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What are the barriers to nurses mobilising adult patients in intensive care units? An integrative review

Abstract

Objectives

There is a need for early mobilisation of patients in intensive care units prevent acquired weaknesses which can have a long-term impact on health and quality of life. This need is not always fulfilled. We therefore sought to conduct an integrative review of international evidence to answer the question:

What are the barriers to nurses mobilising adult patients in intensive care units?

Review method used

We conducted a systematic search and thematic analysis. We were able to present a descriptive quantitative synthesis of the survey papers included.

Data sources

We searched CINAHL, MEDLINE and PsycINFO databases between 2010 and 2020 using search terms synonymous with intensive care unit and nurse and early mobilisation and barrier using Boolean operators and truncation. We completed backwards and forwards citation searches on included papers.

Results

We included seven papers which we synthesised into three themes and 13 subthemes as follows: i) organisational barriers (subthemes were staffing levels, time and workload, resources and care coordination), ii) individual barriers (subthemes were self and team safety, knowledge and training, beliefs about the consequences of early mobilisation, stress and other barriers) and iii) patient-

related barriers (subthemes were medical instability/physical status, patient safety, neurological deficits and sedation and non-concordance of patients).

Conclusion

Nurses' barriers were wide ranging and interventions to improve concordance with early mobilisation need to be tailored to address this group's specific barriers.

Key words

Adherence, Early mobilisation, Intensive Care Unit, Nurses, Quality Improvement

What are the barriers to nurses mobilising adult patients in intensive care units? An integrative review

Introduction

Mobilising patients in Intensive Care Units (ICUs) has many benefits, including preventing Intensive Care Unit Acquired Weakness (ICUAW), reducing the risk of delirium and length of stay in ICUs and hospital and reduced ventilation duration (1). Other benefits of mobilising include increased functional independence, walking distance, muscle strength and functional score (2). Lack of mobilising can result in up to 40% muscle mass loss in the first week and 1% bone density loss per week (3). A complication of being admitted into an ICU can be acquired weakness which presents as a persistent generalised, symmetrical, flaccid weakness, (4) leading to prolonged periods of recovery and hindering long term quality of life (5). Between 40% (4) to 65% (6) of those admitted will acquire some form of ICUAW. As a result, upon discharge from the hospital, most patients still have not entirely recovered physical function (7) and only 50% of patients with ICUAW made a full recovery after 12 months (8). Most patients who have a prolonged stay in ICUs will need physical rehabilitation on their discharge from the hospital (9). The most reliable intervention for preventing ICUAW and physical decline in ICU is Early Mobilisation (EM) (10). EM is defined for the purpose of this review as mobilising within the first two to five days after admission into intensive care (11). Passive mobilising includes turning and repositioning patients and active mobilising includes walking, standing, and transferring patients (12).

National Institute for Health and Care Excellence (13) states that assessments must be performed on patients at risk of physical and non-physical deficits in ICUs as early as possible and rehabilitation initiated as soon as clinically advised. This review will focus on adult patients (aged 18 years or above).

A multi-professional, multi-disciplinary approach to the mobilisation of patients in ICUs is needed to prevent ICUAW (1). However, systematic review evidence highlights issues with concordance for mobilising patients as it is the third most missed aspect of nursing care (14). There is a moderate amount of research on the barriers of EM, with some research suggesting that quality improvement projects may promote EM but few of these pertain specifically to nurses. Existing reviews on barriers to mobilisation (15, 16) do not specify barriers according to disciplinary or professional group. In order to design theoretically underpinned interventions (17, 18) tailored (19) according to specific need, it is fundamental to understand what the barriers are for nurses who are at the forefront of maintaining, assessing and promoting activities of daily living (which includes mobility) (20).

Our objective, therefore, was to address the question:

What are the barriers to nurses mobilising adult patients in intensive care units?

Methods

Methodology approach

Due to the nature of the question, we opted to conduct an integrative review, a comprehensive method allowing a range of methodological approaches to fully understand the area of interest (21). We followed the methodological approach outlined by Whitmore and Knafl (22), i) problem identification (nurses experience barriers to early mobilisation of patients in), ii) literature search, including all relevant literature on the topic of interest (illustrated in the methods section below), iii) data evaluation (assessment for methodological rigour according to the process identified in the section “quality assessment” below), iv) data analysis (data extraction (reported in the section of the same name below) and data synthesis (involving reduction (table 3), display (table 3 and 4 and figure 2) and comparison (within themes reported in the “findings” section below)).

Search Strategy

According to the Centre for Review and Dissemination guidelines (26), we conducted a systematic search and reported it according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (23). The Setting, Perspective, Intervention, Comparison and Evaluation (SPICE) framework (24) was used to develop search terms (table 1). We did not register our protocol.

