Family-based Care Interventions to Improve Health Outcomes in Older Adults with Hip Fractures: A Systematic Review

Nareerat Puttakun, Praneed Songwathana, Chantra Promnoi*

Abstract: Hip fractures are common health issues among older adults, and many require surgery to restore mobility and alleviate pain. However, post-surgical recovery can take months and requires intensive care and rehabilitation at home, which is linked to better health outcomes. Family-based care interventions with optimal management have been advocated to support good recovery and improve health outcomes, but their effectiveness remains inconsistent across studies. This systematic review aimed to critically synthesize evidence on the effects of family-based care interventions in improving health outcomes in older adults undergoing hip fracture surgery. The review was conducted on November 1, 2024, by searching databases PubMed, Science Direct, Web of Science, Scopus, ThaiJo, and other sources from Google Scholar from 2014 to 2024. The inclusion criteria were people aged 60 and older with hip fractures, and the articles related to family interventions that affect physical or psychological health outcomes. The review used the Joanna Briggs Institute approach and is reported here in accordance with PRISMA. The PROSPERO registration was CRD42024625893.

Six of 521 articles met the criteria: three randomized controlled trials, a secondary data analysis of such trials, and two quasi-experimental studies. A meta-analysis was not conducted because the studies differed in their characteristics. Therefore, a narrative synthesis was used. Results show that interventions using various components are mostly provided during the pre-discharge phase. The main components were assessment and consultation, a team-based approach, health education, patient and caregiver training/coaching, rehabilitation, motivational intervention, and follow-up. Physical outcomes were a primary health outcome measured in all studies that showed positive trends using mobile innovation and self-management programs. Psychological outcomes such as stress, fear of falling, depression, and burden were also improved.

The review underscores the potential of the family-based care intervention in improving health outcomes of older adults who underwent hip fracture surgery. The intervention consists of multiple components that improve physical and psychological outcomes. A comprehensive hospital-to-home-based intervention and the use of technology during care transitions appear to help both community nurses and families achieve successful care. However, these require a more comprehensive assessment of their cost-effectiveness in terms of patient outcomes.

Keywords: Family-based care, Family intervention, Family nursing, Health outcomes, Hip fracture, Older adults, Systematic review

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Introduction

Hip fractures are among the common health issues for older adults and continue to increase

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worldwide[1-3] as more people live longer. The global population of older adults with hip fractures rose from 5.4 million in 1990 to more than 14 million in 2021, representing a substantial 168.71% increase.[2,3] Hip fractures are not only a common consequence of falls and osteoporosis, but can also lead to severe pain, activity disorders, and prolonged bed rest, which impede recovery.[4] Therefore, older adults with hip fractures should undergo surgery as soon as possible.[5]

Hip surgery is the standard and common treatment for patients with hip fractures. After the operation, the patient needs specific care due to impaired physical ability and the risk of complications. In addition, such problems can cause mental problems that may affect physical health and daily life.[5] Older adults may be prone to the risk of complications and negative emotions due to limited knowledge, poor memory, and a lack of understanding regarding post-fracture rehabilitation, which affects compliance and health outcomes.[6] Older patients then need more dependence on family caregivers to support their daily activities and post-operative rehabilitation during their discharge.[5,6] This can increase the burden of health and emotional stress in both older adults and family caregivers.[7]

A previous study found that patients and family caregivers face many challenges during the transition of care, including a lack of information sharing, disorganized distribution planning, and role confusion.[8] Additionally, contextual factors, including patient complexity and system constraints, impact the ability to achieve good recovery during transition.[9] Although older adults and family caregivers may receive self-care information and advice before leaving the hospital, this is often inadequate and results in a limited understanding of the complex illness.[10] Supporting the family, both patients and family caregivers, is therefore critical for patient recovery.[9]

A preliminary scoping search revealed that a few systematic reviews evaluated the effectiveness of care of older adults following hip fracture before and after surgery.[11-13] Most interventions primarily focus on rehabilitation or exercise, and measure a patient's physical and clinical outcomes. Few studies have addressed the involvement of families and patients.[14,15,16] Nurses who work in hospitals and the community play a vital role in promoting family care for older adults during transition after hip fracture surgery. There is insufficient evidence to guide practices for transitional interventions after their discharge home. Therefore, this systematic review aimed to provide evidence-based information on family-based care interventions for older adults who underwent hip fracture surgery in the pre-and post-discharge phase. This will encourage nurses and healthcare professionals to place more importance on family-based care and how to support family engagement as a co-producer, especially during hospital discharge to home.

Study Aim

This study aimed to critically synthesize the evidence on the effects of family-based care interventions in improving physical and psychological health outcomes in older adults with hip fractures.

Methods

Design: The systematic review evaluated the effectiveness of family-based care interventions, offering essential information for developing care strategies for older adults with hip fractures, and focused on two review questions: 1) What are the main components of family-based care interventions?, and 2) What is their effectiveness in terms of physical and psychological outcomes in older adults with hip fractures? This review was conducted using the protocol registered with PROSPERO No. CRD42024625893[17] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines 2020 (PRISMA).[18] PICO was used as a guide to search, as shown in **Table 1**.

Table 1. Defining keywords and searching based on the PICO format

Defining keywords and searching based on the PICO format	
P – Population	Older adults, elderly, aging, geriatric with hip fracture
I – Intervention	Family, family center, family-centered, family framework, family base, family care, family caregiver
C – Comparison	Usual care.
O – Outcomes	Physical function, psychological function

Data Sources and Search Strategy: The data were searched on November 1, 2024 using six databases: PubMed, Science Direct, Web of Science, Scopus, ThaiJo, and other sources from Google Scholar from 2014 to 2024 for published articles that used English and Thai languages and could be accessed with free full text. Otherwise, articles were excluded.

Inclusion Criteria: Studies were relevant to older adults with hip fractures aged ≥ 60 years; involved family interventions involving both patient and family caregivers, and aimed to improve health outcomes in physical or psychological function. Studies were required to be randomized controlled trials (RCTs), quasi-experimental designs, systematic reviews, meta-analyses, or clinical trials.

Exclusion Criteria: This review excluded studies whose interventions targeted only caregivers or patients, not dyads, and studies with no reported results.

