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Review article



# Multi-professional rehabilitation model among Older Persons after Hip Fracture Surgery: Review

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**Abstract**

Hip fracture in the elderly is a major health problem. Multi-professional rehabilitation approaches were recommended; however, there were various multi-professional rehabilitation models; therefore, identifying the multi-professional rehabilitation model, especially for older persons after hip fracture surgery, is needed. The aim of this review study is to identify a multi-professional rehabilitation model among the elderly with hip fracture surgery. A literature search for relevant articles in PubMed, Scopus, Embase, and CINAHL was used. Studies that met the following criteria were included: Patients with hip fracture surgery, multi-professional rehabilitation, and randomized controlled trial study, measured physical outcome, published during 2018 to 2024, English full-text article. Finally, six articles met inclusion criteria. The multi-professional rehabilitation model among older persons after hip fracture surgery includes geriatric interdisciplinary home rehabilitation, multicomponent home-based rehabilitation, comprehensive geriatric care, fragility integrated rehabilitation, and comprehensive orthogeriatric care. In addition, hip fracture rehabilitation problems include fear of falling and comorbid and postoperative complications. The multi-professional rehabilitation model improved the quality of life of the older persons after hip fracture surgery. Multi-professionals' rehabilitation model effectively improved physical performance among older persons after hip fracture surgery. Identifying multi-professional rehabilitation models with specific needs for older persons after hip fracture surgery are recommended in clinical practice.

## INTRODUCTION

Hip fracture is one of the serious complications and the seventh leading cause of death in the elderly [1, 2]. The risk of fracture increases with age due to loss of the bone mass and increased risk of falls. After the age of 50, nearly half of women and one-fifth of men experience a fracture. Fractures occur in nearly half of all osteoporotic patients. In addition, decreased muscle strength and significantly impaired balance and walking function in the elderly also increase the risk of hip

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fracture [1]. Geriatric hip fracture patients are often characterized by the presence of various comorbidities and geriatric syndromes, such as sarcopenia, that contribute to frailty [3]. The number of geriatric hip fracture patients was estimated at 1.6 million in 2000. This number is projected to increase to approximately 6.3 million by 2050 [4]. According to a report from the United Kingdom, approximately 10% of elderly hip fracture patients die within 1 month and approximately 30% die within one year [5].

Hip fractures in the elderly cause a decrease in mobility, quality of life, and independence of the elderly and the ability to perform daily activities [6, 7]. In addition, hip fractures in the elderly can also increase morbidity and mortality, resulting in the increased medical and socioeconomic burden [2, 7, 8]. The costs required for the care/treatment of hip fractures in the elderly are not small [1]. In addition, hip fractures also cause the elderly to experience excessive pain, postoperative depression and anxiety [2, 7].

Hip fractures in the elderly have become a considerable health problem [1]. The difficulty in managing hip fractures in the elderly is not only in the fracture itself but also in perioperative care, postoperative management, rehabilitation, nursing, fall prevention measures and osteoporosis treatment to reduce the likelihood of secondary fractures [3, 9]. The majority of elderly people who experience fractures are only limited to treatment from orthopedists at the hospital. Handling fractures in the elderly will be better/perfect if it is carried out multidisciplinary such as orthopedists and geriatricians [1].

Multidisciplinary orthogeriatric care improve the clinical outcomes of fracture treatment due to fragility mainly by improving the functional status and independence of patients in daily activities. This leads to maintaining the quality of life and reducing the mortality rate of geriatric hip fracture patients [7]. Previous studies have shown that multidisciplinary care in orthogeriatric hip fracture patients can shorten the time to undergo surgery and hospitalization. In addition, treatment with this approach also causes morbidity rates due to serious complications such as pneumonia and heart failure and the mortality rate of orthogeriatric patients is lower than usual care [8].

Rehabilitation with an interdisciplinary orthogeriatric care model can be used to optimize the recovery of older adults with hip fractures [10, 11]. Previous studies have shown that the functional status of orthogeriatric hip fracture patients receiving multidisciplinary care is significantly better than that of usual post-surgical care alone. Good functional status leads to lower mortality rates in geriatric patients [7]. Several other studies have also mentioned that interdisciplinary rehabilitation is proven to be able to restore independence of daily life activities in elderly hip fractures well [12, 6]. There was various multi-professional rehabilitation model, therefore identifying the multi-professional rehabilitation models especially for older persons experiencing hip fracture surgery are needed. The aim of this review study is to identify multi-professional rehabilitation model and physical outcome among older persons following hip fracture surgery.

