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Association between early sitting and functional mobility recovery after hip-fracture surgery in older patients: a prospective cohort study

Clarissa Catalano-Nadakhovskaia[1*], Carlos Pérez-López[2], Esther García-Lerma[3], Laura Alexandra Ivanov[1], Oscar Macho-Perez[1] and Alejandro Rodríguez-Molinero[2]

Abstract

Background Hip fractures significantly impact older adults, leading to compromised mobility and various adverse outcomes. The importance of early post-surgery mobilization in regaining pre-fracture levels of mobility is recognized, but lacks standardized definitions and implementation strategies. This study aimed to assess the impact of early sitting position 24 h after hip-fracture surgery on functional mobility recovery after 30 days using data from the Spanish National Hip Fracture Registry (RNFC).

Methods Prospective cohort study, including patients aged ≥ 75 years admitted for hip-fracture surgery between 2017 and 2020 at Sant Camil Residential Hospital. Data from the RNFC were analyzed, and linear regression models were developed to assess the association between early sitting after surgery (ESAS) and mobility recovery at 30 days after surgery.

Results Of 486 identified patients, 321 were included, with an estimated ESAS prevalence of 38.32% (95% CI: 32.97–43.88). ESAS was significantly associated with improved mobility recovery at 30 days. Multivariate regression models consistently revealed ESAS as a modest independent predictor of better post-surgery mobility. Factors such as age, cognitive capacity, and general health also impacted mobility recovery.

Conclusion The ESAS effect, while modest, emerges as a significant predictor of hip mobility recovery among older patients with hip fractures 30 days after surgery. These findings underscore the potential of this low-risk, low-cost intervention in enhancing functional mobility recovery strategies and emphasize the need for further research to uncover its broader implications in post-operative care. Implementation of early sitting could be enhanced, as only a third of patients in our study underwent this simple intervention.

Keywords Early mobilization after hip fracture, Early sitting position, Hip-fracture surgery, Recovery of functional mobility

*Correspondence:
Clarissa Catalano-Nadakhovskaia
ccatalanonada@gmail.com
Full list of author information is available at the end of the article

Background

Hip fractures are one of the most prevalent injuries among the older adults [1, 2]. Incomplete recovery of patients' mobility after surgery often leads to significant alterations in their management of activities of daily living, independent lifestyle and living arrangements, psychological deterioration, and overall reduction of their well-being [3–5]. Furthermore, hip fractures in older adults are associated with high rates of morbidity, mortality, and health care financial burden [5–7].

A critical aspect influencing patients' quality of life and independent functioning following hip-fracture surgery relies on regaining pre-fracture levels of mobility [3, 8]. In this context, patients' early mobilization after surgery has become a gold standard for improving functional recovery. Early mobility after surgery positively correlates with a reduced length of hospital stays, post-operative complications, and pain, while enhancing walking abilities and elevating overall quality of life. Moreover, it is associated with reduced readmission rates, lower mortality rates, decreased total hospitalization costs, higher satisfaction levels, and a lower incidence of fracture displacement or implant failure [9]. In this regard, one of the quality standards developed by the National Institute for Health and Care Excellence (NICE) recommended starting mobilization at least once a day, no later than the day after surgery [10]. On the other hand, although evidence-based clinical practice guidelines from the United States recommend supervised physical therapy after hip-fracture surgery across the continuum of care [11], there is no indication of when mobilization should start. Additionally, these guidelines do not provide any additional recommendations about what type of mobilization is adequate when tolerated.

Despite the increasing evidence supporting the many benefits of early mobilization after hip-fracture surgery, the definition of early mobilization is still inconsistent [12, 13] and its implementation, suboptimal [14]. Geriatric patients presenting with a hip fracture may have a range of health problems that limit early mobilization, including reduced preexisting mobility or cognitive impairment [14]. Moreover, fear of experiencing another fall, pain management, and patient confusion are frequently factored in. These elements frequently impose limitations, restricting more high-risk interventions like ambulation [14, 15].