Study Selection: As mentioned, articles were selected following the PRISMA guidelines,[18] which included steps for identification, screening, and eligibility assessment. For identification, studies were sourced, and articles were selected according to eligibility criteria. All identified studies were then imported into EndNote, version 20, and duplicate entries were removed. During screening, the titles were evaluated for relevance to the target population and outcome by the first author (NP). Subsequently, the titles and abstracts were reviewed by two independent authors (NP and PS). In the eligibility step, two reviewers independently evaluated the full texts of articles that met the inclusion criteria to determine their suitability. In case of disagreement, a third author (CP) reviewed and discussed the results.

Assessment of Methodological Quality: Two authors (NP and PS) independently assessed the quality and determined the risk of bias for each full-text study using the revised Joanna Briggs Institute (JBI) critical appraisal tool for RCTs (a 13 criterion checklist[19]) and the quasi-experimental study tool (a 9-criterion checklist[20]). They offer questions and answers on internal, external, and statistical conclusion validity, focusing on biases in selection, intervention administration, outcome assessment, participant retention, and statistical conclusions. Answers are by yes, no, unclear, or not applicable.[19,20] The decision to include or exclude items was based on achieving a cutoff score of 60%.[21] To qualify for inclusion, studies must have at least eight "yes" scores of 13 for RCTs and six "yes" scores of nine for quasi-experimental studies. The reviewers unanimously agreed on the quality of the studies. The critical appraisal results are detailed in **Appendix Tables A1 and A2.**

Data Extraction: Data were extracted into two matrix tables. **Table 2** presents the study characteristics, and the Template for Intervention Description and Replication (TIDieR) was applied to guide the extraction of the intervention characteristics. The 12-item TIDieR checklist includes the brief name, rationale, materials, procedures, provider details, methods, location, timing, funding, tailoring, modifications, planned effectiveness, and actual effectiveness.[22] **Table 3** presents the intensity of the intervention.

Table 2. Study characteristics of family-based interventions

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
1. Prieto-Moreno et al, 2024[23] Setting: Andalusia (Spain) at the hospital and home Design: RCT Population: - Aged 65+ - No cognitive impairment - Recruited with caregivers who have Internet access -105 patients and their caregivers *IG = 51 *CG = 54	Why: The study was designed based on The Model of Human Occupations (MOHO)[30] -WHO guidelines for healthy aging.[31] The program trains patients and caregivers while enhancing their health literacy to effectively address their daily needs.	Name: ActiveHip+ mHealth intervention which is a health education and tele-rehabilitation program utilized a mobile app linked to a webpage for healthcare provider follow-up. What materials: -The intervention includes occupational therapy, physical exercise, and health education, delivered via a mobile app connected to a webpage for healthcare provider follow-up. Who provided: Physical therapists and Occupational therapists What procedures, how, where, when, and how much: Pre-discharge, at the hospital - Face-to-face 3-5 rehabilitation sessions, a booklet with recommendations, and exercise on the first day of recovery (usual care). - Orientation of the mobile app on the smartphone before discharge Post-discharge at the patient's home -Three weekly videos through the mobile app (two physical exercises and one occupational) are divided into four difficulty levels. (Total 12 sessions in 12 weeks via mobile app, each session 30-60 min)	Duration: - Intervention 12 wks. - Assessment outcomes: 1. Hospital discharge (baseline) 2. Three months post-surgery 3. One-year post-surgery follow-up Physical health outcome - Physical performance (The SPPB assessment) - Functional status (The FIM and NMS) - Pain (VAS) - Quality of life (EQ- 5D) - low back pain - Self-reported fitness (IFIS) Psychological outcome - Fear of falling (SFES-I) - Emotional status (HADS) - Burden on caregivers	Tailoring: -Exercise and occupational therapy are organized into four levels based on patients' status. -HCP tailor tele-rehabilitation to each participant's progression for individualized care. Modifications: No report How well (planned): -HCP from hospitals, independent of recruitment, assessment, or data analysis, managed the allocation and evaluation processes. -Participants were blinded to the participants' allocation. How well (actual) -At 3 months, IG had 2 falls compared to 4 in CG, with no refractures. -At 1-year follow-up, IG had 7 falls and 1 refracture, while CG had 13 falls and 2 refractures.	At 3 months post-surgery: IG had higher significance than CG in physical performance, emotional status, pain relief, and self-perceived health. - No significance for other outcomes At 1-year follow-up: The outcomes were not maintained.	11/13

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
2. Tseng et al., 2021[14] Setting: Taiwan at the hospital and home Design: RCT Population: Patients with hip surgery age ≥ 60 years with cognitive impairment Family caregivers age ≥ 20 years Total 152 *IG = 76 *CG = 76	Why: The study was designed using interdisciplinary care models and adapted a family- centered perspective based on their previous research[32-34] The program aimed to enhance the knowledge, confidence, skills, and support necessary for patients with cognitive problems and family caregivers.	Name: A family model of care was developed for older adults who have hip fractures and cognitive problems. What materials: The care model included geriatric assessment, discharge planning, rehabilitation, and family caregiver training both in the hospital and at home. Who provided: The geriatric team, including geriatric nurses, geriatricians What procedures, how, where, when, and how much: Pre-discharge at the hospital - Geriatric assessment: the geriatric nurse contacted patients and family caregivers before surgery to conduct an evaluation and then discuss with the geriatrician. - The geriatric nurse conducted a pre-discharge assessment for continuity of care and appropriate referrals. - A rehabilitation program was initiated, with daily visits by the geriatric nurse starting the day after surgery. Post-discharge at home - discharge planning: Geriatric nurses assess patients' homes and offer suggestions.	Duration: -Total 12 months -Assessment outcome 1-, 3-, 6-12 months after discharge Physical health outcome: -Self-care ability (Barthel Index: performance of activities of daily living: ADLs and instrumental activities of daily living: IADLs -Nutritional status -Self-rated health -Health-related quality of life (SF-36, EQ-5D) -Caregiver self-efficacy -Caregiver Competence	Tailoring: Registered research nurses trained family caregivers to manage patients' behavioral issues and symptoms at home. Modifications: No report How well (planned): - Participants are cared for by geriatric specialists. - Home visits were conducted regularly for 1 year. How well (actual) IG rehabilitation adherence at home was 36.1% in the first month, decreasing to 20.0% by the sixth to twelfth month. This adherence was positively correlated with improvement in the Chinese Barthel Index ($r = 0.27-0.43$, $p < .05-0.01$) from the first to sixth month.	-No significant difference was found between the two groups in ADLs, IADLs, physical-related health and mental-related health outcomes. - IG showed a significantly greater improvement in self-rated health and nutrition, especially in the first 6 months, caregiver self-efficacy and competence increase in 3 months.	10/13

