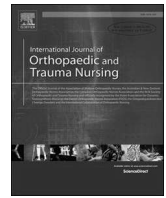




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# Functional capacity and quality of life of older person with hip fracture at hospital discharge: a cross sectional study

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## ABSTRACT

**Background:** In older adults, a hip fracture, leads to functional decline, resulting in dependence in activities of daily living, with a negative impact on quality of life.

**Objective:** Characterize the functional capacity and quality of life of older person with hip fracture on returning home.

**Methods:** Exploratory-descriptive, cross-sectional, quantitative study, with a sample of 102 individuals aged 65 years or older with hip fracture admitted to an orthopedic service in a hospital in a central region of Portugal. Was used a questionnaire that included sociodemographic and clinical characteristics, instruments to assess functional independence, ADL performance, and quality of life. Descriptive and inferential statistical analysis was performed using SPSS software, version 29.

**Results:** The results indicate severe dependence in performing activities of daily living (Barthel: 61.08); severe gait impairment (speed and quality) (Time Up and Go Test: 85.58 s); difficulties in functional exercises (10-m Walk Test: 77.74 s); and high risk of falls (Morse: 66.53). There is a negative correlation between gait and the Barthel index ( $r = -0.263$ ;  $p = 0.007$ ) and the Berg Scale ( $r = -0.420$ ;  $p < 0.001$ ); and a positive correlation between the Berg scale and the Barthel scale ( $r = 0.452$ ;  $p < 0.001$ ). Individuals with a history of falls had worse scores on the Berg Scale ( $U = 835.5$ ;  $p = 0.002$ ), and those who had less dependence had better quality of life scores in the General Health Status ( $p = 0.002$ ); Physical Function ( $p = 0.003$ ) and Mental Health ( $p = 0.005$ ).

**Conclusions:** Results obtained at hospital discharge are predictors of functional loss in older adults with hip fracture on returning home. Individuals with previous falls and who are more dependent are at greater risk of loss of quality of life.

## 1. Introduction

Aging, understood as a multifaceted process, is characterized by a decline in physical performance, resulting in reduced gait speed, decreased lower limb strength, and impaired balance, particularly

noticeable during activities such as walking and changing positions. This increases the likelihood of falls, leading to direct impacts on the hip joint due to inadequate protective responses. Associated with this, muscle atrophy and decreased bone strength further increase the risk of hip fractures due to reduced shock absorption, even in falls from the same or

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lower height (Lim et al., 2024) (see Fig. 1).

Hip fractures, usually resulting from falls from standing height (Lim et al., 2024), are one of the main causes of loss of functional independence (Brás et al., 2019), representing a significant challenge in orthopedic care, especially among the older people (Ilic et al., 2023; Ong et al., 2020).

It is estimated that more than 80% of hip fractures occur in people over 65 years of age, typically presenting with acute pain, loss of walking ability, and severe functional impairment (Zhang et al., 2020). This requires hospitalization (Rudy and Grant, 2024) and surgical stabilization to allow early mobilization and weight-bearing, making the rehabilitation process essential for restoring function (Lobo and Vítor, 2025). In a hospital setting, it is important to enhance this functional rehabilitation process to maximize capabilities.

These injuries, resulting primarily from falls in this age group, hinder full functional recovery. It is estimated that approximately 77% of individuals do not return to pre-fracture levels of function and independence (Dyer et al., 2016). This often leads to a transition from independence to dependence on others, negatively impacting their quality of life (Wang et al., 2025). In this context, dependence naturally generates a greater need for care and caregivers, requiring greater efforts from healthcare systems.

After a hip fracture, older adults experience a significant decline in functional capacity for basic and instrumental activities of daily living, resulting in a considerable deterioration in health-related quality of life (HRQoL), especially in self-care, activities of daily living, and mobility (Amarilla-Donoso et al., 2020). According to the same authors, one month after surgery, the health-related quality of life of these individuals is still far from pre-fracture levels.