Other factors may also limit early mobilization in post-operative patients, including surgical complications or excessive bleeding. Additionally, barriers such as a lack of health education, absence of standardized protocols, and limitations in the availability of nursing or physiotherapy support further hinder early mobilization efforts. Addressing these challenges requires a multidisciplinary approach and systemic improvements in care delivery [16]. In older patients, prolonged bed rest is associated with various complications, particularly muscle mass loss and functional decline [17]. Early mobilization may range from sitting in bed to hospital ambulation. While the benefits of early mobilization and rehabilitation after hip fracture have been reported, there are no known studies specifically addressing the act of "getting out of bed," that is, transitioning from the bed to a chair at an early stage.

Evidence-based refinement of these recommendations is essential to improve the adherence to, and implementation of, standardized and effective protocols. In that regard, this prospective study aimed to evaluate the impact of a low-risk intervention, early sitting position 24 h after surgery (ESAS), in recovering functional mobility after a hip fracture using data from the National Hip Fracture Registry (*Registro Nacional de Fracturas de Cadera*, or RNFC [18]). In this study, early postoperative seating was defined as having documented evidence, during any of the three 8-h nursing shifts following surgery, that the patient had been seated in a chair. We developed multivariate regression models to investigate how ESAS contributes to functional mobility recovery at 30 days after surgery for hip fractures.

Methods

Study design and population

This prospective cohort study included all patients aged 75 years and older, included in the RNFC, admitted for surgery due to a hip fracture between 2017 and 2020 to the Sant Camil Residential Hospital (Barcelona, Spain). The service of traumatology at the Hospital Residencia Sant Camil performs more than 100 hip fracture surgeries annually and consists of a team of 13 traumatologists, supported by geriatricians who collaborate in the care of older patients. The hospital is part of the Consorci Sanitari de l'Alt Penedès i Garraf, a network comprising three second-level hospitals with a total of 457 beds, serving a reference population of over 247,300 inhabitants. Patient data were collected from the RNFC. Exclusion criteria were patients with pathological, periprosthetic, or high-impact fractures, patients who died within the first 30 days after surgery, and those with incomplete data on key variables.

Patient data were collected from the RNFC, a prospective, multicenter, observational, and descriptive registry that gathers epidemiological, clinical, and care-related data during hospitalization, progression, and one month after suffering a fragility hip fracture. The registry includes a representative sample of Spanish National Health Service hospitals. Since 2017, the RNFC has involved 105 hospitals and has included data from over 56,000 cases of hip fractures in patients aged 75 and older. Exclusion criteria were patients with pathological, periprosthetic, or high-impact fractures, patients who died within the first 30 days after surgery, and those with incomplete data on key variables.

Centers participating in the RNFC received approval from their local Ethics Committee; *Comitè d'Ètica d'Investigació de la FUNDACIÓ UNIO CATALANA HOSPITALS* for the center that conducted this study (Approval reference: CEI 17/25). All patients included in the RNFC gave their prior informed consent. This study was therefore performed according to the ethical standards laid down in the 1964 Declaration of Helsinki.

Data source

The RNFC [18] is a prospective voluntary registry that collects anonymized sociodemographic and hospitalization data on patients aged 75 and older admitted for hip fracture in participating hospitals, including dates of admission, surgery and discharge, pre-fracture place of residence and mobility, cause of discharge and destination at discharge, among other variables. Additionally, the RNFC captures information about post-surgical care provided, encompassing whether patients sat up the day after surgery and their 30-day follow-up, covering mobility, residence, and vital status. The registry is filled in directly using a data collection template proposed in the Fragility Fracture Network Minimum Common Dataset (FFN MCD) [19].

