

What factors affect early mobilisation following hip fracture surgery: a scoping review

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STATEMENTS

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RG conceived the article and performed the literature search. RG, KL and CW collected and interpreted the data. RG wrote the first draft of the paper. TS, KL and CW revised the first and TS, RD and CW the subsequent drafts. All authors contributed to interpretation of the findings and revised the manuscript for important intellectual content.

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Supplemental material

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ABSTRACT

Objectives

Identify and evaluate factors affecting early mobilisation by the day following hip fracture surgery.

Design

Mixed-methods, scoping review.

Data sources

MEDLINE, AMED, CINAHL, APA PsycINFO, APA PsycArticles, ISRCTN, Clinical Trials registry, and grey literature accessed in November 2022 with publication dates between 2001 and November 2022.

Eligibility criteria

English language publications that:

- (1) include patient populations who sustain a fragility hip fracture managed surgically
- (2) include patient populations who are mobilised out of bed by the day following their hip fracture surgery
- (3) report factors which influence the ability to undergo early mobility post-surgery

Data extraction and synthesis

One reviewer screened all titles and abstracts for inclusion. Two reviewers performed data extraction and quality assessments using the relevant Critical Appraisal Skills Programme tools and the Mixed Methods Appraisal Tool.

Results

3,337 papers were identified, of which 23 studies were eligible for review, representing 210,811 patients. Heterogeneity in the types of study included, the definition of early mobilisation and the outcome measures used precluded meta-analysis. Thirteen factors were identified as having an effect on whether people mobilise by Day 1 post

hip fracture surgery, grouped into five principal themes: (1) healthcare setting or worker-related factors; (2) patient psychological factors; (3) Acute patient health factors; (4) non-acute patient health factors; and (5) surgical factors.

Conclusions

There was a paucity of robust research investigating Day 1 mobilisation post-hip fracture surgery.

Each of the five factors identified are potentially modifiable through service improvement change and innovation strategies. There is opportunity to explore how service provision change could be implemented to improve outcomes for all patients following hip fracture surgery demonstrating the clinical and cost benefits of these changes against the cost of delivering the change.

Strengths and limitations of this study

A systematic search of eight major electronic databases and the grey literature reported per the Preferred Reporting Items for Systematic Reviews extension for scoping reviews guidelines.

The range of studies included allows a broad overview of the available evidence base including observational, mixed-method and qualitative research. This enables a review of the factors, extent, range and nature of the literature which has not yet been mapped and which is required to identify and analyse knowledge gaps.

Heterogeneity in the type of study, the definition of early mobilisation and the outcome measures used precluded meta-analysis.

This review only used one independent reviewer to screen all titles and abstracts for inclusion in the review and only included English language publications.

Key messages

What is already known on this topic – Delayed mobilisation following hip fracture surgery is detrimental to patients and health systems but despite established national guidelines and metrics promoting early mobilisation there is large variation nationally in achieving this. The factors affecting this variation have not yet been reviewed.

What this study adds – We identified five factors that impact on early mobilisation, highlighted a lack of inclusivity for patients with dementia and a lack of unified definition for early mobilisation in studies investigation early mobilisation

How this study might affect research, practice or policy – Three of the five factors identified: acute health factors, patient behaviour and healthcare worker behaviour, could be readily implemented into practice, such as education and training programmes to the wider MDT, to help reduce the variation in achieving this important metric

INTRODUCTION

Delayed mobilisation following hip fracture surgery is detrimental to patients and health systems with prolonged hospital stay [1] decreased function [2] and increased mortality [3-6]. There are established national guidelines promoting early mobilisation out of bed by the day following their hip fracture surgery, to improve survival rate and reduce the negative sequelae of prolonged bed rest [7-8].

The UK HipSprint audit in 2017 [9] found significant variation in practice. Sixty-eight percent of patients were mobilised out of bed by the day following their hip fracture surgery but seven percent of Trusts achieved this in less than half their patients [9]. It is important to gain a greater understanding of the reasons affecting early mobilisation after hip fracture surgery to help reduce this variation not only in the UK, but worldwide.

To our knowledge, no previous literature review has determined what factors relate to successful mobilisation out of bed by the day following their hip fracture surgery. The purpose of this scoping review was to identify and evaluate factors affecting early mobilisation which we have defined as “mobilisation by the day following hip fracture surgery”.

METHODS

A mixed-methods, scoping review was reported in accordance with the PRISMA-ScR guidelines [10] (Supplementary File 1). A scoping review is the most appropriate choice of methodology when identifying available evidence, clarifying key definitions, identifying key factors and knowledge gaps in the literature [11]. A scoping review was well suited to this work. Whilst evidence is available assessing factors which affect early mobility, the extent, range and nature of the literature has not yet been mapped and this mapping exercise is required to identify and analyse knowledge gaps.

Identification

A systematic search of: MEDLINE, AMED, CINAHL, APA PsycINFO, APA PsycArticles, was undertaken simultaneously using the EBSCOhost platform from January 2001 to November 2022. The final database search was completed on 1st

November 2022. Additional citation searching was undertaken by manually screening included articles reference lists. The full search strategy can be seen in Supplementary File 2. The search of ISRCTN registry, Clinical Trials registry, Google search engine, Chartered Society of Physiotherapy conference proceedings and professional contacts through Twitter were also completed on November 1st 2022. This search strategy can be found in Supplementary File 3.