This condition constitutes a major problem affecting the geriatric population over 65 years of age, facing difficulties related to functional limitations, pain and emotional management, with the need for help in performing ADLs and training to return home (Rocha et al., 2024) and making them highly susceptible to a set of complications, which include pressure ulcers, respiratory and urinary tract infections, leading to decreased quality of life and increased mortality (Amarilla-Donoso et al., 2020; Tang et al., 2023; Liao et al., 2024). In this sense, early

mobilization is associated with reduced mortality and complication rates, resulting in more favorable postoperative outcomes (Agarwal et al., 2024). Physical training, occupational therapy/activities of daily living training, and conventional postoperative rehabilitation are also recommended to achieve muscle strengthening and safe gait, combined with activities of daily living (Rocha et al., 2023). In addition to the high associated mortality, these traumatic events cause disabilities that can have a significant economic impact. Therefore, adherence to care plans based on the shared management of these patients, integrating the medical team, the patient, and their family/caregivers, is recommended (Biz et al., 2016).

Thus, given the complexity described and the growing scale of the problem, and considering that in Portugal little is known about the functional status of these individuals at the time of discharge, investigating dependence in ADLs, walking ability and balance, as well as the quality of life of older individuals at the time of discharge after hip fracture, poses a challenge for clinicians and academics. Based on these assumptions, the following research question was formulated: What is the functional capacity and quality of life of older person with hip fracture on returning home?

The primary objective of this study was to evaluate the functional capacity and quality of life of older person with hip fracture on returning home. Secondary objectives included exploring the associations between balance and gait maintenance capacity and dependence in activities of daily living; exploring the associations between balance and history of falls; and exploring the association between the level of dependence in activities of daily living and quality of life.

## 2. Materials and methods

### 2.1. Study design

A cross-sectional, exploratory-descriptive, and correlational quantitative study (Waltz et al., 2016; Marôco, 2021) was conducted in the orthopedic department of a hospital in central region of Portugal, including patients treated between April 14, 2022, and February 28, 2025, in a single center dedicated to the treatment of acute conditions.

### 2.2. Setting/participants

The inclusion criteria were: people aged 65 or over, with a hip fracture, admitted to a hospital unit, undergoing surgical treatment, who returned home after discharge and who agreed to participate in the study voluntarily and in an informed manner, being able to understand the questions and perform the tests.

Exclusion criteria were: people under 65 years of age; people with difficulty understanding/communicating, orienting, and unable to follow simple instructions; people unable to walk; and people discharged to nursing homes.

The sample used was non-probabilistic for convenience (accessible population sample), composed of 102 patients who were already in a stable postoperative context and undergoing rehabilitation intervention, and met the inclusion criteria. Patients were included consecutively to minimize selection bias. The sample size is related to the number of older people who would return home after hospital discharge due to a hip fracture and surgery, and who would have the capacity to understand the questions and perform the tests.

### 2.3. Data collection instruments and procedures

The data collection instrument was a questionnaire containing: sociodemographic and clinical variables (refracture rates; prevalence of falls; injuries secondary to falls); Morse Scale: a scale that assesses the risk of falls and includes 6 items: history of falls, secondary diagnosis, need for assistance to walk, intravenous therapy, posture while walking and during transfer, and mental state (Costa-Dias et al., 2014);

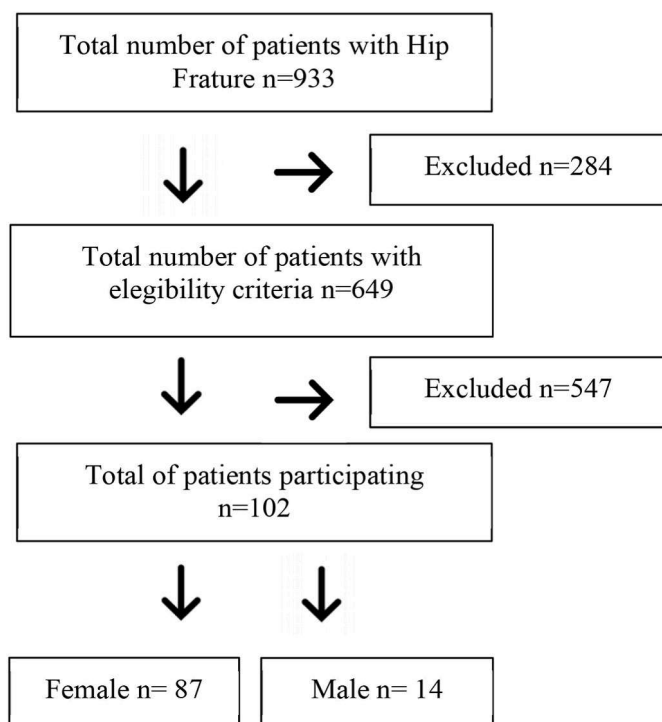


Fig. 1. Flowchart of the selection of the participants for the study.

