Early Mobility After Fragility Hip Fracture: A Mixed Methods Embedded Case Study

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Abstract

Background

Following a hip fracture up to 60% of patients are unable to regain their pre-fracture level of mobility. For hospitalized older adults, the deconditioning effect of bedrest and functional decline has been identified as the most preventable cause of loss of ambulation. Participating in early mobility activities can decrease the overall length of hospital stay and aid in re-establishing a patients' functional status. Recent studies demonstrate that this older adult population spends greater than 80% of their time in bed during hospitalization, despite being ambulatory prior to their fracture. We do not fully understand why there continues to be such high rates of sedentary times, given that evidence demonstrates functional decline is preventable and early mobility recommendations have been available for over a decade.

Methods

A descriptive mixed method embedded case study was selected to understand the phenomenon of early mobility after fragility hip fracture surgery. In this study, the main case was one post-operative unit with a history of recommendation implementation, and the embedded units were patients recovering from hip fracture repair. Data from multiple sources provided an understanding of mobility activity initiation and patient participation.

Results

Activity monitor data from eighteen participants demonstrated a mean sedentary time of 23.18h. Median upright time was 24 min, and median number of steps taken was 30. Qualitative interviews from healthcare providers and patients identified two main categories of themes; factors that are external to the person (system, healthcare provider team, environment) and factors that are unique to the person (psychological and physical factors). Discussion There are multi-level factors that require consideration with implementation of best practice interventions, namely, systemic, healthcare provider related, and patient related. Recommendations are being sustained at the system level, and the unit has embraced a strong interdisciplinary approach. At the micro level, patients identify several factors influencing their participation, which ultimately demonstrates successful uptake of recommendations.

Conclusions

The study reports several variables to be important considerations for facilitating early mobility. Communicating mobility expectations and addressing physical and psychological readiness are essential. Our findings can be used to develop meaningful patient centred interventions to address these barriers.

Background

Following a hip fracture up to 60% of patients are unable to regain their pre-fracture level of mobility [1, 2]. For hospitalized older adults the deconditioning effect of bedrest and functional decline has been identified as the most predictable and preventable cause of loss of independent ambulation [3]. National and international hip fracture guidelines [4-6] recommend a number of interventions geared towards prevention of this hospital related functional decline, one of which is early mobility after surgery. It has been shown that early mobility can decrease the overall length of hospital stay and aid in re-establishing a patients' functional status and return to their pre-fracture environment [4]. Recent studies have showed that this older adult population spends greater than 80% of their time in bed during hospitalization, despite being ambulatory prior to their fracture [7-9]. We do not fully understand why there continues to be such high rates of sedentary times, given that evidence demonstrates functional decline is preventable and early mobility recommendations have been available for over a decade.

In 2011, an interprofessional team of health care providers at a large urban tertiary centre in Toronto, Ontario implemented the Bone & Joint National Model for Hip Fracture Care & Toolkit (2011) on one post-operative unit. The Hip Fracture Care & Toolkit was designed to standardize and disseminate hip fracture best practices across the continuum of care in all Canadian provinces [6]. Evidence outlines the multi-level factors requiring consideration with implementation of best practice interventions, namely, systemic (macro), healthcare provider related (meso), and patient related (micro) [10]. Subsequently, the unit's implementation strategies included systemic changes with the introduction of hip fracture specific nursing care pathways, pre-printed order sets for prescribers. There were a series of interprofessional staff education sessions, and patient education booklets to address meso and micro level factors. A recent chart review of the older adult hip fracture population on this unit [11] identified that early mobility activities are initiated in the first five days after surgery to varying degrees. Many patients did not participate in early mobility activities, with non-participation rates higher in those with a low pre-fracture functional mobility level and those with a cognitive impairment. The reasoning behind the lack of patient participation was not clear; health care provider behaviours appeared to be in line with recommendation utilization. The chart review failed to provide insight into any of the multi-level factors that influenced health care provider or patient behaviours.

Historically, the implementation of best practice recommendations has focused on changing health care provider behaviours. As identified, healthcare provider behaviours (i.e., early physiotherapy involvement) represent only one piece of the complex interchange between the system and patient. Exploration of other factors that may have an influence on the facilitation of activities and patient participation is required. Additionally, research that explores patient perceptions and attitudes about early mobility after surgical repair of their fracture is lacking. Weakness, pain, and fatigue have been attributed to be potential factors for the limited mobility tolerance of older adults during their hospitalization [12, 13]here is a paucity of data which explores other factors that may be associated with their low participation in mobility activities.

The presence of a cognitive impairment has been identified as a potential factor that deters patients from participating in early mobility activities. Up to 65% of hip fracture patients display some degree of

cognitive impairment (CI), yet these patients are traditionally excluded from research studies [14]. Previous research has identified that memory problems, poor insight, and loss of purposeful movements have been reported to be a barriers for individuals with cognitive impairment [15]. To date there is no study that examines the pattern of mobility activities for those with cognitive impairment during hospitalization among older adults with a fragility hip fracture.

There is a need to better understand the contextual factors which influence patient participation in early mobility activities, given the evidence of persistent high sedentary times in this vulnerable older adult population. As suggested, factors which can potentially impact a patient's participation are complex and multi-layered, including unit factors, healthcare provider factors and patient related factors. The purpose of this study is to a) describe early mobility activities on one post-operative unit with a history of recommendation implementation and b) identify locally specific contextual factors influencing participation in early mobility activities after hip fracture surgery.

Methods

A descriptive embedded case study using mixed methods was selected to understand the phenomenon of early mobility after fragility hip fracture surgery. A case study brings together multiple sources of qualitative and quantitative data to provide an indepth understanding of complex phenomena [16]. An embedded case study design enables the examination of multiple units of context within a single main case [17]. In this study, the single main case is the post-operative unit, and the embedded units are the patients (and their families) recovering from hip fracture repair. The patients are 'embedded' within the case study as recipients of recommendation utilization by health care providers. Obtaining data from multiple sources and key stakeholders provides us with the most comprehensive understanding of mobility activity initiation and patient participation on the unit.

Defining, Binding, and Selecting the Cases

Participants

Main Case Context

The study took place in a large tertiary care centre located in Toronto, Ontario. The hospital admits approximately 200 older adults with hip fracture per year [18]. As per Health Quality Ontario (HQO) recommendations [19], surgical repair of a fragility hip fracture occurs within 48 hours of patient admission [11]. The main case was purposefully selected as the unit where the majority of patients after hip fracture surgery are admitted.

Participants within the main case included the healthcare providers (HCPs) who are directly involved in mobilizing patients and familiar with the study population: physiotherapists, occupational therapists, therapy assistants, and registered nurses. The unit employs two physiotherapists, two occupational therapists, and one assistant who works with both therapists. There is a four to one patient to nurse ratio

during daytime hours. Written consent was obtained for the interviews by all healthcare provider participants.