Eligibility

The inclusion criteria were studies which:

- (1) include patient populations who sustained a fragility hip fracture managed surgically
- (2) include patient populations who were mobilised out of bed by the day following their hip fracture surgery
- (3) report factors which influenced the ability to undergo early mobility post-surgery

Since factors for enabling early mobilisation could be presented across both quantitative and qualitative study design, the following study designs were eligible for inclusion: qualitative, randomised controlled trials (RCTs), cohort, cross-sectional, and case-control studies [12]. Inclusion was limited to English language but there were no restrictions on country of origin of papers. The search was limited to studies published after 2001 as including just the last 20 years results in no loss of relevant studies compared to including the last 40 years [13].

Screening

One reviewer (RG) screened all identified titles and abstracts. Relevant full-text studies were obtained and reviewed for eligibility before being included. All data were extracted by one reviewer (RG) and independently peer reviewed (KL or CW) to challenge the extraction and creation of data points to improve validity.

Data were extracted from each eligible study. This included: number of participants, age, gender, presence of dementia or cognitive impairment, definition of early mobilisation, outcome measures, identified factors related to early mobilisation, and study quality.

Quality appraisal

The Critical Appraisal Skills Programme (CASP) and Mixed Methods Appraisal Tool (MMAT) were used to appraise the methodological quality of included studies (Supplementary File 4). The level of evidence in the evidence hierarchy was assigned to each paper [14]. This was undertaken by the first reviewer (RG) and independently verified by a second reviewer (KL or CW). Discrepancies between reviewers in respect to study eligibility, data extraction or methodological assessment were resolved through discussion until consensus was reached.

Data synthesis

Data were synthesised through a narrative analysis approach due to the study (e.g. audit, RCT, cohort) and population (i.e. perioperative pathway, comorbidities, and concomitant treatments) heterogeneity across included studies (Supplementary File 1: Table 1). This approach was used to determine what factors were associated with patients commencing early mobilisation following hip fracture surgery. Discussion on

the narrative analysis themes was made across the reviewers to ensure agreement of the origin and interpretation of these to the research question.

RESULTS

A summary of the search results is presented in the PRISMA flow diagram [15] (Figure 1). From 3337 citations, 23 met eligibility criteria and were included in the analysis [16-37].

FIGURE 1 - HERE

The characteristics of the included studies are presented in Supplementary File 5: Table 1. Data were included from 23 studies recruiting 210,811 patients. The average patient age was 81.9 years in the 17 papers that included this data [16-19, 21-24, 26, 27, 29-31, 35-38]. Seventy-three percent of patients were female, in the 19 papers that stated sex [17-27, 29-31, 35-38] and 38% of patients had dementia or cognitive impairment, in the 12 papers that included this data [19, 21-23, 27, 29-30, 34-37] (Supplementary File 5: Table 1).

A summary of the individual items from the critical appraisal evaluation is presented in Table 1. To summarise, the included studies consisted of two RCTs of moderate-quality [16, 17], two qualitative study of high-quality [36, 37], mixed methods study of high-quality [38] and 18 observational studies. Of these, five of the 13 prospective studies were of high-quality [19, 23, 24, 27, 30], and eight were moderate-quality [18, 21, 24, 26, 31, 32, 34]. Two of the five retrospective studies were of high quality [20, 22], two were of moderate quality [28, 33] and one was of low quality [29].

Table 1: Critical appraisal of included studies using CASP and MMAT appraisal tools