assessment of gait speed and quality (Time Up and Go Test - TUGT) (Rosa et al., 2017); assessment of functional exercise capacity (Sit to Stand in 30 s); 10-m walk test; Bergs Balance Scale – BBS: a scale that determines the ability to maintain balance during a series of 14 pre-determined tasks (Stand from a sitting position, Stand without assistance, Sit without assistance, Sit down from a standing position, Transfer from a bed to a chair, Stand with your eyes closed, Stand with your feet together, Reach forward with your arms, Pick an object up from the floor, Look behind yourself while standing, Turn 360° while standing, Place your foot on a stool while standing, Stand with one foot in front of the other, Stand on one foot) (Apóstolo, 2012); Barthel ADL Index: a scale which assesses a person's level of independence in performing ten basic activities of daily living (feeding, personal hygiene, toileting, bathing, dressing, sphincter control, walking, transferring from a chair to a bed, climbing and descending stairs) (Araújo et al., 2007), and health-related quality of life Medical Outcomes Study 36-item Short Form Health Survey: SF-36: an instrument that assesses health-related quality of life and includes 36 questions, which integrate 8 dimensions: physical function (PF), physical performance (PP), emotional problems (EP), social function (SF), pain (P), vitality (VT), mental health (MH) and general health (GH) (Ferreira et al., 2012).

The lead researcher was responsible for filling out the questionnaire, which was answered in the hospital's admissions department on the day of discharge. Data collection took place between April 14, 2022, and February 28, 2025. The outcomes were measured by the same evaluator, thus eliminating any variability between observers in the use of imaging or scoring systems.

#### 2.4. Bias

The main risk of bias in this study is selection bias due to the convenience sampling option. To control this bias, the research team clearly defined the inclusion and exclusion criteria and ensured an adequate sample size.

To avoid measurement bias, the selected instruments were validated for Portuguese, the measurement procedures were standardized, and only one researcher, experienced in using the instruments, collected the data.

#### 2.5. Statistical methods

Data processing and analysis were performed using SPSS® (Statistical Package for Social Sciences) version 29, using descriptive and inferential statistics. Skewness and kurtosis were used to assess the normality of variables. Depending on the objectives of the analysis, different methods were used, such as: the Mann-Whitney *U* test, Pearson's correlation coefficient, multiple linear regression, and analysis of variance (ANOVA). In the multiple linear regression models examining health-related quality of life (SF-36 domains), the variables sex, history of previous falls, and history of previous fractures were included as covariates, selected a priori based on their clinical relevance and evidence from the literature. Statistical tests considered 95% confidence intervals and a significance level of  $p < 0.05$ . No missing data were identified. Due to the advanced age of the participants, data collection was conducted through structured face-to-face interviews, during which the researcher administered all questionnaires and functional assessments, ensuring complete data acquisition for all study variables.

#### 2.6. Ethical considerations

Prior to data collection, participants were asked to voluntarily and fully cooperate with the study by signing an informed consent form. They were also provided with information about the research objectives, and the anonymity and confidentiality of their responses were guaranteed.

It is important to emphasize that ethical and legal procedures were

followed and that a favorable opinion was obtained from the ULSG Ethics Committee (Minutes No. 15/2022). All procedures in this study respected the ethical principles enshrined in the Declaration of Helsinki.

### 3. Results

The study included 102 participants (85.3% female and 14.7% male), with a mean age of 76.9 years ( $\pm 7.47$ ), ranging from 65 to 90 years. These individuals were predominantly married (63.7%), lived in rural areas (84.3%), had a spouse (61.8%), and relied primarily on support from their spouse (44.1%) and children (36.3%). The vast majority (93.1%) had a diagnosis other than hip fracture, and 92.2% were taking multiple medications.

