A health care record review of early mobility activities after fragility hip fracture: Utilizing the French systematic method to inform future interventions

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Abstract

Background

A fragility hip fracture is a serious injury in older adults. After experiencing a fracture, a large percentage of patients do not regain their pre-fracture level of mobility. There are several international guidelines recommending early mobility after surgery. We do not know the usage of these early mobility recommendations by health care providers within our institution. An evidence-to-practice gap occurs when there is a failure to implement best practices. Utilization of a systematic method allows for a strategic approach to assessment of an evidence-to-practice gap. There were two aims of this project; to describe early mobility activities undertaken on one post surgical unit and b) to identify if there is an evidence-to-practice gap.

Methods

At a large tertiary centre in Toronto, Ontario, medical records from one calendar year were abstracted for older adults (≥ 65 years of age) recovering from fragility hip fracture repair. Data regarding demographics, co-morbidities, surgery type, post-operative mobility activities, and any post-operative complications were collected. Primary outcomes were evidence of early mobility activities and a comparison to Health Quality Ontario recommendations for fragility hip fracture care.

Results

Between 11% - 50% of patients are not participating in early mobility activities. By postoperative day five only two patients had walked over 50 metres. Those with low pre-fracture functional ability and a cognitive impairment consistently experienced lower rates of participation compared to patients with a high pre-fracture functional ability and no cognitive impairment. Chi-square tests and regression analysis did not reveal any significant associations with variables.

Conclusions

There is very limited participation in early mobility activities after surgery. The study was unable to identify any significant relationships between several variables that may impact participation. This chart review identified the processes that have been sustained and highlights potential areas for future interventions.

Contributions To The Literature

- Early mobility guidelines following fragility hip fracture were first published over a decade ago, yet there is no published evidence of implementation success or failures
- The chart review provided insight to health care provider facilitation behaviours and patient participation in early mobility activities

- Utilizing Step 1 of the French systematic method, we identify potential evidence-to-practice gaps
- Although physiotherapy assesses patients recovering from fragility fracture, the participation in early mobility activities is limited, and recommendations are not routinely implemented

Background

Every year, more than 32,500 Canadians experience a fragility hip fracture, of whom approximately 13,000 reside in Ontario (1, 2). For older adult patients in Canada's most populous province, Ontario, after the fracture, less than half of patients are able to walk without aids, and subsequent institutionalization occurs in up to 20% (2). The number of hip fractures has been increasing in all jurisdictions and is projected to continue to do so in the next decade (1). For a hospitalized older adult, the deconditioning effect of bedrest and the resultant functional decline has been identified as the most predictable and preventable cause of loss of independent ambulation (3). As a response to this risk of functional decline after hip fracture, national and international guidelines (4-6) have recommended a number of acute care interventions, one of which is early mobility after surgery. The National Institute of Health and Care Evidence (NICE) guideline (2017) identifies that early mobilization can decrease the overall length of hospital stay, aid in re-establishing a patients' functional status and return them to their pre-fracture environment (4). When mobilization is started within the first 48 hours after surgery, there are statistically and clinically significant increases in independence to transfer at day 7, and a doubling in the distance walked (7). In 2017, Health Quality Ontario (HQO), the provincial government-designated lead on health care quality, released the Hip Fracture Quality Standards, a set of recommendations focusing on high priority areas for improvement in care, one of which is early mobilization (2).

Several studies have demonstrated that after a hip fracture an older adults' participation in mobility activities while still in an acute care hospital setting is very limited; time spent in low intensity or sedentary activities, such as bedrest or sitting in chair, have been reported on average to be 23 hours, with minimal steps taken (8-10). There is a lack of data as to why such high sedentary times are experienced by this population, indicating the need to identify barriers and facilitators to participation in mobility activities while in an acute care hospital setting. Brown et al. (11) identified pain, fatigue, medical instability, and medical devices as barriers to participation in mobility activities by hospitalized older adult medical patients. Another potential barrier to in hospital mobility is the presence of a cognitive impairment. Research has shown that older adults with dementia are estimated to be three times more likely to experience hip fracture (12, 13). After a physiological stressor, such as a fall, or a surgical procedure, older adults with underlying cognitive frailty are more likely to develop cognitive complications such as delirium (14). Studies have reported between 31% and 65% of patients with a fragility hip fracture experience cognitive impairment post-operatively (12). Previous research has identified that memory problems, poor insight, and loss of purposeful movements have been reported to be a barrier for individuals with cognitive impairment (15).

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-

surgical unit. As this implementation was done several years ago, the extent to which the implementation efforts have been sustained is not known, nor is it understood how health care providers have utilized recommendations specific to hip fracture care in their day to day practice. Since the implementation, there have been several documentation changes across the institution, and a multitude of other competing practice change efforts that staff have had to integrate. Patient participation in early mobility activities after hip fracture repair has not been collected by the hospital; thus, it is not known if our populations' sedentary times is comparable to rates as described in the literature.