Embedded units – Patient cases

The primary consideration for selecting an embedded patient case is to “maximize what we can learn” [16]. Cases should be a) relevant to the phenomena being studied, b) provide diversity across contexts, and c) provide opportunities to learn about complexity and context [16]. These attributes inform an understanding of the phenomena [17]. The embedded patient cases were bound by three criteria (time, activity, and place). First, the patients were adults 65 years or older, recovering from surgical repair of a hip fracture (consent obtained pre-operatively). Secondly, the surgical repair must have allowed for immediate post-operative mobility (weight bearing as tolerated). Thirdly, post-operatively, the patients had to be admitted to the post-operative unit of study (the ‘main case’). Resultant inclusion criteria included: adults 65 years of age or older, admitted for surgical repair of a fragility hip fracture, and able to independently ambulate prior to experiencing the fracture. Exclusion criteria were defined as older adults who were unable to walk independently before their fracture, those who had a traumatic hip fracture or suffered from a concurrent illness or trauma (such as a stroke), and those presenting to the hospital over 48 hours after experiencing the fracture.

To assess cognitive status, the Mini-Mental State Examination (MMSE) [20] was utilized at the time of consent. With the total score of 30 points, 24 points or higher is considered normal, 18-23 points represents mild cognitive impairment, and less than 17 points represents severe cognitive impairment [20]. To assess pre-fracture mobility function, we utilized the New Mobility Score [21]. For this study, we dichotomized the NMS groups – low and high. An NMS of 2-5 was categorized as low, and those scoring over six was categorized as high, or good pre-fracture functional ability [22]. Those with a NMS score less than 2 were excluded (unable to independently ambulate).

Patients admitted to the hospital with a hip fracture were screened in the emergency department by a research team. If they were deemed to meet inclusion criteria, they were approached by the study’s research assistant for written consent. If the patient had a physician documented history of delirium or dementia on their chart, the substitute decision maker (family) was approached for written consent. For all participants, family members were advised at time of consent that they could also participate in the interview. The consent included a statement that allowed for ongoing participation should delirium occur after surgery. Verbal consent was obtained again at the time of interviews.

Data collection sources

The phenomena of interest is the contextual factors which influence a patient’s transition from sedentary behaviour (e.g. bedrest, sitting) to participation in early mobility activities. We will be exploring this phenomenon using multiple data sources as outlined in Figure 2.

Main Case

Healthcare provider interviews

The aim of the interviews was to explore the influence of contextual factors on healthcare provider behaviours related to the ability to implement early mobility recommendations. Consequently, qualitative interview questions were informed by the Theoretical Domains Framework (TDF) [23] to identify influences on health care provider behaviour related to implementation of evidence-based recommendations. The TDF has been utilized to support health behaviour change interventions in healthcare providers and patients [24] and provides a good coverage of potential reasons for implementation problems [23]. We developed the interview guide to identify the level of HCP awareness of early mobility recommendations and understand how HCPs view their ability to implement recommendations within their clinical practice, including personal and environmental / contextual influences.

Unit documents

The unit's policies and procedures for care of patients recovering from a fragility hip fracture were reviewed. We reviewed the pre-printed order sets used by prescribers, the documentation tools utilized by healthcare providers, and the methods utilized for interprofessional communication. Additionally, we reviewed the patient education brochure. Starting on the first post-operative day, the booklet outlines the expected progression from sitting at edge of bed, to standing with walker, and mobilizing to bathroom as tolerated. It also notes that the expected discharge date is post-operative day five, to a rehab facility or to home.

Environment

The main case unit has 38 beds, with 20 patient rooms: 9 private, 4 semi-private, and 7 ward rooms. Unit room measurements were confirmed by therapists as distances are commonly referred to in narrative documentation: five metres is the approximate distance to the bathroom, with ten metres reflective of a trip to the bathroom then back to the bed. If able, patients ambulate in hallways with staff, family or alone, essentially doing 'laps' around the unit.

Embedded units – Patient cases

Patient interviews

The aim of the patient interviews was to explore perceptions of early mobility and understand contextual influences on patient mobility behaviours. For the purpose of this study, transitioning from sedentary behaviour (e.g. bed rest) to active physical activity after surgery was the behaviour we were interested in hearing about. The qualitative interview questions were grounded in the Capability, Opportunity, Motivation, Behaviour model (COM-B) of behaviour change [25]. This model proposes that behaviour change depends on an interacting system of these three components – capability, opportunity, and motivation. The model provides a basis for designing interventions aimed at behaviour change, and

aligns with the domains within the TDF framework [23]. Interviews took place at a time convenient to the patient and/or family member, prior to discharge. Each interview was recorded.

Observational data

Observational data was obtained for each embedded case and included daily behaviour mapping, and a review of the nursing Patient Care Record and therapy narrative notes for each day the participant was in the study. Quantitative data about physical activity was collected with the ActivPAL® wearable activity monitor. The ActivPAL® monitor has been found to be a valid and reliable measure of walking activity in community-dwelling older adults [8]. Using a triaxial accelerometer and embedded gyroscope, the ActivPAL® and accompanying software quantifies time spent lying, sitting, upright and walking time, number of steps per day, cadence, and the amount of sit-to-stand and stand-to-sit transitions [26]. The activity monitors were applied at time of consent in the emergency department and removed prior to discharge. Corresponding with the day of patient inclusion, the monitor was set to record for 7 days nonstop, with the device in a non-latex waterproof sleeve and attached by a Tegaderm® dressing, placed midline on the quadriceps region of the nonfractured limb.

We obtained approval from both the hospital Research Ethics Board and Queen's University Health Research Ethics Board.

Analysis

The overall analysis approach utilized pattern matching, which compares empirical evidence and predicted patterns to the study's findings [17]. The objectives and design of the study have been based on the following propositions (predicted patterns):

1. Unit implementation of best practice recommendations (guidelines) standardizes care for fragility hip fractures
2. A collaborative and coordinated effort between healthcare providers utilizing best practice recommendations for fragility hip fractures improves mobility related outcomes [27]
3. Immediately following hip fracture surgical repair in the older adult (>65), early mobility activities are limited

Quantitative

Patient characteristics are described using descriptive statistics, including means and standard deviations. Behaviour mapping and narrative observational data is described using medians with a minimum to maximum range. R statistical software was utilized for activity monitor analysis, inclusive of data for any full days (i.e. 24 hours) of movement activities commencing the first day after surgery (omitting pre-operative and intra-operative movement). For each patient, sedentary and upright times are described using means with a minimum to maximum range and standard deviations. Sit to stand transitions and steps taken are described using medians with a minimum to maximum range, as the data

were not normally distributed. The maximum achieved value is highlighted across all data points. Group patterns and variations between pre-fracture functional status and cognitive status are reported.

Qualitative

The qualitative data obtained is critical to assist in providing an explanation for the case study's propositions [17]. Interpretive description is an inductive approach designed to create a way to understand clinical phenomena [28]. Interpretive description acknowledges that there is a contextual nature to an experience that allows for 'shared' realities [28]. Capturing themes and patterns within the subjective perceptions of the participants allows for a generation of an interpretive description of the context at hand. The interpretive description approach yields 'constructed truths' about the phenomena of study [28].