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
		- In-Home Rehabilitation: Geriatric nurse visits occur weekly for the first month, biweekly for months two and three, monthly from months four to six, and bimonthly from months seven to twelve. - Caregiver Training for Dementia: Research nurses train family caregivers in managing patients' behavioral issues and symptoms. (Total, once each day after surgery and 14 sessions in 48 weeks at home, face-to-face, each session about 30 minutes.)				
3. Tseng et al., 2022[24] Setting: Taiwan at the hospital and home Design: Secondary RCT data analysis of family care model[14] Population: -Patients with hip surgery - age ≥ 60 years with cognitive impairment	Why: The design was family care model using secondary data analysis study of Tseng et al. (2021)[14] The study explored the relationship between nutrition and family-centered care intervention for older adults with cognitive impairment.	Name: Influence of nutritional status on a family model of care was developed for older adults who have hip fractures and cognitive problems. What materials: - Secondary data analysis from a family care model randomized controlled trial - Nutritional status assessed with a mini-Nutritional Assessment (MNA) and body weight change - Intervention process as same as Tseng et al. (2021).[14] Who provided: The geriatric team, including geriatric nurses, geriatricians	Duration: MNA assessments were conducted for 1-month post-discharge and then at 3, 6, and 12 months in the patient's home. Physical outcome: - Nutritional status impact on family care model outcomes - Mini Nutritional Assessment (MNA)	Tailoring: - During hospitalization, at-risk or malnourished patients were assessed by a geriatrician. - A diet evaluation for necessary calories and protein was also conducted during in-home visits. Modifications: No report How well (planned): - None of the characteristic differences between the CG and IG were well-nourished or poorly nourished at one month.	The well-nourished of IG had significantly better IADLs ($b = 1.74$, $p < .05$), hip muscle strength ($b = 9.64$, $p < .01$), and physical scores ($b = 10.47$, $p < .01$) three months post-discharge. -There were no significant differences in any of the outcome variables for those who were poorly nourished.	11/13

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
-134 participants well-nourished, *IG = 4 *CG = 8 Poorly nourished *IG = 65 *CG = 57		What procedures, how, where, when, and how much: - The geriatric nurse assessed physical and nutritional measures to identify medical or functional concerns and gathered dietary information before and after surgery. -Secondary data analysis took place one-month post-discharge when nutritional status was stable.		How well (actual): Twelve months after discharge, 22 participants (16.4%) in the control group and 23 (17.2%) in the intervention group were well-nourished.		
4. Smith et al., 2023[25] Setting: English at the hospital and phone coaching at home Design: Feasibility RCT with qualitative study Population: Patients with hip surgery age ≥ 60 years with/without cognitive impairment.	Why: The social learning theory was applied.[35] The study aimed to assess the feasibility of an RCT to evaluate the clinical and cost-effectiveness of a caregiver training program for supporting recovery after hip fracture surgery.	Name: Hospital-based caregiver intervention (HIP HELPER) What materials: HIP HELPER is a multidisciplinary pre-discharge care program that consists of education, caregiver-patient dyad training, goal setting, motivational discussion, and telephone coaching sessions after discharge; also, provide a booklet. Who provided: Multidisciplinary (physiotherapist, occupational therapist, and nurse) What procedures, how, where, when, and how much: Pre-discharge at the hospital: The pre-discharge program consisted of three one-hour individualized training sessions.	Duration: - Intervention total 6 wks. - Assessment outcome 2 times at baseline and 4 months post randomization Feasibility outcomes: 1. Recruitment feasibility 2. Intervention acceptability 3. Intervention fidelity (healthcare professionals) 4. Intervention fidelity (caregivers) 5. Randomization acceptability	Tailoring: Goal setting, stress management, and coaching will be tailored to each patient and family. Modifications: No report How well (planned): - HCP delivering the intervention attended a 1-day training session. - The Central Trial Team maintained regular contact with the clinical team, reviewed initial HIP HELPER sessions for fidelity, and held monthly meetings to discuss study processes.	The research shows that the HIP HELPER intervention was well-received by patients, caregivers, and healthcare professionals.	10/13

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
- 102 participants (51 patients. 51 caregivers) *IG = 25 *CG = 26 weight, patient cognitive impairment		Session 1: Education and skills training for caregivers, focusing on transfer assistance, walking, early postoperative goal setting, and behavior modification techniques. A booklet is included.[36] Session 2: Reinforce practical teaching skills for caregivers by reviewing shared goals with patients. Enhance understanding of stress management, pacing, and behavior modification related to those goals[36] Session 3: The refresher covers stress management and caregiver pacing, linking them to goals and behavior modification, and includes case studies on recovery in the first six weeks post-discharge.[36] Post-discharge at home: Three telephone coaching sessions at 1, 3, and 6 weeks after discharge (Total six sessions in six weeks: three face-to-face at the hospital and three phone calls at home; each session was around 1 hr.).	6. Risk of contamination 7. Completeness of outcome	How well (actual): The components that were delivered most often included: information on recovery expectations (96%; 23 out of 25), goal setting (92%; 22 out of 25), and pacing along with behavior modification (92%; 22 out of 25).		
5. Mashhadi-Naser et al., 2024[15] Design: A quasi-experimental	Why: The study did not specify a theoretical framework but stated that family and social support were essential in transition care and associated with positive outcomes.	Name: A family-based care transition program What (materials): - The transition care program consists of education, training, rehabilitation, and stress management.	Duration: - Intervention 4 weeks after discharge - Assessment outcome 3 times: baseline, wk-4, -8 after discharge	Tailoring: -Researchers adjust mobility training according to each person's progress. Modifications: No report	- ADL, HRQol had significant difference of group and time 1 and 2 between IG and CG, a greater increase in IG.	9/9

