barriers of early mobilization and therefore insight in these facilitators and

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barriers are necessary to implement or to evaluate early mobilization programs. It is important to note that a variety of professionals are involved in the care of critically ill patients and each of them can have different perceptions on early mobilization, and the facilitators and barriers that go with it (Clarissa et al., 2019).

A frequently chosen method to identify the facilitators and barriers of early mobilization in an ICU setting is conducting a survey. Various questionnaires are presented in literature, but no overview of their psychometric properties (Streiner & Norman, 2008) and similarities and differences on content and focus is available. Such an overview will enable those who intend to implement early mobilization or evaluate existing facilitators and barriers of early mobilization to choose a well developed and tested, valid, reliable and suitable questionnaire for their ICU setting. As in our case, a questionnaire to use in medium sized burn ICUs. Therefore, the purpose of the present review is to identify questionnaires to assess facilitators and barriers of early mobilization in critically ill patients and evaluate their psychometric properties, feasibility and suitability for a specific ICU setting.

Methods

Guidelines and Protocol Registration

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Moher et al., 2009) guided this systematic review.

Eligibility criteria. Studies were included if they were published in a peer-reviewed journal and reported on the development and/or adaptation of a questionnaire that specifically aimed to assess the facilitators and barriers of early mobilization in an ICU. There were no restrictions on year of publication, type of ICU patients or ICU types. However, qualitative studies were excluded. The presented questionnaire had to be available, or made available by the authors, or all questions of the questionnaire had to be present in the publication. Moreover, the publication had to be in Dutch, English or German.

Information sources and search strategy. A literature search was conducted using PubMed, CINAHL, and Web of Science. The search strategy combined four key words, namely; critically ill, facilitators and barriers, early mobilization, and questionnaire. For each key word, synonyms, related words, and subject heading terms were included. Search strategies were applied conform the requirements of the database (for a full description of the search strategy see Supplemental Appendix A). The last search was performed on February 12, 2019.

Study and questionnaire selection. After completion of the search, duplicates were removed and publications were screened for title and abstract for relevance (Y.D. and

L.J.M.). Publications and questionnaires were screened for relevance by two independent reviewers (Y.D. and L.J.M.). In case of discrepancies, this was resolved by discussion and, with remaining doubts, by seeking the opinion of a third reviewer (M.K.N.). Finally, full-text publications, as well as the corresponding questionnaires, were obtained. If questionnaires were not available, emails were sent to the authors.

Data extraction and analyses. Relevant data were extracted from publications and questionnaires. Elements of the extraction included: (i) general information and definition of early mobilization, (ii) description of the development and psychometric properties, that is, pretesting and pilot testing, face and content validity and reliability. To assess the feasibility and suitability of the questionnaires, the following data were extracted, (iii) number and content of the questions, (iv) question format, and (v) settings in which the questionnaire was assessed or tested.

Subsequently, pretesting, pilot testing, face- and content validity were rated. For these constructs the definitions of Burns et al. (2008) were used. Pretesting and pilot testing of questionnaires were rated as “yes” if a pre-test or pilot test was performed and rated as “?” when it was not clearly described what had been done. Regarding face- and content validity, each questionnaire could be rated “moderate” (+), “excellent” (++) or “unknown.” Rating for face validity was based on the involvement of experts (which, how many, and how), the testing phase and reliability testing. If experts were involved, pretesting and/or pilot testing were performed, this was rated “moderate” and “excellent” if experts were involved, both pretesting and pilot testing were performed and reliability was tested. For content validity the bar was set higher regarding the number and expertise of the experts and the thoroughness of the testing phase; it was considered “moderate” if experts were involved, pretesting and/or pilot testing was performed and “excellent” if they described the number of experts involved in the development, both pretesting and pilot testing was performed, clinical sensibility test was performed and if they tested reliability. “Unknown” was assigned if it was not clear what had been done in terms of validation.

Concerning the number and content of questions, questions were first classified according to which of the domains of facilitators and barriers they belonged to. These domains were “knowledge and view on early mobilization,” “current situation of early mobilization,” and “perceived facilitators and barriers of early mobilization,” as described in three recently published systematic reviews on facilitators and barriers of early mobilization (Costa et al., 2017; Dubb et al., 2016; Parry et al., 2017). Second, content was evaluated as the percentage of questions that focused on the different topics within the three domains.

Questions were also evaluated concerning their formats, that is, Likert-scales, VAS (visual analog scale), open-ended

questions, ranking questions, yes-no items, more answer checkboxes, matrix items, and one answer checkbox. If questions contained more than one sub-item to be answered, the question format was analyzed per sub-item, that is, items within one question that require an answering possibility.