All participant interviews were transcribed verbatim using Nvivo® transcription software, then checked for accuracy by the primary author. We followed the thematic analysis approach as described by V Braun and VLP Clark [29], including 1) familiarization with data; 2) generating initial codes; 3) searching for themes; 4) reviewing themes; 5) defining and naming themes; and 6) producing a report. Transcripts were read through several times (LH) to obtain a sense of the whole. LH, VD, and CD met to review transcripts and discuss the coding strategy and generate initial codes related to the study objectives. Nvivo® software was utilized to group higher order categories and subcategories and develop a main codebook of themes and subthemes. Themes were reviewed and revised by LH and VD.

Data integration

To demonstrate the case as a hospital unit, qualitative findings are presented with quantitative data. In our study, we sought to understand the contextual influences of the unit on an older adult's participation in mobility activities. We did this by listening to the perceptions of healthcare providers, patients, and their families. We analyzed the interview and observational data alongside the quantitative data to 'construct the truth' about early mobility activities after hip fracture surgery.

Results

Recruitment

Main Case - Healthcare providers

As there is a small number of therapists (five), we approached all of them directly to participate. We invited nursing staff to participate by attending daily nursing rounds and placement of study posters. The first author conducted individual face-to-face semi-structured interviews with consenting health care providers from May through to June 2019. There were ten individual health care provider interviews: two physiotherapists, two occupational therapists, one physiotherapy/occupational therapy assistant, and five registered nurses. All interviews were audio recorded.

Embedded cases – patients

Utilizing a convenience sampling approach, we screened 118 adults over 65 years of age admitted to the hospital secondary to a fragility hip fracture from November 2018 through to June 2019 (refer to Figure 1: Flow diagram). Fifty-four patients were not approached due to exclusion criteria; those with a traumatic / non-fragility fracture (n=21); patients who did not require surgical repair (n=9), those admitted over 48 hours from time of fracture (n=12), and those unable to walk independently prior to their fracture (NMS less than 2, n=12). An additional five patients were not approached due to timing; they were admitted and proceeded to surgery before the research team were advised of their admission. Sixty-three patients were found to be eligible and approached for consent. Thirty-eight patients declined - reasons for not participating included fatigue, participation in another study, and presence of a language barrier. Interpretation services were not available when they were required.

Twenty-five patient-participants consented to participate in the study. As the research focuses on one post-operative unit, patients that were transferred to another unit after surgery were excluded (n=6), leaving 19 patients for inclusion in the final analysis, of which six were identified to have a cognitive impairment. The percentage of those with cognitive impairment is representative of the people approached for consent (refer to Figure 1: Flow diagram). There was a total of eighteen patient participant interviews: thirteen with patients only, three with family members, and two with both the patient and family member.

Demographics

Main Case - Healthcare providers

Healthcare providers had all worked on the unit for over five years, with the exception of one therapist (one year). The nursing staff consisted of all registered nurses (no registered practical nurses). Six of the ten (60%) healthcare providers were female. We did not obtain in-depth demographic information about the healthcare providers.

Embedded cases – patients

Patient participants ranged in age from 66 to 100 years, with an average age of 83.2 years (SD 10.5) (refer to Table 1: Patient Demographics). Fourteen (74%) participants were female. Fourteen (74%) of the study participants lived within the community in an apartment/condominium (A/C) or multi-storey home (MSH). Only one participant with no cognitive impairment resided in a retirement home (RH) prior to the fracture. In Ontario, retirement homes are privately owned, renting accommodation to older adults who can live independently or with help, they do not provide 24-hour nursing care [30].

There were six patients (32%) with a cognitive impairment (two mild, four severe). The two with mild cognitive impairment resided in an apartment/condominium prior to their fracture. The four with severe cognitive impairment resided in a retirement home. In our cohort, cognitive impairment was associated with a low pre-fracture functional mobility; five of the seven (72%) patients with a low pre-fracture

functional mobility also had a cognitive impairment (Figure 5). In the high pre-fracture functional group (Figure 5), only one had a cognitive impairment, and it was 'mild'.

The mean length of stay (LOS) for the cohort was 11.4 days (SD=12.3). There was a significant difference (p=.0007) between the mean LOS in those with a high pre-fracture functional mobility of 4.9 days (SD=2.4), compared to the low group with a LOS of 22.5 (SD=14.7).

Quantitative data – Patient activity monitors

We obtained complete activity monitor data from eighteen participants (refer to Table 2: Activity monitor data). The mean length of activity monitor wear time was 3.78 days (SD 1.08). The activity monitor data demonstrates a high mean sedentary time of 23.18 h, ranging from 20.3 to 24 h (SD 1.54). The median maximum upright time (standing, walking) was 24 min (Range 0.5 – 625), and the median number of maximum steps taken was 30 (Range 0 - 3,762). Documentation was also reviewed to obtain a reported distance walked; the median maximum reported distance over the duration of stay was 12.5 m.

Integrated results

The qualitative interview analysis identified two main categories of themes; firstly, those factors that are external to the person (system, healthcare provider team, environment) and secondly, those factors that are unique to the person (psychological and physical factors) (Figure 3).

Main Case

Unit procedures

Upon admission to the unit, patients receive the hip fracture educational booklet by a member of the healthcare team. To aid in standardizing post-operative care, it is an expectation that prescribing physicians are to utilize the pre-printed order set specific to the patients recovering from hip fracture surgery. The order set prescribes full weight-bearing status immediately after surgery, and an order to 'mobilize within 12 to 24 hours post-operatively if medically stable then daily', with referrals to physiotherapy (PT). The nursing team communicates the referral request to the physiotherapy team via a clipboard system. The physiotherapists work seven days a week, and upon receipt of the referral, a member of the physiotherapy team assesses the patient on the first day after surgery, with the intent to mobilize as able. Occupational therapy becomes involved for those patients with any signs of cognitive impairment, also requested by a physician referral. The interprofessional team meets on a weekly basis to discuss concerns about patients and expected goals of care.

Healthcare providers

Attitudes & beliefs

Mobility as a priority

Healthcare providers articulated that they were aware of the existence of hospital based policies to promote mobility in the older adult population “we look beyond the hip fracture pathway, we also have the other senior friendly standards” (OT1). Mobility was recognized by many healthcare providers as being an important intervention to prevent poor outcomes: “….probably the most important thing out of anything… number one and most important treatment that we provide post-op” (PT1). If staff were unable to implement their full plan for mobility, they articulated that they would compromise with an alternative to promote some activity and upright time; “….if they’re too ill to actually engage… they can still be hoyered up to chair” (PT2). This statement was also reflected in HCP behaviours during the care of Patients 1, 14, and 19, who were mechanically assisted to chair as they were unable to stand or pivot themselves (Figures 4 and 5).

Staff articulated they prioritized their assessments and workload. Members of the team identified that the system is discharge oriented, with early assessments to enable rehab application completion. “Once the rehab application has been completed I’m not necessarily mobilizing them” (OT1). The expectation is that nursing or the therapist assistant will follow the recommended mobility activity plan until discharge. As a contrast, patients would be a lower priority for an assessment “if they’d been here a couple of weeks” (PT2).