## METHODS

### *Data Sources*

In this review, the clustering method was used as suggested by Arksey and O'Malley [13]. Questions in the literature search are formulated in population exposure outcomes (PEOs) such as older adults (population/problem), multi-professional, interdisciplinary or multidisciplinary (exposure), physical older persons following hip fracture surgery (outcome), and randomized controlled trial (study design). The data bases used to search for

relevant articles in the preparation of this review are PubMed, Scopus, Embase, CINAHL.

### *Included and Excluded Studies*

The inclusion criteria used in the preparation of the review include (a) Patients with hip fracture surgery, (b) multi-professional rehabilitation and, randomized controlled trial study, (c) measured physical outcomes, (d) conducted for studies published from 2018 to 2023, (e) full-text article was available in English. The exclusion criteria were as follows: comments (such as blogs and electronic newspapers), reviews, letters, guidelines, and protocols.

### *Searching Strategy*

The searching period ranged from 2018 to April 2024. Studies were retrieved using the following keywords: *"interdisciplinary"* OR *"multi-professional"* OR *"multidisciplinary"* AND *"health improvement"* OR *"physical outcome"* AND *"older persons"* OR *"older"* OR *"elderly"* AND *"hip fracture"* OR *"femoral neck fracture"* OR *"femoral head fracture"* OR *"intertrochanteric fracture"* OR *"sub capitals fracture"* AND *"surgery"* The results of the number of articles and the filtering process are described in the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) flowchart [15] (Figure 1).

### *Study Selection*

Two researchers examined the article titles and abstracts for eligibility. Subsequently, the full texts of the potential studies were screened to determine final eligibility for inclusion in this review. Uncertainty concerning the inclusion of the studies was checked by a third researcher. In addition, the reference lists of included articles were screened for eligible studies that were not found in the searching.

### *Data Extraction*

The first author extracted the data of the included studies, which were verified by a co-author. Information was collected regarding the title of the study, year, authors, country, study design, study sample, outcomes, and the conclusion (Table 1)

### *Quality of the Included Studies (JBI)*

The quality of the study used in this critical appraisal used systematic The Joana Briggs Institute (JBI). In the list of items, there are four categories of assessments ranging from yes, no, unclear and not applicable. The value given according to the conditions present in the article if the question in the check corresponds to the one in the article is given the value yes, if not in the check on the statement no, if not clearly written on the column is not clear and if not applied by the article is written on the not application box. The six-study included are randomized controlled trial study design with high quality critical appraisal.