For the context of the settings in which the questionnaire was used or tested, it was specified for which patient group(s), in which ICU (medical, trauma, neurological, pediatric, burn, or surgical), in which country, and for which disciplines (nurses, physiotherapists, occupational therapists, respiratory therapists, medical doctors or others) the assessment took place.

When a questionnaire was an adapted and/or modified version of another questionnaire, it was considered an unique questionnaire. In these cases, relevant information, for instance on development and testing, was extracted from the publication of the original questionnaire. Additionally, in case of different versions of one questionnaire, they were only analyzed separately if there were essential differences.

Results

Study and Questionnaire Selection

The searches retrieved 699 publications and after removing duplicates, 537 unique publications remained (Supplemental Appendix B). Screening titles and abstracts for inclusion criteria resulted in 35 possibly relevant publications, of which the full-text was read. Of these 35 publications, 19 were excluded for different reasons (Supplemental Appendix B). Screening the questionnaires of the 16 remaining publications, left 13 unique questionnaires due to duplication of questionnaires. These 13 questionnaires were included for data extraction.

Comparison of Questionnaires

General information about the questionnaires. Three of the 13 questionnaires (Anekwe et al., 2017; Kim et al., 2018; Koo et al., 2016) were adapted or modified versions from other included questionnaires and two questionnaires (Choong et al., 2013; Koo et al., 2016) were developed by one and the same research group (Table 1). All included questionnaires were published between 2013 and 2019 and developed in different countries (Table 1).

In five questionnaires (Anekwe et al., 2017; Choong et al., 2013; Goodson et al., 2018; Koo et al., 2016; Taito et al., 2018) a definition of early mobilization was given (Table 1). In five other questionnaires (Bakhru et al., 2015; Castro et al., 2015; Jolley et al., 2014; Joyce et al., 2018; Kim et al., 2018) this was not the case, although a definition could be retrieved from the accompanying publications. Whether in the latter cases definitions were provided to the participants, for instance in an accompanying information letter or letter of consent, was not clear.

The definitions that were available, differed from each other, though most contained a time and activity aspect. The time aspect was either related to a specific number of hours after ICU admission (Joyce et al., 2018) or after the start of mechanical ventilation, (Jolley et al., 2014) or to the health condition of the patient (Anekwe et al., 2017; Choong et al., 2013; Koo et al., 2016). In the latter case, the words “as soon as possible” were often used without further specification. The activity aspect was in terms of concrete activities, for instance getting patients out of bed, sitting on the edge of the bed or walking (Castro et al., 2015; Goodson et al., 2018; Kim et al., 2018; Taito et al., 2018) or in more general terms such as the current mobility status of the patient or the series of exercises performed (Anekwe et al., 2017; Bakhru et al., 2015; Koo et al., 2016). In the latter case, these definitions were limited to physical therapy practices. Five questionnaires provided a definition of early mobilization covering a broad range of activities, including nurse initiated activities related to patient mobility such as dangling, moving to a chair, or ambulating (Castro et al., 2015; Choong et al., 2013; Goodson et al., 2018; Jolley et al., 2014; Kim et al., 2018).

Development of questionnaires. Most questionnaires were developed by a team consisting of researchers and medical professionals (Table 2), though often it was not described precisely who had been responsible for what. For six questionnaires (Anekwe et al., 2017; Choong et al., 2013; Dafoe et al., 2015; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016) the number of people involved in the development was given exactly, ranging from 3 to 89 (Table 2), with five of them (Anekwe et al., 2017; Choong et al., 2013; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016) including a focus group. Although some questionnaires had an extensive development phase, none described the time needed for development. Comparing the literature that was used during the development of the questionnaires showed that especially the work of Cabana et al. (1999), Schweickert and Kress (2011), and Dubb et al. (2016) was often cited (Table 2). Apart from these, many other manuscripts (Bakhru et al., 2015; Hoyer et al., 2015; Jolley et al., 2014; Kim et al., 2010; Koo et al., 2016; Kress et al., 2000; Leditschke et al., 2012; Needham & Korupolu, 2010; Needham et al., 2010; Pronovost et al., 2003) were cited (Table 2).

The main themes underlying the questionnaires varied between the questionnaires, though the themes, “attitude,” “knowledge,” and “behavior” regarding early mobilization were frequently mentioned (Anekwe et al., 2017; Choong et al., 2013; Goodson et al., 2018; Jolley et al., 2014; Kim et al., 2018; Koo et al., 2016). Furthermore, in three questionnaires (Al-Nassan et al., 2019; Bakhru et al., 2015; Malone et al., 2015) the themes “staffing patterns,” “practices,” and “protocols” were incorporated.