Regarding the current clinical condition, 69.6% of participants ( $n = 71$ ) had their first fracture and 30.4% ( $n = 31$ ) had recurrent fractures. In 52% of cases ( $n = 53$ ), there were records of falls prior to the fracture, with 39.6% reporting four or more falls and 32.1% reporting only one fall. Most of these falls occurred outdoors (56.6%), while 43.4% occurred indoors. Falls occurred mainly during activity (45.3%) or while walking (43.4%). The main triggering mechanisms identified were: tripping (37.7%), slipping (35.8%), and loss of balance (18.9%). In 64.2% of cases, falls did not result in injuries, with fractures occurring in 26.4% of the reported cases.

All of these people (100%) were in the process of rehabilitation, requiring walking aid devices: 84.3% used a walker and 15.7% used crutches.

Functional independence assessed by the Barthel ADL Index revealed, in general, a clear impairment of the functional independence of these individuals, reflected by the respective score ( $x = 61.08; \pm 9.0$ ). The greatest impairment is associated with the dimensions "Taking a bath" ( $x = 0.29; \pm 1.2$ ) and "Going up and down stairs" ( $x = 0.74; \pm 2.3$ ).

Regarding the risk of falls, by applying the Morse Scale, a score of 66.53 was obtained, which revealed a high risk of falls ( $SD = 7.99$ ) (with a minimum of 40 and a maximum of 95).

Regarding balance, by applying the Bergs Balance Scale, an average score of 16.14 ( $SD = 8.62$ ) was obtained, revealing a decrease in the ability to maintain balance and a greater risk of falling, with 71.6% of cases showing a decrease in balance, with a high risk of falling (Table 1).

The Mann-Whitney test revealed a statistically significant difference in functional balance (FBS) between individuals with and without a history of falls before fracture ( $U = 835.5; p = 0.002$ ). Participants with a history of falls had worse scores on the Berg Balance Scale, indicating greater balance impairment.

Regarding gait speed and quality, a mean value of 85.58 s ( $SD = 32.96$ ) was obtained in the Timed Up and Go (TUGT) test, which revealed a high risk of falling, with all individuals (100%) presenting a TUGT value greater than 15 s. In the Sit to Stand test, a mean value of less than 1 elevation ( $x = 0.09$ ) ( $SD = 8.62$ ) was found, and in the 10 m walk test, a mean value of 7.74 m/s ( $SD = 3.73$ ) (Table 2).

There is a negative correlation between performance on the TUGT and the Barthel index ( $r = -0.263; p = 0.007$ ) and the Berg Scale ( $r = -0.420; p < 0.001$ ); and a positive correlation between the Berg scale and the Barthel scale ( $r = 0.452; p < 0.001$ ) (Table 3).

Regarding health-related quality of life, through the application of the SF36 Scale, all dimensions were affected, highlighting greater impairment in terms of "physical function" ( $x = 11.20; \pm 1.8$ ), "physical performance" ( $x = 4.05; \pm 0.4$ ), "emotional performance" ( $x = 3.06; \pm 0.4$ ) and "vitality" ( $x = 15.91; \pm 1.9$ ) (Table 4).

**Table 1**  
Results of the bergs balance scale - BBS.

Results of the Bergs Balance Scale	n <sup>o</sup>	%	X	Dp
Medium balance/Medium fall risk	29	28,4	16,14	8,62
Decreased balance/Increased risk of falling	73	71,6		
<b>Total</b>	<b>102</b>	<b>100,0</b>		

**Table 2**  
Results of functional performance assessment tests.

Functional performance assessment tests	n	Min.	Max.	Average	Dp
Timed Up and Go Test	102	0	166,96	85,58	32,96
Sit to Stand	102	0	7	0,09	0,71
10m walk test	102	0	244,13	77,74	37,33

**Table 3**  
Correlation table between functional performance assessment scales.

Variables compared	Confidence Interval	r	p
	TUGT x Barthel	-0,492-0,009	-0,263 <sup>a</sup>
TUGT x BERG	-0,611-(-0,203)	-0,420 <sup>a</sup>	<0,001
BERG x Barthel	0,276-0,600	0,452 <sup>a</sup>	<0,001

<sup>a</sup> The correlation is significant at the level 0,01.