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
Setting: Iran at the hospital, home visits, and telephone counseling 100 older adults with hip surgery Age ≥ 60 years *IG = 50 and the *CG = 50		- Use of social media to strengthen social connections Who provided: Nurse What procedures, how, where, when, and how much Pre-discharge at the hospital: - Two sessions, face-to-face, starting one to two days before discharge - cover health education, stress management, diet, medicine, and activities of daily living, including mobility and rehabilitation. - They also emphasize using social media to enhance social connections. Post-discharge at home: - One session for a home visit is scheduled for two weeks post-discharge. This session includes face-to-face education to review previous topics, the use of mobility aids for walking, and advanced mobility training based on the patient's progress. - One telephone counseling session will occur four weeks after discharge. This includes a review of previous contents, assessment of mobility progress, potential side effects, and medication usage. (Total four sessions in four weeks: three face-to-face and one phone, each session lasted 20-40 minutes.)	Physical health outcomes: - Activities of daily living; ADLs (Barthel Index) - Health-related; HRQoL (SF-12) Psychological outcome - Perceived Social Support - Multidimensional Scale	How well (planned): - Plan and specify the activities for each session clearly How well (actual): The participant in IG greater progressed in ADL, HRQol over time.	- Perceived Social Support had no significant difference between IG and CG.	

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
6. Rattana-thammawat and Choowat-tanapakorn, 2018[16] Design: A quasi-experimental Setting: Thailand at hospital and phone follow-up at home Patients with hip surgery Age ≥ 60 years 44 patients and their caregivers *IG = 22 *CG = 22	Why The concept of individual and family self-management, according to Ryan & Sawin[37] was applied. The program helps patients and families learn about post-operative self-management, increasing their confidence in rehabilitation and enabling them to perform physical functions after surgery, including standing and walking.	Name: Individual and family self-management program What (materials): - Intervention consists of knowledge and belief, self-regulation, self-evaluation, and management of responses. - Using telephone follow-up Who provided: Nurse What procedures, how, where, when, and how much: Pre-discharge: Session 1 week 1: Knowledge and Belief - Self-Efficacy - Provide knowledge and persuade patients to recognize the importance of surgery - Outcome Expectancy - Present older adults with role models to foster confidence in their practice. - Goal Congruence - See successful examples of rehabilitation. Session 2 week 2: Self-Regulation - Goal Setting: Patients, families, and researchers in post-operative rehabilitation. - Self-monitoring: Observe, record, share, review, and revise rehabilitation behaviors. - Decision-Making: Offer information and feedback for informed choices. - Planning and Action.	Duration: -Intervention 6 weeks -Assessment outcome at 6 weeks after discharge Physical health outcome: The functional capacity is assessed using the six-minute walk test (6MWT).	Tailoring: The program is individual management. It can be adjusted to suit each individual and family. Modifications - How well (planned): The program and research instruments were reviewed by five experts. How well (actual): No sample loss	The functional capacity of the intervention group was significantly higher than that of the control group ($p < .05$; $t = 2.394$, $p = .021$).	8/9

Table 2. Study characteristics of family-based interventions (Cont.)

Study detail	Theoretical framework	Intervention contents	Duration Outcome (Instrument)	Intervention adherence	Results	JBI score
		Session 3 weeks 2: Self-Evaluation: Pre-discharge self-assessment, teaching behavioral recording, and home self-management. Post-discharge Session 4-7, weeks 3-6 Management of Responses: Follow-up inquiries, telephone visits in weeks 3 and 5, and outpatient department in weeks 4 and 6 (Total seven sessions in six weeks: four face-to-face and two via phone, it did not specify the time used in each session)				

Note. *IG = Intervention group, *CG = Control group

Table 3. The intensity of the intervention

Components	Assessment & Consultation				Health education					Patient & caregiver training	A team-based approach	Rehabilitation			Follow-up	Motivation		
Authors and year	Geriatric assessment	Geriatric consultation	Patient & caregiver assessment	Environment assessment	Health Education	Booklet	Case-study scenarios	Mobile application	Videoconference			Rehabilitation/ physical exercise	Home-rehabilitation	Telerehabilitation	Home visit	Phone coaching/ follow-up	Self-efficacy	Goal setting	Self-Management and evaluation
1) Prieto-Moreno et al 2024[23]			✓		✓	✓		✓	✓	✓	✓	✓		✓					
2) Tseng et al., 2021[14]	✓		✓	✓	✓					✓	✓	✓	✓		✓				
3) Tseng et al., 2022[24]																			
4) Smith et al., 2023[25]			✓		✓	✓	✓			✓	✓	✓				✓		✓	✓
5) Mashhadi-Naser et al., 2024[15]			✓		✓			✓		✓		✓			✓	✓			✓
6) Rattanathammawat & Choowattanapakorn, 2018[16]			✓		✓					✓		✓				✓	✓	✓	✓

Data Synthesis: A meta-analysis was not performed because each study varied in characteristics, interventions, time frames, health outcomes, and the tools used to measure these outcomes (see **Table 2**). This variation hindered the ability to compare data across the studies and statistically estimate the effectiveness of the interventions. Consequently, a narrative synthesis was employed to summarize and present the findings of the systematic review, focusing on the study characteristics, interventions, effectiveness, and health outcomes.

Results

The literature search via databases identified 518 articles, and three other sources from Google Scholar were added. After duplicates were removed, 507 articles remained; of these, 62 articles were selected based on title and abstract, and 445 were excluded. A total of 11 articles were assessed for eligibility, and five were excluded because the intervention in three studies focusing only on caregivers. Two studies were only study protocols with no reported results. Finally, six met the eligibility requirements, as shown in **Figure 1**.