Psychometric properties of the questionnaires. Eight of the questionnaires (Anekwe et al., 2017; Bakhru et al., 2015;

Table 1. General Information on Questionnaires to Assess Facilitators and Barriers of Early Mobilization in the Intensive Care Unit.

Name	Year	Authors, <i>n</i>	Special feature	Country	Definition of early mobilization and whether this definition was part of the questionnaire	
Choong et al. questionnaire	2013	9	In collaboration with Koo et al. (2016)	Canada	Mobilization that is initiated as soon as possible following pediatric critical care unit admission	Yes
Jolley et al. questionnaire	2014	4		USA	Any activity beyond range-of-motion performed by a care provider (nursing, physical, or occupational therapy) occurring within 48 hr of initiation of mechanical ventilation	No
Bakhru et al. questionnaire	2015	5	Additional info in Bakhru et al. (2016)	USA	A planned series of exercise of a patient in a sequence that begins at a patient's current mobility status and returns the patient to their baseline mobility status	No
Castro et al. questionnaire	2015	4		USA	Wide range of activities, from getting patients out of bed and into a chair, dangling patients legs at the side of the bed, having patients stand at the bedside, and ambulating patients	No
Dafoe et al. questionnaire	2015	3		Australia	n.m.	No
Malone et al. questionnaire	2015	6		USA	n.m.	No
Koo et al. questionnaire	2016	12		Canada	Progressively physical therapy and acute rehabilitation initiated as soon as possible following admission to the ICU, through a series of exercises that may begin while they are still receiving life support (i.e., mechanical ventilation)	Yes
Anekwe et al. questionnaire	2017	6	Adapted Koo quest.; four questions changed	Canada	Progressively physical therapy and acute rehabilitation initiated as soon as possible following admission to the ICU, through a series of exercises that may begin while they are still receiving life support (i.e., mechanical ventilation)	Yes
Goodson et al. questionnaire	2018	17	Adapted Hoyer et al. (2015) (PMABS) for ICU	USA	Getting patients out of bed or ambulating	Yes
Joyce et al. questionnaire	2018	9		USA	Implementation of therapeutic interventions aimed at ambulating patients within 72 hr of their pediatric ICU stay, including patients on positive pressure and mechanical ventilation	No
Kim et al. questionnaire	2018	4	Adapted and translated Hoyer et al. (2015) (PMABS)	Korea	A series of mobilization interventions applied to patients in phases ranging from range-of-motion, in-bed exercises to walking out of bed	No
Taito et al. questionnaire	2018	7		Japan	Joint range-of-motion exercises, neuromuscular electrical stimulation, respiratory muscle training, cycle ergometer that allows passive exercise in recumbent position, sitting in bed, sitting on edge of bed, sitting in a chair, standing out of bed, walking on the spot or walking	Yes
Al-Nassan et al. questionnaire	2019	5		Jordan	n.m.	No

Note. quest. = questionnaire; *n* = number; ICU = intensive care unit; n.m. = not mentioned; PMABS = Patient Mobilization Attitudes & Beliefs Survey.

Choong et al., 2013; Dafoe et al., 2015; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016; Malone et al., 2015) underwent a structured testing phase, including pretesting and pilot testing and a clinical sensibility test (Table 2). Face validity was excellent in six questionnaires based on the use

of the clinical sensibility format (Anekwe et al., 2017; Choong et al., 2013; Koo et al., 2016) or on experts performing a structured evaluation related to what the questionnaire intended to measure (Bakhru et al., 2015; Goodson et al., 2018; Kim et al., 2018). Five other questionnaires

Table 2. Characteristics of Development and Psychometric Properties of the Included Questionnaires.

