



**Universiteit
Leiden**
The Netherlands

Management of fear of falling after hip fracture

Scheffers-Barnhoorn, M.N.

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The background is a light cream color with a soft, watercolor-like texture. It is decorated with several falling leaves in shades of orange, red, and yellow, and a few small butterflies in orange and purple. The overall aesthetic is gentle and artistic.

Chapter 1

General Introduction

HIP FRACTURE

Proximal femoral fractures, also entitled hip fractures, represent an acute medical event that is common to older adults. In the Netherlands, approximately 17500 patients receive surgical treatment for hip fracture on annual basis ¹. This injury has extensive consequences for the individual patient, affecting health status, daily functioning and participation. It also places a substantial burden on the global health care system as a whole ²⁻⁴. Women have an estimated life-time risk of one in six of sustaining a hip fracture, for men this risk is slightly lower (6%) ⁵⁻⁷. Worldwide the absolute number of hip fractures is expected to increase substantially far above the 1.6 million reported in 2000 ⁸. Estimates suggest the global burden of hip fracture may reach 4.5 million per year in 2050 ⁹.

Utilization of health care services following hip fracture

For a curative treatment approach, the medical management of a hip fracture requires surgical repair of the fracture. This is accompanied by a hospital admission of several days ¹⁰. Hereafter patients are often referred to post-acute rehabilitation. Rehabilitation services can be provided within an inpatient -, outpatient- or ambulant (home-based) setting ^{11,12}. An important characteristic of rehabilitation services is that they have a multidisciplinary approach, which implies that various health care professionals are involved in the treatment of patients with hip fracture. A fundamental goal for rehabilitation is to restore the function of the lower extremity, and consequently regain mobility function (including gait), and functioning in basic activities of daily living (ADL), so that patients are able to return home and function independently ¹¹. However, many patients do not regain their pre-fracture level of functioning (this is described in more detail below). Patients with insufficient recovery often require professional home-care services, or long-term care services. In view of the substantial utilization of health services in (post)acute- and long-term care, it is evident that the care for this population is costly ^{4,5,13}.

Recovery after hip fracture

From a patient's perspective, a hip fracture has significant impact on many health domains. Physical function is limited after hip fracture, and this affects a broad range of activities of daily living. In general, recovery of gait and balance function will require approximately six months. Activities of daily living that involve lower extremity function - such as rising from chair, walking, climbing stairs, putting on socks or shoes - may require a longer recovery period of up to a year after fracture ¹⁴. Despite extensive rehabilitation, less than half of the patients recover to their pre-fracture level of mobility. Recovery of ADL function is also limited, and only 40-70% of the patients regain their prior ADL function ^{2,3}. Moreover, for 10-20% of the population the excess disability is so significant, that there is a need for admission to a long-term care setting ².



Hip fracture is also well-known for the high mortality rates, up to 25-30% within the year following fracture^{3,15}. An excess mortality risk has been described for this population, which remains beyond the first decade after fracture^{16,17}. In patients that survive the first period after fracture, there is an increased risk of a subsequent second hip fracture, generally occurring in the 24 months following initial hip fracture^{18,19}.

Mental health can also be affected as a consequence of hip fracture²⁰. Depression is common in this population, mainly in early stages after fracture, and this has been found to have a negative effect on functional recovery²¹. Likewise, problems in the cognitive domain, such as delirium and cognitive decline, are frequently observed in this population^{22,23}. Furthermore, the health-related quality of life (HRQoL) decreases considerably after fracture, and demonstrates poor recovery over time²⁴.