Author & Year	Study design	Level of evidence	Appraisal tool	Appraisal outcome* †											Overall appraisal score			
				1	2	3	4	5	6	7	8	9	10	11				
Rowlands, M. et al. 2018	Prospective single centre RCT	II	CASP - RCT	Y	Y	Y	N	Y	Y	CT	N	CT	N	N	Moderate			
Bielka, K. et al. 2021	Prospective single centre RCT	II	CASP - RCT	Y	Y	Y	N	Y	CT	CT	N	N	CT	Y	Moderate			
Bell, J. J. et al. 2021	Prospective audit	IV	CASP - Cohort	Y	Y	Y	CT	N	CT	CT	Y	Y	CT	CT	CT	Y	CT	Moderate
Said, C. M. et al. 2021	Prospective audit	IV	CASP - Cohort	Y	Y	CT	Y	Y	Y	Y	Y	CT	CT	CT	Y	Y	Y	High
Farrow, L. et al. 2020	Retrospective cohort	IV	CASP - Cohort	Y	Y	Y	CT	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
Snowdon, D. A. et al. 2020	Prospective Cohort	IV	CASP - Cohort	Y	Y	CT	CT	CT	Y	Y	CT	Y	CT	CT	N	CT	CT	Moderate
Ogawa, T. et al. 2019	Retrospective longitudinal cohort study	IV	CASP - Cohort	Y	Y	Y	Y	CT	Y	CT	CT	Y	Y	CT	Y	CT	CT	High
Munter, K. et al. 2018	Prospective observational cohort	IV	CASP - Cohort	Y	Y	CT	CT	Y	CT	CT	Y	Y	N	CT	Y	Y	Y	High
Buecking, B. et al. 2015	Prospective observational cohort	IV	CASP - Cohort	Y	Y	Y	Y	Y	CT	Y	Y	Y	CT	Y	Y	Y	Y	High
Kristensen, P. et al. 2014	Prospective audit	IV	CASP - Cohort	Y	Y	CT	CT	N	CT	Y	Y	CT	CT	CT	CT	CT	CT	Moderate
Dubljanin- Raspopovic, E. et al. 2013	Prospective cohort	IV	CASP - Cohort	Y	Y	Y	Y	N	CT	CT	Y	Y	CT	CT	Y	CT	CT	Moderate
Barone, A. et al. 2009	Prospective cohort study	IV	CASP - Cohort	Y	Y	Y	Y	CT	CT	Y	Y	Y	Y	Y	Y	CT	Y	High
Oluseye, T. et al. 2020	Retrospective audit	IV	CASP - Cohort	Y	Y	Y	CT	N	N	CT	Y	CT	N	CT	N	Y	CT	Moderate
Johansen, A. et al. 2017	Retrospective audit	IV	CASP - Cohort	Y	Y	N	N	N	N	CT	CT	N	N	CT	CT	Y	CT	Low
Ogawa, T et al. 2021	Prospective cohort	IV	CASP - Cohort	Y	CT	Y	CT	N	Y	Y	Y	Y	Y	N	Y	CT	CT	Moderate
Matharu et al. 2022	Prospective cohort	IV	CASP - Cohort	Y	Y	Y	Y	Y	Y	Y	Y	CT	CT	CT	Y	CT	CT	High
Gray, R. et al. 2021	Prospective audit	IV	CASP - Cohort	Y	CT	CT	Y	N	N	Y	Y	CT	N	CT	Y	Y	CT	Moderate
Halliday, R et al. 2021	Prospective audit	IV	CASP - Cohort	Y	Y	CT	Y	N	N	Y	Y	CT	N	CT	Y	Y	CT	Moderate
Buck, J. et al 2021	Prospective audit	IV	CASP - Cohort	Y	CT	CT	N	N	N	Y	Y	CT	N	CT	Y	Y	CT	Moderate
Foss, N. et al. 2008	Prospective audit	IV	CASP - Case control	Y	Y	Y	CT	CT	CT	CT	CT	CT	CT	N	Y	CT	CT	Moderate
Volkmer, B. et al. 2021	Qualitative, semi-structured interviews	VI	CASP - Qualitative	Y	Y	Y	Y	Y	Y	CT	Y	Y	Y	Y	Y	Y	Y	High
Southwell, J. et al. 2022	Qualitative, semi-structured interviews	VI	CASP - Qualitative	Y	Y	Y	Y	Y	Y	Y	CT	Y	Y	Y	Y	Y	Y	High
Haslam-Larmer, L. et al. 2021	Qualitative & quantitative	VI	MMAT	1.1	1.2	1.3	1.4	3.1	3.2	3.3	3.4	5.1	5.2	5.3	Y	Y	Y	High

* Questions 1-12 taken from CASP critical appraisal tools and questions 1.1 to 5.3 taken from the MMAT critical appraisal tool.

† Y = Yes, N = No, CT = Cannot Tell (taken from CASP and MMAT critical appraisal tools in supplementary file 4).

Thirteen factors, were identified. These were categorised into five overarching themes (Table 2).

Table 2: Range of factors which affect successful mobilisation out of bed by the day following hip fracture surgery

Factors affecting early mobilisation		Overall appraisal score*	
Theme 1: Surgical factors	Timing of surgery	Weekend admission [20]	High
		Weekend surgery [27]	High
		Time to surgery (WITH cognitively intact pts) [22]	High
		Time to surgery (WITH cognitively intact pts) [28]	Moderate
	Approach to surgery	High volume unit [25]	Moderate
		Mode of anaesthesia [16]	Moderate
Mode of anaesthesia [17]		Moderate	
Theme 2: Non-acute patient health factors	Age	Mode of anaesthesia [30]	High
		Age [18]	Moderate
		Age [19]	High
	Diet	Age [27]	High
		Obesity [18]	Moderate
	Previous function	Malnutrition [18]	Moderate
		New Mobility Score [19]	High
		Previous function (with pts with dementia) [22]	High
		Low pre-admission Barthel Index [23]	High
	Cognitive status	Low pre-admission Barthel Index [27]	High
Pre-admission function [38]		High	
Habitual cognitive status [23]		High	
Theme 3: Acute patient health factors	Mental status	Cognitive impairment [27]	High
		Cognitive status [38]	High
		Delirium [19]	High
	Pain	Confusion [19]	High
		Fatigue [23]	High
		Pain [23]	High
		Pain [26]	Moderate
	Medical	Pain [17]	Moderate
Pain [31]		Moderate	
Hypotension [19]		High	
Theme 4: Patient psychological factors	Patient engagement	Anaemia [35]	Moderate
		Medical unpredictability [38]	High
		High depression score [24]	High
		Patient declined [19]	High
	Patient understanding	Low patient & carer engagement [36]	High
		Self-determination [37]	High
Theme 5: Healthcare setting and/or worker related factors	Expertise in mobilisation	Reliance on professional support [37]	High
		Patient perception of early mobility [38]	High
		Manual handling risk/staffing [19]	High
	Multi-disciplinary team	No Physiotherapy assessment [29]	Low
		Type of clinical supervision [21]	Moderate
		Conflict in provision of best practice [36]	High
		Low MDT engagement [36]	High
		Healthcare workers attitudes and behaviours [37]	High
		Ward staff education [32]	Moderate
Ward staff education [33]	Moderate		
Ward staff education and confidence [34]	Moderate		
Engagement with service improvement [36]	High		

*High, moderate and low overall appraisal scores taken from Table 3 Critical appraisal of included studies using CASP and MMAT appraisal tools

DISCUSSION

Study Quality

The majority of papers were single site, observational studies and less than half were appraised as high methodological quality. This may limit the ability to demonstrate causality, and the heterogeneity of outcome measures and definitions of what constitutes 'early mobilisation' makes comparison between studies difficult. Peticrew et al. [39] state that methodology can be a weak influence on policy makers who do not always consider the strength of evidence, preferring to examine the strength of the signal or trend of the evidence. We would suggest that both a qualitative approach to identify these factor and clearer definitions of what defines early mobilisation in future observational studies may help to improve this issue.