Extra people involved during development				Literature background of development		Testing		Reliability		Validity				
Name	Year	N	Nurses	Therapists	Medical doctors	Other specialists	Literature used during development	Themes used in		Test-retest (Cohens kappa)	Interrater (Cohens kappa)	Internal consistency (Cronbach's alpha)	Face	Content
								questionnaire concerning early mobilization of critically ill patients	Pre- test					
Choong et al.	2013	89		x	x	x	Systematic search	n.m.	Knowledge and skills, perception and barriers, timing and practices	Y	Y	++	++	++
Jolley et al.	2014	n.m.	x	x	x		n=7	Cabana et al. (1999); Needham et al. (2010); Schweickert et al. (2011)	Knowledge of potential benefits, attitudes, and perceived barriers	?	Y	?	+	?
Bakhru et al.	2015	n.m.	x		x	x	n=7	Pronovost et al. (2003); Kress et al. (2000); Kim et al. (2010)	Practices, protocols, and barriers	Y	Y	+	++	+
Castro et al.	2015	n.m.	x		x	x	—	—	Mindset toward mobilizing patients receiving mechanical ventilation	?	Y	?	+	?
Dafoe et al.	2015	3	x	x	x		n=15	Needham et al. (2010); Leditschke et al. (2012); Schweickert et al. (2011)	Patient-related, institutional, and other barriers	Y	Y	+	+	+
Malone et al.	2015	n.m.		x	x		—	—	Staffing patterns, experience and training, pt consultation and perceptions of pt care	Y	Y	+	+	?
Koo et al.	2016	89	x	x	x	x	Systematic search	n.m.	Knowledge of ICU acquired weakness, perception, barriers, and practices	Y	Y	++	++	++
Anekwe et al.	2017	89					—	Koo et al. (2016)	Knowledge and skills, perception, barriers, and practices	Y	Y	++	++	++
Goodson et al.	2018	25	x	x	x	x	n=4	Cabana et al. (1999); Hoyer et al. (2015); Leditschke et al. (2012)	Attitude, knowledge, and behaviors	Y	Y	+	++	++
Joyce et al.	2018	n.m.	x	x	x		n=4	Dubb et al. (2016); Hoyer et al. (2015); Needham and Korupolu (2010)	Perceived benefits and barriers, beliefs and concerns	?	?	?	?	?
Kim et al.	2018	11	x	x	x		n=3	Cabana et al. (1999); Hoyer et al. (2015)	Attitudes, knowledge, behaviors, and educational needs	Y	Y	+	++	++
Taito et al.	2018	n.m.					n=7	Bakhru et al. (2015); Dubb et al. (2016); Jolley et al. (2015)	ICU practices, protocols, and implementation of elements of the ABCDE bundle	?	?	?	?	?
Al-Nassan et al.	2019	n.m.		x			?	n.m.	Staffing patterns, education and training, ICU practices, and barriers	?	Y	+	+	?

Note. N=total number of persons involved; n.m. =not mentioned; n =number; pt =physiotherapist; Y =yes; ? =unknown; ++ =moderate; ++ =excellent; ICU =intensive care unit; ABCDE =airway breathing coordination delirium early mobility and exercise.

^aValue is taken from the original questionnaire.

(Al-Nassan et al., 2019; Castro et al., 2015; Dafoe et al., 2015; Jolley et al., 2014; Malone et al., 2015) had moderate face validity (Table 2).

Content validity was excellent in five questionnaires, (Anekwe et al., 2017; Choong et al., 2013; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016) based on the involvement and number of content experts, clinical sensibility score, and extensive testing phase. One of these provided a content validity index (0.92; Kim et al., 2018). In two questionnaires (Bakhru et al., 2015; Dafoe et al., 2015) content validity was moderate, as experts had been involved but this was not extensively described and/or no reliability was tested (Table 2). The remaining six questionnaires (Al-Nassan et al., 2019; Castro et al., 2015; Jolley et al., 2014; Joyce et al., 2018; Malone et al., 2015; Taito et al., 2018) provided limited or no information about content validity.

Reliability measures were present in six questionnaires (Anekwe et al., 2017; Bakhru et al., 2015; Choong et al., 2013; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016). However, different measures for reliability testing were used: Cohens kappa (Anekwe et al., 2017; Choong et al., 2013; Koo et al., 2016) and Cronbach's alpha (Goodson et al., 2018; Kim et al., 2018) (Table 2).

Content of questionnaires. Of the 7 to 65 questions per questionnaire, 0% to 50% of them concerned personal (sex, education, year of experience) or hospital related (type of ICU, occupational rate, number of ICU beds) demographics (Table 3). Note that information on demographics might have been asked apart from the questionnaire.

None of the questionnaires covered all relevant topics, that is, knowledge and view on early mobilization ICU, the current situation of early mobilization, and the perceived facilitators and barriers. Six questionnaires (Anekwe et al., 2017; Bakhru et al., 2015; Choong et al., 2013; Goodson et al., 2018; Kim et al., 2018; Koo et al., 2016) covered most of the topics (Table 3).

All but two questionnaires (Castro et al., 2015; Jolley et al., 2014) addressed the current situation of early mobilization, while in the Malone questionnaire (Malone et al., 2015) this was the main focus. The topic "do you perform early mobilization" was covered in three questionnaires (Goodson et al., 2018; Kim et al., 2018; Taito et al., 2018).