SD French and colleagues (2012) proposed a four-step systematic method (Appendix A) to guide in the development and implementation of knowledge translation interventions, starting with identifying the problem (evidence-to-practice gap). An evidence-to-practice gap occurs with a failure to implement best practices, either as a result of deficits in health care provider knowledge, attitude (i.e., lack of agreement about the recommendation components), or other contextual factors (i.e., patient preference, practice culture, or environmental influences) (17). Identifying and measuring this gap between evidence and practice is the starting point of knowledge implementation. There are several techniques available that allow us to measure the size and nature of the 'gap'(18), one of which is a needs assessment. A local needs assessment, such as the proposed chart audit, allows us to measure documented clinical care against the quality indicators as set out by HQO.

There were two primary aims of this chart review: 1) describe older adult participation in mobility activities after hip fracture repair on a post-surgical unit that has a history of recommendation implementation and 2) identify if there is an evidence-to-practice gap by comparing our healthcare provider practices to the recently published HQO (2017) recommendations for early mobility.

Methods

Research Setting

The chart review took place in a large tertiary care centre located in Toronto, Ontario. The hospital admits approximately 200 older adults with hip fractures per year (19). As per HQO recommendations (2), a goal for hip fracture management is to arrange for surgical repair within 48 hours of a patient's admission. Postoperatively, the majority of the patients are admitted to the post-surgical unit, which had implemented the hip fracture care recommendations in 2011. Implementation strategies included the introduction of hip fracture specific nursing care pathways, pre-printed order sets for prescribers, and interprofessional staff education sessions. Front line health care providers assisted in the design of the care pathways, integrating recommendations as care prompts. The post-surgical unit has 38 beds, with two full-time physiotherapists, one occupational therapist, and one assistant shared between the therapists. There is a four to one patient to nurse ratio during daytime hours.

Participants

The full cohort chart review was approved by the institutional review boards at both the hospital and the local university. As it was a retrospective review, participant consent was not required. The review included all eligible patients admitted after a fragility hip fracture from April 1, 2016 through to and including March 31, 2017. The inclusion of patients over a 12 month period eliminates the possibility of variations due to seasonal changes in the number of hip fracture admissions and staffing variations on the unit. Inclusion criteria were defined as older adults greater than or equal to 65 years of age, experiencing a fragility hip fracture, and admitted for surgical repair. We included all levels of cognition and those who died while in hospital after surgery. 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), presenting to the hospital over 48 hours after experiencing the fracture, and those who were not admitted to the selected unit after surgery.

Review of Medical Records

A nurse practitioner (LH) reviewed the medical records utilizing a hard copy of the data extraction instrument. The same individual (LH) conducted a secondary review of the charts to ensure completeness and accuracy as the data was entered into the electronic database.

Data Extraction Instrument

There is no standardized data extraction instrument identified by the 2017 HQO Quality Standard for Hip Fractures. A data extraction tool was designed after a review of the literature, identifying several variables that have the potential to impact early mobility after a fragility hip fracture. These variables include age (20-24), sex (22, 25), type of fracture (20, 24), a low baseline functional status (15, 23, 24, 26), residence prior to admission, co-morbidities (20, 27), cognitive impairment (28, 29), time to surgery and anesthetic approach (30), pain management (11, 29-31), and medical interventions (11, 30). A pilot audit with a small sample was undertaken to confirm that all the data extraction fields were available within in the hospital chart. We obtained approval from both the hospital and local university ethics boards to conduct the pilot. The hospital health records department provided a list of admitted patients coded with a hip fracture from April 1, 2016, to March 31, 2017, and from this list, every tenth chart was selected to a total of ten charts. The chart data extracted for the pilot was not analyzed. This data was used to modify the fields within the data extraction form to allow for a systematic collection of information. For example, fields from the scanned portion of the chart were bundled together on one page to ensure a timeliness collection with no missing data. Upon review of the therapist narratives, a table with pre-populated options was designed to collect data that reflected the type of mobility activity and level of assistance required on each post-operative day. An example of these options is “edge of bed / sit at bedside” and “independent / assist x1”.

Fear of falling has been identified as a variable that may impact early mobility (32); however, this variable was not included in the final data extraction form as narrative documentation of a patient expressing a fear of falling was not observed within any of the pilot charts. The pilot list of patients was also utilized for the full chart review.

Measurement sources

For this study, cognitive impairment is defined by the notation of dementia or delirium diagnosis within the physician note at the time of admission. Allied health and nursing notes were examined to provide details about cognitive status both prior to surgery and in the post-operative period. To objectively characterize patient co-morbidity, the Charlson Comorbidity Index (CCI) was used. The CCI consists of 19 selected conditions that are weighted, producing a score from 0–33 (33).

