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Original Study

Association between Caregiver Role and Short- and Long-Term Functional Recovery after Hip Fracture: A Prospective Study

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A B S T R A C T

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Objectives: After a hip fracture, 50% of senior patients are left with permanent functional decline and 30% lose their autonomy. The aim of this prospective study was to evaluate whether seniors who are in a caregiver role have better functional recovery after hip fracture compared with noncaregivers.

Design: Prospective observational study.

Setting: A total of 107 Swiss patients with acute hip fracture age 65 years and older (84% women; 83.0 ± 6.9 years; 87% community-dwelling).

Measurements: At baseline, participants were asked if they were caregivers for a person, a pet, or a plant. Lower-extremity mobility was measured using the Timed Up and Go (TUG) test at baseline during acute care (day 1–12 after hip fracture surgery) and at 6 and 12 months follow-up. Subjective physical functioning (SPF) was rated for prefracture values and at 6 and 12 months follow-up using the Short Form 36 Health Survey questionnaire. Differences in TUG performance or SPF between caregivers and non-caregivers at 6 and 12 months were assessed using multivariable repeated-measures analysis adjusted for age, sex, body mass index, Charlson comorbidity index, Mini-Mental State Examination, living condition, baseline TUG, and treatment (vitamin D, home exercise program as part of the original trial).

Results: At baseline, adjusted TUG performance was better in caregivers of any kind compared with noncaregivers (40.9 vs 84.4 seconds, $P < .0001$). At 6 months, and after adjustment for baseline TUG performance and other covariates, TUG was better in caregivers of any kind (−6.4 seconds, $P = .007$) and caregivers of plants (−6.6 seconds, $P = .003$) compared with noncaregivers. At 12 months, only caregivers of persons had better TUG performance compared with noncaregivers (−7.3 seconds, $P = .009$). Moreover, at 12 months, SPF was better in caregivers of persons (58.9 vs 45.6, $P = .01$) and caregivers of any kind (50.8 vs 39.3, $P = .02$) compared with noncaregivers.

Conclusions: Senior hip fracture patients who have a caregiver role of any kind, and especially of plants, had better short-term recovery after hip fracture assessed with the TUG. For long-term recovery, senior

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Clinical Trials Registry (original trial): NCT00133640.

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The authors declare no conflicts of interest.

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hip fracture patients who are caregivers for other persons appeared to have a significant benefit. These benefits were independent of baseline function and all other covariates.

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Hip fractures are the most frequent fractures among seniors age 75 and older,¹ reaching an annual incidence rate of more than 150 cases per 100,000 inhabitants in most industrialized countries.² Further, consequences of hip fracture are serious and costly: already in the first 12 months after the hip fracture, 10% of patients fracture their other hip, 30% are readmitted to acute care for any reason, 50% are left with permanent functional disabilities, 25% require long-term care, and 10%–25% die.^{3–6}

To improve recovery after hip fracture, geriatric traumatology care models have been established globally, integrating secondary fall and fracture prevention into acute and postacute trauma care of senior hip fracture patients.⁷ Evidence-based strategies for better musculoskeletal recovery after hip fracture include evidence-based nonpharmacologic interventions such as vitamin D,^{8,9} exercise,^{8,10} and milk protein,¹¹ as well as pharmacologic therapy for osteoporosis.^{12,13} In addition, geriatric traumatology care concepts extend to the assessment and treatment of established risk factors for poor functional recovery such as malnutrition,¹⁴ cognitive impairment,¹⁴ comorbid status,¹⁵ and postsurgical complications such as delirium and infections.^{14,15} To our knowledge, however, if and to what extent personal motivation impacts recovery after hip fracture has not been investigated to date as a possible concept to be integrated in geriatric trauma care.

While chronically stressful caregiving, such as caring for people with dementia, has often been related to increased risk of health problems,¹⁶ morbidity,^{17,18} and mortality,¹⁹ other research on personal motivation with regard to caregiving suggests that enhanced personal control and responsibility among seniors residing in nursing homes has a positive impact on physical activity, cognitive function, and reduction in mortality.^{20–22} Based on these latter findings, we hypothesized that personal motivation attributable to a caregiver role may modulate recovery after hip fracture. Thus, the aim of this study was to investigate the association between a caregiver role and objective and subjective functional recovery at 6 and 12 months after hip fracture in senior men and women enrolled during acute care for hip fracture repair.