Cognitive impairment

For those with cognitive impairment, staff articulated that a multi-disciplinary approach was required “I think if someone has a cognitive impairment I just wouldn’t mobilize them on my own” (RN1). In our cohort, by the fifth day post-operatively, only two of the four patients with a severe cognitive impairment (Patients 3, 9) had walked. Cognitive impairment was not always perceived to be a barrier by healthcare providers. Patient 9, a 90-year-old female with a severe level of cognitive impairment, was able to ambulate 5 m on the first day after surgery. “Sometimes they just have this automatic – they reach for the handles, and then, it’s more of an automatic thing” (PTA).

Pre-fracture levels of mobility

Healthcare providers articulated that they do expect a greater level of tolerance in those who are younger and/or have a higher pre-fracture functional ability. “If they’re mobile pre-op then the chance of getting them mobilized post-op is definitely higher . . . . I would expect better results in those who are more active pre-op” (RN3). Sedentary times of the twelve patients in the high pre-fracture functional group (M=22.9 h, SD =1.87) compared to the six patients in the low pre-fracture functional group (M=23.7 h, SD 0.50) were not significantly different p=.16. However, there was a significant difference in the maximum reported distances between these two groups; the high group was 36.5 m, compared to the low group at 5 m (p=.04) (Figures 4 and 5).

High pre-fracture mobility group (Figure 4): only one patient in this group had a mild cognitive impairment. Eight of the twelve patients (67%) within this group achieved their maximum activity on post-operative day two.

Low pre-fracture mobility group (Figure 5): five of the seven patients (72%) within this group also had a cognitive impairment; and all the patient participants with a severe cognitive impairment were in this group. The maximum achieved activity was 10 m, and not achieved until post-operative day five. Deferral of activity and non-participation was high in this group.

Environment

The ability to promote mobility is directly impacted by the room size, availability of equipment, and ability to leave the appropriate equipment at the patient's bedside when necessary. Healthcare providers reported navigating the equipment within the environment is a factor; "our room is set up in a way that's not conducive to a lot of mobility" (OT1), and staff often have to rearrange furniture in order to mobilize a patient. Multiple healthcare providers pointed out that the high-wheeled walkers are too large to fit into the bathrooms, thereby hindering the ability to incorporate mobility into a daily activity. Patients also indicated that they were intimidated by the amount of obstacles they would have to navigate "You couldn't walk around the room, there was all kinds of equipment, .. I couldn't get into the hallway" (Patient 7).

Embedded cases - patients

There were two main themes articulated by patients and providers which identify factors influencing participation: physical factors and psychological factors (Figure 3). Although these factors pertain to the patient, healthcare provider interview data were found to support patient perceptions.

Psychological factors

Fears

Healthcare providers and patient participants both reported that a fear of falling, fear of pain, or fear of reinjury were potential factors having an impact on the ability to participate: ". . . .pain control is the number one issue but then there's anxiety on top of that – sometimes they are just afraid to move" (PT2). Patient 25 shared "I was really sweating bullets…. I was in pain and nothing was moving and I was scared of damaging it". She was only able to ambulate 5 m on her second day, with her activity monitor reporting 72 steps taken.

Sense of loss

Some patients reported how experiencing a fall and fracture has impacted their future; specifically some patients talked about experiencing a sense of loss – a potential loss of ability, or change in pre-fracture functional mobility; for example Patient 7 stated "I couldn't do anything, you would sit and think of all the things you couldn't do anymore; I will never not be 'overwhelmed' at what has happened. I can see myself laying on that floor… I won't forget that easily". Her mobility was quite limited; her activity monitor demonstrated a maximum of 20 steps (Table 2).

Motivations

Patients often reported having a something in their life representing an incentive for a quicker recovery; sometimes these motivators were identified as ongoing responsibilities: Patient 8 stated “my main thinking is how can I manage my own problems and help my wife at the same time, that is my main concern”. Patient 25 was an early ambulator, she articulated that “I have to get back to being active very fast. I've got an unwell husband at home”.

Trust in healthcare providers

Patients reported that they felt the timing and duration of mobility activities was up to the healthcare providers, even if they felt they would have been able to tolerate more. As an example, Patient 4 stated “I thought I probably could have done more, but I didn’t know how much I should do, I left it to them”, she had a documented distance of 70 m on POD 2 with physiotherapy, but only 10 m the following day as she ambulated with nursing.

Physical factors

Medical instability

A patient’s medical instability was found to influence a healthcare providers’ decision to facilitate mobility. Healthcare providers stated “we have to focus more on acute illness first” (RN2) and often deferred mobility activities if they felt a patient was unstable or unsafe for transfer: “Safety wise . . . . just looking for a red flag” (PT1). In our study, six (32%) patients activities were deferred over the first two days - two patients (10%) deferred on the first day, and an additional four patients (21%) on the second day due to varying conditions (Figure 4, 5). Similarly, patients were reluctant to participate if the cause for the fall was an underlying medical condition – Patient 19 shared “ “I felt so weak, I had this vertigo for two or three days before I came in, …so I was still suffering from that”, resulting in her requesting to defer activities until her symptoms improved.

‘Needing time to recover’

Many patients articulated elements of this theme, stating that a hip fracture was a “serious injury” (Patient 22) and it would “take weeks to start feeling semi-normal” (Patient 25) and “will take longer than that to really get back” (Patient 23). They did not expect to be mobile in the first few days – “it would be a few days before I could do anything” (Patient 20). Patient 7 stated that she didn’t want to walk with her family – she said “Not yet - I want to be healed first”. Of the seventeen patients who did participate on the first day post-operatively, nine (53%) were able to walk to some degree; three (18%) took 4-5 steps, five (29%) were able to walk 5 to 10 meters, and Patient 6 was able to walk 120 metres (Table 3).

Discussion

Overall, our patient sample were observed to have a very high sedentary time (lying or sitting), with a mean of 23.8 h, and except for one patient, a small number of steps taken during the acute care stay. Similar to our activity monitor data, previous studies have informed us that hospitalized older adult patients spend the majority of their time in bed [7, 31, 32], yet there is a lack of evidence as to why there are such high sedentary rates. The unit of study was selected as there is a history of recommendation implementation. A previous chart review of the unit [11] identified an absence of the contextual factors which are required to identify the barriers to localized knowledge sustainability and subsequent meaningful monitoring of knowledge use [33]. Consequently, this study has attempted to better understand the multi-level factors which may influence both the provider facilitation and patient participation in early mobility activities.

Returning to the propositions, literature has demonstrated that at a unit level, implementation of best practice recommendations (guidelines) standardizes care for fragility hip fractures [4]. In 2011 the unit did implement the recommendations in their approach to standardization of care for patients with fragility hip fracture. It has been demonstrated through a review of the unit policies, procedures, and documentation that these recommendations are being sustained at the system level. The hospital has also adopted an older adult mobility program, promoted hospital wide, which staff referenced in the interviews. Having organizational support for early mobility is an important first step.