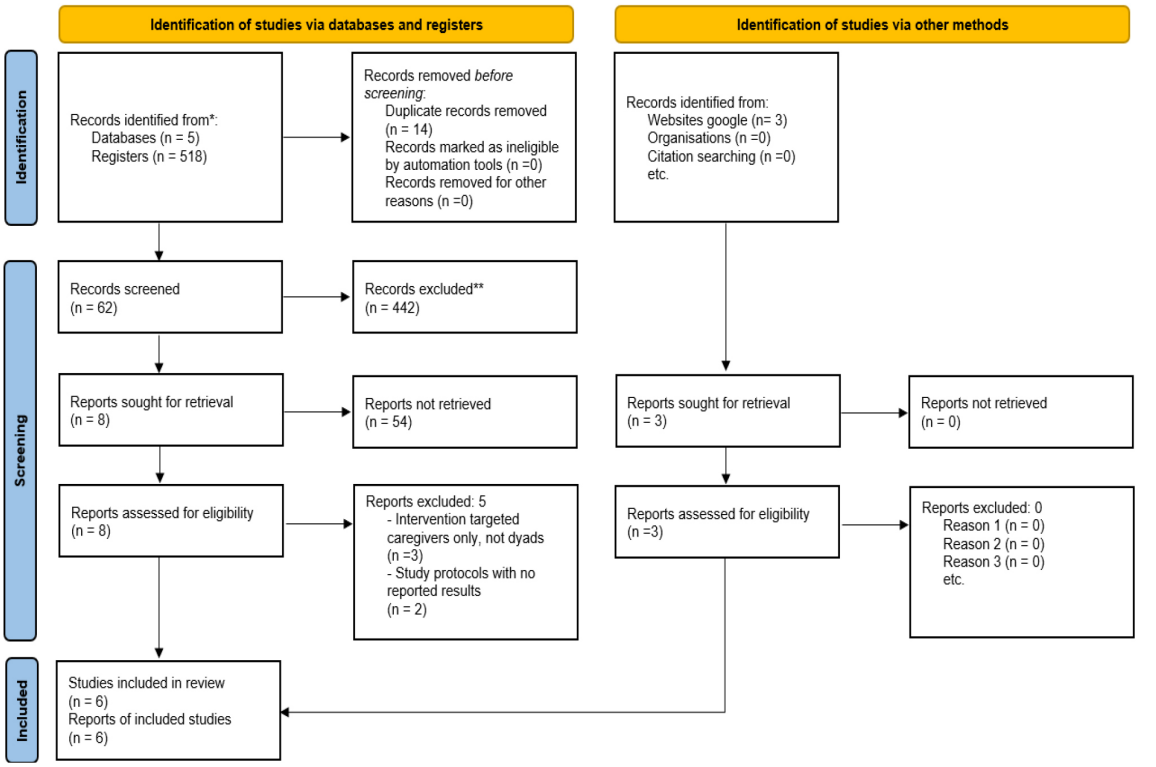

Figure 1. PRISMA flow diagram 2020

Study Characteristics: The six articles included in the study included two RCTs[14,23] one secondary data analysis of an RCT,[24] one test feasibility for an RCT,[25] and two quasi-experimental studies.[15,16] All studies were on older adults post-hip fracture surgery, with three studies including older adults with cognitive impairment.[14,16,24] Two of the six studies were in Europe (Spain and the UK)[23,25] and four were in Asia (Taiwan, Thailand, and Iran).[14-16,24] The studies contained different interventions and health outcome evaluations. The duration of the studies was 6 weeks to 12 months, as shown in **Table 2**.

Methodological Quality Assessment: The JBI critical appraisal tool for assessing risk of bias in RCTs was applied to 13 criteria.[19] Two of four RCT studies met a maximum of 11/13 "yes" scores.[23,24] One RCT had assessor- and analyst-blinded outcomes,[23] lacked participants and delivered blinding treatment (question 4 and 5 in the assessment of risk of bias). Another RCT was participant single-blinded[17] but lacked delivered and assessor blinding to treatment (questions 5 and 7). The remaining two RCT studies met 10 of 13 scores.[14,25] Although the first RCT study used participant blinding, it lacked blinding of delivered, assessor to treatment. There was also a bias in participant retention, as many participants dropped out (questions 5, 7, and 10).[14] There was no blinding in the second study. (questions 4, 5, and 7)[25] The quasi-experimental studies were assessed on nine criteria.[20] One met the maximum of nine "Yes",[15] and another met eight due to "Not Available" (N/A) report on follow-up completion or drop-out.[16] The results of the critical appraisal for each study are presented in the **Appendix, Tables A2 and A3.**

Description of the Family-based Care Interventions: The program was designed using various activities based on different theoretical frameworks. Interdisciplinary care models integrating a family-centered perspective, based on previous research, were employed in two studies.[14,24] Other studies applied different frameworks to design the intervention, including the Model of Human Occupations (MOHO) and the World Health Organization (WHO) guidelines for healthy aging,[23] Social learning theory[25] concepts of individual and family self-management according to Ryan and Sawin,[16] transitional care and social support.[15] Most interventions included a program that incorporated seven main components, namely: 1) assessment and consultation,[14-16,23-25] 2) a team-based approach,[14,23-25] 3) health education,[14-16, 23-25] 4) patient and caregiver training and coaching,[14-16,23-25] 5) rehabilitation,[14-16,23-25] 6) motivation techniques,[15,16,25] and 7) follow-up.[14-16,24-25] The duration and intensity of interventions varied from four,[15] six[16,25] to twelve weeks,[23] to twelve months.[14,24] The number of sessions ranged from four,[15] six,[25] seven,[16] twelve[23] to fourteen sessions.[14,24] Each session lasted 20 to 60 minutes. Interventions were mainly delivered face-to-face at the hospital and during home visits. In addition, two studies used mobile applications or social media,[15,23] while three studies used telephone calls for monitoring and follow-up.[15,16,25] Most interventions were provided by nurses who coordinated with other providers. The components of interventions were administered in two phases, but mostly pre-discharge rather than post-discharge.