Improving outcome after hip fracture

The broad range of adverse events and poor outcome following fracture, underpins the need to critically review the opportunities to optimize treatment for patients with hip fracture. Thus, to systematically evaluate and address those risk factors that may be amendable. Over the past decades, the long-term outcomes have merely improved, despite many advances in medical management of hip fractures, and an increased focus on a multidisciplinary treatment approach²⁵⁻²⁷. There is only some evidence to suggest that the one-year mortality rate is slightly decreasing²⁸. Fortunately, research in this area is elaborate and ongoing. In the past years, a large number of factors have been identified as predictors for poor functional outcome, including factors related to the health care system or surgery. Important patient-related risk factors include age, pre-fracture functioning and pre-fracture mobility, cognitive function and comorbidity²⁹⁻³⁵. Despite the abundance of identified risk factors, only a few are potentially modifiable, and could be subject to treatment. Within this context, '*fear of falling*' may be of specific interest, as it has been associated with poor functional outcome and mortality after hip fracture³⁶⁻³⁹. The background of fear of falling is discussed in more detail below.

FEAR OF FALLING

Fear of falling can be considered one of the psychological constructs of '*fall-related psychological concerns*'. In the general population of community-dwelling older adults fall-related psychological concerns have been studied quite elaborately in the past decades^{40,41}. However, as research in this area advanced, so did the conceptualization of different constructs under this umbrella term^{42,43}. In early literature of this topic, *falls efficacy* and *fear of falling* were considered interchangeable. Based on the current theoretical approach to this subject, they should be regarded two distinct constructs. Thus for a correct understanding of fear of falling - the research topic

of this thesis - it is important to differentiate these two constructs. Falls efficacy has been defined as the perceived self-efficacy to perform activities of daily living without falling. Or – in a broader perspective – falls efficacy can be considered the perceived self-efficacy of performing all the necessary actions that are needed in a pre-fall, near-fall, fall-landing or completed fall situation⁴⁴. Fear of falling on the other hand is based on *lasting concerns* about falling, which can lead to an individual avoiding activities that one remains capable of performing⁴⁵. Based on this conceptualization, high levels of fear of falling are believed to lead to reduced falls efficacy, a high (excessive) perceived fall risk, and risk of avoidance behavior^{46,47}. In this thesis we focus on the construct fear of falling (FoF): concerns about falling that can lead to avoidance behavior.

Assessment of fear of falling

The 'Falls Efficacy Scale International' (FES-I) is a valid measurement instrument for FoF, which is frequently used in research on this subject^{44,48-50}. Additionally, this instrument is recommended in national fall prevention guidelines for evaluation of FoF in daily practice⁵¹. In contrast to what the name may reflect, this instrument measures *concerns about falling* in relation to seven (short version) or 16 (regular version) social and physical activities inside and outside the home, such as getting (un)dressed, preparing meals, and walking stairs. The level of concerns about falling is measured using a 4-point Likert scale, with response categories 'not at all concerned', 'somewhat concerned', 'fairly concerned' and 'very concerned'. The FES-I has been validated for patients with hip fracture⁵². In all the studies discussed in this thesis, the FES-I was used to assess and evaluate FoF.

Fear of falling in older adults

In community-dwelling older adults, approximately half of the population has FoF^{40,53-55}. This concern about falling is often associated with avoidance or restriction of physical activities. Approximately one-third of the community-dwelling older adults with FoF has fear-related activity restriction. This avoidance behavior can make older adults reluctant to engage in physical activities. Consequently this can result in a diminished balance function, impaired gait, and an increased risk of falling⁴⁰. In community-dwelling older adults FoF has been associated with a (pre)frail status⁵³. Depression, anxiety and sarcopenia have been found to be associated with severe FoF, or with activity avoidance related to FoF^{41,53,54,56,57}.

Current state of knowledge on fear of falling following hip fracture

Fear of falling after hip fracture has only been subject to research since two decades, thus the understanding of FoF for this population is still somewhat limited. The etiology and characteristics of FoF following hip fracture may differ from the general population of community-dwelling older adults, as these patients experience a sudden impairment of the physical function as a consequence of an injurious fall. Therefore, findings regarding FoF from the general population of community-dwelling older adults cannot by definition be extrapolated to this population.