Table 1: Search terms.

Setting		Population/ Perspective		Intervention		Evaluation/Outcome
intensive care* or ICU or critical care* or CCU	AND	healthcare worker* or nurs* or clinician* or Staff or professional*	AND	mobil* or ambulat* or walk*	AND	delivery of care or challeng* or issu* or obstacle* or difficult* or barrier*

Subject specific databases were explored; The Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE and PsycINFO using EBSCOhost as a platform. A limit of ten years was applied (2010 to July 2020) as ICU is a rapidly evolving area of practice. Boolean terms, including truncation, were applied, but MeSH terms were not used to prevent inadvertent exclusions. We completed a forward and backward citation search on included papers.

Study eligibility

Inclusion criteria included international peer-reviewed empirical research studies published from 2010 onwards. Table 2 presents all inclusion and exclusion criteria.

Table 2: Inclusion and exclusion criteria

Inclusion	Exclusion
Critical care or intensive care units	All other settings
Nurses (or where nurse specific data can be extracted)	Other professional and disciplinary groups
Articles published in or after 2010	Published before 2010
English Language	Written in languages other than English
Focused on ambulation and mobility	Studies focused on other nursing interventions
Peer-reviewed primary research	Opinions pieces, editorials, letters and protocols
The patient group is adults	Articles focused on children and adolescents

Study selection, data extraction and quality assessment

The article selection process is shown in figure 1 using the Preferred Reporting Items for Systematic Reviews, and Meta-Analyses flow diagram (PRISMA, (23)). Titles and abstracts were reviewed (MP), and a 10% sample reliability checked (JD). Full texts were agreed upon by the entire author team. Data were extracted according to the study question using the categories, i) first author and year, ii) aim, ii) setting and sample, iii) methods and iv) findings relating to the study question. We included papers with a range of practitioners, so long as we could extract data specific to only nurses. There were notable studies where this was not possible (e.g. (25, 26)). All included papers were assessed for methodological quality by MP using quality appraisal tools, Critical Appraisal Skills programme and Centre for Evidence-Based Medicine Critical Appraisal tools (27, 28). Only exceptions to data quality were reported (see table 4) and studies were not excluded based on the quality appraisal.

Data synthesis

Due to methodological heterogeneity, quantitative synthesis was not possible across all papers. However, six of the seven papers were surveys. Four of these articles presented both numbers of participants and/or percentages. Therefore, we were able to synthesise mean percentages across