Main Components of Interventions: The components were classified according to the family care approach. The most common reported components across all studies[14-16,23-25] were 1) assessment and consultation, 2) using a team-based approach, 3) providing health education, 4) training/coaching by focusing on 5) rehabilitation with 6) motivational techniques, and 7) follow-up. Two studies used specialists in geriatric assessment and geriatrician consultation.[14,24] Providing comprehensive assessment and medical care for older adults is essential to detect potential medical and functional problems prior to surgery. In addition, the assessment process continued at the pre-discharge phase to ensure appropriate referrals, and after discharge, including a further assessment of the home environment to provide advice on improvements.[14,24] Consultations were based on the patient's condition.[14] The geriatric nurse contacted the patient and family caregiver before surgery to conduct an initial assessment and discuss with a geriatrician.[18,24] Before hospital discharge, the geriatric nurse assessed the family caregiver's abilities, family resources, family functioning, the patient's ability to care for themselves, the need for community services or long-term care, and any necessary referrals.[14,24]

In a team-based approach, health education and training/coaching were mainly combined. Most studies employed a team-based approach[14,23-25] led

by nurses who coordinated expertise for optimal care, including orthopedists, geriatricians, geriatric nurses, registered nurses, physiotherapists, occupational therapists, and social workers, depending on family care requirements. Improving multiple outcomes required specialized skills and approaches, instilling confidence in caring for older adults and their families following hip fracture surgery. One study utilized the ActiveHip+ mHealth intervention, comprising digital health education and home-based rehabilitation services delivered by physiotherapists and occupational therapists.[23] Another study implemented the hospital-based caregiver intervention (HIP HELPER), which offers multidisciplinary pre-discharge care through nursing, physiotherapy, occupational therapy, or social work.[25]

All studies provided health education[14-16,23-25] to enhance knowledge and practice before and after surgery to prevent complications, promote rehabilitation, and offer tips to prevent falls and second fractures. Techniques used included face-to-face interaction and the provision of a booklet for patients and family caregivers at the hospital.[23,25] A key aspect of this study[23] was the continuation of care through digital health recovery at home to enhance both patients and their family caregivers' readiness to use a mobile smartphone application that connects to a webpage for healthcare providers to facilitate follow-up care. Another study, known as HIP HELPER,[25] implemented a multidisciplinary pre-discharge program. The training focused on health education, skill development, and motivational techniques such as goal setting and stress management.[25] In addition, the content was provided mostly face-to-face to patients and family caregivers during hospitalization. It included the importance of preparation and behavior before and after surgery, the recovery process, preventing complications, rehabilitation after surgery, and behavior modification techniques.[15,16,23-25] Some studies emphasized interventions for stress management,[15] self-management, self-efficacy,[16] goal setting, action planning, and problem-solving.[16,23,25]

Most patients and family caregivers received training in practical skills and followed the rehabilitation protocol. During hospitalization, the geriatric nurse visited the patient daily.[14,24] Mutual goals were collaboratively set to support and encourage patients in daily living activities and movement: sitting, standing, personal hygiene, dressing, toileting, bowel and bladder control, transferring from bed to chair, moving on smooth surfaces and stairs, and sleeping properly.[15,16,25] Moreover, mobile health application programs and social media applications were installed on smartphones, and guidance and training on technology usage were offered to facilitate their practical application and follow-up at home via an online platform.[15,23]

Three studies reported using a motivation intervention[15,16,25] that focused on the psychological dimension. This aimed to inspire and build mental strength for fighting and overcoming obstacles by enhancing self-efficacy, goal-setting, stress management, self-management, and evaluation. Various strategies were used to discuss the importance of patient and family preparation, including preventing complications, so that older adults and their families know their roles and abilities. Motivational intervention provides older adults undergoing hip fracture surgery with role models and successful examples of rehabilitation, thereby enhancing their confidence and benefiting both patients and family caregivers.[16] Sharing goal setting between patients, family caregivers, and healthcare providers in the early postoperative period helped them to be aware of their current health condition and the importance of recovery.[15,16,25] Moreover, the healthcare provider discussed caregivers' stress management and pacing and how these relate to established goals and behavior modification.[25]

The main component in the post-discharge phase was followed up with either a home visit, an application, or a digital health ambient-assisted tool. The geriatric nurse must regularly visit the patient to provide home-based rehabilitation training.[14,24] The

number of visits only in the intervention group ranged from weekly to every two months, depending on patient adherence to treatment. Family caregivers took a major role in monitoring and recording the patient's rehabilitation progress, following the rehabilitation protocol.[14,24] In addition, patients and caregivers were asked to record their daily exercise [27] and received coaching via phone to monitor progress in physical recovery, and facilitate collaborative problem-solving.[15,16,25] Only one study used tele-rehabilitation via a mobile application, with two physical exercise videos per week for 12 weeks, showing significantly improved outcomes.[23]

All studies provided follow-up after discharge to monitor the health outcomes of patients and caregivers. Physical abilities were assessed in most studies regarding activities of daily living, self-care, quality of life, and family caregivers' competence.[14-16,23] The psychological outcomes, including fear of falling, emotional status, and caregiver burden, were also assessed.[15,23] There are various formats for follow-up, including home visits,[14,24] video conferences,[23] and phone follow-up.[15,16,25] Mobile health (mHealth) was a choice for rehabilitation and symptom monitoring to overcome the issue related to limited healthcare resources. It appeared to be a good trend to improve access to care and services compared to traditional face-to-face rehabilitation.[23]

Effectiveness and Health Outcomes of Included Studies: Meta-analysis could not explore the effectiveness of the intervention because studies differed in study characteristics, measurement instruments, and follow-up measurement intervals (**Table 2**). In this review, health outcomes for patients were divided into two categories: physical and psychological.

Physical health outcomes were identified as the primary outcomes in all studies. Physical performance was most common; however, there were differences in the instruments use such as the Barthel Index: performance of activities of daily living (ADLs),[14,15,24] instrumental activities of daily living (IADLs),[14,24] the Short Physical Performance Battery (SPPB), the Functional Independence Measure (FIM), the New Mobility score (NMS),[23] and the Six-minute Walk Test: (6MWT).[16] The results showed that physical performance was significantly higher in the intervention group (IG), who received education via a mobile application and mobile health (M-health)[23] and a family-based care transition program that utilized social media.[15] The physical performance was also high after receiving the Self-Management Program based on Ryan and Sawin's Theory.[16] However, one study did not find a significant difference in ADLs and IADLs between the two groups, which included a sample of older adults with cognitive impairments.[14] The secondary outcomes were diverse, namely health-related quality of life (HRQoL), which was also measured using a variety of instruments, including EQ-5D,[14,23] SF-12,[15] and SF-36.[14] The family-based care transition program was found to have a positive effect on HRQoL.[15] However, the results are conflicting.[14,23] Low back pain, caregiver self-efficacy, and caregiver competence were also evaluated.[23,24] The study's results found that IG had higher caregiver self-efficacy and caregiver competence than CG, with significance.[14] However, the two groups had no significant difference in low back pain of caregivers.[23]