Objectives and variables

The primary objective was to assess the impact of ESAS (recorded dichotomously, "Yes/No") on mobility 30 days after intervention, measured using the RNFC [18] scale, scoring mobility from 1 (maximum mobility) to 10 (minimum mobility). ESAS was defined, according to the RNFC data collection form, as sitting no later than 24 h after surgery. A patient was considered to have been seated early after surgery if it was documented during the clinical course of any of the three 8-h nursing shifts following the operation that the patient had been seated in a chair. In our center, for postoperative hip fracture patients, a physician must prescribe the medical order to get out of bed and sit in a chair during the day for the nursing staff to implement it. Once this order is given, the nursing staff strives to minimize the patient's time in bed and encourages them to sit in a chair during daylight hours, adjusting for the patient's tolerance for sitting. Those patients who remained bedridden performed exercises in bed, while those who were seated performed exercises while sitting, and at most, they achieved standing (bipedal stance) and a few steps, and then returned to sitting. We considered additional variables based on existing evidence, showing their impact on mobility: demographic characteristics (gender and age), pre-fracture mobility (RNFC scale), pre-intervention cognitive capacity, pre-surgical health status, time to surgery (time in hours from patient admission to surgery), and type of surgery (prosthesis vs. osteosynthesis). Cognitive capacity was recorded using Pfeiffer's mental status questionnaire [20, 21], with scores ranging from 0 to 10: a 0–2 score indicated normal cognitive functioning; 3–4, mild cognitive impairment; 5–7, moderate cognitive impairment; and > 8, severe cognitive impairment. Pre-surgery health status was recorded following the American Society of Anesthesiologists (ASA) classification [22, 23] as follows: ASA I meant a normal healthy patient; ASA II, a patient with mild systemic disease; ASA III, a patient with severe systemic disease; and ASA IV, a patient with severe systemic disease that is a constant threat to life.

Statistical analysis

Categorical variables were described as the number of cases and the percentage relative to the total for each category. Continuous variables not following a normal distribution were described using the median and the first (25th percentile, Q1) and third (75th percentile, Q3) quartiles. We estimated the prevalence of ESAS alongside the 95% confidence interval (CI).

The association between early sitting position 24 h after surgery and mobility after 30 days (RNFC scale) was analyzed using linear regression models. The researchers selected the adjustment variables based on their clinical relevance to the study outcome and their distribution across groups. Selected co-variables were gender, age, pre-surgery cognitive capacity, pre-surgery general health, time to surgery, and type of surgery. The analysis was conducted using R software, version 4.0.5.

Results

Demographic and clinical characteristics of study patients

This prospective cohort study identified 486 patients, of which 37 died within 30 days after surgery, and 128 had incomplete data on key variables, resulting in a study population of 321 patients (see Annexe 1, Supplementary Fig. 1). Of these, 123 patients were sat within 24 h after surgery, resulting in an estimated ESAS prevalence of 38.32% (95% CI: 32.97-, 43.88) as shown in Table 1. Patients' mean (SD) age was 86.5 (5.73) years for the ESAS group and 85.0 (5.29) years for the non-ESAS group. Patients' demographic, fracture, surgery, and clinical characteristics, including mobility, cognitive capacity (Pfeiffer scale), general health (ASA scale), and pre-surgery housing arrangements are presented in Table 1. The percentage of males and females was similar between the ESAS and non-ESAS groups. The most common type of fracture was trochanteric, with a prevalence of

Table 1 Pre-surgery characteristics of patients surgically treated for non-pathological hip fractures