In all questionnaires the institutional related facilitators and barriers were addressed, but this was not evenly distributed over the items culture, protocol, time of staff, equipment, training/expertise, and other facilitators and barriers (Table 3).

Feasibility: Number and format of the questions. The questionnaires contained 7 to 65 questions (Table 4). However, as questions often contained sub-items the total number of to-be-answered items per questionnaire was 7 to 205. In three questionnaires (Al-Nassan et al., 2019; Goodson et al., 2018; Malone et al., 2015) the time required to fill in the questionnaire

was given and ranged from 5 to 15 min (Table 4). Others did not report this.

In three questionnaires mainly one question format was used, that is, Likert scale answer possibilities (Goodson et al., 2018; Kim et al., 2018) or visual analog scale answers (Dafoe et al., 2015). In all others (many) different question formats were used, most often Likert scale, or check box answer possibilities (Table 4).

Suitability: Settings in which the questionnaires were assessed.

The number of ICUs in which the questionnaires were administered ranged from 1 to 500 per questionnaire. In case of more ICUs, these were in one (Choong et al., 2013; Koo et al., 2016; Malone et al., 2015; Taito et al., 2018) or more countries (Bakhru et al., 2015) and in one or more hospitals per country (Supplemental Appendix C). Most frequently, a questionnaire was administered in a medical-surgical ICU (Bakhru et al., 2015; Castro et al., 2015; Goodson et al., 2018; Jolley et al., 2014; Taito et al., 2018). Two questionnaires (Choong et al., 2013; Joyce et al., 2018) were specifically related to pediatric ICUs. Three questionnaires (Anekwe et al., 2017; Dafoe et al., 2015; Koo et al., 2016) were administered in many different ICU types, including medical and/or neurological ICUs. For three questionnaires (Al-Nassan et al., 2019; Kim et al., 2018; Malone et al., 2015) it was not mentioned in which type of ICU they were administered.

Suitability: Professionals involved in the assessments.

The respondents included in most cases nurses, medical doctors and/or physiotherapists. Four questionnaires (Anekwe et al., 2017; Choong et al., 2013; Jolley et al., 2014; Joyce et al., 2018) were provided to many different disciplines, that is, nurses, medical doctors, physiotherapists, and respiratory therapists. Two of the questionnaires were administered also to other disciplines, for example clinician technicians (Goodson et al., 2018) and speech therapists (Joyce et al., 2018). Two questionnaires were administered to specific disciplines only, that is, physiotherapists (Al-Nassan et al., 2019; Malone et al., 2015) or nurses (Kim et al., 2018). The response rate was between 29% and 96% (Supplemental Appendix C). Most frequently questionnaires were administered digitally.

Which questionnaire to choose. Combining the results on development, psychometric properties and content of the 13 questionnaires on facilitators and barriers of early mobilization in critically ill patients, six scored best; those of Choong et al. (2013), Bakhru et al. (2015), Koo et al. (2016), Anekwe et al. (2017), Goodson et al. (2018), and Kim et al. (2018). All of them presented a definition of early mobilization. These six questionnaires had all undergone an extensive development phase, had good to excellent psychometric properties and addressed (almost) all relevant topics. Of these six, the feasibility of the questionnaires of Goodson et al. (2018) and Kim et al. (2018) seemed very good, based

Table 3. Percentage of Questions in the Questionnaire That Include the Different Topics Concerning Early Mobilization.