Within the institution, an assessment measure of a patient's pre-fracture functional status is not utilized. In the literature, a frequently referenced reporting measurement representing one's pre-fracture functional status is the New Mobility Score (NMS). The NMS was originally developed to predict mortality after a fragility hip fracture in the older adult population. The NMS is a composite score of a patient's ability to perform indoor walking, outdoor walking, and shopping (34). Direct patient reporting of their preinjury ability provides a score between 0 and 9 (0 = not at all, 1 = with help from another person, 2 = with gait aid, and 3 = no difficulty and no gait aid) for each function. The total score ranges from 0 (no walking ability at all) to 9 (fully independent). The NMS is a reliable and valid tool and has been demonstrated to be an independent predictor of in-hospital outcomes (24), with a lower score (less than five) being a significant predictor of not regaining basic mobility at four months (15, 23, 35). For this study, we dichotomized the NMS groups – low and high (36). An NMS of 0-5 was categorized as low, and those scoring six or greater was categorized as high, or good pre-fracture functional independence.

Surgical records provided demographic information, anesthetic type, surgical information, and early complications (e.g., intraoperative blood transfusions). Medical orders were reviewed to assess utilization of the pre-printed order sets. Data were coded as 'not documented' if there was no evidence of documentation.

Outcome parameters

For the first research aim the outcomes are a) facilitation of mobility as evidenced by rates of physiotherapy assessments, b) patient transitions from bed rest to chair, c) walking within the room (5m) and d) walking out of room (10m or greater). In-hospital complications, length of stay, and discharge location are also reported.

For the second research aim, the outcome is evidence of implementation of recommendations as set out by the 2017 HQO Quality Standards for Hip Fracture. For this audit, mobilization was defined by the authors as any healthcare professional acting to facilitate any mobility activity within the first five days postoperatively.

Analysis

For the first aim, descriptive statistics are used with means and standard deviations. Chi-square tests were conducted to explore any significant relationships between mobility activities and a number of relevant variables to mobility (i.e., previously demonstrated in the literature to impact participation in

mobility activities). The mobility activities (outcome variables) were evidence of physiotherapy assessment, sitting up to chair, and participation in walking – all assessed as having occurred (yes) or no (no) on each of the first day post-operatively. The independent variables explored were gender (set as female), cognition (cognitive impairment), pre-fracture function (high), fracture type (trochanteric), and anesthetic (presence of a nerve block). For cell values less than five, a Fisher's Exact Test (2 tail) was conducted. P values of less than .05 was considered significant. Separate logistic regression models were utilized to predict the effect of the independent variables on each of the three outcome variables.

For the second aim, the 2017 HQO recommendations for early mobility activities was compared to the occurrence of patient participation in these activities.

Results

Recruitment

During the 12 month study period, a total of 145 older adult patients 65 years of age and over were admitted with a diagnosis of hip fracture. We excluded those patients who had a traumatic fracture (n=3) or did not require surgical repair (n=11), those admitted over 48 hours from time of fracture (n=2), and those with unable to walk independently prior to their fracture (NMS less than 2, n=11). As this study aims to examine practices in one specific unit, any patients transferred to other units during hospitalization were excluded (n=40). We excluded one patient who died during surgery. The final analysis included of a total of 77 patients admitted to the target unit (Figure 1).

Demographics

Of the 77 patients, 32 (42%) were over the age of 90 years, and 55 (71%) were female. 35 (45%) of patients had a low pre-fracture functional ability (Table 1: Demographics). A total of 53 (68%) of patients were living independently or with a caregiver prior to admission.

Cognitive impairment (CI), documented as dementia or delirium on admission was present in 33 (43%) patients. There were 23 (30%) females and 10 (13%) males in this CI group. Post-operatively, an additional three patients with no history of cognitive impairment documented on admission did develop delirium (Table 2). Of those with cognitive impairment, 25 (76%) also had low pre-fracture functional ability. Of the 12 (16%) living in a retirement residence, eight had a cognitive impairment, and all 12 (16%) admitted from long term care had a cognitive impairment.

41 (53%) patients had a femoral neck fracture, and 36 (47%) were trochanteric fractures. The anesthetic approach included: 45 (58%) spinal, 31 (40%) general anesthetic, and 1 patient with a failed spinal converted to general. 45 (58%) of patients received a peripheral nerve block: 20 in addition to the spinal and 12 in addition to the general anesthetic.

Aim 1: Early mobility activities within the cohort

Physiotherapy assessment

On the first post-surgical day, 71 (92%) of the cohort were assessed by physiotherapy (Table 2: Mobility activities). The rate of physiotherapy assessments declined over the following post surgical days, ranging from 50-64% (Table 2: Mobility activities).