Some of the barriers to early mobilisation such as age or previous function may be less impactful if all methods of transfer were included to enable patients to move from their bed to chair instead of some high-level definitions such as being able to mobilise five metres. By including all definitions of early mobilisation, and not restricting papers to those using the UK National Hip Fracture Database (NHFD) definition, [7] we may be incorrectly highlighting the importance of some of these factors in relation to our specific question. The definition of what "early mobilisation" entails needs further exploration in order to better measure this outcome [41].

Definitions

The universal definition of early mobilisation was not typically used by the studies in this systematic review. The universally accepted definition is provided by the NHFD, however only seven studies in this systematic review used this definition [28, 30, 32,

33, 34, 36, 37]. Others used the Cumulated Ambulation Score (CAS) [16, 22, 23, 31, 35] or their own self-defined criteria [17-21, 24, 25, 27, 29, 38]. This impacts the ability to identify barriers to mobilisation which is important because a barrier in one study which defines early mobilisation as being able to walk two meters, may not be a barrier in a study which defines the same as being able to hoist from a bed to a chair.

Five key themes were identified in this review; health care setting and/or workers, patient psychological, non-acute patient health, acute patient health and surgical factors. When considering the wider context of these themes, they essentially reside within the wider context of seven-day care services, workforce, training, metrics and conflict, and impact on clinical care provision.

Seven-day care services and workforce

There is a need for seven-day care services across the NHS, with benefits focusing on removing variation of outcomes, increasing patient safety and provision of quality care throughout the week [42]. This review's findings support the need for improved seven-day working and staffing to support this as inequalities remain. Early mobilisation is negatively impacted by weekend admission to hospital [20, 27] and pre-national holiday, i.e. bank holiday surgery was a significant predictor of non-compliance with early mobilisation [27]. Patients admitted on Thursday or Friday were significantly less likely to achieve early mobilisation compared to those admitted on a Monday (1.77 or 1.48 respectively). A reduction of available resources at weekends is cited as reason for the discrepancy [20, 27]. Further research is required to explore the potential causality of weekend surgery and reduction in out of bed statistics with a view to improving equity of care throughout a seven-day service.

Whilst it is in the interest of quality and safe care to develop a robust seven-day working service for the benefit of patients, the current workforce capacity and capability presents a challenge to allowing this to happen successfully [43]. This is important because a move to a seven-day service with no investment in staffing requires a reallocation of existing staff working hours between the week and the weekend, thus spreading the existing workforce thinly. In cases of sickness or annual leave, workforce numbers are further compounded leaving departments under-resourced [44].

There is a positive correlation between presence of physiotherapist and patients being more likely to be successfully mobilised earlier/early [29]. Patients not assessed by a physiotherapist were three times less likely to mobilise day one, than those who were assessed by a physiotherapist [29]. One reason for this could be perceived risk, as non-therapist staff perceived manual handling as one of the top three risks to mobilising patients in the first 48 hours post-surgery [19]. This may be due to perceived role, fear of mistakes/harm and litigation, and/or lack of confidence and competence in non-therapist staff. Post-operative mobilisation may be seen as a single profession activity by professions other than physiotherapists, rather than a 'care delivery' approach [36], which can negatively impact on early mobilisation in the absence of the physiotherapist [29]. Activities of daily living, including mobilisation, resides in the role of all health and care professionals. There is evidence suggesting a fear of litigation toward health care professionals [18], although the perspectives of staff and reasons behind it in isolation are unknown. There is evidence which suggests a fear of litigation toward the healthcare professional should a mobilisation error or injury occur, although

the evidence supporting this fear is unknown. These perceived risks may contribute further to the perception of mobilisation being beyond their job role or scope, and therefore remain a 'physiotherapist's task'. There was also limited data throughout this review for the treating therapists' experience levels,' limiting the ability to infer if this barrier is related to training or resource. Training and education of roles, remits, skills and theoretical knowledge are an important factor for a truly multi-disciplinary approach to supporting patients out of bed day one post operatively [36].

Our review did not reveal an impact of mode of anaesthesia on mobilisation by the day after surgery. A large, prospective cohort study using the National Hip Fracture Database (NHFD) data to identify the impact of either general or spinal anaesthetic found no statistically significant difference in Day 1 mobilisation rates between the groups ($p=0.156$) [29]. One RCT found no significant difference in rates of mobilisation between groups receiving femoral nerve block compared to titrated oral morphine ($p=0.76$) [15]. Another RCT did not statistically analyse psoas block with spinal compared to general anaesthetic [16]. However they did report a clinically significant difference in the ability to commence mobilisation out of bed the day after surgery between groups, with 13% in the psoas group mobilising compared to zero percent in the other groups [16]. Meta-analysis of the two RCTs was not completed due to the heterogeneity of the designs and measures used.