**Table 4**  
SF36 results.

SF36 - dimensions	M	DP
PF = physical function	10-30	1,8
PP = physical performance	4-8	0,4
EP = emotional performance	3-6	0,4
SF = social function	2-10	0,9
P = pain	2-10	1,5
V = vitality	10-24	1,9
MH = mental health	13-24	2,7
GH = general health	12-20	1,4

Multiple linear regression analysis was performed to assess the impact of sex, history of previous falls, and history of previous fractures on health-related quality of life (SF-36 domains). The model was statistically significant only for the Pain domain (adjusted R<sup>2</sup> = 0.121; F = 5.655; p = 0.001). Female sex was independently associated with pain (B = -0.823; 95% CI: -1.61 to -0.04; p = 0.041). A history of previous falls showed a non-significant trend toward higher pain levels (B = 0.550; 95% CI: -0.08 to 1.18; p = 0.085), while previous fractures were not associated with pain (B = -0.546; 95% CI: -1.22 to 0.13; p = 0.112). No statistically significant associations were observed for the remaining SF-36 domains.

Analysis of variance (ANOVA) revealed statistically significant differences between the levels of functional dependence (measured by the Barthel index) in the General Health (p = 0.002), Physical Functioning (p = 0.003), and Mental Health (p = 0.005) domains of the SF-36. Bonferroni post hoc tests indicated that individuals with lower dependence had better quality of life scores in these domains, compared to those with higher dependence. The effect sizes (Eta squared) indicate moderate effects (10-12%). No statistically significant differences were observed between levels of functional dependence in the remaining SF-36 domains (physical performance, emotional performance, social function, pain, and vitality) (p > 0.05). (Table 5).

**4. Discussion**

This study sought to determine the functional capacity and quality of life of older individuals with hip fractures who underwent surgical treatment on returning home. The findings should be interpreted in light of its observational and cross-sectional design, which allows the identification of associations between functional capacity, balance, gait, and quality of life, but does not support causal inferences.

The results indicate a clear prevalence of this type of fracture in female (85.3%), with a mean age of 76.8 years. This corroborates the conclusions of previous studies that reported similar results, such as the

**Table 5**  
ANOVA Results – Quality of Life (SF-36) by degree of dependence in ADL.

Domain SF-36	F	p-value	Eta <sup>2</sup>	Significant Differences (Bonferroni)
General health	6595	0,002	0,118	Mild vs Moderate (p = 0,027) Mild vs Severe (p = 0,003)
Physical function	6172	0,003	0,111	Mild vs Moderate (p = 0,012) Mild vs Severe (p = 0,002)
Mental health	5499	0,005	0,100	Moderate vs severe (p = 0,005)
Physical performance	0,125	0,882	0,003	—
Emotional performance	0,173	0,841	0,004	—
Social function	1657	0,196	0,032	—
Pain	0,449	0,639	0,009	—
Vitality	1630	0,201	0,032	—

study by Feng et al. (2024), which gathered data from 204 countries over three decades and identified a higher number of hip fractures associated with female compared to male, and with older age groups. Similar results were identified in the systematic review conducted by Lim et al. (2024). It is also important to note that this regional hospital study presented similar results regarding the average age of patients and gender, compared to a national epidemiological study (Silva et al., 2018).

It was found that these individuals had already been diagnosed with some disease (93.1%), requiring pharmacological therapy (92.2%). These data are consistent with those presented by Alexiou et al. (2018), who stated that several factors, such as comorbidities and malnutrition, were associated with poor physical health before the fracture. These factors were also associated with a negative impact on quality of life and health status after surgery, with the perception of intense postoperative pain.

Although it was a first fracture in most cases (69.6%), a very significant percentage of people (52%) were identified who had already suffered a fall before the fracture, which reinforces the results of the study by Lim et al. (2024) when they state that more than 90% of hip fractures result from falls and Feng et al. (2024), who identify falls as the main cause of fractures among both sexes and in all age groups.

The characterization of the injury mechanism and the fall itself identified in this study is consistent with reports in the literature. A systematic review conducted by Lim et al. (2024), which included 30 articles, revealed that falls related to hip fractures typically occur indoors, from standing height, during the day, often involving lateral or backward movements with inadequate protective responses. Slips, loss of balance, and weakness/collapse are also prevalent, with gait preceding many falls. However, position changes, sitting or standing, transfers, low use of walking aids, and impact with hard surfaces are also common features of these falls.