Based on literature for patients with hip fracture, various observational studies consistently found that FoF is common^{37,38,58}. Prevalence rates of over 60% have been reported for FoF in the early stages of recovery, that is, during the period of inpatient rehabilitation. Additionally, study findings show that FoF is prevalent after discharge home^{59,60}. The negative effects of FoF are also evident for this population. Similar to community-dwelling older adults, FoF in this population is associated with reduced physical activity. Moreover, FoF is associated with poor long-term functional recovery after fracture, and patients with FoF have an increased risk of institutionalization³⁷⁻³⁹. Recently FoF has also been identified as a risk factor for hospital readmissions within 90 days after inpatient geriatric rehabilitation⁶¹. All in all, these findings point toward FoF as an important factor that can hamper the recovery process in patients with recent hip fracture. This emphasizes the need to optimize management of FoF in this population, as also exemplified by the case of Mrs van Dijk.

FEAR OF FALLING IN CLINICAL PRACTICE – MRS VAN DIJK

Five weeks ago Mrs van Dijk sustained a hip fracture as a result of an indoor fall. Currently she is admitted to inpatient geriatric rehabilitation (GR) for the recovery of the fracture. Mrs van Dijk is a 83-year old widower with two children, both living abroad. She lives in a double-story house with bath- and bedroom upstairs. Thus, in order to be able to return home, she has to be able to walk independently indoors, and has to be able to walk up and down the stairs. This is one of the primary goals of her individualized GR program.

In the first three weeks of GR, Mrs van Dijk has an active participation in her rehabilitation therapy. She is somewhat cautious during the physical therapy sessions, but she seems to be able to motivate herself to engage in exercise. There is adequate progress in her recovery process. Although always friendly for the staff, she had an introvert character, and the social interaction with other patients is somewhat limited. Three weeks after admission to GR, the occupational therapist is involved to perform a home visit to evaluate home safety and assess the need for additional aids or adjustments in home. Mrs van Dijk accompanies the occupational therapist during the home visit. Three days after this event she does not show up for the physiotherapy, and in the days hereafter she cancels the therapy sessions. She does not engage in the social activities organized within the GR unit. As the team suspects that Mrs van Dijk may be depressed, the psychologist is involved.

Mrs van Dijk seems discouraged to go home, and is pessimistic about her ability to achieve further recovery. She perceives her current physical disabilities as a natural consequence of aging, and states that she would be better off in a nursing home. The psychologist applies

motivational interviewing techniques, and this leads to the finding that there are some important motives for her to live in her own home. Here-after, she expresses that she is afraid to fall again. Essentially, she is afraid that a next fall may be fatal. The psychologist suspects that it is mainly the FoF that contributes to the current psychological burden. She performs additional diagnostic testing to assess FoF. The FES-I is clearly elevated (score 38 / 64 on the 16-item FES-I), indicative of FoF. Screening for mood and anxiety problems reveals scores just above the cut-off values for these screening instruments (*Hospital Anxiety and Depression Scale*). The GR team questions which treatment is required for Mrs van Dijk's psychological problems, in particular with regard to the fear of falling.



MANAGEMENT OF FEAR OF FALLING

At present there are no clinical guidelines available addressing FoF in patients with hip fracture. However, as illustrated by the case of Mrs van Dijk, there is a need for recommendations for approaches to screening, selection and treatment of FoF in this target group. Important questions regarding the management of FoF include: *'Which treatment approaches have potential to reduce FoF in patients with a recent hip fracture?'*; *'Which patients benefit from treatment of FoF?'*; and *'What is the natural course of FoF after fracture in the different stages of recovery, and accordingly what is appropriate timing for treatment of FoF?'*

At present there is a considerable knowledge gap regarding FoF after hip fracture. Little is known about the clinical course of FoF after hip fracture, and the available data on this subject is limited by short follow-up. For this population, no standardized treatment programs are available that specifically address the FoF, and studies evaluating FoF interventions lack. Thus it is also unknown which patients may benefit from treatment, and when it is appropriate to provide treatment (timing after fracture).