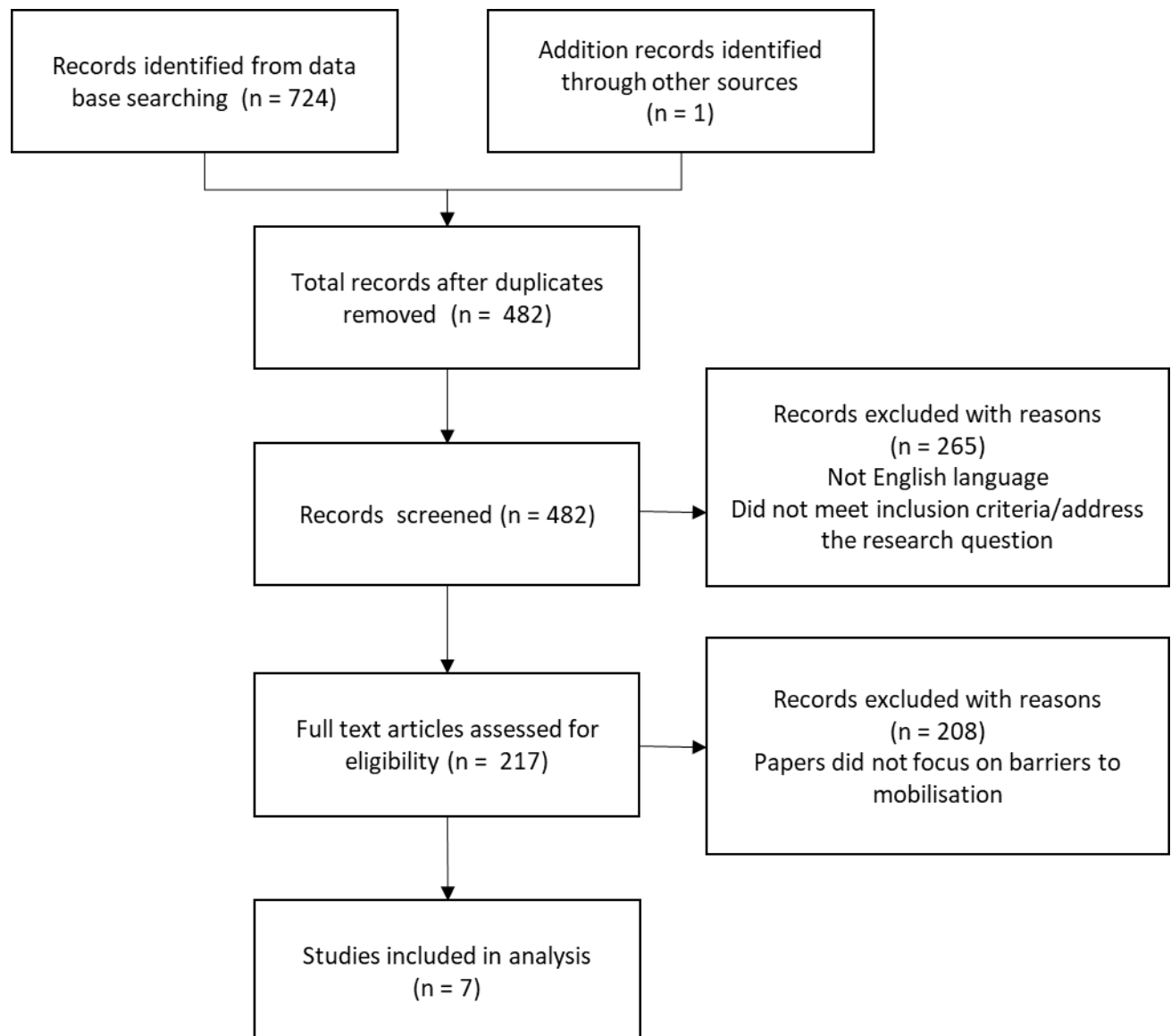
these papers according to the barriers presented (31-34), presented in table 4. The remaining two surveys (29, 30) presented mean Likert scores across questionnaire items. There was insufficient information to calculate the numbers or percentages of participants expressing barriers to each item. However, we combined the data in these two papers and presented results to allow a visual comparison in table 4. In all cases the Likert scores were 1 to 5 with 5 being the greatest perception of barriers.

Further to this, we undertook a thematic analysis following the six-step approach of Braun and Clarke (31) to include all papers. Data were analysed inductively. Where other professional or disciplinary groups are included in the studies, we presented data that relates only to nurses. MP and JD extracted and synthesised data.

Results

We examined a total of 482 titles, with 475 being excluded as not relevant to our research question. Seven papers were ultimately included. Reasons for exclusion were papers that did not focus on barriers and those where it was not possible to extract nurse data from other groups. Figure 1 outlines the study selection process.

Figure 1: Prisma flow diagram



Findings

Table 3 offers a summary of included papers. Table 4 presents a numerical synthesis of survey papers; we have included barriers in this table if measured by more than one survey. Thematic analysis resulted in three broad themes and 13 subthemes (illustrated in figure 2) which synthesises both qualitative and quantitative data. Themes were: i) organisational barriers (subthemes were staffing levels, time and workload, resources and care coordination), ii) individual barriers (subthemes were self and team safety, knowledge and training, beliefs about the consequences of

early mobilisation, stress and other barriers) and iii) patient related barriers (subthemes were medical instability/physical status, patient safety, neurological deficits and sedation and non-concordance of patients). Each of these are presented in turn after presenting a summary of study characteristics.

Study characteristics

There were six survey studies, including a total of 475 nursing participants (29, 30, 32-35). There was one focus group study involving 6 nurses (36). Studies from various healthcare systems were included in this review. Two studies were based in Australia (35, 36), one in Brazil (33), one in South Korea (30), one in Canada (32) and two in the US (29, 34).