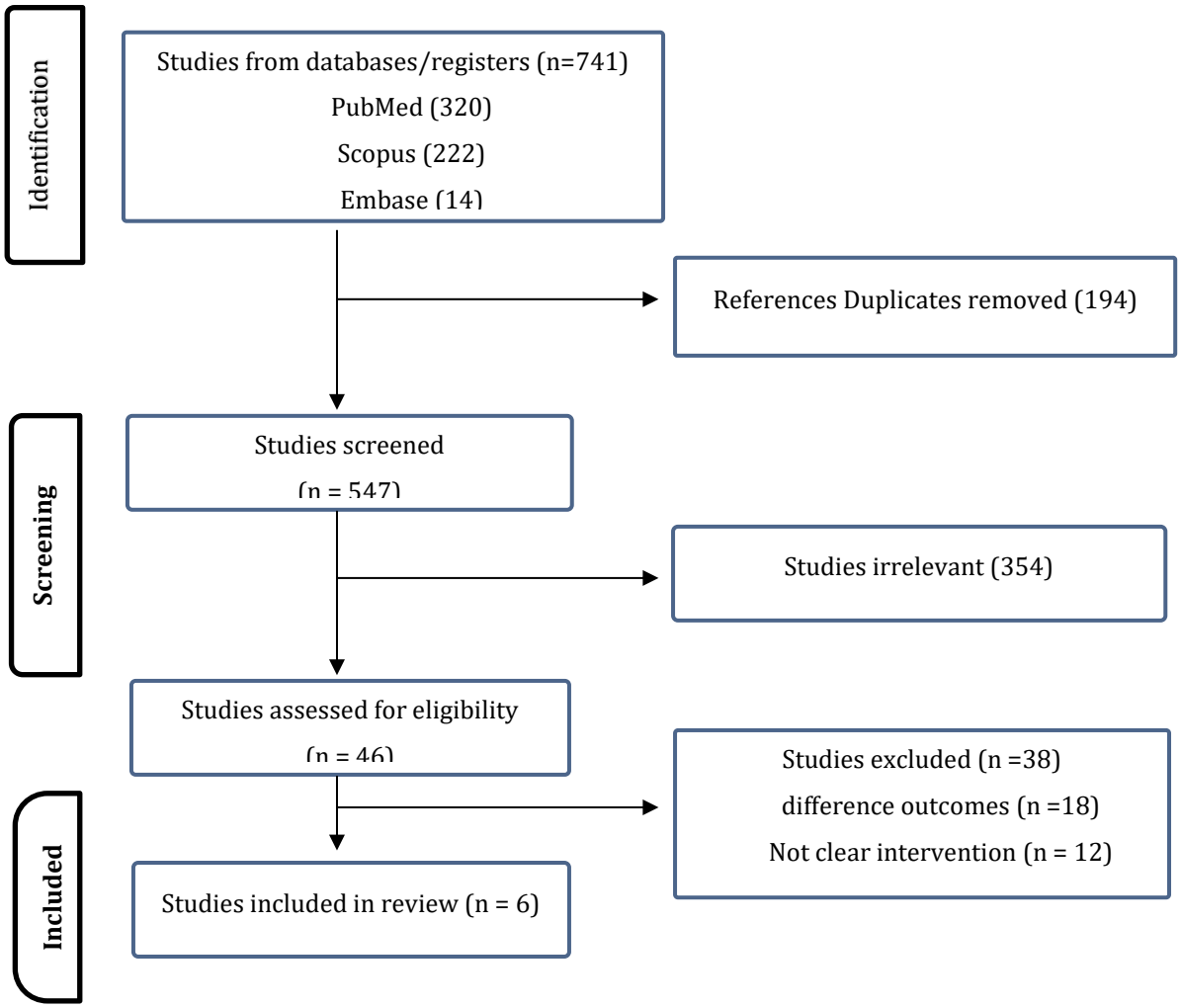


Figure 1
Prisma flowchart

## RESULTS

### *Characteristics of the Included Studies*

The initial search identified 741 studies, of which 194 were duplicates and removed. Finally, after full-text after reviewing forty-six articles, and six articles were included in this review. All studies included are randomized controlled trial study, published in 2018-2024 (Table 1). All research was conducted in several developed countries; two study was conducted in South Korea [18], two study was conducted in Sweden [6], one study was conducted in Canada [19], and one study was conducted in Germany [22].

### *Type of multi-professional rehabilitation and rehabilitation problem among older persons following hip fracture surgery*

Based on the six studies included five types of multi-professional rehabilitation among older persons following hip fracture surgery were identified; (a) geriatric interdisciplinary home rehabilitation, (b) multicomponent home-based rehabilitation, (c) comprehensive geriatric care, (d) fragility integrated rehabilitation, and (e) comprehensive orthogeriatric care

(Table 2). The hip fracture rehabilitation problem among older persons following hip fracture surgery were identified such as fear of falling and post-operative complications.