In contrast, there is a considerable body of evidence on this topic for the general population of community-dwelling older adults⁶²⁻⁷¹. In the past two decades various intervention programs have been developed. Group programs are available, as are individual programs (including home-based programs). Interventions vary from programs primarily based on exercise or balance training, specific programs such as tai chi, and programs applying principles based on cognitive behavioral therapy. Programs based on cognitive behavioral approaches in combination with exercise training have shown to be effective to reduce FoF in short- and long term^{63,66,72,73}. In the United States, the FoF program *'A Matter of Balance'* proved to be cost-effective to reduce FoF. Based on this program, the Dutch intervention *'Zicht op Evenwicht'* was developed and evaluated, and similarly this program proved to be (cost)effective. This subsequently led to

national implementation of this program, and additionally to development of an individualized home-based program^{64,74}.

In light of the fact that the Dutch programs are effective and available, we may consider these FoF programs for treatment of FoF in patients with hip fracture. Yet, in order to minimize the negative effect of FoF on the recovery process, it may be appropriate to intervene promptly - in an early stage of rehabilitation. We can question whether these current programs, developed for the general population of community-dwelling older adults, fit the setting of an inpatient rehabilitation setting. Below, we elaborate on this issue. However, for a better understanding of the context of GR, we first describe the custom practice in GR in the Netherlands.

GERIATRIC REHABILITATION SERVICES IN THE NETHERLANDS

In the Netherlands, the average duration of hospital admission after hip fracture is 8.5 days. Hereafter, 55% of patients that are community-dwelling prior to fracture are referred to inpatient geriatric rehabilitation (GR)⁷⁵. Typically, patients that participate in GR programs are characterized by multimorbidity⁷⁶. Compared to patients with a direct discharge home after hip fracture, those referred to GR are older, have poorer pre-fracture ADL function and mobility, and have a higher ASA score at hospital admission (American Society of Anesthesiologists physical status classification), indicative of a poorer physical condition⁷⁵.

In the Netherlands GR is typically provided within an inpatient setting in skilled nursing home facilities. Treatment is provided by a multidisciplinary team, led by an elderly care physician, specialized in rehabilitation care for frail older adults. Furthermore, the team consists of nursing staff, a physiotherapist, an occupational therapist and a social worker. Often a dietician, psychologist and on indication a speech therapist are involved too. The general duration of the inpatient GR program after hip fracture is approximately 6 weeks.

Based on the most recent international definition, GR is “*a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments*”¹². In line with this definition, the aim of the Dutch GR program for patients with hip fracture is to improve physical functioning, mobility and self-care in such a manner that the patient will regain independence for basic ADL, and will be self-reliant in the independent living situation (i.e. after discharge home). This implies that the patient is able to walk indoors, and to make a transfer independently, for example standing up from a chair, getting out of bed or using the toilet. During GR the physical therapy is aimed at improving strength of the lower extremity, and

optimizing balance function and gait. Nursing staff assist patients in practicing basic ADL. The elderly care physician attends to issues such as pain management, prevention of complications, fall risk analysis, and management of comorbidity that could potentially influence rehabilitation outcome. Often a comprehensive geriatric assessment (CGA) is performed, which can help identify and timely address factors that have potential to influence or hamper the recovery process, such as social factors (presence of informal care givers), personal factors (motivation), and psychological factors (cognition, mood, anxiety, coping, FoF).



TREATMENT OF FEAR OF FALLING DURING GERIATRIC REHABILITATION

Previous study findings from our research group show that FoF, defined by elevated FES-I levels, is common to patients admitted to GR, specifically those with hip fracture^{58,59}. Prompt treatment of FoF may have potential to minimize the risk of avoidance behavior, and consequently help improve physical functioning for this group of patients. However, implementation of the current treatment programs (for community-dwelling older adults) as treatment for FoF during and within GR, raises the following concerns. These programs are not designed to address FoF in patients with a sudden physical impairment as a result of an injurious fall. In line with this, patients in GR participate in an extensive multidisciplinary rehabilitation program. Thus, if such a program is provided as an *additional* treatment in GR, it may not receive appropriate attention. An alternative approach is that a FoF program is integrated in the multidisciplinary GR treatment program. This also offers the opportunity for a multidisciplinary treatment approach to FoF, which could prove to be beneficial⁷⁷.