Name	Year	Number of questions	Knowledge and view on EM				Current situation of EM				Perceived facilitators or barriers, institutional oriented					
			Demographics (%)	Definition of EM (%)	General knowledge of effects (%)	View on which patients should get what EM (%)	Is EM currently performed (%)	Do you perform EM (%)	Which discipline involved (%)	Culture (%)	Protocol focused (%)	Time of staff (%)	Equipment (%)	Training/ expertise (%)	Other F&B (%)	Others %
Choong et al.	2013	28	3.6	0.0	10.7	3.6	17.9	0.0	17.9	28.6	17.9	3.6	3.6	3.6	7.1	14.3
Jolley et al.	2014 pt	12	33.3	0.0	16.7	8.3	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	16.7	8.3
	2014 md	11	9.1	0.0	18.2	18.2	0.0	0.0	0.0	9.1	9.1	9.1	9.1	9.1	9.1	27.3
Bakhru et al.	2015	41	24.4	0.0	4.9	4.9	14.6	0.0	7.3	4.9	14.6	2.4	7.3	2.4	2.4	14.6
Castro et al.	2015	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.6	0.0	14.3	14.3	14.3	14.3	0.0
Dafoe et al.	2015	32	12.5	0.0	0.0	0.0	3.1	0.0	6.3	15.6	0.0	6.3	6.3	3.1	6.3	3.1
Malone et al.	2015	65	20.0	0.0	0.0	0.0	46.2	0.0	1.5	10.8	3.1	1.5	0.0	4.6	9.2	1.5
Koo et al.	2016	29	13.8	3.4	10.3	3.4	17.2	0.0	10.3	17.2	17.2	3.4	3.4	3.4	3.4	13.8
Anekwe et al.	2017	30	10.0	3.3	10.0	3.3	20.0	0.0	13.3	16.7	16.7	3.3	3.3	3.3	3.3	13.3
Goodson et al.	2018	30	13.3	0.0	3.3	6.7	3.3	3.3	6.7	3.3	3.3	13.3	3.3	13.3	6.7	16.7
Joyce et al.	2018	14	14.3	7.1	7.1	42.9	7.1	0.0	0.0	7.1	0.0	7.1	7.1	7.1	7.1	7.1
Kim et al.	2018	35	0.0	0.0	2.9	8.6	2.9	2.9	8.6	8.6	8.6	11.4	5.7	17.1	2.9	17.1
Taito et al.	2018	17	41.2	0.0	0.0	0.0	17.6	5.9	5.9	17.6	17.6	11.8	5.9	5.9	5.9	11.8
Al-Nassan	2019	26	50.0	0.0	0.0	3.8	0.0	0.0	3.8	11.5	0.0	7.7	0.0	19.2	0.0	3.8

Note. Note that if a question covered more topics, it was counted in all suitable contents, leading to a total of over 100%. EM=early mobilization; ICU=intensive care unit; pt=physical therapists; md=medical doctors; F&B=facilitators and barriers.

Table 4. Characteristics of the Question Formats Used by the Different Questionnaires

Name	Year	Assessment time in minutes	Number of questions			Number of questions and subitems per question format						
			Number of questions	To be answered subitems	Likert scale total (subitems)	Visual analog scale (VAS)	Open (ended) questions (subitems)	Ranking (subitems)	Yes-no, true-false	More answer check box (total answer possibilities)	Matrix (subitems)	One answer check box (total answer possibilities)
Choong et al.	2013	n.m.	28	196	3 (14)		1 (3)		1	6 (46)	1 (72)	16 (60)
Jolley et al.	2014 pt 2014 md	n.m.	11	25	10					1 (15)		
			12	15	11					1 (4)		
Bakhru et al.	2015	n.m.	41	114			13	1 (5)	14			84 (84)
Castro et al.	2015	n.m.	7	7	7							
Dafoe et al.	2015	n.m.	28	32		28	1 (2)					3
Malone et al.	2015	15	65	102	18		23 (25)		5	8 (43)		11
Koo et al.	2016	n.m.	29	203	4 (16)		1 (3)		1	5 (48)	1 (72)	17 (63)
Anekwe et al.	2017	n.m.	30	205	4 (16)		1 (3)		1	5 (47)	1 (72)	18 (63)
Goodson et al.	2018	5	26	30	26		2					2
Joyce et al.	2018	n.m.	12	51				2 (23)	7 (15)	2 (12)		1
Kim et al.	2018	n.m.	35	35	35							
Taito et al.	2018	n.m.	17	100			4 (6)	1 (32) ^a		5 (48)		7 (14)
Al-Nassan et al.	2019	10	26	26			7		2	1		16

Note. pt = physiotherapist; md = medical doctor; n.m. = not mentioned.

^aChoice of 32 barriers.

on the limited number of questions and short time to fill in the questionnaire. Feasibility for the four others can be classified as good, based on the response rates of the performed assessments, but these latter questionnaires do contain a (very) large number of (sub)questions and a large variation in question formats. Suitability of the questionnaires differed, of which the questionnaire from Choong et al. (2013) is specifically for pediatrics, and Koo et al. (2016) was the only one which was administered in a burn ICU. Moreover, the questionnaire from Kim et al. (2018) only involved nurses and all others involved different disciplines (i.e., nurses, physiotherapists, medical doctors). Which of the six best scoring questionnaires to choose depends on the aim, the ICU setting and which specialism is targeted. In view of the fact however, that their definition of early mobilization covers a broad range of activities, including nursing related mobility activities, three questionnaires are preferred (Choong et al., 2013; Goodson et al., 2018; Kim et al., 2018).