The second proposition identifies that a collaborative and coordinated effort between healthcare providers utilizing best practice recommendations for fragility hip fractures improves outcomes [27]. Older adults are at risk of a host of post-operative complications and functional decline secondary to bedrest [3]. As such, the promotion of physical mobility should ideally be an interdisciplinary goal-directed therapy to facilitate movement and 'improve' patient outcomes [34]. Since recommendation implementation, the unit has embraced a strong interdisciplinary approach the first two days after surgery, with therapy involvement required in addition to nursing. Staff providers stressed that they are aware of the importance of mobility after surgery – stating it is "one of the most important interventions we do post-operatively", a sentiment that has been recently echoed by nurses in a study by Ohlsson-Nevo et al [35]. Although our staff study participants articulated the importance of mobility, there was no consensus as to how frequent a patient should be participating in mobility activities, nor were they able to articulate what the expectations for mobility are. It has been identified that the international recommendations may not be specific enough to support mobility recovery [36]. As an example, the HQO (2017) recommendations do not provide details on the frequency or amount of mobility patients should receive during their acute hospitalization stay, nor do they identify outcome expectations prior to transfer to a rehab facility. With this resultant lack of clear mobility goals, it is difficult to communicate expectations to patients and family members.

Provider variables (Attitudes & Behaviours)

As seen in our study participants, the levels of activity do not progressively improve each post-operative day. It was articulated that the goal is to "make sure each patient gets that bit of activity every day",

essentially maintaining their earliest achievements until the patient is discharged to rehab; the ideology of mobility for 'improvement' of patient outcomes is not explicit nor expected. Nursing reported their primary activity goal of getting a patient out of bed and up to chair at least once daily, which literature describes as a low level of mobility [37]. Nursing staff participants articulated balancing workload and perceived time required as a limitation to walking patients, a finding echoed in other studies [37].

As a prioritization point in our study, health care providers articulated that they "focus more on acute illness first" and deferred mobility activities until medical stability could be achieved. In the first two post-operative days, six (32%) of our study patients had their mobility deferred; making this a potential area for behaviour change interventions. Safety concerns are not uncommon, in a critical care study, nurses identified that patient safety concerns such as hemodynamic instability, orthostatic hypotension and fear of falling or injury represented the most significant barrier to mobilization [38]. Kimmel et al [39] demonstrated that an intensive physiotherapy program for hip fractures is safe and can reduce length of stay. For those who are more acutely ill, data from critical care studies that identify mobilization activities can be safe and feasible in more acutely ill critical care patients, with a relatively small number of adverse events reported (<1%) [40].

Several participants had a low pre-fracture functional mobility, and had a lower reported distance walked of 5 m compared to that of the high function peers at 36.5 m. Staff members did articulate that if they were mobile pre-operatively that "chances of them getting mobilized post-op is definitely higher", which may indirectly place those with low pre-fracture mobility at a higher risk of being a lower priority for mobility efforts. Unfortunately, patients that are not on the care pathway due to illness or complications were also identified as a lower priority, potentially placing them at greater risk of further complications. It is this population – those who are initially deferred secondary to medical instability, and subsequent prolonged periods of bedrest that have longer lengths of stay and are at highest risk of institutionalization secondary to functional decline [3].

The final proposition is an acknowledgement of the literature that identifies immediately following hip fracture surgical repair in the older adult (>65), early mobility activities are limited [8, 9, 41]. Having a system which supports early mobility activities, and healthcare providers that understand the importance of mobility ensures a framework is in place for patient participation. However, at the micro level, it is ultimately patient participation in these mobility activities which demonstrates successful uptake of recommendations. Our patient interviews help to provide a contextual understanding of their experience and perceptions of what they believe is expected for their recovery.

Patient variables (Fears, tolerance, trust)

Brown and colleagues [12] point out that patients themselves often assume bedrest during hospitalization is a necessity, which was echoed in our study participants comments. Several patients expressed that they 'need time to recover' and were not expecting to ambulate so quickly after surgery, with many patients expressing the belief that as they were older it would take a longer time to recover. It is hypothesized that patients are innately aware of their limited capability for any exercise; in a dose

response study it has been demonstrated that this population has a low tolerance for walking mobility, with a maximum tolerated walking dose of only six minutes [41]. An alternative explanation of those who were able to do more is the concept of “I left it to them” in which patients expressed that they felt they could have done more, but they were trusting that the health care providers knew what their personal limitations were, and what they were supposed to achieve in order to transition to rehab.

Patients also expressed that it is not only physical capability, but psychological readiness that may be a barrier. Several patients articulated that they were afraid they would ‘break something’ or that they were afraid of incurring pain. Previous studies have reported similar findings [12, 13]. Interestingly, there were participants in our study who felt ‘overwhelmed’ at what had occurred, and articulated they needed time to reflect on what happened and consider the ramifications of the fracture on their life moving forward. These findings were similar to a qualitative study undertaken by Gesar et al [42] as those patients also identified uncertainty as to how it would affect their life in the future.

Implications for practice

As demonstrated in our embedded case study, there are multi-level factors that require consideration with implementation of best practice interventions, namely, systemic (macro), healthcare provider related (meso), and patient related (micro) [10]. Ongoing support after recommendation implementation is a crucial step, in our unit the tools which are still in use after a decade include pre-printed order sets and automatic referrals to therapists. This is an important element to ensure that even with staff turnover, standardization of care with best practices can be sustainable. An organizational culture that emphasizes ‘senior friendly’ care for hospitalized older adults has helped to communicate the importance of mobility for this at risk population.

Patients and healthcare providers have articulated that at the bedside, for each patient there are physical and psychological factors to be assessed for readiness to participate in activities. Patients have identified the ‘mismatch’ of recovery expectations; they expect to recuperate in bed, whereas healthcare providers have an expectation for mobility. How each healthcare provider bridges this gap between expectations is the challenge and opportunity for future interventions.

The lack of insight previously identified as a barrier for those with cognitive impairment has been identified as a potential enabler by our healthcare providers as these patients may not have the fears expressed by their cognitively intact peers. Future research in engaging with those with cognitive impairment is needed.

Limitations

We recognize that a limitation is within the scope of the study; we intended the study to closely examine practices of one unit, the findings may not be generalizable to all. However, our activity monitor data is in keeping with previous published studies [9, 41]. A limitation of the ActivPAL® monitor is the limited ability to accurately detect steps taken at a slower walking speed (rate slower than $0.45 m.s^{-1}$) [26]. The walking

speed limitation may be relevant to this older adult population recovering after surgery, and so we also collected observational data via behaviour mapping and a review of therapists' narrative within the chart.

In those with a cognitive impairment, timely contact with substitute decision makers proved to be a challenge; there were seven eligible patients that we could not approach for informed consent as we were unable to reach their family members. However, we demonstrate that our numbers of participation in those with cognitive impairment was likely representative of the presenting population. As we were trying to be inclusive of those with cognitive impairment, interviews with family members and their perceptions of early mobility may not be accurate to the patient experience.

We were unable to verify statements made by participants as they were discharged from hospital. We did not member check the interview data with healthcare providers; there is the limitation that our interpretation may not represent the participants' meaning. We did attempt to minimize this risk with multiple reviews of the transcripts. We felt that the transcript results align with lived experience of research clinicians and consistent with previous literature [43]. Additionally, the use of multiple sources of data (direct observation and documentation) was found to support statements made in interviews.