Training and education

The wider multi-disciplinary team (MDT) can influence the implementation of early mobilisation. Such support may be given in the form of training, providing it is specific to the perceived barriers/tailored to meet staff needs [45]. This review provides insight

into some challenges as viewed by staff groups, and can be used to investigate training needs at a local level.

Nurses for example tend to focus on patients “medical unwellness” [37] with their focus on maintaining medical stability. Clinical factors may however be potentially modifiable. For example, although there were no statistically significant findings to support this, hypotension [19] and anaemia [35] were identified as modifiable medical barriers to mobilisation. Where nurses are able to address modifiable clinical factors, they may be better able or more confident to mobilise patients early, or support the wider MDT to mobilise patients earlier by optimising potential medical barriers to achieving this. Qualitative or mixed-methods research is required to explore this further.

Patients’ also have negative perceptions of early mobility [38]. Many patients reported fearing damage, feeling overwhelmed and holding a belief that it was “too early” [37] and this was reflected in the behaviours of over 10% of patients who declined to engage with physiotherapy and did not mobilise [19]. If nervousness of a caregiver is combined with the reluctance of a patient to mobilise early, it may contribute to delayed mobilisation. Sixty-six percent of patients reported the importance of a positive outlook when dealing with early rehabilitation [38]. The importance of self-determination could be improved by giving individuals more information and greater feeling of control over their situation and environment through such interventions as goal setting. Early education and open conversation around the benefits of early mobilisation with both the patient and their caregivers are highlighted.

There was under-representation of those with cognitive impairment and, for those included, some comments were provided by family members as proxy [38]. This may not accurately reflect the experience of those with cognitive impairment who were included in this study. Although dementia and other habitual cognitive impairment affect a substantial proportion of the hip fracture population, these patients were omitted, or representation was unknown in thirteen of the twenty-one studies [16-18, 19, 24-26, 28, 29, 32, 33, 35, 37]. In those studies where they are included, early mobilisation is negatively impacted by the presence of a cognitive impairment ($p=0.01$) [27]. This is also the case when combined with low pre-morbid function ($p=0.01$) and when residing in a 24-hour care setting ($p<0.001$) [23]. Healthcare worker perception lent to considering those with cognitive impairment as more difficult to mobilise alone [38], and this perception of requiring two people before attempting to mobilise a patient could present an instant barrier, particularly in times of workforce shortage.

In the presence of delirium, patients are significantly less likely to mobilise in less than 48 hours when compared to after 48 hours post-surgery ($p<0.001$) [19]. This lack of early mobilisation correlates with previous findings related to the impact of post-operative delirium on functional outcomes [40], however due to the observational nature of the study, it is not possible to attribute causality. Studies in this systematic review [18] often did not collect details of pre-operative cognitive status or previous level of function, which may confound this variable as an independent factor for early mobilisation.

For junior physiotherapists, there appears to be a link between supervision training style and focus on early mobilisation [21]. Direct supervision is the provision of care

with both the junior and senior physiotherapist present. Indirect reflective supervision is a reflection between the junior and senior physiotherapist after the junior physiotherapist alone has provided the care. Where direct supervision is provided there is increased involvement and engagement in early mobility in supervised therapists [36] suggesting the importance of direct supervision and engagement to achieve successful engagement and clinical outcomes. This is worth considering when strategies are implemented to try and change the behaviour of the MDT in relation to early mobilisation.

Three conference papers in the past 12 months demonstrated how improved MDT awareness, training and engagement through the use of service improvement can positively impact on early mobilisation [32, 33, 34]. These papers used NHFD [7] and Hip Sprint [9] data to focus on reducing variation in early mobilisation through the use of healthcare assistant education, training and confidence [32, 34] and greater MDT emphasis on patient symptoms rather than objective measures alone, e.g. haemoglobin and blood pressure [33]. This may help to address the reported staff reluctance to engage in early mobilisation due to perceived “medical unpredictability” in non-symptomatic patients [38] or due to the perception that early mobilisation is the role of just one profession [29, 36, 38].

The need to provide training and collective action to engage the wider MDT in early mobilisation is essential [36]. Engagement at a system-level, which is perceived by clinicians as an insurmountable barrier, is required [36]. If achieved, this could help to accelerate better MDT awareness, training and engagement in a joined-up care delivery approach. The need to invest in resources, such as time for more direct

supervision, training and funding also needs to focus on physiotherapists themselves and not just the wider MDT.

Metrics and conflict

The desire or need to achieve key metrics and government set targets was noted in relation to performance and associated funding streams [21, 36]. The focus on targets directly conflicts with the ability to provide person-centred care [21, 36], particularly in the context of a depleted workforce. A physiotherapist achieving target numbers may result in a high number of patients seen, but a lower level of patient experience or time allocation. Conversely a physiotherapist who focuses on time and experience, may not achieve the target numbers.