There was a similar rate of therapist assessment between the low pre-fracture function group compared to the high group; 32 (91%) and 39 (93%), respectively. As there were counts less than five (6 patients were not assessed), a Fisher's Exact Test (2 tail) was conducted. There was not a significant difference in physiotherapy assessments between those with a high pre-fracture functional ability and a low pre-fracture functional ability ($p=1$).

Physiotherapy assessed 40 (98%) of patients with no cognitive impairment, compared to 31 (86%) of those with a cognitive impairment. A Fisher's Exact Test did not identify a significant difference in physiotherapy assessments between those with a cognitive impairment and those with no cognitive impairment ($p=.09$). *Additional Fisher's Exact tests for differences in physiotherapy assessments were insignificant for sex ($p=.34$), fracture location ($p=.67$), and presence of nerve block ($p=.39$).*

Sitting up in chair

Achieving mobility to chair was documented consistently by both physiotherapy and nursing staff. Only 42 (54%) of patients sat in chair on the first day, with subsequent post-operative days demonstrating an increasing number of the patients being up to chair (Figure 1). When looking at patients grouped by functional status and cognition, as in Table 2, those with a high pre-fracture function with no cognitive impairment had the lowest percentage of sitting in a chair; 14 (46%). By the fourth day after surgery, this was the group with the highest percentage of sitting up in chair 17 (89%). Those with low pre-fracture function and a cognitive impairment demonstrated the highest rate of sitting up to chair on the third day 15 (83%) (Table 2).

We conducted Chi-square analyses to explore differences between groups for sitting up to chair on the first day. There was not a significant difference in sitting in chair between those with a cognitive impairment and those with no cognitive impairment (chi-square=.811, $df=1$, $p=.36$). There was not a significant difference in sitting in chair between those with high pre-fracture functional ability and those with low (chi-square=.183, $df=1$, $p=.66$). *Additional Chi-square tests for differences in sitting in chair were insignificant for sex (chi-square=1.483, $df=1$, $p=.22$), fracture location (chi-square =.088, $df=1$, $p=.77$), and presence of nerve block (chi-square=0.0, $df=1$, $p=.99$).*

Walking: 5m or less (within room)

On the first day, 35 (45%) of patients walked within the room (less than 5 metres). Patients with a high pre-fracture function had a higher incidence of achieving this activity on the first day; 22 (52%) compared to 13 (35%), in the low pre-fracture functional group (Figure 2). The highest percentage of walking within

the room was represented by those with a high pre-fracture function with no cognitive impairment on the second day after surgery 22 (76%) (Table 2).

We conducted Chi-square analyses to explore differences between groups for walking within the room on the first day. There was not a significant difference in walking within room between those with a cognitive impairment and those with no cognitive impairment (chi-square=3.755, $df=1$, $p=.05$). There was a weak correlation ($\phi=-.228$). There was not a significant difference in walking within room between those with high pre-fracture functional ability and those with low (chi-square=1.471, $df=1$, $p=.22$). *Additional Chi-square tests for differences in mobility to chair were insignificant for sex* (chi-square=3.93, $df=1$, $p=.53$), *fracture location* (chi-square =.00, $df=1$, $p=.98$), *and presence of nerve block* (chi-square=.196, $df=1$, $p=.65$).

Walking: more than 5m (out of room).

Overall, 5 (6%) of patients were able to ambulate over 5 meters on the first post-operative day (Table 2). By postoperative day five, across all groups, only two patients walked over 50 metres (one patient walked 200 metres). 9 (31%) of the patients with a high pre-fracture function and no cognitive impairment walking out of room on the second day (Table 2).

Relationship between variables

Logistic regression was performed to determine the predictive power of the independent variables on participation in mobility activities (dependent variables). These mobility activities were physiotherapy assessment, sitting up to chair, and participation in walking. The model contained five independent variables (sex, cognition, pre-fracture functional status, presence of nerve block, and fracture site). None of the full models containing all predictors was significant and no independent variables made a unique statistically significant contribution to the model. As they are insignificant, results are not reported.

Complications / length of stay

The Classification of Surgical Complications (37) was utilized to categorize postoperative complications of the cohort. Within the cohort, 44 (57%) had no complications. Twelve (16%) of patients had a documented report of pain, and ten (13%) were documented to have a medical issue leading to a deferral of physiotherapy (e.g, x-ray, telemetry, low blood pressure). Ten (13%) patients displayed a Grade 1 complication (e.g., transient confusion not requiring therapy, or requiring an anti-emetic). The most common complication was receiving a blood transfusion (Grade 2) by 16 (21%) patients. Seven patients (9%) died during their hospital stay (Grade 5). All deaths occurred in the low pre-fracture functional group; prior to their fracture three patients were admitted from long term care, one patient resided in a retirement home, and three resided in their own homes with relative or caregiver support.