Table 1
Charting Data

| No | Title / Author/ Year | Country | Objective | Research Type | Data Collection | Sample | Results |
|---|---|---|---|---|---|---|---|
| 1 | Effects of Geriatric Interdisciplinary Home Rehabilitation on Independence in Activities of Daily Living in Older People with Hip Fracture: A Randomized Controlled Trial (Lee &. Lee, 2022) [16]. | Sweden | To determine the effect of geriatric interdisciplinary home rehabilitation on independence of daily life activities in elderly patients with hip fracture. | Study Cluster randomized controlled trial | Participants were randomized sequentially from May 2008 to June 2011 using sequential numbers in opaque, sealed envelopes collected by ward nurses not involved in the study. Participants were randomized to either in hospital geriatric care and rehabilitation with GIHR after hospital discharge or in-hospital geriatric care and rehabilitation. | 466 participants. | In older people with hip fracture, early discharge followed by GIHR intervention resulted in restoration of ADL independence at 3 and 12 months that was comparable to inpatient geriatric care following a multifactorial rehabilitation program. |
| 2 | Effects of geriatric interdisciplinary home rehabilitation on complications and readmissions after hip fracture: a randomized controlled trial (Cook *et al 2020)* [17] | Sweden | To determine the effect of geriatric interdisciplinary home rehabilitation on complications and readmission after hip fracture. | Randomized controlled trial | Geriatric interdisciplinary home rehabilitation is individually designed and aimed at early discharge with the aim to prevent, detect and treat complications after hospital discharge. | Individuals aged >70 years with acute hip fracture (n=205). | No significant differences in outcomes were observed between participants' discharge and 12-month follow-up; between participants in the geriatric interdisciplinary home rehabilitation group and the control group. |
| 3 | Effectiveness of Multicomponent Home-Based Rehabilitation in Elderly Patients after Hip Fracture Surgery: A Randomized Controlled Trial (Kappenschneider *et al., 2022)* [18] | South Korea | To assess the clinical effectiveness of this 8-week personal MHR program by comparing it to a home exercise program performed | Randomized controlled trial | Participants were randomized to Multicomponent Home Rehabilitation (MHR) and home exercise groups. The MHR group received 24 rehabilitation staff visits over 8 weeks (3 times per week), while the home exercise group received | 40 patients (≥60 years) who underwent hip surgery. | The results showed that an eight-week MHR program, compared with unsupervised home exercise, resulted in a significant improvement in balance function in elderly patients |

| No | Title / Author/ Year | Country | Objective | Research Type | Data Collection | Sample | Results |
|---|---|---|---|---|---|---|---|
| | | | unsupervised after hospital discharge. | | home exercises with a strengthening focus as described in the booklet. | | undergoing hip fracture surgery. Thus, the MHR program may be a feasible intervention to improve balance and mobility in patients. |
| 4 | Comprehensive Geriatric Care to Improve Mobility after Hip Fracture: An RCT (Adams *et al* ., 2018) [19]. | Canada | To determine if a comprehensive geriatric care program following hip fracture hospitalization can improve mobility. | Randomized controlled trial | The intervention group (comprehensive geriatric care) consisted of 24 patients and the control group (usual care) consisted of 25 patients. The study started in May 2011 and ended in July 2014. The mobilization of the patients was measured by the SPPB (Short Physical Performance Battery) after 12 months. | 49 patients were ≥ 65 years old. | The analysis showed that the mean of SPPB (Short Physical Performance Battery) scores in the intervention and control groups were 9.08 (SD 3.03) and 8.24 (SD 2.44), respectively. The difference between the two groups was 0.9 (95% CI -0.3 to 2.0, p = 0.13). |
| 5 | Comparative Effectiveness of Fragility Fracture Integrated Rehabilitation Management for Elderly Individuals After Hip Fracture Surgery a Study Protocol for a Multicenter Randomized Controlled Trial (Lloyd, et al., 2023) [20] | South Korea | To evaluate the effectiveness of Fragility Integrated Rehabilitation Management (FIRM) for older adults after hip fracture surgery. | Study randomized controlled trial | Elderly patients are randomly assigned to 3 groups, namely FIRM, conventional, and control groups, for the intervention period of 2 weeks after surgery, with each group consisting of 94 patients. | 282 elderly patients aged ≥ 65 years. | The loss of functional independence is the long-term impact of a hip fracture that is often accompanied by a decline in health-related quality of life. Patients who receive comprehensive rehabilitation after hip fracture surgery have significantly better ADL and mobility scores. |
| 6 | Special Orthopedic Geriatrics (SOG) - a new multi-professional care | Germany | To evaluate the effectiveness of comprehensi | Study prospective randomized controlled trial | Patients are randomized 1:1 to receive comprehensive orthogeriatric care | 310 patients. | The Special Orthogeriatric Care (SOG) in the treatment of hip fractures |