Discussion

This systematic review found that six questionnaires underwent a thorough development phase, showed good to excellent validity, provided reliability measures, covered all relevant content and seemed feasible. Between questionnaires differences existed for which disciplines and which specific ICU setting they were developed, which may influence suitability. In addition, it was found that questionnaires differed regarding the definition used for early mobilization with three of them covering a broad range of activities, including those routinely performed by nurses.

In the present comparison of the questionnaires, development and psychometric properties were taken as separate criteria, on which in the final advice relatively strong emphasis is placed. This was a deliberate choice as for producing questionnaires the development and testing phase is considered essential (Kelley et al., 2003). Moreover, it is important that the right concept is addressed and that the questionnaire will provide valid and reliable information (Mokkink et al., 2010; Paiva et al., 2018). We found however, that the description of the development of the questionnaires differed from being very complete to almost absent. This degree of description directly influenced the scoring of the psychometric properties. For instance, when it was clearly described that the development of the questionnaires included focus groups to generate relevant questions and also the method used to develop the questionnaire was clearly formulated, a high validity of the questionnaire was ensured, as validity depends on the opinion and involvement of experts, be it in a structural way (Burns et al., 2008). On the other hand, if the description of the development phase was almost absent and thereby no information was given on the involvement and contributions of experts this resulted in a low(er) validity. This finding emphasizes that a good description of how a

questionnaire is developed is essential to be able to judge the quality of a questionnaire.

We found that different definitions of early mobilization between the questionnaires, which is in line with the finding of the recently performed review of Clarissa et al. (2019). All found definitions included the word “movement,” “activities” or “exercises,” however, differences existed in the presence and description of the kind and intensity of movement as well as the timing of starting early mobilization. This has several important consequences. First, regarding kind and intensity of mobilization, definitions varied for all movements, including passive movement of the patient initiated by care providers, to only movement related to ambulation of the patient. It is likely that such differences lead to different content of questions about facilitators and barriers of early mobilization. For instance, questions about physiological instability would have other consequences when the definition included out of bed mobilization of mechanically ventilated patients compared to passive mobilization procedures only (Sibilla et al., 2020). Furthermore, nurses are involved in the early phase of ICU admission, and daily nursing procedures like wound care, patient positioning and bathing, as well as dangling at the bedside or ambulating, which is also part of standard nursing care, can be seen as nurse facilitated mobilization practices, and therefore defined as early mobilization based on the definition chosen (Engström et al., 2017). However, mobility practices which are part of standard nursing care are excluded by some of the definitions. This should be taken into account, when choosing a questionnaire.

Second, timing of mobilization was often not addressed, and if it was, there was no agreement on what constituted “early.” Sometimes “early” was related to the time of ICU admission. In some cases, a specific number of hours after ICU admission was added, which seems a reasonable objective description. However, descriptions like as “as soon as possible after ICU admission,” is not objective and thereby large differences could occur in the questions on facilitators and barriers, as well as on how different health care providers will answer these questions. In other definitions “early” was related to patient status, for instance being mechanically ventilated. We think that international consensus about the definition of early mobilization in kind and intensity as well as in timing is needed, to get a better insight in the meaning of early mobilization and thus, the accompanying facilitators and barriers. Moreover, an agreed definition will ensure better understanding and evaluation of mobilization practices in an ICU. Until then, when conducting surveys, it must be clear what is meant by early mobilization in that particular case.

In this review all questions and sub-items per questionnaire were classified in different content items. These content items were based on three recent reviews on facilitators and barriers of early mobilization (Costa et al., 2017; Dubb et al., 2016; Parry et al., 2017). However, during this process

it became clear that sometimes questions were placed within the same topic, while the intention of the questions differed. For example, in one case a question within the topic, “view on which patients should get what early mobilization,” was based on the statement that “increasing mobilization will be harmful to them.” Such questions reflect the attitude of the respondent regarding mobilization. Another question within the same topic, however was “what patients are included in the early mobility protocol,” this question will provide more factual information. The difference in how questions are drafted seems to reflect the different approaches that exist in assessing facilitators and barriers of early mobilization and more importantly, what the intended purpose of the questionnaire was. Some questionnaires intended to assess the actual information of mobilization as part of a quality improvement project. This approach will have led to more questions about the current situation of early mobilization. Others intended to assess the beliefs from the different disciplines and thereby used for example the attitude, knowledge, and behavior framework of Cabana et al. (1999). In these cases, the questions were more opinion- and less fact-oriented. So, the approach and purpose chosen will have influenced the questions within the questionnaire and even if questionnaires seemed to assess the same content, the information gained can be different. Therefore, we recommend to clearly relate the aim of research to the information to be obtained, to ensure that a chosen questionnaire addresses the issues one wants to clarify concerning early mobilization.