Table 3: Summary of included papers

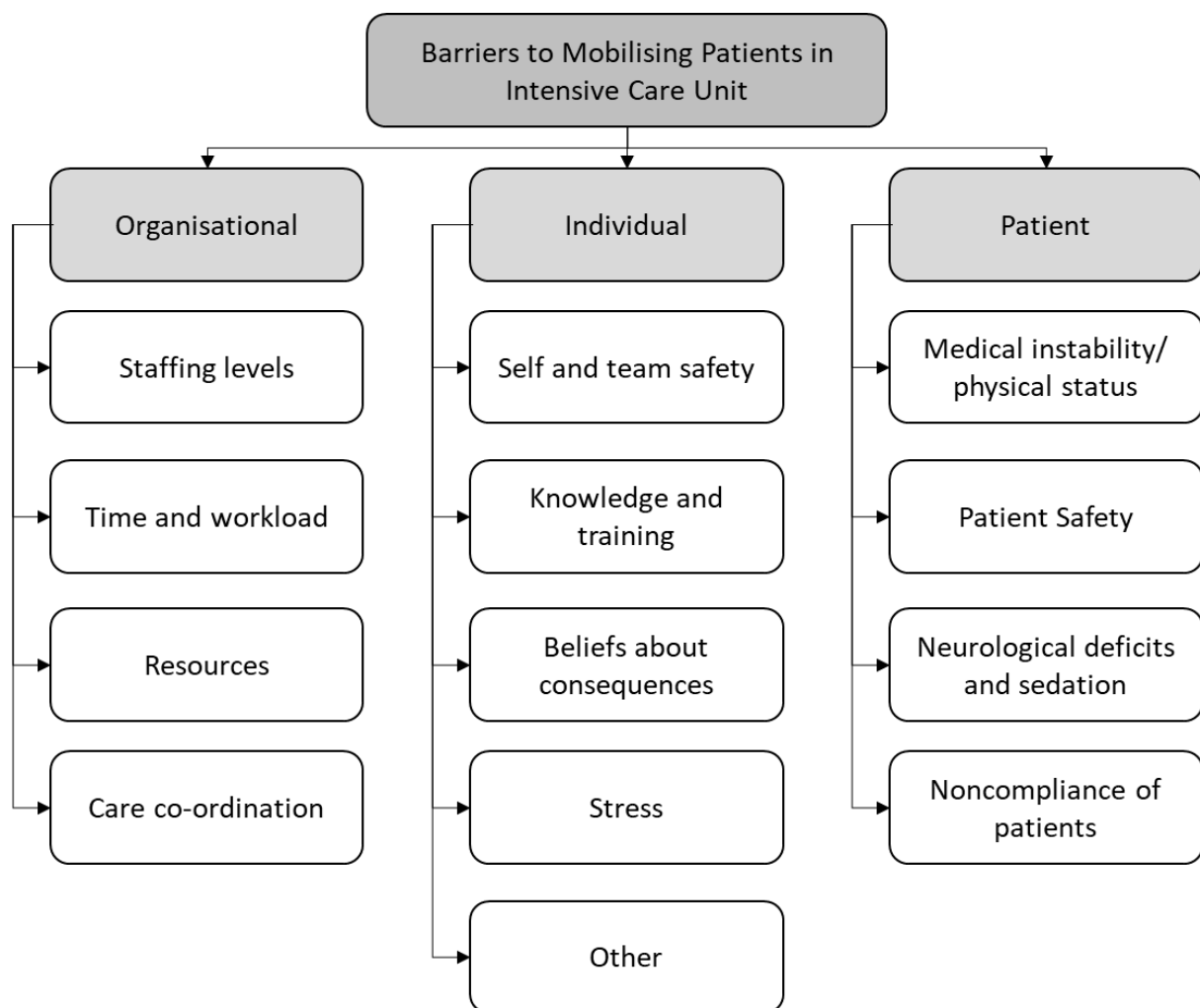
First author, year, location	Aim	Sample and setting	Methods	Main Findings	Strengths and Limitations
Anekwe 2019 (32) Canada	To establish compliance with and barriers and facilitators to Early Mobilisation (EM) of critically ill patients	155 survey responses including nurses (n=86) and nurse specialists (n=7) and other multi-disciplinary team members (n=62) at three university hospitals	Survey	Barriers included staffing levels (59%), lack of resources (70%), poor care coordination (60%), concerns about personal and team safety (60%), lack of knowledge (49%), lack of training (40%) and a patient's medical instability (90%), invasive lines (60%) and fear of dislodgement (60%) and neurological limitations or sedation (40%).	It is unclear whether the survey offered a comprehensive list of potential barriers
Barber 2014 (36) Australia	To establish the barriers and facilitators of early mobilisation in the (Intensive Care Unit) ICU	Medical doctors (n=12), nurses (n=6) and physiotherapists (n=7) from an ICU at a single hospital	Three qualitative focus groups, one for each professional group.	Barriers for nurses were the presence of an endotracheal tube, sedation, lines, low priority, poor communication and inadequate resources including staffing, equipment, training and increased workload.	Those conducting interviews knew some of the participants potentially introducing some social-desirability bias.
Fontela 2017 (33) Brazil	To investigate the knowledge, attitudes and barriers of nurses and other members of the multi-professional team in mobilising critically ill patients	98 survey responses including 61 nurses, 22 physicians and 15 physiotherapists across six ICUs in two university hospitals	Survey	Main barriers for mobilising patients reported by nurses were stress (59%), fatigue (49%), and musculoskeletal self-injury (52%). Other barriers were insufficient staffing levels (49%) and time (38%). There was no difference between responses according to length of experience between nurses.	Low response rate, only 21% of nurses responded. There was a potential for self-report bias. It was unclear whether the list of barriers presented in the survey was comprehensive.