| No | Title / Author/ Year | Country | Objective | Research Type | Data Collection | Sample | Results |
|---|---|---|---|---|---|---|---|
| | model for elderly patients in elective orthopedic surgery: a study protocol for a prospective randomized controlled trial of a multimodal intervention in frail patients with hip and knee replacement Patel et al., 2021) [21] | | ve orthogeriatric care (SOG care model) versus standard orthopedic care with orthopedic surgeon-only care in patients undergoing primary THA and TKA. | | (intervention group) and standard orthopedic care (control group). Study data will be collected preoperatively, 1-7 days postoperatively, 4-6 weeks, and 3 months postoperatively. | | is associated with significantly reduced morbidity and mortality. However, there is a paucity of data on elective orthopedic care in geriatric patients, particularly for total hip and knee arthroplasty. In contrast to trauma patients, optimal preoperative interventions can usually be performed. |

## DISCUSSION

This is the first review designed to provide an extensive overview of multi-professional rehabilitation model among elderly with hip fracture surgery and outcomes. Six studies were included in this review are with randomized controlled trial study and different approaches were found including (a) geriatric interdisciplinary home rehabilitation, (b) multicomponent home-based rehabilitation, (c) comprehensive geriatric care, (d) fragility integrated rehabilitation and, (e) comprehensive orthogeriatric care. In addition, the hip fracture rehabilitation problem among older persons following hip fracture surgery were identified such as fear of falling and post-operative complications.

### Type of multi-professional rehabilitation model among older persons following hip fracture surgery

#### *1) Geriatric Interdisciplinary Home Rehabilitation*

The multidisciplinary care model is a patient care model that involves different disciplines/health professionals [8]. The combined professionals will plan and coordinate with each other regarding the care/service of geriatric patients with hip fractures, starting from the initial assessment before surgery to after surgery [22, 23, 24]. Well-coordinated care will result in good outcomes [25]. Comprehensive geriatric care from a multidisciplinary team can promote functional improvement in older patients with hip fracture [26]. The results of previous studies suggest that a shared care model in the management/treatment of geriatric patients with hip fracture in geriatrics can significantly reduce morbidity and mortality rates [20, 18]. Other research also shows that shared care for hip fracture patients can reduce in-hospital mortality [20, 18]. An economic

analysis found that shared care models for geriatric patients with hip fracture are more cost-effective and provide better health outcomes than usual care [27, 28, 29].

Although educator activities help in understanding patients who undergo hip bone obedience surgery, the relationship between educator and treatment curvature is not always clear [30]. In contrast, comprehensive treatment, multidisciplinary program that is center on rehabilitation with experts, is more effective in maintaining the sanctioning of bone protection therapy [31]. Previous research revealed that 50% of people who undergo hip fracture surgery completely recover fungi before surgery [32]. In addition to acute rehabilitation in the hospital, the patient's children advise a post-acute plan that is active in continuous, the site is only to mark fast mobility but also to successfully bag fungi [18]. This is the main reason why strategic rehabilitation is chosen as a multidisciplinary treatment grounding program to improve patient fungal activity after surgery [33]. Multidisciplinary treatments have been shown to electively improve treatment and rehabilitation compliance in patients with hip fields due to fragility [34].

### *2) Multicomponent Home-Based Rehabilitation*

Hip surgery can shorten the long-term hospitalization and improve hip function in the elderly, however, long-term rehabilitation is required to restore functional independence [35]. Multicomponent Home-Based Rehabilitation (MHR) is an improvement in balance function in the elderly after hip fracture surgery [36]. Balance is a complex skill achieved through the integration and coordination of musculoskeletal and nervous systems, considering that muscle strength and balance ability are key factors in the prevention of falling in the elderly [37]. Randomized controlled trial (RCT) study of the MHR group showed significant improvement compared to the home exercise group for FRT (mean difference 4.4 cm; 95% confidence interval 1.0 to 7.8) and TUG (MD: −4.2 s; 95% CI −8.0 to −0.3) after 8 weeks of intervention. Subjective pain and physical components of general health-related quality of life also improved significantly in the MHR group. No serious adverse events related to the interventions were observed. The eight-week of MHR program can effectively improve balance and mobility [36]. According to one of the literature studies, there is no significant difference in daily living activities (ADL) between multicomponent home-based rehabilitation and hospital rehabilitation, while multicomponent home-based rehabilitation increases significantly in ADL compared to regular treatments. Home exercises also have significant effects on ADL, quality of life (QoL), balance, gait and muscle strength extensor knee compared to regular treatments ($p<.05$) [38].