For psychological health outcomes, two studies evaluated fear of falling, emotional status,[23] and perceived social support.[15] The results showed that emotional status in IG was significantly better than in CG, while no difference was found between the two groups in fear of falling[23] and perceived social support.[15] The caregiver burden was also assessed, but showed no significant difference between the experiment and control groups.[24]

Discussion

This review summarizes interventions that focus on family care relevant to both patients and family

caregivers. Regarding different theoretical frameworks used in family-based interventions, the key to enhancing patients' and caregivers' success during transition across six studies included seven components. Although the small number of studies limited the study, the group that received family-based intervention tended to have better health outcomes (ADLs, IADLs, physical and psychological health) than the control group.[15,16,23-25] Only one study found no statistically significant differences.[14] This may be because the sample group was older people with hip fractures and cognitive impairment.[14, 24]

In addition, two studies reported a high dropout rate (52 of 152 participants).[14,24] The reduced sample size may have affected the statistical analysis of the results. The sample group with cognitive impairment may have had a complex disease, which may be an obstacle to learning and rehabilitation. A previous study reported that family caregivers, who had experienced caring for patients with hip fractures and cognitive impairment, face more challenges, problems, obstacles, and complex events during the postoperative recovery period than family caregivers of patients without cognitive impairment.[26]

Five of the six studies showed good feasibility of interventions and significant differences in physical health outcomes.[15,16,23-25] These included multicomponent and the use of technology to support education or training, such as telephone calls,[15,16,25] tele-rehabilitation based on smartphones,[23] and utilization of social media.[15]

In addition, psychological interventions provide emotional support and positive reinforcement. Three studies that emphasized motivational interventions can provide positive results. These include goal setting, self-management, and self-efficacy[15,16,25] and stress management.[15] These can encourage patients and families to increase motivation and power in caring for patients to achieve a good recovery or return to normal. Various outcomes are measured, which show the effects on psychological outcomes such as reducing and preventing anxiety, stress, fear of falling, depression, and burden. In addition, motivational interventions can promote coping processes, increase self-efficacy, self-awareness, value, and health-related quality of life of both patients and families.[27,28]

The improved health outcomes were from multicomponent interventions that emphasized a holistic approach, addressing the physical and psychological needs of older adults and their family caregivers. Strategies aimed to empower and motivate patients and family caregivers to achieve independent recovery through knowledge and belief.[16,25] In addition, the duration and intensity of interventions for monitoring and support during the transition period are important. Most interventions consisted of 6 to 12 sessions, each lasting 20 to 60 minutes, conducted over 6 to 12 weeks. Considering that it takes at least two months to enable both patients and families to adhere to the interventions. The interventions in this review were mainly structured with face-to-face preparation and skill-building sessions at the hospital, followed by continued consultation and support from healthcare providers after the patient's discharge.[16,23,25]

The multicomponent approach provides ongoing support to patients and family caregivers after hospital discharge. Easy access to educational materials, particularly videos, enables hands-on practice, making it easier and more convenient for patients and caregivers to engage accurately with the content. Furthermore, healthcare professionals can select rehabilitation or exercise programs tailored to older adults after hip surgery, ensuring that these programs are appropriate for each patient's individual abilities.[23] This can help reduce stress and pressure on both patients and their families, giving them the strength and encouragement to continue their rehabilitation. As patients become more aware of their own abilities and progress, they are likely to feel more empowered.[16,25] The patients and caregivers' outcomes in intervention groups who followed up with coaching and counseling were different from those in the control group. It can effectively enhance the patient's recovery, tailored to

the individual's needs and concerns[15,16,23,25] This method can be more useful for those living in remote areas or who are unable to visit a doctor due to physical disabilities. It can also be done at any time scheduled for a video conference.[29]

Limitation

The number of studies reviewed was relatively small. The studies varied in their settings, interventions, time frames, health outcomes, and the instruments used to measure each health outcome. This variability limited the ability to compare data across the studies and interpret overall conclusions. It made it impossible to estimate the effectiveness of the interventions through a statistical meta-analysis. The study revealed bias in the intervention administration. All studies were unblinded regarding treatment delivery, and most were unblinded for participants. In addition, some studies included patients with and without cognitive impairment, which may have led to different results and were not statistically significant.

Conclusions and Implications for Nursing Practice.

Family-based interventions for caring for older adults with hip fractures consisted of various components, and there was heterogeneity across studies, settings, and outcome measures. The health outcomes of the studies also varied. A combination of hospital-based and home-based interventions may provide better health outcomes. The use of technology for caring can help families achieve successful care.

The findings from this review could significantly enhance in-service nursing education by integrating family-centered care practices into upskill or reskill training. Educating future nurses about the importance of family involvement in patient care can prepare them for more holistic approaches. In addition, structured caregiver training programs within discharge planning to enhance a continuing care system are essential. Implementing these programs would ensure that families are adequately equipped to support their loved ones post-surgery, ultimately improving recovery outcomes and reducing readmission rates.

Author Contributions

Conceptualization, Review and editing, Formal analysis: N.P., P.S.
Investigation, Writing-original draft, Writing, Visualization: N.P.
Methodology, Supervision: P.S.
Writing-review and editing, Supervision: P.S., C.P.
All authors read and approved the final manuscript.