First author, year, location	Aim	Sample and setting	Methods	Main Findings	Strengths and Limitations
Goodson 2018 (29) US	To evaluate a psychometric performance of mobility barriers in ICU instrument, identify baseline barriers and design a quality improvement project that targets mobilising barriers	155 survey responses including nurses (n=91) in one medical ICU	Survey	Nurses barriers were greater than other professional groups and included poor staffing levels (mean Likert score 2/5), inadequate resources (3.4/5), time constraints (2.8/5), lack of training (3.2/5), lack of knowledge on when it is safe to mobilise (3.9/5) high workload (2.2/5) and low confidence (3/5).	The potential for self-report bias, survey limited to one unit
Jolley 2014 (34) US	To identify the knowledge base and barriers to EM in ICU	120 survey responses including 17 nurses in one medical ICU in an academic medical centre	Survey	Most common barriers reported by nurses were risk of self-injury (71%), increased work stress (65%), lack of time (53%), lack of staff (47%), and workload (23%). Nurses demonstrated knowledge on the benefits of EM but considered the risks outweigh the benefits.	The low response rate for nurses (22%) and low numbers of responses (n=17)
Kim 2019 (30) South Korea	To identify critical care nurses' perceived barriers to mobilising patients in ICU	155 nurses responded to a survey conducted in seven hospitals	Survey	Barriers were knowledge (mean Likert score 4.3), heavy workload (4.3), thinking patients are too sick (3.6), lack of training (1.5), not enough time (4) and lack of equipment (3.6). Nurses with less experience identified greater barriers.	Potential for self-report bias
Lin 2019 (35) Australia	To develop and understanding barriers and facilitators to EM	82 participants, including nurses (n=65) in one ICU in a tertiary hospital	Survey	For nurses, the most significant barriers to mobilising patients were delirium (90%), being medically unstable (80%), sedated (73%) and their having limited amounts of time (61%).	As the survey was distributed by email, and participants identified there may have been some social desirability bias.

Table 4: Barriers for nurses to early mobilisation of ICU patients

	Barriers % (n)													
	Organisational				Individual						Patient			
	Staffing levels (nursing)	Time	Resources	Poor Care Coordination	Self and team safety	Workload	Knowledge	Lack of training	Beliefs about consequences of Early Mobilisation (EM)	Stress	Medical instability	Neurological/sedation	Intubation/dislodgement	Non-concordance of patients
Anekwe (32) (n=86)	59 (48)	28 (23)	70 (56)	60 (49)	60 (49)	-	49 (30)	40 (32)	40 (32)	-	90 (73)	40 (32)	60 (49)	-
Fontela (33) (n=61)	49 (30)	38 (23)	-	-	52 (32)	23 (14)	-	-	-	59 (48)	-	-	-	-
Jolley (34) (n=17)	47 (8)	53 (9)	-	-	71 (12)	47 (8)	76 (13)	-	18 (3)	65 (11)	-	-	-	-
Lin (35) (n=65)	71 (46)	61 (40)	32 (21)	57 (37)	33 (22)	-	-	-	40 (26)	76 (49)	80 (59)	73 (48)	44 (29)	-
Mean over all papers %	56	47	51	58.5	54	35	62.5	40	33	62	85	56.5	52	-
	Mean Likert (scale 1-5 with 1 being the least and 5 the greatest barrier)													
Goodson (29) (n=91)	2	2.8	3.4	-	2.5	2.2	3.9	3.2	-	-	2.8	-	-	2.8
Kim (30) (n=155)	4	4	3.6	-	-	4.3	3	1.5	-	-	3.6	-	-	2.8
Mean Likert over all papers (1-5)	3	3.4	3.5	-	2.5	3.2	3.4	2.3	-	-	3.2	-	-	2.8

Figure 2: Themes and subthemes relating to the barriers to mobilising patients in the Intensive Care Unit



Findings: Barriers to mobilising patients in the ICU

Theme 1: Organisational barriers

All included studies reported a range of organisational barriers. There were four subthemes.