As patients were discharged, the cohort size decreased, and by post operative day five 38 (49%) had been discharged (Table 2). The mean length of postoperative stay was seven days (range 1–64 days). Sixty-

one (79%) patients were discharged to a rehabilitation facility, and nine (12%) were discharged directly to their previous facility (i.e., long term care).

Aim 2: Identifying the evidence-to-practice gap

Returning to the French & Green [16] method, the chart audit information can aid in identifying the existence of any evidence-to-practice gaps.

One of the first HQO (2017) recommendations is that when a patient presents to the hospital with a fragility hip fracture, surgery is to occur within 48 hours. The mean time to surgery in the cohort was 33 hours (SD:17.16), with a range from 3 to 97 hours, and 7 (9%) patients had their surgery beyond the recommended 48 hours after admission. The average time to surgery was not significantly different between those with no cognitive impairment (35 hours, with four patients after 48 hours) and those with a cognitive impairment (31 hours, with three patients after 48 hours) ($p=.688$).

Post-operatively, there are several other standards of care that are recommended, and these recommendations are compared to documented evidence of implementation within the chart, as outlined in Table 3.

Discussion

After a fragility hip fracture, older adults are at risk of functional decline secondary to prolonged periods of bedrest (3). Patients with multiple co-morbidities are at higher risk for complications after hip fracture surgery; those with a Charleston Co-morbidity Index score greater than or equal to three are significantly at higher risk of complications (38). Except for one patient, our entire cohort scored three or greater, suggesting that our patient population is a high risk for experiencing complications after their surgery. Participation in early mobility activities can reduce the risk of post-operative complications and decrease the overall length of hospital stay (4, 39). This chart review was undertaken to a) describe older adult participation in early mobility activities on a post-surgical unit with a remote history of recommendation implementation and b) identify if there is an evidence-to-practice gap on this unit.

Early mobility activities

In our analysis, we explored associations between mobility activities and potential barriers to participation. Firstly, we looked to rates of physiotherapy assessment as a marker for participation in activities on the first day. Although the rate of physiotherapy assessment was high, the resultant number of patients participating in activities that first day was relatively low with a total of only 39 (51%) of patients getting up to chair, and 35 (45%) walking within the room. This data is comparable to a recent chart review undertaken by Baer et al (40), they report time to first mobilization was 56% in the first 24h, followed by 35% in the 24-48h category. Our analyses did not find a significant difference in the occurrence of a physiotherapy assessment and level of cognition, pre-fracture functional status, type of surgery or presence of nerve block. This finding may signal that as the physiotherapist referral is within

the post-operative order set, there is a reduced bias as to whom is seen; all patients become a priority for assessment. There have been no other studies that have reported data on the relationship between a physiotherapist's early involvement and independent variables.

In the subsequent post-surgical days, there was evidence of an increasing number of patients getting up to chair. The documentation pattern also changed in the subsequent days. The process of getting up to chair was documented in detail by the therapists in their narrative notes, for example, sit at edge of bed with one person assist, pivot to chair, left in chair. The nurses would document time spent in chair, but not the exact actions undertaken to complete the task. Therefore, as time progressed and physiotherapy was not as intensely involved, the only documentation of time spent in chair was by nursing. Studies have suggested that the most frequent nurse initiated mobility activities in the older adult population are standing and transferring (41). It will be of interest to ask nurses if they consider the associated activities (i.e., sit at edge of bed) when they are documenting the patient time in chair. As there were no significant differences found between patient groups in sitting up to chair it would be of interest to explore other patterns that may have not been evident in the documentation, for example, were the providers working together to ensure patients were up to chair for meals.

We did not find that patients with a high pre-fracture functional status were more likely to walk at bedside. Our findings are dissimilar to that reported in other studies; Baer et al (40) found that patients who are younger age and with fewer co-morbidities were more likely to walk by time of discharge, and Kristensen (42) reported lower odds of walking independently in those with a low pre-fracture functional ability. In our cohort, only 2 patients walked out of room by time of discharge, and both patients did have a higher level of pre-fracture function. A possible explanation to this difference is the smaller sample size within our cohort (77 patients).

Walking at bedside or out of room was documented by therapists, with little evidence of nursing proceeding to walk with patients. There is evidence to suggest that nurses may experience barriers with early mobility in this older adult population. Studies have identified that fear of the patient falling, lack of assistive devices, and lack of staff influenced nurses' decisions about ambulating older patients (11). Doherty-King and Bowers (43) also found that nurses perceive risks related to injury to the patient (fall) or self (back) if they engaged older patients in walking. Further conversations with the nursing team about their barriers and facilitators to mobility activities with patients after hip fracture is warranted.