		Early sitting after surgery	
		No	**Yes**
		***n*=198**	***n*=123**
Age (years), *median (IQR)*		86.50 (83.00; 90.0)	85.00 (81.00; 88.00)
Gender, *n (%)*	Male	44 (22.20)	35 (28.50)
	Female	154 (77.80)	88 (71.50)
Type of fracture, *n (%)*	Intracapsular, non-displaced	12 (6.06)	11 (8.94)
	Intracapsular, displaced	55 (27.80)	38 (30.90)
	Trochanteric	113 (57.10)	67 (54.50)
	Subtrochanteric	18 (9.09)	6 (4.88)
	Other	0 (0.0)	1 (0.81)
Pathologic, n (%)	No	196 (98.99)	122 (99.19)
	Atypical	1 (0.51)	0 (0.0)
	Unknown	1 (0.51)	1 (0.81)
Type of surgery *n (%)*	Canulated screws	3 (1.52)	4 (3.25)
	Sliding hip screw	2 (1.01)	2 (1.63)
	Intramedullary nail	133 (67.2)	74 (60.2)
	Hemiarthroplasty	42 (21.2)	23 (18.7)
	Total hip prosthesis	18 (9.09)	20 (16.3)
Time to surgery (hours), *median (IQR)*		35.30 (16.60, 70.80)	47.90 (22.00, 77.10)
Mobility, RNFC scale (score), *n (%)*	Independent indoors and outdoors, no technical aids (1)	47 (23.70)	47 (38.20)
	Independent indoors and outdoors, with one technical aid (2)	29 (14.60)	26 (21.10)
	Independent indoors and outdoors, with two technical aids or walker (3)	19 (9.60)	12 (9.76)
	Independent only indoors, unsupervised (4)	18 (9.09)	7 (5.69)
	Independent only indoors, with one technical aid (5)	9 (4.55)	6 (4.88)
	Independent only indoors, with two technical aids or walker (6)	47 (23.70)	18 (14.60)
	Independent only indoors, with supervision (7)	3 (1.52)	1 (0.81)
	Only indoors, with small assistance from another person (8)	5 (2.53)	0 (0.0)
	Only indoors, with significant assistance from another person (9)	8 (4.04)	1 (0.81)
	Assisted by two persons or no mobility (10)	13 (6.57)	5 (4.07)
Cognitive capacity (Pfeiffer), *median (IQR)*		4.00 (0.0, 9.00)	2.00 (0.0, 5.00)
General health (ASA), *n (%)*	I	1 (0.51)	0 (0.0)
	II	73 (36.90)	52 (42.30)
	III	122 (61.6)	66 (53.70)
	IV	2 (1.01)	5 (4.07)
Housing, *n (%)*	Home	140 (70.7)	97 (78.9)
	Nursing/residential care	57 (28.8)	26 (21.1)
	Intensive Care admission	1 (0.51)	0 (0.0)
	Hospital (short term)	140 (70.7)	97 (78.9)

IQR interquartile range, *RNFC Registo Nacional de Fractura de Cadera*, *ASA* American Society of Anesthesiologists

57.10% for the non-ESAS group and 54.50% for the ESAS group; an intramedullary nail was used in 67.2% of non-ESAS patients and 60.2% of ESAS patients. Over 70% of patients lived in their houses, and most were independent in terms of mobility (23.70% in the non-ESAS group and 38.20% in the ESAS group), both indoors and outdoors, with no technical help. Cognitive capacity ranged from a median of 4 errors in the Pfeiffer scale for the non-ESAS group to 2 errors in the ESAS group. Regarding general health status, 61.6% in the non-ESAS group and 53.70% in the ESAS group presented with severe systemic illness restricting activity but not disabling (ASA III).

Supplementary Table 1 (Annexe 1) summarizes patients' clinical information and pre-surgical treatments.

Table 2 summarizes clinical variables 30 days after surgery and housing arrangements. Only one patient was admitted for surgical reintervention during the 30 days after hip-fracture surgery.

Association between ESAS and mobility at 30 days after surgery

Patients who engaged in ESAS showed lower pre-surgery mobility scores (median value of 2, RNFC scale), indicating better initial mobility than patients from the non-ESAS group, with a median value of 4 (Table 3). The RNFC scale was grouped into three categories to evaluate mobility, as shown in Table 3. We found a higher percentage of patients who were independent indoors and outdoors in the ESAS group, before and after surgery, than in the non-ESAS group.

A multivariate regression model, including ESAS and pre-surgery mobility scores, showed that early sitting was associated with lower scores in the RNFC scale, i.e., better mobility 30 days after surgery (Table 4). Similarly, greater mobility before the fracture was significantly associated with better mobility at 30 days (Table 4).