Staffing levels

Between 47% (34) and 71% (35) of nurses expressed staffing levels to be a barrier and the degree to which it was a barrier identified as 2 (29) to 4 (30) on five point Likert scales. Respondents in the survey reported by Fontela et al. (33) suggest the high workload of the nursing team and the need for overtime may compromise the quality of mobilisation care offered. There was no difference in

the perception of nurse staffing levels being a barrier according to the experience of respondents in those papers where this was captured (30, 33, 34). Physiotherapist availability was another staff related barrier (32, 35) due to them being unavailable during evenings and providing only a limited service on weekends (32). Barber et al. (36) also identified staffing levels as a barrier and details included the need to have more than one person available at any one time which proved challenging and to have staff with the relevant skills was also identified as necessary.

Time and workload

Time was the most frequently reported barrier to mobilisation in several studies (29, 30, 32, 34). It is hard to establish whether this was related to competing priorities as reported in three studies (32, 35, 36), the impact mobilisation has on an already busy workload (29, 30) or whether attributable to poor staffing levels reported above or a low staff to patient ratio reported by Kim et al. (30). In two included studies (33, 35) over half of the nurses surveyed reported having enough time to mobilise patients at least once a day (62 and 61.5% respectively), although, in one of these nurses also reported the need to work overtime (33). In the nurse focus group reported by Barber et al. one participant said,

"I think the tone of this prioritisation suggests that we are all bubbling away under there thinking that we should be mobilising these patients more. But we have prioritised it lower than perhaps other things."

The time necessary for each mobilisation session was estimated to be between 16 and 45 minutes (34).

Resources

Although insufficient equipment and resource constraints were reported in five included studies (29, 30, 32, 35, 36), the survey studies were vague as to the nature of the equipment lacking with Lin et al. (35) reporting only "specialist equipment" and Kim et al. (30) specifying "equipment and or furnishings". Barber et al. (36) offered details as "manual handling equipment" and "equipment to

aid mobility" but equally having additional general equipment was seen as important too with one nurse reporting:

"Even having a permanent monitor down in the window bay there. You could walk along with a little "pleth" then plug them into a big monitor when you get there. . . . It's just little things like that I think would make life a bit easier."

Care Coordination

This theme relates to effective communication and coordination of care that supports the patients' mobilisation in ICU. This element varied in the degree to which it was expressed as a barrier considerably across studies. In one study, nurses agreed that they regularly discussed physical functioning of patients (Likert 3.3/5), that physicians gave appropriate orders about mobilisation (3.3/5), and that documentation about physical functioning was good (4.1/5) (29). However, in another study, nurses disagreed (3.26/5) that physical functioning was discussed among the multidisciplinary team (30). This is supported by findings of Anekwe et al., where 60% of nurses stated that there is a lack of coordination amongst providers, 38% reported poor communication at shift changes and 30% expressed poor communication during bedside rounds (32). In the survey reported by Lin et al. (35), 63.1% of nurse respondents said that mobilisation should occur automatically through nursing and physiotherapist protocol unless otherwise stated. In contrast, Anekwe et al. (32) found that nurses had no decision-making authority to mobilise patients. Barber et al. (36) emphasised the importance of team planning and the need for daily mobilisation goals.

A second factor acting as a barrier concerning care coordination was scheduling patient procedures reported in two studies. In one, 18% of nurses said that patient procedures was a barrier to mobilisation (34), in another 56.9% reported this as a barrier (35). In the survey by Fontela et al. (33), nurses and physicians were asked slightly different questions. Whilst we are not reporting

physician barriers, it is worth noting 55% identified lengthy nursing procedures as a barrier (that may well have been identified by nurses had they been asked).

Theme 2: Individual barriers

Self and team safety

Five of the included seven papers identified nurses' fear of injury to themselves or others as a barrier. Degrees of concern varied across papers from 33% (n=22) (35) of respondents who considered this to be a barrier to 71% (n=12) (34). Nurses in focus groups conducted by Barber et al. (36) identified both personal risk and limitations of training provided to address the risk as a barrier:

"We just sort of wing it. Our back smart training is only about how to move someone in the bed or use the hoist, it's not about how to get someone up or sit on edge of bed."

Knowledge and training

Another common barrier reported was lack of knowledge about a range of elements of mobilisation. A range of knowledge deficit was identified, for example, knowing when it is appropriate to mobilise an ICU patient (29, 30, 32, 35), the incidence of ICUAW (32), how to mobilise patients (36) and the mortality associated with ICUAW (32). There was less doubt on when to involve a physiotherapist or occupational therapist (29, 30). Nevertheless, barriers existed among some nurses in these studies. Most respondents understood the type of mobilisation necessary to maintain muscle strength (33, 34). When correlating nurses' perceived knowledge against knowledge test questions they believed they knew more than they actually did (32). However, many nurses identified training (29, 30, 32, 36) or experience (30, 32, 34) deficits. One study found a positive correlation between higher knowledge related barriers and less experience (29), and one found no such correlation (32). Finally, in one study, participants reported a lack of available early mobilisation guidelines/protocol (78%, n=119) (30).