A reduced rate of early mobilisation was noted in high volume (surgery) units, Relative Risk (RR) 0.89 (95% CI 0.85-0.93), with an increased rate in medium size units RR 1.09 (1.05-1.14) [25] compared to low volume units. Patient demographic information was lacking between the cohort groups and the definition of 'high/medium/low' volume units was not standardised. In these instances, it could be considered that one target is being met (surgery), whilst another (mobilising) is not. It can be easy to fall into a trap of 'blame' or negative culture and working environment where these conflicts exist, with staff challenging each other instead of the system. The healthcare worker or setting in which the healthcare is being provided makes this balance an act which directly impacts patient care and staff morale [36]. Embracing strategies for MDT designed service improvement may help to address all the above identified system barriers to early mobilisation.

We must also be clear that mobilisation by the day after surgery is only one component of established gold standard practice for this patient group [7, 8] and this package of best practice metrics requires organisational and MDT 'buy-in'. There may be conflict and resource constraints which impact on the overall achievement of the gold standard practice and not just early mobilisation by the day after surgery. This was outside of the scope of this review but not exploring this could be considered a limitation to the study.

Patient engagement

Southwell [37] found a strong reliance among patients for professionals to support and help to improve their recovery post-surgery. Resources and time available to support patients in the early stages post-surgery are being continually stretched but the important elements of education and empowerment are clearly needed and valued by patients. This will be an important consideration for clinicians and researchers to address, particularly as the reliance on advice was not restricted to allied health professionals such as physiotherapists but extended to the wider MDT [37].

Beucking et al. [24] found that higher score on the geriatric depression scale (GDS) was significantly associated to a reduction in the frequency of early mobilisation post-surgery ($p=0.012$). Depression has been reported to be associated with reduced engagement in physical activity [47]. Improved engagement and shared decision-making with patients can help to establish realistic expectations and engagement [36] suggesting time spent by healthcare workers to engage and empower patients may be an important factor to improve early mobilisation.

Limitations

Whilst offering new insights into the early rehabilitation of people following hip fracture, there are some key limitations. Firstly, all data were extracted by one reviewer (RG) due to time constraints but were independently peer reviewed (KL or CW) to challenge the extraction and creation of data points to improve validity. This may introduce selection bias. Secondly, we limited our inclusion criteria to English language due to resource constraints. This may limit generalisability and introduce publication bias through potentially omitting relevant non-English language publications.

There was also a limitation with how we operationalised our second inclusion criteria, “those mobilised out of bed by the day following their hip fracture surgery”. With the inclusion of studies where first mobilisation was recorded using CAS and therefore could have taken place after the day following surgery, this could be seen as a limitation of our review. However, by including these studies we were able to identify important factors which may have been omitted and could affect mobilisation within the first 48 hours, which are valuable learning points to support clinicians overcome barriers or enhance practice to enable initial mobilisation after surgery.

Finally, the results of this review, and the impact of early mobilisation on patient outcomes is just one part of a multi-factorial package designed to improve clinical outcomes and must be considered as this limits our ability to comment on the wider organisational context and factors related to the gold standard guidance for the hip fracture population that the early mobilisation metric is embedded within.

Future study

The lack of patients presenting with cognitive impairment in the included studies is an important consideration when interpreting the data and it will be important for future

studies to consider greater inclusion of this growing hip fracture demographic to improve generalisability to the whole hip fracture population. It must also be remembered that this is a complex patient population. Due to the age of this patient cohort, multi-morbidity is common [48] and likely to impact on all other factors identified in this review. The inclusion of many observational cohort studies makes it difficult to determine causality or inter-relatedness of factors. For example, two papers [29, 30] found that the presence of cognitive impairment alone does not significantly impact early mobilisation but when combined with low pre-morbid function there is a significant negative effect. The conduct of further studies using a qualitative, mixed method and randomised controlled trial approach would be beneficial to further explore this clinically important topic.

Sheehan et al. [1] recommend mobilisation within 36 hours should be part of the UK Best Practice Tariff to address the current delay seen in around 20% of hip fracture patients. This would add a financial incentive to the existing clinical benefits of achieving this metric [1-8] and makes the case for understanding the reasons this metric is not achieved even more important for healthcare workers, services and commissioners.

CONCLUSION

Five themes were identified; surgical factors, non-acute patient factors, acute patient health factors, patient psychological factors, and healthcare setting or worker related factors.

Each of these factors are potentially modifiable through service improvement change and innovation strategies.

There is an opportunity to explore how service provision change could be implemented at a regional and national level to improve outcomes for all patients following hip fracture surgery demonstrating the clinical and cost benefits of these changes against the cost of delivering the change.