Methods

Study Design and Participants

The present study is a secondary analysis of a 1-year randomized controlled clinical trial (Early Rehabilitation After Hip Fracture study, NCT00133640) that originally investigated the effect of vitamin D (2000 vs 800 IU/d cholecalciferol) and a simple home-based exercise program on complications after hip fracture surgery among 173 hip fracture patients age 65 years and older (79% were women; mean age was 84 years; 77% were community-dwelling) using a 2 × 2 factorial design.⁸ Of the 173 patients enrolled in the study, 107 participants who had information on the Timed Up and Go (TUG) test available and filled in the questionnaire on caregiver role, were included in the present prospective observational analysis. The baseline assessment took place at day 1–12 after hip fracture surgery. The study protocol of the original randomized controlled trial is in accordance with the standards for the use of human participants in research as outlined in the Declaration of Helsinki and was approved by the Cantonal Ethics Committee at the University of Zurich, Switzerland. All participants gave their written informed consent to the study.

Assessment of the Caregiver Role and Definition of Types of Caregiver Categories

At baseline, all participants were asked if they were caregivers (yes/no) for another person, a plant, or a pet by using a simple questionnaire. This questionnaire, however, did not include questions on the specific type of person, plant, or pet, or on the frequency and intensity of caregiving, and was only completed at baseline. Based on the questionnaire, we categorized all participants in 4 caregiver roles: (1) caregivers of either a person, a pet, or a plant (from now on called “any caregivers”) vs noncaregivers of either a person, a plant, or a pet; (2) caregivers of a person vs noncaregivers of a person; (3) caregivers of a plant vs noncaregivers of a plant; and (4) caregivers of a pet vs noncaregivers of a pet. In statistical analysis, our models investigated the independent additive impact of caring for persons, caring for plants, or caring for pets because the models were adjusted for all other types of caregivers. For example, our models investigating the independent impact of caring for persons were adjusted for whether they also cared for a plant or pet (ie, they compared caregivers of persons-only to noncaregivers, and, simultaneously, caregivers of persons and plants to caregivers of plants-only, caregivers of persons and pets to caregivers of pets-only, and caregivers of persons, pets, and plants to caregivers of both pets and plants). For simplicity, the respective noncaregivers of persons, plants, or pets will be referred to as “noncaregivers.”

Assessment of Functional Recovery after Hip Fracture

Objective functional recovery was measured with the TUG. The TUG is a standardized objective test for lower extremity mobility.^{23,24} It measures the time to rise from a chair, walk 3 meters, turn around, go back, and sit down on the chair by stopwatch. Fewer seconds needed to perform the test indicates better performance. Values below 20 seconds reflect an independently mobile person and are regarded as normal. With regard to the present study, the TUG was performed at baseline (day 1–12 after hip fracture surgery) and at the 6- and 12-month follow-up.

Subjective physical functioning (SPF) was assessed using the RAND Short Form 36 Health Survey questionnaire (v 1.0)^{25–27} to record self-reported prefracture mobility (retrospectively assessed at baseline for the 6 months before fracture) as well as self-reported mobility at the 6-month and 12-month follow-up. Of the 8 health concepts included in the Short Form 36 Health Survey, we used the 10-item section on physical functioning that describes limitations in physical performance concerning their presence and extent because of health restriction.²⁵ The 10 items adhere to vigorous and moderate activities including climb 1 or several flights, lift and carry groceries, bend knee, walk 1 or several blocks, walking a mile, and grooming (bathing, dressing) independently.²⁵ Each item was rated on a 3-point scale (yes, limited a lot; yes, limited a little; and no, not limited at all). Answers to each question were transformed to a 0–100 scale, summed, and divided by 10, resulting in a score from 0 to 100.

Assessment of Covariates

Age, sex, the Charlson comorbidity index (CCI, score 0–37),²⁸ living situation (at home vs assisted living/nursing home), and the total score of the Folstein Mini-Mental State Examination (score 0–30)²⁹ were assessed at baseline by questionnaires during acute

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