Conclusions

In conclusion, we found that there are high sedentary times after surgical repair for fragility hip fracture. Several variables have been reported to be important considerations for facilitation of early mobility by healthcare providers and participation by patients, including communication of mobility expectations, addressing physical and psychological readiness, and prioritization of patients at risk for prolonged hospitalization. Our findings can be used to develop meaningful patient centred interventions to address these barriers.

List Of Abbreviations

A/C Apartment/Condominium

CI Cognitive impairment

COM-B Capability, Opportunity, Motivation, Behaviour model

HCPs Health care providers

HQO Health Quality Ontario

LOS Length of stay

MMSE Mini-mental State Examination

MSH Multi-storey home

NMS New Mobility Score

OT Occupational therapist

POD Post-operative day

PT Physiotherapist

RH Retirement home

RN Registered nurse

TDF Theoretical Domains Framework

Declarations

Ethics approval and consent to participate: Ethics approval was obtained from the Sunnybrook Health Sciences Centre (Ref 321-2017) and Queen's University (Ref 730-8).

Consent for publication: Participant written and verbal consent was obtained.

Availability of data and material: The datasets during and/or analyzed during the current study available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions: LH collected, analyzed and interpreted data, and was lead in writing the manuscript. CD assisted with study design, qualitative analysis, and manuscript review. MA assisted in quantitative statistical analysis, and manuscript review. KW reviewed statistical analysis and manuscript. VD assisted with study design, qualitative analysis, quantitative statistical analysis, and manuscript review. All authors have read and approved the manuscript.

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Tables

Due to technical limitations, table 1-2 is only available as a download in the Supplemental Files section.