In our analysis of the questionnaires, the question format was also scored as part of feasibility. In the six questionnaires that scored best, the approach and goal of the questionnaire differed and with them the question format they used. Some questionnaires assessed barriers of early mobilization using multiple check boxes that cover all reasons for barriers. The use of such a format might influence feasibility because it takes longer to complete the questionnaire. However, the information obtained gives a better understanding of the background of the barrier. Such understanding is important because it can be essential in the multi-dynamic environment of an ICU where mobilization practices are complex, time-consuming and the point prevalence of mobilization is not that high (Berney et al., 2013; Brock et al., 2018). On the other hand, some questionnaires made use of less extensive formats, like Likert scales, which are known to be more quick and easy to use (Passmore et al., 2002). Using such question formats however, often does not provide an in-depth insight into the reasons why to mobilize or not. So, what format and which questionnaire to use, depends on the amount and extent of information one wants to obtain and the variability in opinions of the respondents that one wants to receive.

A variety of ICU settings was involved, for example, Medical-surgical ICU, Trauma ICU, Neurological ICU. The ICU for which a questionnaire was developed has implications for the suitability of a questionnaire in a specific

context; every ICU has its own patient specific factors and own contextual aspects, which are both related to early mobilization (Barber et al., 2015; Grol & Grimshaw, 2003). Additionally, two included questionnaires focused on pediatric ICUs (Choong et al., 2013; Joyce et al., 2018). It seems logical that such special context requires, at least partly, different questions on the facilitators and barriers of early mobilization. We would like to emphasize that when choosing the appropriate questionnaire to assess facilitators and barriers of early mobilization, it is important to screen for the one with the most relevant questions for a specific type of ICU, or maybe add specific relevant questions if needed.

We found that six questionnaires were developed to assess the facilitators and barriers of multiple different disciplines in performing early mobilization in critically ill patients. Insight in the differences in experience of the various disciplines involved in early mobilization has a clear advantage, as the facilitators and barriers can be divergent between disciplines (Nickels et al., 2017). Knowledge on the similarities and differences will be very helpful to come to an optimal multidisciplinary collaboration, which is crucial in the treatment and care of critically ill patients (Krupp et al., 2018). Other questionnaires (Al-Nassan et al., 2019; Malone et al., 2015) were specifically developed for physiotherapists. Focusing on just one discipline may provide deeper insights based on their specific expertise. However, with information of just one discipline, the overall team collaboration cannot be optimized.

To gain insight in the common thoughts and beliefs of the team about factors concerning early mobilization, we suggest to include all disciplines, albeit with also questions that are discipline specific.

Limitations

There were some limitations, first; the comparison of questionnaires is based on the questionnaire and the accompanying publication, however we had no insight in the cover letter and the accompanying information that was provided to the respondents. Had we approached all authors to provide us the questionnaire the same way as had the respondents during their study, we may have uncovered additional information, such as the time required to fill in the questionnaire or the underlying definition of early mobilization. Secondly, to describe the development and psychometric properties, we used the publication from Burns et al. (2008) which defines the different phases of the development of a questionnaire, that is, pretesting and pilot testing, face and content validity and reliability. However, it was not always possible to clearly distinguish and classify the phases of development and psychometric properties, due to the involvement of experts during the whole development process of a questionnaire (Mokkink et al., 2010).

Finally, to categorize (sub)questions on content, we used themes which emerged from three recent systematic reviews

about facilitators and barriers of early mobilization (Costa et al., 2017; Dubb et al., 2016; Parry et al., 2017). Sometimes it was difficult to categorize (sub)questions as they fell under multiple themes. In these cases, it was discussed between authors, but still in some cases an arbitrary choice between two categories had to be made. This will have slightly influenced the distributions between content categories, but certainly had no impact on the final conclusions.

Conclusion

The present thorough analysis enables an optimal choice between questionnaires when knowledge on facilitators and barriers of early mobilization in a specific ICU setting is needed. Such information is essential to implement or evaluate an ICU early mobilization program for example in a burn ICU.

For future studies we recommend that a definition of early mobilization is chosen which includes sort and intensity of activities as well as timing in terms of mentioning specific medical situations. Subsequently, clinical practice concerning early mobilization can be optimized by first assessing the facilitators and barriers of early mobilization present in a specific ICU situation by use of a valid and reliable questionnaire. We strongly recommend to include every discipline that is directly and indirectly involved with early mobilization.

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Supplemental Material

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