Table 2 Clinical characteristics of the study population 30 days after surgery

		Early sitting after surgery	
		No	Yes
		n = 198	*n* = 123
Hospital readmission (hip-related), *n (%)*	No	194 (98.00)	121 (98.40)
	Yes	4 (2.02)	2 (1.63)
Reintervention within 30 days, *n (%)*	No	197 (99.50)	123 (100)
	Yes	1 (0.51)	0 (0.0)
Mobility, RNFC scale (score), n *(%)*	Independent indoors and outdoors, no technical aids (1)	0 (0.0)	2 (1.63)
	Independent indoors and outdoors, with one technical aid (2)	3 (1.52)	5 (4.07)
	Independent indoors and outdoors, with two technical aids or walker (3)	16 (8.08)	18 (14.60)
	Independent only indoors, unsupervised (4)	0 (0.0)	0 (0.0)
	Independent only indoors, with one technical aid (5)	5 (2.53)	7 (5.69)
	Independent only indoors, with two technical aids or walker (6)	65 (32.80)	50 (40.70)
	Independent only indoors, with supervision (7)	1 (0.51)	0 (0.0)
	Only indoors, with small assistance from another person (8)	1 (0.51)	2 (1.63)
	Only indoors, with significant assistance from another person (9)	13 (6.57)	10 (8.13)
	Assisted by two persons or no mobility (10)	94 (47.50)	29 (23.60)
Housing, *n (%)*	Home	37 (18.70)	29 (23.60)
	Nursing/residential care	58 (29.30)	27 (22.0)
	Intensive Care admission	6 (3.03)	0 (0.0)
	Hospital (long term)	8 (4.04)	3 (2.44)
	Functional recovery unit	89 (44.90)	64 (52.0)

RNFC Registro Nacional de Fractura de Cadera, *ASA* American Society of Anesthesiologistsn

Table 3 Mobility before and 30 days after surgery, RNFC scale (score)

	Pre-surgery		30 days after surgery	
	No ESAS	ESAS	No ESAS	ESAS
	n = 198	*n* = 123	*n* = 198	*n* = 123
Mobility (RNFC scale), *median (IQR)*	4.00 (2.00, 6.00)	2.00 (1.00, 4.50)	9.00 (6.00, 10.0)	6.00 (5.00, 9.00)
n (%)				
Independent indoors and outdoors (scores 1–3)	95 (48.0)	85 (69.1)	19 (9.60)	25 (20.3)
Independent only indoors (scores 4–7)	77 (38.9)	32 (26.0)	71 (35.9)	57 (46.3)
Not independent (scores 8–10)	26 (13.1)	6 (4.88)	108 (54.5)	41 (33.3)

ESAS early sitting 24 h after surgery, *IQR* interquartile range, *RNFC Registro Nacional de Fractura de Cadera*

Table 4 Linear regression models for mobility 30 days after surgery

Predictors		*Estimates*	*Std. error*	*95% CI*	*p-value*
Model 1					
ESAS		−0.78	0.26	0	**0.003**
Pre-fracture mobility		0.45	0.05	0.35, 0.54	**< 0.001**
Model 2					
ESAS		−0.54	0.24	−1.02, −0.06	**0.027**
Pre-fracture mobility (RNFC scale)		0.22	0.05	0.11, 0.32	**< 0.001**
Age		0.08	0.02	0.04, 0.12	**< 0.001**
Gender (female)		−0.58	0.27	−1.12, −0.05	**0.033**
Cognitive capacity (Pfeiffer scale)		0.24	0.04	0.16, 0.32	**< 0.001**
Model 3					
ESAS		−0.57	0.24	−1.05, −0.09	**0.02**
Pre-fracture mobility (RNFC scale)		0.21	0.05	0.10, 0.31	**< 0.001**
Age		0.07	0.02	0.03, 0.12	**0.001**
Gender (female)		−0.53	0.27	−1.07, 0.01	0.055
Cognitive capacity (Pfeiffer scale)		0.23	0.04	0.15, 0.31	**< 0.001**
General health (ASA scale)	ASA II	3.07	2.06	−0.98, 7.12	0.137
	ASA III	3.51	2.06	−0.54, 7.57	0.089
	ASA IV	4.71	2.2	0.38, 9.04	**0.033**
Time to surgery		0	0	−0.01, 0.00	0.372