Beliefs about consequences

There was a wide range of findings regarding the judgment of the benefits versus the risks of early mobilisation. When asked about the importance of early mobilisation in one study, only 18% of nurses judged it to be crucial and 37% very important (32). Two of studies reported that participants considered the benefits of early mobilisation outweighed the risks at 82% (n=42) (33) and 82% (n=14) (34), even when the patient is mechanically ventilated (33). In a third study just over half of the participants (50.8%, n=32) perceived the benefit greater than the risks and a two further studies presented mean Likert scale scores indicating nurses believed mobilisation would be harmful to patients to varying degrees (3.58/5 (30) and 2.9/5 (29)). The rationale for this was explicitly offered by Goodson et al. (29) where participants stated that patients were too sick to mobilise. This is further discussed below in the third theme, patient barriers.

Stress

Although there were no explanatory narrative, high proportions of participants in three studies identified excessive work stress as barriers to early mobilisation at 59% (n=48) (33), 65% (n=11) (34) and 76% (n=49) (35). One paper also cited “fatigue” as a barrier 49% (n=30) (33).

Other

A small range of other individual barriers was reported less frequently. These included having members of the team who do not support early mobilisation (23%, n=20) and conflicting perceptions on the benefits of and the best time to start early mobilisation between different members of the team (50%, n=43) (32). Where responses between groups of clinicians were compared in this study, there were many disparities in how soon to mobilise patients. Two studies identified a lack of confidence in nurses as barriers to mobilisation (mean Likert 2.9/5 (30) and 3/5 (29)).

Theme 3: Patient barriers

Medical instability and physical status

Four studies identified medical instability generally as a barrier to mobilising patients (90%, n=73 (32), 80%, n=59 (35) Likert 3.88/5 (30) and 2.8/5 (29)). Specific reasons (greatest first) included obesity (32%, n=26 (32)), patient frailty (18%, n=14 (32), mean Likert 3.6/5 (30)) and inadequate analgesia (17%, n=14 (32)).

Patient safety

This sub-theme included the perceived restrictions associated with mechanical ventilation, intubation and the dislodgement of other lines. Participants generally agreed that they would mobilise mechanically ventilated patients (92%, n=60 (35), 94%, n=16 (34)), however fewer would mobilise a mechanically ventilated patient if they were on vasopressor medication (43%, n=28 (35), 41%, n=7 (34)). The majority of nurses considered it within the scope of their practice to alter mechanical ventilation settings to facilitate mobilisation (75%, n=49, (35)). Intubation was cited as a specific barrier in three survey studies 15%, n=13 (32), 41%, n=26 (35) and in Barber et al. (36), despite acknowledging that an endotracheal tube was not a contraindication to mobilisation, they were perceived as a barrier. Invasive lines and the fear of dislodgement were barriers for 60% of nurses in one study (n=29, (32)). Nurses in the focus groups (36) identified femoral lines as a particular barrier and suggested:

"We could take lines out of patients much earlier than we traditionally have."

Neurological deficits and sedation

Cognitive impairment (20%, n=16 (32)) and delirium (90%, n=59 (35)), were all cited as barriers to mobilisation. Sedation too was cited as a barrier (73%, n=48 (35), 40%, n=32 (32)), however in one

study, 81% of nurses (n=53) said they would decrease sedation to facilitate mobilisation (35). For example, one nurses in focus groups (36) said:

“The culture of the way we use sedation. Years ago we used to use intermittent diazepam and morphine. And there was also a culture at that time where we did get patients out of bed and sitting up. . . but now we have continuous infusions of Propofol and whatever else and we don’t seem to be able to do it.”

Non- concordance of patients

The patient refusing to engage with mobilisation was a barrier identified in two studies with mean Likert scores of 2.8/5 (29) and 3.6/5 (30). No details were offered as to their reasons for declining mobilisation or any nursing strategies taken to support reluctance.

Discussion

Our systematic search of the literature identified seven papers that answered our question: what are the barriers to nurses mobilising patients in intensive care units? We identified i) organisational barriers including staffing levels, time and workload, poor resources and challenges with care coordination, ii) individual barriers consisting of self and team safety, knowledge and training, beliefs about the consequences of early mobilisation, stress and a number of other less frequently cited barriers such as lack of confidence and iii) patient barriers which were medical instability and physical status, patient safety, neurological deficits and sedation and non-concordance of patients.