Home-based multicomponent physical therapy program can increase walking speed in patients after hip fracture surgery [39]. Multicomponent physical exercise programs include strength, endurance and balance exercises are effective in reducing the adverse effects associated with aging [40]. When performed during or after acute hospitalization, this intervention increases muscle strength and functional capacity and is effective in improving physical functional functionality and cognitive status [41]. Rehabilitation is recommended to reduce systemic complications or deaths caused by long-term immobilization after hip surgery, which is the main goal in the recovery process of patients with hip fractures [42]. Since patients require shorter hospitalization time in hospitals can increase treatment costs, there is an increase in interest in home-based rehabilitation for long-term rehabilitation after being discharged from the hospital [43]. In addition, home rehabilitation has a positive impact on the patient's physical and mental performance [35]. The rate of recovery of patients who get MHR programs

is better than patients who receive regular treatment or rehabilitation in hospital [44].

### *3) Comprehensive geriatric care*

Comprehensive geriatric care is an orthogeriatric multidisciplinary approach to hip fracture in the elderly. It involves a geriatric consultation team, treatment is jointly performed by geriatricians and orthopedic surgeons, and postoperative care by geriatricians [45]. The comprehensive geriatric care model is a multi-domain assessment [46]. The various professional teams will conduct coordinated and integrated treatment and rehabilitation to diagnose and assess the medical, psychological, social status, physical function, and living environment needs of the elderly together [46, 47]. Most programs center on addressing cognitive symptoms, frailty, and immobility and preventing impairment before and after surgery to avoid poor outcomes [46]. This multidimensional interdisciplinary care is carried out in a coordinated and integrated manner in order to shape/improve medical, psychological, and functional abilities in elderly hip fracture [19].

Comprehensive multidisciplinary care includes examining medical information, fall history, vital signs, and current medication and assessing physical and cognitive function, social skills, mental health, preoperative risks, nutritional status and comorbidities, delirium prevention, discharge planning, early mobilization measures, rehabilitation, and home visits [45, 46]. Comprehensive geriatric care during hospitalization can improve the function and mobility of older people with hip fractures [19]. In addition, comprehensive geriatric care can reduce hospital mortality and overall mortality and improve activities of daily living [45, 47]. Previous studies have suggested that pre-operative comprehensive geriatric care with shared decision-making in the emergency department provides great benefits. Involvement of geriatricians in hip fracture assessment also provides benefits including lower mortality and morbidity, better functional status, and decreased hospital stay [48].

### *4) Fragility Integrated Rehabilitation*

Integrated fracture rehabilitation management is a multidisciplinary and comprehensive rehabilitation program that aims to improve the recovery of physical function after hip fracture surgery [20]. The rehabilitation program usually includes physical therapy, occupational therapy, fall prevention, nutritional support, psychiatric evaluation, treatment of complications and discharge planning with environmental adjustment [49]. One of the long-term impacts of a hip fracture is the loss of functional independence which is often accompanied by a decrease in quality of life [20]. An integrated fracture rehabilitation program will assist older adults with hip fractures in improving mobility, physical activity, and cognitive function [49]. Comprehensive care such as a multidisciplinary rehabilitation program is more effective in keeping patients on bone-protective therapy. Elderly people who undergo hip fracture surgery cannot fully recover their preoperative function [1]. The application of inpatient rehabilitation after surgery is still limited due to lack of staff, inadequate facilities and lack of health insurance coverage and reduced postoperative length of stay in tertiary care hospitals [50].

Therefore, in addition to in-hospital rehabilitation care, many elderly people still need a care plan that includes ongoing active therapy. The program is not only to improve their mobility but also to restore their function quickly [1]. The results of previous studies show that elderly people who get integrated fracture rehabilitation after hip fracture surgery for nine weeks get significantly better ADL scores, mobility and walking speed compared to usual care [20], [48]. The results of previous research conducted by [49] showed that elderly

people who were given integrated fracture rehabilitation interventions experienced improvements in indoor mobility with a walker/crutches and climbing stairs compared to elderly people who were only given conventional physical therapy [49]. Other research results also show that rehabilitation-based care from multidisciplinary medical professionals can improve daily function, reduce the risk of falls and recurrent fractures in older people with hip fractures. In addition, the treatment program is also able to make the rate of disability and death in one year lower compared to the elderly who get standard therapy [1].