Figures

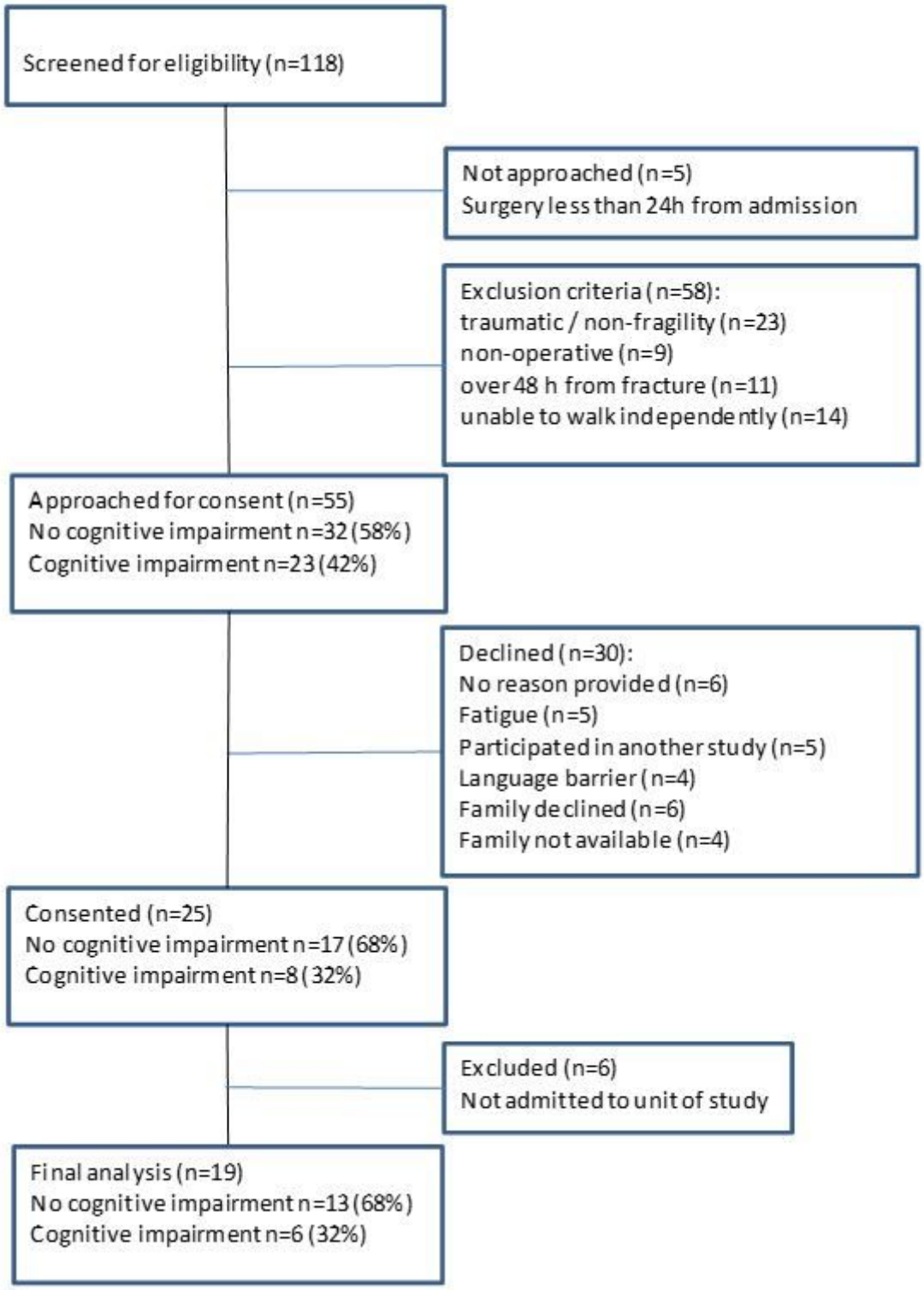


Figure 1

Flow diagram

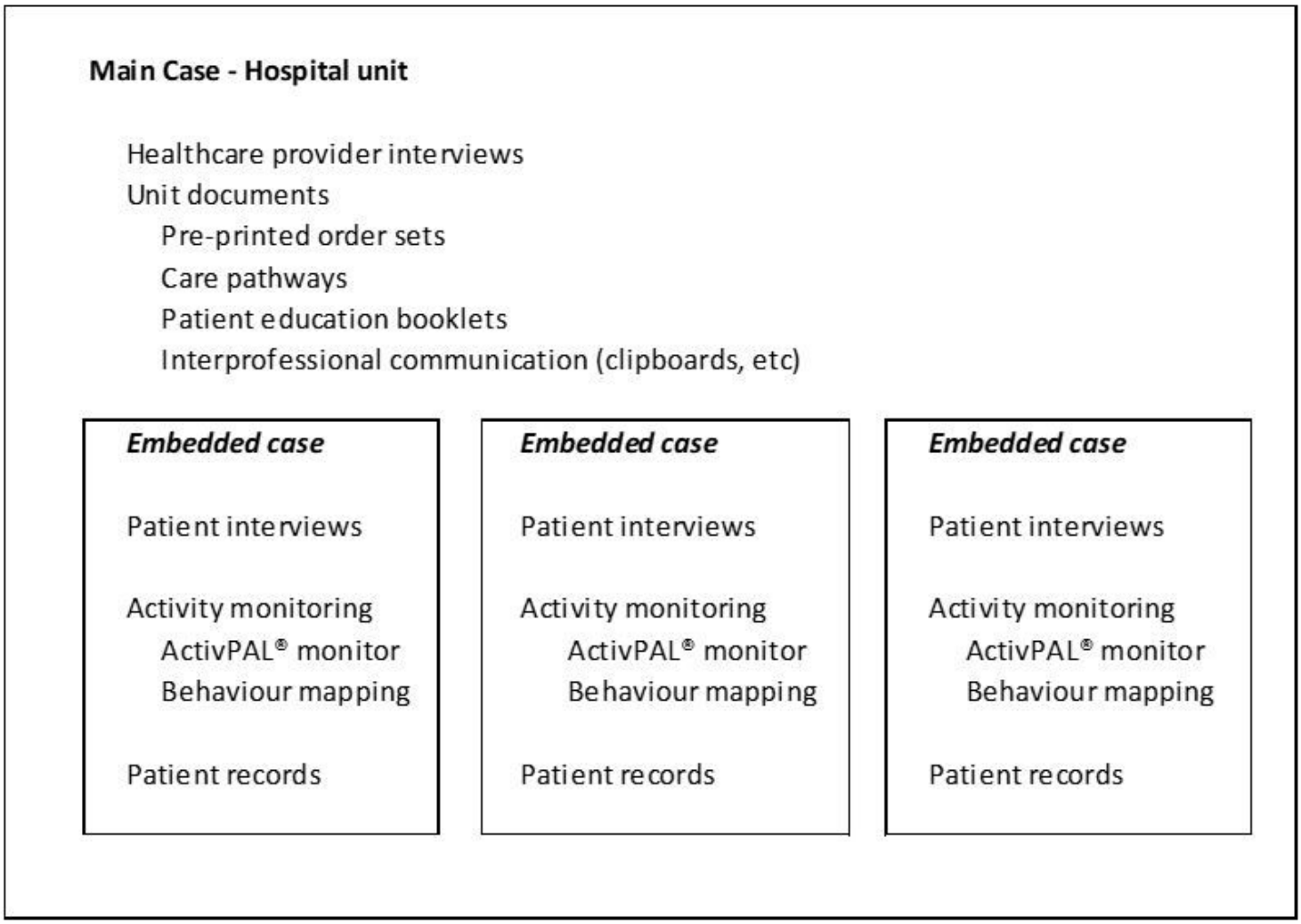


Figure 2

Data Collection Sources

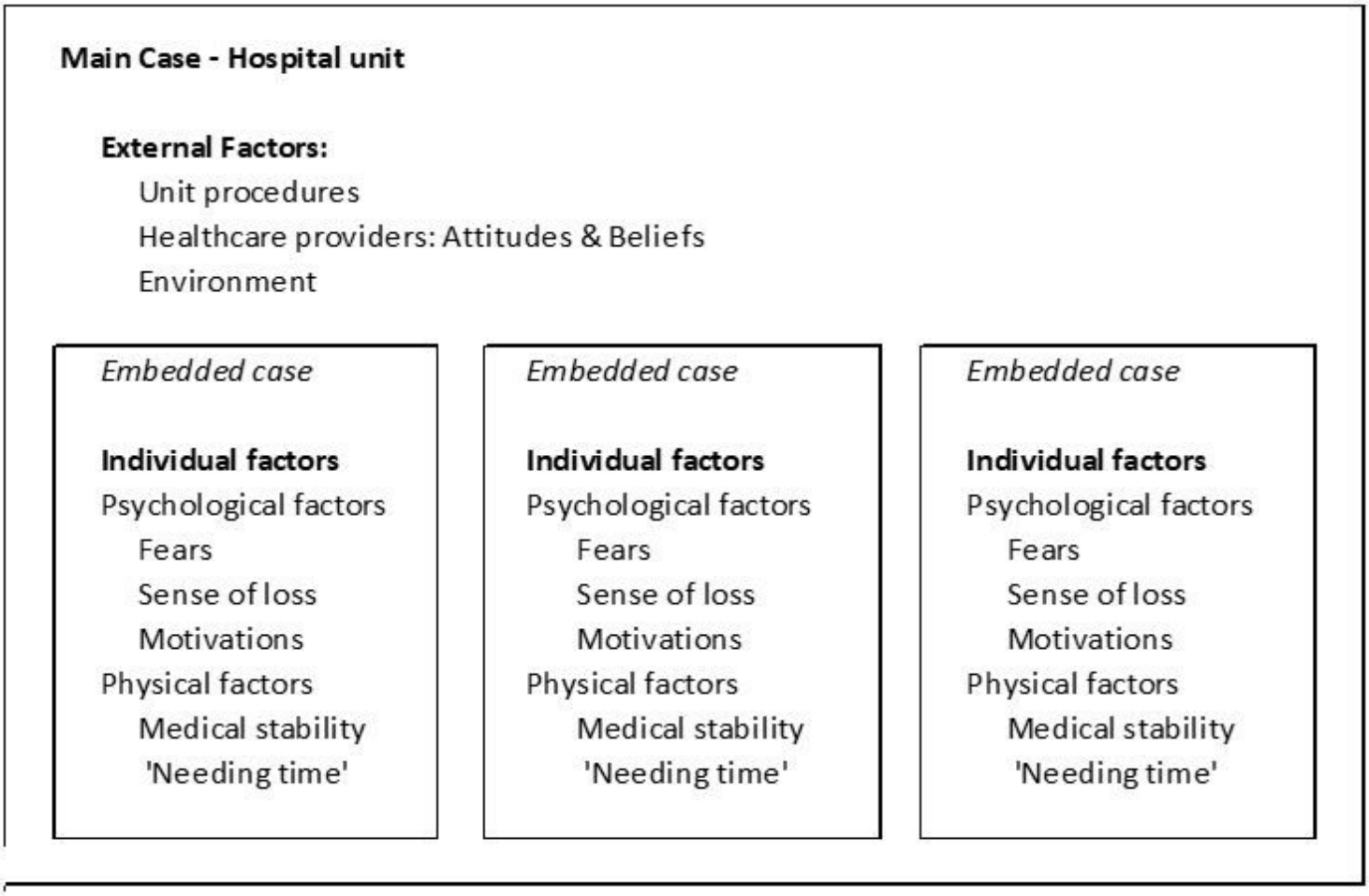
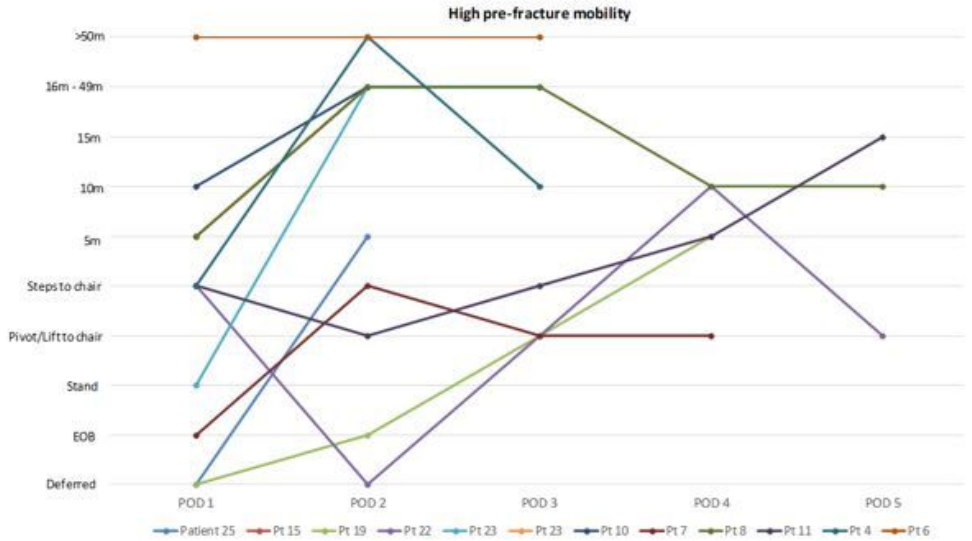