Cognition and participation

Historically, literature has identified barriers to rehabilitation in patients with CI symptoms, including a limited ability to initiate activities; a demonstrated lack of insight/judgment, loss of purposeful movements, loss of recognition; and memory problems or language impairments (44).

Post-operatively the percentage of the CI group getting up to chair ranged from 54% to 78%, whereas those cognitively intact ranged from 72% to 84%. It was not clear from the chart review documentation if health care providers limit their time for facilitating early mobility activities in this patient population. Not

all health care providers providing direct patient care have equal knowledge about effective strategies for rehabilitation in those with CI, resulting in diminished health care processes (44). Our chart review data confirms that there is an apparent disparity of participation in those who are documented to have a cognitive impairment and low pre-fracture functional ability. This area would be one of interest to explore with health care providers.

Evidence-to-practice gap

As previously stated, the selected post-surgical unit had implemented recommendations for hip fracture care in 2011. This chart review identified the processes that have been sustained (e.g. pre-printed order sets, and prioritization of these patients to timely surgery), and highlight potential areas for future interventions. Specifically, there is an apparent lack of patient participation in daily mobility activities.

HQO Standard 8 (2) that recommends ensuring protocols are in place, is closely related to earlier implementation efforts. The pre-printed order sets created in 2011 continue to be utilized by the surgical team and these order sets are more consistently adhered to, ensuring some standardization of care in the post-surgical period. However, other standards that are not always followed. For example, HQO Standard 9 (2) that recommends daily mobilization is to occur. There are a number of challenges with this recommendation. Firstly, daily mobilization within the Standard is expressed on a continuum, with no clear milestones for healthcare providers to follow. Although not specifically outlined by the HQO standard, one could picture the early mobility progression as a patient being assisted to sit at the edge of bed, transfer to a chair for meals, participate in physiotherapy, and continue with exercises as tolerated with the help of health care staff or family members. This progression of activities is more complex and is dependent on several other factors, such as availability of clinicians, clinician experience, and patient stability.

Early mobility activities are the responsibility of the entire health care team, inclusive of a preliminary assessment by the physiotherapy team, the involvement of occupational therapy, and finally incorporating education about early mobility for assistance by family members. The current documentation is fragmented across health care providers, making it difficult to track progress. Additionally, there was no information reflective of the patient and/or family perspective about early mobility activities; this may be a potential area for future change.

Contextual considerations

Previous qualitative studies have identified medical interventional barriers such as intravenous lines, oxygen tubing, and urinary catheters (11). In our chart review, these medical interventions were present; however, there was no documentation by the health care providers that these items impacted their ability to mobilize these patients. Additionally, we could find no mention of solutions or alternatives to address these tangible barriers (e.g., intravenous disconnected to allow for mobility). Based on this chart review alone, it is unclear if these medical interventions are a perceived barrier by health care providers or patients. Fear of falling, pain, and depression have also been identified by patients as barriers to

participating in activities (32, 45). These types of patient statements were not reflected in health care provider narratives in our chart review. It would be of interest to explore this concept with healthcare providers and patients.

Contextual factors, such as unit policies and procedures, staffing, team communication, team to patient communication, and environmental considerations, are not reflected in documentation. Evidence-to-practice gaps often occur secondary to systems issues and not solely on provider performance (18). The chart audit is limited in its ability to assess the systems issues, which may influence the health care provider behaviour. To fully understand the multilayered complexity of the unit, a future study would have to examine the inter-relationships of these factors on patient participation.

Limitations

This retrospective chart review was undertaken to determine patient participation in early mobility activities and as a needs assessment to analyze the presence of an evidence-to-practice gap by the healthcare provider team. The chart review method is limited by several factors. Firstly, as we were only reviewing charts from patients admitted to the one post-surgical unit, there is a limited number of patients and the results may not be generalizable to other units.

Review of records

As a planned strategy to minimize errors of omission, only one person (LH) conducted the actual review. LH is a nurse practitioner with knowledge of orthopedics and anesthesia, and she was a lead in the initial implementation intervention. She has an extensive knowledge of the location of where information was likely to be documented within the live electronic and scanned chart. A chart review protocol was developed for use by a research assistant; however, the differing documentation sources (electronic narratives and unit admission logs, scanned documents) would likely be complicated to navigate, resulting in a risk of large amounts of missing data.

Not documented, not done

There was a large percentage of undocumented data. The strength of the audit is only as strong as the data recorded in the chart. If the data was not recorded, it was assumed that the task was not done. This potentially underestimates what activities were facilitated by health care providers. For example, the nursing care pathway has blank boxes for 'sitting at the edge of bed', 'sit to stand', 'ambulation', but this information was rarely completed. It is unclear whether this incomplete nursing documentation reflects a practice gap or inconsistent/missing documentation.