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Supplementary File: Table 1

Author (s)	Year	Country	Study design	Number of participants	Patient characteristics			Definition of early mobility	Intervention/ comparison	Outcome measures	Factors affecting early mobilisation	Level of evidence	Overall appraisal score*
					Age (range)	Female (%)	Dementia (%)						
Rowlands, M. et al.	2018	UK	Randomised Controlled Trial (RCT)	118 patients	83.5 (79-90)	78.5	not provided	None given	Femoral nerve block vs standard care (titrated oral morphine)	Cumulated Ambulatory Score (CAS) & Cumulative Dynamic Pain Score (CDPS) Day 1-3	No significant difference in CAS scores between Femoral block group vs standard care, P=0.76	II	Moderate
Bielka et al.	2021	Ukraine	RCT	90 patients	Mean 72.3 (68-75)	71	Excluded	"getting to feet" on first day	Psoas compartment block Vs. Spinal Vs. GA	Mobilisation to feet by Day 1 post surgery	No statistically significant difference provided between groups. Clinical difference = Psoas block group 13% Vs. 0% mobilised to feet by first day post-surgery in other groups	II	Moderate
Bell, J. J. et al.	2021	Australia	Prospective audit	127 patients	Median 81 (48-97)	66.9	not provided	Transfer from lying to standing position AND walking >5m (with or without assistance)	Malnutrition, BMI	Factors that may impact mobilisation (<48hrs>48hrs)	Age OR 1.07 (1.02-1.12, (p=0.009) obesity OR 3.83 (1.48-9.88), (p=0.006) malnutrition OR 3.29 (1.05-10.31) (p=0.041)	IV	Moderate
Said, C. M. et al.	2022	Australia	Prospective audit	101 patients	Median 84 (78-88)	66	29	Minimum of step transfer from bed to chair	Mobilised within 48 hrs after surgery	Factors that may impact mobilisation (Multivariate Logistic Regression (n=96)) Barriers to mobilisation as identified by the physical therapist (Day 1)	Delirium OR 0.25(0.08-0.79) (p=0.019) New Mobility Score (NMS) OR 1.30 (p=0.012) <70 yrs old OR 1.72(1.07-2.76) (p=0.023) Confusion (n=15) Hypotension (n=14) Manual handling risk (n=12) Patient declined (n=11)	IV	High
Farrow, L. et al.	2020	UK	Retrospective cohort	15,351 patients	>50 yrs	71.6	not provided	Can include getting out of bed to use the toilet as well as more formal mobilisation	Day of admission	Not mobilised by end of first day post-surgery (Compared to Monday as reference)	Thursday OR 1.77, p<0.001, Friday OR 1.48, p < 0.001	IV	High
Snowdon, D. A. et al.	2020	Australia	Prospective Cohort	290 patients	82 (22-99)	71	31.7	Walking at least 5 metres	Level of clinical supervision: direct or reflective	Patient mobilised day 1 post surgery & patient assessed Day 1 post surgery	Patient mobilised POD 1: Direct supervision 35% vs 14% reflective supervision - OR 3.14 (1.41-7.01) (P < 0.005) Patient assessed POD 1: no sig difference	IV	Moderate
Ogawa, T. et al.	2019	Japan	Retrospective cohort	175 patients	Mean average 86 (65-100)	80.6 (77.7 early/88.9 late)	65 (69.2 early/53.3 late)	None given	Timing of surgery from admission- early (<24 hours) vs late (>24 hours)	CAS Day 1-3	Adjusted analyses - early surgery CAS scores (beta=1.36 (0.24-2.48)) (p=0.02). Adjusted analyses - Walking before injury (beta=1.76 (0.7-2.82)) (p=0.001) Multivariate subgroup analysis in presence of dementia = early surgery result maintained with Cognitively impaired (CI) patients (beta=2.59 (0.62-4.69)) (p=0.01) Multivariate subgroup analysis in presence of dementia - walking before surgery result maintained with patients with dementia (beta=1.92 (0.84-3.00)) (p=0.001)	IV	High
Munter, K. et al.	2018	Denmark	Prospective observational cohort	204 patients	Average 80 (72-87)	70	36	None given	Ability to mobilise/engage in physiotherapy	CAS & Patient reported limitation to early mobility & Physiotherapist reported limitation to early mobility	Primary limitations for independent bed transfer: Fatigue (no-subgroup associations) pain (associated with ASA score 1-2 > 3-4, cognitive status high/low, trochanteric-fem, neck, habitual cognitive status (particularly in association with # type fem, neck-troch, pre-fracture function low(NMS 0-6)>high(NMS 7-9), residence 24 hr setting-town score)	IV	High
Buecking, B. et al.	2015	Germany	Prospective observational cohort	392 patients	81 (80-82)	72	not provided	Ability to stand beside the bed without help	Ability to mobilise/walk/climb stairs	Stand after 2 days (Bivariate analysis)	Higher American Society of Anaesthesiologists (ASA) score (p=0.002) Lower pre fracture Barthel Index (p=0.006) Charlson comorbidity index (p=0.024) Low Mini mental state examination (MMSE) score (p<0.001) Pre-Fracture Geriatric depression Scale (GDS) (p=0.012)	IV	High
Kristensen, P. et al.	2014	Denmark	Prospective audit	12,065 patients	65-74 = 17% 75-84 = 40% 85+ = 43%	71.5	not provided	Assisting a patient from bed rest to walking or rest in a chair	Hip fracture patient volume: low, moderate, high	Being mobilised within 24 hours post operatively (Binary regression model)	High volume units had reduced chance of early mobilisation - RR=0.89 (0.85-0.93)	IV	A
Dubjarnin-Rasopovic, E. et al.	2013	Serbia	Prospective cohort	96 patients	78.3 (SD 7.45)	79.2	not provided	None given	Mobilised within 48 hrs after surgery	Being mobilised within 48 hours post operatively	ASA OR 3.82(1.18-12.41) (p=0.26) Visual Analogue Scale (VAS) pain OR 1.07(1.04-1.11) (p=0.00)	IV	A
Barone, A. et al.	2009	Italy	Prospective cohort	469 patients	84.6 (SD 7)	77.4	62.5 (cognitive impairment)	Weight bearing = ability to stand upright for at least 2 minutes. Ambulation = walked with assistance >5m	Mobilised within 48 hrs after surgery	Being mobilised within 48 hours post operatively	Age (p=0.01) Pre-holiday/weekend surgery (p < 0.001) AND OR 2.49 (1.06-3.99) (p<0.001) Barthel Index (p < 0.001) Cognitive impairment (p = 0.01)	IV	G
Oluseye, T. et al.	2020	UK	Retrospective audit	287 patients	not provided	not provided	not provided	NHFD definition†	Delay to surgery >48hrs after admission	Mobilised on the day or day after surgery	Delay in surgery = 77% achieved early mobility versus 92% with no delay to surgery	IV	Moderate
Johansen, A. et al.	2017	UK	Retrospective audit	64,922 patients	82.7	71	not provided	standing with or without aid or being hoisted to sit out of bed	Physiotherapy assessment by post operation day 1	Percentage mobilised by post operation Day 1	No Physiotherapy Assessment = 76.7% NOT mobilised by day 1 Physiotherapy Assessment = 24.4% NOT mobilised by day 1	IV	Low
Matharu, G. et al.	2022	UK	Prospective cohort	124,960 patients	Mean 82.7	71	35 (AMT<7)	NHFD definition†	general anaesthetic Vs spinal (with sedation) vs spinal (without sedation)	Mobilisation by day after surgery	GA Vs. Spinal anaesthesia = no sig. difference in mobilisation OR = 1.02, CI = 0.99-1.06 P = 0.156 GA Vs. Spinal anaesthesia (no sedation)= sig. difference in mobilisation OR = 1.06, CI = 1.02-1.10 P = 0.004. 6% increased odds.	IV	High
Ogawa, T. et al. 2021	2021	Japan	Prospective cohort	78 patients	87.25 (4.9-95.6)	90	mean 42.5	No specific definition Uses CAS	Femoral Nerve Block (FNB) provided in theatre Vs. Standard care (no FNB in theatre)	CAS Day 1 to 3 & 1-day CAS scores Day 1, 2 & 3	Significant difference CAS Day 1-3 (p=0.048, CI 0.03-2.74) AND CAS day 2 (p=0.049, CI 0.01-1.07) significant difference in sub-group (No dementia) CAS Day 1-3 (p=0.05, CI 0.05-4.10) No significant difference in sub-group (dementia) CAS Day 1-3 (p=0.62, CI -1.18-1.98) No significant CAS day 1 score (p=0.19, CI -0.18-0.89)	IV	Moderate
Gray, R. et al.	2021	UK	Prospective audit	431	No data available	No data available	No data available	NHFD definition†	Education programme delivered to ward HCAs Vs. standard HCA practice	Percentage of patients mobilised by day following surgery using NHFD standard	Healthcare Assistant (HCA) education = Pre-Intervention = 60%, Post-intervention = 76.7%	IV	Moderate
Halliday, R. et al.	2021	UK	Retrospective audit	122	No data available	No data available	No data available	NHFD definition†	Enhanced MDT awareness of early mobilisation Vs. standard practice	Percentage of patients mobilised by day following surgery using NHFD standard	Multi-disciplinary Team (MDT) awareness of mobilisation = Pre-Intervention = 61%, Post-intervention = 96%	IV	Moderate
Buck, J. et al.	2021	UK	Prospective audit	13	No data available	No data available	n/a	NHFD definition†	Education programme delivered to ward HCAs	Staff confidence in mobilising post operation Day 1	HCA education = Pre-Intervention = 63%, Post-intervention = 93%	IV	Moderate