For that reason, we chose to develop and evaluate an intervention for FoF, specifically designed to fit the inpatient GR setting. The afore-mentioned Dutch program '*Zicht op Evenwicht*'^{63,64} was adapted into an individualized tailor-made intervention, designed to be integrated in the regular GR treatment program. This led to the development of the *FIT-HIP* intervention.

The effectiveness and the feasibility of the FIT-HIP intervention for clinical practice was subject to further research. This was evaluated in the studies presented in this thesis.

FIT-HIP INTERVENTION

The FIT-HIP intervention is a multi-component cognitive behavioral intervention, aimed at reducing FoF in patients with hip fracture in GR. This individualized treatment program is tailored to the individual needs, preferences and capacities of the participant. The intervention

is essentially conducted by physiotherapists that are part of the multidisciplinary GR team. The intervention consists of various cognitive behavioral elements aimed at reducing FoF, including psycho-education, guided exposure to feared activities, cognitive restructuring, and relapse prevention. Intervention items are integrated in the physical therapy sessions, and combined with the regular exercise training in GR. The guided exposure to mobility-related feared activities is the core element of the intervention. The principles of guided exposure are also applied by the nursing staff, as they are involved in the daily mobilization activities too. Additionally a psychologist - also part of the multidisciplinary GR team - is involved in the intervention and provides additional on-site coaching with regard to the cognitive therapy.

AIM AND OUTLINE OF THIS THESIS

The overall aim of the studies presented in this thesis is to obtain a better understanding of appropriate management for FoF in patients with a recent fracture. For this purpose the following four research questions are addressed:

- 1] To which extent is the FIT-HIP intervention, a multi-component cognitive behavioral treatment program for FoF, effective in reducing FoF and improving physical function in patients with hip fracture?
- 2] What is the feasibility of the FIT-HIP intervention provided in inpatient geriatric rehabilitation?
- 3] Which coping strategies are used by patients with FoF after hip fracture, and how are these associated with pain, mood, anxiety and quality of life?
- 4] What is the long-term course of FoF after fracture, and what is the effect of pre-fracture FoF on the course after fracture?

The above-mentioned research questions are addressed in various studies, which are presented in this thesis. First, we discuss the FIT-HIP study protocol, which is presented in Chapter 2. This protocol includes an elaborate description of the FIT-HIP intervention, and the study design used to investigate the effectiveness and feasibility of the intervention. In Chapter 3 the effects of the FIT-HIP intervention are evaluated. The effectiveness of the intervention was studied within a cluster randomized controlled trial (cRCT), comparing usual care in GR to the addition of the FIT-HIP intervention to this usual care. FoF was evaluated up to 6 months after discharge from GR. Other outcomes included mobility, ambulation, and self-reported activity restriction. Chapter 4 presents the results of the feasibility study. This observational study was performed alongside the RCT and had a mixed method design, using both quantitative data (questionnaires and logs) and qualitative data (interviews with patients and intervention facilitators). Based on the framework of Saunders et al⁷⁸, the following items were addressed to describe the feasibility of the FIT-HIP intervention: 1] recruitment and reach; 2] performance

according to protocol; 3] patients' adherence; and 4] opinions of patients and facilitators on the intervention. In Chapter 5 we explore coping strategies in patients with FoF after hip fracture. This cross-sectional study, using the baseline data of the FIT-HIP trial, described the use of active and passive coping strategies. Additionally, the association was evaluated between the two coping strategies and depression, anxiety, quality of life and pain. Chapter 6 examines the long-term course of FoF after fracture, based on a large inception cohort with follow-up up to 12 months after fracture. We also evaluated the effect of FoF prior to fracture on the course of FoF after fracture. In Chapter 7, the general discussion, the main findings of this thesis, and the implications for clinical practice are discussed in a broader perspective. We also discuss future research perspectives.



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