Pre-fracture mobility was evaluated as 1-unit increment. Age (continuous variable) was evaluated as 1-year increment. Cognitive capacity was evaluated as 2-error increments. Time to surgery was evaluated as 1-day increment

Std standard, *95% CI* 95% confidence interval, *ESAS* early sitting 24 h after surgery, *ASA* American Society of Anesthesiologists

Bold figures indicate statistical significance ($p < 0.05$)

A model that also included age, gender (female), and cognitive capacity (increments in the Pfeiffer scale scores) as co-variables confirmed that ESAS and pre-fracture mobility were associated with mobility at 30 days. Age, cognitive capacity, and gender (female) also showed a statistically significant association.

In a more comprehensive model including general health, time to surgery, and type of surgery, ESAS demonstrated a modest effect on mobility at 30 days and remained an independent predictor alongside the aforementioned factors. Patients in the ESAS group had decreased RNFC mobility scores by −0.57 (95% CI: −1.05, −0.09) ($p = 0.02$) compared to those in the non-ESAS group. Age, cognitive capacity, and specific health factors also showed significant associations, while time to surgery and type of surgery showed no significant impact on the recovery of mobility after surgery.

Discussion

The multivariate regression analysis in this study aimed to understand the impact of ESAS on mobility recovery at 30 days after hip-fracture surgery. ESAS consistently emerged as a modest but significant predictor across all models in our study, suggesting its association with better mobility recovery at 30 days after surgery.

The recovery of functional mobility after a hip fracture is a multiple variable-dependent outcome, especially in the older adults [6, 24–30]. In that regard, three sequential models were constructed, each expanding on the co-variables considered for mobility recovery after surgery. In all the models, ESAS showed a modest, yet significant correlation with improved post-surgery mobility scores based on the RNFC scale, confirming the validity of ESAS as an independent predictor of the functional recovery of mobility after hip-fracture surgery. Furthermore, the multivariate models evolved from focusing solely on immediate post-surgery factors, i.e., ESAS and pre-fracture mobility, to encompassing demographic (age, gender), cognitive (Pfeiffer scale), and broader health (ASA category) factors. The consistency of the significance of the co-variables across all models and the fact that those co-variables have been validated by other studies as predictors (age, cognitive capacity, female sex, general health, etc.) highlights the potential importance of ESAS in enhancing hip mobility recovery. On the other hand, the impact of different mobilization maneuvers, such as early ambulation, has been previously investigated [24, 31], but, to our knowledge, the specific impact of ESAS remained unassessed. Furthermore, the measures used to assess mobility (before and after surgery) are widely heterogeneous among studies [5, 8, 13, 28, 32–35], often precluding direct comparisons.

Among other significant co-variables in our study, a worse pre-fracture mobility was associated with poorer mobility 30 days after surgery. Indeed, several independent studies have reported similar associations [28–30, 35, 36]. Age and pathological cognitive decline have also been linked to delayed functional recovery in mobility from many angles. It is easy to see that cognitive status may limit mobilization and increase the risk of falling, reinforcing the notion that aging and cognitive capacity contribute to poorer mobility recovery [26, 27, 34, 35]. Additional significant co-variables in our study associated with better functional recovery outcomes in previous studies included less systemic disease [21] (ASA scale) and the female gender [24, 37–39], the latter with a marginally significant impact on mobility recovery. Furthermore, other multivariate analyses have also linked early mobilization after surgery, age, and general health to better mobility outcomes [38, 40], strengthening our findings. However, our results underscore the potential benefit of a very specific and simple, low-risk, low-cost intervention in this population: sitting 24 h after surgery.

Regaining basic mobility after hip-fracture surgery is a primary goal of rehabilitation during acute hospitalization [11] and a strong predictor of reduced mortality among the older adults [4–7, 36]. Although the underlying physiological and pathological reasons for early mobilization in regaining basic functional mobility after hip surgery are yet poorly understood, some studies show early mobilization as an effective non-pharmacological preventive measure of additional comorbidities, such as post-operative infections, including concomitant urinary tract infections, acute thromboembolic complications, post-operative delirium, sarcopenia or functional decline [41], to name a few. The list of post-surgery complications after hip-fracture surgery in the older adults is inevitably long. The impact of these complications on functional mobility recovery is complex and yet unclear at best, untested at most, and will require further research.