New Mobility Score and Cognition

We utilized the New Mobility Score (NMS) as a marker of pre-fracture functional mobility. The hospital does not currently assess pre-fracture functional ability by any scoring method. During data extraction, we aimed for accuracy in the NMS score calculation by obtaining data from several sources – social

work notes, occupational therapy and physiotherapy notes, and the emergency department record. We recognize that there is a risk that the score was miscalculated. However, we dichotomized the results into two groups - low and high, as in previous studies. This grouping is somewhat easier to recognize in scoring – those in the low group are dependent on a gait aid, which is usually documented by the healthcare providers.

Similarly, we identified those with cognitive impairment by physician documentation of dementia or delirium on admission. There is no standard validated cognitive assessment, such as a Mini-Mental State Examination (MMSE) on admission. In the post-surgical period there were an additional three patients that had documentation of confusion by nursing and physiotherapy, which were included in the cognitively impaired group. Delirium often occurs in the post-operative period in those with some minor cognitive impairment. Therefore there is a risk that we have under-identified those with cognitive impairment as we are using a diagnosis of overt dementia on admission (46).

HQO Quality Standards

The 2017 HQO Quality Standards have fifteen quality statements. In this chart review, the focus was on the recommendations promoting early mobility. Demographic data, such as time to surgery was collected; however, we did not collect data on all fifteen recommendations, and there are resultant gaps (e.g., screening for delirium, analgesic use). To fully appreciate if an institution has implemented the recommendations for hip fracture care, future studies should consider utilizing a data extraction instrument designed to collect data on all fifteen of the quality standards.

Conclusions

Our chart review has reported similar findings to others in the literature, namely, that older adults experiencing a fragility hip fracture are slow to mobilize after surgery. We have identified the areas where recommendations have been implemented successfully, and potential areas of evidence-to-practice gaps. The chart review has uncovered a paucity of contextual information which may influence health care providers' behaviours related to early mobility. Considering the lack of information in these areas, we recognize that further work is required to explore factors that may be having an impact on the health care provider's ability to engage the patients in early mobility activities. There are several additional strategies, such as direct observation, and health care provider interviews, which may be better suited to examine factors that influence the use of evidence in day to day practice.

A prospective exploratory embedded case study (Phase 2) is planned to explore the contextual factors influencing activities undertaken by the health care providers and patients. Many decisions that health care providers make at the point of care are context-dependent (16). It is planned to continue to follow the French four-step method (16) to identify the pathways of change, and possible barriers and enablers to behaviour change within our organization.

List Of Abbreviations

NICE	National Institute of Health and Care Evidence
HQO	Health Quality Ontario
NMS	New Mobility Score
CCI	Charleston Co-morbidity Index
LTC	Long term care
IM nail	Intramedullary nail
GA	General Anesthetic
CI	Cognitive impairment

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: As it was a retrospective chart review, consent forms were not required.

Availability of data and material: The datasets during and/or analysed 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 patient data, and was lead in writing the manuscript. MA assisted in the design of data collection tool, data review, and manuscript review. KW reviewed statistical analysis and manuscript. CD assisted with study design, data collection tool, and manuscript review. VD assisted with study design, data collection tool, statistical analysis and manuscript review.

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Tables

Table 1: Characteristics of the study cohort

	All patients (n=77)		No cognitive impairment (n=44)		Cognitive impairment (n=33)			All patients (n=77)		No cognitive impairment (n=44)		Cognitive impairment (n=33)	
Age (mean)	85.3 (SD 8.7)		83.39		87.91		Fracture type						
Sex							Femoral head	2	3%	1	1%	1	1%
Male	22	29%	12	16%	10	13%	Femoral neck	39	51%	20	26%	19	25%
Female	55	71%	32	42%	23	30%	Trochanteric	32	42%	22	29%	10	13%
Residence (pre fracture)							Sub-trochanteric	4	5%	1	1%	3	4%
Independent, at home	26	34%	23	30%	3	4%	Surgical type						
Independent with caregiver	20	26%	12	16%	8	10%	Dynamic hip screw	15	19%	10	13%	5	6%
Living with relatives	7	9%	5	6%	2	3%	IM nail	28	37%	16	21%	12	16%
Retirement residence	12	15%	4	5%	8	10%	Cannulated Screws	2	3%	2	3%	0	0%
LTC	12	15%	0	0%	12	15%	Hemi Arthroplasty	31	40%	15	19%	16	21%
Functional Status (pre fracture)							Total arthroplasty	1	1%	1	1%	0	0%
NMS low (2 - 5)	37	48%	10	13%	27	35%	Anesthetic Approach						
NMS high (6 - 9)	40	52%	34	44%	6	7%	Spinal	25	32%	11	14%	14	18%
Side of fracture							Spinal and nerve block	20	26%	11	14%	9	12%
Right	41	53%	24	31%	17	22%	GA	19	25%	15	19%	4	5%
Left	36	47%	20	26%	16	21%	GA and nerve block	12	16%	6	8%	6	8%
							Spinal and GA	1	1%	1	1%	0	0%