In this study, the condition of decreased balance maintenance ability, as well as decreased gait speed and quality, presented by older adults is highly significant. These results are particularly relevant considering that it is estimated that only 60% of these older adults are able to fully recover gait to pre-fracture level after 6 months of recovery (Lobo and Vítor, 2025). The findings of this study are also in line with those reported by Smith et al. (2025) when they state that these individuals experience reduced independence during recovery after fractures. This is particularly relevant and concerning given the tendency for increased subsequent falls and re-injuries, which leads to reduced independence and decreased confidence in self-care, as stated by Smith et al. (2025).

It is worth noting that these individuals are at high risk of falling on returning home, due to previous falls, walking speeds greater than 15 s, and dependence on more than one ADL (Lavareda Baixinho and Dixe, 2017). A study by Phonlakid et al. (2025) found that the prevalence of recurrent falls was 27.8% in the first six months after hospital discharge, with individuals at high risk for falls having a 4.74 times greater risk of

recurrent falls than those classified as low risk. It is worth noting the high risk of falls in the sample considered, evaluated at 66.53 on the Morse Scale, with TUGT presenting high risk, with a time greater than 15 s to perform the test.

The results obtained point to the need for early mobilization of people with hip fractures, which may be associated with reduced mortality and complication rates within 30 days, when compared to late mobilization (Garre-Fivelsdal et al., 2023; Agarwal et al., 2024). In this sense, Svenøy et al. (2020) also advocate the importance of early mobilization, as part of an interdisciplinary orthogeriatric care plan, to prevent loss of function after hip fracture and improve physical performance. Koudouna et al. (2023) and Salvesen et al. (2025) emphasize the contribution of this intervention to improving mobility and the ability to perform activities of daily living (ADLs) in the post-discharge period. Bökberg et al. (2024) point out that, during hospitalization, older adults who have suffered a hip fracture receive rehabilitation interventions to improve their safety and independence in walking and self-care. However, after hospital discharge, these individuals may not receive rehabilitation care or may receive it, but it may fall short of their needs (Blackburn and Yeowell, 2020). In this sense, Kjærvi et al. (2024) warn that there is still a residual number of people with access to rehabilitation in the first year after injury.

Considering that the assessment of the degree of independence of this population group is extremely important, from the perspective of assessing the health status and consequent care planning, taking into account their specific needs, it was found that older people with hip fractures present a clear impairment of their functional independence (translated by a score of 60.47 on the Barthel Scale). Similar results were obtained in the study by Ceolin et al. (2023) involving older patients hospitalized for proximal femur fracture, which highlights the significant impact of this event on the loss of functional autonomy, with the deterioration being more pronounced in the first six months after discharge, resulting in an increased risk of mortality during the first year. In this sense, Bano et al. (2020) advocate a care model supported by an interdisciplinary approach, which contributes to reducing hospital mortality, improving functional recovery, and increasing the likelihood of the older person of being able to live alone at home within six months.

In this context, considering that there is a decline in ADL performance, a situation that can be reversed in the case of individuals who receive specialized rehabilitation after discharge, resulting in near-recovery of function and ADL performance one year after surgery (Salvesen et al., 2025), it is essential to ensure the continuity of the rehabilitation process, uninterrupted, after returning home. In this process, it is essential to train family members who will be caregivers to support the older person discharged from hospital after a hip fracture (Rocha et al., 2024), which can optimize their recovery, improve physical function, independence, and quality of life, and, consequently, reduce the need for other health and social services (Smith et al., 2025).

This study found a reduction in health-related quality of life across all dimensions, with greater impairment in physical function and performance, emotional functioning, and vitality. These results are consistent with the study by Alexiou et al. (2018), which highlights a serious impact on the physical functioning of all patients in the first months after a hip fracture, with a subsequent detrimental impact on their health status and quality of life. Recovery to pre-fracture levels takes time, with a significant number of patients failing to reach these levels or even surviving. Similarly, Ghasemi et al. (2023) emphasize the poor quality of life in these individuals across all aspects.