									Vs. standard HCA practice				
Foss, N. et al.	2008	Denmark	Prospective audit	487 patients	82 (75-88)	26	not provided	None given	Haemoglobin levels post operation - Day 1 to 3	CAS - section 3 only	Anaemia POD 1= (p=0.048): No anaemia(%)=anaemia (%) = walking independently (16.5), with assistance (51.61), not able (33.34)	IV	Moderate
Volmer, B. et al.	2021	UK	Semi-structured interviews	21 Physiotherapists	Median 13 years' experience (5.5-16)	90.5	N/A	NHFD definition†	N/A	N/A	Conflict in achieving protocolised & personalised care Degree of patient and carer engagement Degree of multidisciplinary team engagement Importance of service improvement strategies	VI	High
Southwell, J. et al.	2022	UK	Semi-structured interviews	15 patients	mean 79.3 (over 3 age groups)	46.7	0 (excluded)	NHFD definition†	Patient perception of early mobilisation	N/A	Importance of self-determination (n=9). Reliance on professional support (n=10)	VI	High
Haslam-Larmer, L. et al.	2021	Canada	Quantitative, observational and activity analysis Semi-structured interviews	19 patients 10 healthcare workers (5 RN, 2 PT, 2 OT, 1 TA)	Average 83.2 (66-100)	74	32	Stand, pivot to chair, steps to chair, mechanical lift to chair	N/A N/A	Activity monitor data, Physiotherapy documentation	Pre-fracture function High NMS 2/12 (17%) not mobilised POD 1, Low NMS 3/7 (43%) not mobilised POD 1. Cognitive status "I wouldn't mobilise on my own" Healthcare workers attitudes and behaviours post # expectations Medical unpredictability focus on acute wellness Perceptions of early mobility - fear of damage,	VI	High

* High, moderate and low overall appraisal scores taken from Table 3 Critical appraisal of included studies using CASP and MMAT appraisal tools

† National Hip Fracture database definition "able to get out of bed by being helped to stand or being hoisted out of bed by the day following their operation"