LTC: Long term care; NMS: New Mobility Score; IM nail: Intramedullary nail; GA: General anesthetic

Table 2: Number and proportion of patients achieving mobility activities by pre-fracture function and cognitive status

Mobility Criteria	Post operative day 1 n=77				Post operative day 2 n=75				Post operative day 3 n=61				Post operative day 4 n=66				Post operative day 5 n=39			
	Low pre fracture mobility n=37 (48%)		High pre fracture mobility n=40 (52%)		Low pre fracture mobility n=36 (48%)		High pre fracture mobility n=39 (52%)		Low pre fracture mobility n=29 (48%)		High pre fracture mobility n=32 (52%)		Low pre fracture mobility n=21 (48%)		High pre fracture mobility n=23 (52%)		Low pre fracture mobility n=20 (51%)		High pre fracture mobility n=19 (49%)	
	No cognitive impairment n=11 (14%)	Cognitive impairment n=26 (34%)	No cognitive impairment n=29 (34%)	Cognitive impairment n=11 (14%)	No cognitive impairment n=12 (14%)	Cognitive impairment n=24 (32%)	No cognitive impairment n=28 (39%)	Cognitive impairment n=10 (13%)	No cognitive impairment n=10 (14%)	Cognitive impairment n=19 (31%)	No cognitive impairment n=23 (38%)	Cognitive impairment n=9 (15%)	No cognitive impairment n=6 (13%)	Cognitive impairment n=15 (30%)	No cognitive impairment n=18 (41%)	Cognitive impairment n=5 (13%)	No cognitive impairment n=6 (15%)	Cognitive impairment n=14 (34%)	No cognitive impairment n=5 (13%)	Cognitive impairment n=14 (36%)
	11	23	28	9	2*	13*	22	9	6	10	15	6	3	5	12	3	4	5	10	5
PT Assessment	p=114				p=931				p=704				p=477				p=202			
Transfer to chair	6	13	13	7	9	13	24	7	7	16	17	6	4	11	17	4	5	9	10	4
	p=800				p=226				p=369				p=759				p=394			
Walk within room (<5m)	7*	7*	16	5	4	8	22	6	6	10	15	6	2	4	10	4	2	3	7	2
	p=935				p=707				p=704				p=759				p=573			
Walk out of room	0	0	4	1	0	0	9	3	0	0	6	1	1	1	5	1	0	0	2	0
	p=688				p=951				p=356				p=480				p=629			

Table 3: Comparison of HQO recommendations to evidence of implementation

HQO Recommendations (2017)	Evidence of implementation
Standard 8: “Ensure protocols, pathways, medical directives, and standardized order sets are in place to facilitate patients achieving weight-bearing as tolerated within 24 hours following surgery” (p. 23).	<ul style="list-style-type: none"> pre-printed order sets were utilized in 76 (99%) of the cases one patient was not ‘weight-bearing as tolerated’
Standard 9: “Following surgery, ensure patients with hip fracture are mobilized at least once daily by a member of the health care staff. (p.25)	<ul style="list-style-type: none"> 71 (92%) were assessed by physiotherapy 39 (51%) of patients were able to get up to chair on the first day range of 50% - 89% of the cohort were up to chair in the first five days
Where possible, family members or caregivers should be encouraged to assist with mobilization” (p.25)	<ul style="list-style-type: none"> no documentation within the physiotherapy or nursing notes about the inclusivity of family members in mobility activities
Bone & Joint Decade Canada (2011) Patients receive daily physiotherapy and occupational therapy, regardless of a patient’s cognitive status (p.35)	<ul style="list-style-type: none"> 36 patients documented with cognitive impairment (dementia or delirium) after surgery on the first day after surgery, of these 36 patients: <ul style="list-style-type: none"> - 31 (86%) were assessed by physiotherapy - 11 (31%) were assessed by occupational therapy - 20 (54%) were up to chair - 11 (31%) walked within the room (<5m) - 1 (2%) walked out of the room highest occurrence did not occur until post operative day three; 22 were up to chair and 16 walking within the room (Table 2)

Figures

Figure 1

Achievement of early mobility activities by cognitive status

Figure 2

Achievement of early mobility activities by pre-fracture mobility status

Supplementary Files

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

- [AppendixAFrenchmethod.pdf](#)
- [STROBEchecklistcohortaslam.pdf](#)
- [CONSORTdiagram.pdf](#)