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Appendix

Table A1. Search strategy
PubMed database, search conducted in November 2024

Search	Search terms	Result
#1	("hip fracture") AND ((Older adults) OR (Elderly) OR (Aging) OR (Geriatric))	13,854
#2	("hip fracture") AND ((Older adults) OR (Elderly) OR (Aging) OR (Geriatric)) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review, in the last 10 years	838
#3	("family-centered" OR "family care" OR "family caregiver" OR Family) OR "Family-based program" OR caregiver) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review, in the last 10 years	42,171
#4	(#2) AND (#3) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review, in the last 10 years	53
#5	((physical function) OR (psychological function)) AND (#4) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review, in the last 10 years	11

Table A2. JBI critical appraisal tool for the assessment of risk of bias for RCTs (13 items)[19]

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Sum
Prieto-Moreno et al. (2024)[24]	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	11
Tseng et al. (2021)[14]	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	10
Tseng et al. (2022)[24]	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	11
Smith et al. (2023)[25]	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	Y	10
% of Yes	100	100	100	50	0	100	25	100	100	75	100	100	100	

Note. N = No, Y = Yes

Table A3. JBI critical appraisal tool for the assessment of risk of bias, quasi-experimental (9 items)[20]

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Sum
Mashhadi-Naser et al. (2024)[15]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Rattanathammawat & Choowattanapakorn (2018)[16]	Y	Y	Y	Y	Y	Y	Y	N/A	Y	8
% of Yes	100	100	100	100	100	100	100	50	100	

Note. Y = Yes, N/A = Not applicable

วิธีการดูแลแบบครอบครัวเป็นฐานเพื่อเพิ่มผลลัพธ์ด้านสุขภาพในผู้สูงอายุที่มีภาวะกระดูกสะโพกหัก : การทบทวนวรรณกรรมอย่างเป็นระบบ

นารีรัตน์ พุทธกูล ประณีต ส่งวัฒนา จันทรา พรหมน้อย*

บทคัดย่อ : ภาวะกระดูกสะโพกหักเป็นปัญหาสุขภาพที่พบบ่อยในผู้สูงอายุ ผู้ป่วยหลายรายจำเป็นต้องได้รับการผ่าตัดเพื่อฟื้นฟูการเคลื่อนไหวและบรรเทาอาการปวด อย่างไรก็ตาม การฟื้นตัวหลังการผ่าตัดอาจใช้เวลาหลายเดือนและต้องการการดูแลและการฟื้นฟูสมรรถภาพอย่างใกล้ชิด ที่บ้านเพื่อส่งต่อผลลัพธ์ด้านสุขภาพที่ดีขึ้น วิธีการดูแลแบบครอบครัวเป็นฐานโดยใช้การจัดการที่เหมาะสมจะช่วยเพิ่มการฟื้นตัวและผลลัพธ์ทางด้านสุขภาพของผู้สูงอายุ อย่างไรก็ตาม ประสิทธิภาพของวิธีการแต่ละการศึกษายังมีผลลัพธ์ที่แตกต่างกัน การศึกษาทบทวนวรรณกรรมอย่างเป็นระบบนี้มีวัตถุประสงค์เพื่อสังเคราะห์หลักฐานเชิงประจักษ์เกี่ยวกับผลกระทบของวิธีการดูแลแบบครอบครัวเป็นฐานเพื่อเพิ่มผลลัพธ์ด้านสุขภาพในผู้สูงอายุที่ได้รับการผ่าตัดกระดูกสะโพกหัก เริ่มดำเนินการเมื่อวันที่ 1 พฤศจิกายน พ.ศ. 2567 โดยสืบค้นจากฐานข้อมูล PubMed, ScienceDirect, Web of Science, Scopus, ThaiJo และแหล่งข้อมูลอื่นๆ จาก Google Scholar ตั้งแต่ปี พ.ศ. 2557 ถึง พ.ศ. 2567 เกณฑ์การคัดเข้า คือ ศึกษาในผู้ที่มีอายุมากกว่า 60 ปี มีภาวะกระดูกสะโพกหัก และบทความที่เกี่ยวข้องกับวิธีการดูแลของครอบครัวที่ส่งผลต่อผลลัพธ์ด้านสุขภาพทางด้านร่างกายหรือจิตใจ โดยใช้แนวทางของ Joanna Briggs Institute และรายงานตามแนวทางของ PRISMA การศึกษานี้ได้รับรองการลงทะเบียนใน PROSPERO หมายเลข CRD42024625893

บทความวิจัย 6 เรื่องจาก 521 เรื่องที่มีการศึกษาตรงตามเกณฑ์ พบว่า เป็นการทดลองแบบสุ่มและมีกลุ่มควบคุม 3 เรื่อง การวิเคราะห์ข้อมูลทุติยภูมิจากการทดลองแบบสุ่ม 1 เรื่อง และการศึกษากึ่งทดลอง 2 เรื่อง การวิเคราะห์อภิมานไม่สามารถดำเนินการได้เนื่องจากแต่ละการศึกษามีลักษณะเฉพาะที่แตกต่างกัน ดังนั้น จึงใช้การสังเคราะห์เชิงบรรยาย ผลการศึกษาพบว่า กิจกรรมการดูแลมีหลายองค์ประกอบ ส่วนใหญ่ดำเนินการในช่วงก่อนการจำหน่าย ได้แก่ การประเมินและการให้คำปรึกษา แนวทางการทำงานเป็นทีม การให้ความรู้ด้านสุขภาพ การฝึกอบรมผู้ป่วยและผู้ดูแล การฟื้นฟูสมรรถภาพ การสร้างแรงจูงใจ และการติดตามผล ผลลัพธ์ทางสุขภาพด้านร่างกายเป็นผลลัพธ์ที่สำคัญที่พบจากการศึกษาทั้งหมดว่ามีแนวโน้มที่ดีขึ้นจากการใช้นวัตกรรมผ่านโทรศัพท์มือถือและโปรแกรมการจัดการตนเอง ส่วนผลลัพธ์ทางจิตใจ เช่น ความเครียด ความกลัวการล้ม ภาวะซึมเศร้า และภาระของผู้ดูแล มีแนวโน้มในทางที่ดีขึ้นเช่นกัน

การทบทวนวรรณกรรมนี้ เน้นย้ำถึงศักยภาพของการดูแลแบบครอบครัวเป็นฐานในการเพิ่มผลลัพธ์ด้านสุขภาพของผู้สูงอายุที่เข้ารับการผ่าตัดกระดูกสะโพกหัก ซึ่งมีองค์ประกอบหลายประการที่ช่วยเพิ่มผลลัพธ์ทั้งทางร่างกายและจิตใจ การดูแลแบบครบวงจรจากโรงพยาบาลสู่บ้าน รวมถึงการนำเทคโนโลยีในการดูแลมาใช้ในระยะเปลี่ยนผ่าน มีแนวโน้มช่วยให้พยาบาลชุมชนและครอบครัวประสบความสำเร็จในการดูแล อย่างไรก็ตาม ยังมีความจำเป็นต้องมีการประเมินประสิทธิผลและความคุ้มทุนในด้านผลลัพธ์ของผู้ป่วย

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