In addition to the physical aspects, Alexiou et al. (2018) add that the occurrence of a hip fracture has a severe mental and psychosocial impact, detrimental to the quality of life of older adults. This is consistent with the results of a systematic review developed by Taylor et al. (2024), which revealed that this clinical condition substantially alters life, being accompanied by a sense of loss, prolonged negative emotions, and fear of the future, with a progressive acceptance of a new reality without the ability to perform usual activities.

Considering this impact, assessing the functionality and dependence of these individuals is essential to support the provision of quality nursing care adapted to their specific needs, highlighting the importance of adequate and timely planning of hospital discharge, facilitating better readaptation to the new condition, which is in line with what Levi et al. (2020) recommend, when they refer to the need to plan a structured intervention to improve the continuity and efficiency of care, thus facilitating functional recovery.

Understanding all these aspects is crucial for optimal use of existing resources in healthcare services, especially in the area of rehabilitation. Using an approach more focused on the patient's characteristics and needs allows for the optimization of more personalized rehabilitation care. The results justify the need for investment in teams to implement rehabilitation and fall prevention programs that consider the continuity of care between the hospital and the community (Baixinho and Dixe, 2017).

#### 4.1. Implications for clinical practice and research

This study sought to characterize the condition of older individuals with hip fractures on returning home. The results revealed changes in gait, the need for assistance walking, dependence in at least one ADL, and a high risk of falls. These results clearly recommend the implementation of rehabilitation and fall prevention programs, ensuring that the rehabilitation program is not interrupted, despite the reduction in the average hospital stay. The data also highlight the need for health policies centered on the individual and their needs, ensuring integrated care.

There are still gaps in research regarding how patients' pre-injury condition can affect treatment outcomes and recovery, as well as functional recovery characteristics in specific subgroups, or the impact of new rehabilitation interventions on functional outcomes at hospital discharge. More research is needed in this area, with research methods that integrate longitudinal tracking designs or multicenter studies.

Despite its limitations, this study may have implications for the training of health professionals, given that it suggests the need to fill a knowledge gap related to the functional recovery of older individuals with hip fractures after discharge, a process that must be adapted in an individualized and person-centered manner.

#### 4.2. Study limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes causal interpretations of the observed associations between functional capacity, balance, gait, and quality of life. Second, the study was conducted in a single hospital in a central region of Portugal, using a non-probabilistic convenience sample, which may limit the generalizability of the findings to other healthcare settings or populations. Additionally, the analyses did not take into account other potentially relevant confounding variables, such as pre-fracture functional status, socioeconomic factors, or time until surgery. Therefore, the results should be interpreted with caution and viewed as context-specific.

### 5. Conclusion

This study, in line with research conducted in similar contexts, found results reflecting a clear impairment of functional independence, as well as a severe decrease in the ability to maintain balance and gait (speed and quality), and a high risk of falls in older individuals with hip fractures. This defines a functional profile whose results obtained at discharge are predictors of loss of functionality and decreased quality of life after a fracture. These insights can guide healthcare professionals in the development and implementation of personalized interventions to restore pre-fracture functional and social status, while increasing safety and preventing further falls.

The functional decline that occurs makes it difficult to return to pre-fracture status, resulting in loss of independence and a deterioration in quality of life. Therefore, intervention is necessary to maximize the functional potential of individuals with this condition and provide them with the security of returning to their previous level of functionality as quickly as possible. In this context, appropriate discharge planning can significantly contribute to the well-being of these patients.

### CRedit authorship contribution statement

**Paula Rocha:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Andréa Marques:** Validation, Software, Methodology, Investigation, Formal analysis, Conceptualization. **Luís Matos:** Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation. **Andreia Costa:** Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Conceptualization. **Maria Adriana Henriques:** Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Cristina Lavareda Baixinho:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

### Ethical statement

This study was approved by the Ethics Committee of a healthcare institution in the Central Region of Portugal. Informed consent was obtained from all patients involved.

### Data availability statement

The data set used during the current study is available from the corresponding author on reasonable request.

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### Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Paula Rocha reports financial support was provided by Nursing Research, Innovation and Development Centre of Lisbon (CIDNUR) - Nursing School of Lisbon.

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