### *5) Comprehensive orthogeriatric care*

The elderly often have limited physical and cognitive capacity and require assistance with daily activities, so even small improvements in their mobility are very important/valuable. Therefore, continued rehabilitation after hospital discharge aims to improve or maintain mobility and function [26]. Rehabilitation programs complement multidisciplinary orthogeriatric care in geriatric hip fracture patients [7]. Geriatric interdisciplinary team rehabilitation programs use comprehensive geriatric assessment (CGA) as the cornerstone of care. The interdisciplinary team systematically evaluates older adults with the aim of assessing and optimizing medical, psychosocial and physical capacities, including plans for early discharge [26]. Multidisciplinary orthogeriatric management of acute care and rehabilitation not only shortens the length of hospital stay, but can also improve the functional outcomes of geriatric patients with hip fractures.

The geriatric interdisciplinary team rehabilitation program can further improve the clinical outcomes of hip fracture patients, especially by improving the functional status and independence of patients in performing daily activities. Previous studies have shown that geriatric interdisciplinary team rehabilitation improve ADLs, physical function and, mobility more than conventional care. The results of another study conducted in Austria showed that geriatric hip fracture patients who received geriatric rehabilitation interventions immediately after discharge from the hospital had a significantly better functional status compared to usual care. Early discharge of older adults with fractures followed by geriatric interdisciplinary home rehabilitation resulted in restoration of independence of daily activities [43]. Rehabilitation programs should include an orthogeriatric model of care with an interdisciplinary team and use comprehensive geriatric assessment (CGA) to optimize the recovery of geriatric patients with hip fractures.

## Hip fracture rehabilitation problem among older persons following hip fracture surgery

In addition, the hip fracture rehabilitation problem among older persons following hip fracture surgery were identified such as fear of falling and post-operative complications.

### *1) Fear of falling*

Fear of falling is defined as a persistent concern about falling that causes a person to avoid activities. However, they are still able to perform. The consequences of fear of falling and activity avoidance due to fear of falling are the increased risk of falling, decreased mobility/balance performance, loss of independence, low social participation, and low health-related quality of life [11]. Therefore, it affects not only physical functioning but also psychosocial functioning [19]. Targeted treatment of fear of falling during rehabilitation after hip fracture can reduce the fear of falling and associated activity restrictions [22]. The results of a previous study showed that a multidisciplinary team-based approach in geriatric hip fracture

care reduced surgery time, length of hospitalization, and postoperative mortality [25].

### *2) Postoperative complications*

Older person are prone to various complications after hip fracture surgery related to the care received or hospitalization in the hospital [49]. Some of the risks of complications after hip fracture surgery in the elderly include the signs of wound infection, dislocation, fixation failure, peri prosthetic fracture, reoperation, bleeding/hematoma, pneumonia, pulmonary infection, urinary tract infection, deep vein thrombosis/ pulmonary embolism, cerebrovascular problems, acute coronary syndrome/ myocardial infarction, muscle atrophy, pressure sores, and acute renal failure [46, 47, 48, 49]. Although there are several complications that can occur, effective preventive measures can minimize complications after hip fracture surgery [49]. One of them is by performing multidisciplinary team interventions. In addition to improving mobility and function after hip fracture surgery, these interventions also aim to reduce the risk of complications [26]. Postoperative complications can be one of the effective indicators to assess the quality of care and rehabilitation, which is also closely related to reducing postoperative disability and mortality [48].

## CONCLUSION

Multi-professionals' rehabilitation approaches such as geriatric interdisciplinary home rehabilitation, multicomponent home-based rehabilitation, comprehensive geriatric care, fragility integrated rehabilitation and, comprehensive orthogeriatric care model effectively improved physical performance among older persons after hip fracture surgery. Identifying multi-professional rehabilitation model with specific needs and comorbidities of older persons following hip fracture surgery are recommended clinical practice. Single rehabilitation model and homogenous outcomes measures review are suggested for future study.

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