Figure 3

Factors affecting mobility while in hospital (themes)



Study number	Accom	Sex	Age	NMS	MMSE score	Max Activity POD 1	Max Activity POD 2	Max Activity POD 3	Max Activity POD 4	Max Activity POD 5	LOS
25	MSH	Female	83	High	No CI	Deferred	5 m	Discharged	---	---	2.6
15	A/C	Female	72	High	No CI	5 m	30 m	Discharged	---	---	2.7
19	MSH	Female	84	High	No CI	Deferred	EOB	Mech lift to chair	5 m	Off unit	8.8
22	A/C	Male	92	High	No CI	4 steps to chair	Deferred (transfusion)	Pivot to chair	10 m	Pivot to chair	8.8
20	A/C	Female	88	High	No CI	Stand	40 m	40 m	Discharged	---	3.6
23	MSH	Female	69	High	No CI	5 m	40 m	Discharged	---	---	3.2
10	A/C	Female	66	High	No CI	10 m	30 m	Discharged	---	---	2.9
7	A/C	Female	91	High	Mild CI	EOB	4 steps to chair	Pivot to chair	Pivot to chair	Discharged	4.9
8	A/C	Male	90	High	No CI	5 m	40 m	25 m	10 m	10 m	7.0
11	A/C	Female	93	High	No CI	4 steps to chair	Pivot to chair	3 steps	5 m	15 m	7.0
4	A/C	Female	74	High	No CI	4 steps to chair	70 m	10 m	Discharged	---	3.8
6	MSH	Male	66	High	No CI	120 m	150 m	Stairs / hallway	Discharged	---	3.6

Max achieved

Multi-storey home (MSH)
Apartment / Condominium (A/C)
Retirement home (RH)

Post-operative day (POD)
New Mobility Score (NMS)
Mini-Mental State Examination (MMSE)

Cognitive Impairment (CI)
Edge of bed (EOB)

Patient interview narratives in this group included:

"I've got to do it because my daughter can't; I have the shopping, and washing, and housework and stuff" (Patient 20)

"the second day was a challenging day, .. the two CT scans and the echo…. (Patient 11 Family)
"Whatever I was doing, I was doing because it was supposed to help me….I think the pain has been well controlled, I really do" (Patient 11)

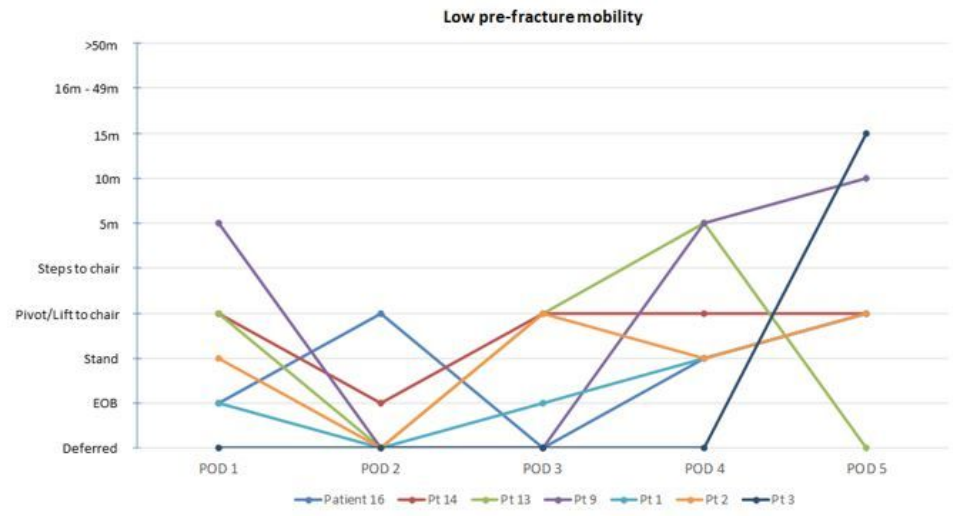
"I think my brain was attuned to what I could and couldn't do….whatever my actions were, it would hurt" (Patient 8)

"I felt more comfortable if I knew what they were going to do.. I was agreeable to participating in everything…" (Patient 22)

"She looked totally wiped out.. she had no energy.. I think she was overwhelmed" (Patient 7's Family)

Figure 4

High pre-fracture mobility group. The line graph depicts the activities in the table.



Study number	Accom	Sex	Age	NMS	MMSE score	Max Activity POD 1	Max Activity POD 2	Max Activity POD 3	Max Activity POD 4	Max Activity POD 5	LOS
16	RH	Female	91	Low	Severe	EOB	Pivot to chair	Refused	Stand	Pivot to chair	11.7
14	A/C	Male	69	Low	Mild CI	Pivot to chair	EOB	Mech lift to chair	Mech lift to chair	Stand device to chair	24.6
12	RH	Female	86	Low	No CI	Pivot to chair	Refused	Pivot to chair	5 m	Refused	35.0
9	RH	Female	89	Low	Severe	5 m	Deferred (high HR)	Delirium (no activity)	5 m	10 m	12.9
1	A/C	Male	93	Low	No CI	EOB	Deferred (low BP)	EOB (attempt stand x2)	Stand	Mech lift to chair	18.7
2	RH	Female	100	Low	Severe	Stand	Deferred (drowsy)	Pivot to chair	Stand	Pivot to chair	48.3
3	RH	Female	85	Low	Severe	Nil (agitated)	Nil (agitated)	Nil (agitated)	unable to participate	15 m	6.6

Max achieved

Multi-storey home (MSH)
Apartment / Condominium (A/C)
Retirement home (RH)

Post-operative day (POD)
New Mobility Score (NMS)
Mini-Mental State Examination (MMSE)

Cognitive Impairment (CI)
Edge of bed (EOB)

Patient interview narratives in this group included:

"she had complications post surgery… so she lost a day there" (Patient 9's Family) and "they are trying to get her sleep pattern.... more awake during the day, she has a zoned-out type of delirium"

"when I found out about the medical issues I have been spending more time in bed (Patient 14)

"no, no, no.. I feel more comfortable in bed, and no, I wouldn't want to go" (when asked about getting up to chair) (Patient 12)

"they gave her a blood transfusion… she appeared just really unwell" and "she seems to have some challenges trusting and that's fear….she doesn't know where she's going" (Patient 16's Family)

Figure 5

Low pre-fracture mobility group. The line graph depicts the activities in the table.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1demographics.docx
- Table2activitymonitordata.docx