Many of our findings are consistent with other reviews that do not specifically focus on nurse participants. In particular patient related barriers such as the patients’ physical status and institutional barriers such as lack of resources and time. These are widely reported and captured in reviews related to multidisciplinary groups of participants (3, 16). There were individual barriers in our review relating to nurses not identified elsewhere, particularly lack of confidence and the need

to work overtime. In the discussion sections of our included papers recommendations were made to address the barriers that their studies identified. These included educational interventions such as training to improve knowledge and help understanding of the benefits of EM, the best time to implement EM (29, 30, 32, 34), structural adaptations (e.g. EM multidisciplinary protocols) (30, 34) and daily discussions of targeted goals relating to nursing care implemented patient mobilisation (29). Whilst these interventions may address knowledge deficits, realign the perception of benefits over risks for nurses and go some way to supporting skills to manage medical instability, neurological deficits and sedation; they would not be effective in addressing other barriers identified for example stress, workload, available resources and concerns about the individual nurse's safety. Strategies to improve care that are tailored according to barriers are more effective (19) and this approach has been used extensively in acute care including ICU environments (37). In our included papers, only Lin et al. (35) suggest targeted interventions according to the professional group and their specific barriers.

Systematic review evidence demonstrates that interventions that are theoretically underpinned (38, 39) and tailored according to individual or group need are more effective than those that are not (19). The Theoretical Domains Framework (18) is a comprehensive framework derived from all behaviour models or behaviour changes that offer a comprehensive framework of the determinants to practice related behaviours. It has been used in a range of contexts to understand the barriers to optimal practice (including mobilisation (40, 41)), in a range of acute environments (including intensive care (42-44)). This framework allows mapping the most appropriate and effective techniques to support practice behaviours (45). Therefore, we would recommend that interventions to support nurses in the EM of ICU patients go beyond educational interventions and use this or a theoretical approach to understand local nurse barriers and underpin tailored interventions to support optimal care. We also recommend that support strategies to address individual or patient barriers take a include or take a "bottom up" approach (46, 47). ICU nurses have multiple demands

upon their time and priorities need to be set according to clinical need and outcomes in the moment. In terms of organisational barriers, for example staffing levels, time and workload, consideration of costs both human, e.g. morbidity and quality of life (2, 4), and financial length of ICU and hospital stay (1) may encourage budget holders to ensure adequate human resources if necessary.

Future survey research should consider the best questionnaire to use in terms of comprehensiveness and psychometric properties. A review by Dikkema et al. (48) identified 13 questionnaires to assess barriers and facilitators to early mobilisation, of which only 6 were assessed for validity and reliability. We further suggest that occupational group needs to be considered when selecting surveys; only three surveys identified by Dikkema et al. (48) specifically include nursing related mobilisation activities. Some of the barriers nurses and others experience may go under reported due to research bias such as social desirability (49) or cognitive biases such as automatic or logical versus actual reasons being offered (50). Whether survey or qualitative research, when practitioners are asked about their practice behaviours a theoretical approach and a full set of *potential* barriers (rather than barriers previously reported) needs to be offered to avoid biases (18). More extensive international surveys are needed to make meaningful comparisons according to healthcare systems; our results included only 475 survey and 6 qualitative participants and studies were restricted to only five countries. Beyond survey studies there is a need for qualitative research that investigates and leads to an understanding of the nuances of barriers experienced by nurses and implementation studies where strategies are designed and tested to address barriers.

There were a number of strengths and limitations to our review. Although some robust studies investigate barriers to mobilisation of adult patients in ICU for the multi-disciplinary and multi-professional teams (51), others conducting studies to compare barriers (52) and some considering interventions to improve mobilisation (53, 54) ours is the first study to synthesise the perceived

barriers for nurses in relation to early mobilisation in an integrative review. However, there was a dearth of relevant literature we included six survey papers and one qualitative study. Because of this heterogeneity of methods and because only two of the surveys included the same questions, quantitative synthesis was challenging. However, what we present demonstrates the breadth and extent of the barriers for nurses. It is possible that our search strategy did not identify all studies; this is mitigated by our systematic search and select procedures. We did not have the resources to include non-English papers in our review. Included studies were conducted in a range of countries (e.g. South Korea, Brazil, Australia) with different healthcare systems and health cultures; this compromises the potential application of findings and we therefore offer our recommendations tentatively.

Conclusion

Our review identified multifaceted barriers for nurses in engaging in the early mobilisation of patients in ICUs and barriers that have not been identified in other occupational groups, specifically, lack of confidence and the need to work overtime. Theoretically underpinned and tailored interventions should be developed and tested to address these barriers. Further research is needed for a deeper understanding of the nature and extent of these barriers.

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