Overall, in our study, less than half of the operated patients were moved out of bed and seated in a chair within the first 24 h. While in some cases the patient's medical condition may justify this delay in achieving a seated position, the percentage is notably low and underscores the need for protocols designed to reduce time spent in bed. Prolonged bed rest may often be attributed to delays in issuing the physician's order to seat the patient or the absence of necessary diagnostic tests, such as a blood test to assess hemoglobin levels during the physician's rounds, to confirm the safety of the maneuver.

Surgical delays beyond 48 h have been associated with poorer survival and functional outcomes in various observational studies [42]. However, there are precedents in the literature suggesting different findings. For instance, in the clinical trial by Reguant et al., surgery performed beyond the first 48 h was not a risk factor for mortality when protocolized and continuous medical care was provided [43]. In our multivariate model, time to surgery was not a determining factor for mobility at 30 days after surgery. This finding, for which the authors do not have a clear explanation, should be interpreted with caution and requires further investigation.

Study limitations

The study focused on patients within a specific residential hospital, potentially limiting the generalizability of findings to broader patient populations. While the study included various predictors, they were limited by the data available in the RNFC, and therefore, other unaccounted confounding factors with a potential influence on mobility recovery outcomes (e.g., individual lifestyle, socio-economic status, or specific comorbidities) remained unaddressed. The study primarily focused on a 30-day post-operative period, which might not capture long-term mobility changes or variations in recovery trajectories beyond this period of time. Additionally, ESAS prevalence was only slightly above one third of the study population and demonstrated a modest but significant correlation with a superior recovery of functional mobility 30 days after surgery in the geriatric population. Despite these limitations, our study identified that ESAS positively impacts mobility recovery at 30 days and should be considered in the management of oder patients after hip-fracture surgery.

Conclusion

In conclusion, this study stresses the importance of early sitting position 24 h after surgery to enhance hip mobility recovery 30 days after surgery. To our knowledge, this is the first report evaluating and validating the impact of such a low-risk intervention as sitting within the first 24 h after hip-fracture surgery on the recovery of functional mobility in older patients. In our study, only a third of the patients underwent such a simple intervention, indicating great potential for improvement in its implementation. Our findings hold promise for refining post-operative care strategies, offering essential insights into low-risk interventions to optimize functional mobility recovery for the geriatric population after hip-fracture surgery.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-025-05831-x.

Supplementary Material 1.

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Authors' contributions
CCN: Designed the study, contributed to data analysis and interpretation and drafted the manuscript. EGL: Performed the statistical analysis. CPL: Managed the data. LAI, OMP, and CPL: Participated in fieldwork. ARM: Contributed to the study design, data interpretation and manuscript preparation. All authors reviewed and approved the final version of the manuscript.

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Data availability
The data that support the findings of this study are available from the authors upon reasonable request and with permission of the RNFC.

Declarations

Ethics approval and consent to participate
All participating centers in the Spanish hip-fracture registry *(Registro Nacional de Fracturas de Cadera*, or RNFC) received approval from the local Ethics Committee, which in this study was the Comitè d'Ètica d'Investigació de la FUNDACIÓ UNIO CATALANA HOSPITALS. All patients provided written informed consent before inclusion in the RNFC. This study has therefore been performed by the ethical standards laid down in the 1964 Declaration of Helsinki. The RNFC is registered with the Spanish Data Protection Agency [18].

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Geriatric Unit, Consorci Sanitari Alt Penedès i Garraf, Sant Pere de Ribes, Barcelona, Spain. [2]Research Area, Consorci Sanitari Alt Penedès i Garraf, Sant Pere de Ribes, Barcelona, Spain. [3]Biostatistics Unit, Institut d'Investigació Biomèdica de Bellvitge, Hospitalet de Llobregat, Spain.

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